

JUNE 20, 1957

electronics

business edition

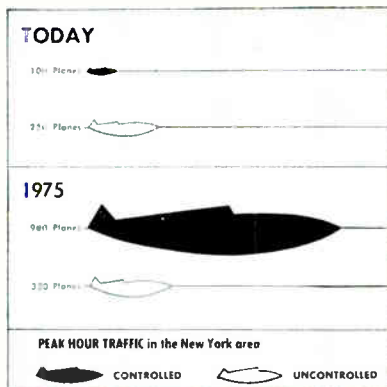
A MCGRAW-HILL PUBLICATION • VOL. 30, NO. 6B • PRICE FIFTY CENTS



What's in IGY for Electronics?

Pole-to-pole investigations

to begin July 1 p 13



Behind the Curtis Report

Will Capitol Hill objections

delay action on air snarl? p 24



Sending a needle to intercept a needle...

THROW a needle high into the air. Then try to hit the needle by throwing another needle at it. You'll know how hard a task it is to intercept a deadly enemy "needle" rushing towards you from the sky at hypersonic speeds.

Engineers and scientists of

Sylvania's Electronic Systems Division are working to answer the threat of enemy ballistic missiles. Accepting complete responsibility, from idea to production, they are creating an integrated weapons system . . . a ground-to-air ballistic missile intercept system.

Whether your project requires management or technical experience for complex integrated systems, sub-systems, equipments or special components, from initial concept through mass production—Sylvania engineers will be glad to discuss methods of solving your specific problems.

SYLVANIA ELECTRIC PRODUCTS INC.
Electronic Systems Division
100 First Avenue, Waltham, Mass.



SYLVANIA

LIGHTING • RADIO • ELECTRONICS • TELEVISION • ATOMIC ENERGY

electronics business edition

A MCGRAW-HILL PUBLICATION • VOL. 30, NO. 6B • JUNE 20, 1957

NEWS AT A GLANCE

H. W. MATEER, *Publisher*

W. W. MacDONALD, *Editor*

Managing Editors: Vin Zeluff,
John M. Carroll.

John Markus, Feature Editor.
Associate Editors: John M. Kinn,
Jr., Frank Leary, Michael F. Tom-
maino, Howard K. Janis, Sylvester
P. Carter, David A. Findlay.

Assistant Editors: William P.
O'Brien, Haig A. Manoogian,
George Sideris, Lawrence Kamarck,
Edward DeJongh, John F. Mason.
Pacific Coast Editor (Los Angeles)
Harold C. Hood; *Midwestern Editor*
(Chicago) Harold Harris; *New*
England Editor (Boston) Roland J.
Charest.

Harry Phillips, Art Director.
Roy Thompson, Barbara Ellwood.
John C. Wright, Jr., Production.
Jean L. Matin.

Editorial Assistants: Gloria J.
Filippone, Arlene Schilp, Bernice
Duffy, Barbara Hearst, Noreen
Hennessy, Phyllis A. Cronin, Bar-
bara M. Shaw.

JAMES GIRDWOOD, Advertising
Sales Manager. R. S. Quint, As-
sistant Advertising Sales Manager
and Buyer's Guide Manager. Fred
Stewart, Promotion Manager.
Frank H. Ward, Business Manager.
George E. Pomeroy, Classified
Manager. Jean Heiges, Research.
Wallace B. Blood, Market Consult-
ant.

New York: Donald H. Miller,
Henry M. Shaw, Martin J. Gallay.
Boston: Wm. S. Hodgkinson. *Phil-*
adelphia: James T. Hauptli. *Chi-*
cago: Bruce Winner, Walter M.
Luze. *Cleveland:* Warren H. Gar-
dner. *San Francisco:* T. H. Carmody,
R. C. Alcorn. *Los Angeles:* Carl
W. Dysinger, Russell H. Antles.
Atlanta: M. Miller. *Dallas:* Gordon
L. Jones. *London:* Herbert Lagler.

Keith Henney, *Consultant.*



What's in IGY for Us? Our part in the International Geophysical Year will cost U.S. \$39 million. At least 10 percent of this will buy electronic equipment. IGY results may bring long-range improvements in communications and electronic navigation.....p13

Missiles Boost Telemetry. Earth satellites challenge telemetering engineers but missile testing remains the biggest market. Four telemetering firms expect average 50-percent sales increase in 1957.....p15

Manhunt for Management. It's no longer considered bad form to look outside your own firm for management talent—rapid growth often demands it. Here are a few hints on executive pirating.....p17

Vacations—Close or Stagger? Which is best for your plant? Here is a sampling of what electronics firms do. Chart shows just when plants in our business shutdown for vacation.....p19

Transistor Makers Mechanize. Volume sales have brought automation to the transistor-making business. See how leading manufacturers mechanize their metallurgical, assembly and testing operations.....p20

Behind the Curtis Report. Bulk of this report to President Eisenhower deals with how to handle air traffic. Implications point to a new kingpin federal agency to control aviation electronics.....p24

Transistor Sales Rise. Survey of 80 manufacturers of electronic equipment reveals a potential market for 125 million transistors in 1959. By then the industrial-commercial market will be biggest.....p29

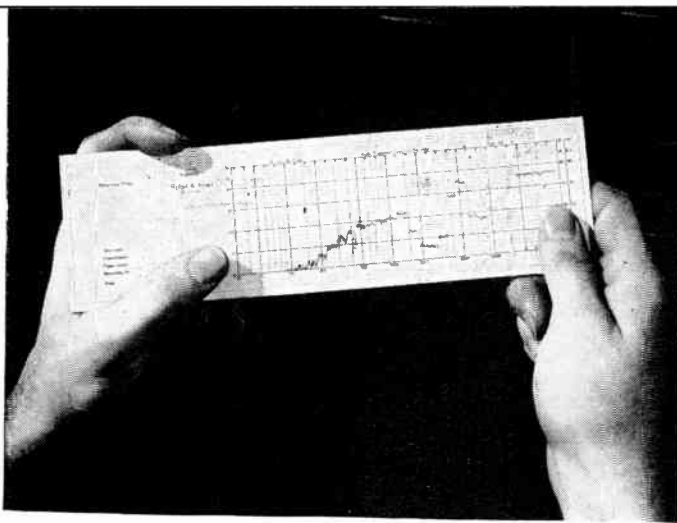
Big Missiles: \$1 Billion. ICBM-IRBM project filters a long way down. Seven-teen prime contractors, 200 subcontractors and thousands of vendors get into the act.....p32

Published three times a month, with an additional issue in 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 subscriptions or change of address. Donald C. McGraw, 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 75¢ for Technical Edition and 50¢ for Business Edition in United States and possessions, and Canada; \$2.00 and \$1.50 for all other countries. Buyer's Guide \$3.00. Subscription rates—United States and possessions, \$6.00 a year; \$9.00 for two years. Canada, \$10.00 a year. All other countries \$20.00 a year. Three-year rates, accepted on renewals only, are double the one-year rate. Entered as second-class matter August 29, 1936, at the Post Office at Albany, N. Y., under act of Mar. 3, 1879. Printed in U.S.A. Copyright 1957 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; National Press Bldg., Washington, D. C. 4; Architects Bldg., 17th & Sanson Sts., Philadelphia 3; 1111 Henry W. Oliver Building, Pittsburgh 22; 1510 Hanna Bldg., Cleveland 15; 856 Penobscot 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. **ELECTRONICS** is indexed regularly in the Engineering Index.

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

POSTMASTER: Please send form 3579 to ELECTRONICS, 330 W. 42nd St., New York 36, N. Y.



**typical
data presentation**

of Spectrum Recorder. Instrumentation consisted of Accelerometer, Vibration Pickup Preamplifier, and Spectrum Recorder.

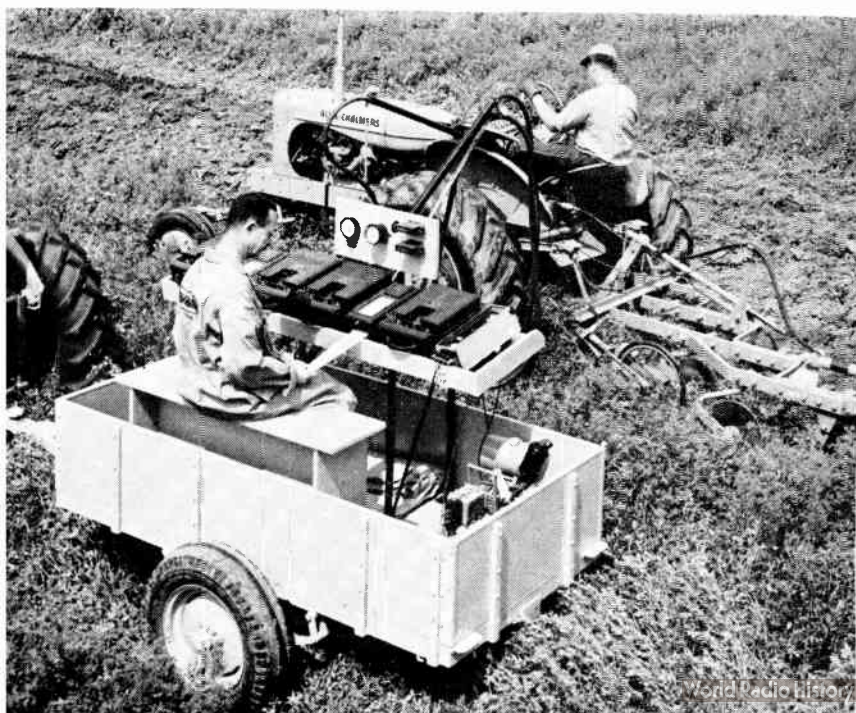
CONVAIR CUTS JET LINER ENGINEERING TIME WITH AUTOMATIC SOUND INSTRUMENTATION

The noise problems of the jet age are receiving special attention in development of the Convair 880. Materials and components are being tested for acoustical properties in a new Sound Laboratory using Brush-Bruel & Kjaer instrumentation.

Here the unique Brush Spectrum Recorder performs a complete frequency-spectrum analysis on sounds from 14 to

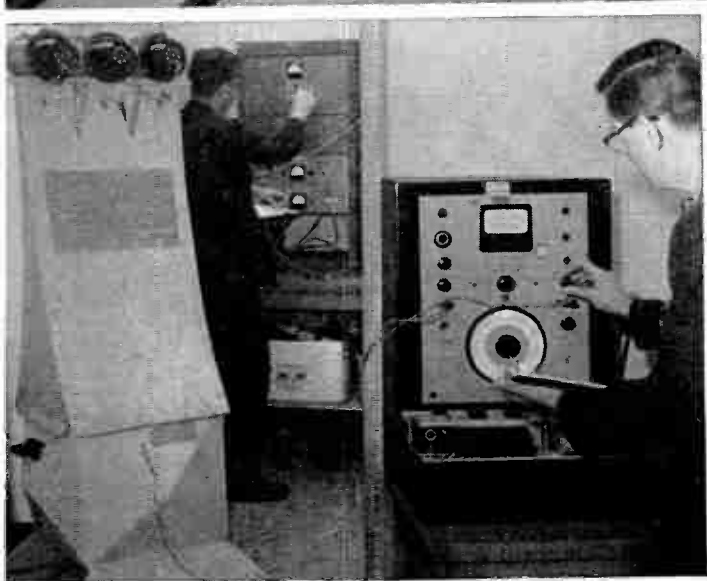
36,000 cycles per second. Chart records, in one-third octave steps, provide data in most useful form to achieve desired results. **And this instrumentation, operating automatically, saves hours of engineering time.**

Brush-Bruel & Kjaer instruments are available in complete systems for analyzing sound-noise-vibration. Let us help *you* eliminate undesirable noise.



**strain measurements
speed up field tests**

Here Allis Chalmers uses Brush Analyzers and Oscillographs to record variables such as weight and hydraulic pressure variation, drawbar load, axle torque, etc. **Brush Oscillographs maintain accuracy in such rugged use, provide immediately available chart records to save engineering time.** Described in booklet "Strain Recording".



Small section of fuselage skin being noise tested in Convair Sound Laboratory. Brush-Bruel & Kjaer instruments are used here to check transmission loss in panels, absorption coefficients of materials, reverberation times, and for general sound tests.

*For information call your Brush representative.
Or write Dept. K-6 for booklet "Sound Measurements"*

BRUSH ELECTRONICS

3405 Perkins Avenue, Cleveland 14, Ohio



COMPANY

DIVISION OF



OSCILLOGRAPHIC RECORDING SYSTEMS • SOUND INSTRUMENTATION • MAGNETIC COMPONENTS • PIEZOELECTRIC MATERIALS • WEAPONS SYSTEMS



SPECIFICATIONS

Sweep Range: 0.02 $\mu\text{sec}/\text{cm}$ to 15 sec/cm .

Calibration: 24 sweeps; 1-2-5-10 sequence, 0.1 $\mu\text{sec}/\text{cm}$ to 5 sec/cm . 3% accuracy.

Triggering: Internal, line voltage or external 0.5 v or more. Pos. or neg. slope, +30 to -30 v trigger range.

Preset Trigger: Optimum setting for automatic stable triggering.

Horizontal Amplifier: Sweep magnification 5, 10, 50, 100 times. Vernier position control selects any 10 cm part of sweep. External input pass band dc to over 500 KC. Sensitivity 200 mv/cm to 15 v/cm.

Vertical Amplifier: Pass band dc to 10 MC. Optimum transient response and rise time less than 0.035 μsec . Signal delay of 0.25 μsec permits leading edge of triggering signal to be viewed.

Amplitude Calibration: 18 calib. voltages, 1-2-5-10 sequence, 0.2 mv to 100 v peak-to-peak. Accuracy 3%. Approx. 1 KC square wave, rise and decay approx. 1.0 μsec .

Prices: -hp- 150A High Frequency Oscilloscope, \$1,100.00

-hp- 151A High Gain Amplifier, \$200.00

-hp- 152A Dual Channel Amplifier, \$250.00

-hp- 150A

HIGH FREQUENCY OSCILLOSCOPE

New reliability • New convenience
DC to 10 MC. Plug-in preamplifiers
24 direct reading sweep times
Sweeps 0.02 $\mu\text{sec}/\text{cm}$ to 15 sec/cm
"Universal" automatic triggering
New, ultra-conservative design

New Model 150A is not a "warmed-over" imitation of previous oscilloscopes. Instead it is a totally new kind of instrument whose radical design approach obsoletes old standards of oscilloscope versatility, simplicity and dependability.

Specifications given here spell out the 150A's unique usefulness. Its simplicity and reliability stem from such unique features as: *Unitized circuits*, easily isolated for testing or service, etched and mounted on translucent plastic. *Highest quality components*, operated well below ratings. *Concentric, color-coded*, functionally-grouped controls. *Direct sweep-time selection*; no mental gymnastics. *Universal automatic triggering* system wherein one preset adjustment provides optimum triggering for almost all conditions.

Wouldn't you prefer a *really new, convenient* oscilloscope? Call your -hp- representative today for the complete story. Or, write direct.

HEWLETT-PACKARD COMPANY

4053A PAGE MILL ROAD • PALO ALTO, CALIFORNIA, U.S.A.

CABLE "HEWPACK" • DAVENPORT 5-4451

Field engineers in all principal areas

Data subject to change without notice. Prices f.o.b. factory.



also offers -hp- 130A Low Frequency Oscilloscope,
dc to 300 KC, sweeps 1 $\mu\text{sec}/\text{cm}$ to 12.5 sec/cm .

Search for Growth

Many venture capital groups are in electronics. They look for firms with proprietary products

VENTURE capital groups have invested between \$100 and \$200 million since the war in small companies with outstanding growth prospects.

Electronics has a substantial share. Four of eight large groups are especially interested in electronics: Payson & Trask, American Research and Development, Donner Foundation and Electric Bond & Share. Laurance Rockefeller's organization, primarily in aviation, also has sizable electronics investments.

Some electronics companies using venture capital money are: Trans-Sonics, CGS Laboratories, Vacuum Tube Products, Interference Testing and Research, Airborne Instruments, Stavid Engineering, Aircraft Radio, Induction Motors, High Voltage Engineering, Machlett Labs.

Venture capital investment is as old as capitalism, but only recently has it become an organized, continuing business. Most venture capital groups have been established by wealthy individuals seeking capital gains rather than income taxable profits. Several investment trusts have joined them.

Venture capital investor looks for companies with proprietary products in a rapidly growing area of the industry, says W. Hardie Shepard, a partner in Payson & Trask. Guided missiles, infrared equipment, transistors and computers are examples of rapid growth areas. A proprietary product has an exclusive customer position due either to patents, advanced scientific position or special production know-how.

Companies most eligible for venture capital are usually past invention and development stages but not quite large enough to raise money publicly.

Usual sizes of initial investments range from \$100,000 to \$250,000. One group sets \$500,000 as a maximum limit. Payson & Trask sometimes makes investments as low as \$25,000.

In addition to money, company gets experienced and competent counsel. Venture capital groups often place a representative on the board.

SHARES and PRICES

POTENTIAL market for medical electronic equipment for next 10 years is \$1 billion, says W. G. Damroth, vice president of Nuclonics, Chemistry and Electronic Shares fund. NCFES recently made an intensive study of medical market.

At one time x-ray and diathermy accounted for almost all electronic medical sales. In recent years many conventional medical tools have been made electronic. Also many

new research, diagnostic and therapeutic tools have been developed.

Innovations range from electronic thermometer and hi-fi stethoscope to betatrons for cancer research. They also include electroencephalographs, electrocardiographs and calorimeters, electronic surgical instruments, blood-pressure recorders, fluoroscopes and microscopes.

Several groups are studying applications of computers to the medical

field. In one project computers are revealing new knowledge of heart disease. Another aims to store all known signs and symptoms of disease in a computer.

Smaller and less expensive devices will come into widespread use soon. Damroth predicts. More complicated and expensive equipment will take longer. But shared use by hospital and medical groups within a community should help.

Typical Medical Equipment Manufacturers	Recent Price	1956 Dividends	Percent Yield	Earned per Share		Traded	1956 Price Range
				1956	1955		
Airborne Instruments	35½ ¹	....	....	1.54	2.87	OTC	.....
American Electronics	13¾	0.50	3.6	0.73	0.51	ASE	11 - 14½
Beckman Instruments	39	Stock	....	1.36 ²	1.06	NYSE	35¼ - 42
Bogue Electric	1¼ ¹	....	....	d-0.53 ²	1.55	OTC	.....
Borg-Warner	47⅞	2.30	4.9	4.01	5.17	NYSE	38¾ - 46
General Electric	64¼	2.00	3.1	2.46	2.41	NYSE	52¾ - 64¾
General Precision	43¼	2.40	5.5	1.82	2.05	NYSE	36½ - 44¾
Hamilton Watch	25	1.40	5.6	3.98 ³	4.32	NYSE	22½ - 28¼
Hycon Mfg	3¾ ¹	....	....	d-1.07 ³	0.01	OTC	.....
Varian Associates	15¼ ¹	....	....	0.42 ³	0.41	OTC	.....

¹ bid

² fiscal

³ fiscal ended 1/31/57

Warehouse Controls

Cold-cathode tubes speed flow of goods to retail outlets

AUTOMATIC controls are directing the receiving, separating and shipping of goods in the warehouse for the 124-store Mangel chain. The new warehouse was unveiled in New York City late last month.

The system provides a continuous flow of merchandise from point of receipt from 9,000 different suppliers to point of discharge to truckers for delivery to the chain of women and children's apparel stores.

It combines manual, electromechanical and electronic elements in one system. Key electronics unit is a control panel using cold cathode tubes and relays for grouping merchandise destined for individual stores.

Labor savings will pay for the \$400,000 system in less than five years, says Sidney Mangel, vice president of the chain. In addition, indirect savings will result from faster handling of merchandise, which speeds merchandise turnover rate.

Dasol Corporation, which designed and installed the Mangel system, is preparing similar systems for Catalina Swim Suits on the West Coast and Bobbie Brooks, Cleveland manufacturer of dresses and

sweaters. These installations will utilize IBM's RAMAC and 650 computers to take over much of the control work left to humans in the Mangel operation.

More Automation

Only way to raise labor productivity says planning director

FUTURE labor shortages will be offset by increased use of automation, predicts Westinghouse planning director W. C. Allen.

Gross national product is now advancing at double the rate of the work-force. Automation, permitting each man to increase his rate of productivity, is the only answer, said Allen.

Speaking before a power association group, he called upon utilities to prepare for increased power demands by automated plants of the future.

There need be no fear of labor displacement, he said. Population will double in the next 50 years. But increase will be outside the labor force.

Impact of automation on the wage earner, Allen said, will be to upgrade his skills and make the job physically easier.

Automation has already brought many changes in industry's approach to product planning and design, said Allen.

MERGERS, ACQUISITIONS and FINANCE

• **Bell & Howell's** electronics division sells phonograph-radio-type recorder console line to Columbia Records for an undisclosed price. Money received is being used for expanding photographic and tape-recorder lines. Only six phonograph-radio-type recorder console models ranging in price from \$595 to \$1,800, are included in the sale. Both Bell & Howell and Columbia will each continue to manufacture its own line of tape recorders.

• **Tung-Sol Electric** acquires Chatham Electronics division of Gera Corp. Located in Livingston, N. J., Chatham manufactures tubes, selenium rectifiers, aircraft power supplies and radium detection equipment. Chatham will become a division of Tung-Sol.

