DECEMBER 12, 1958

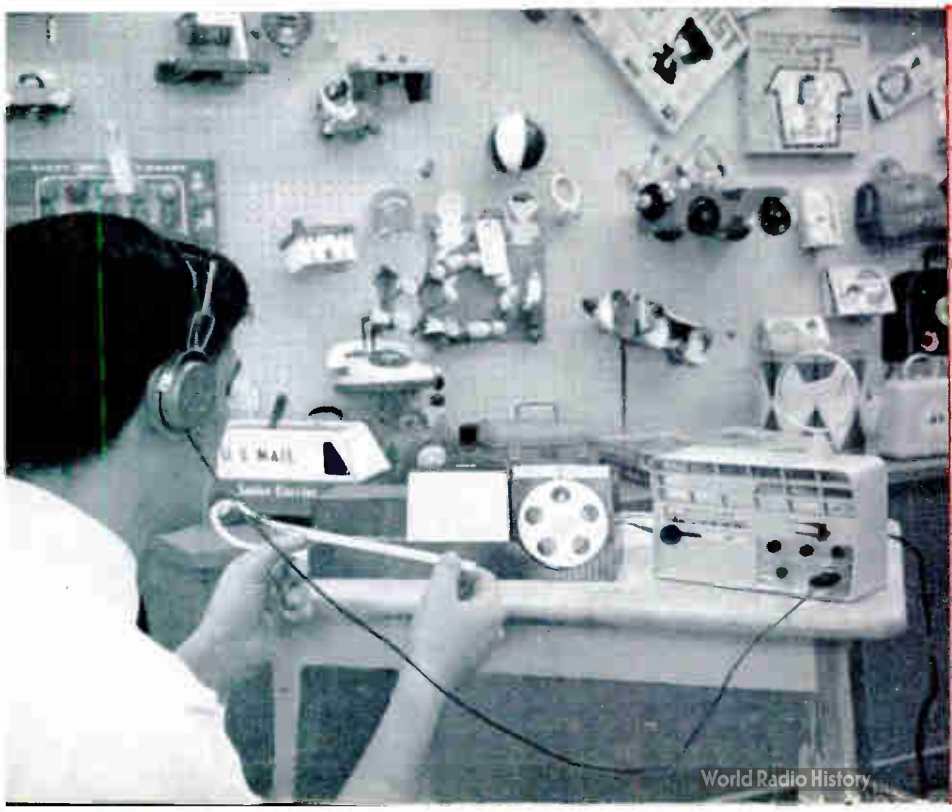
electronics

business issue

A McGRAW-HILL PUBLICATION • VOL. 31, NO. 50 • PRICE FIFTY CENTS

What's New In Surface Missiles

This market's expanding. Here's a complete roundup ...p 13



Christmas Toys Go Electronic

Demand leads to more component sales ..p 16

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Shoptalk . . .

CHILD'S PLAY—One morning last week two ELECTRONICS staffers could have been seen crawling around a stock of brightly colored Christmas toys. Scene was the executive offices of the Toy Manufacturers Association of the U. S. A. where Associate Editors Emma and Manoogian were arranging a selection of new electronic toys for this week's front cover. The toy market provides an important additional outlet for electronic components—transistors, diodes, ferrite-core coils and others.

There is another way electronic toys benefit our industry. In ten short years the boy or girl who puts together a transistor kit radio this Christmas may be flipping the tassel on his or her mortarboard and taking a bright new B. S. into an industry starving for engineering talent.

For a preview of what Santa may leave under your child's tree, turn to p 16.

A MIGHTY TAIL—The electronics in a 1941 military airplane was about 15 percent of total cost. Electronics in a 1959 plane will take about 50 percent. In much of the aircraft business the electronics "tail" is wagging the airframe "dog".

Back in August, one of our readers, Mr. G. L. Hansen of Los Angeles, suggested that we survey major airframe companies to find out how they run the growing electronics part of their business. We liked Reader Hansen's suggestion so much that we assigned Pacific Coast Editor Hood to go out and get the whole story.

To find out how airframe producers are meeting the electronic challenge, Hood made a special swing through California. He traveled from Sacramento to San Diego and visited several large firms.

Well, it took three months and more than 1,000 miles but the story is finished and you can read it beginning on p 15.

FOLLOW UP—Two weeks ago ELECTRONICS brought you a special report by Associate Editor Mason: "The Missile Market". Surface-to-surface missiles figure prominently in the report as one of the biggest spending areas. This week, Mason turns the spotlight on this particular missile type, tells how each major guidance or control system works, extrapolates major trends in the field. See p 13.

Coming In Our Dec. 19 Issue . . .

Coming in Our Dec. 19 Issue . . .

● **Thermonuclear Power.** Recent declassification of the Atomic Energy Commission's Project Matterhorn has disclosed details of progress in controlled thermonuclear reaction research at the James Forrestal Research Center, Princeton University. Managing Editor Carroll, in his article next week, outlines the latest techniques in thermonuclear studies and explains their significance to our industry.

According to Carroll, a great deal of electronic equipment is used to create the environment favorable to a thermonuclear reaction, and in measuring the results of the experiments. In addition, work with plasmas is providing a better understanding of electrical conduction in gas. This may lead to improved design of gas-filled electron tubes.

● **F-M Monitor.** The requirements for tuners used to monitor f-m broadcasts are high. They invariably dictate a crystal-controlled superheterodyne receiver to assure low drift in the presence of line voltage fluctuations, component aging or mistuning.

Lester A. Karg of Karg Laboratories in South Norwalk, Conn., describes a tuner which meets these requirements but, in addition, affords greater versatility through its multichannel design. The tuner has ten channels made highly stable by quartz-crystal control of the local oscillator.

● **Ferroelectric Tuning.** Techniques of frequency control using the nonlinear characteristics of ferroelectric materials such as barium strontium titanates are finding wide applications where wide-range, rapid-scan tuning is required.

Ferroelectric capacitors are being applied to a variety of practical circuits, such as f-m oscillators, panoramic receivers and afc systems, according to T. W. Butler, Jr., of the University of Michigan. Describing the present state of the art, Butler says that currently available materials permit operation at sweep rates up to 100 kc and tuning to 250 mc.

● **Unijunction Binary.** Unijunction transistors exhibit negative resistance characteristics which make it possible to design bistable circuits with a single transistor. However, design and analysis of the circuits are markedly different from circuits using conventional transistors.

T. P. Sylvan of General Electric in Syracuse tells how the unijunction transistor simplifies the design of relaxation type circuits.

electronics business issue

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Issue at a Glance

DIGEST CONTINUED ON NEXT PAGE

DIGEST continued

electronics

Dec. 12, 1958 Vol. 31, No. 50

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THOMAS A.

EDISON

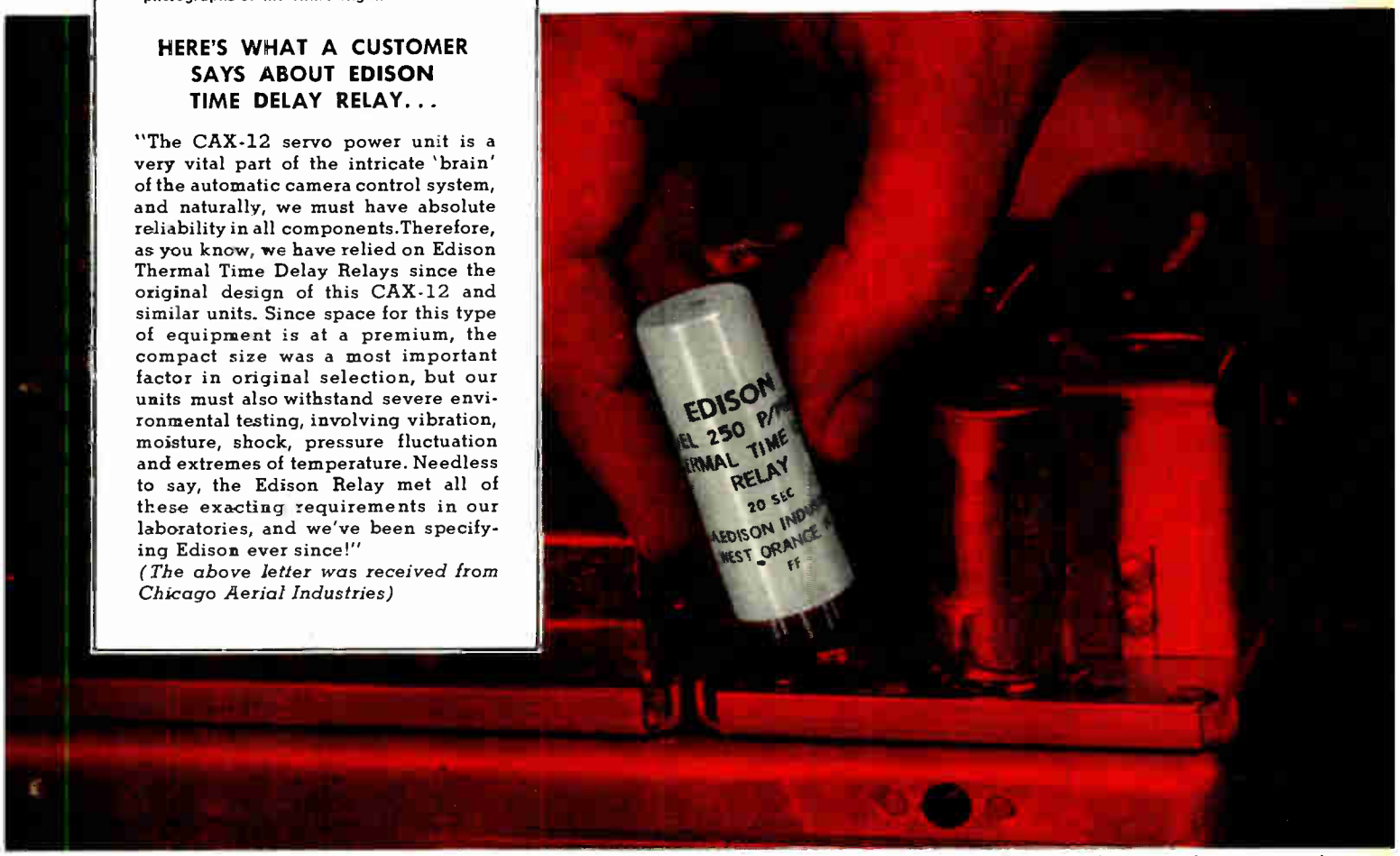
Time Delay Relay assures sharp, clear aerial photos... automatically

The F8U-1P Crusader recently set new coast to coast speed record. CAI camera control system with Edison Time Delay Relay was used to automatically provide sharp, clear aerial photographs of the entire flight.

HERE'S WHAT A CUSTOMER SAYS ABOUT EDISON TIME DELAY RELAY...

"The CAX-12 servo power unit is a very vital part of the intricate 'brain' of the automatic camera control system, and naturally, we must have absolute reliability in all components. Therefore, as you know, we have relied on Edison Thermal Time Delay Relays since the original design of this CAX-12 and similar units. Since space for this type of equipment is at a premium, the compact size was a most important factor in original selection, but our units must also withstand severe environmental testing, involving vibration, moisture, shock, pressure fluctuation and extremes of temperature. Needless to say, the Edison Relay met all of these exacting requirements in our laboratories, and we've been specifying Edison ever since!"

(The above letter was received from Chicago Aerial Industries)



Edison's Thermal Time Delay Relay being inserted in the CAX-12 servo power unit.

Chicago Aerial Industries has developed a camera control system that allows one jet pilot to do the job of ten expert aerial photographers . . . automatically.

Heart of this new unit is the CAX-12 servo power unit. It accurately synchronizes film speed with speed of the jet — changes lens openings in response to electronic signals — regulates shutter speed and controls driving motor on cameras.

Because this power unit is vital to the camera control system component reliability is a must. That's why CAI relies on Edison Thermal Time Relays exclusively for CAX-12.

Edison's line of miniature time delay relays are available for a wide range of electronic applications. They are light, small, rugged and offer these advantages:

- Designed to withstand vibration frequencies to 500 CPS
- Exceptionally high rate of contact closure
- Permanent calibration and hermetic seal
- Extremely rigid mechanical structure using high-strength, high-expansion alloys.

Thomas A. Edison Industries

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CIRCLE 1 READERS SERVICE CARD

AT LAST!
A Precision 200 KC Scope with Dual Trace Presentation!

NEW MODEL 122A

Here at last is a 200 KC oscilloscope—priced at just $625—giving you "big-scope" versatility and the time-saving convenience of simultaneous two-phenomena presentation.

Engineered to speed industrial, mechanical, medical and geophysical measurements in the 200 KC range, the new hp 122A has two identical vertical amplifiers and a vertical function selector.

The amplifiers may be operated independently, differentially on all ranges, alternately on successive sweeps, or chopped at a 40 KC rate.

Other significant features include universal optimum automatic triggering, high maximum sensitivity of 10 mv/cm, 15 calibrated sweeps with vernier, sweep accuracy of ±5% and a "times-5" expansion giving maximum speed of 1 μsec/cm on the 5 μsec/cm range. Trace normally runs free, syncing automatically on 0.5 cm vertical deflection, but a knob adjustment eliminates free-run and sets trigger level as desired between −10 and +10 volts. Rack or cabinet mount; *rack mount model only 7" high.*

For complete details, write or call your hp representative, or write direct.

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BRIEF SPECIFICATIONS hp 122A

Sweep: 15 calibrated sweeps, 1-2-5 sequence, 5 μsec/cm to 0.2 sec/cm, accuracy ±5%. "Times-5" expander, all ranges. Vernier extends 0.2 sec/cm range to 0.5 sec/cm.

Trigger selector: Internal + or −, external or line. Triggers automatically on 0.5 cm internal or 2.5 v peak external. Displays base line in absence of signal. Trigger level selection −10 to +10 v available when automatic trigger defeated.

Vertical Amplifiers: Identical A and B amplifiers, 4 calibrated sensitivities of 10 mv/cm, 100 mv/cm, 1 v/cm and 10 v/cm; ±5% accuracy. Vernier 10 to 1. Balanced (differential) input available on all input ranges. With dual trace, balanced input on 10 mv/cm range. Input impedance 1 megohm with less than 60 μμf shunt. Bandwidth DC to 200 KC or 2 cps to 200 KC when AC coupled. Internal amplitude calibrator provided.

Function Selector: A only, B only, B-A, Alternate and Chopped (at approx. 40 KC).

Horizontal Amplifier: 3 calibrated sensitivities, 0.1 v/cm, 1 v/cm, 10 v/cm. Accuracy ±5%. Vernier 10 to 1.

Bandwidth DC to 200 KC or 2 cps to 200 KC, AC coupled.

General: 5AQP1 CRT, intensity modulation terminals at rear, power input approximately 150 watts, all DC power supplies regulated.

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hp now offers 8 different precision scopes

Reports Win Awards

Many electronics firms receive special praise. Companies woo investors with reports and meetings

SEVEN ELECTRONICS firms received Oscar-of-Industry awards for annual reports judged best of their industry groups at the 18th Annual Reports Award Banquet held recently in New York.

Five thousand firms participated in the competition. First-place awards and second- and third-place mentions were given in 65 industry categories.

Sperry Rand's report was declared winner of the electronics industry group. The Daystrom entry took second honors. ITT placed third.

In the radio-television manufacturers group, Sylvania got top prize. Packard-Bell was second, Motorola, third.

In other industry categories identified with electronics, first-place awards were given to: Thompson Products (now Thompson Ramo Wooldridge), aircraft equipment group; Minneapolis-Honeywell, industrial controls; GE, electrical equipment; IBM, office equipment.

Second-place mentions in these categories went to Temco Aircraft, Robertshaw-Fulton, Westinghouse Electric, National Cash Register; third-place honors were given to Garrett, Rockwell, Allis-Chalmers and Electronic Associates, respectively.

In addition, General Electric and Topp Industries were awarded special Oscars; GE for best post-stockholders meeting report in the industrial group, Topp for best of manufacturers' annual report advertisements.

Many reports featured four-color photos on covers and a wealth of company background and statistical information on inside pages. Some reports had 30 to 40 pages. Per copy costs ranged from 20¢ to $2, depending on volume and quality, says Peter Melich, annual report consultant of New York City.

Richard S. Perkin, president of Perkin-Elmer, explains why companies go to such expense and effort: "The annual report is the most important single communication a company has with its shareholders."

It is important to woo shareholders for more reasons than their value as a key source of money. Stockholder loyalty helps save stock prices from erratic ups and downs. And this loyalty is vital in these days of corporate raiders.

Many firms get bulk of new security money through rights offerings, with special prices to company shareholders. Even when shareholders do not purchase themselves, they often influence purchases of others.

However, firms striving for good stockholder relations should not confine their efforts to annual reports, pointed out Edwin P. Madsen, treasurer of F. C. Huyck & Sons, at a recent American Management Association financial conference. Diversified Huyck makes felt blankets for papermakers and is engaged in paper industry and military electronics.

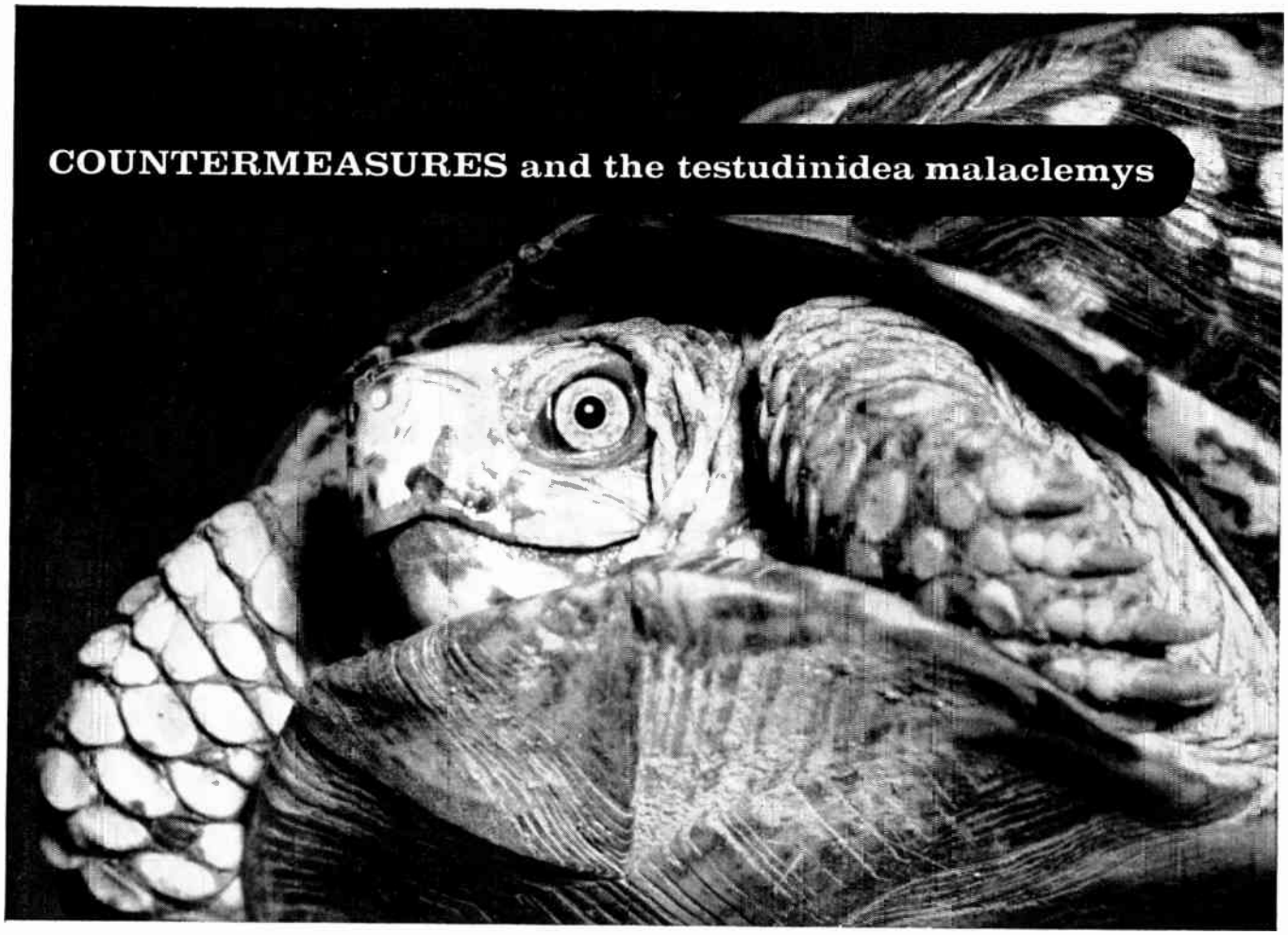
The annual stockholders meeting is a tool that is too often neglected, says Madsen. Although little may be accomplished through mass meetings, much can be done via small regional meetings that provide intimate management-shareholder contacts, he says. Huyck is satisfied with results of regional stockholder meetings it holds at its various manufacturing plants in different parts of the country.

