

AUGUST 8, 1958

electronics

business edition

A MCGRAW-HILL PUBLICATION • VOL. 31, NO. 32 • PRICE FIFTY CENTS

Helicopters Build Big New Market



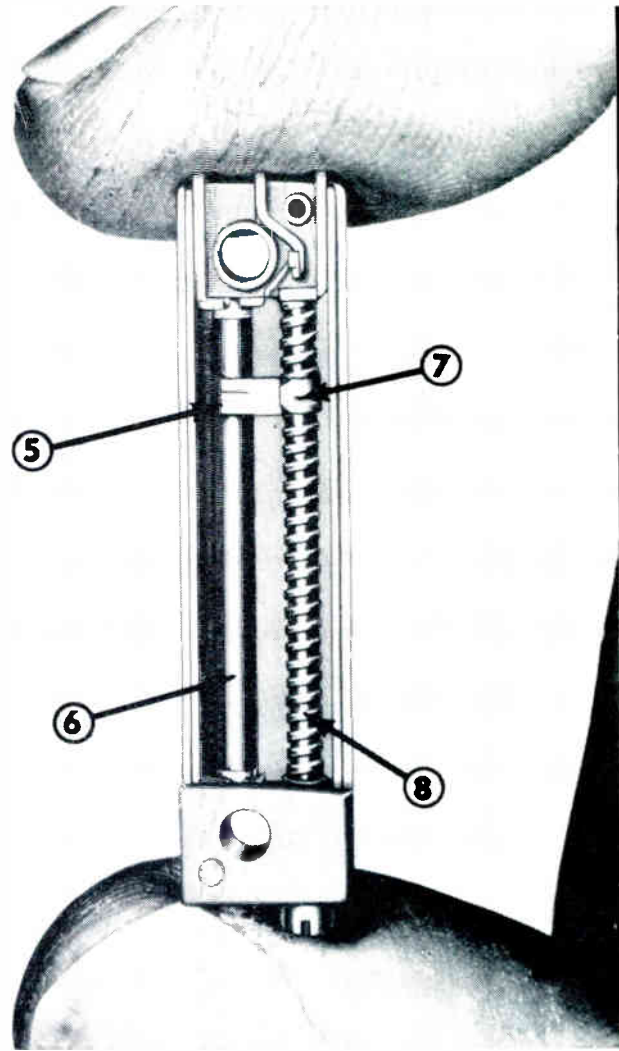
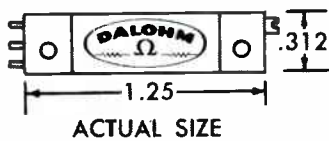
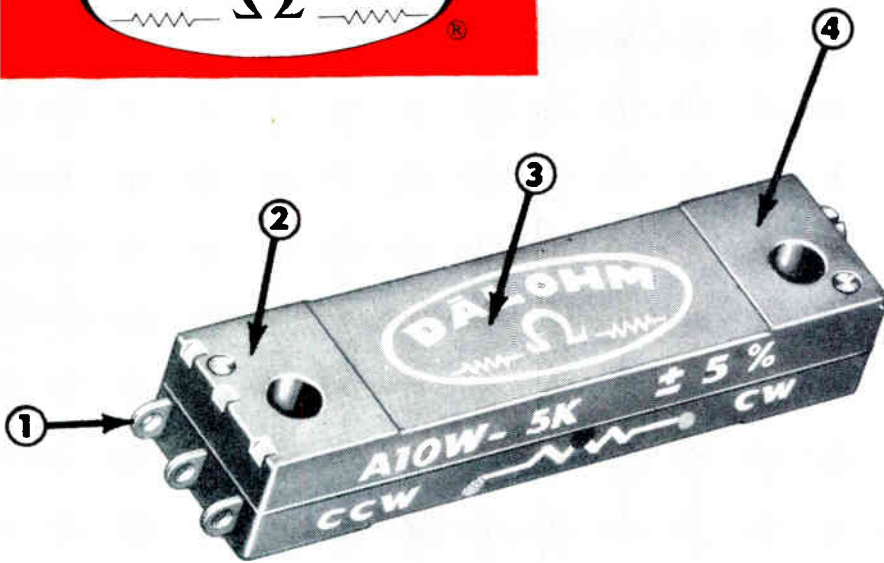
Electronic stabilization equipment
makes battlefield chores easier... p 13

WESCON Mirrors Industry Optimism

Theme of show is "look ahead,"
firms ready hard-sell campaign... p 17



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1. Three terminal types available: Standard solder lug type shown above, printed circuit type, and with insulated wire leads. All terminals are treated to facilitate easy soldering.
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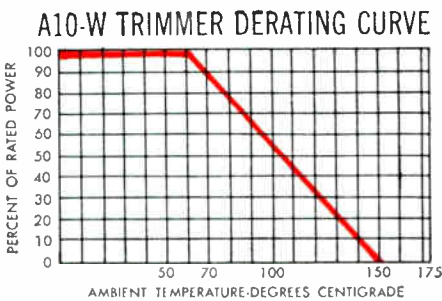
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Shoptalk . . .

PACKING UP? Right about now 30,000 electronics engineers and businessmen are. They're going to the 1958 Western Electronics Show and Convention in Los Angeles.

Of course, Pacific Coast Editor Hood is already on the spot. In fact, he has been working with convention officials for several months now.

According to Hood, the atmosphere of the show will be strictly business with emphasis on electronic components and specialties and plenty order blanks in evidence among the representatives of some 700 companies with exhibits. For a report direct from Los Angeles, turn to p 17.

WHIRLYBIRDS. Pushbutton flight control systems have already taken the helicopter out of the hard-to-manage, fairweather category.

Army, Navy and Marines are finding a surprising number of new uses for 'copters, buying new ones (Army will buy 260 in fiscal '59), refitting old ones with new electronic gear, and creating a big, new market for the electronics industry.

Associate Editor Mason talked with military buyers, prime contractors and electronic subsystem makers. A rundown on what's being bought and what is needed appears on p 13.

AN ENGINEER'S VIEW. How well do U. S. exhibits at the Brussels World's Fair stack up against the Russian ones? This question has frequently been raised in industry and government.

Since progress in electronics is one of the hallmarks of up-to-date national technology, ELECTRONICS arranged to bring its subscribers a first-hand view of electronics at the Fair. We asked Noel Herbst, a young electronics engineer working in Europe this summer, to visit the Fair. His report appears on p 42.

FASTER AND FASTER. Basic tools of aircraft designers since early days, wind tunnels and their instrumentation must keep one jump ahead of flight development.

Their newest chore is mastery of controlled hypersonic flight, requiring wind tunnels and their data gathering systems to operate faster.

To get the picture of how high-speed wind tunnels have created a flourishing market for electronic equipment, Associate Editor Sideris collected information from wind-tunnel operators and some of the firms which supply them with instruments. Story begins on p 15.

ELECTRONICS FOR AUTOS. "Give 'em the works," might well be the motto used by the Chrysler dynamic test engineers whose work today is based on electronic instrumentation.

Midwest Editor Harris went, saw and was convinced that modern cars would not achieve maximum roadability without this specialized equipment.

His story telling of new test methods shows still another growing market. See p 18.

Coming In Our August 15 Issue . . .

Coming In Our August 15 Issue . . .

Magnetic Gages. Many unusual problems crop up in industry which are satisfactorily solved by electronic techniques. One of these, described by Paul Seaward of Stanford Research Institute, involves the necessity for accurately determining the degree of eccentricity of a steel barrier encapsulated in a shaped high-explosive charge used in oil-well blasting.

The problem is neatly solved by spinning the charge in a magnetic field. As the encased barrier rotates, it produces flux variations in the field, inducing a voltage in a probe mounted nearby. Output of a three-stage amplifier-clipper provides an accurate measure of eccentricity.

High-Speed Welding. Substitution of thyratrons for relays in a welding control circuit for high-speed production lines results in a 90-percent reduction of costly downtime, according to author Stuart Rockafellow of Robotron Corporation.

Typical circuit described in his article provides fail-safe operation, reduces transients by correct adjustment of the ignitron firing angle, and affords accurate repetition and calibration of the 4-part timing cycle.

SAGE Input System. Nerve-center of America's air defenses is the SAGE direction system, the first of which opened just last June at McGuire AFB, New Jersey (ELECTRONICS, p 24, July 11, 1958). Visual display of SAGE computer inputs selected from our far-flung radar outposts is provided by an input monitor control containing digital and analog circuits feeding four display consoles.

Author Byron Bair describes the logic which enables the monitor operator to select any one of 15 radar sites, each sending coded messages tagging targets as ships, bogies or commercial aircraft. Desired selections are compared with incoming data in the digital section. If incoming site identity and message label codes match a desired selection, a display of target range and azimuth appears on the console.

Blood Pressure Monitor. Continuous indication of blood pressure with better than 3-percent full-scale accuracy is provided by a transistorized unit developed by Canadian researchers O. Z. Roy and J. R. Charbonneau. In their instrument, a variable reactance transducer mounted in a 5-cc syringe converts patient's blood pressure to a proportional signal.

Compact transistor circuit provides 5-kc transducer excitation and amplifies the pressure-related signal to suitable level. Dual output provides means of recording as well as monitoring.

electronics **business edition**

A McGRAW-HILL PUBLICATION • VOL. 31, NO. 32 • AUGUST 8, 1958

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electronics

August 8, 1958 Vol. 31, No. 32

Published weekly, with alternating engineering and business editions, and with a BUYERS' GUIDE issue in mid-June, by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948) Founder.

Executive, Editorial, Circulation and Advertising Offices: McGraw-Hill Building, 330 W. 42 St., New York 36, N. Y. Longacre 4-3000.

Publication Office 99-129 North Broadway, Albany 1, N. Y. See panel below for directions regarding subscription or change of address. Donald C. McGraw, President; Joseph A. Gerardi, Executive Vice President; L. Keith Goodrich, Vice President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising Sales; A. R. Venezian, Vice President and Circulation Coordinator.

Single copies \$1.00 for Engineering Edition and 50¢ for Business Edition in United States and possessions, and Canada; \$2.00 and \$1.00 for all other foreign countries, Buyers' Guide \$3.00. Subscription rates—United States and possessions, \$6.00 a year; \$9.00 for two years; \$12.00 for three years. Canada, \$10.00 a year, \$16 for two years; \$20.00 for three years. All other countries \$20.00 a year, \$30.00 for two years; \$40.00 for three years. Second class mail privileges authorized at Albany, N. Y. Printed in U.S.A. Copyright 1958 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved. Title registered in U. S. Patent Office. **BRANCH OFFICES:** 520 North Michigan Avenue, Chicago 11; 68 Post Street, San Francisco 4; McGraw-Hill House, London E. C. 4; 15, Landgrat-Wilhelm, Frankfurt Main; National Press Bldg., Washington 1, D. C.; Six Penn Center Plaza, Philadelphia 3; 1111 Henry W. Oliver Bldg., Pittsburgh 22; 55 Public Square, Cleveland 13; 856 Penchcot Bldg., Detroit 26; 3615 Olive St., St. Louis 8; 350 Park Square Bldg., Boston 16; 1321 Rhodes Haverly Bldg., Atlanta 3; 1125 West Sixth St., Los Angeles 17; 1740 Broadway, Denver 2. ELECTRONICS is indexed regularly in The Engineering Index.

Subscriptions: Address correspondence to Fulfillment Manager, Electronics, 330 W. 42nd St., New York 36, N. Y. Allow one month for changes of address, stating old as well as new address. Subscriptions are solicited only from persons engaged in theory, research, design, production, management, maintenance and use of electronics and industrial control components, parts and products. Position and company connection must be indicated on subscription orders.

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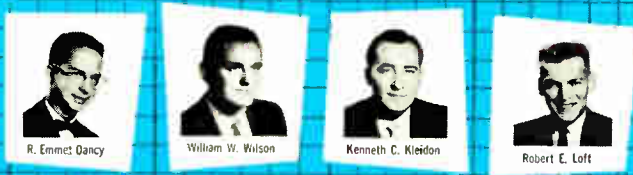
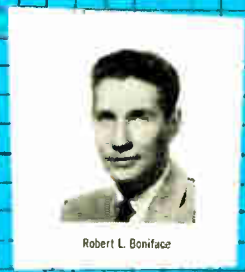
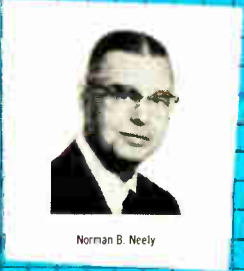
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FINANCIAL ROUNDUP

Profits From Space

West Coast firms organizing special space groups. They see civilian product applications flowing from military work

ONE OF THE HOTTEST subjects of industry conversations today is the prospect of profits to be made from space work.

Several West Coast electronics firms are pointing a way for reaping these profits through establishment of special space organizations.

Last month, Pacific Automation Products organized Space Electronics Corp., a special subsidiary for space and advanced missile work. On Nov. 23, 1957, Ramo-Wooldridge made a somewhat similar organizational move by setting up its Space Technology Laboratories as an autonomous operating division. Several other firms in the industry are known to be thinking of creating separate space groups.

A major aim of these firms in giving space groups independence and special status is to help attract the top quality engineers and scientists needed to

master space jobs. "If you want to draw top technical talent to your firm you have got to offer opportunities for professional recognition," says the head of one of the nation's leading space and missile development firms.

A second aim is to win space contracts through ability to offer customers the services of a group of engineers who will concentrate their activities on advanced space development and missile work, says Frank G. Jameson, president of Pacific Automation Products.

Immediate interest of space groups is the development of missile and space equipment for military and other government uses. But one of their chief long-term objectives is to use knowledge gained from missile and space programs to develop commercial and industrial product applications.

For instance, satellites to relay live television programs and other communications can be a reality in five years, says James G. Fletcher, president of Space Electronics. Fletcher also sees opportunities to use electronic satellites as navigational aids and meteorological surveillance stations for long-range weather observations.

Parent firm, Pacific Automation, was originally organized to manufacture industrial control gear.

SHARES and PRICES

RECENT Middle East war scare puts military manufacturers in the

investment spotlight. Missile guidance is the biggest military spending category for electronic equipment. Over one billion dollars was

spent on guidance systems last year, according to Electronic Industries Association, which anticipates a substantial increase for 1958.

Typical Missile Guidance System Manufacturers	Recent Price	Indicated Dividend Rate	Percent Yield	Earnings Per Common Share			1958 Price Range
				1958	Period	1957	
American Bosch Arma.....	24 $\frac{5}{8}$	1.20	4.9	0.46	(3 mos.)	0.70	NYSE 19 $\frac{3}{8}$ -26 $\frac{1}{2}$
American Tel & Tel.....	178 $\frac{3}{4}$	9.00	5.0	2.76	(3 mos.)	2.63	NYSE 167 $\frac{7}{8}$ -179 $\frac{1}{2}$
Bell Aircraft.....	18 $\frac{1}{4}$	0.70	3.84	0.29	(3 mos.)	0.33	NYSE 14 $\frac{7}{8}$ -19 $\frac{1}{4}$
Bendix Aviation.....	58	2.40	4.1	1.73	(6 mos.) ³	2.57	NYSE 44 $\frac{1}{2}$ -58
Chance Vought.....	46 $\frac{5}{8}$	2.00	4.3	2.12	(3 mos.)	0.93	NYSE 31 $\frac{5}{8}$ -47 $\frac{1}{8}$
Curtiss-Wright.....	28 $\frac{3}{4}$	2.50	8.7	0.62	(3 mos.)	1.29	NYSE 20 $\frac{5}{8}$ -20 $\frac{1}{8}$
General Electric.....	60 $\frac{1}{8}$	2.00	3.3	1.18	(6 mos.)	1.47	NYSE 57-64 $\frac{1}{4}$
General Motors.....	41 $\frac{7}{8}$	2.00	4.8	0.65	(3 mos.)	0.93	NYSE 33 $\frac{3}{4}$ -41 $\frac{7}{8}$
Gen. Precision Equipment.....	31 $\frac{3}{4}$	1.00	3.1	0.16	(3 mos.)	0.85	NYSE 28 $\frac{1}{2}$ -41 $\frac{1}{2}$
Goodyear Tire & Rubber.....	87 $\frac{1}{8}$	2.40	2.3	1.02	(3 mos.)	1.66	NYSE 69-87 $\frac{1}{8}$
International Tel & Tel.....	37 $\frac{7}{8}$	1.80	4.8	0.84	(3 mos.)	0.82	NYSE 29 $\frac{1}{4}$ -38 $\frac{3}{8}$
Martin.....	33 $\frac{1}{2}$	1.60	4.8	0.58	(3 mos.)	0.69	NYSE 31-36 $\frac{7}{8}$
W. L. Maxson.....	5 $\frac{1}{2}$ ¹	.....	.....	0.03	(6 mos.) ³	0.17	OTC 4 $\frac{5}{8}$ -6 $\frac{7}{8}$
Minneapolis-Honeywell.....	92 $\frac{1}{2}$	1.75	1.9	0.61	(3 mos.)	0.75	NYSE 76-92 $\frac{1}{4}$
North American Aviation.....	32 $\frac{1}{2}$	2.00	6.2	1.61	(6 mos.) ³	2.31	NYSE 25 $\frac{5}{8}$ -33 $\frac{1}{8}$
Philco.....	16 $\frac{5}{8}$	²	.....	d-0.28	(3 mos.)	0.20	NYSE 12 $\frac{3}{8}$ -17 $\frac{1}{8}$
Radio Corp. of America.....	36	1.50	4.2	0.86	(6 mos.)	1.35	NYSE 30 $\frac{1}{4}$ -36 $\frac{3}{8}$
Raytheon.....	32 $\frac{1}{8}$	²	.....	0.58	(3 mos.)	0.40	NYSE 21 $\frac{1}{2}$ -35 $\frac{1}{2}$
Sperry Rand.....	18 $\frac{3}{4}$	0.80	4.3	0.96	(year) ³	1.74	NYSE 17 $\frac{1}{4}$ -20 $\frac{3}{8}$
Texas Instruments.....	40 $\frac{3}{4}$	.....	.....	0.34	(3 mos.)	0.25	NYSE 26 $\frac{3}{4}$ -42 $\frac{3}{8}$
Westinghouse Electric.....	57 $\frac{1}{8}$	2.00	3.5	0.73	(3 mos.)	0.82	NYSE 55 $\frac{1}{2}$ -65 $\frac{1}{2}$

d-deficit ¹ bid ² stock ³ fiscal period

MERGERS, ACQUISITIONS and FINANCE

• Sylvania reports earnings after preferred dividends of \$1.4 million on sales of \$75.4 million for the second quarter of 1958. Sales were down only one-half percent from second quarter of 1957, but earnings, after payment of preferred dividends, dropped 17 percent. However, compared with the 1958 first quarter, earnings were up five percent while sales rose 21 percent.