• **Collins Radio** stockholders get rights to subscribe to \$7.9 million of 5 percent convertible subordi-

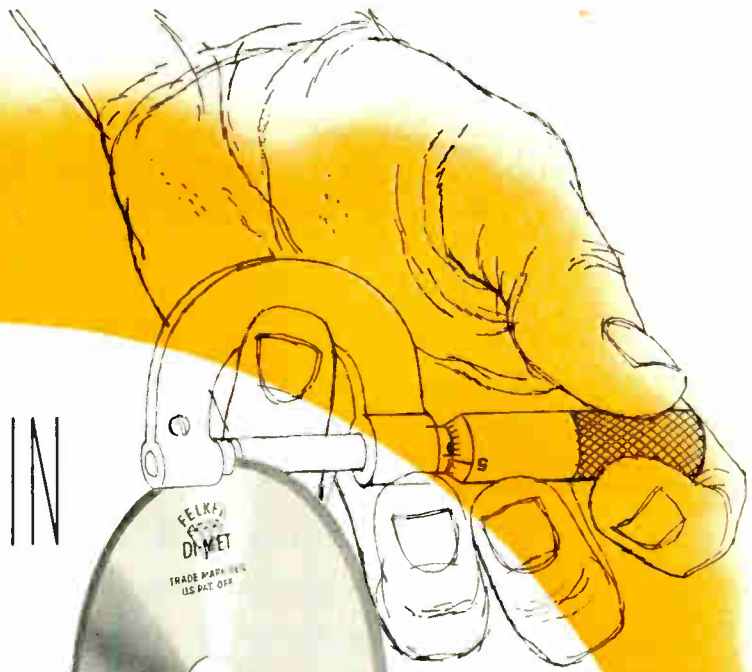
nated debentures, priced at \$100. Debentures are convertible into Class B common at \$26.50 per share. Class A and Class B common stockholders are given right to subscribe to \$100 principal amount for each 19 shares held. Kidder, Peabody & Co. and White, Weld & Co. head the underwriting group. Proceeds are being used to reduce bank loan and for additional working capital needed for growing commercial and military business.

• **General Precision Equipment** issues \$9.7-million of convertible preferred stock, comprising 194,200 shares at \$50. Common stockholders will be offered rights to subscribe to one preferred share for each six common held. Holders of present \$1.60 cumulative convertible preferred stock will have rights to subscribe to one new preferred share for each preferred share held. The First Boston Corp.

and Tucker, Anthony & R. L. Day head the underwriters.

• **F. C. Huyek**, planning to concentrate on engineered products, sells its blanket business to Chatham Manufacturing Co. Last year, Huyek acquired Waldorf Instrument at Huntington Station, Long Island, N. Y.

• **Ampex Corp.**, tape-recorder manufacturer of Redwood, Calif., acquires a 25-percent interest in **Orradio Industries**, tape-making firm of Opelika, Ala. Additional financial details were not disclosed. The two firms will team engineering and research facilities to produce high-quality magnetic recording tape for video, computer and instrumentation use. Ampex president, George I. Long, feels that advances of the magnetic-recording art have been limited until now by the tape itself.



NEW PAPER THIN

DIAMOND BLADES

**INCREASE YIELDS ON
CRYSTAL PROGRAMS!**

DI-MET

Type DIT and DITR

metal bonded for cutting

**GERMANIUM, QUARTZ, SILICON,
BARIUM TITANATE, ETC.**

FOR DICING...
TYPE DIT
available as thin as .006"

26348
D150L 100MT/16

26321
D22ON100M/8

FOR WAFERING...
TYPE DITR
available as thin as .015"

These DI-MET metal bonded diamond blades are producing greater yields in all crystal cutting programs and are eliminating unnecessary waste of costly materials.

You can now obtain Type DIT blades as thin as .006" ... ideal for delicate dicing operations.

For wafering, Type DITR is available down to .015" thick. *Both blades conserve material and provide utmost speed and blade life!*

And here's a valuable secondary advantage... you suffer no contamination of either blanks or cuttings when you slice and dice with DI-MET diamond blades! Make your crystal programs more successful, more economical, more profitable by specifying Felker DI-MET! Available from your Felker Distributor... or write direct.

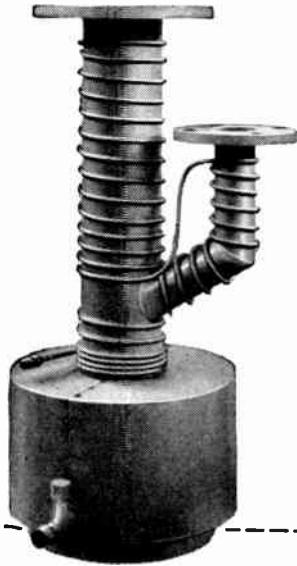


FELKER MANUFACTURING CO.

Torrance, California

First in Diamond Cut-Off Blades!

need high vacuum components?



The Stokes 4-inch Ring-Jet Booster Pump starts pumping at 1,000 microns Hg absolute... pumps as low as .03 μ with low cost pumping fluids. Peak speed over 600 cfm. Equally efficient units available in 6, 10 and 16-inch sizes.

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

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

Send for technical data on any or all . . . without obligation.

High Vacuum Division
F. J. STOKES CORP.
5543 Tabor Road, Phila. 20, Pa.

STOKES

Want more information? Use post card on last page.

8

WASHINGTON report

MILITARY buying of electronic equipment may be curbed somewhat by Defense Dept. orders to halt so-called installment buying by Air Force and other services.

The new policy bans letting contracts on a project until money to pay for all parts of it has been appropriated by Congress and apportioned to the service by the Budget Bureau and Pentagon comptroller.

In the past, Air Force has awarded contracts piece-meal as money became available in partial amounts.

But the new policy does contain a loophole: long-time components such as a certain electronic systems may still be ordered in advance.

Right now, Air Force is battling with Defense Secy. Wilson's office. Air Force argues that a strict view of the policy could mean a cut of \$2 to \$4 billion in scheduled plane and missile buying next year.

Behind the controversial order is this factor: despite the clamor about military appropriation cutbacks, defense spending will remain high.

For the past four months, military spending has been running at an annual rate of \$42 billion. Total spending for 1957 will hit upwards of \$38.5 billion—at least \$2.5 billion over the administration's original budget estimate. This can go on even though appropriations are cut because of heavy carryover funds, money appropriated in previous years but still not committed. Close to \$11 billion is being carried over to fiscal 1958; \$8.1 billion or more will be carried over to fiscal 1959.

The administration has ordered the Pentagon to hold expenditures in fiscal 1958 close to \$38 billion, the spending level originally set for the new budget last January. To do this, Wilson issued the ban on installment buying. In addition, he has held back \$500 million worth of new contract awards that were to be let this month.

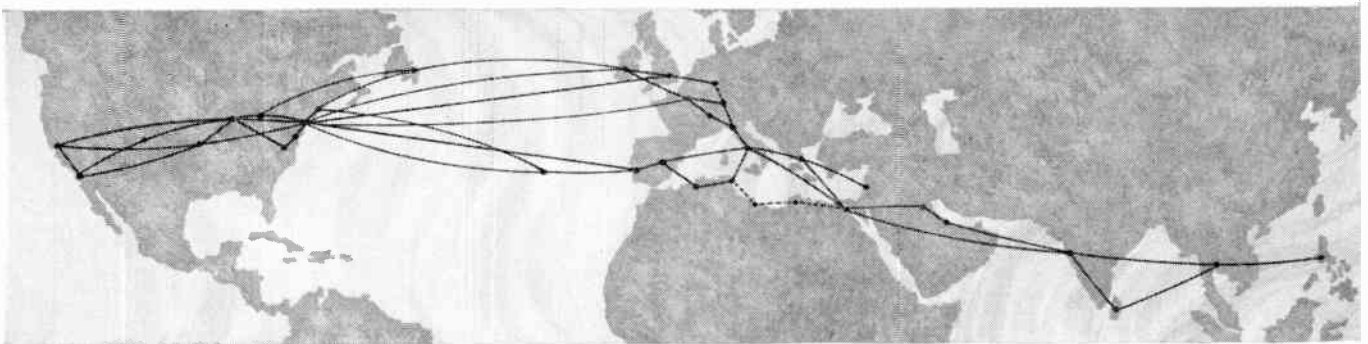
- Army has beaten Air Force in the race for the first successful test launching of a prototype IRBM; a Jupiter test vehicle was fired May 31, reaching a distance of about 1,500 miles and an altitude of 300 miles. The missile reportedly was not completely fitted with guidance, controls and other components. Air Force has flopped in three test firings with its Thor IRBM so far. Insiders still say that the Air Force's Thor, possibly equipped with certain Jupiter components, will be the IRBM eventually put into volume production.

- European and Japanese electronics manufacturers may find a new market in Red China for certain types of gear as a result of the British decision to reduce the curb on China trade to the level applying to trade with the European Communist bloc. The British are expected to be followed quickly by other European nations and Japan. The U. S., however will maintain an embargo on exports of all kinds to Red China. Most electronic items are embargoed for shipment to the Soviet bloc because they are strategically important.

A small number of items, however, may be shipped to the bloc in small amounts or are on the so-called watch list of commodities which may be shipped in any amount under surveillance by COCOM, the 15-nation international strategic controls body in Paris.

Items which formerly were barred from the China trade and now may be exported to China by Britain include radios, hearing aids and telephone and telegraph equipment.

The Senate Interstate and Foreign Commerce Committee is launching an investigation of our China trade policy, and increasing pressure is likely to be brought on the administration to permit U.S. traders to compete for the China market.



TWA *JETSTREAM*^{*} **FREIGHT SERVICE**

27% more cargo capacity for TWA shippers!
Just as soon as the TWA fleet has its full complement of magnificent new Jetstream Skyliners!

They're brand new . . . larger than any airliners now in the skies! And they'll offer the world's longest-range air freight service! De-

signed for high altitude flying . . . across the U. S. and overseas . . . these advanced aircraft will provide frequent, on-schedule flights between major markets in this country and in 21 world centers in Europe, Africa, the Middle East and Asia. Another important exclusive for TWA Air Freight!

SPECIFY TWA AIR FREIGHT
Complete door-to-door service

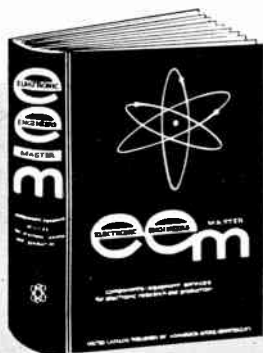
** Jetstream is a service mark owned exclusively by TWA. ©Trans World Airlines, Inc.*

TWA
TRANS WORLD AIRLINES

catalog your
products in the

ELECTRONIC ENGINEERS MASTER

for on-the-spot
product representation
...when 9 out of 10
orders are placed



a companion volume to
The Radio-Electronic **MASTER**

EEM, the industry's only combined master catalog and buying directory of products and services sold direct to industrials.

9 out of 10 orders for industrial products are originated by buyers rather than sellers, states a National Industrial Advertisers Association survey. This means that unless your salesman, literature or advertising are on-the-spot at the critical buying moment ... you are not fully represented when 90% of all orders are placed.

EEM, the industry's only master catalog and buying directory, assures your products on-the-spot representation when 50,000 engineers and purchasing agents are ready to specify and buy. Here's how:

- EEM catalogs manufacturers' data in product sections for easy reference and comparison
- Combines industry-wide catalog information with a buying directory
- Keeps catalog information up-to-date with new product supplements plus new industry-wide filing system

Increase your sales...Cut your selling costs...Catalog your products in EEM.

Get complete details...Write to: E-6
ELECTRONIC ENGINEERS MASTER

60 Madison Avenue, Hempstead, N. Y.
Want more information? Use post card on last page.

EXECS in the news



Pioneer Hyland*: radar reflections . . .

THIS YEAR'S Pioneer Award goes to Lawrence A. (Pat) Hyland, v-p and general manager of Hughes Aircraft. IRE's Professional Group on Aeronautical and Navigational Electronics gave him the prize for 1932 demonstrations of radar at Naval Research Laboratories.

Oddly enough, Hyland—who was born in Nova Scotia 60 years ago this August—never got through college. A friend says of him “he's never needed it. Pat Hyland seems to have an intuitive understanding of the nature of things.”

He did spend a year in Boston University law school, left to go into the Army in 1917. On his return from France he became a U.S. citizen, promptly joined the Navy and went into radio. In 1926 Hyland put the uniform in mothballs and went to work for NRL.

Six years later, after he had helped convince the Navy that radio waves would bounce off planes, he formed a Washington research firm, served as its vice president until 1937. Then he went to Detroit to work for Bendix Radio. When he left in 1954, he was Bendix's engineering v-p, had a raft of inventions to his credit. The spark-plug shield that keeps aircraft radio communications clear is his baby.

A quiet and modest man, Hyland is always careful to point out work others have done, keeps himself out of the limelight. Quietude characterizes even his private life: he likes to “putter around the house and garden—and read books.”

* At left, with PGANE awards chairman Sandretto of IT&T

Strictly PERSONAL

At Sea—with AT&E

We note (in “Exports and Imports,” Apr. 10, p 43) the entry “In England, Holland-America Line . . . is being equipped with f-m vhf radiotelephones . . . Marconi is supplying the six-channel

equipment.”

We would like to advise you that . . . these are being supplied by . . . AT&E (Bridgeworth) Ltd., and not by Marconi Wireless Telegraph Ltd. Furthermore the installations were carried out by our associates in the Hague, Nautisch

Technische Handel Maatschappij
. . . and not in England. . .

We ask you to refer to the equip-
ment in question as ATE Marconi
equipment. . .

G. J. SARD

AUTOMATIC TELEPHONE & ELEC-
TRIC CO. LTD.
LONDON, WC2, ENGLAND

Air Snarl: Cabinet Function?

From my experience on the In-
terstate and Foreign Commerce
Committee, I am convinced that
the recommendations of Mr. Curtis
for an Air Modernization Board
and Federal Aviation Agency will
probably reinforce and accentuate
rather than eliminate the conflict
of interests between military and
civilian users of airways. One rea-
son we do not have modern safety
devices on our airports today is the
conflict between these points of
view on the Air Space Panel.

The mere fact that Commerce
and Defense departments are repre-
sented on the Air Modernization
Board does not in my opinion
change the conflict, because the
Secretary of Defense certainly
would not go contrary to the advice
of the chief of staff of the Air
Force, nor would the Secretary of
Commerce go contrary to the Civil
Aeronautics Administrator.

It would seem to me that the
best solution would be to organize
a Department of Transportation
and Communication with a cabi-
net officer at the head. In this
way you would have a representa-
tive of civil aviation sitting with
the cabinet, which would tend to
smooth the differences between the
civilian and military users.

The great difficulty now from
an administrative standpoint is
that we have independent agencies
such as FCC, and CAB which
legislate, administer and perform
quasi-judicial functions. I believe
that they should be brought under
the control of the Executive as a
cabinet function.

J. ARTHUR YOUNGER, M. C.
HOUSE OF REPRESENTATIVES
WASHINGTON, D. C.

For more on the Curtis Report,
see p 24

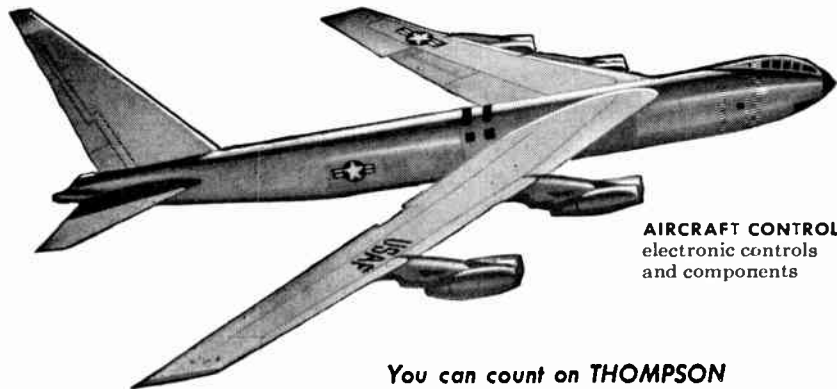
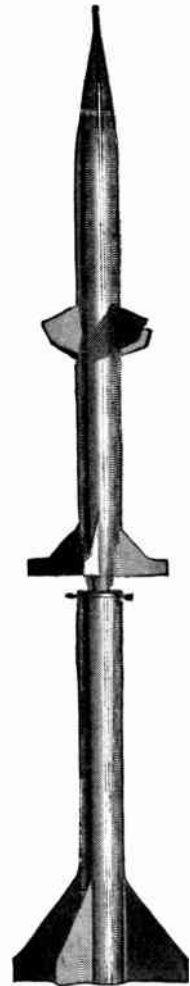
From design through
production . . .

ELECTRONIC CONTROLS

FOR AIRCRAFT AND MISSILES

Today some of the toughest
electronic problems are being solved by
Thompson's task force of engineers.
For example: Thompson has designed
and is manufacturing control sub-
systems and components for aircraft
and missiles. Thompson also is a
leader in development and production
of countermeasures equipment and
microwave components.

MISSILE CONTROLS
auxiliary power
supply controls



AIRCRAFT CONTROLS
electronic controls
and components

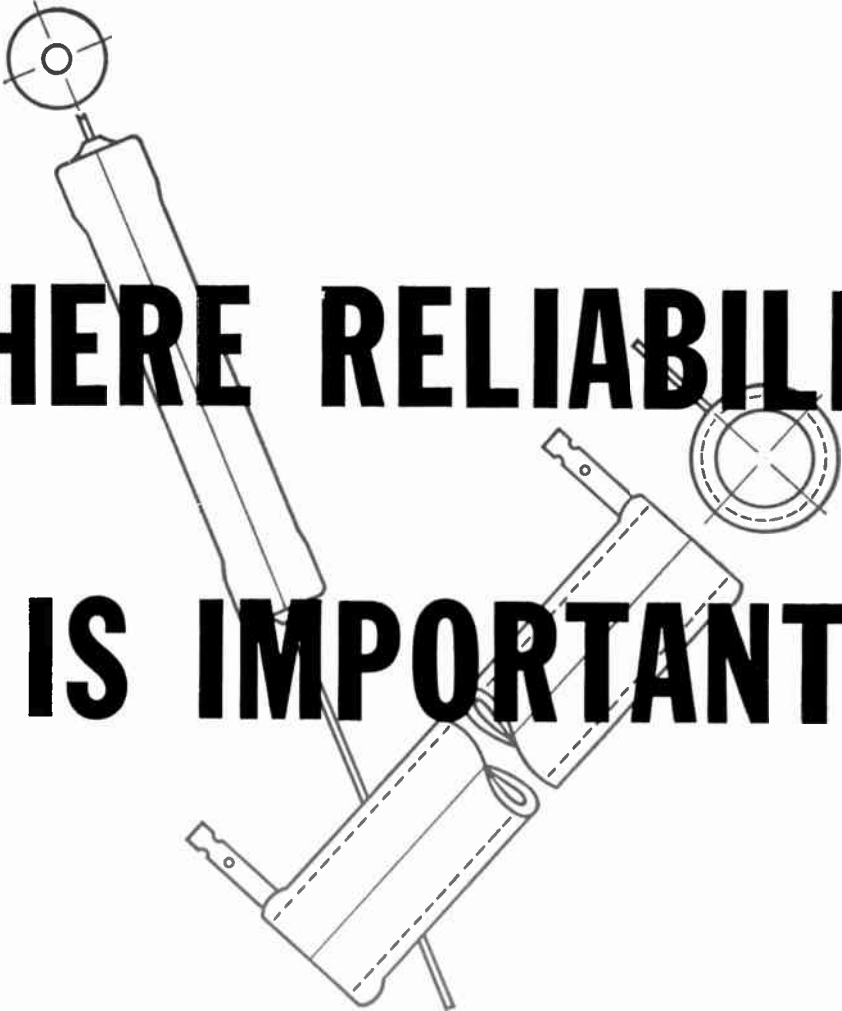
You can count on THOMPSON
Thompson experience, skills and
facilities—from design through
production—are ready to go to
work for you. We're anxious to
demonstrate that "you can count on
Thompson" in the field of electronics.



ELECTRONICS DIVISION
Thompson Products, Inc.

2196 CLARKWOOD ROAD • CLEVELAND 3, OHIO
Career opportunities available for qualified engineers

Want more information? Use post card on last page.



WHERE RELIABILITY IS IMPORTANT

Blue Jacket[®] WIRE - WOUND RESISTORS

Vitreous-enamel power wirewound resistors have been proven to be extremely reliable units by both the military services and the communications industry. Sprague Blue Jacket resistors are among the most outstanding resistors of this type. They can be counted on to withstand the most severe duty cycles!

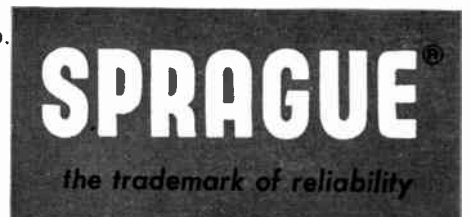
In the manufacture of Blue Jacket resistors, selected resistance alloys are wound on special steatite cores. The expansion coefficient of the vitreous-enamel coating is closely matched to that of the steatite base in order to ensure positive protection of the resistance winding. The terminal bands are

made of an alloy which also closely matches the steatite base in expansion characteristics.

Sprague furnishes a wide range of sizes and power ratings in these reliable resistors, both in axial-lead and tab-terminal designs. For complete details on commercial types, write for Engineering Bulletin 111B. Military styles are shown in Sprague Catalog 101.

Sprague deliveries are prompt! Prices are right! Send your next power resistor order to:

Sprague Electric Co.
35 Marshall Street
North Adams,
Massachusetts.