More important to electronics company shareholders than improvements in technique is need for better understanding and more clarification of research and development spending and the nature of military business, said Casper M. Bower of Utilities Industries and Management Corp., a venture capital group in electronics. He spoke recently before a joint meeting of New York chapters of the IRE Professional Group on Engineering Management and Security Analysts Society.

Use of a glossary of nontechnical phrases to explain meanings behind technical terms is a big help, said Bower. One example is Fairchild Camera and Instrument's 1957 report, he added.

On research and development spending and government work, he appealed for such data as: R&D money spent for government account and also for commercial work; percentage of cost-plus-fixed-fee and fixed-fee government contracts; details on any incentive or penalty fees; proportions of contracts for R&D and for production; prospects for further production contracts and for future commercial development.

Company report covers invite readership

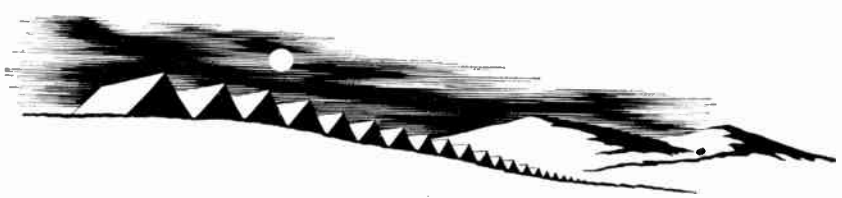


FORTUNATE, INDEED, IS THE TURTLE

for he carries his countermeasure right on his back . . .

Man on the other hand must devise his own countermeasures if he intends to survive in this day of modern warfare. Instruments For Industry is actively engaged in this field working in close conjunction with the Army, Navy, Marines and Air Force.

Recently developed is a portable unit which, in effect, places a "ceiling of safety" over personnel in the field making them all but invulnerable to ballistic attack. I.F.I. is proud of this opportunity to contribute to the defense of our services.



An I.F.I. "ceiling of safety" protects these men against surprise ballistic attack.

MILITARY ELECTRONICS

INSTRUMENTS FOR INDUSTRY, Inc.
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Graduate engineers with two or more years of circuit application in the fields of electronics or physics are invited to meet with Mr. John Hicks in an informal interview or send complete resume to: Dir. Personnel, IFI, 101 New South Road, Hicksville, New York.

MERGERS, ACQUISITIONS and FINANCE

• **Electronic data processing** systems have been installed by **Banco di Roma** at Rome, Italy, and the **Bank of New York** at New York City. Italian bank's system will use an IBM 705. The computer will process data from the bank's more than 200 branches. New York bank will use an IBM 650 magnetic-tape system, to be used initially for the processing of mutual-fund accounts. A number of other applications are planned, including deposit and general ledger accounting.

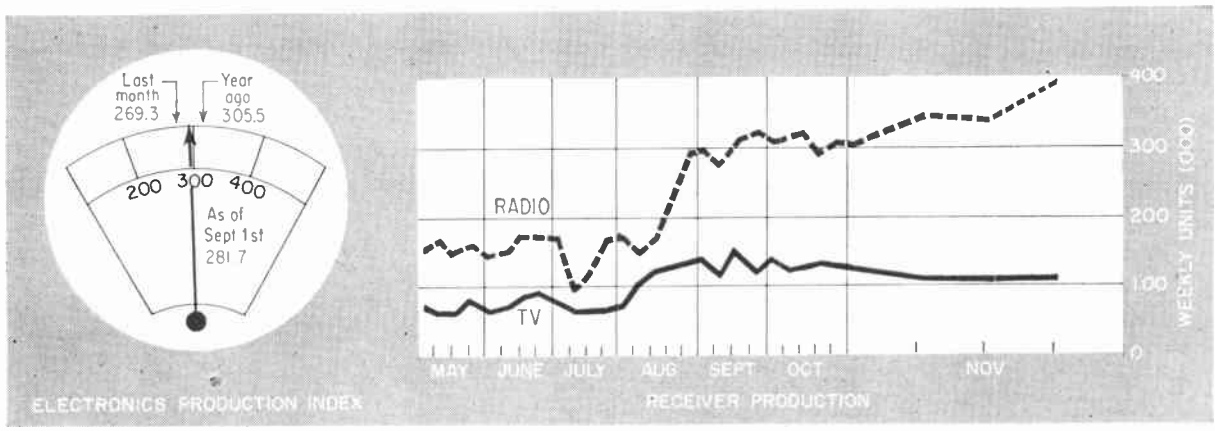
• **Bell & Gossett,** manufacturer of hot-water heating and air-conditioning equipment, acquires patents and assets of **Dualex Corp.** of New York City. Dualex participated in development of electronic communication systems based on vibrating reeds. Prior to the acquisition Bell & Gossett was under license to make and distribute the Dualex devices. Acquisition enables Bell & Gossett to distribute them on a world-wide basis. **Dualex International Corp.** was included in the deal.

• **Belock Instrument,** College Point, Long Island, N. Y., plans to issue $1 million of convertible subordinated debentures due in 1973. New money will go for equipment and working capital. Carl M. Loeb, Rhoades & Co. will underwrite the issue.

• **Waltham Precision Instrument Co.,** Waltham, Mass., offers common shareholders rights to subscribe for an additional 300,000 shares of common at $1 per share. Proceeds will be used for additional working capital and for general corporate purposes. The offering is not underwritten. Firm makes gyroscopes and electrical-electronic components. In March, it acquired **Thermal Dynamics,** active in high-temperature research.

• **Muntz, TV, Inc.** reports considerable improvement in its financial outlook. Net earnings for year ended August 31, 1958, were $23,467 compared to a loss of $1,024,842 a year earlier. Firm predicts a considerably higher net income for fiscal 1959. Number of changes have been made since firm was forced into bankruptcy in 1954. New management has been installed; tax debt has been reduced from $1.6 million to $300,000; hi-fi and radios have been added to tv product line. Harold Lansing, a Muntz director, says creditors outside the government will be paid through promissory notes as soon as government debt is paid.

• **DuMont Labs** turned a profit corner in October, company reports. It was first profit month in 1958. Cost reduction program is being pushed by Dr. Allen DuMont. He is now general manager as well as board chairman.



FIGURES OF THE WEEK

RECEIVER PRODUCTION

(Source: EIA)	Nov. 21, '58	Nov. 14, '58	Nov. 22, '57
Television sets, total	116,530	112,554	134,179
Radio sets, total	390,019	344,204	455,779
Auto sets	137,678	117,585	158,655

STOCK PRICE AVERAGES

(Source: Standard & Poor's)	Nov. 26, '58	Nov. 19, '58	Nov. 27, '57
Radio-tv & electronics	68.96	69.18	43.74
Radio broadcasters	73.77	75.67	52.81

FIGURES OF THE YEAR

	1958	Totals for first nine months 1957	Percent Change
Receiving tube sales	291,718,000	341,663,000	—14.6
Transistor sales	30,387,277	18,842,300	+61.3
Cathode-ray tube sales	5,844,665	7,308,552	—20.0
Television set production	3,572,189	4,589,164	—22.2
Radio set production	8,178,821	10,764,454	—24.0

LATEST MONTHLY FIGURES

EMPLOYMENT AND EARNINGS

(Source: Bur. Labor Statistics)	Sept. '58	Aug. '58	Sept. '57
Prod. workers, comm. equip.	367,200	354,900	417,900
Av. wkly. earnings, comm.	$83.62	$82.59	$78.40
Av. wkly. earnings, radio	$83.03	$81.40	$76.02
Av. wkly. hours, comm.	40.2	39.9	40.0
Av. wkly. hours, radio	40.5	40.1	39.8

TRANSISTOR SALES

(Source: EIA)	Sept. '58	Aug. '58	Sept. '57
Unit sales	5,076,443	4,226,616	3,231,000
Value	$10,811,412	$9,975,935	$6,993,000

TUBE SALES

(Source: EIA)	Sept. '58	Aug. '58	Sept. '57
Receiving tubes, units	40,061,000	30,456,000	44,382,000
Receiving tubes, value	$33,951,000	$25,442,000	$35,545,000
Picture tubes, units	891,803	713,458	1,071,662
Picture tubes, value	$17,704,289	$14,190,878	$20,819,036

WASHINGTON OUTLOOK

THE DEFENSE DEPT. is in the final stretch of drafting the military budget for fiscal 1960, starting next July 1. Defense budget planners are trying to hold to the administration's $42-billion ceiling on military spending for next year. This is some $1.2 billion over the current level of expenditures.

However, the initial new money requests from the armed services are pushing spending estimates for the new year several billions of dollars over the $42-billion mark.

From here on out, there'll be a flow of Pentagon decisions with an important impact on electronics contractors as the final budget details are ironed out.

Recent Navy cutback in production of Martin's Seamaster jet seaplane is the latest move. The decision to slash production from 24 to 14 planes will save about $60 million in cash outlays.

Another upcoming Navy decision will wash out either the Chance Vought-Pratt & Whitney F8U-3 or the McDonnell-General Electric F4H aircraft. The two all-weather fighter-interceptor planes are competing for production contracts. Production rates for the surviving plane will be below initial plans.

Monthly output of Boeing's B-52 bomber, now running at 15, will be reduced in mid-1960. Production is now scheduled as far as early 1961; under the latest planning it isn't likely to be extended.

North American's B-70 chemical bomber will be pushed. But it's in the early stages of development, and still doesn't account for heavy hardware expenses.

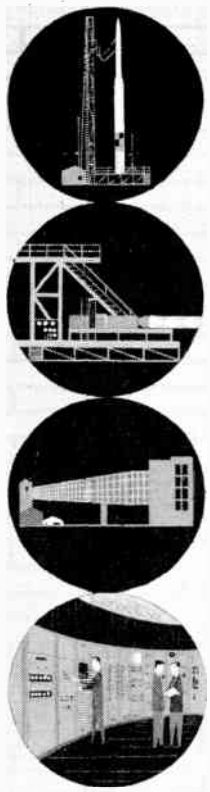
Disclosure that Russia is flying a prototype nuclear-powered bomber provides a new stick for congressional critics of U. S. defense policy, will spur a new attack next month on the administration's military budget. But so far there's no sign that the Pentagon will substantially speed up the joint Air Force-AEC Project Canal to develop a U. S. nuclear plane.

Over the last 12 years, AEC and the military services have spent some $850 million on the nuclear-aircraft project, but they have yet to go beyond the design study stage. There has been some laboratory investigation of the ability of electronic components to withstand nuclear radiation. The administration has refused to put the whole project on a crash basis on the grounds that present technology would restrict a nuclear plane to low speeds; such a low-performance aircraft would not fit into current military requirements.

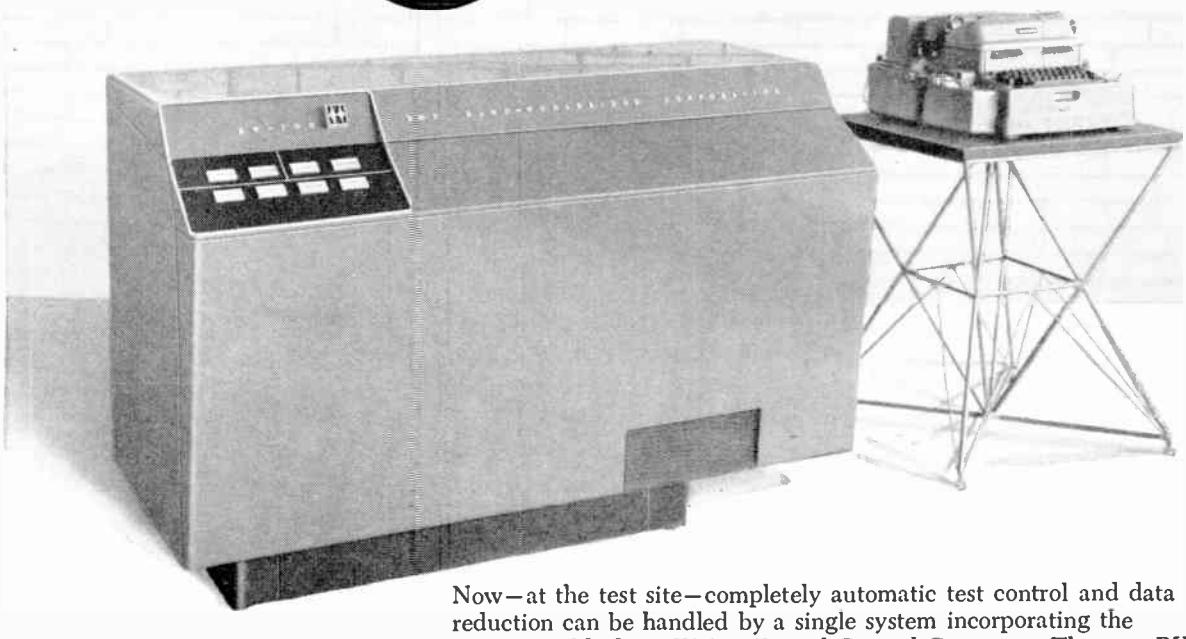
- Big savings in the budget will be made by holding production of latest planes and missiles to current low rates, or even reducing schedules, rather than phasing into higher volume output.

  Such planes as Convair's F-106 all-weather interceptor and B-58 medium-range supersonic bomber, Lockheed's F-104 fighter, McDonnell's F-101 fighter, North American's A3J carrier attack plane, and Republic's F-105 fighter-bomber are considered likely to be hit. So are missiles such as Douglas' Thor IRBM, Martin's Mace, Chance Vought's Regulus II, and Chrysler's Redstone.

  Both Northrop's Snark and Chrysler's Jupiter will probably be phased out of production next year. Martin's Titan ICBM development project will be kept at a low rate of effort.

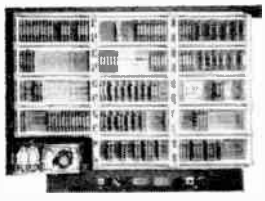


The RW-300 is the first digital computer for test control and data reduction



Now—at the test site—completely automatic test control and data reduction can be handled by a single system incorporating the Ramo-Wooldridge RW-300 Digital Control Computer. The new RW-300 can schedule and closely control test routines, and it can collect, analyze, and record test data.

The versatile RW-300 utilizes input data as feedback to modify control actions, thus substantially shortening many test routines. In addition, the RW-300 directly logs both instrument data and complex relationships among these data. Thus, test results are available immediately. The time-consuming task of processing raw data through a separate computer, often remote from the test facility, usually can be eliminated.



For technical information on automatic test control and data reduction with the RW-300 and with special digital systems which utilize solid-state components exclusively, write: Director of Marketing, The Thompson-Ramo-Wooldridge Products Company, P.O. Box 90067, Airport Station, Los Angeles 45, California, or call OSborne 5-4601.

THE THOMPSON-RAMO-WOOLDRIDGE PRODUCTS COMPANY

Ridenour: rockets and radar

NEWLY RAISED to the rank of Fellow of the American Rocket Society is affable Louis Ridenour, chief scientist of Lockheed's missile systems division. This accolade in the increasingly important astronautics technology is the latest addition to the rocketing Ridenour's long record in such fields as radar and nuclear physics.

The young (47) scientist was born in Montclair, N. J., took his B.S. at the University of Chicago (Phi Beta Kappa '32) and his Ph.D. in physics at Caltech in 1936. He returned East to study at the Institute for Advanced Studies, then taught—at Princeton, Penn and Chicago—for eight years.

Ridenour took leave from his academic chores during the war to serve as a consultant to the Secretary of War. In 1950 he was borrowed from the University of Chicago by the Air Force to become its first chief scientist. He is perhaps best known to the scientific world for his work as advisor to the Air Force on R&D organization.

Ridenour is an articulate and prolific writer, has authored a couple dozen technical articles and several widely used textbooks, was editor-in-chief of the MIT Radiation Laboratory series.

In 1951, he left the academic environment to take a vice-presidency at International Telemeter Corp. Four years later he joined Lockheed, was upgraded within six months to director of the research labs. In his current job he supervises research in 40-odd scientific fields. "Believe it or not," says a close associate, "he is expert in most of them."

Ridenour is anything but the fictional type of the introverted scientist. He's adept at dealing with the public, transmits a warm personality from the podium, is outgoing and approachable to his staff. Like many Westerners, he goes for sports cars, is wont to unwind from a day at the labs by zipping around the San Francisco peninsula in his Mercedes 190SL. His real devotion, however, is to his Palo Alto home, wife Gretchen (they were married in 1934), and their two attractive daughters. Eying his distaff side, he'll remark that Lockheed's research staff "is just one of the topflight teams" of which he is head.

COMMENT

One Best Bet in 1959

I'm glad to see that all issues of ELECTRONICS are going to use the same editorial format in 1959.

Sure, we need information about the business of electronics as well as the technology, but for our purposes it's most important

to keep up with the technology . . .

RICHARD MACMULLEN
NEW YORK CITY

. . . How about making one other change? You could index the two different types of material on separate tables of contents so that a reader trying to locate technical data can find it in one place, and not have to weed out nontechnical material.

WARREN HUGHES
AURORA, O.

I think the idea of sticking to your "one best bet" is the smartest thing you've done so far. Just so it doesn't mean less editorial coverage. In this field, we need information — and more information . . .

DOUGLAS GIFFORD
DUBUQUE, IA.

Our new plan will mean only the standardization of format—to keep all our hats on one head. It will mean more, and more meaningful, information—in both technical and nontechnical areas. As far as the table of contents is concerned, we feel that it will adequately indicate the technical depth of coverage in any article. But we hope our readers will keep us apprised of ways in which we can do our job increasingly better and more efficiently.