For the first six months of this year Sylvania's sales were \$147.6 million, a decline of eight percent from first half of 1957. Earnings after preferred payments dropped 46 percent to \$2.6 million.

• RCA's second quarter sales dropped to \$264.2 million, a decline of less than one percent from the 1957 second quarter. Earnings fell to \$4.5 million, off almost 40 percent from last year. Sales for the first half of 1958 were \$542.6 million, less than one percent below the like 1957 period. But earn-

ings, \$6.8 million, were down 33 percent.

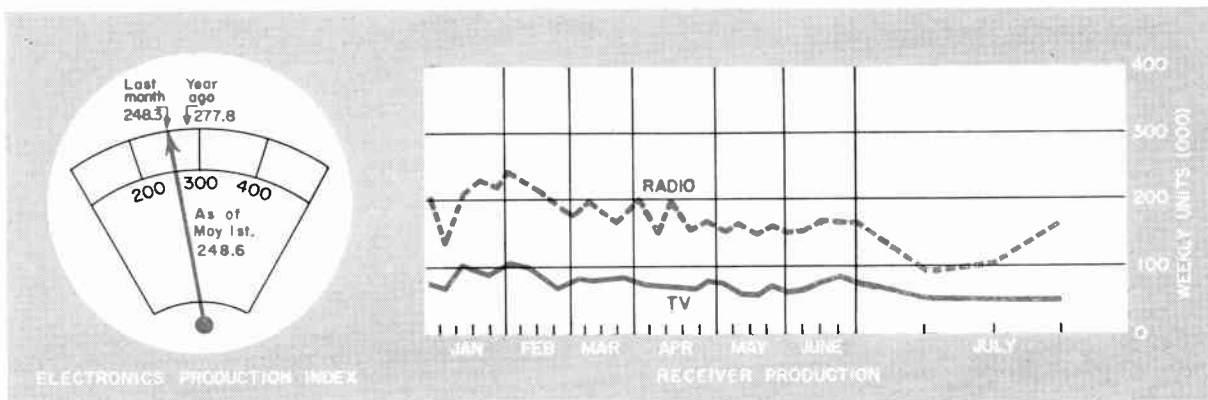
• IBM reports gross revenue of \$564.6 million and net income after taxes of \$50.6 million for the six months ended June 30, 1958. Revenue is up 24 percent from first six months of 1957 and net income is 26 percent higher. However, net new orders during first half of 1958 were 40 percent below the rate for the same period in 1957.

• High Voltage Engineering's sales and net profit for first six months of 1958 were up about 40 percent from the 1957 period. Sales were \$2.9 million and profits were \$206,091. Muter Co.'s six-month sales dropped 20 percent while earnings fell 42 percent. Firm earned \$88,698 on sales of \$5.3 million in the first half of this year. Aerovox Corp. reports a six-month net profit of \$48,000, an 85-percent decline from earn-

ings of \$332,000 in the same period of 1957.

• National Industrial Conference Board reports 97 merger announcements, including 12 involving electronics firms, during the period May 11, 1958 to June 10, 1958. The board listed nine electronics mergers out of a total of 91 in the preceding period, April 11 to May 10.

• Underwood Corp. acquires Canoga Corp. of Van Nuys, Calif., for an undisclosed price. Canoga is a supplier of radar and telemetry systems and guidance and control equipment. Last year, Canoga's sales were slightly in excess of \$3 million. The acquisition is reported to be another step in Underwood's plan to expand its position in the electronic office equipment field and at the same time develop a base in the missile industry.



FIGURES OF THE WEEK

RECEIVER PRODUCTION

(Source: EIA)	July 18, '58	July 11, '58	July 19, '57
Television sets, total	56,130	54,343	107,569
Radio sets, total	161,756	103,490	188,773
Auto sets	49,771	43,167	91,866

STOCK PRICE AVERAGES

(Source: Standard & Poor's)	July 23, '58	July 16, '58	July 24, '57
Radio-tv & electronics	50.43	49.37	51.23
Radio broadcasters	62.35	62.18	65.10

FIGURES OF THE YEAR

	1958	1957	Percent Change
Receiving tube sales	154,136,000	185,847,000	-17.1
Transistor production	14,894,230	8,954,000	+66.3
Cathode-ray tube sales	2,963,741	3,710,646	-20.1
Television set production	1,790,840	2,178,361	-17.8
Radio set production	4,186,869	6,098,951	-31.4

LATEST MONTHLY FIGURES

EMPLOYMENT AND EARNINGS

(Source: Bur. Labor Statistics)	May, '58	Apr., '58	May, '57
Prod. workers, comm. equip.	337,100	338,700	384,600
Av. wkly. earnings, comm.	\$80.75	\$80.94	\$79.00
Av. wkly. earnings, radio	\$79.78	\$79.78	\$76.21
Av. wkly. hours, comm.	39.2	39.1	40.1
Av. wkly. hours, radio	39.3	39.3	39.9

TRANSISTOR SALES

(Source: EIA)	May, '58	Apr., '58	May, '57
Unit sales	2,999,198	2,856,234	2,055,000
Value	\$7,250,824	\$7,025,547	\$5,636,000

TUBE SALES

(Source: EIA)	May, '58	Apr., '58	May, '57
Receiving tubes, units	36,540,000	32,582,000	32,836,000
Receiving tubes, value	\$31,406,000	\$28,788,000	\$28,955,000
Picture tubes, units	560,559	590,357	758,328
Picture tubes, value	\$11,237,147	\$11,591,733	\$14,031,519

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6 CIRCUITS

9 CIRCUITS

12 CIRCUITS

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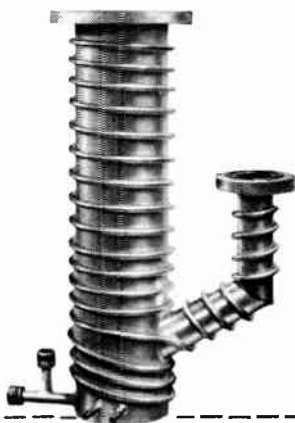
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CIRCLE 4 READERS SERVICE CARD

8

WASHINGTON OUTLOOK

THE MIDDLE EAST crisis will have little impact on the volume of military hard goods procurement. Washington's consensus is that no major changes in defense production plans are needed under current U.S. military commitments in the Middle East, unless a large-scale shooting war breaks out. It's also thought the threat of such a conflict has subsided.

Nevertheless, the rate of both new orders and cash outlays from the Pentagon is finally beginning to spurt. Latest figures reveal that during June new contracts for military hardware totaled \$2.6 billion, the highest monthly rate since March 1956, and expenditures added up to \$3.8 billion, the highest monthly rate since June 1953.

New procurement contracts for fiscal year 1959 will amount to close to \$17 billion for hardware—with the peak volume expected during the January-March quarter. This compares with a total of about \$16 billion in new orders during fiscal 1958 which ended June 30.

A good rule of thumb, according to many Pentagon officials, is that roughly 27 percent of all military hard goods procurement is earmarked for electronic equipment. The estimate, \$4.6 billion for fiscal '59, includes electronic gear covered by the aircraft and missile categories in the defense budget.

As ELECTRONICS went to press, there was a chance that the Pentagon's procurement plans for the new year might be boosted again. The Senate Appropriations Committee tacked on \$359.7 million to the fiscal 1959 appropriation for defense production—\$108.7 million for 13 more B-52 bombers, \$111 million for 30 additional KC-135 jet tanker planes, and \$140 million for additional procurement of troop carrier aircraft. The extra money is still subject to review by the entire Senate and the House. The Pentagon has implied the additional funds may not be spent.

Excluding these additional sums, however, the original plan calls for \$7.2 billion worth of new orders for 2,100 aircraft this year—down slightly from last year's \$7.9 billion. In missiles, new orders will total about \$5 billion—roughly 20 percent over last year's sum.

New contracts for research and development will rise to \$2.6 billion this year from \$1.9 billion. When items for development, testing, evaluation and related costs are added in, the actual total comes out over \$6.2 billion.

- The Pentagon is starting to push a new program for monitoring reliability of missile weapon systems. The program was proposed by a 15-man industry-military committee and sets up monitoring points at major stages in weapon system development—during detailed design study, at the preprototype stage, prototype, preproduction demonstration, demonstration of service readiness, service evaluation, full-scale production and during demonstration of major production improvement. The committee concluded that reliability can be predicted, assessed, measured and controlled during these stages.

Limited copies of the committee's report, "Proposed Reliability Monitoring Program for Use in the Design, Development, and Production of Guided-Missile Weapon Systems," are available from the Defense Dept., Office of the Director of Guided Missiles.



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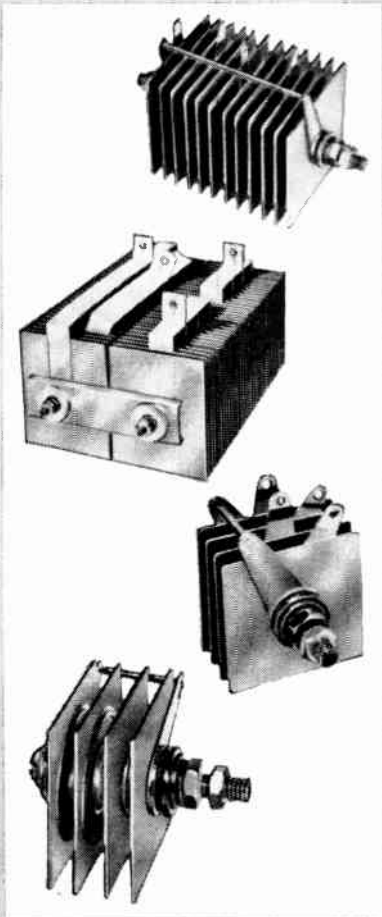
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CIRCLE 6 READERS SERVICE CARD

EXECUTIVES IN THE NEWS



Howard*: a lot of vision

CHAIRMAN of WESCON '58 is Lewis W. Howard, president of Triad Transformer Corp. and v-p of parent Litton Industries. Howard, a charter member of West Coast Electronic Manufacturers Association, managed the first big trade show of that association in 1946. He's been at it ever since.

Born in Greeley, Colo., in 1907, Howard has been a Californian since he was 13. After a hunting-and-fishing boyhood ("punctuated by imposed schooling") he took a BSEE in 1929 at the University of California at Berkeley. He took the diploma to Federal Telegraph in Palo Alto, but when the crash came a few months later found himself trimmed off the bottom. In early 1930, he went to work as chief engineer for S & L Mfg. Co., stayed there 10 years during which it became part of Phelps-Dodge Copper and he became LA general manager. From there, he went to Peerless Electrical Products as sales v-p.

In 1946, he cast his lot with three-year-old Electronic Components Co., became a partner, grew with it as it became Triad Transformer. Howard has been a transformer man all his life, starting with his Colorado farm days when he built them for his homemade radio.

Howard is friendly and easy to know. A close associate says "he may not be a colorful character, but he has a lot of vision." His strong points aren't limited to engineering; he's a canny businessman, a determined and resourceful manager as well.

Sporting interest centers on golf; he's won trophies on the links. But his real affections lie with his family (three children, seven grandchildren). Wife Faye is an accomplished artist with a serious interest in marine science. Two of her contributions to marine biology, the *Acameca turveri fayeae* and *Nasarius howardae*, immortalize her first name and his surname.

* With WESCON executive committee chairman Bruce Angwin (left) and the WESCON '58 entrance pavilion.

COMMENT

Missile Warning System

I've been following the reports in your magazine and in the public

prints about the Ballistic Missile Early Warning System, and was quite surprised to read (Washington Outlook, p 8, July 25) that there were only going to be two BMEWS stations. Perhaps the two sites in

Alaska and Greenland will see far enough and clearly enough, but it seems strange to rely on only two observation posts.

What really shocks me is that no one seems to be thinking about detecting missiles with infrared. At least, no mention has yet been made of infrared detection as part of the BMEWS setup. Yet the searing heat of a reentering missile ought to provide quite a target for an infrared detector.

I wonder if this is to be another area where we will sit smugly by while our enemies walk off with the honors and the victory. I feel that we should be exploiting every avenue that improves our defenses.

J. S. CARBERRY

NEW HAVEN, CONN.

Reader Carberry's shock is not quite in order. Actually, our sources indicate that the Air Force is indeed thinking about it, but is stuck with the present limitations of infrared detectors. They don't see far enough nor with sufficient accuracy to provide our defense forces with time to take action. If we could put the sensory equipment above the atmosphere, where background noise becomes less a problem and the ambient temperature drops to a negligible point on the Kelvin scale, we might be able to make valuable use of the infrared technology. It's being worked on, anyway.

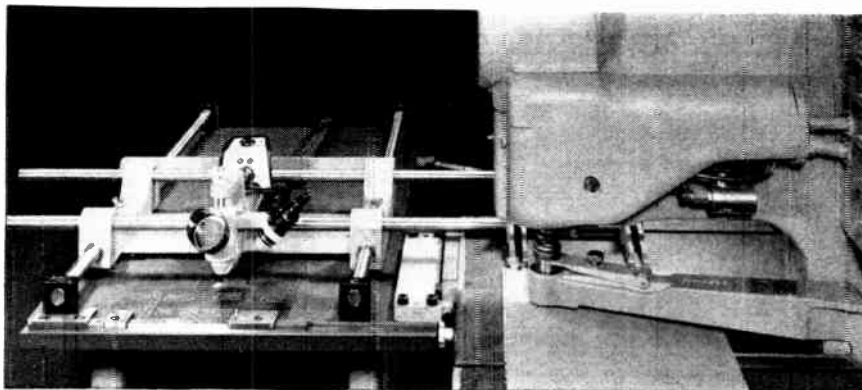
Jubilee

As you know, the American Institute of Electrical Engineers will be celebrating its 75th Anniversary during 1958-59, having been organized on May 15, 1884.

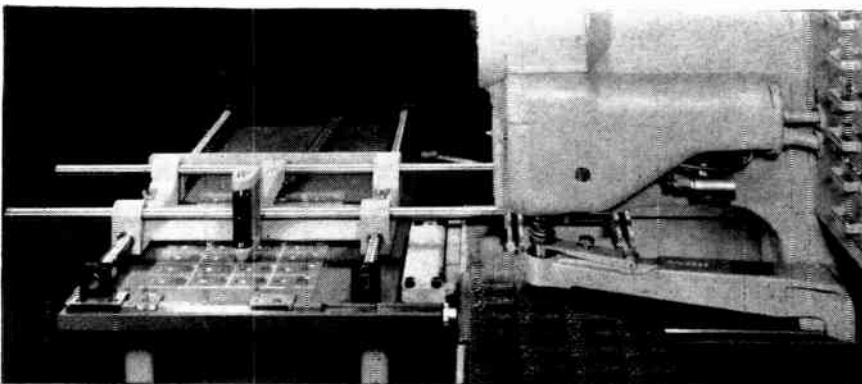
The first technical paper, presented at Philadelphia in October 1884, was on the Edison effect, under the misleading title "Notes on Phenomena in Incandescent Lamps" by Edwin J. Houston. The Edison effect was the birth of electronics, as shown so well in the "Family Tree of the Thermionic Tube" published in *ELECTRONICS* in 1934.

L. F. HICKERNELL

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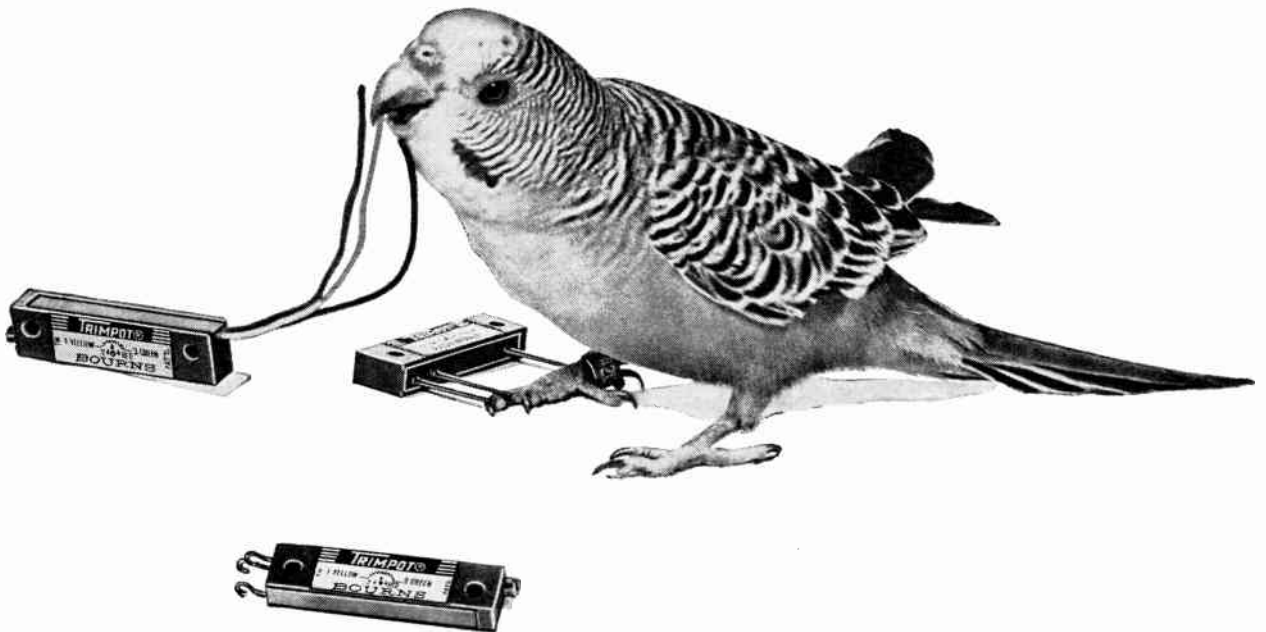
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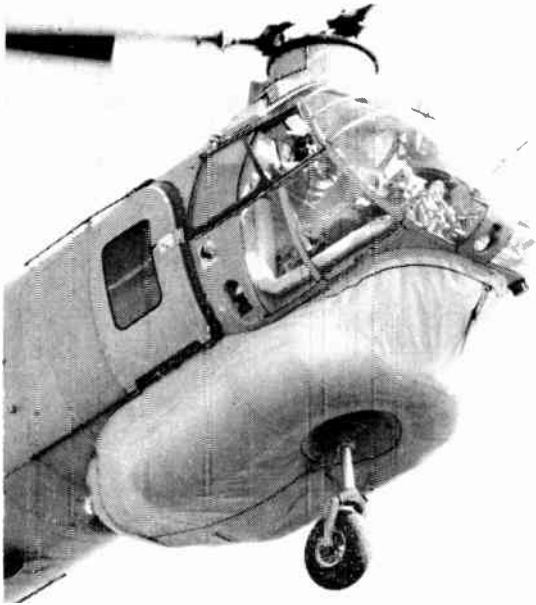
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"Hands off" electronic flight control systems are changing the helicopter from a clumsy pelican into a well disciplined bird. This is one reason . . .