RESISTORS • CAPACITORS • MAGNETIC COMPONENTS • TRANSISTORS • INTERFERENCE
FILTERS • HIGH TEMPERATURE MAGNET WIRE • PULSE NETWORKS • PRINTED CIRCUITS

JUNE 20, 1957

NATIONAL SCIENCE FOUNDATION SPENDING FOR IGY: to date

STUDY	(FISCAL YEARS)			TOTAL
	1955	1956	1957	
Aurora and Airglow	\$ 250,000	\$ 530,288	\$ 732,552	\$1,512,840
Cosmic Rays	11,000	356,035	482,500	849,535
Geomagnetism	15,000	1,003,200	336,800	1,355,000
Glaciology	4,000	367,500	288,600	660,100
Gravity Measurements	.....	153,670	86,230	239,900
Ionospheric Physics	240,000	1,330,970	664,430	2,235,400
Longitude and Latitude	.....	.....	11,000	11,000
Meteorology	28,000	1,177,515	577,345	1,782,860
Oceanography	.....	378,700	1,230,105	1,608,805
Rocketry	17,000	1,161,300	104,000	1,282,300
Seismology	18,975	399,575	239,440	657,990
Satellite	1,172,000	7,309,640	8,117,375	16,599,015
Related Support*	.....	178,174	405,700	583,874
Solar Activity	32,000	134,250	56,250	222,500
Administration	127,000	309,000	329,400	765,400
TOTALS	\$1,914,975	\$14,789,817	\$13,661,627	\$30,366,419

*World Data Center, etc.

BALANCE \$8,633,401

13 sciences, \$39 million, long-range results . . .

What's in IGY for Us?

- Congress granted \$39 million for participation in world-wide scientific program. Electronics got a good slice of it
- Long-range significance reaches deeper. IGY may uncover information vitally affecting our industry

INTERNATIONAL Geophysical Year, which begins on July 1 this year, means a great deal to our industry—from two standpoints.

- This monumental experiment in scientific co-operation hopes to uncover information directly affecting communications, navigation, weather prediction, instrumentation.

- Part of gear that will perform \$39-million experiment is electronic. Some of it has been custom built by universities and research groups. Much more

has been bought. By the end of fiscal 1956, over \$3 million of IGY funds had bought electronic products.

This project is first of its kind and natural successor to the two International Polar Years in 1882 and 1932. IGY deals with global geophysics, where IPY's dealt mostly with the Arctic.

As midsummer opening of IGY nears, work on the dozen-odd sciences (see chart) is picking up tempo all over the world.

National Academy of Sciences, acting as coordinat-

ing body for U.S. participation, split up the nation's part among 46 academic and research groups. Funds were acquired from Congress through National Science Foundation in fiscal years 1955 and 1956.

NSF grants are only part of federal government's spending on IGY. All three armed services, the Weather Bureau, other federal agencies are providing logistic support which will cost an estimated \$50 million more.

Navy is responsible for biggest single project, construction and launching of half a dozen Vanguard satellites. This project used up more than half the NSF budget, still needed—and got—extra money from Navy's other funds. Air Force will provide launching facilities at the long-range test center in Florida.

Government agencies will also provide support for:

- Antarctic expeditions investigating ionosphere, auroral disturbances, geomagnetism, extraterrestrial "whistler" noises.
- Communications, such as links between Vanguard trackers and computers, U. S. portion of world warning network.
- Rocketry program at Ft. Churchill, Canada.
- Most of meteorological, ionospheric and oceanographic experiments.

The 46 investigating agencies include 6 independent scientific groups, 7 defense agencies, 5 nondefense Federal bureaus, 27 colleges and universities and one private investigator. Individual is Herman Yagoda, who was granted \$1,900 to investigate low-energy primary cosmic rays.

At least 10 percent, and probably 25-30 percent, of the \$30 million so far spent has gone for electronic equipment. Estimated 88 percent of electronic purchases have been end equipment. Rest—including satellite instrumentation—has been custom built by researchers.

More important than immediate commercial significance will be results of IGY. Many areas under investigation present problems to our researchers. Communications, broadcasting, scatter techniques, information-handling, navigation, all are affected by weather, magnetic storms, ionospheric disturbances, other geophysical phenomena.

Geophysics is a sparkling mass of questions. Precise answers to some of these would be priceless to electronics:

- How do solar storms affect ionosphere's 4 layers?
- What effects do aurora and ionospheric variations have on radio transmission?
- What is the effect of magnetic storms on wire

transmission? on magnetic tape, wire or drum recordings?

- How do solar and terrestrial forces interact in affecting ionosphere, atmosphere, earth magnetism?

Standards Bureau's Central Radio Propagation Lab says ionospheric studies during IGY may help communications. Aid would be in predicting when transpolar and intercontinental radio transmissions can be made directly, when to bypass direct routes.

Other questions international enterprise may answer concern size and shape of the earth, how and where weather is generated, why pull of gravity varies over the earth, where earthquakes originate.

IGY Scientists Teach Cooperation

To the world's diplomats in the steel-and-glass slab of UN headquarters, scientists provide an object lesson. To achieve cooperation, find a common project and work on it.

Global cooperation in projects of the International Geophysical Year is "noted with pleasure" by the special international committee for the project. Fifty-six nations join in the effort. More than 5,000 scientists employ their talents to probe the common problems of earth physics.

U. S. will have 24 stations in the sensitive Arctic regions. U. S., USSR and the Scandinavian countries cooperate in studies of snow-and-ice cover of the Arctic basin.

At the other end of the globe, a Russian meteorologist will be part of the complement of the U. S. weather central. An American scientist will work in the Russian weather station.

Five Antarctic bases and an air facility are manned by Americans, besides a joint U. S.-New Zealand station at Cape Adare. Other 35 stations on the subzero subcontinent belong to Great Britain, France, Russia, Japan, Chile, Argentina, the Scandinavian countries, Australia, New Zealand.

Japanese and Filipinos join U. S. scientists in investigating the equatorial Pacific. Western hemisphere nations cooperate in picking up data from the satellite.

Solar observatory in Brazil will be manned by Norwegians and Brazilians. South Africa and Australia join in observations from whaling ships in the Roaring Forties, the violent seas of 40 degrees south latitude. Sweden and Britain jointly operate the world auroral data center.

Says an officer of the National Academy of Sciences, U. S. coordinating agency, "scientists are getting together without hesitation wherever they have a common problem."

Missiles Boost Telemetry

- Though earth-satellite telemetry has gained the spotlight, military sales are booming
- Firms expect 50 percent rise in sales for 1957; 75 percent of airborne equipment is nonrecoverable

PRODUCERS of military telemetering equipment are optimistic over sales for 1957. Business is soaring with need for accurate, thorough and recorded data from tests of missiles, rockets and aircraft and for ground tests where distance is needed for safety of personnel.

Equipment included in survey is limited to mobile telemetering equipment: temperature probes, accelerometers, other transducers, amplifiers, encoders, keyers, transmitters, antennas and associated ground-station gear such as receivers and decoders. Excluded are recording systems and data-reduction equipment.

Five leading manufacturers of telemetering equipment expect for fiscal year ending June 30, 1957 an average sales increase of 50 percent over fiscal 1956. Total volume of \$28.5 million is expected this year compared to \$18.9 million last year. One company expects an increase of 200 percent.

Seventy percent of telemetering equipment is used with missiles. Flight testing of aircraft takes 25 percent, with remaining 5 percent divided among radiosondes, airships and ground testing equipment.

Continual market is assured since 75 percent of airborne telemetering equipment is nonrecoverable.



Multicoder by ASCOP responds to 7.5-mv inputs

For example, twenty X-17 test missiles for Atlas and Titan have been fired to date, each shooting away \$100,000 worth of electronic equipment. Large share

Technical DIGEST

- Measurement of water in jelly beans, gum, marshmallows and other confections during manufacture is being made with nuclear magnetic-resonance equipment at Corn Products Refining Co. A Schlumberger NMR analyzer is being used. Method is said be accurate, rapid, nondestructive and requires little or no sample preparation.

- Application of 25,000-volt pulse to special Myriatron image dissector tube gives effect of high-speed shutter. Device is used for making movies under Arditron flash-tube illumination at rate of 50

pictures per microsecond. Ordinary movie camera is aimed at rear screen of tube. Work is continuing at Atomic Weapons Research Establishment in England.

- Aircraft collision-avoidance system proposed by Nevada Air Products employs eight tiny blisters on wing-tips and fuselage. Each contains an infrared detecting element (uncooled lead sulphide cell). Range is obtained by triangulation and angular information by sequential switching of the infrared domes. Transistors keep system weight below 30 lb. Range is 20 miles in good weather, 1 mile in heavy fog.

- Portable guided radiotelephone for coal mines picks up signals in

100 to 150-ke range from pipe or other good-conductor path in up to 3 miles of tunnel. It uses 2-ft diameter single-turn flexible loop as antenna. Final transceiver design by A.T.&E. in England uses hearing-aid tubes and transistors, weighs only 6½ lb complete with 200-hour batteries.

- For airborne early warning search, a saucer-shaped rotating radome over 30 feet in diameter has been built by Zenith Plastics. It has been flown successfully on a Lockheed Constellation. The foil-strip antenna array is molded integral with the glass-reinforced polyester skin, using over a ton of resin. Total weight of radome alone is over 3 tons.

of this \$2 million went for f-m/f-m telemetry.

Telemetry for Martin's Matador cost \$1½ million during research and development. Cost of telemetry for each Nike test is \$1,000 to \$6,000.

Another big use of nonrecoverable telemetering gear is the radiosonde. Radiosonde sales per year total about \$4.5 million. Seventy to 85 percent of this equipment is nonrecoverable.

Price of equipment varies. A fairly complete 90-channel ground station and airborne data-acquisition system would amount to approximately \$1,500 to \$2,000 per telemetering channel.

Complete 90-channel ground station including facilities for full instantaneous or "real time" data read-out, as well as necessary receiving and decoding equipment would sell for about \$160,000. Fully equipped airborne data-acquisition system would list for approximately \$15,000.

Blind spots for manufacturers are not knowing

what the customer does with certain shipments of telemetering gear nor how well it performed. These conditions do not lead easily to improved equipment design or predictions of marketing trends.

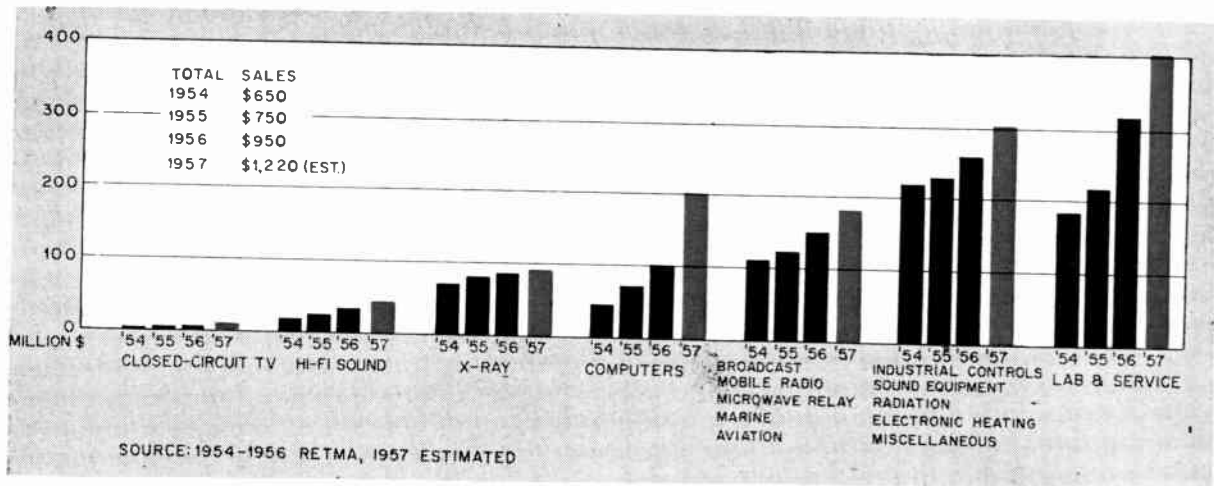
Not knowing the final application also requires that equipment be sufficiently flexible for a number of applications. Flexibility is also required to get larger volume sales.

Here are some design trends:

Smaller and lighter gear is selling better for obvious reasons. One: 14 extra pounds of instrumentation in third stage of Lockheed's X-17 would add one ton to gross take-off weight. Another: telemetering equipment must be miniaturized when a missile becomes operational to make room for the warhead.

Sales are increasing for pulse-code modulation systems. Wide-band data transmission and operation at greater distances is becoming common. Close mechanical tolerances are being required.

PRODUCTION and SALES



Industrial Sales to Rise in '57

Rising capital expenditures by businesses should sharply increase industrial electronic equipment sales in 1957.

Industrial equipment sales amounted to \$950 million in 1956, according to RETMA. Present indications are they will total about \$1.2 billion in 1957.

All businesses plan total capital expenditures of \$41.0 billion in 1957, 12 percent more than 1956, the McGraw-Hill Survey of Business Plans for New Plants and Equipment reveals. Electronics'

share of capital expenditures is increasing. Research and development expenditures in 1957 will total \$7.3 billion for all industries, 20 percent above 1956.

Computer sales of \$200 million are expected in 1957, double those of 1956.

Sales of \$400 million are estimated for group comprising industrial controls, sound equipment, radiation, electronic heating and miscellaneous industrial equipment. Group sales in 1956 were \$316 million.

Laboratory and service equipment sales of \$180 million are predicted for 1957, about \$30 million more than last year's \$150.7 million.

Sales of the group comprising broadcasting, microwave relay, marine and aviation equipment and mobile radio are expected to increase from \$260 million in 1956 to \$300 million in 1957.

Closed-circuit tv, x-ray and hi-fi, which accounted for sales of \$123.3 million in 1956, should register sales of \$140 million in 1957.

Manhunt for Management

- **Rapid electronics expansion forces firms to hire outside even though it may rough up company morale**
- **Some firms find their best source for executive manpower lies in contacts and personal recommendations**

INDUSTRY is feeling the manpower pinch in several uncomfortable spots. One of the sorest is the shortage of management men. Companies in our industry, not exempted from the general rule, are being forced to look outside for executives.

Recruiting managers was once taboo. "It wrecks havoc with morale of incumbent executives," says a management consultant. Today it's frequently a necessity.

According to a survey by American Management Association, 85 percent of industry recruits execs from outside. Two out of five fill more than 10 percent of their executive vacancies through recruiting. One out of twenty gets more than half its executives this way.

One personnel manager calls it a "mad market," another says "it's catch-as-catch-can jungle warfare." Problem is tied up with the engineer shortage, complicated by rapid growth in electronics in the last 15 years.

Generally, most firms would prefer to stay out of the market: recruiting is not only bad for morale, it's also costly. But they're driven into it by new products, new services, expansions requiring either more manpower or talent of a kind not found in the existing lineup.

Two of the reasonably lush hunting grounds for executive manpower are constantly stalked:

- The armed services. Every year, 300 flag officers and 2,000 commissioned officers retire. Military rolls also number many highly skilled people to whom industry salaries look good. Hiring brass is good business in an industry that needs liaison with Defense Department.

- Diversified industries, especially big ones with development programs, management in depth, and more security than greenbacks in their reimbursement packages. Such companies grow managers, occasionally slip into and out of various product lines, leaving men available.

First step in a recruitment program: plan what's to be done, how many people of what kinds are needed.

Minnesota Mining & Manufacturing, in planning

expansion, surveyed its personnel structure, found a correlation between the number of managers on the rolls and total company sales. This correlation and normal turnover ratio became the basis for recruiting. After three years, the plan still works with less than one percent error.

Promises to prospective managers should be realistic, within the company's reach, or else prize recruits will soon leave payroll. An instrument firm's placement manager points out that pirates couldn't function if people were satisfied with their jobs. "Top management," he says, "makes incredible promises sometimes, and when the blue sky dissolves into shadows, the hired become the dissatisfied and go back on the market."

Three most productive aids to recruiters:

- Contacts in industry: a primary source of executive manpower. Many companies keep complete files on executive moves reported in their business.

- Personal recommendations: time-honored, sometimes troublesome, requiring checks, interviews, screening.

- Advertising: third best for executives. Display ads best, classified second, radio-tv advertising not very useful.

Search consultants are retained by two out of five firms. "But they're not very good at finding managers for electronics activities," points out a personnel man, "especially specialists like engineering managers."

Antipirating agreements have diverted business into the laps of consultants. They keep company names out of the deal until it's closed, also charge for their services whether or not they deliver.

Commercial employment agencies are seldom used for top-management recruiting, more often for middle management. College placement services and professional associations are rewarding sources for some execs, particularly specialists.

One electronics firm does 70 percent of its recruiting from unsolicited applications coming in over the transom. Not practical for many firms, this is considered the best source for executives by several large companies.

Vacations—Close or Stagger?

- This summer 60 percent of electronics plants will close down for vacations. Others will stagger staff's time off
- They give good reasons for both techniques. Catch up on maintenance, says one; uninterrupted delivery, says another

A FELLOW ONCE said: "A vacation is no picnic." Maybe he ran an electronic firm. This business of vacations—when? how?—bothers all.

Total of 206 electronics plants, a representative sample of our industry, replied to a RFTMA vacation survey. Percentage of plants shutting down for vacation dropped from 64 percent in 1956 to 60 percent in 1957.

Figures on close-down lengths? The two-week period is way ahead but the one-week span is gaining. In 1956, 85 versus 15 percent. This year, 82 versus 18 percent.

July, the chart shows, is by far the biggest vacation month. Last year, 91 percent of electronics plant closings were in July. This year, 87 percent.

As for leading close-down weeks, all four top ones come in July. The fourth week holds an edge over the third.

Vacation shutdowns have drawbacks. Many workers do not like having time off dictated. Production stops. Employees with working spouses have trouble vacationing together. Work and orders pile up.

On the other hand, Microwave Associates uses the shutdown to catch up on maintenance. Transonics finds the period ideal for installing new equipment. The A. W. Haydon Co. points out shutting completely avoids seniority disputes over vacation dates. This helps morale.

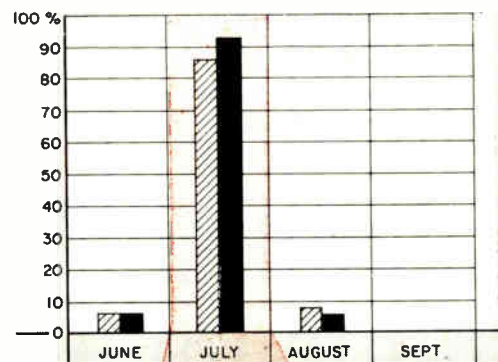
Most firms using the close-down system say employees voice few complaints. Raytheon emphasizes all workers enjoy a prime vacation time.

Skeleton forces of some kind are common in plants that close. New employees not entitled to full vacations usually are placed on these forces. Sales, office, mails—these are departments where minimum operations continue.

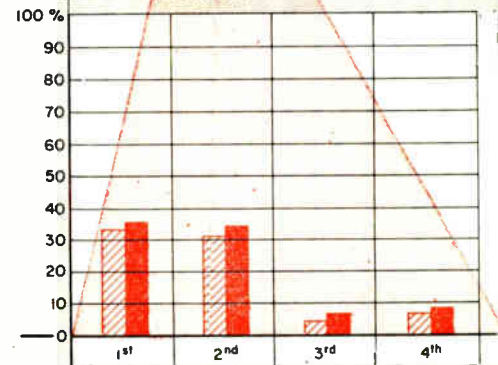
Alternative to shutting down is staggered vacation plan. Staggering vacations isn't fool-proof. Criticisms include: "The company's on a perpetual vacation—business suffers." "Key people are always out." "My production line falls apart."

Yet there's much to be said for staggering vacations. Some firms find it easier to fill small gaps rather than cope with big work-order backlogs. It's

MONTHS OF JUNE/JULY/AUGUST/SEPTEMBER—1956 vs. 1957



WEEKS OF JULY—1956 vs. 1957



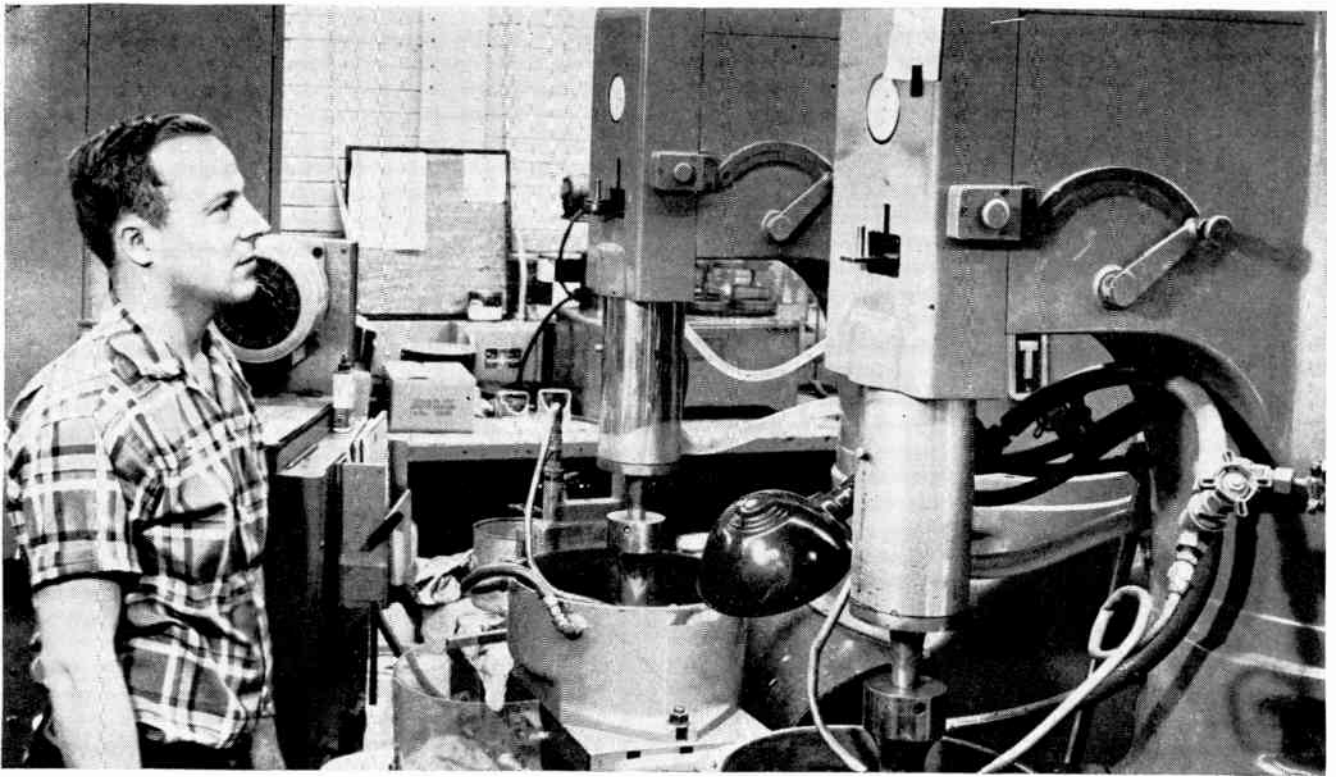
■ 1957
 ▨ 1956

When electronics plants close for vacation

said the carried-over workload increases cost of doing business for a month after vacation. It's also claimed every department's efficiency decreases for the same period.