More Grammar

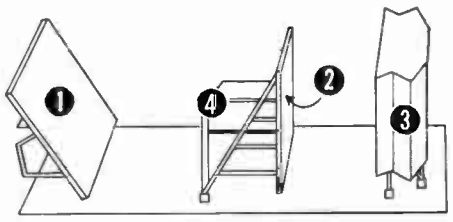
I take umbrage at Mr. M. L. Mason's letter (Comment, p 10, Oct. 3). He has used emotional-content terms hidden beneath a pseudologic. His argument is specious.

I'm concerned about Mr. Mason's apparently violent, strange, unnamed complex. I know many copywriters; all can write American far better than Mason did in his letter.

As a generalization, accurate English is spoken by no one. We yak in patois and slang and improper grammar—that includes educated men and even advertising copywriters.

LESTER COLE
LOS ANGELES

and now... SOLAR FURNACES!



FROM SUNBEAM TO SUNBOMB: Sunlight is reflected from 355-mirror heliostat ❶, through shuttered attenuator ❷, strikes 180-mirror concentrator ❸. Concentrator focuses a 4" dia. image of approx. 5,000°F within test chamber ❹.

This mighty complex of mirrors can convert a dancing sunbeam into a devastating "sunbomb" — a pulse of concentrated energy hot enough to make tungsten boil.

Such is the new solar furnace of the U. S. Army Quartermaster Research and Development Command just installed at Natick, Mass. It is designed to simulate the intense heat radiation of atom bomb blasts in order to test Army protective materials before actual field trials.

There's more to the furnace than mirrors, of course. The intricate solar tracking mechanisms, capable of following the sun in both elevation and azimuth — as well as the rugged construction which enables the furnace to withstand hurricane winds — these are by Kennedy, a long-time tamer of "out-of-this-world" problems.

CHALLENGING POSITIONS OPEN FOR ENGINEERS IN THIS FAST-GROWING ORGANIZATION.

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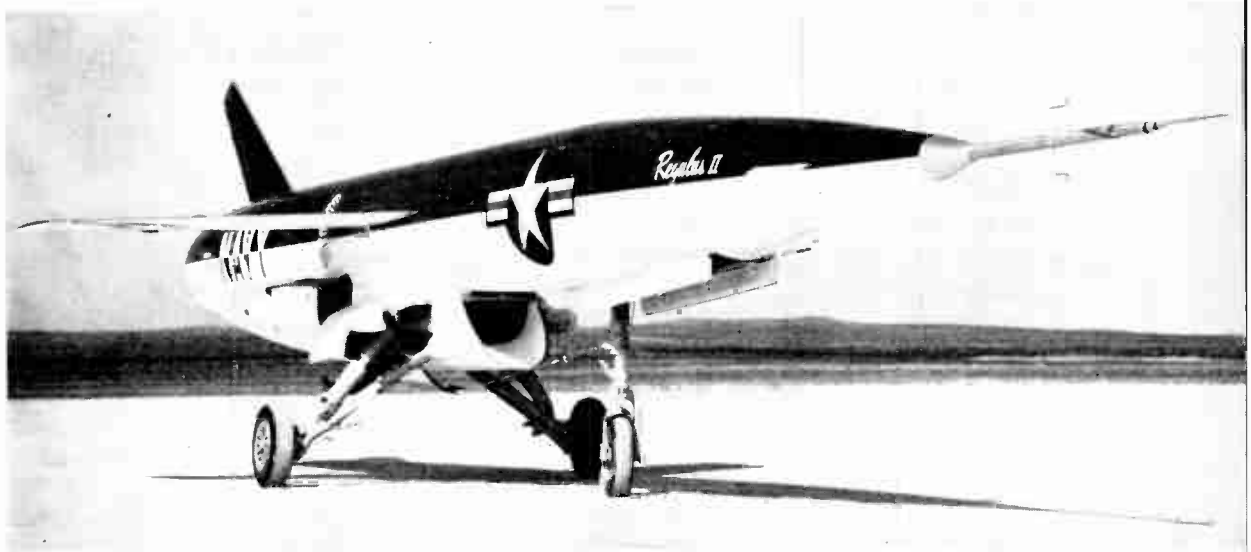
DECEMBER 12, 1958



Regulus II is one of many types in production as government plans . . .

More Surface Missile Buying

Money available for electronic equipment in surface-to-surface missiles will reach $942 million this fiscal year. And new guidance techniques are sure to mean more business

TWENTY-EIGHT surface-to-surface missiles, using nine guidance methods, are providing our industry with a $942.65-million business in fiscal year 1959—$138.3 million more than in 1958.

Breakdown of U. S. arsenal's 28 surface-to-surface missile types shows: 17 missiles, five of which have alternate versions using different guidance techniques (Atlas, Lacrosse, Mace, Regulus II and Titan) and six antisubmarine rocket-torpedos.

Ballistic missiles will get the major share (63 percent or $594 million) of the money authorized for contract awards in 1959; long-range, nonballistic missiles will get 5½ percent ($52.15 million); and short-range, surface-to-surface missiles will get 31½ percent ($296.5 million).

Radio command systems guide four surface-to-surface missiles: The 15-mi-range Lacrosse (radar trackers located on the ground); Lacrosse ABC (airborne control) with radar control located in an aircraft; the 75-mi-range Corporal; and the 500-mi Regulus I.

Radio command plus Shanicle, a hyperbolic system, is used in the 500-mi Matador. After the missile is beyond effective radar range for radio command guidance, the hyperbolic system takes over.

Similar to other hyperbolic systems, such as Loran and Decca, Shanicle requires a master and at least two slave stations. The master, in the case of Matador, is carried in the missile while the two slaves are located on the ground.

Missileborne equipment consists of the master transmitter, two receivers set for different frequencies, a time comparator and computer, control unit (airframe and autopilot) and an altimeter.

The master station transmits signals to the slaves. Replies from the slaves are received by the missile and compared for time differences by the missile's comparator. The location is computed and new heading instructions fed to the autopilot. A number of missiles may be launched at the same time from different sites, headed for different targets—all using the same hyperbolic system.

Autopilot guidance, less sophisticated than iner-

←CIRCLE 8 READERS SERVICE CARD

tial, though adequate for the particular mission, is used in Goose. An intercontinental, diversionary missile, Goose will appear on enemy radar as a group of heavy bombers. If Goose is 300 mi off course by the time it gets close enough to enemy lines to be observed, it will still have served its purpose.

Pure inertial is used in all six ballistic missiles (Atlas, Titan, Thor, Jupiter, Polaris and Minuteman), as well as in five shorter-range surface-to-surface missiles (Mace, Pershing, Redstone, Regulus II and Sergeant). Ranges of missiles using pure inertial go from the 200-mi Sergeant through the 6,300-mi Atlas.

Stellar-inertial—inertial checked by an automatic astro tracker—guides the airbreathing, intercontinental Snark.

Radio-inertial—inertial checked by ground radar with correction instructions sent to the missile by radio link—guides alternate versions of ICBMs Atlas and Titan.

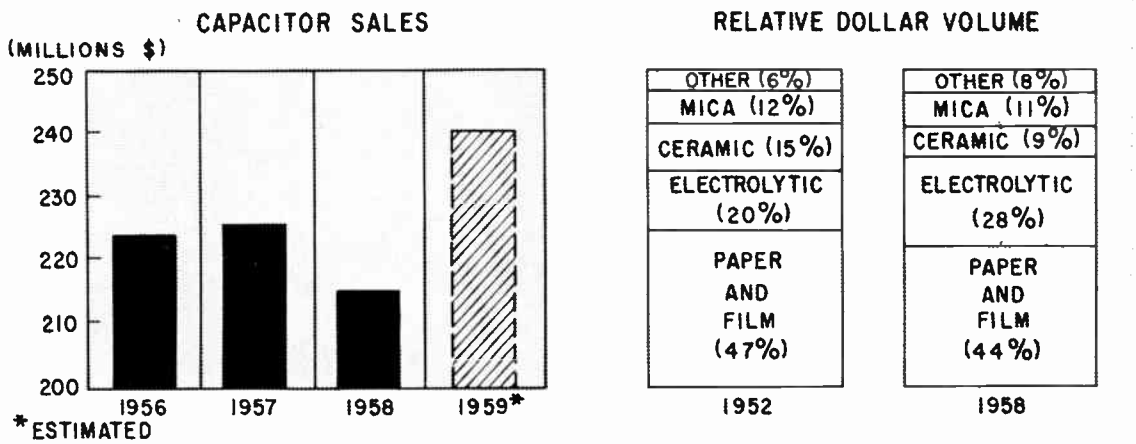
Atran (Automatic Terrain Recognition and Navigation) guides one version of the 650-mi Mace. Goodyear is also working on an improved guidance system of the Atran type—though different in several aspects—for the 1,000-mi Regulus II.

Atran's basic guidance is a fairly sophisticated autopilot. Corrections are made along the way by automatic comparison of airborne radar scope pictures with a prefabricated radar photo strip of the desired course. Deviations are fed to a computer which calculates and supplies corrected headings to the autopilot. (ELECTRONICS, p 21, June 27).

Acoustic homing is used in the majority of advanced antisubmarine rockets and torpedos (Mark 43, Rat and Subroc).

Wire command is used in the Mark 39 torpedo.

PRODUCTION and SALES



Capacitor Sales on Upswing Again

SALES of capacitors are rising again after a slowdown during the first six months of this year. In a pattern similar to that for other circuit components, sales for the first half of this year ran about 10 percent below 1957's first six months. Second six months' record for '58 is expected to show sufficient increase almost to compensate for year's initial losses.

In 1957, capacitor sales at factory door price were $225 million, topping the expected total for 1958 by $10 million. Even though 1958 sales may be about five percent under 1957's, there is a bright spot on the horizon: in 1959, capacitor sales may reach a record high of $240 million.

Paper, film and mica capacitors have maintained the same relative positions in percentage of total dollar volume, although a slight downward trend has been discernible since 1952. Electrolytics, on the other hand, have risen steadily, due in part to increased use of tantalum capacitors. Ceramics show a decline.

ELECTRONICS estimates that for '58 paper and film types comprise 44 percent of capacitor dollar volume. Electrolytics make up about 28 percent; ceramics, 10 percent; micas, 11 percent.

Major cause for this year's dip in capacitors and other circuit components was the slackened demand from radio and tv setmakers early this year. Fall receiver figures, however, indicate better-than-usual seasonal increases for the final half of '58. Upped requirements from high fidelity, tape recorder and phonograph manufacturers have also helped to tighten slack in capacitor demand.

Airframe Electronics

Aircraft manufacturers find themselves in an industrial jetstream. What to do? Create an electronics division–buy an electronics firm–or merge with one? Here's a report on what's happening

LOS ANGELES—This week, with promising 1959 only a few day-steps away, West Coast airframe manufacturers are examining their changing operations. One reason: Today's airborne weapon system is a mass of electronic gear with wings.

Strategy of airframe makers has included building electronics divisions from scratch, buying going concerns, and merging directly with top electronics companies.

Northrop had done much R&D on computers in the early 40's but really entered electronics 12 years ago with its first Snark contract.

Northrop scattered its electronics development groups throughout its plants. In September '57 all electronics efforts were consolidated in the Nortronics division. Northrop tries to produce and develop its own electronics systems, holds outside purchases to component level where possible.

At present Nortronics brings in $60 million of Northrop's annual volume. William Ballhaus, v-p & gen. mgr. of Nortronics, says electronics sales will climb to $300 million by 1963, or 50 percent of company sales.

North American entered electronics via its Aerophysics Labs, formed shortly after V-J Day to investigate all phases of missile work. MACE (Missiles and Control Equipment) division evolved from a handful of engineers and scientists to NAA's Rocketdyne, Autonetics, and Missile divisions.

Mace did work in inertial navigation. Autonetics—made a separate division in 1955, and now boasting 1 million sq ft and 7,300 employees in two plants—continues in that line. It supplied gear used by *Nautilus* and *Skate* in their Polar trips; has a $6.7-million Navy contract for inertial equipment to be used on Polaris-carrying subs.

The division is engaged in about 100 projects, and '58 sales will approach $100 million. Nonmilitary items include a transistorized tape directed 3-axis numerical control system for machine tools, and a rugged mobile general purpose digital computer.

Douglas' Missiles Engineering Dept. was formed in 1955, and since then its design, testing, and assembly capabilities have accelerated to keep pace with increasing demands made by ground support equipment such as required for Nike and Thor systems.

With minor exceptions, Douglas steers clear of producing electronics for outside sales. Diffident toward mergers, Douglas prefers joining forces with existing firms to present team bids.

Lockheed has gone off on a different tack. The firm realized the significant relationship of electronics to airframe devices in 1950 when development of its early-warning Constellations began.

Lockheed's Missile Systems division was formed in 1953 with R&D and production facilities for electronics. Among current contracts it has the prime for Polaris, produces some of the black boxes and licenses outside companies to manufacture others. Lockheed Aircraft Service, a subsidiary, has been actively pushing training aids, flight recorders, and missile ground support equipment and subsystems for the past two years. In 1956 the California division (manufacturing both commercial and military aircraft) set up an electronics operation.

Currently manufacture of electronics equipment represents 3 percent of total sales, or about $25 million annually.

At Convair each major project supports an electronics group which reports to a chief engineer. Convair policy stipulates that wherever possible, production, and in many cases detailed design work, of major electronics items are subcontracted.

To broaden its electronics base, General Dynamics (Convair's parent corp.) acquired Stromberg-Carlson.

Boeing is sitting pretty with orders for 170 707's, twice that many KC-135's (tanker version of 707). The firm doesn't feel the pinch imposed by electronics-dominated weapon systems. Production on its Bomarc missile continues to build up.

Electronics accounts for 40 to 50 percent of Bomarc's cost, but majority of this is farmed out. While it sponsors isolated electronics research projects, Boeing has never established an electronics division. President Bill Allen reportedly favors buying or merging with an established firm rather than starting from scratch.

Ryan Aeronautical of San Diego set up an electronics division one year ago, and has taken pains to accentuate its autonomy. Specializing in c-w Doppler navigation systems for all applications, this division holds some of company's main hopes for future growth.

Yule Toys Go Electronic

Manufacturers show increased interest in electronics as today's children demand playthings reflecting adult world about them. Spreading business boosts orders for components

CHRISTMAS 1959 may be remembered by toymakers as the season electronic toys moved into the big money.

Toys bearing the label "electronics" as they head for the market may be divided roughly into two categories: those that are truly electronic, and those that simulate electronic devices.

In the former category are such items as a miniature pocket radio, crystal radio set, transistor radio, and transistorized receiver and transmitter. These are furnished in kit form, and feature brightly colored plastic parts which help the youngster assemble the equipment.

The transistor radio and the receiver-transmitter set include headphones and diode detector, as well as tuners and amplifiers.

Another radio kit aimed at the small fry supplies heavy cardboard sheets on which the basic radio circuit is printed with symbols. Fahnestock clips are inserted in the cardboards to hold various circuit components supplied. These include a variable tuner, germanium diode, capacitor, earphones and hardware. This kit carries a suggested retail price of $4.95. A more expensive model by the same manufacturer features a solar-type battery to operate the radio.

Also in kit form are a number of sets aimed at teaching youngsters the basics of electricity. With these kits, numerous experiments and demonstrations can be performed. All kits include motors, some in transparent housings through which workings of parts may be studied.

Moving in the direction of electrical toys that simulate electronic devices is a "Signal Corps" teleprinter that uses house current to activate a type wheel and imprint characters on paper tape. An identical station connected by wire duplicates the action of the sending station and can be used to send reply messages.

Other toys which simulate electronic devices include a host of missile trackers, launchers, communications systems and other items imitating present-day electronic arsenals. (Cover photo by Associate Editor Manoogian gives inkling of variety on store shelves.)

One toy operates on a principle similar to that used by some tv manufacturers to allow remote control of receivers. A battery-driven automobile is made to turn corners, move forward and backward by sonic tones produced by a special whistle.

In speaking of the trend to toys designed for the electronic age, a spokesman for the Toy Manufacturers Association says that much of this season's toy design activity is geared to the International Geophysical Year.

"Last year," he said, "many manufacturers of low-priced toys were just sticking on decals or labels that tried to make old designs seem to fit today's scientific advances.

"This year, the trend has been to a more sincere approach. Manufacturers have taken pains to obtain actual drawings and specs to create accurate replicas of the devices."

Besides IGY stimulus, manufacturers report that the whole "Space Age" environment has given new impetus to toy design. Typifying this trend are a number of playthings simulating satellites, launchers and missiles. A model of the Navy's Vanguard missile which "launches" a satellite and escort rocket is expected to do quite well in terms of sales among the nation's 50 million youthful customers.

Electronic capabilities of this year's Christmas toys fascinate adults, too

There are over 50 Cambion® standard solder terminals, each available with varied shank lengths. Ordinarily finished with silver plating, they can also have tin-lead or tin-zinc electroplating, hot tin coating, bright-alloy or cadmium plating, 24K gold plating or finishing. All materials meet military specifications.

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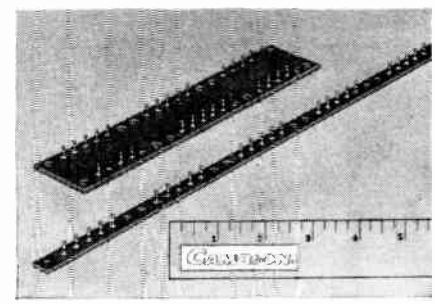
Produced to extremely close tolerances, Cambion solder terminals are quality controlled throughout their entire manufacture. Cambion engineers continually check and recheck the coatings for adhesion, continually inspect cross-sections to guarantee uniform thickness. This is microscopic precision on mammoth scale — means your orders are filled immediately — no matter *how* big.

Precision manufacture guaranteeing precision performance — the standard is high for the entire Cambion line of electronic components, including capacitors, swagers, hardware, insulated terminals, coils, and coil forms. For samples, specifications, and prices write to Cambridge Thermionic Corporation, 437 Concord Avenue, Cambridge 38, Massachusetts. West Coast stocks maintained by E. V. Roberts and Associates, Inc., 5068 West Washington Blvd., Los Angeles 16, California. In Canada: Cambridge Thermionic of Canada Limited, Montreal, P. Q.



Cambion standard and custom all-set terminal boards are produced on Cambion-designed swaging machines and tooled to insure smooth finish without cracking. Paper, nylon, cloth, or glass laminates are bonded with phenolic, epoxy, melamine, or silicone resins, then lacquered, varnished, or coated. Now available: ceramic and miniature all-set boards.

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See Cambion Guaranteed Components on Display at Booth 1139, 1958 Wescon Show, Pan Pacific Auditorium, Los Angeles, Aug. 19th. through 22nd.

Military Needs Inventions

National Inventors Council appeals for help in solving important problems in electronics for the armed forces. Radar, microwave devices and data systems are on revised list of inventions wanted

COUNTER-COUNTERMEASURES gear, radar techniques, infrared devices, broadband detectors and missile and ground-based data systems head the list of electronic categories in which inventions are wanted by the armed forces.

Recently, the National Inventors Council, which acts as a clearing house for ideas for the military services, issued a new appeal for help in solving important technical problems.

Some items on the "wanted" list, published by the Department of Commerce, call for solution of "blue sky" problems, such as methods of converting light energy into electrical energy. Other items, pertaining to areas of technology that are better explored, suggest approaches to a solution; some call for devices with specific characteristics.

Among the more unusual requested inventions is a man-made "electric eel" generator to power repeater amplifiers in undersea cables. Military scientists want to emulate the generation process used by the electric eel.