Helicopters Build New Market

Recent advances are equipping the 'copter for a score of brand new jobs, upping sales, and creating a big and healthy market

NOW THAT ELECTRONIC flight control systems have relieved the helicopter of the rigors of trying to maintain four-axis stability (yaw, pitch, roll and altitude), rotary-wing aircraft have moved into a new and higher utility—and therefore market—echelon.

Sikorsky's Automatic Stabilization Equipment (ASE) enables the firm's HSS-1N Navy 'copter to drop at the push of a button from 800 ft to 50 ft and hover automatically at zero ground speed. Stability while hovering is so good an anti-submarine sonar ball can be submerged without kicking up undue noise of its own. Army's version of the HSS-1N, called the H-34, (see cover photo) is also being equipped with ASE.

A still newer electronic device, tied in with the ASE, is a tether, dropped from the plane to a man on the ground who can then lead the 5-ton plane around like a well-behaved kite (ELECTRONICS, p. 12, Aug. 1).

According to military sources two other firms are working on automatic flight control for helicopters.

Sperry's electronic flight control system is installed in the Vertol 44, used by the Royal Swedish Navy for anti-submarine work (see photo above). U. S. Army and Navy are also evaluating the system. Price per unit, in volume production, will run around \$15,000.

Lear's work on flight control systems began by tackling a problem unique to helicopters: The attitude of the fuselage does not reflect the attitude of the flight surface which is actually the main rotor blade. Lear developed a data transmission system to determine the angle between the rotor and the fuselage. With this reference known, a number of automatic pilot systems normally used on fixed wing planes were adapted for helicopters.

Lear is presently engaged in development of several different types of automatic flight control systems for 'copters. Installation of the company's complete autopilot gives control in all axes of flight.

Other chores the now refined work horse is being saddled with include search and rescue, medical evacuation, transportation of heavy equipment (missiles, GCA radar, jeeps, etc.), transport of field commanders, resupply, map making, observation and direction of artillery fire and construction.

Army uses 'copters to help lay girders, towers for antennas and other unwieldy building gear.

The helicopter's ability to become a floating radio station at the place and altitude required makes the plane ideal for a number of tasks. It can act as a temporary radio relay station for line-of-sight transmission. It can go up safely behind the lines at the strategic moment to jam enemy radar or send out deceptive signals. It can quietly locate enemy

radar and analyze the r-f spectrum. Other reconnaissance devices the helicopter can carry include tv (a look into enemy camp at night may soon be possible with a high resolution tv system that works by moonlight), infrared and photographic cameras.

Still being mulled over by the Army is the feasibility of turning the 'copter into a fighting bird. Army demonstrated the plane's capability for such work at White Sands, New Mexico (ELECTRONICS, p 26, July 25) by sending over waves of helicopters equipped with guns, cannons and rockets to shoot up a field of dummy installations.

What Services Have

Approximately 3,500 helicopters make up the military's current inventory.

Army has 2,172 rotary-wing planes valued at \$259.6 million; these consist of 12 models produced by at least six primes. During fiscal year 1959 Army plans to add 352 more helicopters to its inventory at a cost of \$76.2 million. Approximately 20 percent of this (\$15.24 million) will go for electronic equipment. Three companies are now working on flying jeeps.

Navy and Marines have about 900 helicopters made up of 20 models built by at least seven primes. Development of a flying platform is underway.

USAF has 363 helicopters consisting of three models by three primes. A fourth, the H-43B, is scheduled to be operational next fall.

Quantity and sophistication of electronic equipment used in helicopters are both increasing rapidly. Five percent of the cost of older helicopters went for electronic gear. Now the percentage is closer to 25. Twenty percent of the cost of Navy's HSS-1N is for electronics.

Types of Systems

Navigation systems in helicopters range from simple low and medium frequency adf to sophisticated Doppler and/or inertial guidance. One military official says "navigation equipment is the biggest gap in helicopters today."

Much, however, is being done in this relatively open field. Trend is toward systems free of ground-based aids. Ultimate system will be self contained, nonradiating.

A number of companies are selling Doppler navigators for helicopters. Army says Ryan Aeronautical will soon deliver 10 experimental SCAN (Self-Contained Automatic Navigation) units—an automatic dead reckoning navigator using Doppler.

Army indicates that Sperry has a combination d-r automatic navigator, tied in with Doppler, that shows the pilot pictorially where he is and, at the

press of a button, the heading home—even to a moving aircraft carrier. Its called the Compass Pictorial Displacement Indicator. A still more advanced version is currently under development.

According to Army, Laboratory for Electronics has two Doppler navigators for helicopters, the APN-78 already produced experimentally and the APN-119 still under development. The latter, once in volume production, should cost about \$40,000 a unit.

Navy says Sanders Associates, as well as several unnamed companies, are also active in the Doppler field.

Bendix-Decca, low-frequency area-coverage navigation system, is currently being evaluated in the New York City area, according to Airways Modernization Board. Manufacturer Bendix Pacific says the system is suitable for Army helicopters as well as ground vehicles, such as tanks.

Sylvania is getting into helicopter work with its APN-117 low-altitude radio altimeter (ELECTRONICS, p 26, May 2) which, according to the Navy, is used along with Raytheon's radio altimeter in the HSS-1N. Sylvania's device costs about \$3,750. Dollar potential for the APN-117, Sylvania says, is about \$1 million a year—most of it for helicopters. Emerson has an Army contract for an absolute altimeter, the APL-100. Sperry makes a combination radio-barometric Altitude Vertical Rate Indicator.

Sylvania is known to be working on a Doppler device that will combine two important elements of helicopter flight—zero ground speed and precise altitude indications.

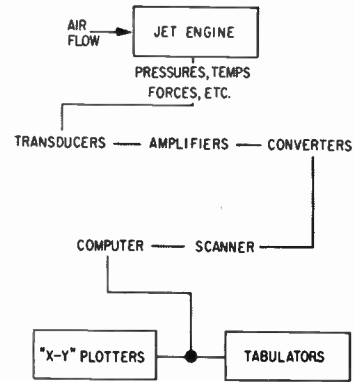
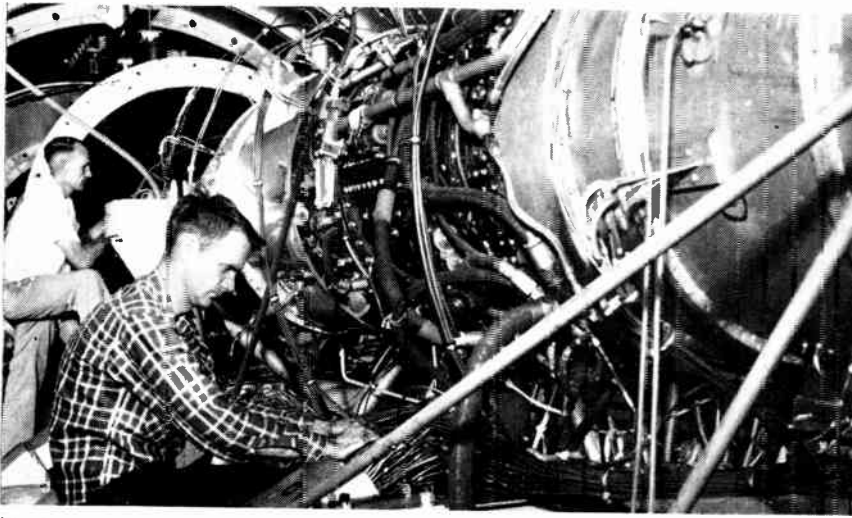
Army says Lear and Litton Industries are working on pure inertial systems for helicopters. Weight is, of course, one of the main obstacles.

What Army Wants

Improvements in electronic equipment that Army would like include: decrease in weight, size, power input and cost, better reliability and quality. Army needs a low altitude, long range communication system, self-contained navigation equipment, module construction to provide flexibility of operations, and equipment that is easy to maintain and support.

More than half the electronic gear used in helicopters is government furnished. With the coming of more elaborate systems, however, a gradual shift toward the weapons systems concept may take place.

Military prime contractors for helicopters at present, according to lists provided by Army, Navy and Air Force, include: Aerophysics Development, Bell Helicopter, Cessna, Chrysler, Delackner, Gyrodyne, Hiller, Kaman, Piasecki, Sikorsky and Vertol.



Technicians ready an engine for test at Arnold Engineering Development Center. Diagram shows how data is handled. Scanning speeds multiply by using . . .

New Gear for Wind Tunnels

More high-speed instruments are needed to gather, digitize, record and analyze results of hypersonic tests lasting only seconds or split seconds. Hypersonic-type wind tunnel construction forges ahead

NEXT YEAR, five high-speed wind tunnels will be completed in the United States. The number is not exceptional, but location and types presage a stepup in the flourishing wind tunnel instrumentation business.

The 1959 crop includes our first two large hypersonic tunnels, a small hypersonic tunnel and large transonic and supersonic ones.

Mach 1 equals speed of sound, approximately 760 mph at sea level and 60 F. Transonic speed is Mach 0.7 to 1.3; supersonic, Mach 1.3 to 5.0; hypersonic, over Mach 5.0.

More recently, it was the large transonic and supersonic facilities which dominated construction. Rising emphasis on faster aircraft, missile and engine test speed is expected to enlarge the need for faster, more expensive data gathering systems.

One source feels that hypersonic data systems will cost two or three times as much as supersonic test gear of equivalent sophistication.

Tunnels generally require an array of real-time indicators of measurements from temperature, pressure and strain transducers, as well as tunnel control devices. Many add a data processing system which digitizes and records these measurements for on-line or subsequent computer analysis.

A Mach 0.5 to 5 tunnel recently completed handles 25 channels at a maximum of 400 samples of each channel a second; 100 pressures can be digi-

tized and recorded twice each second. An engine test tunnel would have 760 data channels.

As tunnel speeds rise and test times shorten, the number of transducers will be reduced and sampling rates increased. New systems will have rates of 15,000 to 20,000 a second, two firms report.

Hypersonic test facilities normally produce speeds up to 12,000 or 15,000 mph, at temperatures to 40,000 F and pressures to 20,000 psi. Some of them attain even more fantastic speeds, requiring data to be gathered in split seconds.

Air Force's ARDC Arnold Engineering Development Center's 50-inch diameter Hotshot II arc-discharge tunnel has reached 32,400 mph. It will have facilities for recording 52 channels on high-speed analog to digital converters, with output fed to a digital computer.

An advanced shock tube has been clocked at 100,000 mph and 100,000 C. It uses microwave, photoelectric and spectroscopic measuring systems.

Aircraft firms have yet to invest heavily in hypersonic tunnels. So far, they have preferred less costly shock tubes, arc discharge plasma jets, heat tunnels and other simulators of hypersonic flight. These are ideal for small model testing.

Government agencies, however, are going ahead with design of larger facilities, in preparation for large model or even full-scale testing.

At present, there are only a dozen small hyper-

sonic tunnels, all government or university-owned. By comparison, aircraft firms own 12 of the 30 large transonic and supersonic tunnels and 12 of the 60 small transonic and supersonic tunnels.

Aircraft firms have invested in five large transonic and supersonic tunnels during the past year to avoid line-ups at government and university tunnels. They cost \$3 million to \$5 million apiece, of which some 10 per cent is for instrumentation.

There is an abundance of test space now available in these large tunnels, partly because of the number constructed, partly because of growing interest in hypersonic plane development.

However, these facilities and additional hypersonic test space will come into demand, it is expected, as hypersonic development progresses. Planes must be tested at all speeds up to their maximum speed.

One firm has installed three \$250,000 data processing systems this year. Another delivered a "several hundred thousand dollar" system this spring and is building a \$121,000 system for a Navy lab.

Testimony of rising complexity and size of tunnels

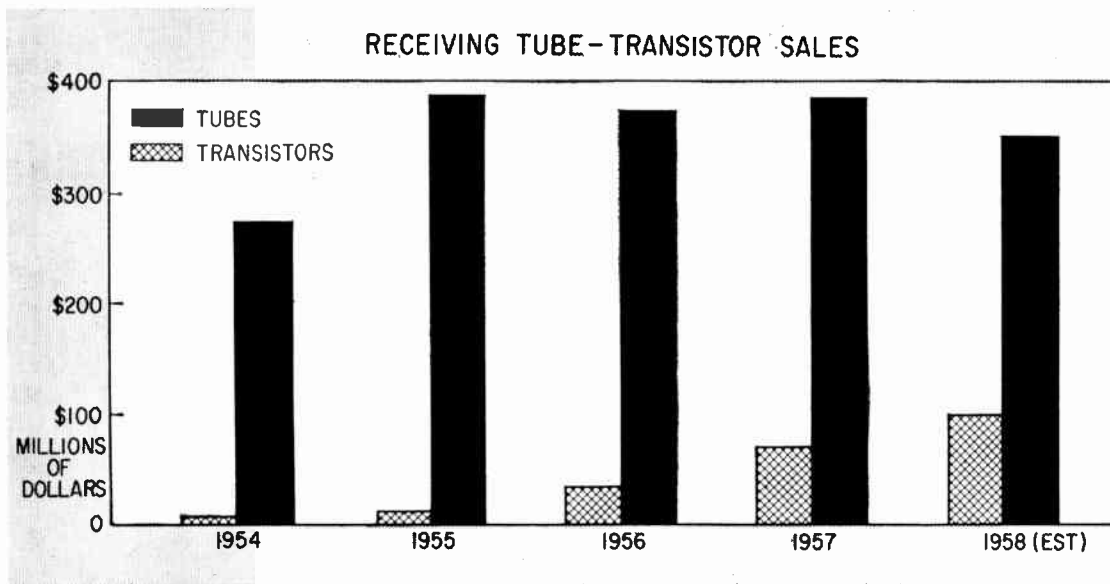
is given by National Advisory Committee for Aeronautics, which operates 40 assorted tunnels. A 1946 tunnel cost \$1 million with \$14,000 instrumentation; a 1956 tunnel cost \$27 million with \$920,000 instrumentation.

Arnold Engineering Development Center in Tullahoma, Tenn., will contain about \$10 million in instrumentation when current construction is completed. Each of three major labs there is equipped with a large digital computer in an automatic data reduction system.

AFDC buys instruments from many firms through ARO, Inc., operating contractor. The gas dynamics facility, for example, uses 102 electronic indicators. The propulsion wind tunnel has a 100-channel data processing system and the new ramjet facility for engine testing, a 400-channel system.

Not all tunnels, of course, are so elaborately instrumented. The small hypersonic tunnel at Brooklyn Polytechnic Institute finds 34 \$1,500 indicators and a \$25,000 analog computer adequate for heat transfer studies.

PRODUCTION and SALES



Transistor Sales Rise; Tubes About Steady

THIS YEAR, receiving tube sales are continuing on a high plateau, while transistor sales go on establishing a spectacular growth record.

Transistor sales for 1958 should total about \$100 million, up 45 percent from 1957. Receiving tubes are expected to post sales of \$350 million, a slide of about 10 percent from 1957 figures.

In 1954 transistor sales were 1.8 percent of receiving tube sales. In 1955 the transistor-tube sales ratio was 2.6 percent; in 1956, 10 percent and in 1957, 18.2 percent.

Transistor sales were about \$5.1 million in 1954, \$10 million in 1955, \$37.4 million in 1956 and \$69.7 million in 1957.

From 1954 to 1955 tube sales

jumped from \$276 million to \$385 million. In 1956 sales were \$11 million below the 1955 record peak. In 1957 they were \$1 million short of 1955. Predicted sales for 1958 are \$350 million.

In 1954 tubes accounted for 5.4 percent of total industry sales. By the end of 1958, their share is expected to be 4.3 percent.

WESCON: What You'll See . . .

Enthusiastic optimism exists for this month's big West Coast electronics shindig. But the hard sell's harder and down-to-earth product displays are replacing blue-sky speculation

LOS ANGELES—Among other things, Wescon is a barometer. Types of wares displayed, tenor of technical sessions, motivations for attendance all reflect the general atmosphere of the electronics industry around the nation.

This year's reading: Enthusiastic optimism with recession effects still much in evidence.

Exhibit space was sold out early this spring, expanded, then sold out again. At this minute, 901 booths are booked, 20 percent above last year.

Companies are coming to LA's Pan Pacific Auditorium this month with order pads in hand. A preshow poll of participating firms shows that exhibitors are training their biggest guns on buyer targets. A higher-than-usual number of top company officials will attend the show Aug. 19-22.

Industry basics—instruments, components, production equipment—are replacing some of the more spectacular systems displays seen at past shows. Several computer and systems people report belt-tightening processes necessitate confining their display activity to more specialized conclaves.

Increased budget-consciousness of potential customers is seen throughout. Competitive—and lower—prices are being emphasized. Labor-saving, cost-cutting production devices are getting a big play.

Breakdown of exhibitors by category is about the same as last year, 88 percent manufacturers, eight percent manufacturers' reps, four percent publishers, government agencies, research organizations. Percentage of never-before-shown items is expected to be higher than usual. And an encouraging number of firms report recruiting will be stepped up.

Technical program chairman R. C. Hansen lists the following as possible highlight sessions: A special evening session (Aug. 20) titled "Project Management—Airframe or Electronics." A session on reliability is called "Contract Implications of Military Electronics Reliability Requirements."

There will be an invited session on "Parametric Amplifiers and Masers." Comparisons will be drawn between modified semistatic ferrite amplifiers and the conventional ferrite amplifier.

Also scheduled is a five-paper session on "Modern Management Problems."

Developments to be reported include a new class of artificial dielectrics for construction of large microwave lenses, a technique for fabricating ceramic capacitors of greatly reduced size, airborne and ground-based devices for easing air traffic control.

New telemetry techniques in the space age will be stressed. High data handling capacity and extreme reliability point future trends toward pulse code modulation systems. One manufacturer will bare details of a 12-channel pcm unit, consuming less than 25 w, achieving accuracies of 0.2 percent, and weighing only 10 lbs.

Solid-state devices will come in for a good deal of talk. While 15 papers specifically discuss new types, materials, and circuits, many others touch upon current and potential applications. Among new units described is a diffused silicon computer diode with a switching time of 1 microsecond to 1 millimicrosecond and low capacitance.

A silicon *pnpn* controller rectifier with ratings up to 16 amp and 300 v offers some interesting new design possibilities. Recently discovered circuit applications of the voltage sensitivity of semiconductor junction capacitance will be demonstrated.