Markem Machine Co. favors staggering because "our fast deliveries aren't interrupted." Technicraft Laboratories contends: "It produces happier employees and customers."

Combining the two vacation methods is done too. Laboratory for Electronics has 700 employees. A staggered plan would practically halt production lines, so these groups close down. All other departments follow a staggered schedule. LFE reports the dual way "is most economical for us."



Ultrasonic energy slices semiconductor crystals (Texas Instruments)

Transistor Makers Mechanize

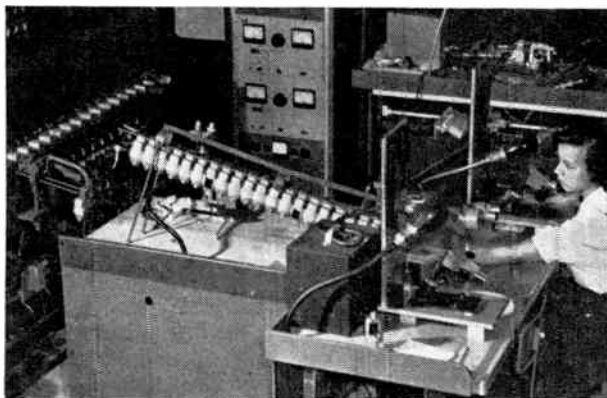
- **Burgeoning sales volume makes manufacturers turn from hand-assembly operations to mechanized production**
- **Easy-to-read testers speed up inspection; clips, racks and conveyors reduce assembly time**

HANDWORK is still important in transistor manufacture. But expanding sales are forcing automatic assembly and test devices. Some examples:

- Philco machines handle nine production steps and intermediate cleaning, prepare and solder leads and whiskers, test seven parameters.
- Sylvania uses slicers which can handle several ingots simultaneously. One of its machines makes

1,600 transistor case bases an hour, another exhausts or fills the case, welds it and attaches the base at the same rate.

- Transitron feeds germanium wafers, indium and base electrodes into a continuous belt furnace for one-step fusion.
- Texas Instruments speeds up transistor matching with a panel of glass containers which light up ac-



Carousel joins stems, leads, transistor (Philco)



Conveyor for transistor assemblies (Motorola)

ording to electrical characteristics of transistor.

- Minneapolis-Honeywell testers flash results with pinball-like lights.

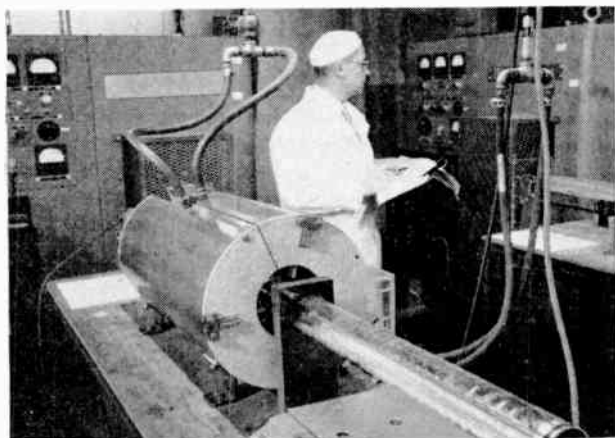
Transistor makers are also transistor users. Motorola has transistorized production test equipment. Delco feeds clips of transistor assemblies into transistorized etchers.

Mechanization is more advanced in semiconductor diode production. CBS-Hytron uses a machine which accepts raw material, ejects finished diodes.

Pacific Semiconductors has a diode sorter which handles up to 8,000 diodes hourly. Hughes Aircraft packages diodes in belts to speed assembly.



Gaging 3,600 transistor dice an hour (Sylvania)



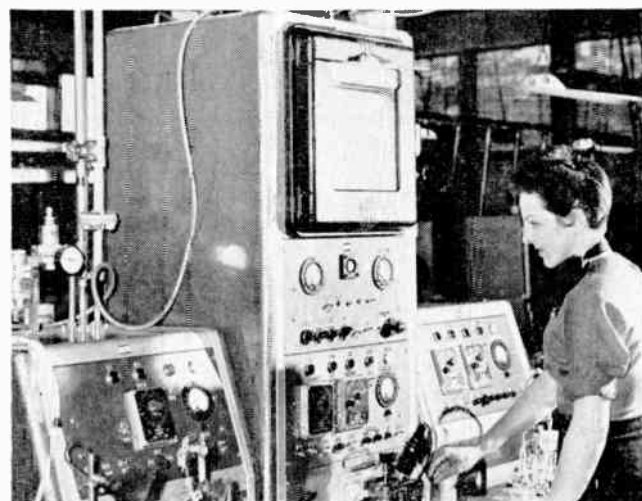
Crystal-puller is water-cooled (M-I)



Continuous alloying furnace (RCA)

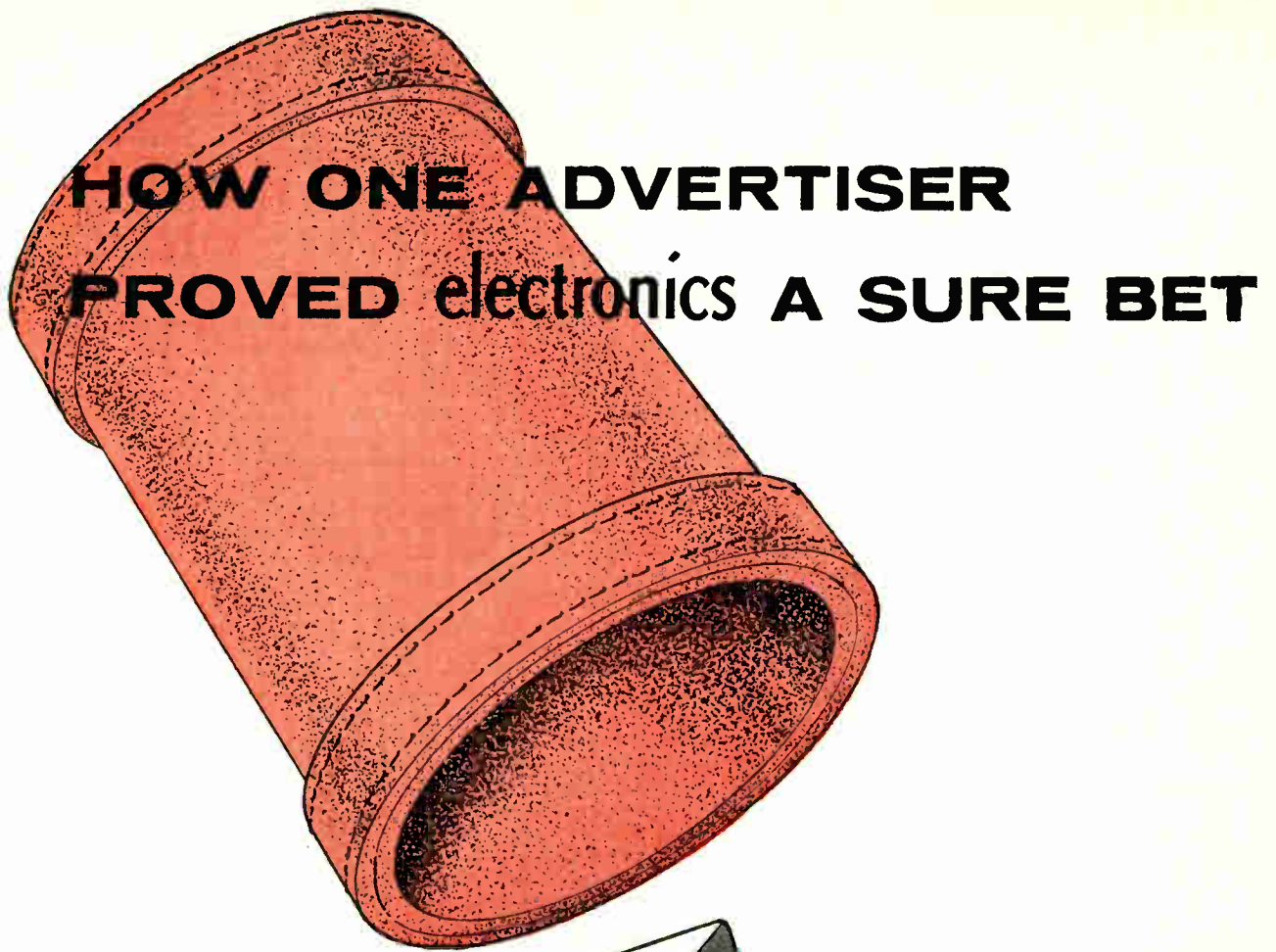


Reducing germanium in continuous furnace (GE)



Etcher pares germanium to 0.0001 in. (Sprague)

HOW ONE ADVERTISER PROVED electronics A SURE BET



"A regular schedule in the business editions as well as in the established technical edition"



A MCGRAW - HILL PUBLICATION . . . 330



MEMO TO: Sales Representatives

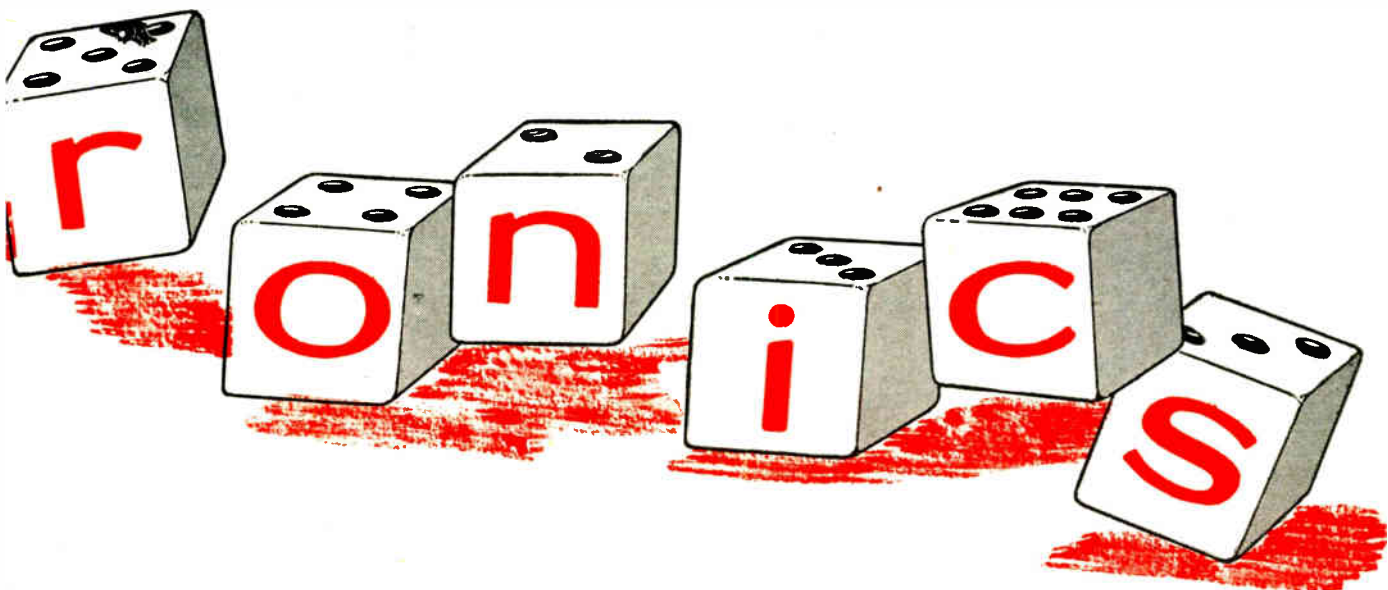
From : Frank H. Rockett

Subject: Current Advertising

November 26, 1956

This (the geographic distribution of inquiries from electronics*) indicates that the quality of inquiries from electronics, because they come proportionally from all market centers, is high. The tabular results also show that the circulation of electronics reaches as representative a cross section of the electronic market as do the other magazines combined. For this reason, we will continue to use electronics as the main stay of our advertising in 1957. This will include a regular schedule in the new business editions as well as in the established technical editions.

**These conclusions of Mr. Rockett, Advertising Director for Airpax Products Company, result from an analysis of inquiries from advertisements and press releases over an 18-month period (January, 1955 through June, 1956).*



EST 42ND STREET... NEW YORK 36, N.Y.

ELECTRONICS business edition — June 20, 1957

23

Behind the Curtis Report

- **Everybody agrees the report points the way to unsnarling air traffic. But it's not all sweetness and light**
- **Suggested reorganization may burn some bureaus—and some bureaucrats. Timetable is uncertain**

LAST WEEK, House Interstate and Foreign Commerce Committee was deliberating on the first legislative step of Edward Curtis' multipronged plan for air traffic control. While hearings were going on, observers could sense a quiet groundswell of opposition, hardly noticable during Senate hearings that wound up before Memorial Day.

Nothing much can be done to translate the Curtis plan into law before adjournment, and by fall the opposition may consolidate. But whatever ultimately happens, electronics stands to gain materially from concern over crowding in the airlines. As FCC general counsel Warren Baker put it, "the heart of any plan will have to be an electronic system."

Bringing traffic control systems up to date may entail half a billion dollars for electronic gear alone. Annual spending to keep abreast of growing air technology will be an estimated \$40 million.

Traffic system envisaged by Curtis' planners is full of electronics:

- Airspace will be divided into blocks defined electronically by a navigation system.
- Air situation will be determined by position reports from aircraft and a three-dimensional ground-surveillance system.
- Communication will be essentially automatic among all elements of the system.
- Processing, storage, communication and display of data used by controllers to make decisions will be mechanized.
- Computers will facilitate scheduling and expedite flow of traffic.

Curtis committee plan results from 15 months of study, projection and evaluation. It accurately analyzes air traffic problem. With tacit White House approval, it naturally got a good reception at first. Everybody agrees that it hits the mark as far as saying what's wrong and recommending improvements.

Not everybody agrees on how the problem should be tackled, and that fogs up the timetable. Crux

of disagreement is the legislation that the Curtis report recommends:

- Creation of an Airways Modernization Board, three-man body representing the President and Departments of Commerce and Defense. AMB would press forward with R&D programs for new approaches to air traffic control. It would function as an interim planning group until its 1960 expiration date.
- Creation of a Federal Aviation Agency which would take over CAA, CAB, absorb the Modernization Board in 1960. FAA would have policy-making and regulatory authority over every aspect of air, with specific exception of weapons, international affairs, economic regulation.
- Adoption of a user's tax, possibly levied on fuel, to help government pay for modernization program.

Rep. J. Arthur Younger (R., Cal.), member of the House Interstate and Foreign Commerce committee, may become center of opposition to Curtis plan. He regards AMB as "piecemeal legislation," told *ELECTRONICS*: "We've had all that before. It's time we took some real action to solve the problem instead of setting up just one more independent agency to recommend and investigate."

Younger has a bill pending in the House that would create a Department of Transportation and Communication. He feels a cabinet-level post would fill the needs of all the agencies now stirring the soup, be more in keeping with our form of government. He objects to independent air agency, says air traffic is "perfectly capable of standing on its own feet. It no longer needs special treatment."

One high government official says "that's the direction in which we must ultimately move." Another officer in the same federal department disagrees: "I think Curtis' plan makes more sense."

Although AMB may not have a terribly hard time, many people are getting the wind up already about FAA. This agency, as presently conceived, would absorb much authority now diffused around Washington. It would need a voice in FCC, the Weather Bureau, USAF's Air Weather Service. It could become a free-wheeling authority over everything above the ground.

**THIS IS AN
UNUSUAL OPPORTUNITY
.....
FOR SALES-MINDED
ELECTRONIC ENGINEERS**

If you have a genuine interest in electronic components, it is likely that you are one of the men we are looking for. We have unusual openings which will be both challenging and interesting to you.

For your information, we are a nationally known and respected name in the components industry. At the moment we are expanding our sales engineering staff for the East Coast, Middle West and West Coast areas.

Our executive personnel will be glad to discuss the positions we have open at a time and place that can be arranged for our mutual convenience. You can be certain your reply will be kept entirely confidential. We will of course require full particulars on your education and past experience.

Write To: P5343 • ELECTRONICS • P. O. Box 12 • New York 36, N. Y.

Plan Color TV Push

RCA opens up its biggest campaign to get public acceptance of color television. Test run in Milwaukee raises sales 800 percent

BIG PLUNGE into color tv begins. Wraps have been taken off campaign to sell color tv sets across the nation.

RCA, having spent \$100 million and more for development and promotion of color tv sets, has opened up its coffers to make 1957 a "color year."

Preliminary to the nationwide sales effort was merchandising test run in Milwaukee, Wisconsin. "We pulled the stops out," says William Boss, RCA color coordinator. "We tried every promotion scheme conceivable."

Results in Milwaukee: Before campaign started in May color tv set sales averaged 12 a week. Campaign boosted figure to 106 a week for 800 percent rise. 70 percent of sales were for models costing more than low price of \$495. Most expensive set costs more than \$800. Black-and-white set sales also profited. They rose 11 percent.

One of the most effective promotional techniques used in Milwaukee, says Boss, was telephone solicitation program. Six attractively voiced girls spent time placing calls to phone subscribers. The girls suggested that a color set be installed on a trial basis.

More than 35 percent of those contacted said okay; 60 percent of the yeas bought.

September begins a major push. All 80 RCA distributors are expected to take part. They will have Milwaukee results boiled down to a working plan in August.

RCA sees five other major tv set makers entering sales picture on a major scale by December.

Radar Death Calls For Caution

RECENT report on death of a technician caught in beam of a radar transmitter is frightening: radiated energy in less than a minute literally cooked the man's viscera. But common-sense precautions can prevent injury. Besides, opportunities to stand directly in the beam of a live radar are rare.

As reported in *May California Medicine*, a 42-year-old man stood within ten feet of a powerful antenna. In a few seconds he felt heat in his abdomen. Heat became intolerable within a minute and he moved away. Half an hour later he had acute abdominal pain and vomited.

Blood-count, x-rays and general appearance of the man showed doctors what seemed to be peritonitis. They operated, removed his appen-

dix, noted unusual discoloration in abdominal organs.

For ten days patient remained under hospital care. On the tenth day his abdominal wound gave way. Immediate operation did no good; he died within 24 hours.

Medical science indicates human tolerance to radiant power is lowest in S and C bands (around 3,000 and 5,000 mc) where energy is dissipated as heat a few centimeters below the skin. Organs with little blood-cooling ability, such as the eye, gall bladder, urinary tract, are susceptible to irreversible damage.

Dangerous power level is somewhere near 3 watts (average) per sq cm. One report indicates 0.01 watt per sq cm as recommended tolerance level, undoubtedly with an eye to cumulative effect of long

exposure. The man in the California case was working on a set believed to emit 2.5 megawatts peak. If so he received radiated energy of about 25 to 50 watts per sq cm.

Radiation is not so dangerous to flesh or muscle tissue because blood action keeps tissue cool.

Russian Buildup Seen U. S. Match

Russia can match U. S. electronics production in ten years if her economy can support it, says an electronics executive home from a trip to the Soviet Union.

John N. Dyer, vice president of Airborne Instruments Laboratory, Mineola, Long Island, sees no reason why the Russians will not solve present production problems. He says their technical manpower and laboratory equipment compares favorably with that in the U. S.

Technically, says Dyer, the Russians have their high spots, but in some areas they lack years of activity and background.

Development of color tv is being pushed vigorously at Leningrad's Television Institute, Dyer reports. Studio equipment for tv stations is also being made there. The Russians, he says, are making image orthicon and super iconoscope tubes and have built many color tv systems.