Here, by category, are some of the electronic "inventions wanted":

Radar, Tracking, Tv

Microwave supergain antenna, highly directive, to increase the range of a radar set or communications gear, especially in the bands between 1,000 and 30,000 mc.

Counter-countermeasures methods for combating the jamming of radar sets with noise, c-w and pulse jamming, chaff, spoofing and artificial glint.

Electronic systems to determine miss-distance between a missile and an aerial target. Needed are systems that depend only on reflection; also, systems which depend on a second device in the target.

Bandwidth compression of 3.5-mc video signals down to the order of one mc for transmission, and re-creation of the original bandwidth signals after transmission.

Television systems of improved resolution to permit optical tracking of missiles, with image quality approaching that of a photograph.

Microwave power source in the region around 2,200 mc, too high a frequency for conventional triodes and too low for best results with magnetrons and klystrons.

Three-dimensional device to display trajectory of a missile in a quick visual means relative to time and space. Display would appear on stand as missile is fired, give permanent record of its path.

Infrared

Electromagnetic radiation receiver for the 9- to 14-micron region which will have a response time of microseconds, and operate at normal temperatures.

Infrared sensors and heads sensitive to several bands of frequencies, rather than the entire infrared spectrum.

Infrared detectors with higher sensitivity and faster response time than are now available for wavelengths up to 14 microns.

Highly sensitive infrared device with fast response capable of converting an infrared image into a visible counterpart, and able to operate at wavelengths as high as 14 microns.

Electronic Components and Systems

Microwave filters for L or X band, whose purpose would be to increase the accuracy of reflection Doppler systems by increasing signal-to-noise ratio.

Indirectly heated, unipotential, thermionic cathode capable of operation in less than one second.

Broadband detectors for h-f, vhf, uhf, centimeter and millimeter wavelengths with sensitivities 10 to 40 db better than present crystal detector.

Acoustic transducer, unidirectional, of small size in relation to wavelength for sound detection on signals as low as 5 cps.

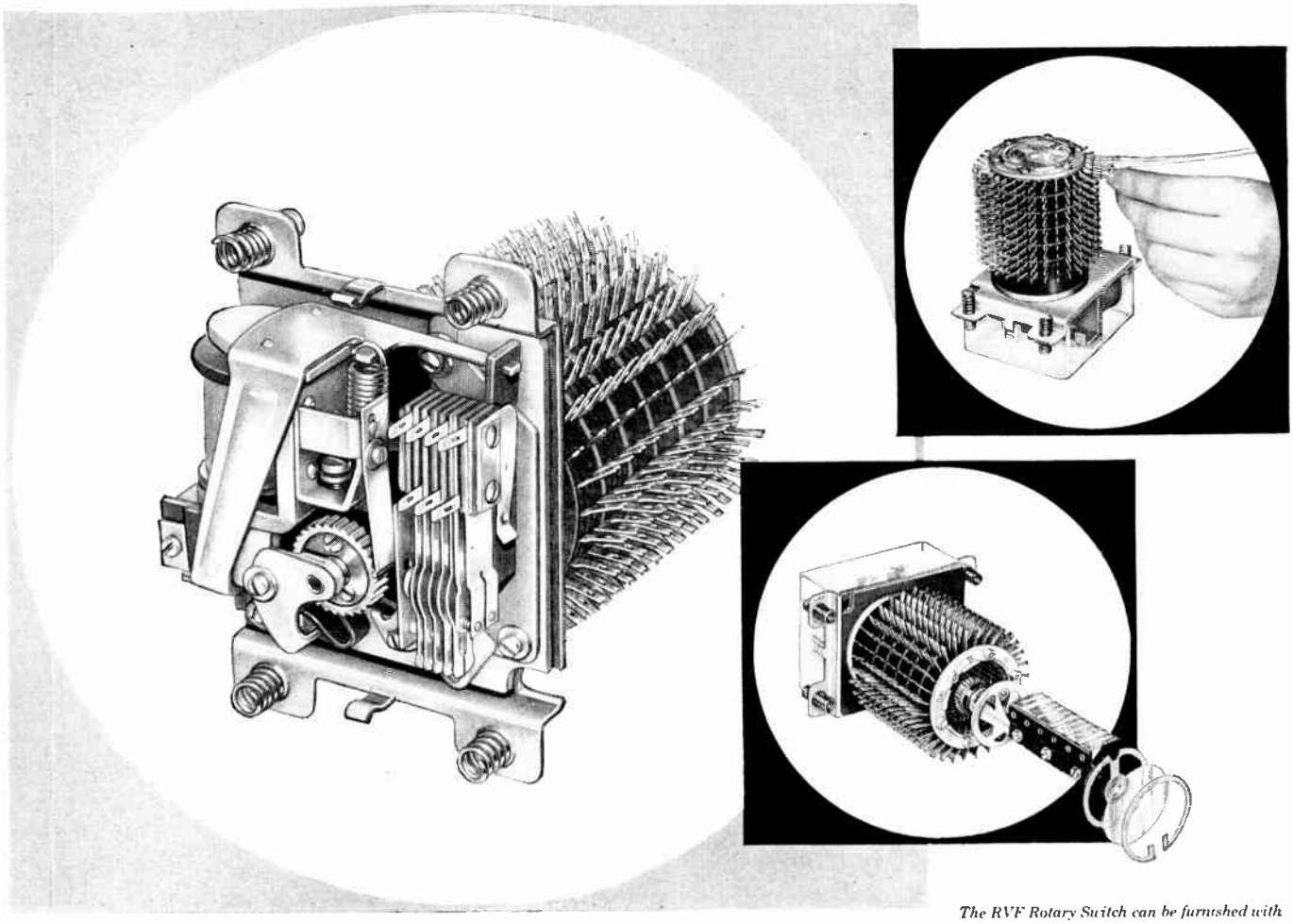
Resistors in the range of 1 to 100 megohms, with positive temperature coefficients up to 1,000 parts per million per degree C for temperature compensation of electronic circuits.

Transistors to operate in h-f, vhf and uhf at temperatures well above 150 C; others for microwave frequencies. **Power rectifiers** to work in an ambient of −20 to +500 C.

Data Systems

Ground-based trajectory measuring system for missiles which will provide accurate data in three dimensions almost simultaneously with the flight, with time lag of no more than a fraction of a second.

Computer system so simplified that a working engineer with little or no knowledge of numerical analysis or programming techniques can present it with a scientific or engineering problem in a form which it can accept and solve.



The RVF Rotary Switch can be furnished with 2, 4, or 6 levels, 30 points, each with single wiper. With double wipers, the same switches become 4, 8, or 12 level units respectively with 15 points per level. Bank contact ratings: 1 amp. at rest; .2 amp. resistive when stepping. Off normal contact ratings .4 amp. resistive. Switch may be driven self-stepping or externally. Gold plated bank contacts and wipers are available for low level switching. Available with 12, 24, 48, 110 V. D.C. coils. Built-in spark suppression on 24 and 48 volt switches. Mounting dimensions: 1.968" x 3.661" O.C. Overall height: 4¼" height above mounting, 3½" (max. dimenstons for 6 level switch). Weight: 1.32 lbs.

FIND THE PIVOT PIN

IN THE STEPPING MECHANISM OF THIS **NORTH** RVF ROTARY SWITCH

Give up? So did we! A rotary switch cannot be designed with a pivot pin in the stepping mechanism and meet North Electric's standards of reliability!

Result: North's high speed RVF Rotary Switch has no pivot pin – *no wear point to change critical dimensions of any part of the stepping mechanism* – reliable, accurate stepping for the life of the switch!

The North RVF Rotary Switch allows maximum flexibility in circuit approach – no longer is the engineer limited to one input per bank level – *any combination up to 30 inputs and/or outputs per bank level affords a flexibility hitherto unknown.* North's RVF Rotary Switch is being used for programming, sequence control, routining test equipment, as an impulse counter, memory device, and for tallying and counting in production control.

The bank terminals on the North RVF Rotary Switch are designed for use with either soldered connections or solderless connectors.

The switch is completely dust enclosed, and has vibration-proof mounting.

For the most versatile, flexible, reliable Rotary Switch on the market – NORTH RVF ROTARY SWITCH.

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Coming: A New Low-Temperature Transistor

LOW-TEMPERATURE TRANSISTOR capable of operating at 2 K is under development at Sylvania's Bayside, N. Y., research laboratory. Such a transistor could have applications in earth satellites and other space electronics where cryogenic temperatures can knock out conventional units. Sylvania scientists call the device a grain boundary transistor. They told ELECTRONICS that it makes use of the properties of a boundary formed between two crystal lattice structures of different grain orientation to obtain characteristics similar to *npn* or *pnp* junctions, depending upon whether germanium or silicon is used.

MISSILE SPENDING by the government may outstrip manned aircraft spending by 50 percent in 1962. That's the prediction the Senate Small Business Committee was given recently by USAF's deputy director of ballistic missile procurement, Maj. Gen. Ben I. Funk. Presumably, if development of nuclear aircraft should be accelerated, this ratio could change. Defense Department's latest missile procurement estimate for fiscal '59 is $3.373 billion, about half the aircraft total; some 25 to 50 percent of the missile total is electronics procurement.

SOVIET ELECTRONICS RESEARCHERS are getting their own seven-year plan as part of Nikita Khrushchev's economic blueprint for 1959 to 1965. *Tass* said recently that "plans which are being outlined" will spur new achievements. Semiconductors, cosmic rays and nuclear reactors were singled out as areas of concentration. Report said that "great sums" would be allocated during the seven-year plan for new scientific establishments and modern laboratory instruments, mainly in the eastern part of the USSR. Sparsely populated area is logical place for development of nuclear-electronic spacecraft.

FOREIGN MARKETS FOR TV SETS will show a steep upward sales curve by 1960, with more than 50 million in use outside the U.S. by 1962. That's the prediction of Romney Wheeler, U.S. Information Agency television service director. He said sets abroad now total about 21.5 million. Overseas tv growth, he declared, may be complemented by promise of an inter-American tv network by 1960 and trans-Atlantic "live" tv by 1962.

DATA-PROCESSING GEAR will take over the clerical job of handling service orders of new telephone customers in Michigan. Burroughs Corp. system, which includes a "220" computer, will start operating in January 1960 in a Detroit suburb, and is expected to service the whole Detroit area by 1962. Michigan Bell Telephone Co. said it signed a $1-million-a-year contract with Burroughs for the leasing of the system.

TECHNICAL DIGEST

• **Radioactive high-speed smoke** detector uses two ionization chambers in opposition, each containing a radium source. Closed reference chamber is connected between grid and anode of thyratron, while open chamber is connected between grid and cathode. Smoke entering open chamber decreases ionization, thereby increasing its resistance and driving grid more positive. This triggers thyratron, operating alarm relay in plate circuit. Alarm was developed in Switzerland.

• **Chemical-type high-voltage fuse** currently used in RCA tv receivers withstands short-duration current surges. Sustained shorts heat resistance wire in fuse, igniting chemical and melting wire completely to give clean break.

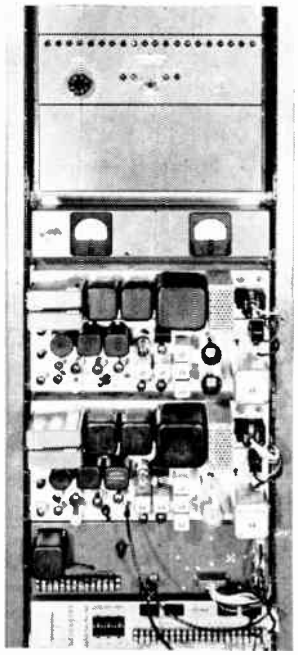
• **Projected radar** pictures for air traffic control were demonstrated in England by Kelvin-Hughes, using continuous photographic process that produces and projects new negative every six seconds. Machine photographs radar tube, then develops, fixes, washes and dries negative by spray technique. Time delay is comparable to time for one rotation of search radar antenna, hence does not appreciably affect usefulness of display.

• **Cadmium-sulfide photoresistors** eliminate costly refilling of CO_2 fire extinguishers at electrostatic paint-spraying installations by interrupting sprays automatically for short period at instant that flash occurs. Response was fast enough to prevent fire from developing, in test installation in French factory.

• **Beam width** of 0.5 deg was achieved by Stanford Electronics Labs for S-band broadside antenna array by using helix radiator in front of ground plane to feed each of eight in-line parabolic reflectors. Resulting beam is electronically swept at high speed through ±2-deg sector by rotating individual helices rapidly at multiple rates to obtain phase shifting. Antenna is used for beyond-the-horizon propagation tests at 3,120 mc.

• **Ferrite antenna** replaces conventional metal rod in emergency transmitter designed to float on water. Fins rotate transmitter slowly on waves so antenna nulls do not stay in same direction. In tests by Telefunken with 3.2 microwatts of transmitter output at 2.05 mc, bearings could be taken over range of 5 nautical miles.

F-M Switches Capacitors



Equipment at central station includes regular and standby f-m carrier transmitters. Row of lights on programmer near top indicates number of capacitor banks on line

CAPACITOR-SWITCHING system, developed by Motorola, provides automatic control of remote capacitor banks in electrical utility systems.

Switching is accomplished through transmission of code tones by carrier on the feeder lines. Transistorized receiver-decoders respond at the remote capacitor sites.

Programmed coder unit and accessory panels, with the power-line carrier transmitter, make up the central station equipment. Only the receiver-decoder unit is needed at the remote locations.

When system voltage or reactance measured at the substation bus exceeds preselected limits in either direction, the coder initiates action to add or remove capacitor banks from the line.

Two tone-generating devices (for open and close signals) are provided in the coder for each controlled capacitor bank or group of banks. The tone generators are programmed in the sequence in which the capacitor banks they control should be added to the line. The sequence can easily be altered by changing the plug-in, hermetically sealed units.

When the need for additional capacitance is sensed, close tones are generated. These tones are transmitted in the preset sequence until enough capacitor banks have been switched on the line to bring reactance or voltage within required limits.

When removal of capacitors is necessary, open tones are transmitted in reverse sequence. Manual control is also available for special switching and testing functions.

Tone signals are transmitted by a 10-watt carrier transmitter. The signals are received at the capacitor sites through ferrite-core inductive antennas mounted between the pole lines. No connection is made to the feeder.

The receiver-decoder is mounted in a watt-hour meter case with a standard five-terminal base. It consists of an eight-transistor f-m receiver, two tone-sensitive decoders and a magnetic latch relay that furnishes an external circuit closure.

A tone signal meant for a particular location actuates one of the decoders, causing operation of the capacitor switching relay. The system is capable of controlling 20 capacitor banks or combinations of banks on any one distribution system.

Amplifier for Official Cars Is Transistorized

Combination siren and 30-watt amplifier for emergency vehicles is fully transistorized. Radio calls can also be amplified and reproduced on behind-the-grille speaker so they can be heard at a distance from vehicle

THE STEEL SCAFFOLDING COMPANY, INC.
MANUFACTURERS OF Trouble Savers SINCE 1912

January 9, 1957

Mr. C. H. Lausberg
Area Development Department
West Penn Power Company
Cabin Hill
Greensburg, Pennsylvania

Dear Clem:

Needless to say, I am more than pleased that the final decision reached was on locating our new plant in Western Pennsylvania. In no small measure, a good deal of the credit rests with you and your associates and your untiring efforts. Your clear presentation of facts simplified our problem of sorting out the myriad of claims that so many communities set forth. It was gratifying to note that the Greater Uniontown Industrial Fund was well aware of the role you played and so acknowledged by the "plug" in the local paper announcements.

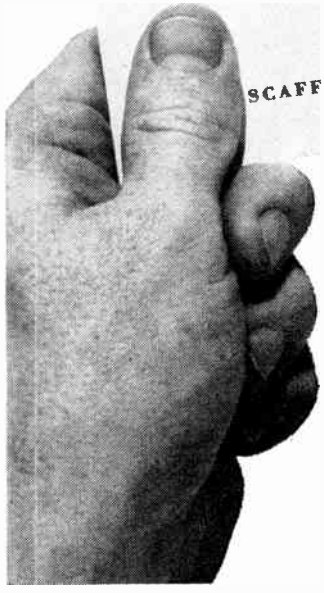
Many thanks for the Directory of Products and Manufacturers. It will be very helpful for future reference.

Sincerely,

Bert

N. A. Engelen, Secretary

SCAFFOLDING FOR EVERY PURPOSE



WEST PENN POWER

an operating unit of the
WEST PENN ELECTRIC SYSTEM

Hello . . .

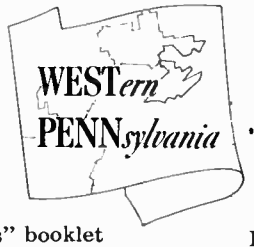
I'm Charlie Fife . . .

This letter is very complimentary. But we won't accept all that credit.

Our part is quite simple. All we do is determine your requirements. Once we've done that, the only skill is to make sure that opportunities in our area apply to *you*. You see, we live here . . . know in detail the *favorable tax climate* that encourages industry. We know the localities that offer *100% financing* plans at low interest. We know where *labor* and *skills* are available.

We take credit for just this: We like to add two plus two and get four—no fractions. If you'd like us to work on your side of the equation, let us know. We've got a pretty good record of fours. Won't you let us prove it . . . in confidence, of course.

CHARLIE M. FIFE, *Manager*
Area Development Department



Area Development Department,
West Penn Power Company,
Cabin Hill, Greensburg, Pennsylvania

☐ Please have representative call

☐ Please send "Plant Location Services" booklet

E-5

Yes, I'm interested in WESTern PENNsylvania.

☐ Please send "Directory of Products & Manufacturers"

Name_____ Title_____

Company_____ Street_____

City_____ Zone_____ State_____

A giant step has been taken in the U.S. military development program with contracts for the creation of an unprecedented primary strategic weapon system. It is the Air Force DYNA-SOAR, now in Phase-I design stage by a six-company project team under Martin direction.