. . . Booth Chatter

LOS ANGELES—Samplings from Wescon booth attendants:

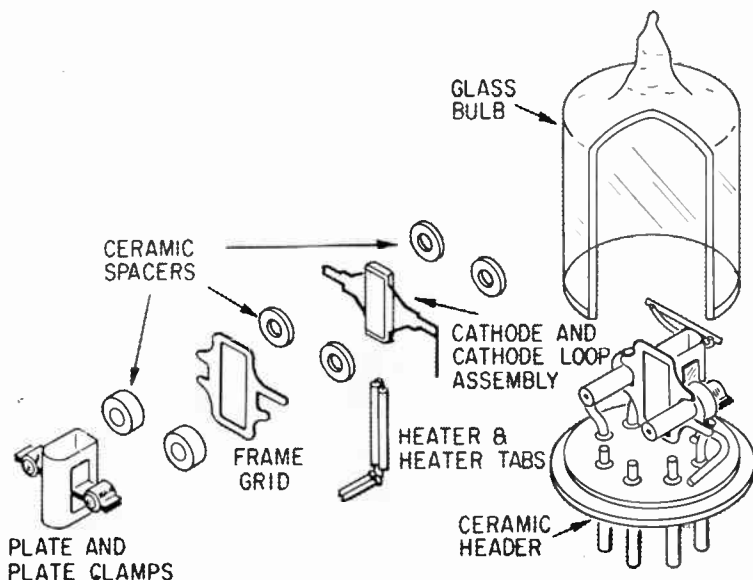
Missiles systems developer: "We will be emphasizing new hardware, showing how it has increased reliability, efficiency, and lower production costs."

Instruments maker: "The hard sell will be even harder. Our men will pitch quality, reliability, short delivery time, experience."

Military computer man: "We expect to see the emphasis on miniaturized and special purpose computers."

Machine controls producer: "Because of the emphasis placed on production electronics at this year's show, we're expecting direct results."

Components manufacturer: "Our top technical and production people will man the booth along with sales engineers. They'll stress newly acquired systems capabilities."



Semiexploded view of new dual triode tube shows construction of stacked mount in . . .

Ceramic-Glass Tube

Manufacturer combines ceramic mount, glass envelope to gain production advantages

CERAMIC receiving tube developments of one manufacturer took off on a tangent two weeks ago when the firm announced it will produce a tube intermediate between conventional and advanced types.

Sylvania is taking its stacked mount and putting it in a conventional glass envelope. The mount will plug into standard sockets but was originally designed to go into a ceramic envelope.

The firm is one of several working on all-ceramic-metal receiving tubes (see summary of Advisory Group on Electron Tubes report, *ELECTRONICS*, p 101, July 18).

The designs of some other experimental tubes also seem adaptable to glass envelopes. This possibility was indicated in the AGET report and in a prior survey by Stanford Research Institute.

The compromise, according to one Sylvania source, foregoes some of the ultrahigh temperature advantages of ceramic envelopes. But it is said to yield these advantages:

- Solidity of the stacked mount—it vibrates as one piece.
- Glass envelopes can be ex-

hausted and sealed with conventional tube-making machinery. This allows mass production.

- Stack mounts lend themselves to automatic production. The mount structure readily allows dimensional control during assembly and is adaptable to available manufacturing equipment.

- Ceramic spacers do not out-gas at high temperatures.

All-ceramic-metal tubes have been primarily developed for use in missiles and other demanding military applications. One reason the military has been reluctant to adopt them in standard equipment, it is reported, is bell-jar sealing methods employed with ceramic envelopes at present. The military is concerned whether sufficient quantities could be produced to meet emergency requirements.

A dual triode, a medium-mu double triode and a high-mu triode are available in new design.

Adaptation of an audio beam power pentode and an r-f pentode will be completed sometime later this year.

Cerium Raises Solder Strength

SOLDERED JOINTS subjected to heat and pressure are greatly strengthened when solder tin content is raised and a small amount of cerium is added, according to Battelle Memorial Institute tests sponsored by Tin Research Institute.

Thin sheet brass pressings were soldered to form boxes simulating auto radiators, in which difficult joint conditions are found. Steam pressure in the boxes was cycled from zero to 20 psi six times a minute.

When the box joints were soldered with 30 tin-70 lead solder, addition of cerium gave negligible improvements in strength. Average time to failure remained at around 1,500 cycles.

Boxes soldered with straight 70-30 solder withstood 4,960 cycles on the average. Addition of 0.05 percent cerium metal raised average joint life to 11,494 cycles; 0.10 percent cerium metal, 11,478 cycles, and 0.20 percent cerium added as mischmetal, 10,649 cycles.

More Uses for Solar Cells

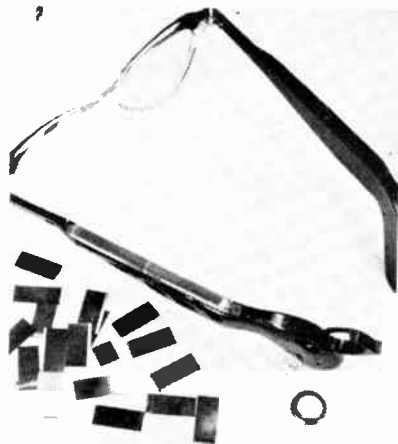
SILICON SOLAR CELLS now have a dozen commercial and consumer applications, according to the semiconductor division of Hoffman Electronics Corp.

Hoffman is using them to power a transistor portable radio. They provide a constant charge for nickel-cadmium batteries in Zenith eyeglass hearing aids. Seth Thomas has a solar-powered clock.

Other uses reported are movie camera aperture control, robot weather stations, radio transmitters, microwave relay stations, punched card and tape computer readouts, control devices, flasher beacons and flashlights.

The cells power the Vanguard satellite transmitter. In the Aerobee-III rocket, they activate a motion picture camera so that it takes pictures in the spinning rockets only when facing earth.

The U.S. Forestry Service has



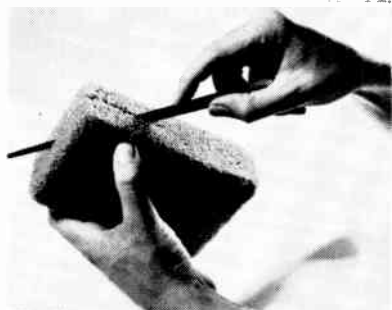
Silicon wafers use light to charge hearing aid battery

used a silicon solar converter to power a low-power transistorized transceiver located at a mountain-top lookout post. Messages were relayed as tone signals.

Hoffman says the cells will respond at a rate of 50,000 impulses a second, permitting their use in high-speed air and ground computers. They may also be used as infrared sensors and fire or flame detectors.

Silicon solar cells have an efficiency of about 10 percent, sufficient to convert sunlight into electricity at the rate of 100 w per square yard of converter area. They will also convert incandescent light. Estimated lifetime of the cells is 10,000 years.

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Millions of small, airtight bubbles of 99 percent pure silica form strong, inert thermal and electrical insulating material and microwave absorber, developed by Pittsburgh Corning Corp. Dielectric constant is 1.155. Loss tangent is 0.003 at 9,400 mc, 26 C temperature and density of 9.4 lbs per cubic foot

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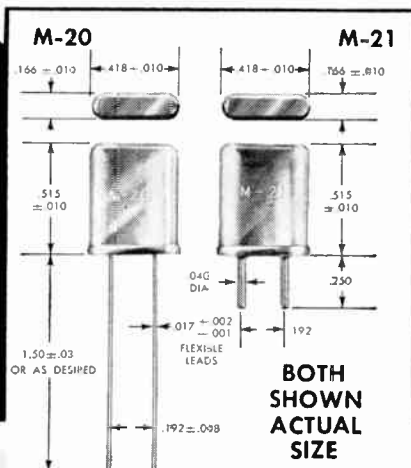
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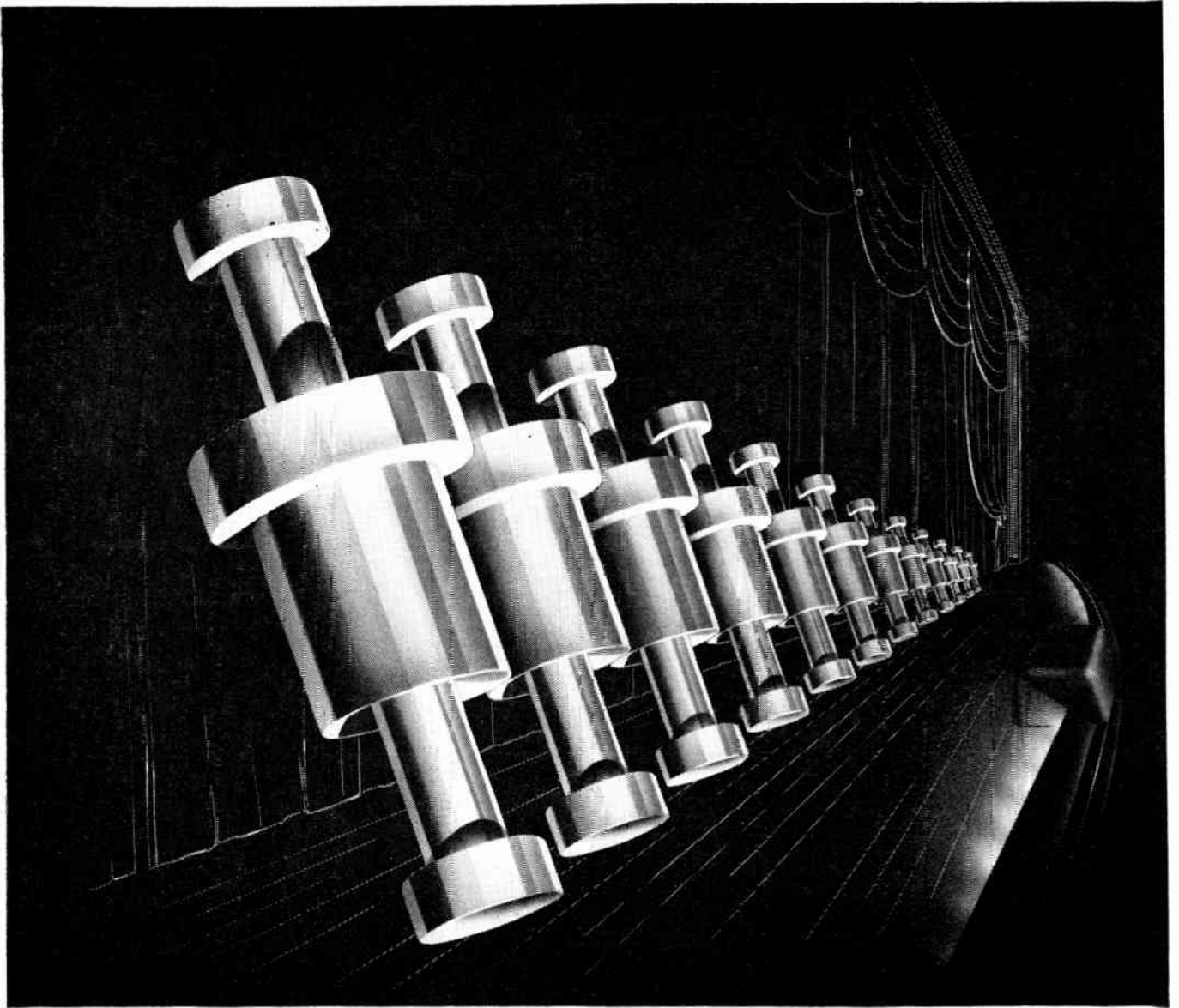


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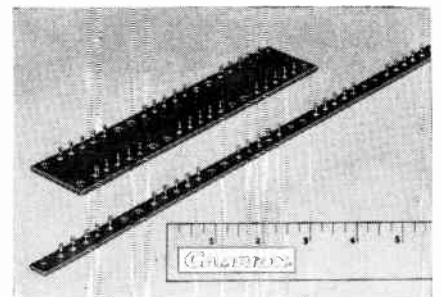
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Explorer IV Measures Only Cosmic Rays

EXPLORER IV's entire 18-pound instrumentation load is devoted to more discriminating cosmic-ray measurement than the first two Explorers, which were swamped by unexpectedly intense cosmic ray activity. Two Geiger-Mueller tubes and two scintillation counters are carried. One of each is shielded to eliminate data below certain energy levels; data from the unshielded counter is directed into two radio channels reporting different energy levels. This gives five information channels to ground stations. Explorer IV will show not only the total registration of particles but also how many fall within certain intensity ranges. It's suspected that only about one-tenth of 1 percent of the 20,000 or so counts per second that were recorded by Explorers I and III were actually caused by cosmic rays. New Geiger counters, able to handle thousands of times the radiation intensity which jammed the other satellites' counters were put in the new State University of Iowa instrument package. Also, the "dynamic range" of one counter has been increased, permitting it to take counts up to 1,500 times the capacity of previous systems.

FIRST HIGH ALTITUDE TV pictures were transmitted last week by balloonists Cmdr. Malcolm Ross and M. Lee Lewis. Their balloon reached an altitude of 82,000 ft. on its 34-hour flight from Crosby, Minn., to Jamestown, N. D. Stratosphere television pictures were seen by ground crews and the audiences of local tv stations.

ANTI-ICBM PROGRAM of the Advanced Research Projects Agency includes studies based on the discovery that a missile warhead creates an ionized track of air when it reenters the atmosphere. Ionized air is the product of acoustical shock. ARPA chief scientist Herbert York says this electrified air can be used as a radar target. York told the House Appropriations Committee recently that this discovery shows promise for the antimissile missile program. One possibility, he said, is to home on electromagnetic signals produced by the nose cone; another is to reflect ground radars off the ionized track to provide the data for steering an interceptor missile. While reentry detection allows only 60 seconds warning, York intimated that this might be the key to discovering other phenomena associated with missile flight; hence, a way may be found to detect the missile on its way up and give 25 to 30 minutes advance warning.

ELECTRICITY FROM STEAM is reported by Soviet engineers. They claim that they have provided a steam-boiler plant with a number of semiconductor elements; these are so designed that the difference in temperature between the combustion gas—1,300 F—and the boiling water—212 F—is used to generate current. Hand-size disks are arranged so that they are in contact with the gases on one side and the boiling water on the other. Disks are made of an alloy that includes zinc and antimony.

TECHNICAL DIGEST

- Doppler effect is used in England to give frequency multiplication up to about 10 in ordinary smooth-wall waveguide. Input signal at fundamental frequency is fed through guide in one direction. Beam of electrons bunched at different frequency is fed in opposite end of guide. New higher-frequency signal can then be induced if velocity of electrons is chosen so fundamental and induced signals have same frequency because of Doppler.

- Degaussing control systems for ships now change degaussing currents automatically to compensate for slow or rapid changes in roll, pitch and heading so distortion of earth's magnetic field is minimized

for all positions of moving ship. In Vickers-built systems, signals representative of the three ship movements are obtained from synchro generators of ship's gyro compass and gyro stabilizer and fed into three-resolver computer that controls degaussing-coil currents.

- Rubidium vapor magnetometer developed by Coast & Geodetic Survey is compact, high-precision new tool for measuring magnetic fields heretofore too weak to be detected. Light from Rb vapor lamp is circularly polarized and beamed through Rb vapor absorption cell to photocell. Atoms of Rb tend to line up with their magnetic moments parallel to external magnetic field, and then ab-

sorb less light. R-f magnetic field applied transversely makes atoms change orientation, causing dips in photocell output as oscillator frequency is swept through Zeeman transition frequency of about 395 kc for Rb; these dips give strength of unknown magnetic field.

- Position indicator for magnetic tape uses small lamp and photo-transistor to detect scraped gap in oxide coating. Associated circuit operates relay directly to turn on lamp indicator or actuate stepping switch used to count gaps and stop tape or mute amplifier precisely where desired. For 7½-ips speed, gap is about $\frac{1}{2}$ inch wide across half of tape width, and is wider for higher speeds.

Electronics to Aid Eclipse Studies

ELECTRONICS will play an important role in IGY experiments during the total eclipse of the sun due Oct. 12, 1958. The solar physics studies are expected to provide an abundance of data on the sun for long periods before and after the eclipse.

The eclipse will occur near a period of maximum solar activity. September and October are expected to be the most active solar maximum in recorded history.

Studies will be made of the distribution of different wavelengths on the sun's disk. The effects of specific wavelengths on the ionosphere are made possible during an eclipse since the moon blocks off portions of the disk. This effect can not be duplicated in the laboratory.

Two electronic experiments, one by the Naval Research Laboratory and one by the Central Radio Propagation Laboratory of the National Bureau of Standards, will entail observing ionizing sources on the sun and the resultant ionization in the earth's atmosphere.

NRL plans to study the distribution of ionizing sources on the sun's disk and in the corona by direct measurement from rockets. It plans to fire a series of 6 to 8 rockets during the eclipse. Two will be launched during the period of totality and the rest during the partial eclipse before and after.

Count-Down Receiver for Missile Crews



Two pencil flashlight cells power transistorized receiver mounted on ear-protector headset. Cameramen and other employees of Chance Vought Aircraft are kept advised of missile count down and aircraft test flights with small size receiver

Each rocket will be equipped with detectors for soft X-rays (50 A), harder X-rays (8 to 20 A or 1 to 7 A) and Lyman-alpha ultra-violet radiation (1216 A). The rockets will be the Nike-Asp system, fired from shipboard. Data recorded during the rocket flights will be telemetered to receivers aboard ship.

Each rocket will be in flight for approximately seven to eight minutes—about five minutes of which will be above the absorbing atmosphere. Totality will last about four minutes.

Aboard ship, data from the two rockets aloft during totality will be recorded simultaneously by two independent telemetering stations. These two rockets will be launched in quick succession just before totality. Before and after this period, rockets will be launched so as to bracket active coronal regions. The first in each pair will measure the solar flux as the occulting disk of the moon approaches an active coronal spot; the second will be fired after the spot is covered.

A series of firings to test and, if necessary, improve the reliability of the rocket system is presently being carried out.

The NRL observations will be complemented by the observations of the CRPL group. It hopes to obtain data on heights, ionization densities and critical frequencies of the different ionospheric layers by use of a modified vertical-incidence sounder. The sounder will operate from Motu Koe Island during the eclipse and for a suitable period before and after. Using pulses of radio energy, this equipment determines the heights and ionization densities of the ionospheric layers.

Because these layers are ionized by solar ultraviolet and X-rays, a solar eclipse causes a marked decrease in ionospheric density. Correlation of the radiation data gathered by the rockets and the ionospheric data gathered by the sounder should give much information about changes in ionospheric structure with changes in solar radiation. These two experiments can be carried on regardless of the amount of cloud cover.

MEETINGS AHEAD

Aug. 13-15: Conf. on Electronics Standards and Measurements, AIEE, IRE, NBS, National Bureau of Standards Labs., Boulder, Colo.

Aug. 13-15: Seventh Annual Conf. on Industrial Applications of X-ray Analysis, Denver, Colo.