According to information given Dyer, Russia's tv outlook is this:

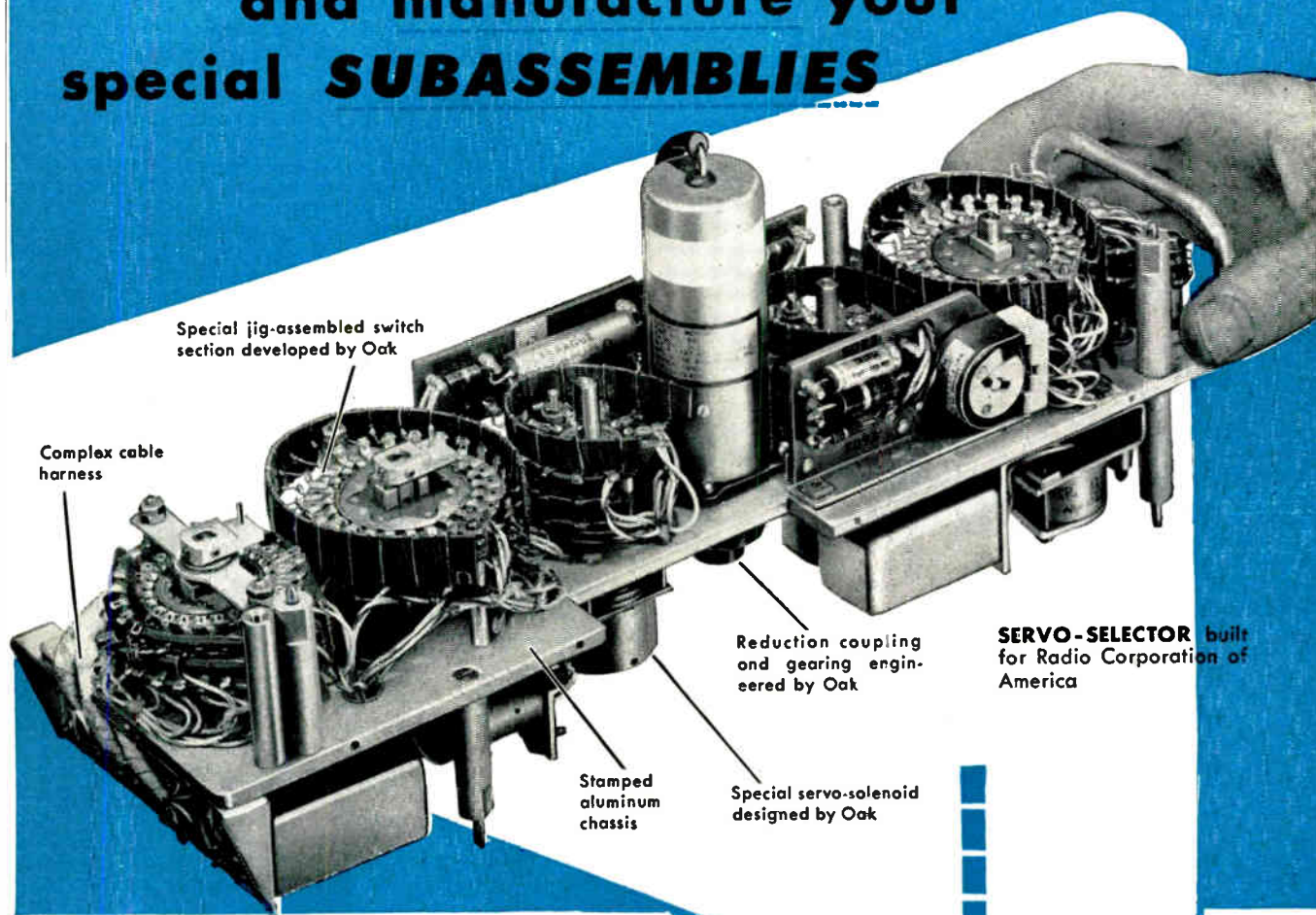
Receiver production in 1957 will be 2.5 million and double that next year. Tv stations will be increased from 17 this year to 70 by 1960.

There has often been a gap, however, between the number of sets planned for production and the actual output. In 1956 planned production of both radio and tv sets was 5,415,000. Actual output was 4,300,000.

Dyer and three others visited a transistor factory which turns out a few thousand units a month, and brought home samples for evaluation. Some are said to be good to 100 mc.

They saw an experimental transistor radio and dip soldered units, presumably the first step towards printed circuits.

OAK can engineer and manufacture your special **SUBASSEMBLIES**



Special jig-assembled switch section developed by Oak

Complex cable harness

Reduction coupling and gearing engineered by Oak

SERVO-SELECTOR built for Radio Corporation of America

Stamped aluminum chassis

Special servo-solenoid designed by Oak

one responsibility for the design and production of your electromechanical requirements . . .

In the servo-selector, shown above, Oak engineers solved three different design problems. They developed (1) an ingenious jig-assembly for fastening the clips to the switch sections, giving exceptional accuracy in placement and retention; (2) lower speed operation through special reduction coupling and gears; and (3) special solenoids for positive clutching.

Oak then produced the assembly . . . stamping the aluminum chassis . . . manufacturing screw machine parts . . . making the complicated cable harnesses, switches, and solenoids . . . assembling all parts . . . then running vibration, cold (-55°C), humidity, and life tests.

Why not contact Oak engineers about your own requirements? But, do it *early* in the design stage . . . take full advantage of Oak's 25 years of experience in solving electromechanical problems.

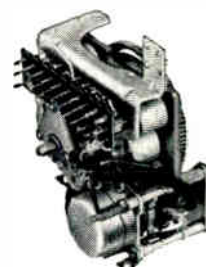
Phone or Write Our Mr. Howard Olson, Today,
on Any Aspect of Your Subassembly Projects

OAK MFG. CO. 

1260 Clybourn Ave., Dept. B. Chicago 10, Illinois
Phone: MOhawk 4-2222

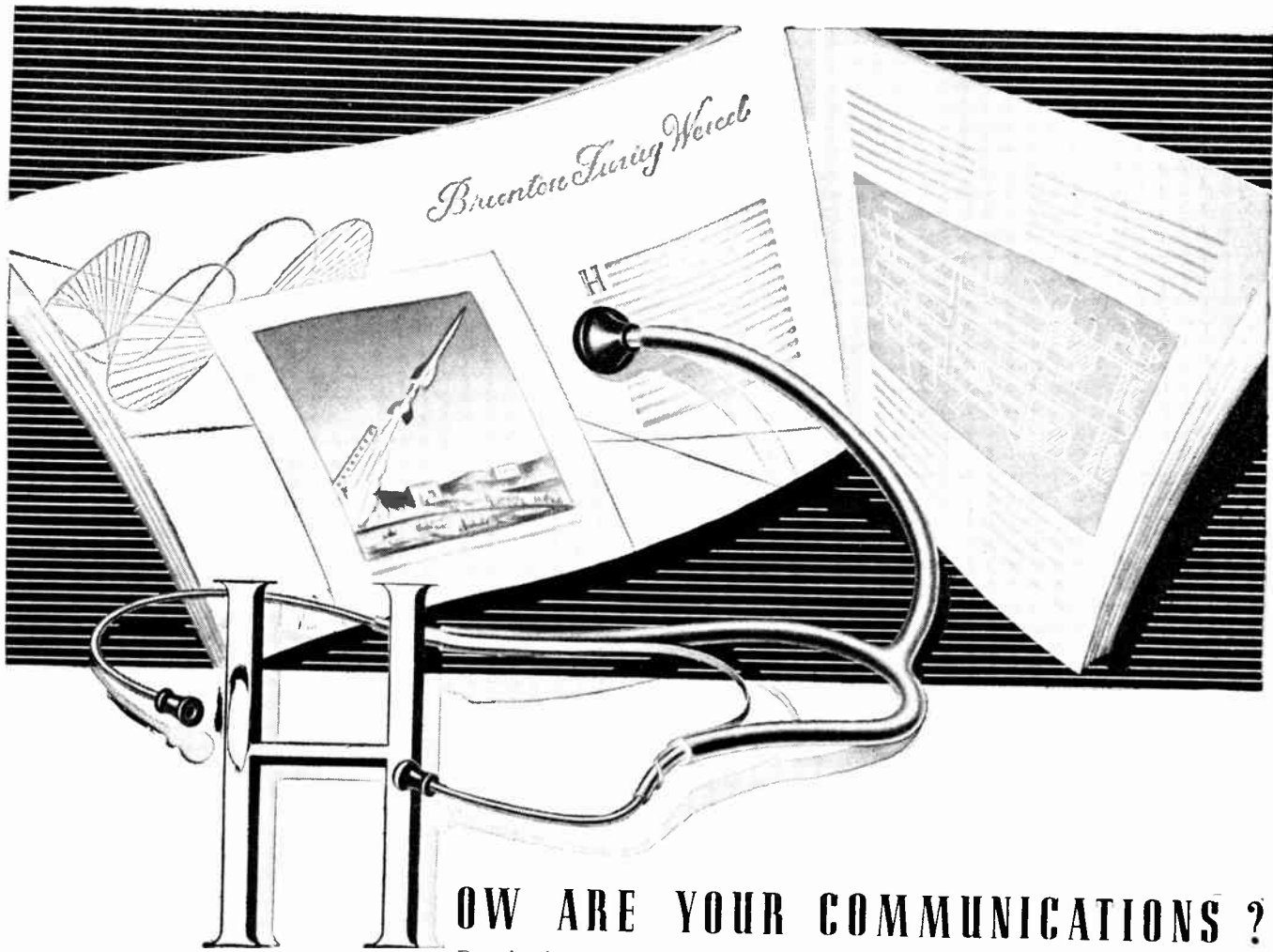


CHANNEL SELECTOR switch built for Sylvania Electric Products Inc.



CAPACITOR SWITCH built for Radio Corporation of America

SWITCHES • ROTARY SOLENOIDS • CHOPPERS • SPECIAL ASSEMBLIES • VIBRATORS • TUNERS



HOW ARE YOUR COMMUNICATIONS ?

Do the booklets, pamphlets, and manuals you use really *work* for you? Are these vital publications, that tell the story of your products and your company, as effective, readable, well designed and illustrated as they can be? Today more than ever, your entire operation is judged by each annual report, employee manual, and public relations piece that you produce. Have you examined your communications lately? If you have any doubt as to the impact of your instructional and promotional literature, remember . . .

COMMUNICATION IS OUR BUSINESS

For a good many decades McGraw-Hill has stood for complete coverage in the business literature field. Now the McGraw-Hill TECHNICAL WRITING SERVICE offers a new approach to your publication problems — an *integrated* writing, editing, illustrating, and printing service for the *custom* production of: INSTRUCTION MANUALS, PRODUCT BULLETINS, TRAINING AIDS, INDUSTRIAL RELATIONS LITERATURE, ANNUAL REPORTS, COMPANY HISTORIES, PROCEDURAL GUIDES and other collateral literature. More than 150 editorial and graphic experts are at your disposal, ready to prepare high-quality material to your own or government specifications. Save time, save money . . . and make your communications work! Let *our* staff be your staff for technical and business publications.

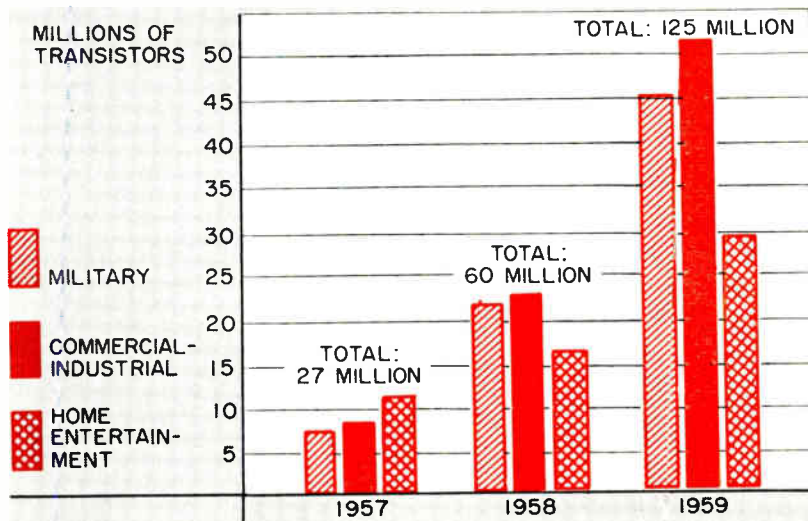
McGraw-Hill Book Co. TECHNICAL WRITING SERVICE

Write or phone Technical Writing Service, McGraw-Hill Book Co., Inc.
330 West 42nd Street, New York 36, N. Y. • LONGacre 4-3000

This service is available through ad agencies.

June 20, 1957 — ELECTRONICS business edition

PREDICTED TRANSISTOR MARKET



SOURCE: STANFORD RESEARCH INSTITUTE

Industrial uses lead as . . .

Transistor Sales Rise

Electronic equipment makers see 125 million units sold in 1959. Silicon transistors continue to grow in popularity

TRANSISTOR market will multiply almost five times in the next three years, predicts Stanford Research Institute. SRI recently completed a transistor market survey among 80 electronic equipment manufacturers for Philco.

Stanford researchers estimate 125 million transistors will be sold in 1959. For 1958, sales of about 60 million units are expected. The 1957 estimate calls for 27 million units.

Entertainment products, including auto radio, are currently biggest user group. They will take 11 million transistors in 1957, 42 percent of total market.

Commercial-industrial users will take 8 million units or 30 percent. Military needs call for about 7 million units or 28 percent.

By 1959, commercial-industrial products will be the biggest factor in the transistor market. They are expected to use about 51 million transistors in 1959, or 41 percent of total market. Military is expected to take 45 million units or 36 percent. Entertainment with 29 million units will then represent 23 percent of market.

Use for silicon transistors is growing rapidly in commercial-industrial and military market segments. Because of cost, entertainment use of silicon type is negligible.

Predicted silicon transistor market for 1957 is 2.3 million units or eight percent of entire transistor market. By 1959, silicon transistor market is expected to be 19 million units or 15 percent of total.

Military use is expected to increase from 2.0 to 18.0 million silicon transistors over the three-year period. Commercial-industrial use is similarly expected to increase from 250,000 to 2 million units.



PRODUCTS

TRANSISTOR OSCILLATOR

Complete, compact, precise plug-in signal source providing fixed temperature and humidity environment for transistor, crystal, and circuitry elements. Frequency stability: (24-hr. period) 1 part in 10^6 or better. Write for complete data.



THE
JAMES
KNIGHTS
COMPANY

Sandwich 1, Illinois



Mc GRAW-HILL
DIRECT MAIL LIST SERVICE

McGraw-Hill Mailing Lists
Will Help You

- Merchandise your advertising
- Conduct surveys
- Get inquiries and leads for your salesmen
- Pin-point geographical or functional groups
- Sell direct
- Build up weak territories
- Aid dealer relations

Direct Mail is a necessary supplement to a well rounded Business Paper advertising program.

Most progressive companies allocate a portion of their ad budgets to this second medium at the same time as they concentrate on the best business publications.

600,000 of the top buying influences in the fields covered by the McGraw-Hill publications make up our 150 mailing lists. Pick YOUR prospects out of our Industrial Direct Mail catalogue.

Write for your free copy.
It contains complete information.

Want more information? Use post card on last page.

Over 400 electronic control circuits

now available for quick, easy reference



Here are the circuits you need for sorting, timing, measuring, and counting; for sweep control, triggering, temperature and motor control, and hundreds of other industrial uses—each with concise description, performance characteristics, component values, and practical applications. Save hours, even days, of search and preliminary work to find basic circuit ideas for a particular application—consult this big, handy collection of tested circuits—selected from recent issues of *Electronics* and classified and indexed for quick use.

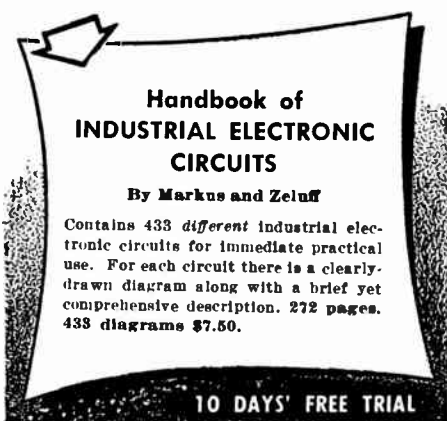
Just Out!

Handbook of INDUSTRIAL ELECTRONIC CONTROL CIRCUITS

By John MARKUS and Vin ZELUFF
Electronics Magazine
352 pages, 412 diagrams, \$8.75

Following each description is a reference to the original source where you can get more details on related mechanical problems or study graphs of performance characteristics. In the index, each circuit is cross-indexed as many as a dozen times, to permit locating specific circuits quickly when they are known by a variety of names.

a companion volume . . .



Handbook of INDUSTRIAL ELECTRONIC CIRCUITS

By Markus and Zeluff

Contains 433 different industrial electronic circuits for immediate practical use. For each circuit there is a clearly drawn diagram along with a brief yet comprehensive description. 272 pages, 433 diagrams \$7.50.

10 DAYS' FREE TRIAL

McGraw-Hill Book Co., Inc. Dept. FL-6-20
327 W. 41st St., N. Y. 36.

Send me book(s) checked below for 10 days' examination on approval. In 10 days I will remit for book(s) I keep, plus few cents for delivery costs, and return unwanted book(s) postpaid. (We pay delivery costs if you remit with this coupon—same return privilege.)

Markus & Zeluff—Indust. Elect. Control Circ.—\$8.75

Markus & Zeluff—Indust. Elect. Circ.—\$7.50

(PRINT)

Name

Address

CityZone.....State.....

Company

Position

For price and terms outside U.S.FL-6-20
McGraw-Hill Book Co., Inc.

Want more information? Use post card on last page.

30

Garnets Enter Electronics

Man-made crystals having same crystal structure as popular gem stone will aid microwave transmission, boost business in ferrites

FERRITE business in our industry is expected to multiply 10 times to almost \$50 million in 10 years. Playing a key role will be a just-announced newcomer to electronics—the garnet.

Expected to have much military importance, the garnet is a man-made ferromagnetic material having same crystal structure as the gem stone. New applications of garnets are revealed by C. Lester Hogan of Harvard University's Division of Engineering and Applied Physics. Tenfold jump in ferrite business is predicted by Ernest Wantuch, v-p of Airtron, Inc.

Importance of garnets compares to that of titanates, says Wantuch. In radar and other microwave equipment, earlier ferrites doubled efficiency in the range above 1,000 mc. Garnets, having a long relaxation time, promise to extend lower limit to 100 mc.

Bell Laboratories' Harry Suhl recently proposed a type of microwave amplifier using single crystals of garnet. It would provide low-noise operation at room temperature. And in microwave mixing, garnets (believed more rugged) may substitute for crystal rectifiers.

Cost of a garnet bar (\$100-\$120) is termed nothing in comparison to the material's many advantages. Moreover, only a small quantity—about \$2 worth—is used in a component selling for \$100 to \$500.

Three years ago, ferrite business was almost nonexistent. Today, it is in the \$3-\$5 million class. And when it hits \$50 million, experts say, garnets will account for 25 percent of that total. They are ready for commercial applications now.

Military Gear Shrinks

Top Army, Navy and Air Force brass wandering through the basement exhibit hall of Washington's plush Sheraton Park hotel last month got a bird-colonel's eye view of what cooks in military electronic equipment. One big trend was clear. The transistor is here to stay and it's making military electronic equipment smaller, lighter, more reliable, less power hungry.

Several transistorized items held the spotlight at the Armed Forces Communications and Electronics Association convention and show. Here are just a few highlights. A new general purpose ppi (plan position indicator) repeater by Westinghouse for Navy ships is half as heavy, uses 1/3 the power and performs better than some current equipment.

The equipment, designated AN/

SPA-25, has completed service testing. It uses 57 transistors and 4 tubes—two sweep drivers, cathode-ray tube and one glow tube.

All-transistor digital computer RECOMP by North American Aviation brings data processing down to desk-top size, speeds design of jet aircraft. Unit occupies 6 cu ft, weighs 210 lbs, consumes 600 w. It offers 16 arithmetic operations, 17 logical and transfer instructions and 8 input/output instructions, stores 4,032 40-bit words in a magnetic-disk memory. Computer adds in 1.04 milliseconds, multiplies in 20.8.

Four-channel multiplex system by Lenkurt can speed military communications over either wire or radio circuits. It operates on frequency-division principle and uses about 60 transistors.



Flight simulator for four-jet KC-135 stratotanker

Analog Computers Train SAC Pilots

EVEN before the planes are built AF pilots will be racking up flying experience in the big four-jet KC-135 stratotankers designed to refuel SAC B-52 bombers in mid-air.

Ereco's flight simulator, consisting primarily of analog computers and costing \$1.8 million, is making this advanced training possible on the ground.

In appearance, the simulator's cockpit is identical to the actual Boeing KC-135. Controls are wired to a panel that feeds in actual flying conditions. Simulated conditions include: fuel controls, problem of handling plane under varying load conditions as fuel is pumped out from tanker into B-52, plus other normal and emergency conditions such as adverse weather and mechanical failures.

Current contract calls for eleven simulators to be built at a total contract price of \$6,239,000 and placed at various SAC bases. The first, which took two years to build, is already in use at Castle AFB, Calif. Second simulator is scheduled for delivery in August. Remaining ten simulators will follow at one month intervals.

Ereco foresees big increase in demand for simulators. Right now, Ereco officials say, electronic simulating systems account for about 75 percent of the division's work, amounting to \$15 to \$16 million a year.

KOVAR[®] glass-sealing alloy



over 200 years experience
by 14 leading companies



makes finest glass-to-metal seals



matches perfectly
fuses readily
bonds permanently

® Westinghouse Trade Mark No. 337,962

There's no doubt about it, Kovar alloy has proved its superiority year-after year. These leading companies know they can depend on Kovar for uniform quality. The remarkable chemical-bonding and thermal expansion characteristics assure perfect matching, and it seals with permanent vacuum and pressure tightness. Kovar is available in all desired forms along with Technical Service to assure maximum design and application benefits. Write us about your specific needs.

STUPAKOFF DIVISION OF
The CARBORUNDUM Company

WRITE DEPT. E LATROBE, PENNSYLVANIA

Big Missiles: \$1 Billion

Ballistic missile business filters down through 17 prime contractors and 200 subcontractors to thousands of vendors

CARE and feeding of the ballistic missile family—Atlas, Titan and Thor—will be a billion-dollar-a-year business in fiscal 1957. It will filter down through 17 prime contractors, more than 200 subcontractors and thousands of suppliers of material and equipment.