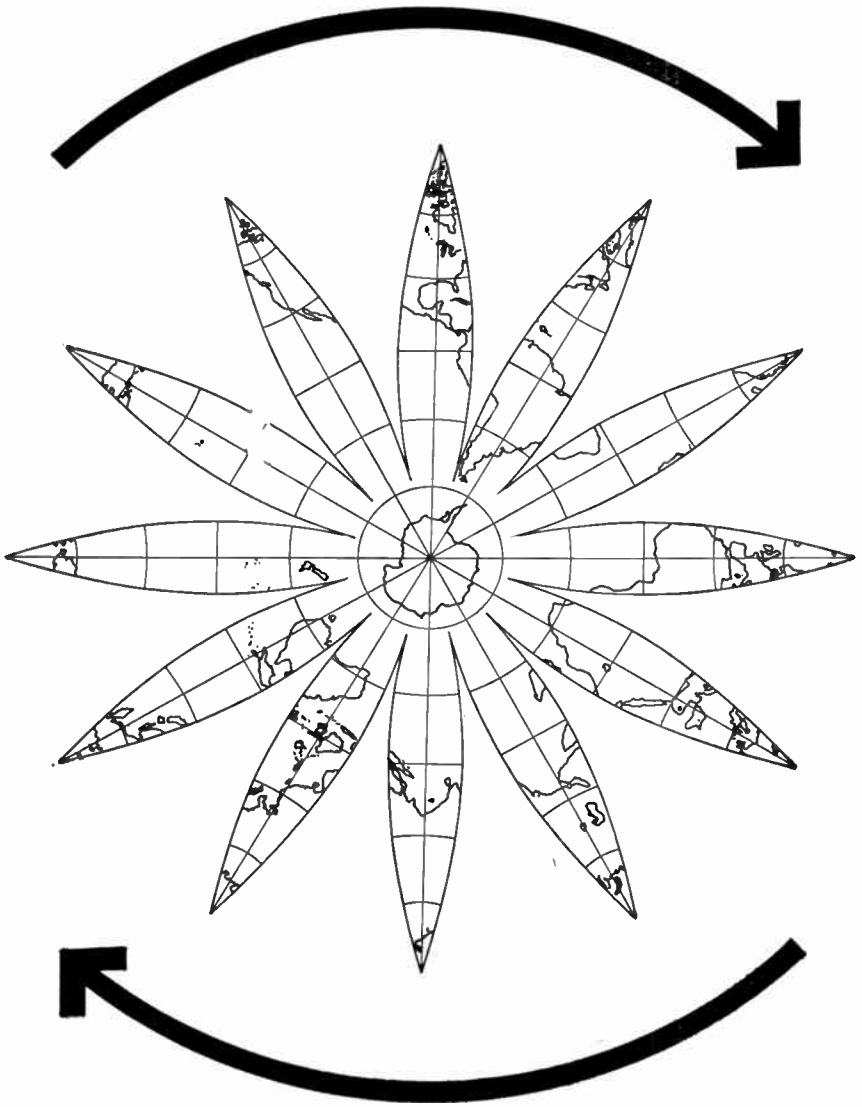
DYNA-SOAR—the most advanced military weapon system now in development—is a pilot-controlled bomber-reconnaissance space vehicle, its mission being to circle the earth at orbital velocity, with controlled aircraft landing capabilities. It will be propelled by several stages of rocket boosters, enabling it to operate from ground level to the ionosphere at hypersonic speeds.

In an entirely new and advanced concept of integrated industry coordination, the six companies teamed in this No. 1 military program constitute top capabilities in the basic areas of airframe, propulsion and radar guidance system development.

Bell, a pioneer in the boost-glide field, will design and build the airframe of the vehicle ...Bendix will develop communication, telemetry, hydraulic and electrical power conversion systems...Goodyear will produce the crew-escape capsule and the radar systems ...Minneapolis-Honeywell will be responsible for guidance and navigation to keep DYNA-SOAR on course and supply position and velocity information to the crew. American Machine & Foundry's responsibility is an advanced system of ground handling and launching equipment...And Martin will establish the configuration and design of the rocket boosters, carry out an experimental aerodynamic program for the complete vehicle, and assemble a full-scale mockup of the system.

Because of the challenging technical problems involved, the presidents of the six companies – aggregating assets of over $2 billion – comprise an active advisory panel, with their top engineering teams participating.

Never before in military history has so formidable a task force of specialized industrial capabilities been applied against such an advanced concept.



MEETINGS AHEAD

Jan. 12-14: Reliability and Quality Control, Nat. Symp., PGRQC of IRE, ASQC, EIA, Bellevue-Stratford Hotel, Philadelphia.

Jan. 13-14: Cathode Ray Tube Recording, Systems Development Corp., Engineers Club, Dayton, O.

Jan. 21-23: Southwest Electronic Exhibit, Arizona State Fairgrounds, Phoenix, Ariz.

Jan. 29-30: Long Distance Transmission by Wavegnides, Institution of Electrical Engineers, London, England.

Feb. 1-6: American Institute of Electrical Engineers, Winter General Meeting, Statler Hotel, N.Y.C.

Feb. 12-13: Transistor & Solid-State Circuit Conf., AIEE, PGCT of IRE, Univ. of Penn., Philadelphia.

Feb. 12-13: Electronics Conference, AIEE, IRE, ISA, CPS, Eng. Soc. Bldg., Cleveland.

Feb. 17-20: Western Audio Convention, Audio Eng. Soc., Biltmore Hotel, Los Angeles.

Mar. 3-5: Western Joint Computer Conf., AIEE, ACM, IRE, Fairmont Hotel, San Francisco.

Mar. 5-7: Western Space Age Conf. and Exhibit, LA Chamber of Commerce, Great Western Exhibit Center, Los Angeles.

Mar. 15-18: National Assoc. of Broadcasters, Annual Convention, Conrad-Hilton Hotel, Chicago.

Mar. 23-26: Institute of Radio Engineers, IRE National Convention, Coliseum & Waldorf-Astoria Hotel, New York City.

Mar. 31-Apr. 2: Millimeter Waves, Symposium, Polytechnic Inst. of Brooklyn, USAF, ONR, IRE, USA Signal Research, Engineering Societies Bldg., N.Y.C.

Apr. 5-10: Nuclear Congress, sponsored by over 25 major engineering and scientific societies, Public Auditorium, Cleveland.

Apr. 14-15: Industrial Instrumentation & Control, Conf., PGIE of IRE, Armour Research Foundation, Illinois Inst. of Tech., Chicago.

Apr. 16-18: Southwestern IRE Conf. and Electronics Show, SWIRECO, Dallas Memorial Aud. & Baker Hotel, Dallas.

May 3-7: Semiconductor Symposium, Electrochemical Society, Phila.

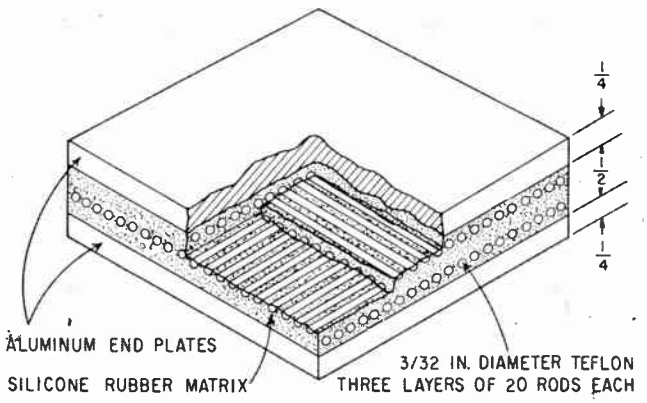


Diagram illustrates new method of making . . .

Slabs Absorb Shock

Research report proposes plastic rods in rubber as high-performance shock mounting

UNUSUAL VIBRATION damping material—one which could lead to a new family of shock mountings for missileborne electronic equipment—is reported from a research project conducted for Wright Air Development Center.

WADC wanted a mounting material which combined low cost, high internal damping and cut-to-fit slab construction with an ability to stand up under the environmental extremes encountered in missiles.

A solution recommended by Robert H. Jacobson, of Armour Research Foundation, Illinois Institute of Technology, consists of Teflon rods embedded in a matrix of silicone rubber (Report PB 151005, OTS, Dept. of Commerce, Washington, $2.75).

In a three-inch-square test specimen, 60 rods, each 3/32 inch in diameter, were embedded in three layers in a half inch of silicone rubber. This was the most successful of 57 combinations tested.

WADC specified that the maximum transmissibility (Q) of the medium be 1.5. This is the ratio of output to input displacement of the vibrating system. An ideal material has a Q of 1; some materials commonly used for vibration damping have Q's of 4 to 10.

Q of the silicone rubber-Teflon system is 2.1 at an amplitude of 0.010 inch and less at greater amplitudes.

Internal damping is believed due to slippage between the rubber and Teflon. Performance may be improved by varying the quantity, orientation and shape of the rods. Grooving the rods, for example, would increase the rubber-Teflon interface area in a given volume.

The material can be attached to housings and support structures with silicone adhesive, or laminated to aluminum plates and attached by bolts or welds. Strength requirements at temperatures of —65 C to 250 C are generally met.

New Insulators To Cool Helium

NEW INSULATORS for vessels holding liquid helium and other cryogenic fluids are now reported by Linde Co., Division of Union Carbide, to be lighter than any insulator except a vacuum, and up to 26 times as efficient as vacuum.

The firm has not identified the material used. The insulating principle is said to be similar to powder-vacuum. The insulating material is placed in the insulating space and then a vacuum is drawn.

Linde is now using the insulator to construct a large helium vessel. The pressure rise will be below 180 psi in 15 days and evaporation rate 2.6 percent a year. A company spokesman says he assumes the materials can be used in small vessels as well.

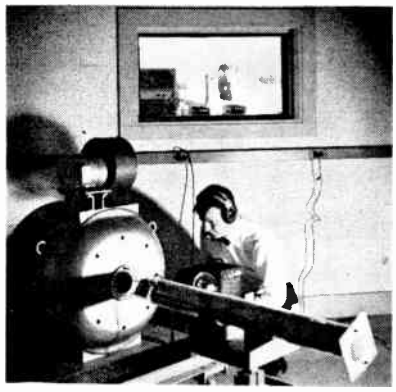
Capacitor Takes 1,200 Hours Wet

NEW TYPE of glass capacitor has been developed for military applications. It will stand 1,200 hours moisture test or 450 hours in boiling salt water and can operate at —55 C to 125 C without derating.

Called a fusion sealed capacitor by Corning Glass Works, the component has been under development for 18 months. A chief problem was matching thermal expansion of glass and lead wire. A special copper-clad chrome steel wire was developed for Corning by Sylvania.

The capacitor is in limited production at present in one size, CYF-10. Equipment for mass production is expected to be ready in early 1959. Introductory price is 50 percent higher than glass capacitors now made by the firm.

Big Noisemaker



Components and electronic subsystems for ICBM nose cones are tested in noise up to 170 db at Avco Research and Development division. Output of moving coil loudspeaker surrounds test piece in a reverberant chamber or tube

Buyers Want Suppliers Nearby

Sacramento area group invites electronics firms to locate in expanding industrial sector

SACRAMENTO—Five big consumers of electronic gear said this week they would like more suppliers within arm's length here in this busy area.

The five ready-made customers in the area are all crying for closer supply sources. Largest is the Army's huge Signal Depot, where communications equipment for the eight-state Sixth Army area, Alaska, Far East Command and other far-flung outposts is repaired. Ranging in size from tiny meters to complete mobile radar stations, equipment is dismantled, inspected, refurbished and reassembled.

The Depot's employees number 2,750 and value of equipment on hand frequently tops $300 million. Annual purchases of replacement components and electronic equipment run into millions of dollars.

Second biggest customer is McClellan AFB. With a combined military and civilian population of 19,700, this base serves as headquarters for USAF's Sacramento Materiel Area and home field for the 52nd Airborne Early Warning Wing. Specially outfitted Constellations flown by the latter each carry half a million dollars worth of electronic gear.

Outdated and damaged USAF craft are completely torn down, modified and put back into operational status. Base warehouses hold a $688-million inventory. Procurement of weapon systems and spares from McClellan means big money—last year its 740-man procurement staff administered 500 active contracts having a face value of more than $4 billion. McClellan is the only USAF base where modification on Lockheed and North American fighters is performed.

Two Southern California firms have set up major installations in this area—Douglas Aircraft and Aerojet-General. The former conducts captive tests on Thor and other missiles, has spent $8 million to date on test stands, blockhouses, advanced instrumentation and supporting facilities.

"When we need equipment for our crash testing programs, we need it yesterday," reports John Goodman, head of the Douglas operation. "We'd welcome some local suppliers."

Aerojet's operation has grown from 7,000 employees the first of this year to an estimated 12,000 by year's end. Manufacturing and testing of liquid and solid rockets constitute major activities at location, much larger than company's headquarters plant in Azusa, Calif. Purchases and subcontracting from the Sacramento site last year totaled $50 million. A significant proportion was for electronics.

Mather AFB, an advanced navigational training site and home base of SAC wing, is another potential customer. In 1957, 85 percent of the $34 million required to operate the base was spent in the Sacramento area. Had there been electronics suppliers in the area, spokesmen say, the percentage would have been higher.

MILITARY ELECTRONICS

• **Quail**, the Air Force's air-launched decoy missile, has been successfully launched by Strategic Air Command long-range bombers. McDonnell Aircraft Corp., the developer, reported that the missile was launched from both B-52 and B-47 bombers and performed perfectly before recovery. The St. Louis firm is producing the missile under AF contracts totaling about $45 million.

• **Navy ships** armed with surface-to-air Terrier missiles will get an improved automatic missile guidance radar system, the AN/SPG-55. New system marks an advance over the SPQ-5 and SPQ-5A. All were developed by Sperry.

• **Well-known** tube manufacturer will soon announce a new glass vacuum tube that operates without a filament and has the same drain as semiconductors.

• **New Automatic Landing System** for USAF will differ from Bell Aircraft's earlier Navy model. USAF version will radar-track signals emitted from plane. Landing instructions will be transmitted by radar tracker.

CONTRACTS AWARDED

Raytheon gets a $833,839 contract with BuAer for services and materials necessary for testing, handling, repair, rework and/or modification of the Sparrow III guided missile.

Lockheed is awarded an $18-million contract by Navy for development and installation of a new submarine detection system for Neptune patrol planes. Navy says it will eventually spend $36 million on the two-year program.

North American gets an $18,928,000 contract from AMC for pro-

duction of Hound Dog, air-to-surface missile to be launched from the B-52G.

Rheem is awarded a $950,000 contract with Army Signal Supply Agency for redirection of work to be performed under contract in the manufacture of 15 surveillance drones.

Erco div. of Nuclear Products gets a $903,000 contract with AMC for maintenance of electronic flight simulators.

Perkin-Elmer receives production contracts totaling over $1.5 million for alignment theodolites, electronic-optical systems used to monitor the guidance system of Jupiter, Thor and other missiles prior to launch. Most of the contracts were received from Ford Instrument.

Martin is awarded a $20.4-million contract by BuAer for production of air-to-surface missile, Bullpup. Guidance, also developed by Martin, is by radio command, controlled from the launching aircraft.

Western Electric sells magnetron tubes to New York Army Ordnance District totaling $787,322.

Motorola gets $690,536 in contracts from Los Angeles Army Ordnance District for production of antennas and for design, development and study programs covering a variety of advanced miniaturized electronic equipment.

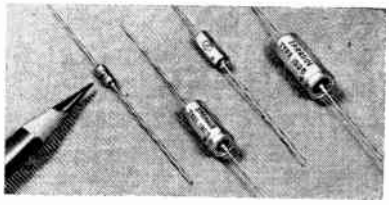
Hoffman is awarded a $33-million contract by AMC for development and production of improved Tacan air navigation equipment. The set measures about 8 by 11 by 17 in., and weighs approximately 60 lbs.

BuShips is creating a big electronic market with construction contracts to four firms for guided-missile frigates: $49.8 million to New York Shipbuilding Corp., Camden, N. J.; $25.3 million to Puget Sound Bridge and Dredging Co., Seattle; $26.4 million to Todd Shipyards, San Pedro, Calif.; and $7.1 million to Bath Iron Works, Bath, Maine.

NEW PRODUCTS

Capacitors solid tantalum

SPRAGUE ELECTRIC CO., 35 Marshall St., North Adams, Mass., has added two new case sizes to increase the maximum capacitances available in its type 150 D series of solid-electrolyte Tantalex capaci-



tors. Maximum capacitances now available range up to 330 μf at 6 v, 220 μf at 10 v, 150 μf at 15 v, 100 μf at 20 v, and 47 μf at 35 v. In addition, the company has now added 10 percent EIA series nominal capacitance ratings to the listings previously available. Further details are given in engineering bulletin No. 3520 C, available on letterhead request.

Mylar Capacitors epoxy encapsulated

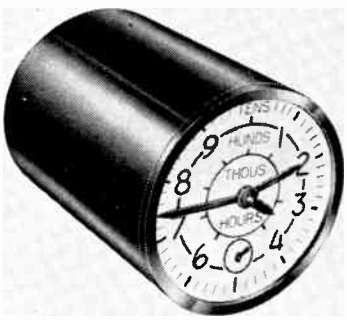
ELECTRONIC FABRICATORS, INC., 682 Broadway, New York 12, N. Y. New epoxy encapsulated Mylar dielectric capacitors for high reliability applications in filters and couplings have been announced. Available in capacitances ranging from 0.001 to 1 μf, for voltages from 100 to 800 v, the units will operate at temperatures from −60 to 125 C without derating. Greater miniaturization is effected because the tube enclosure, end seals, tube fillers and ground insulation are eliminated by the use of a nonconductive case with a hard, extremely thin, moisture-resistant outer shell in round or flat tubular styles. **Circle 50 on Reader Service Card.**

D-C Milliammeter clip-on type

HEWLETT-PACKARD CO., 275 Page Mill Road, Palo Alto, Calif. Model 428A clip-on d-c milliammeter employs a pen-sized probe which clips around a wire without interrupting the circuit. Current is then read directly on the milliammeter. Model 428A thus eliminates the necessity of breaking and resoldering leads, and does not load the circuit under test. The unit, which measures by sensing the magnetic field around a conductor, has full scale current ranges from 3 ma to 1 ampere in 6 steps. Accuracy is ±3 percent ±0.1 ma. The accuracy is unaffected by line voltage changes, instrument aging, or effects of the earth's magnetic field. The instrument is priced at $475 (cabinet mount) and $480 (rack mount). **Circle 51 on Reader Service Card.**

Indicator shows elapsed time

WALTHAM PRECISION INSTRUMENT CO., Waltham, Mass., has developed a new subminiature elapsed time indicator which displays total operational use of electrically powered equipment. Only 1 in. in diameter and less than 2 in. long, it



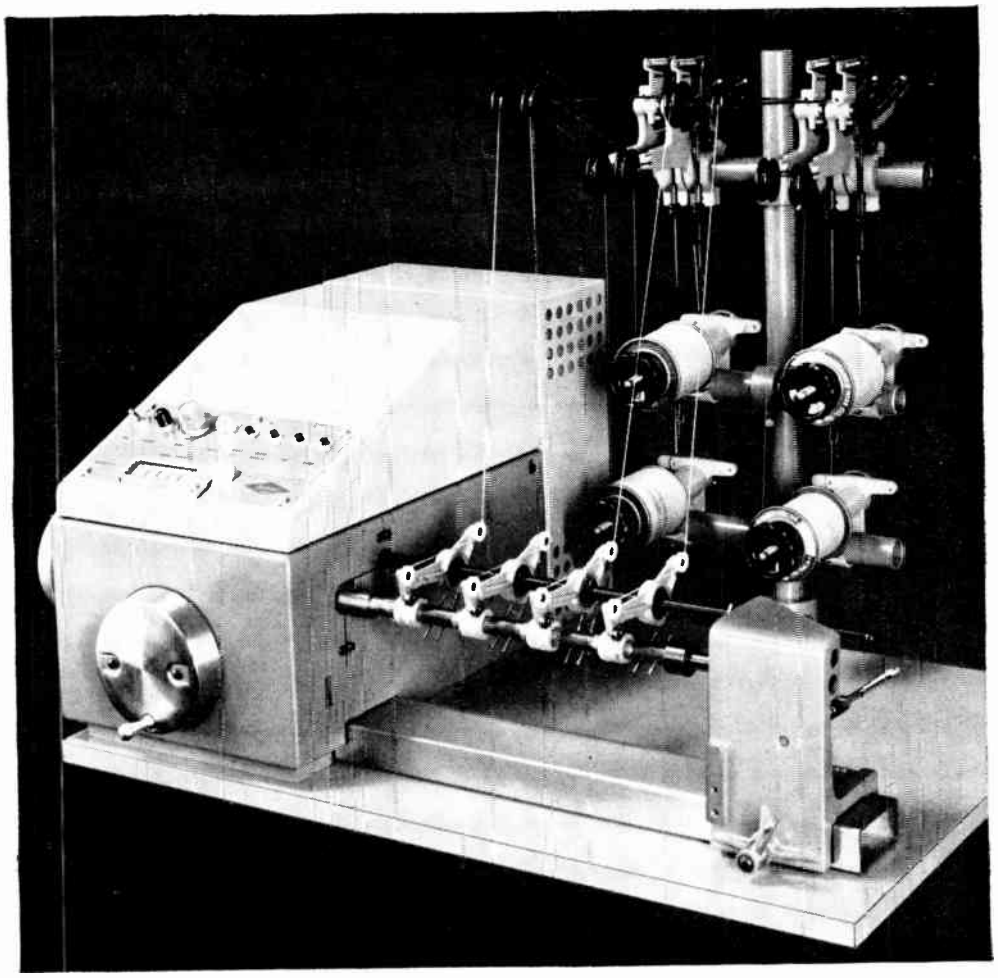
weighs only 3 oz. The device will record up to 10,000 hr, permitting numerous applications in life testing, maintenance checks and qualification testing. The indicator operates on 115 v and can be supplied for either 60 cps or 400 cps frequency. Synchronous speed is attained almost immediately upon application of power. **Circle 52 on Reader Service Card.**

R-F Connectors subminiature

SEALECTRO CORP., 610 Fayette Ave., Mamaroneck, N. Y. The Conhex subminiature r-f connector line now includes six types in the 50 ohm series—type 3000 cable plug, 3001 cable jack, 3002 panel receptacle, 3003 panel jack, 3004 cable feed-through and 3005 right-angle plug. The hexagonal bodies allow assembly or disassembly to be completed with pliers or small wrench, in lab, plant or out in the field. **Circle 53 on Reader Service Card.**

Fine Wire highly stable

MOLECU-WIRE CORP., Scobeyville, N. J. A new fine wire made of an exclusive alloy called Moleculoy is



The No. 111 Cross-Winds
These or any other
Universal Type Coil

Flyback

Pie-Wound

Linearity

Constant pitch progressive

Variable pitch progressive

For Widest Versatility in Cross-Wound Coil Production...