Aug. 19-22: Western Electronic Show and Convention, Los Angeles, Calif., WESCON, IRE, WCFEMA, Pan Pacific Auditorium, Ambassador Hotel, L. A.

Aug. 19-22: Pacific General Meeting, AIEE, Senator Hotel, Sacramento, Calif.

Aug. 26-Sept. 6: British National Radio Show, Radio Industry Council, Earls Court, London.

Sept. 9-11: Applied Meteorology Engineering, Second National Conf., Univ. of Mich., Ann Arbor.

Sept. 10-12: Tube Techniques, Fourth National Conf., Advisory Group on Electronic Tubes, OSD, Western Union Auditorium, N. Y. C.

Sept. 12-13: Communications Conf., IRE, Sheraton Montrose Hotel, Cedar Rapids, Iowa.

Sept. 15-19: Thirteenth Annual Instrument-Automation Conf. and Exhibit, ISA, Philadelphia Convention Hall, Pa.

Sept. 18-19: National Assoc. of Broadcasters, Fall Conf., Buena Vista Hotel, Biloxi, Miss.

Sept. 22-24: National Symposium on Telemetering, Americana Hotel, Miami Beach, and Patrick Air Force Base (Sept. 25).

Sept. 29-Oct. 3: Audio Engineering Society, 10th Annual Conv., Hotel New Yorker, N. Y. C.

Oct. 1-2: Radio-Interference Reduction, U. S. Army Signal Research & Devel. Labs, IRE, Armour Research Foundation, Chicago, Ill.

Oct. 6-8: Symposium on Extended Range and Space Communications, IRE and George Washington Univ., Lisner Auditorium, Wash., D. C.

Oct. 8-10: IRE Canadian Convention and Exposition, Electronics and Nuclears, Exhibition Park, Toronto, Canada.

Oct. 13-15: National Electronics Conf., 14th Annual, Hotel Sherman, Chicago.

Oct. 20-21: Aero Communications Symposium, Fourth National, PGCS, Hotel Utica, Utica, New York.



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SAC's Weapons Timetable

Electronics gets a key role as Strategic Air Command examines its requirements for future

THE ELECTRONICS industry has a big stake in the Strategic Air Command. Here's a closeup of what SAC has on hand today and what it plans for the future.

Of the \$20½ billion USAF has available for fiscal year 1959 for expenditure for aircraft-missile procurement and support, electronics will get a big part.

Electronics' share per weapon breaks down roughly this way: missiles, 45 percent; advanced bombers, 40 percent; and fighters, about 30 percent.

This week, USAF's multiphased stockpile, covering all major items, looks like this:

There are 53 types of aircraft out of production but still in use, 11 in production, three in the initial stages of production (B-58, F-105 and F-106) and four in R&D (X-15, Dynasoar, B-70 and F-108).

SAC weapons available for use today include: medium bomber, B-47; long range bomber, B-52; F-100, F-101, F-102 and F-104.

Though the B-47 will probably be in the air for 10 years, B-58 squadrons will start replacing B-47's

by the middle of next year, military sources say.

The B-52, with the "G" version carrying the air-to-ground Hound Dog missile, will also be around for another decade at least. Scheduled to then replace the B-52, is the B-70, a Mach 3, chemically-fueled bomber.

Following the B-70, according to USAF's Gen. C. S. Irvine, Deputy Chief of Staff, Materiel, will be "a piece of equipment which we will boost off the ground with something like the Atlas, using boosters as the first stage to push it out of the atmosphere."

The X-15, manned rocket due to fly early next year, will be followed by Dynasoar, a manned boost-glide orbiting vehicle.

Future operational fighters are the F-105, F-106 and—still on the drawing boards—the F-108.

Presently operational strategic surface-to-surface missiles consist of the Matador and Snark. The Atlas, still in the checkout stage, may be operational in about two years. Liquid-fueled Titan will be ready later. IRBM's Thor and Jupiter are scheduled to go to troops late this year.

Work on Minuteman, a solid-fueled ICBM which will eventually replace Atlas and Titan, has just begun as a study contract let to five principal firms.

MILITARY ELECTRONICS

• USAF will let several more contracts, by October, for the solid-fueled ICBM Minuteman including contractor for assembly and testing. USAF's Ballistic Division will have overall direction of the program with technical guidance by Ramo-Wooldridge (ELECTRONICS, p 7, Aug. 1).

• Controls systems contractor for the research and testing reactor now being built by NACA at the Plum Brook Ordnance Works near Sandusky, Ohio, is Leeds and Northrup. Servo logarithmic amplifiers will be supplied by Bendix, Detroit. Other electronic equipment that will go into the reactor before its completion next year are data logging, and alarm and area monitoring systems. A \$10,735,000 appropriation has been made for the 60 megawatt (heat) reactor.

NACA will use it to further development of reactors suitable for aircraft propulsion.

• Navy Manpower Information System in the Bureau of Naval Personnel has converted to automation. Heart of the system is an IBM 705 electronic data processing machine. Data processing installations equipped with IBM 650's are located at San Diego, Norfolk and Pensacola, Fla. Personnel accounting machine installations are located at district headquarters of all Continental Naval Districts and the Naval Air Reserve Training Command. The center is linked with all field installations by telephone lines and transceivers.

The system transmits and receives information in punched card form.

CONTRACTS AWARDED

Bendix Aviation gets two guided missile contracts with BuOrd totaling over \$29 million. \$21.5 million is for production of Talos; \$7.5 million is for Talos missile advanced engineering.

Packard-Bell's contract with Douglas for ground support equipment for the IRBM Thor has been increased by \$7.3 million, bringing the total contract to over \$14 million.

Crosley div. of Avco gets a \$4.5 million contract for additional fire control systems for the B-52 and a \$2.5 million contract for development engineering for Polaris, Navy IRBM.

Consolidated Diesel Electric is awarded new contracts and increases in previous orders from

Army Corps of Engineers totaling \$2.5 million. Units to be furnished consist of diesel electric generator sets used to provide precise power to missiles, radar and other electronic equipment.

GE gets a \$12 million contract with Rome AF Depot for production of advanced long range search radar system, AN/FPS-7.

Western Electric gets \$20.7 million to produce parts for Nike-Ajax and Hercules and \$9.2 million for production engineering for Nike-Hercules.

Douglas Aircraft wins a \$48.46 million contract to produce launchers for Hercules.

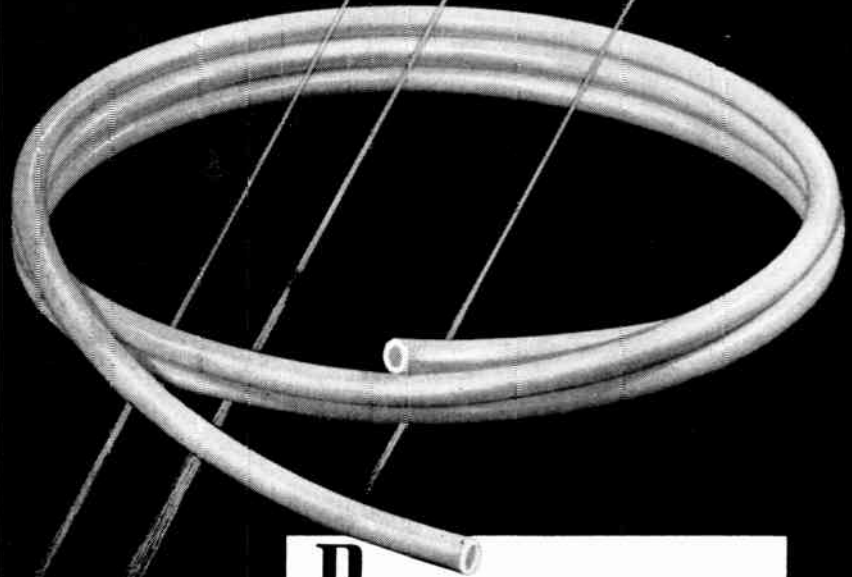
Convair gets two USAF contracts totaling \$11.175 million for modification of the Hughes MG-10 fire control systems in Convair's F-102A's. First contract covered modification of 131 of the interceptors and totaled \$6.7 million (original letter contract last December was \$2.531 million). Second contract covered 98 F-102's and totaled \$4.475 million.

Stromberg-Carlson gets a \$1,341,026 contract with Navy for production of sonar-type mine detector equipment.

Burroughs wins a \$1.7-million sub-contract with AC Spark Plug for design and fabrication of prelaunch data computers to be used in the Navy Regulus II missile program. Inertial guidance system for the submarine or ship-launched Regulus II is being developed by AC Spark Plug. Burroughs, also, gets another USAF contract for \$17,418,352 for construction of 24 coordinate data processing systems for SAGE. Burroughs' 66 contracts to date for SAGE total about \$90 million (ELECTRONICS, p 14, July 18).

Laboratory for Electronics is awarded a \$23 million USAF contract for Doppler airborne navigation equipment. AN APN-105. Unit weighs 210 lbs and occupies less than 7 cu ft.

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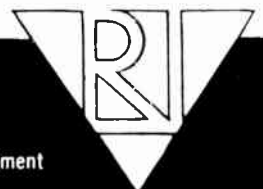
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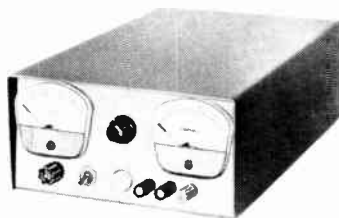
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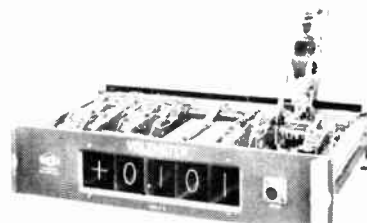
Transistorize More Units



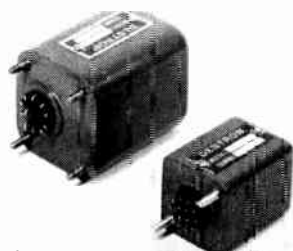
Southwestern Industrial Electronics Co. portable voltmeter



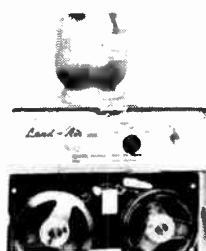
Kepeco Laboratories, Inc. v-r power supply



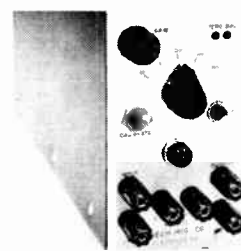
Cubic Corp. digital systems



Destron Co. timer and intervalometer



Land-Air, Inc. gamma recorder



Rheem Mfg. Co. d-c amplifier

IN RECENT years types and volume of industrial and laboratory instruments incorporating transistors have increased rapidly. Pictured here are some of the newly announced instruments.

Southwestern Industrial Electronics Co., 2831 Post Oak Road, Houston 19, Texas, (50) reports the new model R-3 portable voltmeter for measuring a-c voltages, positive and negative d-c voltages, and resistances. Battery-powered transistor circuitry endows the unit with high reliability and eliminates warmup time.

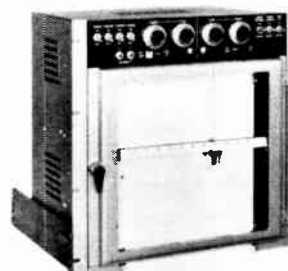
Model SC-3672-0.5 is a new transistorized v-r power supply in production at Kepeco Laboratories, Inc., 131-38 Sanford Ave., Flushing 55, N. Y., (51). It delivers 36-72 v, 0-0.5 ampere. Regulation for line or load is less than 0.1 percent or 0.003 v, whichever is greater.

Cubic Corp., 5575 Kearny Villa Rd., San Diego, Calif., (52) recently developed all-transistorized digital systems. These include a digital voltmeter, control unit, ratiometer, ohmmeter, a-c converter, master scanner and printer units. The voltmeter features polarity symbols, decimal point and a-c symbol.

Now available at Destron Co., 1321 Florwood Ave., Torrance, Calif., (53) are models 3000 and 5000 subminiature timers. They were developed to meet the need for a precision adjustable timer or intervalometer in missile and aircraft programs. A unique transistor circuit provides up to 3 basic time intervals or rates in a single unit.

Land-Air, Inc., 7444 W. Wilson Ave., Chicago 31, Ill., (54) has announced the GIFR (gamma intensity time recorder). It is a portable, battery-operated, transistorized, ion chamber nuclear radiation instrument which, unattended, records on magnetic tape the time and intensity of gamma radiation to which it is exposed.

Recently introduced by Rheem Mfg. Co., 7777 Industry Ave., Rivera, Calif., (55) is the REL-120, a completely transistorized direct-coupled instrumentation d-c amplifier. It features long life due to inert components, low heat generation and self-contained power supply.



X-Y Recorder with chart advance

F. L. MOSELEY Co., 409 N. Fair Oaks Ave., Pasadena, Calif. Model 6 Autograf is an X-Y recorder of the automatic chart advance type. It provides facilities for curve drawing, curve following, and point plotting from two variables in almost any application where data can be reduced to electrical form. With available accessories it may be used for punched card reading, automatic gain-frequency curve drawing, perforated tape reading, and numerous other time and labor-saving operations. Unique feature is the chart advance mechanism. Model 6 is designed to accept a roll of up to 100 complete

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program?

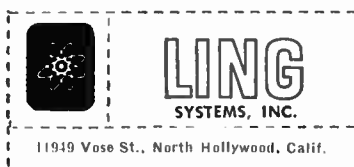


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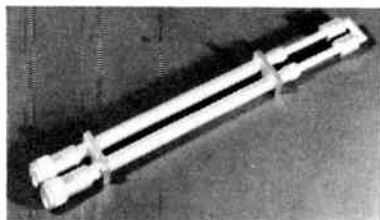
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 - Bulkhead feed-thrus
 - Special purpose cables



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charts which may be advanced into place one at a time by manual or automatic means. Circle 56 on Reader Service Card.



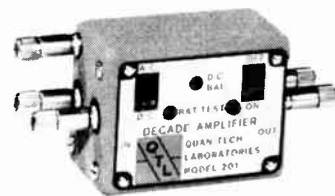
Line Stretchers constant impedance

MICROLAB, 71 Okner Parkway, Livingston, N. J. A new line of constant impedance line stretchers are used to adjust the electrical separation of other components without introducing additional mismatch into the system. They are designed to be used in the 250 to 5,000 mc region. Type N connectors are employed. The line stretchers are part of a group of coaxial tuners developed by the company. Catalog 7B describing the line of coax tuners is available. Circle 57 on Reader Service Card.



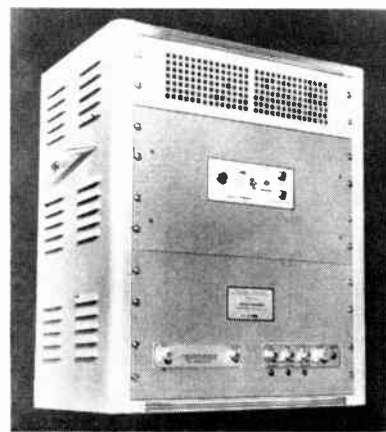
Servomotor takes 115 v input

HELIPOT CORP., Newport Beach, Calif. Model 8 SM 460 is a size 8 servomotor capable of operation at 115 v. It has an extremely low rotor inertia of 0.2 gm cm² and comparatively high stall torque of 0.33 oz in. Result is acceleration at stall of 115,000 rad/sec² . . . up to five times faster than size 8 units of comparable size. Although weighing but 1.6 oz and only 1.165 in. long, it is rugged enough to withstand 100 G shock and 30 G vibration to 2,000 cycles, exceeding MIL-B-5272A specifications. Circle 58 on Reader Service Card.



Decade Amplifier has many uses

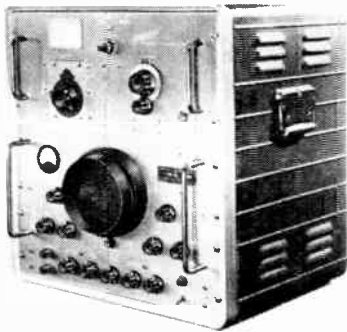
QUAN-TECH LABORATORIES, Morristown, N. J., announces model 201 decade amplifier which permits both a-c and d-c coupling. The unit suggests many uses: in extending the sensitivity range of voltmeters, oscilloscopes, and microphones; in eliminating input loading of voltmeters; in subsonic and geophysical applications; and when a-c operated instruments generate high hum levels. Frequency response is flat within ± 2 percent d-c to 100 kc, and 1 db to 500 kc. Circle 59 on Reader Service Card.



Post-Amplifier has a gain of 300

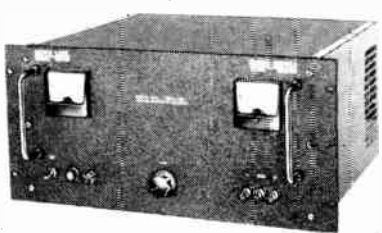
MILLIVAC INSTRUMENTS, P.O. Box 997, Schenectady, N. Y. The VS-102A post-amplifier has a gain of 300, a frequency response of 20 cps to 10 mc and a maximum output of 28 v peak-to-peak. Output impedance is adjustable between 35 and 130 ohms, to match various transmission lines. It is used to increase the output voltage and output power of continuous wave generators and sweep generators, to make possible alignment of amplifier output stages at their true high

operating signal level. Capacitive loads as high as 100 $\mu\mu\text{f}$ have practically no influence on the output voltage of this amplifier at its upper 10 mc frequency limit. Circle 60 on Reader Service Card.



Spectrum Analyzer wide range of uses

POLYTECHNIC RESEARCH & DEVELOPMENT Co., Inc., 202 Tillary St., Brooklyn 1, N. Y. Series S60 spectrum analyzers are valuable for precise spectrum measurements; evaluation of high vswr, leakage, and loss; and analysis of radar, radio relay, and other signals. They offer a choice of frequency ranges from 2,400 to 9,600 mc and have an accuracy of ± 0.08 percent, or ± 1 mc. The instruments are based on an improved power supply and indicator unit, type S60-1. The S60-1 is a complete power supply, i-f amplifier, and 5-in. oscilloscope display unit which can be used with any number of four different r-f heads. Circle 61 on Reader Service Card.