Thus says Brig. Gen. Ben I. Funk, AMC's deputy director for ballistic missiles and weapons system manager for logistics for the AF ballistic missiles program.

A large but undisclosed percentage of the \$1 billion spent for the three big birds during fiscal year 1957 went to the electronics industry.

Thirty-five percent of all ballistic missile spending to date has gone to subcontractors.

Five years ago, less than 0.1 percent of total AF procurement was for missiles. Today, missile ratio

is nearer 10 percent of all AF procurement and still climbing.

Atlas, Titan and Thor contribute heavily to industrial development. Facilities provided by AF to contractors since late 1954 amount to \$154 million. July 1957 is expected to bring the figure to \$200 million. Contractors have spent \$100 million.

Psychology behind a program that involves three separate systems and 17 prime contractors is based to some extent on value of competition.

Two prime contractors work on each of the four subsystem areas: airframe, propulsion, guidance and nose cone. Effort of each contractor is geared to one or more of the missile designs. In case of need, swapping competing developments is possible with minimum change of design.

Example: Guidance system being developed for Atlas is in competition with that being developed for Titan and Thor. Besides these systems there are still other basic guidance systems under development that could prove more successful than those now slated for Atlas or Titan-Thor.

MILITARY electronics

- **System** for operating helicopters on instruments, called electronic road map, consists of combination of Bendix-Decca navigator, Bendix sonic altimeter, improved attitude display and glide path indicator. Developed by Bell Helicopter and Bendix, equipment enables pilot to fly to any spot within 100-mile area, make instrument approach to within 10 feet of ground and land without looking outside.

- **Raytheon** is making both bombing and navigational radars for Convair's B-58 Hustler. Forward 10 feet of Hustler as well as other sections of plane are Raytheon's responsibility.

- **Theme** of Army Signal Corps' 97th anniversary celebration on June 21 will be Army Signal Corps contributions to the American standard of living. Signal Corps developments directly benefiting living standards include: printed

circuitry. Auto-Assembly of electronic parts, storm-detector radar, magnetron tubes, portable tv cameras, techniques for microwave radio relay communications and radio and tv electron tubes.

- **Small** rockets may make weather balloons obsolete. They carry a 6-pound warhead of electronic equipment 60 miles above sea level. Fired from a five-inch rifle, the HASP (High Altitude Sounding Projectile) has successfully reached 110,000 feet. New version, under development at Naval Ordnance Lab, is expected to add another 200,000 feet to present record.

- **Minneapolis-Honeywell** announces new inertial navigation system for automatic guidance of manned or unmanned aircraft. Developed under Navy contract, system is called ISIP (Inertial System, Indicating Position).

CONTRACTS awarded

Wayne-George Corp., Boston, formerly Applied Electronics, will begin research and development under AF contract of digital position-read-out system for preparing inputs for large-scale digital computer. System will go into Askania cinetheodolite, high-speed optical-tracking device used for testing guidance systems.

Boeing gets \$7,109,195 AF contract for production models of Bomarc (IM-99) ground-to-air interceptor guided missile.

Transitron will sell signal generators to Aviation Supply Office totaling \$531,135.

Polarad Electronics gets \$254,850 contract with Aviation Supply Office for 133 radio test sets.

Bendix Friez will sell transosondes (large radiosondes) to BuAer under \$302,329 contract.

Eclipse Pioneer gets \$980,368 contract with AMC for directional



All business is specialized

... and nothing specializes on your business like your business paper

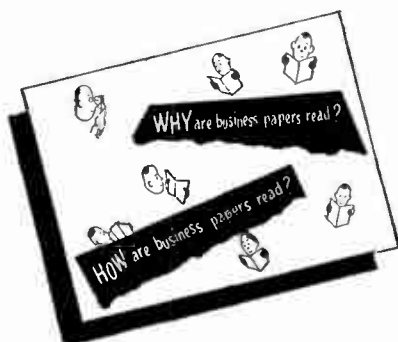
Here's a smart business man. He spends his time where every sitzmark parks a prospect at his feet. It's simple sense: He *specializes* ... and it *pays*!

Your business is specialized, too ... and so is your business paper. The time you spend with it pays ... for its editors are experts in your specialty. They scout the field ... report what's good that's new ... find ideas that worked ... suggest methods to keep you a leap ahead of competition.

The ad pages are as specialized as the editing. They, too, tend strictly to business ... your business. They bring you data on new products, new materials ... gather in one place a raft of ideas on where-to-buy-what, or how to make (or save) a dollar.

That's help you can't find concentrated into such quick reading time *anywhere* else! It's help that puts many a man out front in his field, as a specialist who knows what's what today ... sees what's coming tomorrow. It's simple sense to read every page, every issue.

This business paper in your hand has a plus for you, because it's a member of the Associated Business Publications. It's a paid circulation paper that must earn its readership by its quality ... And it's one of a leadership group of business papers that work together to add new values, new usefulness, new ways to make the time you give to your business paper still more profitable time.



A copy of this quick-reading, 8-page booklet is yours for the asking. It contains many facts on the benefits derived from your business paper and tips on how to read more profitably. Write for the "WHY and HOW booklet." Room 2710.

McGRAW-HILL PUBLISHING COMPANY
330 West 42nd St., New York 36, N. Y.



One of a series of advertisements prepared by THE ASSOCIATED BUSINESS PUBLICATIONS



in an instant — **THE KILL**

Twelve seconds ago, this hostile aircraft came in range of a Navy interceptor. Ten seconds ago, a little black box took control of the Navy craft's weapons system. Four seconds ago it unleashed a salvo of deadly rockets. Two seconds from now the intruder will explode into a ball of fire.

The little black box that takes credit for the kill is an airborne fire control computer designed to make split-second decisions in high-speed aerial warfare. Credit for the black box goes to the Navy, to Lenkurt and other cooperating manufacturers. Developed to meet a specific military need, it is one of the unpublicized but highly important marvels of this electronic age. Everything else about it is classified.

But it can be said that Lenkurt has unique facilities and experience for "black box projects" as well as for commercial and industrial communications systems. You are invited to join the growing list of users — including America's telephone companies, railroads, pipelines, and government agencies — who look to Lenkurt for leadership in telecommunications.

Lenkurt
ELECTRIC

San Carlos, Calif. • Mexico, D.F. • Vancouver, B.C.

Lenkurt Products are distributed to Public Utilities by **AUTOMATIC ELECTRIC**

gyro control equipment, spares and installation.

Airborne Instruments will provide services, facilities and materials for 12 months to conduct research program on tropospheric propagation for Army Signal Corps. Contract: \$130,000.

ACF Industries gets \$172,224 contract with Army Signal Corps for radio beacon AN/DPN-42, spare tubes and crystals.

Wileox Electric gets \$477,187 contract with Army Signal Corps for radio transmitting sets, AN/FRN-22.

Ameco wins \$355,157 contract with Army Signal Supply Agency for frequency meters, AN/URM-80.

Stavid Engineering will work with Naval Ordnance Test Station on radar for bomb director AN/ASB-S under contract amounting to more than \$1,000,000.

Beckman Instruments will develop electronic instrumentation to detect excessive moisture in rocket fuels for AF.

Wiley Electronics gets \$200,000 AF contract for classified research on passive detection techniques for surveillance.

GE will supply Rome AF depot with modification kits for radar course-directing group, AN/GPA-37, for \$417,846.

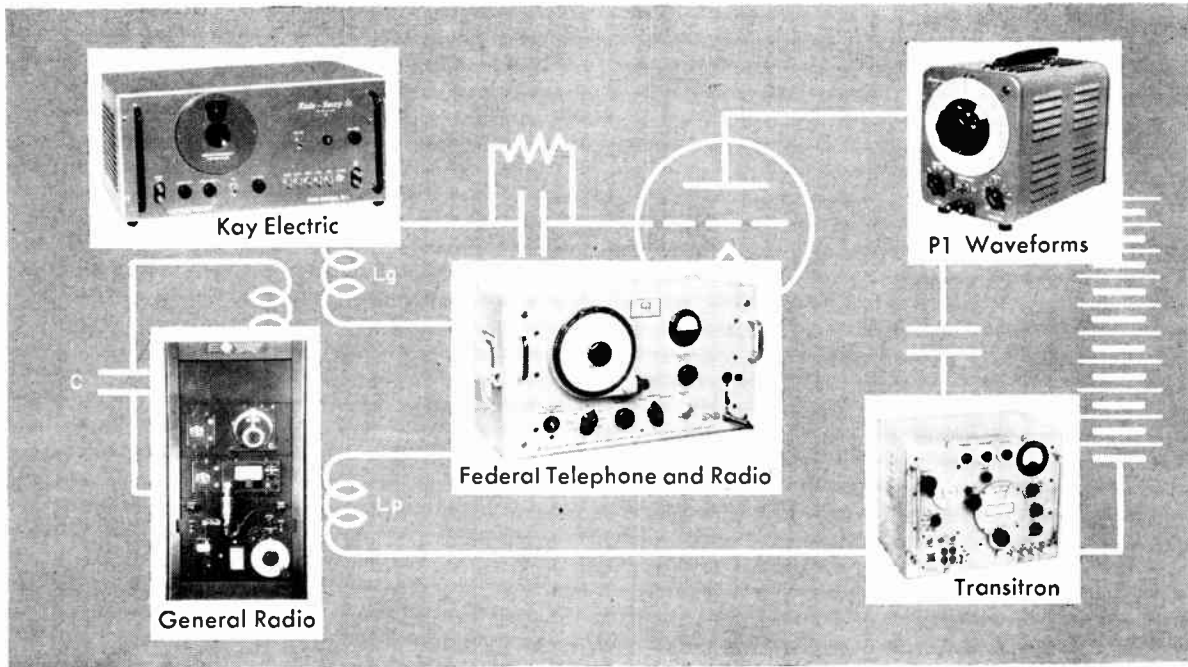
Brush Electronics wins \$225,000 contract with BuShips for navigation data recorders.

Ryan will supply Navy with KDA-1 firebee remote-controlled jet target drones amounting to \$4 million.

Western Electric will supply Philadelphia Ordnance District with Nike spare parts and components under contracts totaling \$255,206.

BJ Electronics will furnish AMC, under a \$34-million contract, high-power standard signal generators.

Oscillators Lead Parade



Units Supply R-F, I-F, A-F

OSCILLATORS in their almost infinite varieties are the heart of much electronic apparatus. Audio oscillators by Waveforms (P1) operate from 10 cps to 100 kc and deliver $\frac{1}{2}$ watt into 600 ohms. Sweeping oscillators produced by Kay Electric (P2) for radar i-f's have 24 crystal markers and center frequencies from 1 to 260 mc.

S-band signal generators developed by Transistron (P3) cover 1,800 to 4,000 mc for testing microwave communications and radar receivers. A one-megacycle capacitance bridge designed by General Radio (P4) measures capacitances of 1,000 micromicrofarads and less. Federal Telephone and Radio (P5) announces a vhf signal generator that supplies at least 3 volts over the frequency range from 30 to 300 mc.

Other Products

MEASUREMENT of pulsed or c-w power in the frequency range between 1,120 and 40,000 mc is possible with F-R Machine's (P6) thermistor mounts. . . Two 250-watt ceramic and metal tetrodes, the 4CX250K and 4CX250M, are available from Eitel-McCullough (P7).

Altitude and airspeed are sensed by a 2-ounce electronic device of-

fered by Borg-Warner (P8) for flight evaluation testing of supersonic aircraft. . . DuMont (P9) announces a 27-pound 3-inch oscilloscope designed for use in the field or rack mounting in the laboratory. . . Machining of germanium, ceramics and ferrites in the manufacturing of electronic components can be done with an ultrasonic impact grinder available from Raytheon (P10).

Miniature indicator lights are

offered by Eldema (P11) to accommodate neon or incandescent plug-in lamps from front of mounting panel. . . Operation over temperature range of -65 to 125 C is claimed for RCA's (P12) 204W1 relay for military and industrial applications.

Mylar $\frac{1}{4}$ -mil thick is available from Sillcocks-Miller (P13) for electronic parts manufacturers. . . The type 12FL6 double-diode detector and high- μ triode is designed by Sylvania (P14) to operate with 12-volt auto battery as plate supply.

An English-made quartz-crystal x-ray goniometer marketed by Jarrell-Ash (P15) is said to enable unskilled operators to orient crystal surface and lattice planes within an accuracy of 30 seconds of arc.

Three high-speed switching transistors (Types 2N356, 2N357, 2N358) are offered by General Transistor (P16) for digital computer applications. . . A line of Dale Products (P17) type RSE precision resistors is available with ratings to 10 watts, resistances to

For more information use READER SERVICE CARD

Is Your Secretary in a "DICTATION DAZE" because of words like:



You can make her dictation days brighter by providing her with these new shorthand word guides prepared by expert shorthand writers.

Each list of 200 special industry terms is printed on an 8 1/2"x11" quality stock for long lasting use.

Prices:

Single copies—25¢ each
10 to 50 " —20¢ each
Over 50 " —15¢ each
Set of Five —\$1.00

Send cash, check or money order for full amount with order to:

TODAY'S SECRETARY

330 W. 42nd St., New York 36, N. Y.

Gentlemen:

Please send me.....
copies of each of the reprints I have
checked below, for which I enclose pay-
ment of \$.....

... Electronic ... Atomic Energy
... Electrical ... Legal
... Contract
... Complete set of Five

Name
Company
Address

Want more information? Use post card on last page.

175,000 ohms and tolerances as close as 0.05 percent.

An oscilloscope for field and laboratory applications is announced by Lavoie Labs (P18) and features dual calibration of amplitude and time. . . . Over-temperature recorders for jet engines by Avien (P19) provide a permanent log of engine operating temperatures. . . . A frequency, period and time-interval meter announced by Electro-Pulse (P20) features modular construction and printed wiring.

Individual assemblies for fabrication of magnetic shift registers are available from Magnetics Research (P21) for computing, telemetering and communications equipment. . . . Genisco (P22) announces a-c accelerometers for missiles, fire-control and flight-control systems. . . . Silicon rectifiers are used in miniature a-c relays made by Union Switch & Signal (P23) for high-temperature applications.

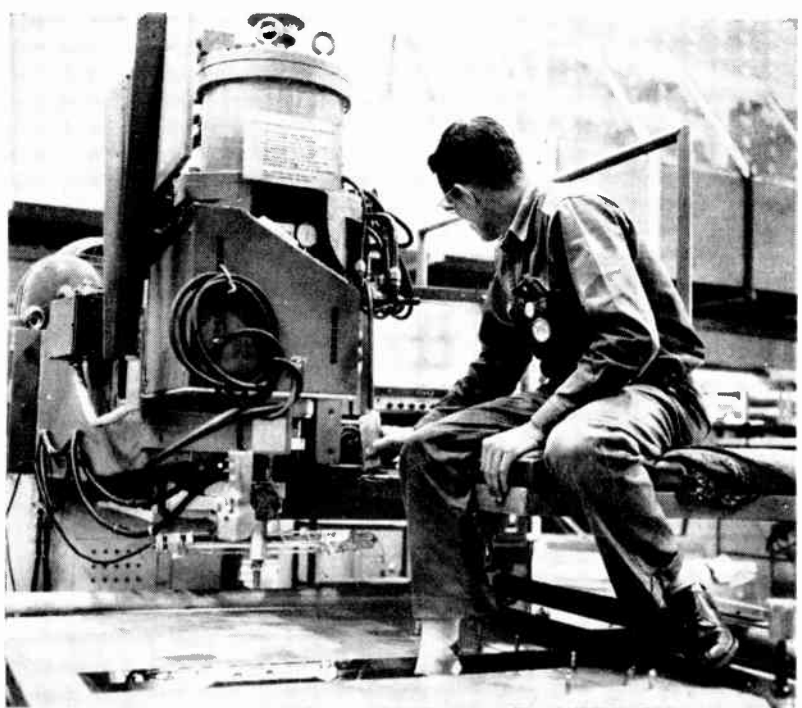
Teflon-insulated magnetic wire is offered by Tensolite (P24) in a

variety of gage sizes in kit form to provide samples for R&D. . . . WacLine (P25) offers coaxial dummy loads to provide 50-ohm terminations for transmitter outputs of 500 watts.

A medium-mu twin triode (type 6350) is announced by Vickers (P26) for such applications as control of temperature in electric furnaces. . . . Variable delay line offered by Advance Electronics (P27) is said to have a delay accuracy of ± 1 percent at any point.

Burrongs (P28) announces two current drivers designed for testing square-loop, tape-wound bobbin cores. . . . Transistorized hermetically sealed servo amplifiers are available from M. Ter Bosch (P29) for operating size 15 400-cycle servo motors. . . . Stud-mounted silicon rectifiers are announced by GE (P30) for use in military and commercial equipment power supplies.

Regulated klystron power supplies capable of continuously variable beam voltages from 4,000 to



Welder's Third Eye

Closed circuit tv by GPL at Ryan Aeronautical plant lets spotwelder operator see two sides of aircraft skin panel. Camera replaces man who used to watch quality of welds on panel's underside

5,000 volts have been developed by **Alto Scientific** (P31). . . . **Hupp Instru/Mation** (P32) announces the model 400 counter-timer, a five-decade electronic counter with response from 1 cps to 100 kc. . . . Miniature and subminiature connectors are offered by **Kings Electronics** (P33) for use with RG-59/U, RG-62/U and RG-71/U cables.

BJ Electronics' (P34) magnetic memory drums can store 12,000 bits of data and associated clock and reference information. . . . **J. Frank Motson Co.** (P35) is marketing printed circuits which use silver inks applied directly, thus eliminating etching. . . . Magnetron transmitters by **Levinthal** (P36) delivers 650 kw peak power over the frequency range 2,700 to 2,900 mc.

Sixty-cycle choppers by **Barber-Colman** (P37) covert d-c signals as low as 10 microvolts, such as are produced by thermocouples and photocells, to a-c signals for amplification. . . . Transistorized, regulated 900-volt power supplies by **Ramo-Wooldridge** (P38) operate from 24 to 32-volt d-c inputs.

Called the dual Pultrator, a test set by **Packard-Bell** (P39) provides two pulse trains with variable spacing and duration times for simulating radar returns, video circuitry of beacon systems and unsynchronized beacon replies. . . . A calibrating bridge balance unit is offered by **B & F Instruments** (P40) for balance, control and series calibration of strain gages, accelerometers, pressure pickups.

Rhem's (P41) galvanometer amplifiers amplify and transform impedance of low-level signals from titanite transducers to level and impedance required to drive fluid-damped optical galvanometers. . . . A 35-pound oscilloscope by **Tektronix** (P42) has a passband up to 10 mc and 12 vertical deflection steps from 0.01 to 50 volts per division. . . . **Keithley's** (P43) model 412 micromicroammeter measures current from 10^{-13} to 10^{-7} ampere.

Ultrasonic probes announced by

YOURS for the ASKING



A copy of this quick-reading, 8-page booklet is yours for the asking. It contains many facts on the benefits derived from your business paper and tips on how to read more profitably. Write for the "WHY and HOW booklet."

McGraw-Hill Publishing Company, Room 2710, 330 West 42nd St., New York 36, N. Y.



he's working
for you

THIS FELLOW IS TRAINED IN YOUR BUSINESS. His main duty is to travel the country — and world — penetrating the plants, laboratories and management councils . . . reporting back to you every significant innovation in technology, selling tactics, management strategy. He functions as your all-seeing, all-hearing, all-reporting business communications system.

THE MAN WE MEAN IS A COMPOSITE of the editorial staff of this magazine. For, obviously, no one individual could ever accomplish such a vast business news job. It's the result of many qualified men of diversified and specialized talents.

AND, THERE'S ANOTHER SIDE TO THIS "COMPOSITE MAN," another complete news service which complements the editorial section of this magazine — the advertising pages. It's been said that in a business publication the editorial pages tell "how they do it" — "they" being all the industry's front line of innovators and improvers — and the advertising pages tell "with what." Each issue unfolds an industrial exposition before you — giving a ready panorama of up-to-date tools, materials, equipment.

SUCH A "MAN" IS ON YOUR PAYROLL. Be sure to "listen" regularly and carefully to the practical business information he gathers.



McGraw-Hill PUBLICATIONS

Gulton Industries (P44) cover the frequency range from 2 ke to 2 mc for calibrating ultrasonic equipment. . . . Dielectric testing of plastics and liquids can be done with Federal Telephone and Radio's (P45) dielectric test bridge. . . . Andrew Corp. (P46) has added several parabolic microwave antennas to its line with special emphasis on side and back lobes and cross polarization.

Seven-channel d-c amplifier packages are offered by Allegany Instruments (P47) for use with strain gages, accelerometers, thermocouples. . . . Radio telescopes by Ewen-Knight Corp. (P48) are said to be capable of sensing radiation energy differentials as small as one degree centigrade from heavenly bodies.