The Leesona® No. 111 Coil Winder

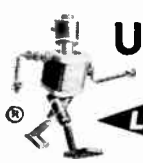
Equipped with a progressive coil attachment, the Leesona No. 111 can be used for high speed winding of variable and constant pitch progressive coils. And an optional pie-winding attachment automatically indexes coils from 3/32″ to ½″ between coil centers.

Besides versatility, plenty of other advantages are built into the No. 111 Cross-Winder. The change gears can be dropped into position on fixed centers, without tools, for quick set-up and proper meshing — a Leesona time-saving exclusive.

Also, breakage of fine wire by abrupt starts is eliminated. An electronic drive starts the arbor slowly, gradually accelerates to full pre-set speed and maintains a constant speed rate for uniform wire tension and coil density.

Winding coils singly or in multiple, the No. 111 produces coils up to 3½″ diameter . . . at high speeds . . . accurately and uniformly . . . reduces rejects . . . is simple to set up, run and maintain. Get further facts by sending for the No. 111 Bulletin.

23B.8.7



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FOR WINDING COILS IN QUANTITY . . . ACCURATELY . . . AUTOMATICALLY

LEESONA

. . . USE LEESONA WINDING MACHINES

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P. O. Box 1605, Providence 1
Rhode Island, Dept. 1212

Please send me:

- ☐ Bulletin on the Leesona No. 111 Coil Winder
- ☐ Condensed catalog on Leesona Winders

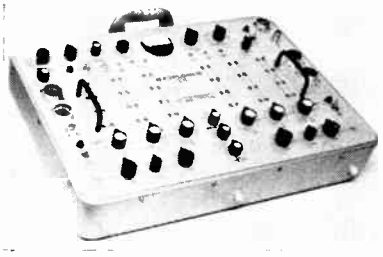
Name.....*Title*.....

Company.....

City.....*Zone*....*State*.....

now available for use in resistors, potentiometers and other precision instrumentation. It maintains its temperature resistance characteristics over temperatures ranging from extremes of −65 to +250 C, possessing a very low thermal emf vs copper. This quality has a particular significance in aircraft, guided missiles and precision electronic equipment. **Circle 54 on Reader Service Card.**

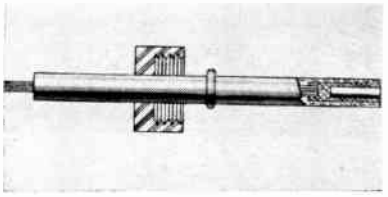
Seismic System all-transistorized



TEXAS INSTRUMENTS INC., Industrial Instrumentation Division, P. O. Box 6027, Houston, Texas. Model 8000 Explorer is a 24-channel all-transistorized seismic amplifier system. Components in the system include 591 germanium transistors, 103 silicon diodes and rectifiers, and numerous tantalum capacitors and carbon deposited precision resistors. Miniaturization achieved thereby is so great that the entire seismograph—complete with control and test circuitry—is contained in one waterproof case weighing only 57 lb. An all-transistorized regulated power supply and lightweight 12-v aircraft battery both are contained in another case weighing but 45 lb. **Circle 55 on Reader Service Card.**

Lead and Terminal for high voltage

CAPITRON DIVISION, AMP Inc., Elizabethtown, Pa., has produced a new lead and terminal for high altitude and high voltage, in 12,000, 25,000 and 35,000 v ratings at 5 amperes. The leads, made of silicone rubber insulated wire, are available in lengths of 3 in. to any desired length. The terminal is made of epoxy and glass fibre or ceramic materials, depending upon performance specifications. Compact design and light weight, coupled with features of rapid disconnect or assembly and positive reliable alignment or mating of wires, makes this connector particularly suited for missile and aircraft applications. **Circle 56 on Reader Service Card.**

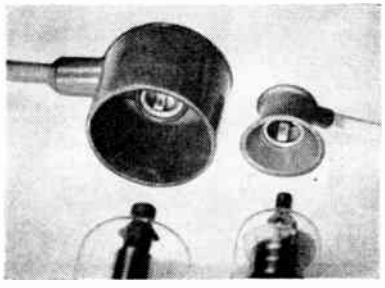


Pot Checker highly accurate

ANALOGUE CONTROLS, INC., 39 Roselle St., Mineola, N. Y. The PC-15 potentiometer checker consists of a 10-turn master pot; a coupling mechanism which permits mounting and phasing of the pot under test and coupling its shaft to the drive mechanism; a drive mechanism which drives the master and test pot and the recorder paper drive; a recorder; trimming facilities for zeroing end error; and a calibration source. **Circle 57 on Reader Service Card.**

Tapped Delay Lines fast rise time

AD-YU ELECTRONICS LAB., INC., 249 Terhune Ave., Passaic, N. J. Type 7T series tapped delay lines consist of thirty sections of m-derived LC networks. Each of these networks was especially designed to achieve (1) linear phase shift beyond 70 percent of the cutoff frequency, and (2) frequency-amplitude response curve approaching Gaussian in shape. For this reason, both the rise time and overshoot of these tapped delay lines are much less than other delay lines with equal time delay. **Circle 58 on Reader Service Card.**



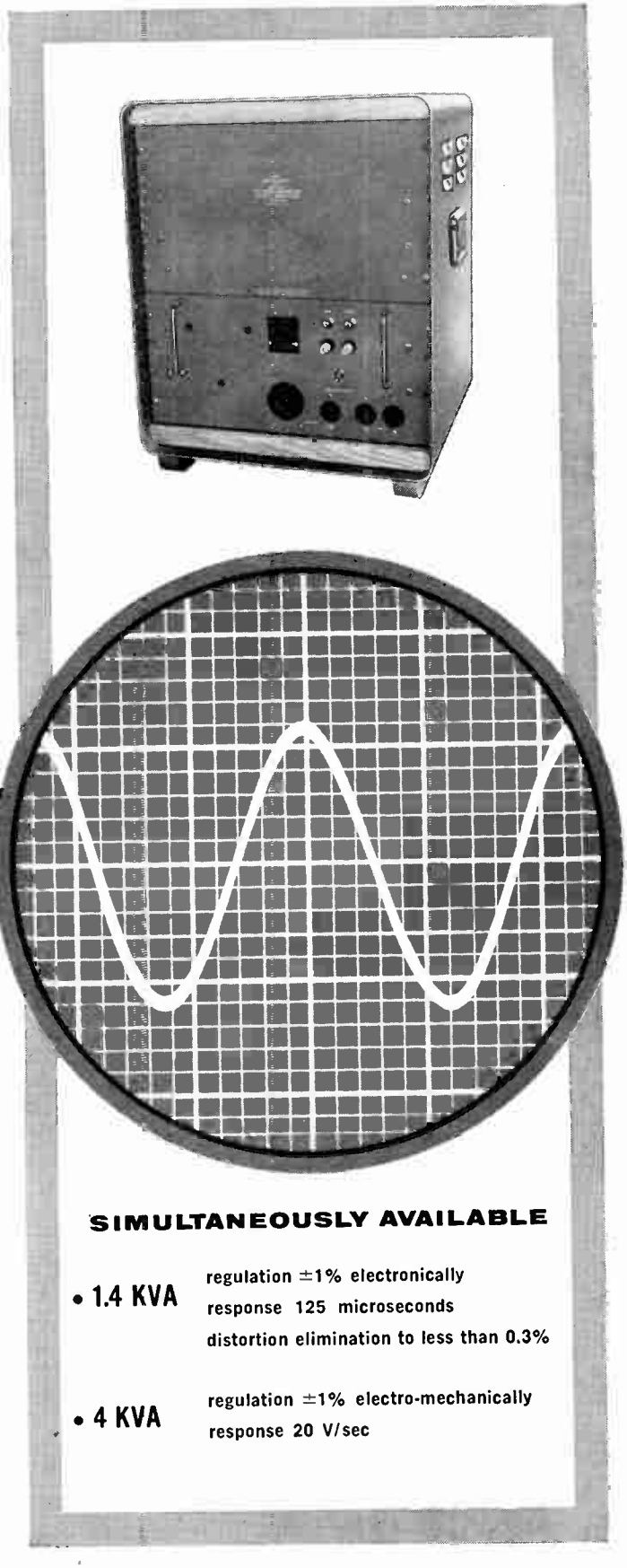
Tube Cap Connectors for airborne uses

ALDEN PRODUCTS CO., 117 N. Main St., Brockton 64, Mass. A new tube cap connector series combines the outstanding thermo, electrical and mechanical characteristics of silicone molding compounds with special connector techniques. They were designed specifically to meet the critical requirements of high voltage, high temperature and high altitude applications, and are particularly suited for special airborne applications. Two types of silicone insulation are now available: (1) glass-filled silicone for highest temperature applications will give reliable service from −65 F to 750 F and will withstand up to 1,000 F for short durations; (2) silicone rubber for high flexibility and resiliency . . . allows the configuration of the tube cap connectors to vary for special applications. **Circle 59 on Reader Service Card.**

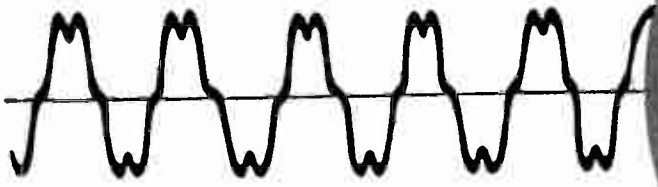
Transistor Tester checks various types

THE REFLECTONE CORP., Post Road and Myano Lane, Stamford,

NEW 400 cycle DEVR



eliminates distortion



regulates voltage

Distortion Eliminating Voltage Regulator responds to transient surges and harmonics, as well as to normal variations caused by line and load changes. The Curtiss-Wright Model 104 DEVR corrects for any deviations of up to 20% from pure sine wave, regardless of their nature, in less than 125 microseconds.

It provides the answer where line fluctuations or distortion cause inaccuracies and loss of engineering and production man-hours in the design and manufacture of electronic systems for aircraft and missiles. In servos and computers, and wherever summing operations are performed, the Model 104 DEVR assures increased accuracy and stability. It is invaluable for standards laboratories and others where accuracy of instrumentation is pushed to extremes; it also increases equipment life by eliminating surges.

Write today for complete information. Price: $1875 f.o.b., Carlstadt, N. J.

The DEVR is also available in 60 cps model.

SIMULTANEOUSLY AVAILABLE

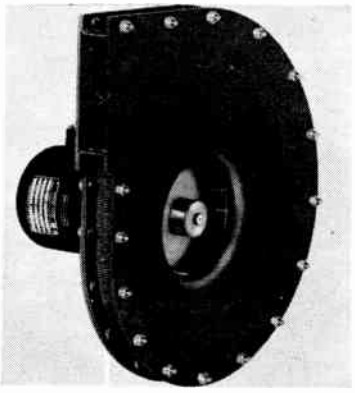
- **1.4 KVA** — regulation ±1% electronically; response 125 microseconds; distortion elimination to less than 0.3%
- **4 KVA** — regulation ±1% electro-mechanically; response 20 V/sec

ELECTRONICS DIVISION

CURTISS-WRIGHT

CORPORATION • CARLSTADT, N. J.

Conn., announces model TT-1 universal transistor tester. The device provides tests for both *npn* and *pnp* units, of the low, medium and high power types, and both socket and external leads are provided to accommodate the various transistor types. It checks leakage and gain characteristics as well as testing for shorts and may also be used to check the reverse and forward current ratio on all diodes. **Circle 60 on Reader Service Card.**

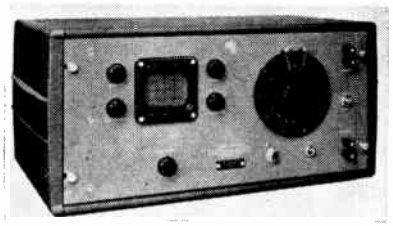


Blower Unit high-altitude

THE TORRINGTON MFG. CO., Torrington, Conn. A special high-altitude blower unit for ventilating and cooling aircraft enclosures and electronic equipment has been designed to meet all environmental conditions in Specification MIL-E-5272A. The SK1991 blower unit, furnished with a totally-enclosed, explosion-proof aircraft motor rated at ¼ h-p and 27 v d-c, is recommended also for military, ground and marine service. Air delivery is 500 cfm at a static pressure of 2.4 in. of water of 65,000 ft. **Circle 61 on Reader Service Card.**

Oscilloscope wide-band response

HYCON ELECTRONICS, INC., 370 So. Fair Oaks, Pasadena, Calif., announces model 622A professional 5-in. oscilloscope. It features wide-band response, high vertical sensitivity that permits display of a full inch of amplitude with a 10 mv input signal, and a triggered sweep which allows the input signal to initiate the sweep without the use of a vernier setting. It provides the high performance necessary for color tv work, or for pulse work in industrial applications. **Circle 62 on Reader Service Card.**



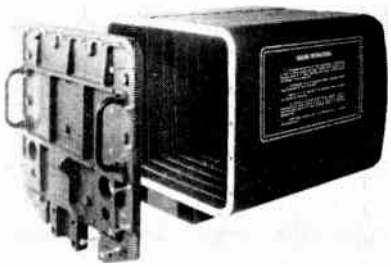
Phase Standard ultrasonic

ACTON LABORATORIES, INC., 533 Main St., Acton, Mass., offers type 706-A ultrasonic primary phase standard. The instrument generates two sinusoidal voltage signals whose phase difference can be varied smoothly from 0 to 360 deg with an accuracy of 0.1 deg. Units are built for any single frequency from 20 kc to 200 kc. The instrument can be used for calibrating h-f phase meters and phase detectors, and phase shifting devices in general. **Circle 63 on Reader Service Card.**

Rugged Amplifiers transistorized

ERCO RADIO LABORATORIES, Garden City, N. Y. Designed especially for railway "physical" telephone systems, the type 494-S (6 v) and type 496-S (24 v), plug-in amplifiers permit a large number of telephones to be bridged across a line for conference calls by a dispatcher. They measure 3½ in. long and 1¼ in. in diameter. Used with a local battery telephone set, the

output or "talk" level is raised 15 db during transmission, and during receiving the bridging impedance is raised to 75,000 ohms, thereby enabling many more sets to be connected across the line without the usual loss. **Circle 64 on Reader Service Card.**



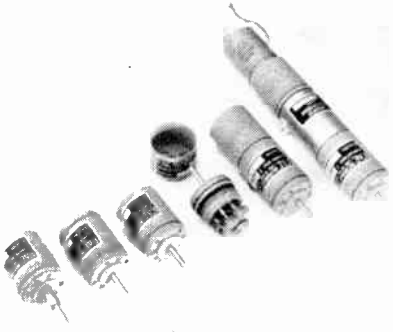
Aluminum Cases pressurized

NORTHEASTERN ENGINEERING, INC., Manchester, N. H., designs and fabricates pressurized aluminum cases for electronic equipment to be used at high altitudes. Contractors or government agencies manufacturing electronic equipment for missile or for high altitude aircraft are invited to submit requirements (specifications and prints) directly to the company.