V-R Power Supply transistorized

KEPCO LABORATORIES, Inc., 131-38 Sanford Ave., Flushing 55, N. Y. Model SC-300-1 transistorized voltage regulated power supply delivers 0 to 300 v, 0 to 1 ampere. Regulation is 0.01 percent for line

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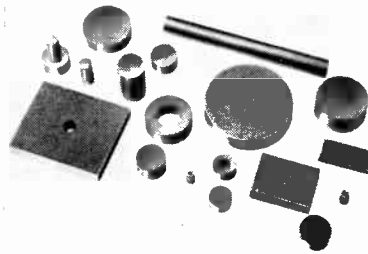
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CIRCLE 16 READERS SERVICE CARD

32

changes 105 to 125 v. Regulation for load changes from 0 to maximum is less than 0.01 percent or 0.002 v, whichever is greater. Ripple is less than 1 mv rms. Recovery time is less than 50 μ sec. Ambient operating temperature is 50 C. Temperature coefficient is less than 0.01 percent per deg C. Circle 62 on Reader Service Card.



Ferrite Magnets all-purpose

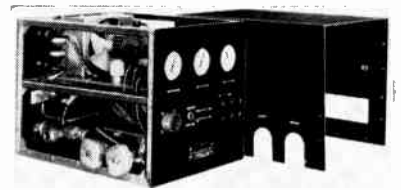
NATIONAL MOLDFITE Co., 248 South St., Newark 5, N. J. Permanent barium ferrite magnets for unlimited applications are now available. The magnets are smaller and lighter in weight, yet do not sacrifice magnetic power. They contain no critical material, are non-conductive, will not rust and are chemically inert. They also offer greatest resistance to demagnetization, require no keepers or pole pieces, have best storage life and can be magnetized either before or following assembly of user's product. Circle 63 on Reader Service Card.



Power Supply transistorized

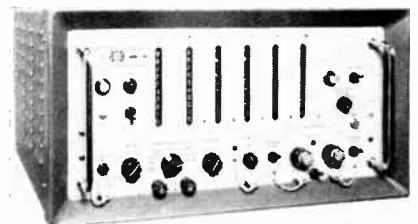
RHEEM MFG., 7777 Industry Ave., Rivera, Calif. The REL-203 power supply is a completely solid-state

unit employing the latest techniques of transistor switching to attain high efficiency and reliability. An r-f filter is included in the 28 v input to prevent interference being conducted to radio equipment. The typical r-f voltage level is down 50 db at 14 kc and down 80 db at 150 d-c. Measurement is based on 0.775 v for 0 db and is measured across a 1.0 ohm resistor placed in the 28 v power lead. The unit is magnetically and electrostatically shielded. Circle 64 on Reader Service Card.



Cooling System for missile parts

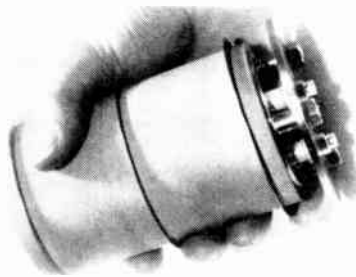
EASTERN INDUSTRIES, INC., 100 Skiff St., Hamden, Conn., has developed a cooling system for the detecting cell of infrared search systems. Model RS-25, type 100 features a specially designed two-stage piston type compressor to achieve cell temperatures down to -70 C by direct expansion. It is applicable to either airborne or ground installations. Weighing 32 lb and measuring 10 in. by 14 in. by 10 in. high, its power requirements are 200 v, 400 cycle, three phase. Operating range is up to 85 F and to 5,000 ft. altitude. Circle 65 on Reader Service Card.



Electronic Counter highly versatile

NORTHEASTERN ENGINEERING, INC., 25 South Bedford St., Manchester, N. H. Model 13-20 is a precision type direct reading universal electronic counter. It can measure fre-

quencies, time intervals, periods, time and frequency ratios, frequency drift and similar quantities. It will also count and totalize discrete electrical impulses such as those found in pulse and nuclear work whether of regular or random occurrence. It measures frequency from 10 cps to 1.1 mc; period, 0 to 10 kc; time interval, 3 μ sec to 100,000 sec; total events, 1 to 999,999. Circle 66 on Reader Service Card.



Hydrogen Thyratron ceramic case

INTERNATIONAL TELEPHONE & TELEGRAPH CORP., 88 Kingsland Rd., Clifton, N. J., has introduced a new Kuthe ceramic hydrogen thyratron tube (KU-73) designed to meet the adverse environmental conditions imposed by high performance radar systems. It permits the design of more compact aircraft radar modulator equipment for airframe manufacturers. The tube has a peak voltage rating of 25 kv, a peak current rating of 1,000 amperes and an average current rating of 1 ampere. Circle 67 on Reader Service Card.



Airborne Receiver crystal controlled

NEIS-CLARKE CO., 919 Jesup-Blair Drive, Silver Spring, Md. Type 1403 airborne receiver is a crystal controlled telemetry receiver designed for aircraft use. It is a double superhet type covering

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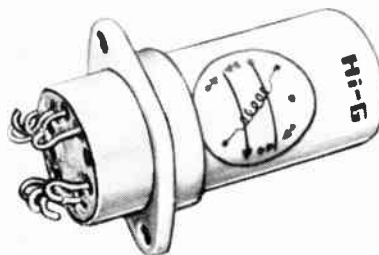
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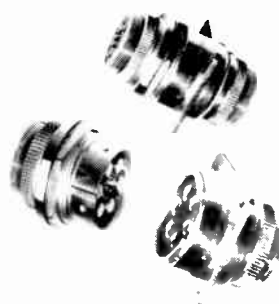
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a frequency range from 216 to 245 mc. Noise figure is less than 7 db. A choice of two i-f amplifiers of different bandwidths may be made by means of a selector switch on the front panel. The 1403 is supplied with a shock-mounted tray and can be furnished for either 60 cycle or 400 cycle operation. Circle 68 on Reader Service Card.



Two-Pole Relay high reliability

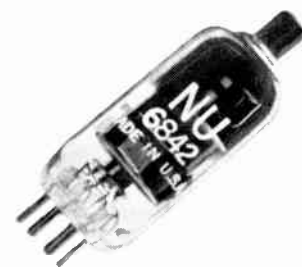
Hi-G, Inc., Bradley Field, Windsor Locks, Conn., offers a two-pole relay on special order to those who need vibration immunity to two or three times the normal limitation of 20 G at 2,000 cps. Engineering assistance is offered in selecting the proper mounting method and coil characteristics. The relay will withstand temperatures to 125 C, standard, and to 200 C, special. Contacts are rated to 5 amperes resistive, and for dry circuit application. This relay features a balanced rotary armature, and is designed for the ultimate in reliability. Circle 69 on Reader Service Card.



Connector six coax contacts

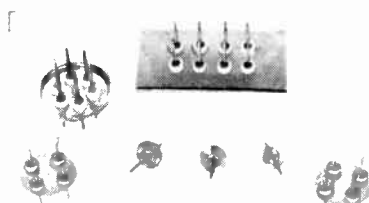
THE DEUTSCH CO., 7000 Avalon Blvd., Los Angeles 3, Calif., offers an environmental connector utilizing six coax contacts and 13 No. 20

contacts. Available in six alternate insert positions, the push-pull quick-disconnect connector features either standard or special coupling rings that lock and unlock in the direction of plug travel without lockwiring or twisting, without bayonet or coupling nut. Coax contacts will accept RG-196/U cable. Pins or sockets are available in either the plug or the receptacle. Dimensions on the receptacle are 1 3/4 in. in length and 1 1/2 in. in diameter. Plug dimensions are 1 3/4 in. in length and 1 1/2 in. in diameter. Circle 70 on Reader Service Card.



Miniature Pentode for h-v use

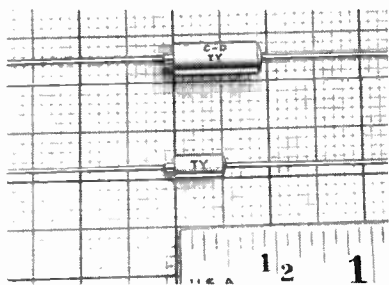
NATIONAL UNION ELECTRIC CORP., Bloomington, Ill. Type 6842 is a miniature h-v pentode designed for long life use in regulated power supplies or in voltage amplifiers at plate voltages up to 4,000 v and 8 w dissipation. Mutual conductance is 2,500 μ mhos at 1,500 v and the plate resistance is 930,000 ohms. Input capacitance is 4 μ mf with an output capacitance of 1.3 μ mf. The 7-pin miniature base and T5 1/2 bulb permit use of standard components. Circle 71 on Reader Service Card.



Terminal Headers metal-ceramic

RADIAN LABORATORIES, INC., P. O. Box 454, Mineola, N. Y. The novel use of standardized insulating

ceramics in this line of metal-ceramic headers makes possible a large assortment of both off-the-shelf and custom units, with no ceramic tooling requirements. Standard single and multiple terminal headers are available for application in electronic tubes, relays, transformers, missile components, and other devices requiring vacuum tight, high temperature, ruggedized seals. Circle 72 on Reader Service Card.



Capacitors solid electrolytic

CORNELL DUBILIER ELECTRIC CORP., South Plainfield, N. J., announces a series of solid electrolyte capacitors designed especially for transistor application in computer and military circuits. Called Solitan, they contain no liquid electrolyte, residue or moisture of any kind. Tantalum oxide film on the anode is the means for producing this solid-state capacitor. Among the advantages are smaller sizes and wider useful temperature characteristics within the range -80 C to $+85\text{ C}$. Circle 73 on Reader Service Card.



Servo Motor very small size

DAYSTRON TRANSICOH CORP., Worcester, Montgomery County, Pa. The size 6 servo motor was developed specifically for military

Synchros...another Kearfott capability



accuracy...reliability



SYNCHROS FOR EVERY APPLICATION

Kearfott offers the widest range of synchros in the industry. Ruggedly constructed of corrosion-resistant materials, they give unequalled performance under every environmental condition. For best characteristics and reliability, specify Kearfott for all your synchro requirements. Here are a few typical models:

Size 8: .750" x 1.240". 1.75 oz. -54C to $+125\text{C}$. Available as transmitter, control transformer, resolver, and differential. Max. error from EZ: 10, 7 and 5 minutes.

Size 11 Standard: 1.062" x 1.766". 4 oz. -54C to $+125\text{C}$. Available as transmitter, control transformer, repeater, resolver and differential for 26v and 115v applications. Max. error from EZ: 10, 7 and 5 minutes standard, 3 minutes in 4-wire configurations.

Size 11 MIL Type: Dimensions and applications same as above. Meets Bu. Ord. configurations: max. error from EZ: 7 minutes.

Size 15 Precision Resolver (R587): With compensating network and transistorized booster amplifier, provides 1:1 transformation ratio, 0° phase shift. Max. error from EZ: 5 minutes.

Size 25 Ultra-Precise: 2.478" x 3.187". 45 oz. Available as transmitter, differential, and control transformer. Max. error from EZ: 20 seconds arc.

Engineers: Kearfott offers challenging opportunities in advanced component and system developments.

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"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 stagna-

tion. 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."

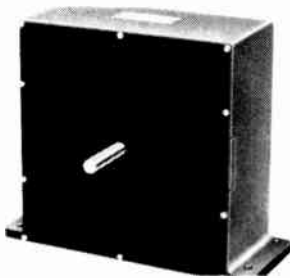
You see — you, yourself, are really two men . . . one well-versed in your specialty . . . the other, well-informed on "the big picture". And this same one McGraw-Hill publication is edited to satisfy both of you. How well? Read on, and be pleasantly and profitably surprised.

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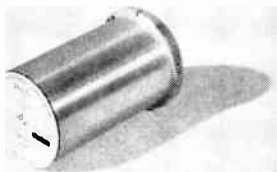
most interested in moving ahead

applications where high response and extreme size and weight limitations are of great importance. Weighing only 0.9 oz., it will develop a stall torque of 0.125 oz-in., and has a free speed of 6,200 rpm. The unit is available for 400 cycle operation with 26, 33, or 52 v control phase windings. The control phase is center-tapped for operation directly with transistor amplifiers. Operating temperature range is from -55 C to +120 C. Circle 74 on Reader Service Card.



Memory Unit for automation

INDUSTRIAL CONTROL CO., 805 Albin Ave., Lindenhurst, L. I., N. Y. The 603-A is a memory storage unit designed for moderate bit capacity and simplicity of operation. Memory storage is accomplished by charging selectively any one of 60 condensers, mounted on a rotating disk. Charging and pickoff may be continuous, for proportional process control, or the drive shaft may be indexed to each condenser by a servomechanism. Maximum charging voltage is ± 200 v d-c. The 603-A can be charged by a simple d-c potentiometer, and the output can drive a meter indicator, or a servo system for process control. Circle 75 on Reader Service Card.



Integrated Gyros floated type

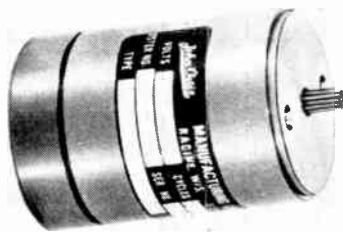
REEVES INSTRUMENT CORP., Roosevelt Field, Garden City, N. Y. Trimmed drift rates of 0.1 deg/hr

rms are guaranteed in a new series of 201G single axis floated integrating gyros. The gyros have an extremely low anisoclastic constant of 0.025 deg hr/g², combined with a high command turning rate of over 20 deg sec maximum. They are ideal for airborne guidance, navigation, and control applications. Circle 76 on Reader Service Card.



Vacuum Controller thermocouple type

VEECO VACUUM CORP., 86-P Denton Ave., New Hyde Park, N. Y., has available an automatic controller actuated by a thermocouple vacuum gage for electrically controlling vacuum or process equipment. A relay in the controller is energized when the thermocouple vacuum gage tube indicates system pressure corresponding to any pre-set point within the range of from 500 microns down to 5 microns. The relay can be used to open or close the circuit of a solenoid valve, a diffusion pump heater, power relay or any other piece of electrical equipment. Circle 77 on Reader Service Card.



Synchronous Motor reversible

JOHN OSTER MFG. CO., 1 Main St., Racine, Wis. A new versatile size 11 airborne quality fine instrument type synchronous reversible motor can be connected to either 60 or 400 cycle operation. Pullout torque at 60 cycles and 1,800 rpm is 0.15

write for this MANUAL HIGH VOLTAGE BREAKDOWN Testing

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for
Production
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"Practical Hi-Pot Testing" outlines procedures for setting up both AC and DC high voltage tests of materials and equipment ... such as cables, wiring, components, motors, capacitors and transformers. Send, today, for your copy of this useful manual.

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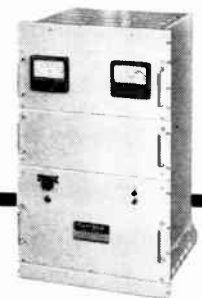
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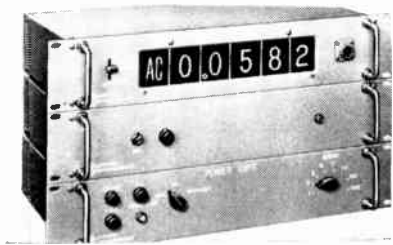


Write for Bulletin AC-58-A

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Over a Quarter Century of Rectifier Manufacturing

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oz in. and at 400 cycles and 12,000 rpm is 0.085 oz in. This is achieved by using a 1.0 μf capacitor for 60 cycle operation or a 0.1 μf capacitor for 400 cycles. Input voltage is 115 for both 60 and 400 cycles. Type 11A-8011-01 is a 60 cycle motor designed to meet MIL-E-5272, is rated at 12 w input and weighs 4.25 oz. Circle 78 on Reader Service Card.



Digital Voltmeter modular unit

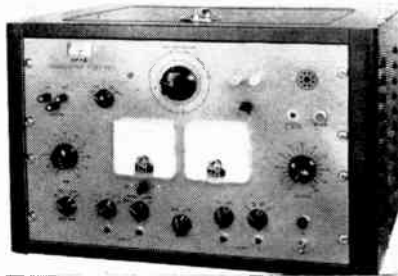
ELECTRO INSTRUMENTS, INC., 3540 Aero Court, San Diego 11, Calif., announces model DVA-510 modular digital voltmeter for measuring a-c or d-c voltages. It consists of a transistorized power module, d-c switch module and a-c converter module. Unit has a range of 0.0001 to 999.99 v and displays a 5-digit reading, with automatic ranging, and polarity. It is accurate to ± 0.01 percent, \pm one digit, with 0.01 percent stability. Circle 79 on Reader Service Card.



Multimeter miniaturized

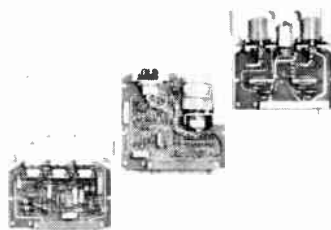
BRITISH INDUSTRIES CORP., 80 Shore Rd., Port Washington, N. Y., announces the AVO Multiminor, a miniature multimeter. D-C voltages from 2 mv to 1,000 v are measured in 7 ranges, with an accuracy of 3 percent, at a sensitivity of 10,000 ohms per v. A-C voltages from 200 mv to 1,000 v are meas-

ured in 5 ranges, with an accuracy of 4 percent and a sensitivity of 1,000 ohms per v. D-C current from 2 μa to 1 ampere and resistance from 5 ohms to 2 megohms are covered. Circle 80 on Reader Service Card.



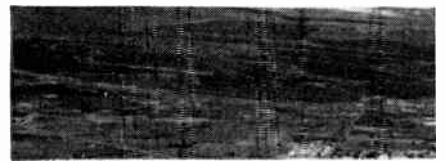
Transistor Tester for lab, production

BAIRD-ATOMIC, INC., 33 University Road, Cambridge 38, Mass. Model KP-2 is a versatile precision instrument for analyzing transistors at frequencies from 100 cps to 200 kc, valuable and dependable for both lab and production work. It offers a current range of from 100 μa to 1 ampere with two regulated semiconductor power supplies for bias voltages and currents. Special models are available for use up to 2 amperes. Price of the KP-2 is \$975. Circle 81 on Reader Service Card.