New Product Makers

- P 1: Waveforms, 333 6th Ave., New York 14, N. Y.
- P 2: Kay Electric, 11 Maple Ave., Pine Brook, N. J.
- P 3: Transistron, 186 Granite St., Manchester, N. H.
- P 4: General Radio, 275 Massachusetts Ave., Cambridge 38, Mass.
- P 5: Federal Telephone and Radio, 190 Kingsland Rd., Clifton, N. J.
- P 6: P-R Machine Works, 26-12 Borough Pl., Woodside 77, N. Y.
- P 7: Eitel-McCullough, San Bruno, Calif.
- P 8: Borg-Warner, 3300 Newport Blvd., Santa Ana, Calif.
- P 9: DuMont Labs., 750 Bloomfield Ave., Clifton, N. J.
- P10: Raytheon, 100 River St., Waltham 54, Mass.
- P11: Eitelma Corp., 3844 Reiner St., El Monte, Calif.
- P12: RCA, 30 Rockefeller Plaza, New York 20, N. Y.
- P13: Silloucks-Miller, 10 W. Parker Ave., Maplewood, N. J.
- P14: Sylvania, 17 10 Broadway, New York 19, N. Y.
- P15: Laurel-Ash, 26 Fairwell St., Needhamville 60, Mass.
- P16: General Transistor, 130-11 90 Ave., Richmond Hill 18, N. Y.
- P17: Dale Products, Box 136, Columbus, Neb.
- P18: Lavoie Labs., Morzaville, N. J.
- P19: Avien, Woodside, N. Y.
- P20: Electro-Pulse, 11861 Teale St., Culver City, Calif.
- P21: Magnetics Research, 255 Grove St., White Plains, N. Y.
- P22: Genisco, 2234 Federal Ave., Los Angeles 64, Calif.
- P23: Union Switch & Signal, Swissvale, Pa.
- P24: Tensolite, 198 Main St., Tarrytown, N. Y.
- P25: MacLine, 55 S. St. Clair St., Dayton 2, Ohio.
- P26: Vickers, 1815 Locust St., St. Louis 3, Mo.
- P27: Advance Electronics, 249-259 Terhune Ave., Passaic, N. J.
- P28: Burroughs, 1209 Vine St., Philadelphia 7, Pa.
- P29: M. Ten Bosch, Pleasantville, N. Y.
- P30: GE Semiconductor Products, Electronics Park, Syracuse, N. Y.
- P31: Alto Scientific, 855 Commercial St., Palo Alto, Calif.
- P32: Bump Instru-Mation, 2119 Sepulveda Blvd., Los Angeles 25, Calif.
- P33: Kings Electronics, 10 Marbledale Rd., Tuckahoe, N. Y.
- P34: BJ Electronics, 3300 Newport Blvd., Santa Ana, Calif.
- P35: J. Frank Mottson Co., Flourtown, Pa.
- P36: Levinthal Electronic Products, 700 Stanford Industrial Park, Palo Alto, Calif.
- P37: Barber Colman, Rockford, Ill.
- P38: Ramo Woolbridge, P. O. Box 8405, Denver 10, Colo.
- P39: Packard Bell, 12373 W. Olympic Blvd., Los Angeles 64, Calif.
- P40: B & P Instruments, 1732 N. Broad St., Philadelphia 11, Pa.
- P41: Rheem Mfg., 7777 Industry Ave., Rivera, Calif.
- P42: Tektronix, P. O. Box 831, Portland 7, Ore.
- P43: Keithley Instruments, 12415 Euclid Ave., Cleveland 6, Ohio.
- P44: Gulton Industries, 212 Durham Ave., Methuen, N. J.
- P45: Federal Telephone and Radio, 190 Kingsland Rd., Clifton, N. J.
- P46: Andrew Corp., 365 E. 75 St., Chicago 19, Ill.
- P47: Allegany Instrument, 1991 Willis Mt., Cumberland, Md.
- P48: Ewen-Knight Corp., Needham, Mass.

F-m Picks Up

Stations increase in 1957,
Large cities near saturation,
as f-m optimism grows strong

MORE f-m stations are broadcasting today than a year ago. This reverses a pattern that persisted since 1948 when there were more than 700 stations on the air. Each succeeding year saw the total drop until it hit low of 546 on June 30, 1956.

For year ending June 30, 1954, comparison of stations going off the air and those going on showed net loss of 32 f-m stations. In 1955 loss was 17.

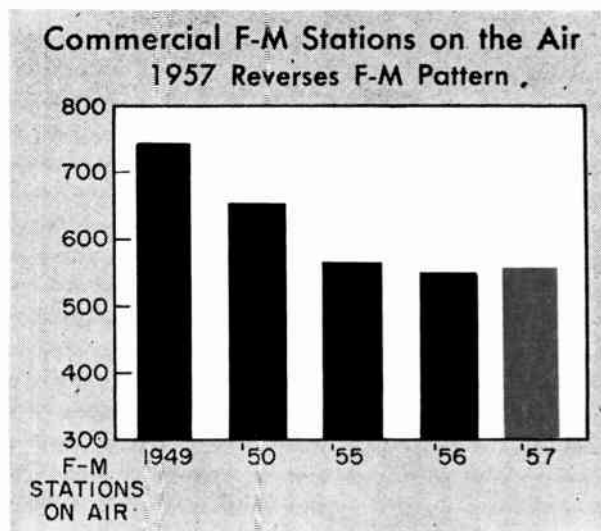
By June 30, 1956, 36 more stations had folded; 30 had started, for a net loss of only six.

As of May, 1957, gain had become the important word. Nine more f-m stations are operating. Grand total is boosted to 555.

In two cities, Los Angeles and New York, there are more applicants for f-m channels than there are channels available. Five hopefuls compete for three channels in Los Angeles, five compete for two in New York.

FCC notes that activity in seeking f-m channels has risen to point where each week sees one or two grants given out, and an additional 15-20 applications on tap.

Commission has brought into play for f-m a rule originally set up for crush of tv applications. When more than one applicant competes for f-m channel, a hearing—a sort of judicial competition—is automatically scheduled. When only one applicant asks



for a given f-m channel, there is no hearing.

Major population centers are nearing full-up status in f-m stations. New York, N. Y., presently has 18 channels allocated, 16 of them taken. Los Angeles has 20 channels, 17 stations. Chicago has 18 channels, 13 stations.

Same sort of distribution is true for most large metropolitan areas. There is, however, one exception. San Francisco has a long way to go before reaching saturation. Allocated 17 channels, it has only 7 stations.

Large majority of f-m stations are run as subsidiary operations of a-m stations. Broadcast executive Fred Barr of WWRL and WWRL-FM, New York, N. Y., explains: "In most cases f-m is financed by the a-m operation. We're operating at a loss looking to the day when f-m becomes a financial success.

FCC actions

- Reduces frequency separation in vhf flight test band from 200 kc to 100 and 50 kc, depending on area.
- Delegates authority to chief of Common Carrier Bureau to make decisions when a carrier owns more than 50 percent of stock of another or other carriers, or when a person owns 50 percent or more of stock of two or more carriers.
- Looks at radiation interference limits. Proposes to increase uhf tv receiver radiation limit from 500 to 1,000 microvolts per meter. Also proposes to raise power-line interference limit from 100 microvolts to 1,000 microvolts in range 10 mc to 25 mc.
- Sets up rule for f-m station applications that formerly applied in television. Automatic hearings go into effect when more than one applicant requests grant of a channel. No hearings are needed when there is only one applicant for a given channel.
- Ponders on whether to permit electric utilities to establish fixed stations which would be automatically activated by an electric power line failure. Breakdown would be announced by transmission of a distinctive signal.

STATION moves and plans

WGN-TV, Chicago, Ill., intends to install new 50,000-watt transmitter in modernization move. Changes will run up bill of \$110,000.

WRC-TV and WRC, Washington, D. C., begins to build \$4-million studio and office headquarters. Three decks high, it will contain three tv studios and three radio studios.

KCBQ, San Diego, Calif., plans new transmitter.

ABC Television Network begins transmitting test signals during program time. Amplitude reference sig-

Narrow Band Frequency Detector
 Output current is linear with input frequency.
 At 375 CPS output is zero; at 425 CPS output is 50 microamperes. Linearity of Magmeter detector Type F-992 is within 1/4% of midscale.

- Substantially insensitive to fluctuations in signal amplitude or waveform
- Operates during 10 G vibrations to 2000 CPS and 30 G shocks
- Output operates servo type recorders, magnetic amplifiers
- Use to measure generator frequency, telemetering

AIRPAX
 PRODUCTS COMPANY
 ENGINEERS
 ENGINEERING DIVISION
 MIDDLE RIVER
 BALTIMORE 20
 MARYLAND

WIDE BAND SWEEP GENERATOR...

JERROLD MODEL 900
\$114500
 f.o.b. plant

- OUTPUT AGC CONTROLLED
- COMPLETE VOLTAGE REGULATION
- INTERNAL DETECTOR
- INTERNAL OSCILLOSCOPE PREAMPLIFIER
- INTERNAL MARKER AMPLIFIER

SWEPT WIDTHS—AS WIDE AS 300 MC. RANGE FROM—200 KC TO 1,000 MC.

SPECIFICATIONS

VHF SWEEP RANGE

Center frequency continuously variable from 0.2 MC to 250 MC. Sweep Width continuously variable from a minimum of 0.1 MC, at any center frequency setting, to a maximum of 250 MC at a center frequency setting of 125 MC.

UHF SWEEP RANGE

Center frequency continuously variable from 275 MC to 900 MC. Sweep Width continuously variable from a minimum of 0.1 MC, at any center frequency setting, to a maximum of 100 MC at a center frequency of 275 MC, and to a maximum of 300 MC at a center frequency of 850 MC.

For complete information on the Model 900 and other special test equipment, write to



JERROLD
 ELECTRONICS CORP.
 PHILADELPHIA 3, PA.

SOURCE IMPEDANCE

50 ohms—VSWR less than 1.2.

OUTPUT VOLTAGE

0.3 volts RMS.

MAX. OUTPUT VOLTAGE VARIATION AT MAX. SWEEP

VHF Range—±0.5 db.
 UHF Range—±3.0 db.

FREQUENCY MODULATION

60 cycle sinusoidal

nal, using four of 525 lines, is not seen on receivers, but aids testing of transmission lines.

WBZ-TV, Boston, Mass., operates from tall new antenna tower, 1,349-foot one in Needham Heights.

WGBH-TV, Cambridge, Mass., gets \$15,000 grant to direct programming toward Boston school system. An educational station, it's in its third year of operation.

DuMont Broadcasting avows it will buy enough stations to reach FCC limit of ownership of seven radio and seven tv. It has six radio stations and four tv stations to go.

WLCR, Torrington, Conn., changes ownership from Litchfield County Radio to Electronic Maintenance, Inc. Price is \$73,000.

WDBO-TV, WDBO and WDBO-FM, Orlando, Fla., changes hands from Orlando Broadcasting to Cherry Broadcasting. Cherry pays \$3 million.

WBRC-TV and WBRC, Birmingham, Ala., switches owners. WBRC, Inc., pays Storer Broadcasting \$6,350,000. Also included in deal is fm construction permit.

WLou, Louisville, Ky., ups power five fold to 5 kw.

WPEO, Peoria, Ill., is sold by WPEO, Inc., to Dandy Broadcasting for \$170,000.

WAAM, Baltimore, Md., will be part of television holdings of Westinghouse Broadcasting. WAAM, Inc., gets \$4.4-million worth of stock.

KNPT, Newport, Ore., plans new transmitter and increase in power.

KVOS, Bellingham, Wash., installs auxiliary transmitters.

KLAK, Lakewood, Colo., installs new transmitter, plans to use old transmitter as auxiliary.

WEBY, Milton, Fla., plans new transmitter.

WFCR, Fairfax, Va., installs new transmitter.

Parts Price Cuts Hurt

Distributors see shrinking profit margins in '57 despite 10-percent sales hike. Industrial sales show biggest gain: 30-35 percent

NUMBER ONE problem for distributors in the electronics industry is price cutting. Distributor costs are going up continually. The manufacturer's tendency is to "shrink the distributor discount." Thus says Herbert Hedden, executive officer, National Electronic Distributors Association.

During the Electronic Parts Distributors show just ended in Chicago, distributors showed intense interest in boosting their industrial sales.

"Hit the engineers directly for bigger industrial sales" was part of the advice given distributors in closed-door sessions. Distributors were urged to sell the engineering staff as well as the purchasing agents, who may have little technical knowledge of the products they buy.

Sales picture for distributors looks good.

- A 10-percent rise in total distributor sales for 1957 is forecast. The industrial end of the business, "going like mad," is expected to be 30 to 35 percent better at 1957's end.

- Distributors display enthusiasm for high-fidelity products. Many feel packaged hi-fi products in 1957 will show at least a 30 percent improvement in sales over 1956.

- R. M. Brumfield, president of Potter & Brumfield, notices "soft spots in industrials sales," but says, "the military is taking up the slack."

- A distributor noted "dealer business is off 10 percent in some southern states, but industrial business is going up. Antenna tv installations have decreased sharply throughout the U.S. But repair business by servicemen for consumer sets is good and holding up components."

- Some distributors are facing the problem of underfinancing. "So many new products are being added and older ones being made obsolete, our inventory and sales problems mushroom," says one.

Harvey E. Antley of Cartwright & Dean, Tampa, Florida, says "Tight money is making it harder for distributors to expand and open branches in other towns. Distributors are wising up, too slowly in some cases, to the fact that they can stop cutting each others throats."

Medical X-ray Holds Lead

DOCTORS and hospitals still buy more than 90 percent of all x-ray units made in the United States. NEMA members sold 4,439 medical units, including fluoroscopes, in 1955 and 4,791 units in 1956.

Dollar value of x-ray sales isn't recorded by NEMA. Census of Manufacturers figures show x-ray equipment business has been edging from \$50 to \$60 million during past decade.

With more equipment in use, tube sales are rising. NEMA says six firms sold 31,250 tubes in 1955 and the four firms reporting in 1956 sold 42,049.

NEMA statistics reveal 113 industrial x-ray units sold in 1955 and 111 in 1956. These figures do not include imported industrial x-ray units, which have been selling well in the United States during recent years.

McGraw-Hill MAILING LISTS WILL HELP YOU

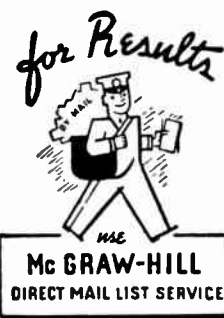
- Merchandise your advertising
- Conduct Surveys
- Get leads for your salesmen
- Get inquiries about your product or service
- Pin-point geographical or functional groups
- Sell Direct
- Build up weak territories
- Aid Dealer Relations

Direct Mail is a necessary supplement to a well rounded Business Paper Advertising program.

600,00 actual names of the top buying influences in all the fields covered by the McGraw-Hill publications make up our 150 mailing lists. These lists are built and maintained primarily for our own use, but they are available to you for Direct Mail purposes. Pick out a list of YOUR prospect from our Industrial Direct Mail Catalogue.

More and more, progressive companies are using Industrial Direct Mail regularly as an advertising medium. They effectively allocate a portion of their concentrate on the best business publication.

For complete, detailed information about our service, fill in the coupon or write for your copy of our free Business and Industrial Direct Mail catalogue.



Direct Mail Division,
McGraw-Hill Publishing Co., Inc.
330 West 42nd St., N. Y. 36, N. Y.

Please forward my free copy of the McGraw-Hill "Industrial Direct Mail Catalogue."

Name _____

Company _____

Address _____

City _____ State _____

Tests Get Rougher

Environmental tests push to new limits as the Defense Department learns more about the life and times of a missile up there

Rock it, shock it, knock it, do everything to it but hock it. That roughly describes what happens to electronic gear and components in environmental test chambers. Add the word harder to each of the first four clauses. That's the trend.

As the Defense Department learns more about the environment in which its equipment will perform, it stiffens requirements for test chambers simulating that environment. Latest Armed Services Electro-Standards Agency List 100, 19 close-writ pages of tests for electronic parts, "is 25 percent closer to reality," says an ASESA expert.

Basic Army, Navy, Air Force environmental test requirements are laid out in a document known as MIL-STD-5272A. Most popular test is vibration. Temperature tests (high and low), altitude, acceleration, shock and humidity are next. At the bottom of popularity scale are radio noise, rain, explosion, sand and dust, salt spray, sunshine, fungus.

Combination tests are used increasingly. Vibration and extremes of temperature are packaged together as are altitude and temperature.

Missile specifications threaten to drive environmental test limits beyond capabilities of extant test gear. Some test gear manufacturers believe they'll have to build chambers that will simulate conditions in altitudes higher than 300,000 feet. Once, 45-60,000 feet was high enough.

Recent addition to tests is white noise. A vibration test covering all audible frequencies duplicates booming shock waves from jet engine exhausts and sound of air going over aircraft skin.

The word is not in yet on what happens to parts in missiles pushing through outer space. Number of companies are still studying the environment. Latest Vanguard tests will give them information.

Manufacturers of environmental chambers think that these studies may make specifications even rougher. "It depends," says one, "on whether they think there's a critical difference between altitudes of 150,000 and 250,000 feet." The difference is small in pressure and temperature but in test chambers it will boost manufacturing cost at least 25 percent.

The difference in the test gear and the need for new gear may increase these makers' present gross take of \$50 million a year two to three times.

Trade Shows Growing

EXHIBITORS spent more than \$1 billion on 3,000 public exhibitions and industrial shows held during 1956 in the U.S.

Trade shows are gaining in popularity. Manufacturers see advantages in a central market place to supplement other advertising. Technical views can be exchanged. Developments of competitors can be

appraised. Products can be sold.

Participation by electronic firms in these shows is growing. Some firms get in 300 or more shows a year. Reason is that electronic products are used in so many areas of industrial, business and home life.

Structural Display, designer of many exhibits at the annual IRE show, has this advice for manufac-

turers exhibiting at trade shows:

- Decide beforehand how much you want to spend.
- Reserve space early and determine size and height limitations.
- Select items to be shown early enough to tie in exhibit with advertising program.
- Choose new and unusual products. If redesigned products are used, try to show improvements.
- Avoid showing so much that booth looks congested.
- Strive for motion, actual demonstrations of products and audience participation.
- Provide for requesting literature.
- Prepare personnel who man booths to answer any inquiries likely to be made. Follow up leads.

A show goer adds: a place to sit down while talking.

New: Electronics Secretaries

THERE'S a new type of girl in our industry. But unfortunately, for now, the waiting line forms on the right.

She's an electronics secretary. She is specially trained for the industry. One-sixth of her two-year college course is spent studying physics and electronics. She also gets a semester of dictation from electronics manuals and magazines.

The new course she takes—electronics secretarial—is offered by Fisher Junior College, Boston. Its first graduating class is now entering industry.

This class isn't a large one. It has only 10 members. That is less than 5 percent of Fisher's 1957 graduating class. But a year from now the electronics secretarial group is expected to be bigger.

How are New England electronics firms receiving these new specialists? Two facts give the answer: interested companies outnumber graduates 4-to-1. Electronics secretaries are being offered \$5 to \$10 a week more than ordinary ones.

For your immediate use
the 6 most vital assets
to insure your

**EXECUTIVE
SUCCESS**

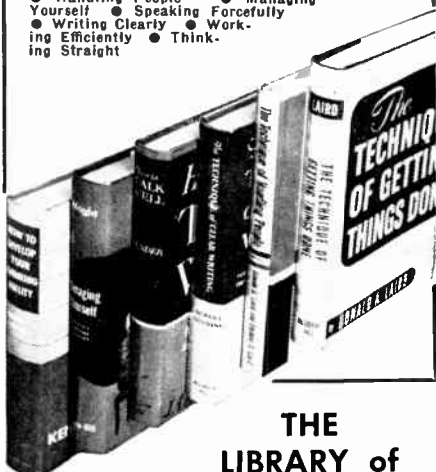


SUCCESSFUL executives will tell you this simple fact: certain key abilities practically allow a man to write his own paycheck. And one doesn't have to be born with these proven executive qualities—they can be self-developed to a degree you may never have thought possible—easily, and without long years of study. You can help yourself acquire them with this specially selected Library of practical executive techniques.

Helps you develop these 6 success qualities:

- Handling People
- Managing Yourself
- Speaking Forcefully
- Writing Clearly
- Working Efficiently
- Thinking Straight

The six books comprising this Library have been selected by successful executives as the ones most useful in developing the six qualities of executive success.



**THE
LIBRARY of**

**PRACTICAL
EXECUTIVE
TECHNIQUES**

Library contains these books:

- Managing Yourself by Wright
- ... The Technique of Getting Things Done by the Lairds
- How to Develop Your Thinking Ability by Keyes
- ... The Technique of Clear Writing by Gunning
- ... How to Talk Well by Bender
- ... and The Technique of Handling People by the Lairds

● 6 volumes • 1633 pages
● \$20.00 — payable \$4.00 in 10 days, then \$4.00 a month

You'll find here the best thinking on a variety of important executive techniques... like getting the best out of your associates, putting your thoughts down clearly and forgetfully on paper, speaking with authority in front of people, thinking a job through logically, and getting it done most efficiently. All in all, you have a storehouse of information on doing *best* every job the successful executive must know how to handle.

SAVE \$4.00. Bought one at a time, the total price of these books would be \$24.00. Under this special offer, the complete Library is available for only \$20.00—a cash saving of \$4.00. And you also have the privilege of paying for the books on easy terms, while you use them.



Edited by DON FINK

**The MASTER reference in
television technology**

- to speed your work
- answer your questions
- help you get better results

TELEVISION ENGINEERING HANDBOOK

- Prepared by a staff of 33 Specialists
- 1483 pages, 6 x 9
- Hundreds of charts, circuits, tables, and illustrations

\$18.00

Full 10 days' examination before you decide to purchase. See coupon.

All your design work is made easier and faster with the help of this comprehensive guidebook. It covers the entire field of television technology, including not only the basic fundamentals, but practical design data for transmitters, receivers, and networks. Monochrome and color television are treated in equal detail, and there is coverage of the related topics of vision, photometry, illumination, optics, and colorimetry.

Look to this handbook for quick help on the countless questions arising in your daily work—on television standards for scanning, modulation, synchronization—on band and channel designations—on camera and picture tubes—on circuit functions and design—on transmission lines and radiators—and many other topics, covered in the 20 big, authoritative sections of this new working tool.