Wire Color Coder speeds to 500 fpm

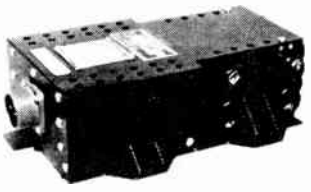
SPECTRA-STRIP WIRE & CABLE CORP., P. O. Box 415, Garden Grove, Calif. Model 701 Spectra-Coder is a sturdy, low cost machine

for use in conjunction with Spectra-Ink, or any other instant drying ink. Speeds up to 500 ft per minute are normal, and any vinyl insulated white wire can be dyed immediately to any one of nine colors. It is particularly useful for color coding shielded and jacketed wire, and the smaller sizes of coaxial line. It is claimed that when used to convert obsolete striped wire to a solid color, this apparatus will pay for itself in thirty minutes of operation. **Circle 65 on Reader Service Card.**



Gear Heads
precision devices

FAF INSTRUMENT CORP., 42-61 Hunter St., Long Island City 1, N. Y. New size 11 precision gear heads are designed for use in conjunction with standard BuOrd MK 14 Mod. 2 (size 11) servo motors and through use of available adapters to other than size 11 motors and systems. All are built for long accurate life at high and low temperature applications and they withstand environmental tests covered by MIL-E-5272A. **Circle 66 on Reader Service Card.**

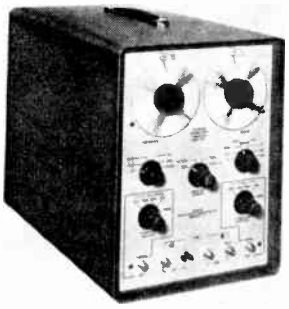


Static Inverter
transistorized

ELECTROSOLIDS CORP., 13745 Saticoy St., Panorama City, Calif. Model W-1347 static inverter converts d-c to a-c without moving parts. The new 100 volt-ampere unit measures 3½ by 7 by 11½ in. and weighs only 7 lb. Its 400 cps output frequency is regulated to ± 1 cycle; output voltage, nominally 115 v, is regulated to ±2 percent. The 3-phase unit, which contains both germanium and silicon transistors, can be mounted on insulation material in remote spots of a missile or aircraft. Input voltage can vary from zero to 40 v d-c without damage to the equipment. **Circle 67 on Reader Service Card.**

Transistors
germanium-alloy

SYLVANIA ELECTRIC PRODUCTS INC., 1740 Broadway, New York 19, N. Y., announces a pair of hermetically sealed *npn* germanium-alloy transistors designed for data processing applications where core drivers operate up to 400 ma current levels. Both feature a junction temperature of 100 C, total dissipation of 200 mw and collector current of 400 ma. Type 2N576 has a 20-v collector to base voltage. The 2N576A has a collector to base voltage of 40 v. **Circle 68 on Reader Service Card.**



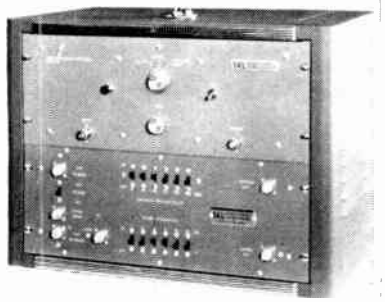
Generator
pulse/square wave

GRUEN APPLIED SCIENCE LABORATORIES, INC., 60 Hempstead Ave., Hempstead, N. Y., announces a versatile new pulse and square wave generator with pulse widths of 0.1 μsec to 0.3 sec. The model PSG-1 features a rise and fall time of 0.02 μsec with a 10 v, 100 ohm output, and of 0.1 μsec with a 50 v, 500

ohm output, with 2 percent calibration accuracy. It is priced at $690. **Circle 69 on Reader Service Card.**

Power Supplies variable-output

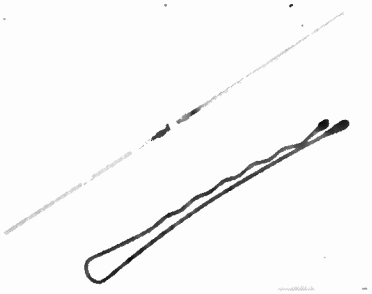
SORENSEN & CO., INC., Richards Ave., South Norwalk, Conn., has a new line of variable-output unregulated power supplies providing both d-c and a-c outputs for general purpose lab or production-line test-bench applications. The RC-Nobatron Rangers consist essentially of a compact, conveniently packaged variable autotransformer, rectifier and filter circuit. Although unregulated, they have very low internal impedance as a result of their conservatively rated components. Models are available to supply d-c voltages ranging from zero to 36 and zero to 150 v, each having available zero to 130 v a-c. **Circle 70 on Reader Service Card.**



Scope Accessories for fast rise time

SPENCER-KENNEDY LABORATORIES, INC., 1320 Soldiers Field Road, Boston 35, Mass. A rise time of 3 millimicroseconds with standard oscilloscopes is now achieved by new auxiliary equipment. Using the company's 320-mc bandwidth

model 206 distributed amplifier as the vertical amplifier of the scope, the application is accomplished by connection of the SKL series 200-28 adapter directly to the crt deflection plates and insertion of the model 200-32 signal control panel into the circuit. The panel combines the required signal splitter, variable trigger delay, signal delay networks, slope compensators and matching and attenuator pads. **Circle 71 on Reader Service Card.**



Germanium Diodes point-contact

ERIE RESISTOR CORP., Erie, Pa. New miniature germanium point-contact diodes are encapsulated in hermetically sealed glass cases measuring 0.265 in. maximum length by 0.105 in. maximum diameter with lead lengths of 1¼ in. minimum. Units are color coded in accordance with EIA standards. The company is manufacturing 11 miniature types for both general purpose and computer applications. **Circle 72 on Reader Service Card.**

Magnetic Counter very small unit

ABRAMS INSTRUMENT CORP., 606 E. Shiawassee St., Lansing, Mich. Model CV magnetic predetermining counter has hundreds of uses in airborne instrumentation, programming, count down, operation limiting, flow metering, and the like. Any count from 1 to 899 may be manually set. Subtractive counter shows count remaining at all times. Normally closed contacts open on next pulse after counter zeros. **Circle 73 on Reader Service Card.**

Literature of

MATERIALS

Synthetic Sapphire. Linde Co., Division of Union Carbide Corp., 30 E. 42nd St., New York 17, N. Y. Brochure F-917 is a resume of single crystal aluminum oxide growth, recent advanced shapes and sizes, and optical, thermal and high temperature physical properties of Linde synthetic sapphire. **Circle 74 on Reader Service Card.**

COMPONENTS

Synchro Data Chart. Theta Instrument Corp., 48 Pine St., East Paterson, N. J. A wall chart contains standardized definitions and connection data to simplify the task of synchro manufacturers and users. **Circle 75 on Reader Service Card.**

Hybrid Junctions. Microwave Development Laboratories, Inc., 92 Broad St., Babson Park 57, Wellesley, Mass. A 4-page catalog provides an up-to-date guide for the selection of precision cast topwall short slot hybrid junctions. **Circle 76 on Reader Service Card.**

Synchros, Servos, Amplifiers. Ketay Department, Norden Division, United Aircraft Corp., Commack, L. I., N. Y., has published a bulletin with specifications and outline drawings for size 8 synchros, servo motors and transistorized amplifiers. **Circle 77 on Reader Service Card.**

Precision Switches. Unimax Switch Division, The W. L. Maxson Corp., Ives Road, Wallingford, Conn. A 4-page catalog-digest covers the Unimax line of miniature snap-acting precision switches; includes photographs, descriptions, actuator types, force-and-movement specifications, and electrical ratings. **Circle 78 on Reader Service Card.**

Rotary Multipole Switches. Electro Switch Corp., Weymouth 88, Mass. A 20-page catalog covers

the Week

a line of rotary multipole switches. Standard tap, transfer, and selector switches are illustrated and technically described. Circle 79 on Reader Service Card.

EQUIPMENT

Constant Current Generator. Electronic Research Associates, 67 Factory Place, Cedar Grove, N. J. A new catalog sheet describes model CC2000 transistorized constant current generator which is intended for transistor biasing and test, solenoid operation, twt powering and similar uses. Circle 80 on Reader Service Card.

Marking Machines. Markem Machine Co., Keene 80, N. H. Eight machines for direct-marking components, parts and packages with the U. L. manifest label legend are described in a new 8-page catalog. Circle 81 on Reader Service Card.

Digital Voltmeter. Kin Tel, Box 623, San Diego 12, Calif. A recent technical data sheet covers the model 801, a portable, all-electronic digital voltmeter that measures d-c voltages to an accuracy of 0.1 percent, and presents them on an in-line readout every $\frac{1}{10}$th sec. Circle 82 on Reader Service Card.

Data Control. Epsco Inc., 588 Commonwealth Ave., Boston 15, Mass., has available a folder on its data control developments. Included are system building blocks, commercial systems, military systems, instruments and components. Circle 83 on Reader Service Card.

FACILITIES

Environmental Testing. Belock Instrument Corp., 111-01 14th Ave., College Point, N. Y., has issued an illustrated brochure of its environmental testing lab facilities which provide for the complete evaluation and testing of all types of commercial and military equipment. Circle 84 on Reader Service Card.

Citizens Radio Sales Grow

New low-cost 27-mc units appearing on market attract buyers. Makers expect brisk class D sales

CLASS D CITIZENS RADIO service set up last September has resulted in development of several new units now going on the market.

New service operates at 27 mc. The equipment designs possible at this frequency lead several manufacturers to expect brisk future sales of low-cost radio gear. The 27-mc equipment is limited to 5 w maximum input to the final stage. Type acceptance requires a-m broadcasting only.

Early entry into the new market was Kaar Engineering Corp.'s model TR 325 which has recently received FCC type acceptance. Rig sells for $360.

Three models are being produced by International Crystal Manufacturing Co. They are priced at $95, $125 and $150. Another model, by Morrow Radio, is expectetd to be on the market next March. It will probably cost between $150 and $175.

When the Citizens Band was first established in 1951, applications for the service were small in number. Despite the small market, equipment became available for point-to-point or for fixed-station-to-vehicle two-way communication.

In time, the Citizens Band became populated with equipment costing upwards of $700 per mobile unit. A substantial portion of band users were commercial enterprise operators not eligible for licenses in the other radio services. Many of these licensees are now shifting to regulated frequencies in the Business Band established last August.

There are many, however, who do not expect to shift. These are users of class B Citizens radiotelephone. One manufacturer of this type of equipment, Vocaline Company of America, sells a complete two-way radio for as low as $75. It will operate from a car battery or 117-v source. Range varies from a few hundred yards to about 50 miles or more. Typical users are surveyors, dredgers, lumber yards, tugboat operators.

The class B licensees will operate on 465 mc under FCC rules that became effective Sept. 11. Rules for class B stations, as well as class D, state that the center of the radiating antenna must be within 25 feet of the transmitter and control equipment.

FCC ACTIONS

• **Notifies** that type acceptance for radio transmitters licensed in the Aviation Services will become effective Jan. 1, 1959. Notice states that equipment in use prior to this date may be kept in operation until Jan. 1, 1965, if it complies with current standards of the rules.

• **Invites** comment to EIA proposal to continue until Dec. 31, 1960, present temporary 1,000-microvolts per meter at 100-ft radiation limit applicable to uhf-tv receivers. Proposal is based on industry opinion that 500-microvolts per meter limitation slated to apply after end of 1958 cannot presently be met.

• **Notes** receipt of eight applications from City of Philadelphia Water Department for Special Services allocations at frequencies above 890 mc. Spectrum usage will be for city's microwave net to govern water supply.

• **Amends** rules governing shore-based Maritime Radio stations to revise requirements for suppression of spurious emissions. Amendments apply only to transmitters operating above 30 mc which are subject to type acceptance requirements.

• **Denies** petition by Daytime Broadcasters Association to withhold action on license renewal for 12 class 1-A a-m stations until final report and order in clear-channel proceeding is issued, or until current freeze on class II stations on class I channels is lifted.

• **Accepts** application from Butler U., Indianapolis, to drop erp.

STATION MOVES and PLANS

WBRC-TV, Birmingham, Ala., plans equipment changes to permit station WTAF-FM to use WBRC's transmission lines and antenna as radiating system for the f-m station.

KODE-TV, Joplin, Mo., files for renewal of license.

WFMU, East Orange, N. J. (Upsala College) requests license to cover c-p authorizing change in antenna-transmitter location and operation of transmitter remotely.

KLIR-FM, Denver, applies for extension of completion date.

WBEN-FM, Buffalo, N. Y., seeks c-p to change frequency from channel 293 to channel 273, raise erp from 15.5 kw to 32.6 kw, install

new antenna, change antenna height from 1,320 to 1,347 ft for auxiliary transmitter.

KNEZ, Lompoc, Calif., files for c-p to up power from 500 w to 1 kw, make changes in transmitting equipment.

WPGC, Morningside, Md., asks change in license to allow moving main studio and station location to Washington, D. C.

KGAY, Salem, Ore., requests c-p to change frequency from 1,430 kc to 1,550 kc.

WSJG, Mimia, Fla., receives extension of completion date to Mar. 27, 1959.

WBBQ-FM, Augusta, Ga., obtains c-p to change antenna-transmitter location, increase erp to 19.3 kw, change antenna height to 682 ft.

WTIX, New Orleans, receives license covering installation of a new transmitter as auxiliary at present location of main transmitter.

WAEL, Mayaguez, P.R., is granted permission to change antenna-transmitter location.

KRCW-FM, Santa Barbara, Calif., obtains extension of completion date to May 15, 1959.

WSOM, Salem, O., plans to change type of transmitter.

KHBC-TV, Hilo, Hawaii, files for voluntary transfer of control of licensee corporation from Consolidated Amusement Co., Ltd., to Hialand Development Corp. Transfer also includes KGMB-TV, Honolulu, and KMAU-TV, Wailuku, Hawaii.

KFYM, Santa Maria, Calif., applies for license to cover construction of a new frequency-modulated broadcast station.

KRNY, Kearney, Nebr., requests permission to change frequency from 1,460 kc to 910 kc, and increase height of antenna.

Panama Invites Reexporting

Colon Free Zone offers 90 percent income tax discount on all electronics reexport profits

PANAMA is offering tax inducements and other advantages to international traders in her 90-acre Colon Free Zone. U.S. electronics firms that wish to do business with Latin America, or expand their trade in the area, may want to investigate the Zone.

A 90-percent discount in income taxes on all net profits earned from reexport trade is granted by the Panamanian Government. On the first $1 million net income the tax is about $30,000, with a tax of about $40,000 on each subsequent million dollars in net income.

M. Edgardo Duque, General Manager of the Colon Free Zone, in New York recently to attend the National Foreign Trade Convention, told ELECTRONICS that at least one large U.S. electronics firm has been considering a Free Zone operation. He said that present electronics activity in Panama has been limited to local agents representing American firms.

Duque argues that many U.S. electronics firms could serve their Latin American customers better by setting up an operation in the Zone to maintain an inventory of spare parts and distribute them as needed. In other words, an electronics exporter could set up an office just to control shipments from a warehouse in the Zone to other countries.

Duque told ELECTRONICS that there is no import duty on equipment entering the Zone unless it is for sale in the Republic of Panama.

He said that Panama grants a 20-year contract to U.S. firms that set up either reexport subsidiaries or manufacturing-assembly operations. Such agreements, he stressed, will have the force of contracts regardless of the government in power.

For U.S. electronics firms uncertain whether to manufacture in Panama for the Latin American market, or just to reexport U.S.-manufactured goods from the Free Zone, Duque suggested that it might "be best for them to start a reexport operation first on a trial basis." He said that such a contract might permit eventual electronic manufacture or assembly, if the U.S. firm later decided that such an operation would be profitable.

Because Panama is anxious to solve its unemployment problem, he explained, manufacturing subsidiaries that are set up in the Zone will not have to pay a tax on exports.

Special study just prepared by the International Department of the Chase Manhattan Bank says the tax discount on Colon Free Zone reexport operations also permits accumulation of profits for reinvestment abroad.

"Considering everything," concludes the bank study, "Panama is perhaps the most desirable base country in the dollar area for the establishment of a subsidiary corporation to develop a firm's international trade."

DEVELOPMENTS ABROAD

• **European Common Market** advantages are believed behind the new agreement between France's CSF (Compagnie Generale de Telegraphie sans Fil) and Italy's Finmeccanica. Agreement provides for joint production of industrial and military electronics equipment through a new firm in Italy, Industrie Riunite Electroniche & Meccaniche. Common market starts functioning in January.

• **In Leningrad** development of a semiconductor thermometer to determine optimum planting time for wheat and corn is reported by the Aerophysical Institute. It may replace large mercury thermometers as well as expensive and cumbersome electric thermometers now in use. Metal stem tipped with a thermal-sensitive semiconductor is inserted in the plowed layer of soil; it's wired to a small instrument which indicates soil temperature. Similar thermometer measures temperature in granaries.

• **In Sydney, Australia,** the Metropolitan Water Board is designing a transistorized indicator system for a low-level sewerage pumping station. System will connect 10 pumping stations on one telephone line; identity of each station and the conditions existing there will be recorded automatically on an electron counting tube. The Board is already successfully using 13 transistorized audio-frequency pipe locaters.

EXPORTS and IMPORTS

In Australia General Telephone Corp. has sold its Sydney affiliate, Automatic Electric Telephones Ltd., an electronics manufacturer, to an Australian industrial concern, Clyde Industries Ltd. It's understood that Clyde will keep certain overseas links and negotiate new license agreements for manufacture of U.S. electronic equipment.

In Sweden Solartron Electronic Group, of England, is forming a subsidiary to sell and service its products. Solartron has other subsidiaries in Italy and West Germany.

In India both Westinghouse and the West German firm, Siemens-Reiniger Werke, are about to build

plants to manufacture X-ray equipment. Indian imports of X-ray gear in 1956-57 amounted to $1.2 million. Officials estimate demand for X-ray gear next year will amount to $1.68 million.

Hungary is building a $5.6-million plant to produce tubes for television. Annual output of 30,000 tubes is expected at first, rising to 200,000 by the end of 1960.

International distribution of communications products of the Gonset division of Young Spring and Wire Corp., Burbank, Calif., will be handled by the Westrex Corp., a division of Litton Industries, under a new agreement just reached. Litton recently acquired Westrex from the Western Electric Co.

In West Germany the Dresdner Bank has just put into operation a new Remington Rand Univac calculating tabulator at a reported cost of $350,000.

Venezuela's Institute of Scientific Research has ordered from Tracerlab two automatic monitoring systems for its new research reactor and laboratories. Firm says the gear will give continuous radiation monitoring and control of reactor effluents before discharge to the environment or retention tanks.

Argentine National Telecommunications Enterprise (ENTEL) has awarded a $7,255,000 contract for telephone equipment to Standard Electric Co. of Buenos Aires, Argentine subsidiary of International Standard Electric Corp.

In West Germany two new signs of electronics growth are reported:

- **In Hanover** Telefunken is building a second plant to produce radio sets at an estimated rate of one every 30 seconds. Plant will start operations at half capacity next spring. Other Hanover plant will then be used only for tv set production, turning out units at rate of one every 20 seconds.
- **In Aachen** Valvo GmbH, a Philips subsidiary, has almost doubled area of its tv tube plant to 24,000 sq meters and is slated to turn out 800,000 units this year.

Sylvania Opens Tube Plant

FORMAL opening of Sylvania Electric Products Inc.'s new 190,000-sq ft receiving tube plant took place recently in Altoona, Pa. New facility is part of Sylvania Electronic Tubes, a division of the company, which produces a wide variety of receiving tubes, subminiature tubes, television picture tubes and c-r tubes for commercial, industrial and military applications.

Designed by the company's Facilities Planning Office at Williamsport, Pa., the new structure is fully air-conditioned, thus ensuring constant temperature and humidity control, factors vital to the production of high-quality electron tubes. The plant contains approximately 110,000 sq ft of production space and features one of the most modern systems for d-c voltage generation and distribution.

The new plant replaces two smaller tube plants in Altoona. William B. Bowes remains as manager of the operation, a post he has held for the past eight years.

Speaking at the opening, Don G. Mitchell, chairman and president of Sylvania, said that sales volume of the receiving tube industry will rise to the level of about 450 million tubes a year due, in part, to the development of new types of electron equipment and new applications for already existing equipment.

DuMont Labs Ups Gordon

NEWLY appointed general manager of tube operations at Allen B. DuMont Laboratories, Inc., Clifton, N. J., is Joseph P. Gordon. He had been acting manager for the past few months.

Tube operations includes the design, engineering, production, and sale of industrial and special crt's, multiplier phototubes, storage tubes, special display devices, and tv picture tubes.

Gordon first joined the DuMont organization in 1950. He has served as administrative assistant and manufacturing manager for tube research, assistant director of tube research, and manager of the Industrial Tube Division.

Philco Sets Up Space Lab

THE Government and Industrial Division of Philco Corp. recently

"George is great . . . right where he is!"

If ever a compliment could cut the ground out from under a man — you just read it. Just make sure your management never says it about you.

Once upon a time, business moved at a slower pace, and people and things were sort of tidily pigeonholed. So many companies were wedded to a single product, a modest plant, simple processing, comfortable competition, family ownership and one-man rule.

Once upon a time, you could be a specialist in a particular part of a particular business, live within narrow walls, and everything was just dandy. No longer! Today, job isolation is stagnation. Companies, products, industries, have cross-bred like crazy. Anybody's business is everybody's business. Being "an expert" is always essential in depth, lacks much in breadth.