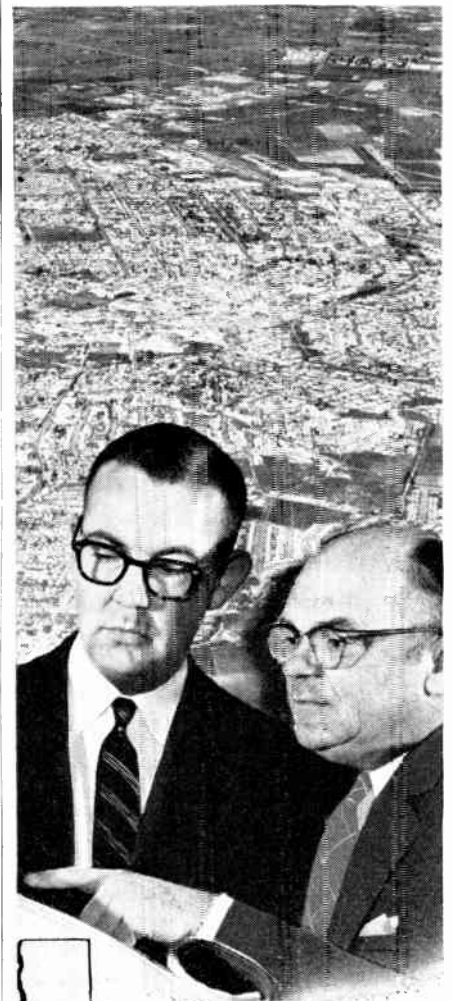


Plug-In P-C Bales for logic systems

SKIATRON ELECTRONICS & TELEVISION CORP., 180 Varick St., New York 14, N. Y. A complete line of plug-in printed circuits in modular form meet all applicable JAN specs. The company developed the line of bales, together with suitable mounting racks, to meet the needs of computer designers and control engineers who are faced with the increasing complexity of circuitry



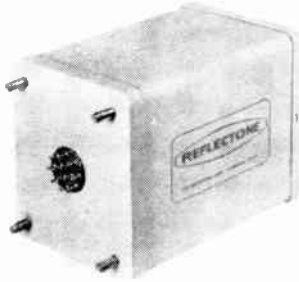
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CIRCLE 22 READERS SERVICE CARD

August 8, 1958 — ELECTRONICS business edition

for military and commercial systems. A special feature of the bales is that each component can readily be replaced, which simplifies checking and maintenance and insures long life of the units. Thirty types of bales are currently offered as stock items. Circle 82 on Reader Service Card.



Servo Amplifier ruggedized unit

THE REFLECTONE CORP., Stamford, Conn. Type III magnetic servo amplifier is designed for operation from standard single or double speed synchro control transformers or from bridge networks. It will drive a wide variety of standard low-impedance, two-phase servo motors delivering up to 10 w mechanical output. The entire unit including clamping diodes is contained in a standard MIL type KA can with four mounting studs. It is shock-proof, moisture proof and operates at a very low temperature rise. Circle 83 on Reader Service Card.

Counter-Timer ultra-compact

ERIC-PACIFIC Division of Eric Resistor Corp., 12932 S. Weber Way, Hawthorne, Calif. Model 400 counter-timer is a five-decade electronic counter with response from 1 cps to beyond 100 kc. High-speed glow tube decades, unique gate control and decade-drive circuitry are integrated in a package less than 1/2 cu ft. Model 400 measures frequency, period, time interval, and a ten-period average using a crystal-stabilized clock source having a maximum error of 0.001 percent. Circle 84 on Reader Service Card.



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Mr. David Packard, President of Hewlett-Packard...



"A good location is directly related to the growth of a new firm. For this reason, we feel that Santa Clara County has made a major contribution to our development. Its all-year mild climate and nearby higher educational institutions serve as a magnet for the kind of scientific manpower we need."

Mr. J. E. Jennings, President of Jennings Radio...



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

Mr. H. Myrl Stearns, President of Varian Associates...



"Clean atmosphere ranks first among the reasons for our enthusiasm over this area. However, other advantages are also important in the manufacture of products such as our Klystron tubes. The many electronic research facilities, an ample supply of skilled technicians, plus top-ranking educational institutions nearby, have all been key factors in our rapid growth."

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don't
have
time
to
read!"



GET UP EARLIER ... Put a new half-hour into your day. Use it to read. While you're shaving. Or at breakfast. Or catch an earlier train. Read that article you may have spotted right in this issue a few seconds ago. "I must be sure to read that," you said. Bet you won't -- unless you create the time to do it.

WRITE SHORTER LETTERS ... less involved memoes, unwindier reports. Brevity is business' biggest bargain. Cut your dictating time in half. And it's contagious. Pretty soon, other people will make their replies shorter and sweeter. So you save twice as many minutes for your favorite business publication.



EAT LESS FOR LUNCH ... You put away fewer groceries in a 1-hour lunch than a 2-hour lunch. You feel lots better. Costs less, too. And look at the time you gain! Invest it in reading. Expose yourself to the current experience of men with similar problems and common goals. Know what's going on. Be an "authority".

BE A CONFERENCE "CLOCK-WATCHER" ... Be Succinct. Then sit down. The boss will bless you. If you're in a meeting-happy company, campaign for faster, fewer meetings. Everybody gets more done. . . . but you're the big time winner. Explore some of the great things you may have missed in these pages. Find out what's going on in other functions and phases of your industry.



LOOK AHEAD, READ AHEAD, GET AHEAD ... today.

Little future for "stand-patters". Be alert. Be informed. Management's watching you. Stimulate your brain cells. Upgrade your viewpoint. And do it on your own terms... as many reading minutes as you like, when and where you want to apply them. For the more time you invest reading your favorite McGraw-Hill business publication, the more time you save to do a better job, to see more of your family, to enjoy life.

Literature of the Week

MATERIALS

Cementable Teflon Tapes and Sheets. Continental-Diamond Fibre Corp., Newark, Del. A four-page bulletin contains technical data for glass supported, unsupported and metal-clad cementable sheets and tapes. **Circle 85 on Reader Service Card.**

Resin Data. Emerson & Cuming, Inc., 869 Washington St., Canton, Mass. A large multicolored wall chart is available showing a compilation of data for the company's various standard resins. Information is also given about a mechanical proportioning dispenser for handling these materials. **Circle 86 on Reader Service Card.**

COMPONENTS

Binding Posts. The Superior Electric Co., Bristol, Conn. Bulletin BP958 contains dimensions, features, methods of connection and prices for 5-way gold-plated binding posts. **Circle 87 on Reader Service Card.**

Miniature Rotary Switch. Instrument Development Laboratories, Inc., 67 Mechanic St., Attleboro, Mass., announces a data sheet on the new miniature, high-speed, motor-driven rotary switch for sampling and telemetering in long-life airborne applications. **Circle 88 on Reader Service Card.**

Power Tube Guide. Westinghouse Electric Corp., Elmira, N. Y. An easy guide to aid in the selection of Reliatron power tubes for industrial and communication applications is now available. **Circle 89 on Reader Service Card.**

Read-Record Heads. Librascope, Inc., 40 E. Verdugo Ave., Burbank, Calif. A four-page bulletin contains the physical and operational characteristics of the company's military and general purpose read and record heads designed for

magnetic drums in airborne data-handling systems, computer memory systems and laboratory testing. **Circle 90 on Reader Service Card.**

EQUIPMENT

Digital Indicator. Fischer & Porter Co., 627 Jacksonville Rd., Hatboro, Pa. Catalog 51-1800 describes a precision in-line digital indicator which accepts a variable frequency a-c input and converts it to a 5-digit indication, accurate to within 1 frequency count. **Circle 91 on Reader Service Card.**

Keyboard and Perforator. Fish-Schurman Corp., 70 Portman Road, New Rochelle, N. Y. Bulletin KP-387 illustrates and describes the model KP keyboard and perforator. **Circle 92 on Reader Service Card.**

Summing Amplifier. Acromag, Inc., 22519 Telegraph Rd., Detroit 41, Mich. A recent bulletin on the model 410 summing amplifier lists several applications of the unit together with the basic circuit for each application. Performance data; electrical, mechanical, and environmental specifications are given. **Circle 93 on Reader Service Card.**

FACILITIES

Connector Soldering Techniques. The Deutsch Co., 7000 Avalon Blvd., Los Angeles 3, Calif. A 10-page report giving a step-by-step procedure for the soldering of miniature electrical connectors is offered. **Circle 94 on Reader Service Card.**

Potentiometer Transducer Terms. Bourns Laboratories, Inc., P. O. Box 2112, Riverside, Calif., offers a new bulletin defining potentiometer transducer terms. It discusses environmental, calibration, test, linearity, over-range and electrical-mechanical terminology and includes formulas. **Circle 95 on Reader Service Card.**

TRACY, CALIFORNIA



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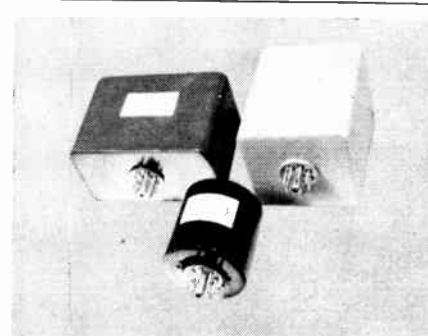
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CIRCLE 28 READERS SERVICE CARD

Brussels: Electronic Tooting

In the Fair's obvious East-West rivalry electronic showmanship is paying off for the U. S.

BRUSSELS—The Brussels Fair is an exercise in international public relations. To put their best foot forward for the more than two million Fair visitors, most nations have used electronic devices, on display and behind the scenes.

Point of greatest interest is the very apparent conflict between East and West. Russian and American pavilions face each other and crowds stream between them. The American hall is light and airy. A mechanical manipulator, with a huge bank of amplifiers, plays with children's blocks. An analog computer toots vaguely musical tunes on an audio oscillator. A six-million bit magnetic memory gives out historical facts in five languages. A one-camera color tv studio produces a variety of programs through the day. Everything has a pretty guide and a dash of showmanship.

Just the opposite is the Russian pavilion. Its theme, one pamphlet says, is "We Have Everything."

One alley, off the machinery-cluttered main hall, has some Russian electronic equipment on display. The analog computers play no tunes; the digital computers know no history; there are no pretty guides. The crowds barely slow up as they pass by.

The exhibit of the Soviet communications industry, in the pavilion's basement, creates much more interest. Long rows of television-radio consoles of every style are in operation; the pictures are good.

Typical Russian-built long and medium wave re-

ceivers are on display. Their construction is similar to that of sets made elsewhere. Also shown are professional magnetic and optical sound recording equipment, transceivers, and medical X-ray equipment. Except for the Russian panel markings, they might look like American equipment.

Although the Russians have not developed the American flair for flashy panels, there is evidence that the Soviet electronics industry can live up to its part of the "We Have Everything" boast. The exhibit is technically impressive.

In the fair's large Hall of Science, an international project, electronics very nearly steals the show. Each country has sent exhibits showing outstanding contributions made by its scientists. Almost every exhibit and demonstration, regardless of the field of science, uses electronics to measure and analyze. Here, Russian and American equipment are very much alike. Russian scintillation counters, pulse analyzers, and mass spectrometers stand by their American counterparts.

Behind the scenes, multichannel tape recorders made by a European firm offer simultaneous sound tracks in as many as six different languages and, in some pavilions, actuate relay banks to control the exhibits themselves. One firm's exhibit uses two 15-channel and two 3-channel perforated-tape playback units with five relay racks of equipment to produce an automatic show of lights and sound.

The large exposition hall has an extensive sound system. From the mixing console, the operator can control the amount of artificial delay so that the reinforced sound reaches each listener at the proper time. Special headsets aid the hard-of-hearing.

DEVELOPMENTS ABROAD

- In Britain a direct-viewing storage cathode ray tube, on which a stylus writes information, has been developed by the English Electric Valve Co. Tube stores information for 10 minutes, and the image can be erased in 30 millisecc. Firm says the 4-in. diameter screen is bright enough to be viewed in daylight. Production is expected to begin shortly.

- Italy's roadbuilding authority, Azienda Nazionale Autonoma delle Strade Statali, is experimenting with an electronic device to help

smooth roads. Owner of the method patent, Pizzarotti Co. of Parma, is negotiating with Galileo Co. of Florence, for series production of the device to cost about \$5,000. Device is said to allow a road finishing machine to eliminate road depressions and humps; the machine's mix layer is controlled by optical and electronic devices along a rectilinear line regardless of the road surface. Technicians, using optical device, controls pouring of mix by pushbutton. Tolerances reportedly do not exceed the order of 0.196-in.

EXPORTS and IMPORTS

Australian Government has authorized the Royal Australian Air Force to place \$2.5 million worth of orders in the U. S. for radar equipment that will be installed near Darwin. The station will be the RAAF's third control and reporting unit; one is already located near Sydney and a mobile unit is being sent to Malaya. The Darwin system will also be mobile and transportable by air.

Italian firm Eletttronica Sicula of Palermo has received an order from

Raytheon Manufacturing Co. for \$500,000 worth of cathode ray tubes. It's believed that another \$1.5 million in orders may follow. Elettronica Sicula manufactures several products under Raytheon license, including X-ray tubes, dischargers and accessories for magnetrons and thyratrons. Raytheon has plowed back royalties, now owns 14 percent of the company founded in 1954.

West Germany's defense ministry indicates that orders for \$8.75 million worth of British radar sets and sonar buoys are as good as signed. Seven frigates bought from Britain are expected to be fitted out with British electronic gear. Meanwhile, a British-German committee is studying other possibilities of adapting British naval electronic equipment to meet West German needs.

In Britain two top computer and office data processing firms—British Tabulating Co. Ltd. and Power-Samas Ltd.—will merge in 1959, subject to shareholders' approval. Operations will be transferred to a yet-unnamed company in which British Tabulating will hold 62 percent and Power-Samas 38 percent. Aim of the merger, says a spokesman, is to improve efficiency and pool computer development.

In France two leading radio and tv manufacturers—Thomson-Houston and Pathe-Marconi—have signed a joint production agreement to strengthen their competitive positions in world markets. T-H will make Pathe-Marconi radio and tv sets; the latter will press records and produce record players for Thomson-Houston. The agreement, which goes into effect within a year, also provides for a new sales organization to sell radio and tv sets for both firms.

West Germany's Siemens and Halske AG and RCA have reached an agreement under which RCA will sell Siemens radiographic microstructure testing gear in the U. S. The agreement covers measuring equipment used especially in metallurgy and chemical engineering.

**"It's the kind of life we
live in Nebraska that's
attracting and holding
our key people,"**



— says
Quentin T. Wiles,

President,
Good-All Electric
Manufacturing Co.,
Ogallala, Nebr.

In a State where bonded indebtedness is constitutionally taboo . . . where more miles of running streams flow than anywhere in the land . . . where folks honestly believe in giving a full day's work for a day's pay . . . where game, fish and a variety of recreational spots are found in profusion . . . where by actual statistics people live longer and (by actual practice) better than in any of the other forty-eight states . . . all these things and more in Nebraska give site-seekers something to think about.

A case in point is the Good-All Electric Manufacturing Co., where President Wiles has pointed out; "The kind of life we live in Nebraska has attracted many of our top people from important positions in well known firms from over the country to a growing company in a thriving community in picturesque western Nebraska. This same kind of a wholesome, interesting life is keeping them here. Like it? They love it!"

As a matter of fact and record, every one of the electronics firms located in Nebraska—and there are an important few now—is prospering, busy and expanding—and yet finds time to "live a little along the way."

Your inquiry will be held in confidence by

DIVISION OF NEBRASKA RESOURCES
STATE CAPITOL — LINCOLN, NEBRASKA

Radio Stations Go Mobile

New interest in outside programming is reflected in remote pickup grants, more use of mobile studios

RECENT TREND evident in the broadcast industry is increased use of mobile units by radio broadcast stations.

An FCC official told *ELECTRONICS* that remote pickup channels in use this year number 3,020 as of May 31. This is 635 more than last year's figure of 2,385 on the same date, and almost 1,500 more than the 1955 figure.

A midwest broadcaster says this is due to increased interest in programs originated on sponsors' premises. His station reports favorable results on broadcasts coming from drive-in restaurants, supermarkets and auto sales agencies.

Station operators planning mobile units are studying recent developments in miniaturized consoles, lightweight turntables, tape recorders and line amplifiers. These new units are ideal for mounting in vehicles.

Inquiry among broadcasters reveals that no particular type of vehicle can be pointed to as standard. Most stations jury-rig their own "rolling stock" to suit their particular needs. Equipment now on the road ranges from conventional station wagons (used by a New York station) to elaborate trailers with air conditioning and picture windows (used by one Ohio broadcaster).

Minimum equipment is a console for controlling

program sources, one or more record turntables, a tape recorder, a microphone and associated circuitry, telephone terminals and a transmitter.

Most stations rely on external power sources and use telephone lines to get the signal back to home base. A number of operators, however, report successful use of internal generators and direct radio links.

Says one station engineer: "Direct radio transmission of good quality is not hard to achieve with present equipment."

There are several channels available to radio stations for remote pickup. The most popular seems to be in the 450-mc area which suffers less from interference effects than the 26 and 150-mc bands where channels are also available. Further advantage in the 450-mc slots is the smaller antenna size usable at this frequency. Channels authorized in this band are not shared with other services.

A difference in present use of mobile units compared with practice in pre-tv days is that moving studios are now for the most part incorporated into scheduled program planning. Earlier usage was often confined to "crash units" which were sent out only to cover disasters, special events and other sudden news developments.

In at least three major markets in the country, stations have taken to the air via helicopters. In general, practice is to rent the whirlybirds on a regular schedule for such uses as traffic reports. They are also finding use for special on-the-spot news coverage.

FCC ACTIONS

- Proposes rulemaking to provide geographical assignment of frequencies in 151 and 159-mc band to state conservation agencies on a state-by-state basis. Users will be exempt from split channel requirements.

- Issues e-p to Broadbent TV Translator, Inc., Myrtle Pt., Ore., for new translator station on channel 78 to serve Broadbent and Myrtle Pt. using KPIC signal.

- Grants permit for new a-m station to operate on 1,250 kc at 500 w daytime to Garden of the Glades Co., Pahokee, Fla.

- Permits KPAM, Portland, Ore., to increase power from 1 to 5 kw, continuing operation on 1,410 kc.

- Issues e-p for new class A f-m station to operate on 92.7 mc, exp 810 to High Fidelity Music Co., Hicksville, N. Y.

- Accepts application from WINA, Charlottesville, Va., for e-p to increase power.

- Files application from Des Moines, Iowa, Community School District for extension of completion date for new educational tv station.

STATIONS MOVES and PLANS

KGUL-TV, Houston, Tex., announces plans for a multistory studio and antenna tower to cost more than \$1 million.

KCEE, Tucson, Ariz., applies for change in e-p to extend completion date.

WRSA, Saratoga Springs, N. Y., requests permission to transfer control of license corporation from Richard O'Connor to Jack Oranch.

KASY, Auburn, Wash., asks for modified e-p to allow changes in transmitter type, deletion of ground

screen, change in studio location and operation of transmitter by remote control.

WACL, Mayaguez, P.R., seeks c-p to install old main transmitter as an auxiliary transmitter for operation by remote control.

WIBG, Philadelphia, plans increase in daytime power from 10 to 50 kw, continuing operation on 900 kc with 10 kw night.

WGOL, Goldsboro, N. C., is granted assignment of license to Better Advertising, Inc., for \$35,000, plus studio building lease for three years to \$175 a month with option to buy.

WBLU, Salem, Va., increases power from 1 to 5 kw, continuing operation on 1,480 kc daytime, using remote control.

WILY-FM, Buffalo, N. Y., plans change in station location to Kenmore, N. Y., to permit call letter change to WINE-FM for identification with WINE-AM.