TRANSISTORS

**HANDBOOK OF
SEMICONDUCTOR
ELECTRONICS**

Edited by LLOYD P. HUNTER

Senior Physicist, International Business Machines Corporation, Poughkeepsie, N. Y. 604 pages, 6 x 9, 484 illustrations, \$12.00

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

CONTROL CIRCUITS

**HANDBOOK OF
INDUSTRIAL ELECTRONIC
CONTROL CIRCUITS**

By JOHN MARKUS and VIN ZELUFF

Electronic 352 pages, 8½ x 11, illustrated, \$8.75

Here are the circuits you need for sorting, timing, measuring, and counting: for sweep control, triggering, temperature and motor control, and hundreds of other industrial uses—each with concise description, performance characteristics, component values, and practical applications. Save hours of search and preliminary work to find basic circuit ideas for particular applications—consult this big, handy collection of tested circuits—selected from recent issues of *Electronics* and classified and indexed for quick use.

**10 DAYS' FREE EXAMINATION
JUST MAIL THIS COUPON**

McGraw-Hill Book Company, Inc.
Dept. FL-6-20
327 West 41st St., New York 36, N. Y.

Send me book(s) checked below for 10 days' examination on approval. In 10 days I will remit for book(s) I keep, plus few cents for delivery costs, and return unwanted book(s) postpaid. (We pay delivery costs if you remit with this coupon; same return privilege.)

- Fink—Television Engineering Handbook, \$18.00
- Hunter—Handbook of Semiconductor Electronics, \$12.00
- Markus & Zeluff—Handbook of Industrial Electronic Control Circuits, \$8.75

For prices and terms outside U. S., write McGraw-Hill Intl., N. Y. C.

Send me the Library of Practical Executive Techniques for 10 days' examination on approval. In 10 days I will send (check one) \$20.00 in full payment, or \$4.00 and \$4.00 monthly until the full price is paid. Otherwise I will return books postpaid.

(Print)
Name
Address
City & Zone.....State.....
Company
Position

FL-6-20

British Plants Buzz

Increased reliability and new designs are trends in burgeoning electronics industry in Britain

ONWARD and upward is the trend for Britain's radio and component manufacturers, according to statistics of The Radio Industry Council in London.

British radio and component production last year amounted to \$226.8 million, compared to \$207.2 million in 1955. In ten years, 1946-56, production has increased sixfold.

Exports rose more than seven times in the same period and more than that in value.

U. S. imports of British sound reproducing equipment alone amounted to \$6,720,000 in 1956; imports of components reached \$798,000. Total: \$7,518,000—113 percent higher than 1955 and 278 percent higher than 1954.

The council spots two major technical trends in the equipment of 160 firms and two government departments.

- Increased reliability in conventional components.
- New designs in subminiature work and printed circuitry.

Conventional components are still used in large numbers, says the Council. Their reliability is being upgraded without changing their overall characteristics.

In the printed circuitry field, there is concentration on production of suitable mountings and "clip-in" arrangements for heavier components such as electrolytic capacitors and output transformers.

British manufacturers also gave attention to easy removal of components with a number of fairly rigid connections; designs to achieve this are now appearing.

Council notes new tubes and semiconductors, xenon rectifiers with enclosed anode and modified anode seal for high gas pressure operation; traveling wave tubes for r-f heating; 100-v subminiature diodes for industrial uses; power amplifiers for tests of guided missile components and aircraft.

Developments ABROAD

- South African uranium mines are using electronic sorting equipment to pick out uranium from waste material on ore conveyor belts. Two scintillometers beneath belt are sensitive to gamma rays, set off bells and a light indicator when uranium-bearing ore passes. Further along, native sorters with probes and geiger counters can then find the uranium quickly. Fourteen mines are said to use the equipment or have it on order.

- Britain's Ministry of Transport and Civil Aviation introduces new system of checking airport radar landing aids. Camera placed near touch-down point photographs normal landings; synchronized photo of radar screen is taken for comparison.

- Venezuela's Institute of Neurology & Brain Research is building an experimental computer using 200,000 cryotrons instead of

electron tubes. Government-financed center may take two years to build. Cryotrons will operate at temperatures close to absolute zero.

- In West Germany Siemens and Halske has developed a combined transmitting and receiving facsimile machine which reportedly uses telephone lines and doesn't require special paper. Black and white values are reproduced without half-tones. Picture lamp and photocell comprise scanning unit; 1,000 picture points make up one square centimeter. Sheet size is 7.48 by 5.4 in., takes 3½ minutes to transmit.

- In Britain Marconi announces test instrument for color tv called a Vectorscope. It displays the chrominance component of the NTSC-type color tv signal and monitors color signals. Marconi says it helps set up coding systems correctly and match characteristics of color cameras.

EXPORTS and IMPORTS

NATO Europe will get a military communications system combining beyond-the-horizon tropospheric scatter and line-of-sight radio relay. It will stretch from eastern Turkey to northern Norway. International Standard Electric Corp., an IT&T overseas subsidiary, and Hyeon Eastern signed contract at SHAPE estimated at \$9 million for engineering and installation. New system will tie together national and international installations and agencies.

Planning and supervision will center in Paris. Equipment will be procured on international competitive bidding basis to the maximum practicable extent, says IT&T. NATO nations will participate directly and contribute engineers and technicians.

Worldwide assets of Philips Incandescent Lamp Works, Eindhoven, Holland, are reported at \$849 million (3,227 million guild-

ders) in 1956 from 5725 million (2,756 million guilders) the previous year. Firm's annual report says its production setup is being constantly modernized around the world to meet international competition.

Turkey signs a contract with two French companies for a 1,740 mi. radiotelephone link between Izmir and Batman. Equipment will be supplied by Societe Francaise Radio-Electrique, a CSF affiliate, and Societe Anonyme de Telecommunications. A link was recently installed between Ankara and Kama. New one will give Turkey total of 2,485 miles of radio network. It's f-m, will have 60 relays, carrier frequency of 2,000 mc and 120 channels.

Saudi Arabian import duties on many electronic items rose recently, according to Department of Commerce figures. Duty on radios went from 20 to 30 percent, on loudspeakers from 35 to 40 percent. For meters, transformers and other electrical and electronic apparatus the tariff was hiked from 15 to 20 percent.

In Montreal Bell Telephone Co. of Canada announces it will build 200-mile microwave link between Ottawa and North Bay, Ont., for telephone and tv use. Facility will extend Canadian Broadcasting Corp. French network tv service to Rouyn and Timmins in 1959.

Australian firm Australian Controls Ltd. wants manufacturing license for temperature control items. It already makes thermostats. Firm prefers to form joint-venture company with U.S. investor for manufacture of light engineering items.

Scottish firm Atkins, Robertson & Whiteford Ltd. of Glasgow, wants a license agreement with a U.S. firm, would like details of a system for counting and batching small items.

Long Island City sound equipment maker Masco appoints Morhan Exporting Corp. exclusive export reps for worldwide distribution of full line.



How to keep informed on the "with what" part of your business

AT YOUR FINGER TIPS, issue after issue, is one of your richest veins of job information — advertising. You might call it the "with what" type — which dovetails the "how" of the editorial pages. Easy to read, talking your language, geared specifically to the betterment of your business, this is the kind of practical data which may well help you do a job quicker, better — save your company money.

Each advertiser is obviously doing his level best to give you helpful information. By showing, through the advertising pages, how his product or service can benefit *you* and *your* company, he is taking *his* most efficient way toward a sale.

Add up all the advertisers and you've got a gold mine of current, on-the-job information. Yours for the reading are a wealth of data and facts on the very latest in products, services, tools . . . product developments, materials, processes, methods.

You, too, have a big stake in the advertising pages. Read them regularly, carefully to keep job-informed on the "with what" part of your business.

McGRAW-HILL PUBLICATIONS



PLANTS and PEOPLE



Watch the watchmakers!

Bulova Jumps into Electronics

DURING the Korean emergency, Bulova Watch Co., 80-year-old Woodside, N. Y., timemarking business, made crystal frequency controls for the government. Now it's in the electronics business to stay.

Bulova still sells crystals for defense computers and missiles, is expanding into miniature component ovens, packaged oscillators, quartz filters. What started as the crystal division is now called the electronics division.

Operations are now settling into new quarters in Woodside. General manager is John J. Carpenter (at right in the picture, with cohorts, left to right, Frank Cheli, head of electronic devices, Barney Ill, sales manager, and H. Buckman, head of crystal manufacturing).

Electronics is also a concern of subsidiary Bulova Research & Development Corp. which has Omar Bradley as board chairman. Brainchildren of the R&D outfit will be produced by electronics division.

The watchmaking company now has an international distribution organization for electronics products, is trying out pilot marketing and advertising programs. During

last twelve months, Bulova doubled its electronic business.

NCR Realigns Top Slots

CHANGING some titles, National Cash Register Co. moves president Stanley C. Allyn up to board chairman, with executive vice president Robert S. Oelman moving into the president's chair. Allyn has been president since 1940, remains chairman of the executive committee and chief executive officer.

Financial v-p Gordon A. Lowden succeeds Oelman as exec v-p and

Business MEETINGS

June 24-28: 11th International Management Conference, Paris, France.

June 26-28: National Machine Accountants Association, Conrad Hilton Hotel, Chicago.

takes a seat on the executive committee. NCR's board stresses that changes do not represent "any shift in management responsibilities."

New Officers at DuMont

TWO NEW officers move up in the ranks of Allen B. DuMont Laboratories. Longtime DuMont-man Stanley J. Koch, director of tube research division, becomes v-p for tube operations. Retired USAF Major General Raymond C. Maude, who has been general manager of the firm's government division, is now v-p for government operations.

In Chicago, John J. Frawley moves up to become general manager of DuMont Illinois, midwest marketing organization of the Clifton, N. J., manufacturer. His regional sales manager will be Norwin J. Eisenman, former field service representative.

Sylvania Aligns Sales Regions

IN a realignment of distributor and equipment sales regions, Sylvania's electric products sales department is consolidating east-central and central sales regions into single midwestern area.

Headquarters of midwest region is in Melrose Park, Ill. East central manager J. P. Mallen moves out from Cincinnati to take over combined operations, with R. A. Starck as his assistant. L. A. Wheelock, former central region manager, becomes renewal sales manager for private brands.

In company's radio tube division, Paul A. Weiss moves up to become supervisor of plant accounting at the equipment development plant in Emporium, Pa.

Daystrom Execs Redistribute

SECRETARY-treasurer's job at Daystrom Inc. splits in two as 50-year veteran George S. Tiernan retires.

Treasurer's slot is filled by Roy Sandquist, who was assistant to the

finance v-p, comptroller of subsidiary Weston Electrical Instrument.

Assistant secretary Samuel M. Kinney Jr. moves up to the secretary's office, continues as corporation counsel. Assistant counsel Robert R. Whelan takes over office vacated by boss Kinney.

PLANT Briefs

FORT WAYNE, Ind., manufacturer Rea Magnet Wire Co. is pushing construction on a 100,000-sq ft production plant in Lafayette, Ind. Plant will ease crowding at home base, allow for future expansions, provide some additional research space.

Techalloy Co., metal-drawing company in Rahus, Pa., is winding up construction of a 24,000-sq ft \$650,000 plant. Drawing equipment will start rolling in December.

Executive MOVES

AUTHOR Edward Streeter (*Dere Mabel, Father of the Bride*) takes a seat on board of Fairchild Camera & Instrument.

Oxford Electric moves general manager Hugo Sundberg into the presidency, sliding predecessor Joseph D. Ceader into board chairmanship.

Dale V. Cropsey, sales v-p of American Machine & Foundry subsidiary Potter & Brumfield, becomes a member of the P&B board and takes on new duties as director of marketing.

Samuel S. Anchineloss takes over as president and board chairman of Tracerlab Inc., moving in from presidency of one of AMP's divisions. Retiring president William O. Faxon becomes consultant.

Borden Co.'s chemical division gets a new manager of government services as Louis J. Jaworski moves up.

Westinghouse sales v-p James H. Jewell takes on added duties with new title of marketing v-p.



EMPLOYMENT OPPORTUNITIES

DISPLAYED

The advertising rate is \$25.25 per inch for all advertising appearing on other than a contract basis. An advertising inch is measured 7/8" vertically on a column—3 columns—30 inches to a page. Subject to Agency Commission.

RATES

\$2.40 per line, minimum 3 lines.

Box Numbers—counts as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Not subject to Agency Commission.

Send NEW ADS to ELECTRONICS CLASS, ADV. PO Box 12, N. Y. 36, N. Y.

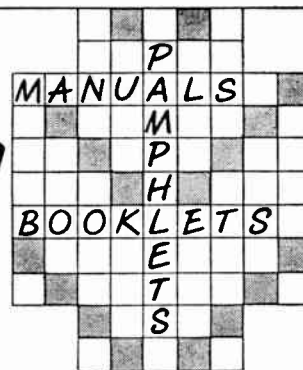
UNDISPLAYED

TRANSFORMER DESIGN SPECIALIST for IBM

Graduate engineer or physicist with five to ten years' experience in magnetics, and transformer design. Must have working knowledge of precision transformers that hold voltage characteristics at high and wide temperature ranges. Experience with military specifications desirable. Excellent salary commensurate with qualifications and experience. Liberal IBM company benefits. Immediate opening. Write, outlining experience and education, to:

Mr. Paul E. Strohm, Dept. 406
Manager of Engineering Employment
Airborne Computer Laboratories
International Business Machines Corporation
Owego, New York

IF
THIS IS YOUR
PROBLEM



THIS IS YOUR

ANSWER

The publications specialists of McGraw-Hill TECHNICAL WRITING SERVICE will write, edit, illustrate, design, and print your business literature for you. Save money and time in the production of Equipment Manuals, Product Bulletins, Handbooks, Company Histories, Annual Reports, and other such vital material. Let our staff be your staff for Technical and Business publications.

Write
Technical Writing Service
McGraw-Hill Book Co., Inc.
330 W. 42nd St., N. Y. 36, N. Y.
LONGacre 4-3000

This service is available through ad agencies.

Reps Get Materials

ELECTRONICS manufacturers' reps do sizable business in basic materials used by our industry. Chicago rep **Harry Halinton** now adds alumina ceramic line of **Diamonite Products Mfg. Co.**, Calton, O. Halinton covers Chicago environs and Wisconsin.

Mica Corp. now merchandises its Micaply epoxy-glass line through two divisions of **Garrett Corp.** **Aero Engineering** division handles the laminates cast of the Mississippi, **Air Supply Co.** in the West.

In Wethersfield, Conn., rep **Joseph A. Cannon** takes on the Teflon products of **Tri-Point Plastics, Inc.**

New reps for the electronics tools of **John Fluke Mfg.** are **Bivens & Caldwell**, Atlanta, Ga., for the Southeast; **Gene French**, Albuquerque, N. M., for Arizona and

New Mexico; **Lahana & Co.**, Denver, Colo., for Colorado and Utah; **Harris Hanson**, St. Louis, Mo., for Missouri and Kansas; **Berg-Hedstrom**, New York, N. Y., for Holland, Belgium and the Scandinavian countries, and **Maurice Parisier**, New York, for France, Italy, Spain and Portugal.

Potter & Brumfield closes its Chicago sales office, turns its relay line over to a pair of home-bred reps. **D. L. Sisson**, former P&B sales engineer, heads rep firm to handle jobber sales. **Bierhaus-Balhorn Sales**, led by two former P&B salesmen, takes on industrial sales.

Chicago's **Merit Coil & Transformer** appoints two new reps: **Anderson Sales** in New England and **W. H. Connors** in the Mountain States.

INDEX TO ADVERTISERS

Airpax Products Co.	40
Bomac Laboratories Inc.	3rd Cover
Brush Electronics Co.	2, 3
Electronic Engineers Master	10
Electronics	22, 23
Felker Manufacturing Co.	7
Hewlett-Packard Co.	4
Jerrold Electronics Corp.	40
Knights Co., James	29
Lenkurt Electric Co.	34
McGraw-Hill Book Co.	30, 43
Oak Manufacturing Co.	27
Radio Corporation of America	4th Cover
Sprague Electric Co.	12
Stokes Corp., F. J.	8
Stupakoff Div. of the Carborundum Co.	31
Sylvania Electric Products Inc.	2nd Cover
Texas Instruments Incorporated	18
Thompson Products Inc.	11
Today's Secretary	36
Trans World Airlines	9

•

CLASSIFIED ADVERTISING
F. J. Eberle, Business Mgr.
EMPLOYMENT OPPORTUNITIES.....47

Coming in Our July 1 TECHNICAL Edition ...

- **Monte-Carlo methods.** Messrs. Hayward, Bubb and Fensom of the British Post Office Engineering Department describe a premium savings bond scheme operating in England that randomly selects over 10,000 prize-winning numbers monthly from over 100 million bond numbers. Computer ERNIE, (Electronic Random Number Indicating Equipment) uses noise generators combined with counters and storage systems to provide printed list of purely random bond numbers. Authors describe circuits using transistors, ferrite-core binaries and printed wiring techniques.


- **Bubbling beer.** A. S. Davis of Mack Electronics tells how a magnetostriction transducer, driven by an ultrasonic generator, vibrates filled beer bottles during packaging to cause foaming that drives unwanted air out of the bottle just before it is sealed. The generator delivers 250 watts to the transducer, consists of a Wien-bridge oscillator feeding phase inverters that drive a push-pull final.



- **Silicon transistors.** Results of tests on 1-mc amplifiers using silicon transistors show sensitivity to temperature that requires compensation. So says S. H. Gordon of Diamond Ordnance Fuze Laboratories. Article gives effects of impedance mismatch, feedback and thermistor compensation for grounded-emitter circuit in temperature range 20 to 100 C.

- **Schoolroom tv.** Large-screen display unit for classrooms, technical lectures and demonstrations can be built economically from television receiver components and tubes. O'Kelley and Todd of Alabama Polytechnic Institute tell how push-pull vertical and horizontal amplifier stages permit use of feedback to make deflection coil current waveforms proportional to input signal voltages. Circuit achieves full deflection of 10 inches at 18,500 cps; deflection drops gradually with frequency.

- **Go-between.** W. R. Smith-Vaniz and E. T. Barrett of CGS Laboratories describe a morse-to-teletypewriter code converter used between radio receiver and teletypewriter. Instrument gives immediate copy of messages at speeds up to 100 words per minute. Signals are converted to five-digit teletypewriter code by combination analog-digital computer using 92 tubes, 62 static magnetic memory units and conversion matrix of 448 neon tubes.



This special test equipment — a high-power simulator — can operate at peak powers as high as 10 megawatts, using a single 500 kw magnetron as a power source. This equipment was jointly evolved by Bomac, Bendix Radio, and Rome Air Development Center.

10,000,000 WATTS OF PACKAGED POWER!

This young Bomac engineer has 10,000,000 watts of power at his fingertips.

Here is an immense new range of power, harnessed for testing Bomac products — power for measuring the life of gas-switching tubes, for assessing tube leakage and temperature rise, for determining high power characteristics of pressurizing windows — power with a vital purpose:

Better microwave tubes, higher power capacities today . . . *still* better tubes, *still* higher power capacities tomorrow.

Write for Bomac's 6-page, 8½-size folder containing details and specifications on more than 500 different microwave tubes and components.

Bomac

LABORATORIES, INC.,

Dept. E-6 Beverly, Mass.

Offices in major cities: — Chicago • Kansas City • Los Angeles • Dallas • Dayton • Washington
Seattle • San Francisco • Toronto Export: Maurice I. Parisier, 1860 Broadway, N. Y. C.

World Radio History

New RCA Super-Power Tubes deliver unprecedented levels of electronically controlled power to work new industrial miracles

To add a new dimension to the usefulness of electronically controlled power—in industry, medicine, research . . . RCA now presents a major “first” in electronic progress—a remarkable group of super-power tube designs capable of unleashing enormous amounts of high-frequency power *above and beyond all previous tube capabilities!*

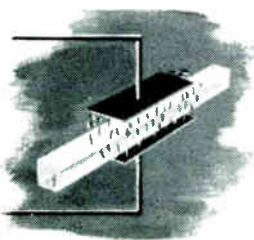
Ingenious in their application . . . dramatic in their results . . . these tubes begin their work where conventional power tubes leave off. Think for a moment of the possibilities of a million watts, or more, of electronically controlled power *harnessed to your industry*—working with hairline accuracy under millionth-second control. Consider the enormous potential of this electronic tool for heating glass, metals, plastics, and other materials at

super speeds . . . irradiating and sterilizing products . . . “blasting” atoms for applied uses of atomic particle acceleration.

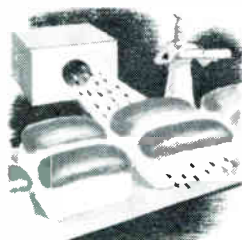
Visualized by the Radio Corporation of America as early as 1937 . . . and under a continuing development and field-testing program . . . RCA super-power tubes are now offered to progressive industries looking ahead to the practical application of super power in their future product planning. RCA is ready to discuss your present and future needs for super-power tubes. If *you* are ready, write today—to RCA, Tube Division, Commercial Engineering, Section F19Q3, Harrison, New Jersey.



ELECTRON TUBES FOR INDUSTRY
RADIO CORPORATION OF AMERICA



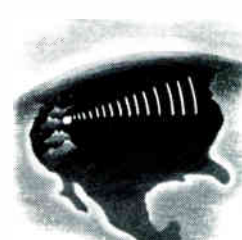
• Induction and Dielectric Heating



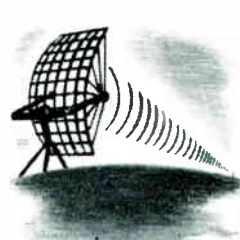
• Irradiation and Sterilization



• Radiology



• Communications and Scatter Transmission



• Radar