Look ahead, read ahead, get ahead. Open up this magazine, and start reading as you never have before. In the past, your eye instinctively has spotted the pages concerned with you and your job, and you've read this material and used it. Now, take the next big step. Read the stories involving other job functions, other men's brand of problems in your field. Get on speaking acquaintance with all the phases and facets of your business — what one McGraw-Hill publisher so aptly calls "Cross-Communication."

You see — you, yourself, are really two men . . . one well-versed in your specialty . . . the other, well-informed on "the big picture". And this same one McGraw-Hill publication is edited to satisfy both of you. How well? Read on, and be pleasantly and profitably surprised.

McGRAW-HILL SPECIALIZED PUBLICATIONS

The most interesting reading for the man most interested in moving ahead

announced the establishment of a specialized Space Communication Systems Laboratory.

S. C. Speilman, director of engineering for the division, also announced that F. X. Rettenmeyer, manager-space communication systems engineering, will be in charge of the laboratory.

Rettenmeyer will consolidate all space communication activities of the G and I division in the Philadelphia area into the new laboratory and be responsible for the development of advanced space communications systems.

Motorola Hires Staff Scientist

ERNEST A. KELLER has been named to the newly created post of staff scientist for the Chicago Military Electronics Center of Motorola, Inc.

In his new position, he will function as senior technical advisor and consultant to the company's Military Electronics Division, reporting to the director of engineering.

Prior to joining Motorola, Keller was director of research for Panellit Inc. of Skokie, Ill., where he has been active in the development of data reduction systems and solid state annunciator systems.

Tidball Joins Virginia Firm

FORMERLY with Remington Rand Univac, Frank E. Tidball has joined General Kinetics Inc. in Arlington, Va., as staff electrical engineer. Having worked in the field of electronic digital computer design and construction since 1946, he is a consultant in the installation and maintenance of large-scale computer systems.

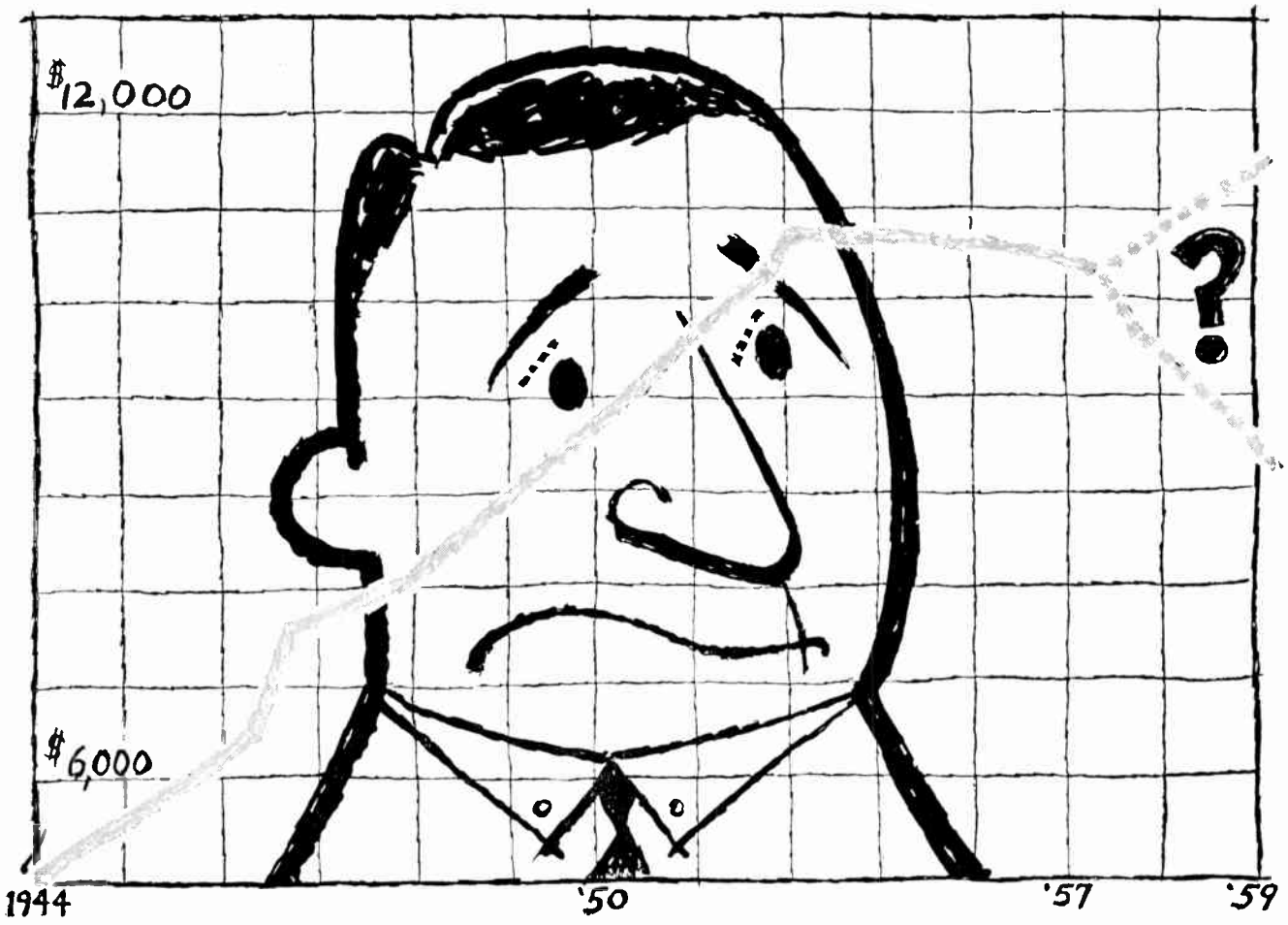
Name Hambleton Tube R&D Head

APPOINTMENT of Philip N. Hambleton as supervisor of research and development—tubes, has been announced by M. F. Callahan, v-p and general manager—receiving tube operations for CBS-Hytron, Danvers, Mass.

Hambleton was previously senior physicist in the tube research and development laboratory. Prior to joining CBS-Hytron, he was associated with Sylvania Electric Products and Philco Corp., and served as supervisor of Superior Tube Company's electronics laboratory. His experience includes ruggedized tube design, cathode materials technology, and electron tube applications.

Adler Appoints Two New Chiefs

CARMEN J. AUDITORE and Sheldon Newberger have been appointed chief electronic and chief mechanical engineer, respectively, at Adler



The "career-curve" of a man named Carter

Charlie Carter started out like a ball of fire. First ten years — terrific! Then he seemed to slow down. Other men — younger newcomers — passed him by. Why?

What happened to Charlie? Nothing. It's what has been happening to industry. Business has become so big and busy, it moves too fast for men who seem satisfied with the status quo. Never have management ranks been so wide open for "get-up-and-go" men.

Look ahead, read ahead, get ahead. Know your job inside out. Be an "authority". But don't stop here. Be a growing man . . . equally knowing on the cross-currents of other job functions within your company — well-informed on the working inter-relationship of all operations — the big picture.

How can you do this comfortably? With the business publication you have in your hand right now. Its editors know your field. They work in it — right at your side. They are your eyes and ears. They go to the places you would go if you had the time. They look, listen, question for you. They review, analyze, edit . . . deliver all that is important to you. They eliminate the non-essential and the time-wasting. They do this fast and accurately. And because they write about that which is as close to you as your own family — your future . . . you will find your favorite McGraw-Hill publication more and more a pleasure as well as a profit to read.

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Electronics, Inc., New Rochelle, N. Y.

Since joining Adler in 1953, Auditore has been active in audio console, tv transmitter and precision test equipment development; and the design and installation of complete tv stations.

Newberger, a specialist in transportable communications and missile ground support equipment, was formerly chief mechanical engineer of Otis Elevator Company's Electronic Division.

News of Reps

Isochem Resins Corp., Providence, R. I., names the **Mechelec Sales Co.** of Medford, N. J., as its sales rep in the Mid-Atlantic territory. This territory includes the southern half of New Jersey, Delaware, Maryland, the District of Columbia, and the eastern half of Pennsylvania.

Hewlett-Packard Co., Palo Alto, Calif., manufacturer of electronic test instruments, is now being represented by **Edward A. Ossmann and Associates** in the upstate New York area west of the Hudson River, but excluding the Kingston region.

Computer Engineering Associates, Inc., has named **Hytronic Measurements, Inc.**, as manufacturers reps for New Mexico, Colorado, Utah, Wyoming, the eastern portion of Idaho, the northwestern portion of Nebraska and the county of El Paso, Texas.

Baird-Atomic, Inc., Cambridge, Mass., has appointed **Northern Associates** as manufacturers reps for sales and service. They will handle B-A's transistor testing and semiconductor testing equipment lines in the upstate New York area.

Recent appointment of **Halgin Sales Co.** as sales rep for its Kansas, Missouri and southern Illinois territory has been announced by International Resistance Co., Philadelphia. Rep firm, located in Mission, Kansas, will service both industrial manufacturers and electronic distributors.

INDEX TO ADVERTISERS

* See advertisement in the June, 1958 Mid-Month ELECTRONICS BUYERS' GUIDE for complete line of products or services.

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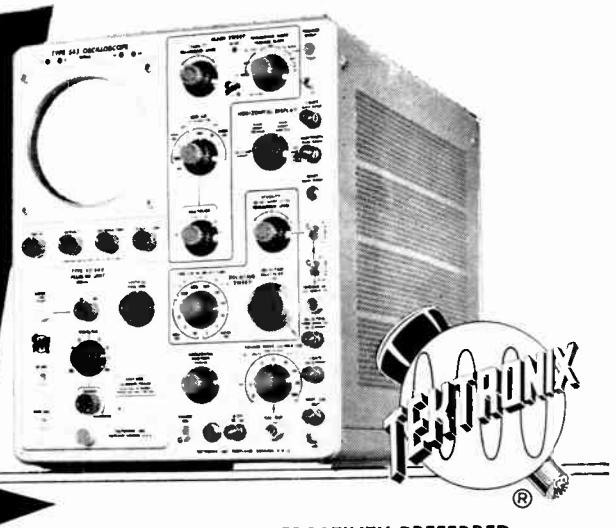
HOW TEKTRONIX SWEEP DELAY

makes the oscilloscope even more useful!

Two Tektronix Oscilloscopes, Type 535 and Type 545, have the additional advantage of sweep delay. The amount of delay is controlled by a second sweep generator. You can use this "delaying" sweep to:

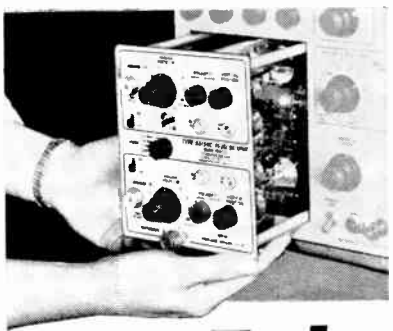


START THE OSCILLOSCOPE SWEEP WITH THE FIRST TRIGGER RECEIVED AFTER A CONTROLLABLE TIME-DELAY PERIOD. This is an important reason for the extra sweep generator and its associated pickoff circuit in Tektronix Type 535 and Type 545 Oscilloscopes. Triggering the delayed sweep by the observed signal guarantees a jitter-free display . . . ideal for examination of time-modulated pulses and signals with inherent jitter.

START THE OSCILLOSCOPE SWEEP AT THE END OF A CONTROLLABLE TIME-DELAY PERIOD . . . convenient for observation of occurrences after an accurately determined time interval.

MAKE MORE ACCURATE TIME-INTERVAL MEASUREMENTS. A calibrated ten-turn time-delay control divides each of the twelve delay ranges into a thousand units. Range accuracy is within 1%, incremental accuracy on any range is within 0.2% of full scale.

TRANSFER PART OF A DISPLAY TO A FASTER SWEEP. By initially displaying a signal on the extra, delaying sweep, and then transferring it to the main oscilloscope sweep, a continuously adjustable horizontal expansion can be obtained. Degree of magnification is determined by the time/cm ratio between the two sweeps. The average jitter of 1 part in 25,000 permits practical use of very large magnifications. Further, the exact portion of the display on the delaying sweep that will appear on the faster main sweep is positively identified by trace brightening. Unblanking pulses for both sweeps are applied to the crt grid, causing the main sweep to show up as a brightened portion of the display on the delaying sweep.



ARM THE OSCILLOSCOPE SWEEP FOR TRIGGERED ONE-SHOT OPERATION. A front-panel pushbutton or an electrical signal from a remote location can be used instead of the internal delayed trigger to arm the sweep. After the button is pressed, or the pulse received, the next trigger causes the main sweep to fire once and revert to the lock-out condition. Photographic recordings of a single transient made in this manner cannot be blurred by spurious signals following its occurrence. Because the single sweep can be triggered any time after the button is pressed or the pulse received, the time of occurrence need not be accurately predictable.

GREATER VERSATILITY PREFERRED

Customer preference for the Tektronix Oscilloscopes with a delaying sweep, Type 535 and Type 545, indicates that the increased utility is valued at much more than the small additional cost. Application possibilities of these versatile instruments make them worthy of your serious consideration.

TYPE 535 and TYPE 545 CHARACTERISTICS

Delay Specifications

A calibrated twelve-step range control and a ten-turn precision control provide for continuously-variable coverage of the full sweep-delay range—1 μsec to 0.1 sec. Range accuracy is within 1%, incremental accuracy within 0.2% of full scale. Time jitter is less than 1 part in 20,000 in conventional sweep-delay operation. Display is completely jitter-free in triggered operation. The delaying sweep can be used as a rate generator, producing trigger rates from 10 cycles to 40 kc, continuously adjustable. The delayed trigger is available at a front-panel connector for external applications.

Other Specifications

Main-sweep range is 0.02 μsec/cm to 12 sec/cm continuously variable, with 24 calibrated steps accurate within 3%. Accelerating potential is 10 kv. Vertical-amplifier response with Fast-Rise Plug-in Units... Type 535, dc to 11 mc—Type 545, dc to 30 mc. Nine plug-in vertical preamplifiers are available for complete signal-handling versatility.

Type 535 (without plug-in units).....**$1300**
Type 545 (without plug-in units).....**$1450**

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Your Tektronix Field Engineer or Representative will be hoppy to furnish complete specifications ond arrange a demonstration at your convenience.

ENGINEERS—interested in furthering the advancement of the oscilloscope? We have openings for men with creotive design ability. Please write Richord Ropiequet, Vice President, Engineering.

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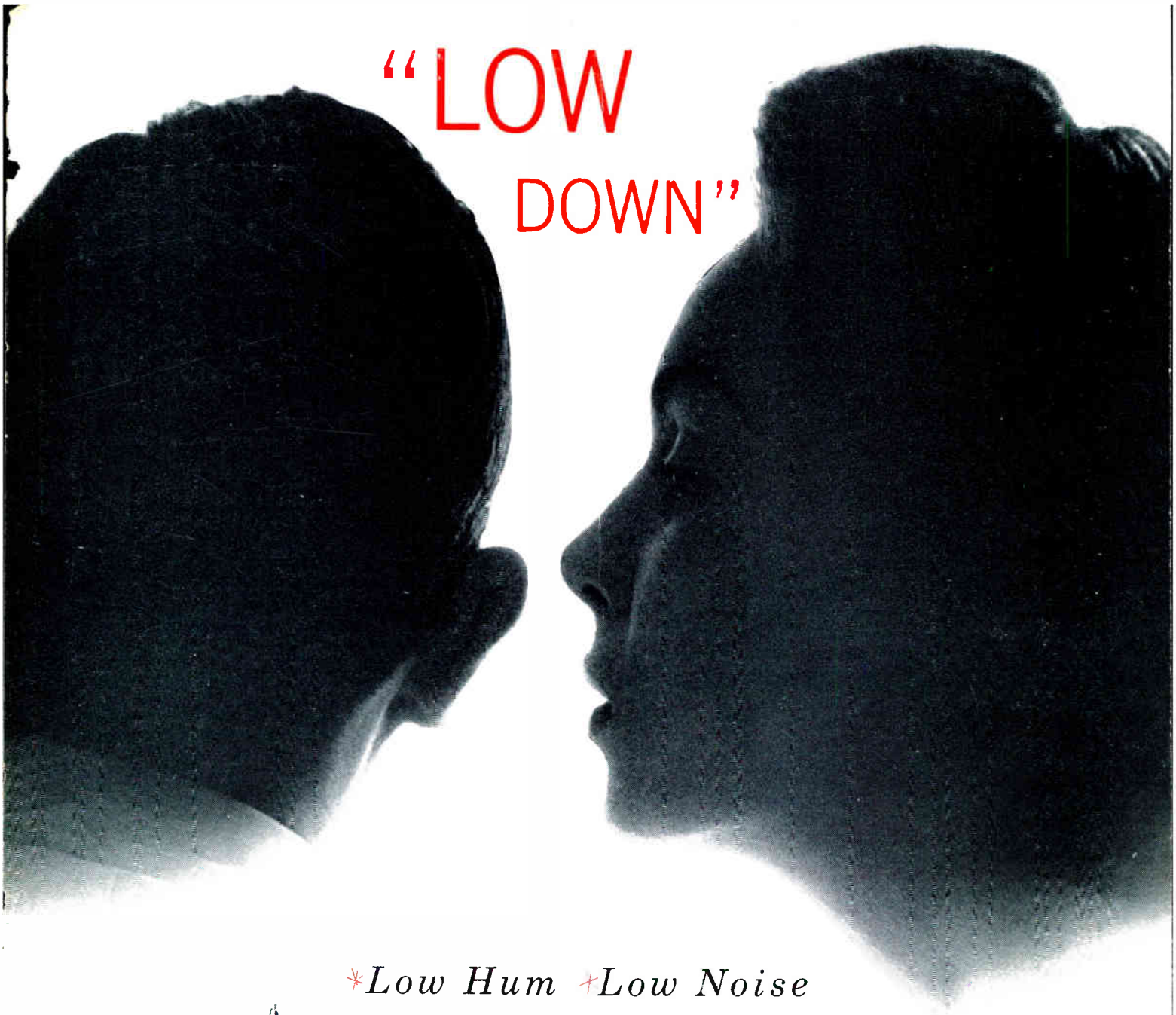

*Low Hum *Low Noise

...outstanding features of the

NEW RCA-7199 FOR HI-FI!

Here's the "low-down" on a most unusual triode-pentode, the RCA-7199. Unusual, because it's a triode-pentode that features low hum and noise. RCA engineers developed the 7199 to be a hard-working "silent partner" in your tone-control amplifier, phase-splitter, and high-gain voltage-amplifier circuits.

To be more specific, let's outline a typical Hi-Fi audio amplifier circuit employing the RCA-7199. First, we'll use two 6973's, new beam power tubes by RCA of course, in the output stage. Then, with the pentode unit of the 7199 as a voltage-amplifier and the triode unit as a phase-splitter, we have a circuit that can provide a sensitivity of 1.2 volts for a power output of 15 watts with a distortion of less than 0.5%.

Some of the design features of the 7199 include the use of special heaters to reduce hum and noise. An exceptionally sturdy cage structure mounted on short stiff stem leads effectively lowers noise and microphonic effects. Separate cathodes for the triode and pentode units and an internal shield to minimize electrical coupling between the units permit greater flexibility of circuit design.

That's just part of the "low-down" on the 7199. Your RCA Field Representative can give you much more information. Ask him or write RCA Commercial Engineering, Section L19Q-2, Harrison, N. J.

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