WIOU, Kokomo, Ind., receives renewal of license.

WXYZ-TV, Detroit, Mich., receives permission to move transmitter and studio to location outside city limits, increase antenna height to 1,000 ft and change equipment.

WALT, Tampa, Fla., applies for c-p to increase power from 10 to 50 kw, install new transmitter, make changes in directional antenna.

KOLO, Reno, Nev., seeks c-p change to allow use of directional antenna for nighttime broadcasts only.

WOOW, Washington, N. C., requests permission to change location to Greenville, N. C., increase antenna height, change ground system.

KTTS, Springfield, Mo., files for increase in power from 250 w unlimited to 1 kw local sunset, and installation of new transmitter.

This is not and is under no circumstances to be construed as an offer to sell, or as an offer to buy, or as a solicitation of an offer to buy, any of the securities herein mentioned. The offering is made only by the Prospectus.

July 22, 1958

100,000 Shares
General Transistor Corp.
Common Stock

Price \$20.50 per share

Copies of the Prospectus may be obtained in any state only from such dealers participating in this issue, including the undersigned, as may legally offer these Securities under the securities laws of such State.

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**SEND FOR NEW COMPLETE ECONOMIC
STUDY OF METROPOLITAN MIAMI**



**LET US SHOW YOU HOW YOUR
COMPANY CAN PROFIT BY LOCAT-
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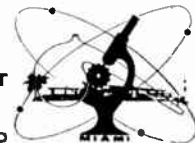
A 24 section, complete economic analysis has just been prepared to supply you with complete data which will assist in determining how your particular manufacturing or statewide, national/international distribution operation can profit here. This important study will be mailed to you free of charge—in strictest confidence—if you write, on your letterhead, to the address listed below.

Please ... no employment applications. We are deluged with resumés from engineers, tool makers, technicians, Ph.D.'s, etc., and cannot possibly aid in placement requests as we already have a tremendous surplus of skilled and professional labor here now. Sorry.

WRITE: John N. Gibson, Director
DADE COUNTY
DEVELOPMENT DEPARTMENT
Section: 32

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Missile R&D Center Grows

Avco's Research and Advanced Development Division, less than three years old and already established in missile systems R&D, recently started moving from a converted Lawrence, Mass., textile mill to a new \$16 million center (picture) in Wilmington, a semi-rural suburb 15 miles northwest of Boston.

Major project of Avco RAD is development of reentry vehicle for Titan ICBM, under \$111 million Air Force prime contract. A month before moving day, Lloyd P. Smith, division president, announced fabrication of nose cones will be done at Avco's Lycoming Division in Stratford, Conn. Continuing R&D on nose cone and other projects will be centralized in Wilmington.

Also moving to Wilmington will be Avco Research Laboratory in Everett, Mass., formerly part of RAD but earlier this year made a separate division under Arthur Kantrowitz, founder of the lab and long-active in physical gas dynamics. Lab's hypersonic shock tubes provided theoretical breakthrough in ICBM problem of atmospheric reentry, as well as data for space flight studies and magnetohydrodynamics. Shock tube research contributed to awarding of Titan nose cone contract to Avco RAD.

Although Avco originally planned to integrate all R&D work in new 16-acre Wilmington center, RAD's Electronics Research Lab will remain in Boston. Under direction of John W. Marchetti, lab concentrates on microwave propagation, magnetics, meteor transmission.

Avco RAD employs more than 2,000 persons. Scientific and engineering roster includes generous sprinkling of graduates, ex-faculty members from Cornell, which has specialized for many years in fluid dynamics. President Smith was for 10 years chairman of Cornell's physics dept. Kantrowitz was Cornell professor after heading gas dynamics section of National Advisory Committee for Aeronautics.

Nucleus of Avco RAD was formed in 1954 with parent corporation's Committee on Advanced Scientific Research. Division was activated in Sept., 1955, six months after successful establishment of hypersonic shock tube techniques to study high temperature gas dynamics.

Division today is also doing extensive R&D on electronic components, systems and testing. Newest program is ESAR (Electronically Steerable Array Radar) for Air Force. Avco RAD is prime contractor and Hughes is principal sub under design-development contract awarded by Rome ADC.

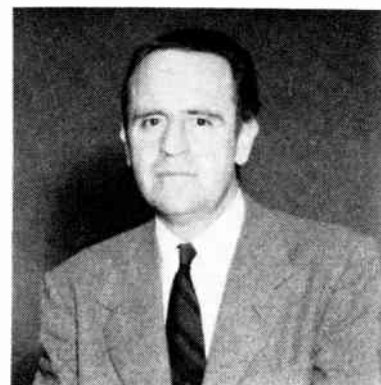
IRC Promotes G. T. Brent

INTERNATIONAL Resistance Co., Philadelphia, announces the appointment of George T. Brent to chief engineer of its subsidiary, Circuit Instruments Inc., St. Petersburg, Fla.

Brent, who joined IRC in 1955, has held the positions of design engineer, production manager and manufacturing superintendent.

Corporation Changes Name

NEW NAME of the Metron Corp., Lambertville, N. J., is Taurus Corporation. They manufacture mechanical components and assemblies for the electronics industry. Product lines include Teflon insulated terminals and static punched card sensors. Management, sales organization and product lines remain unchanged.



Gross Assumes New Duties

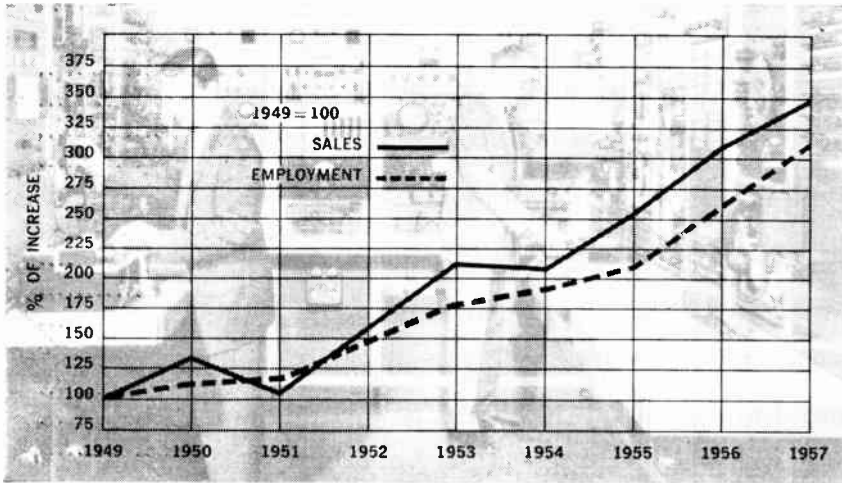
FORMER manager of Kinetics Corp., processing division of High Vacuum Equipment Corp., Hingham, Mass., Robert C. Gross (picture) has been appointed vice president and general manager of both organizations.

ARDC Engineer Joins RRC

LIONEL Schwartz, formerly with Air Research Development Command, is now associated with Radiation Research Corporation, New York City, as liaison engineer with offices in Dayton 5, Ohio.

New Corporation In Operation

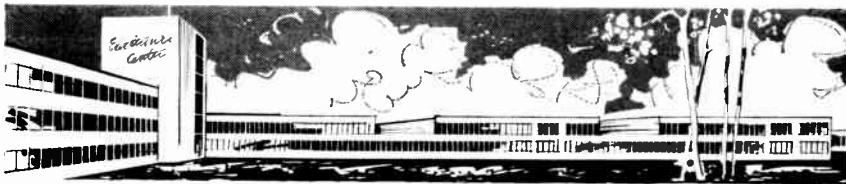
CUSHIONING CRAFTSMEN CORP., incorporated as of July, 1957, has started the production of curled hair in its various forms at Tupelo, Miss. Rubberized curled hair is



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General Transistor Corp....	1756-1757
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Ling Systems Incorporated	716-718
McCoy Electronics Co.....	1622
Neely Enterprises	1452-1453
Radio Corporation of America	1633-1636
Texas Instruments, Inc....	1716-1717; 1740-1741
Tung-Sol Electric Inc.....	1216-1217

used for cushioning of delicate instruments, which of course would include electronic items.

A sales office and warehouse will be maintained at Edgewater, N. J., to service the eastern trade, whereas Tupelo will service the rest of the country according to present plans.

News of Reps

Burt Anderson & Associates, Inc., will represent Fairchild Controls Corp., Hicksville, N. Y., in Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, Wisconsin and Kansas City, Kansas.

Filtors, Inc., Port Washington, N. Y., appoints the **Jack Keith Co.** to handle its relay lines in the states of Indiana and Kentucky.

ERP Associates is named sales rep for the Industrial Division of **Tel-Instrument Electronics Corp.**, Carlstadt, N. J. Territory is upstate New York, with the exception of the counties of Sullivan, Ulster, Dutchess, Orange, Rockland, Putnam, Westchester and metropolitan New York and Long Island.

Pyramid Electric Co., North Bergen, N. J., has appointed **F. W. Moulthrop Co.** as sales rep for northern California.

New reps are announced by **Power Sources, Inc.**, Burlington, Mass. **Specialized Electronics Corp.** will represent the company in Mississippi, Alabama, Georgia, Tennessee, and the Carolinas. **P. J. Engineering Sales Co.** will cover the New England territory.

G. E. Moxon Sales will now handle the **Datran Electronics**, Manhattan Beach, Calif., product line in California, New Mexico, Arizona and Nevada.

Trans Electronics, Inc., Canoga Park, Calif., has named the **W. K. Widdekind Co.** and the **Abbott-Allison Co.** to broaden its sales representation in the Pacific northwest and New England states respectively.

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The Knight Who Went to the Devil

In East Merovingia, the peasants like to tell the story of the ambitious knight who offered to trade his soul to the Devil. The knight asked what he would receive in return.

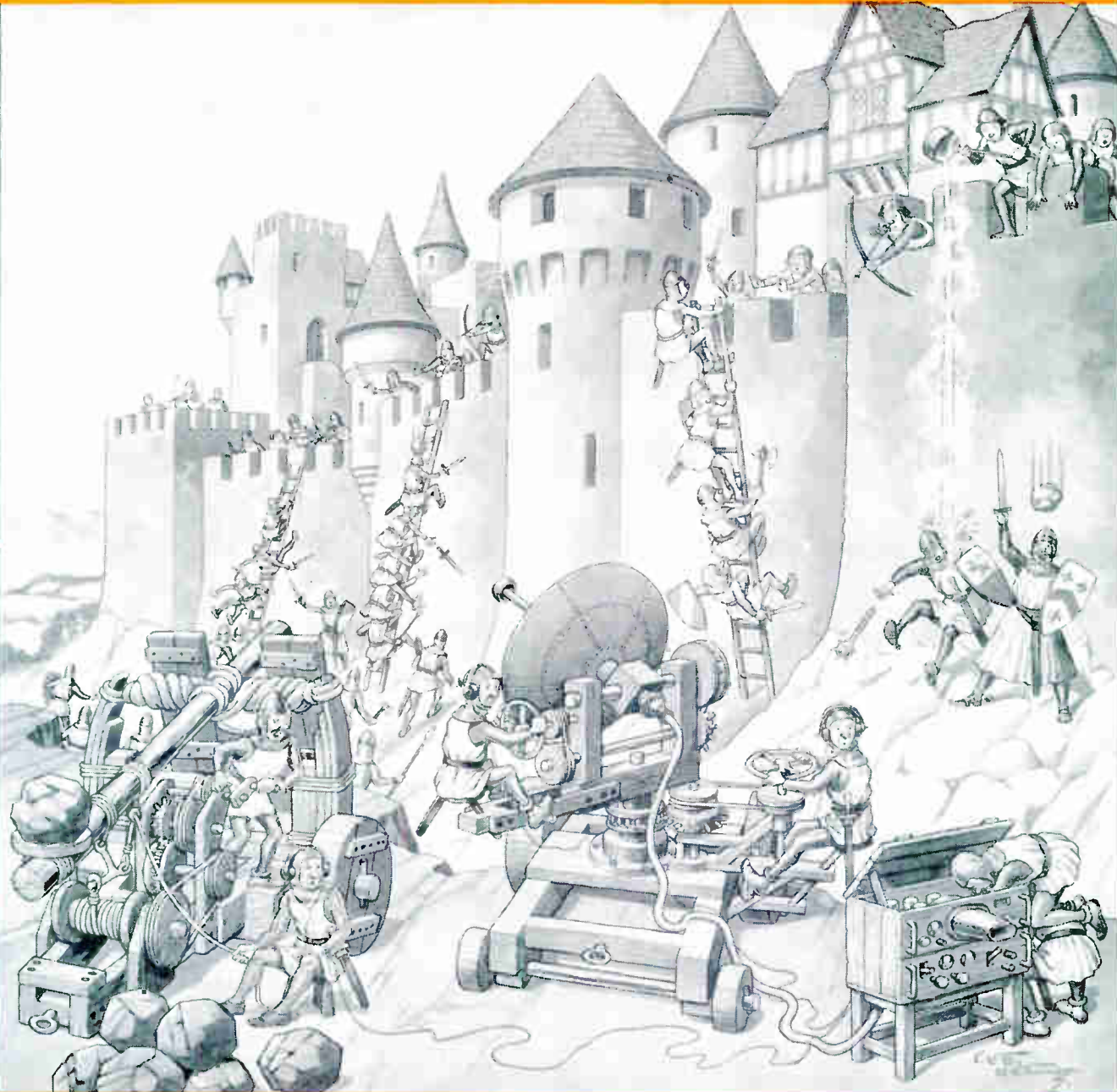
The Devil, realizing that one way to catch a rabbit is to hide behind a tree and make a noise like a carrot, offered to help him overthrow the King. "I will make you one of the crowned heads of Europe," the Devil said. And he promised to fashion for the knight a super-weapon—a radar controlled missile launcher—to make his victory doubly sure.

The foolish knight agreed. But when he went into battle against the King, his troops were routed. The radar failed utterly. His missiles were so misguided, the day was lost.

The Devil later explained away his trickery by saying that even he couldn't make radar work without Bomac® tubes. "And anyway," he said, "I lived up to my part of the bargain." (For proof, see picture. The knight, on the extreme right with sword, is, indeed, about to be crowned.)

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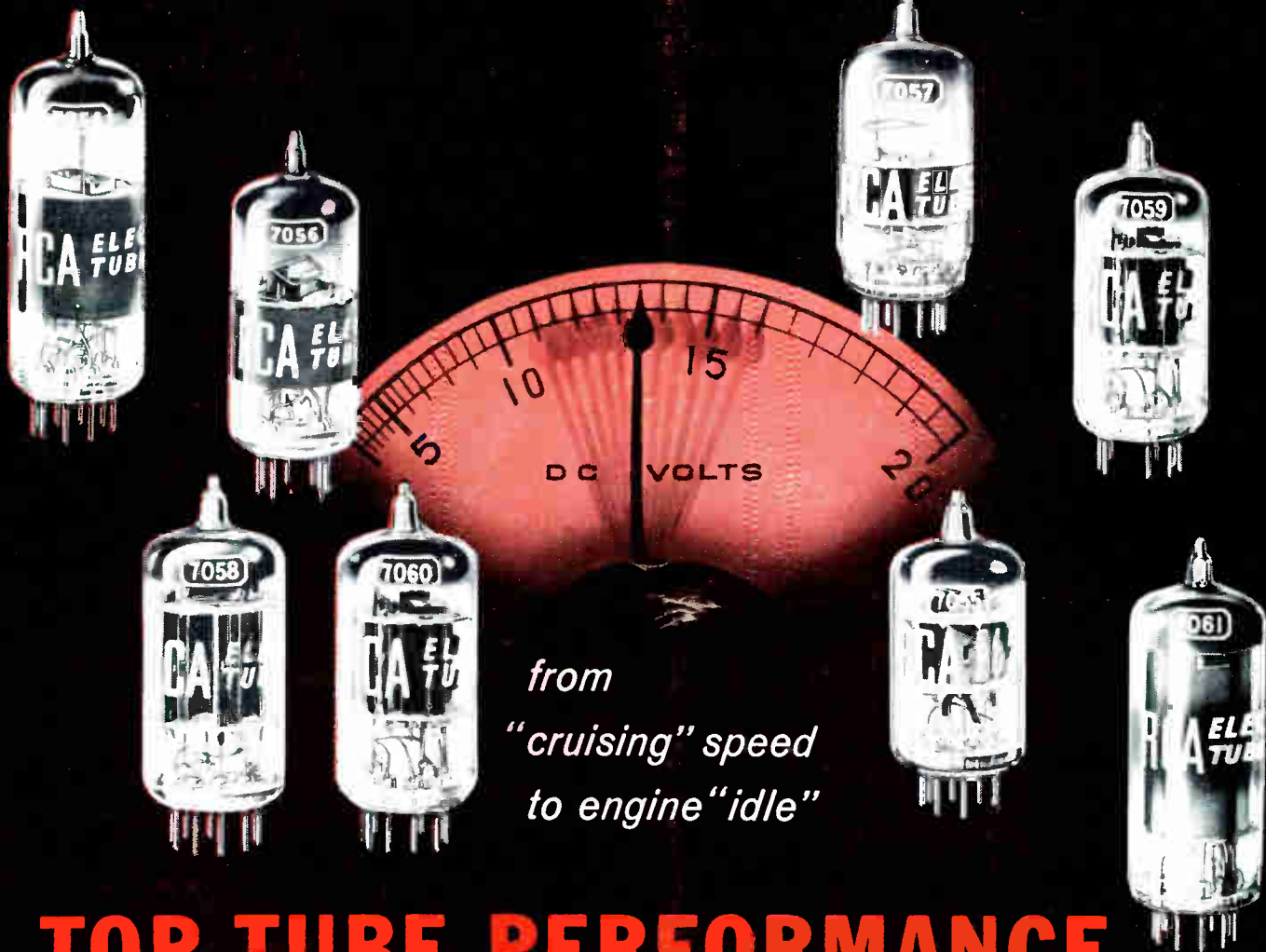
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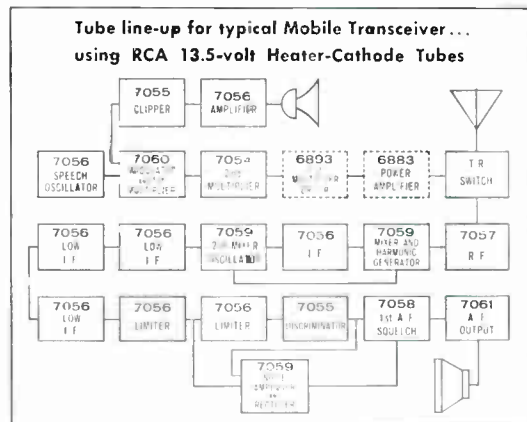
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