

DECEMBER 26, 1958

electronics

business issue

A MCGRAW-HILL PUBLICATION • VOL. 31, NO. 52 • PRICE FIFTY CENTS

Broadcasters Move to Multiplex

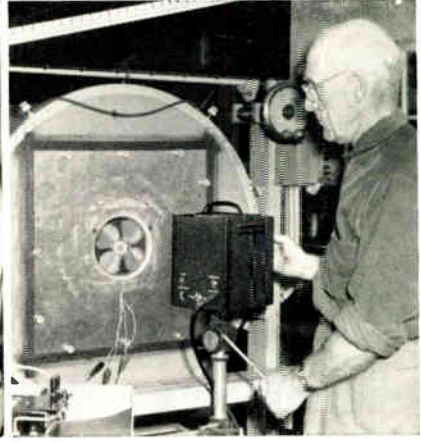
Under impetus of stereo, one-fifth
of f-m stations may go multiplex... p 15



Communicating With the Moon Probe

Even rockets that miss the mark teach
equipment designers valuable lessons... p 11





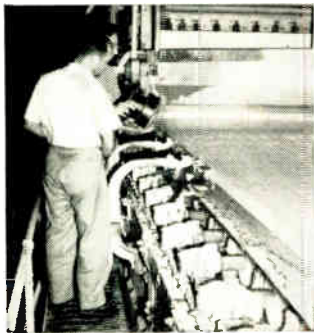
Rotron Research Corp. of Woodstock, N. Y., uses several dozen Strobotacs continuously in the design and production testing of its small fans and blowers, which are used in the cooling of electronic equipment. Typical tests include:

During vibration testing, Strobotac and Strobolux® auxiliary light source spot mechanical resonance present in a developmental vane-axial blower.

Motor-speed measurements under various loads imposed by dynamometer during production testing.

Measuring motor speed during air-moving capacity test of experimental fan in a standard NAFM test chamber.

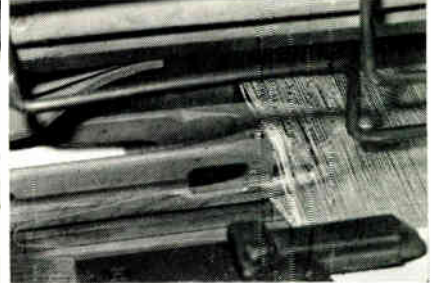
OTHER INDUSTRIAL USES FOR G-R STROBOSCOPIC EQUIPMENT . . .



◀ A Strobolux in use at a typical paper mill helps observe water removal and sheet formation on a Four-dryer wire.



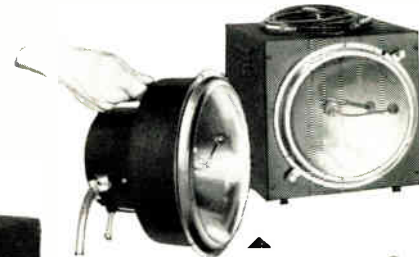
▶ Checking spindle speeds to an accuracy of $\pm 1\%$ at textile mill.



▲ Faulty loom shuttle seen striking warp threads with aid of a Type 1532-B Strobolume.

STROBOTAC^(R) Industry's Most Versatile Tachometer

- ★ Measures speed from 60 to 100,000 rpm.
- ★ Makes rapidly rotating, reciprocating, or vibrating objects appear in slow motion.
- ★ No physical connection between Strobotac and object under study — no drag or retarding effects imposed.
- ★ Permits maintenance checks on machinery, minimizing costly down time.



▶ **Type 648-A Strobolux® . . . \$300**
An auxiliary white-light source with an intensity 100 times that of Strobotac. Flashing rate up to 6000 flashes per minute. Must be flashed from Strobotac. Can be used for single- or multiple-flash photography.



▶ **Type 1532-B Strobolume . . . \$275**
A high-intensity white-light source 400 times as intense as the Strobotac for studies of looms and other low-speed machinery. Flashing rate up to 1200 flashes per minute, or up to 3000 per minute at reduced intensity. Flashing rate controlled by Strobotac, Type 1535-B Mechanical Contactor (\$150), or any other make-or-break mechanism. Strobolume can be used for single- or multiple-flash photography. Cord with push button provided for manual control of flash.

◀ **Type 631-BL Strobotac® . . . \$170**
Versatile, basic stroboscopic light source — flashing range; direct reading from 60 to 14,400 rpm; useful as electrical tachometer from 60 to 100,000 rpm, and from below 300 rpm to 100,000 rpm for slow-motion studies. One control adjusts flashing rate to desired value; dial readings accurate to $\pm 1\%$ over most of range. Operates from 115v a-c line.

STROBOTAC^(R)

Manufactured Exclusively by

GENERAL RADIO Company 275 Massachusetts Avenue, Cambridge 39, Massachusetts

electronics business issue

A MCGRAW-HILL PUBLICATION • VOL. 31, NO. 52 • DECEMBER 26, 1958

H. W. MATEER, *Publisher*

JAMES GIRDWOOD, *Associate
Publisher*

W. W. MacDONALD, *Editor*

Managing Editor, John M
Carroll.

Feature Editor, John Markus.

Associate Editors: John M. Kinn,
Jr., Frank Leary, Michael F. To-
moino, Howard K. Jonis, Sylvester
P. Carter, Haig A. Manoogian,
Roland J. Charest, William P.
O'Brien, George Sideris, Edward
DeJongh, John F. Mason, William
E. Bushor, Ronald K. Jurgen,
Thomas Emma, Samuel Weber.

Pacific Coast Editor (Los Angeles)
Harold C. Hood; *Midwestern Editor*
(Chicago) Harold Harris; *New Eng-
land Editor* (Boston) Thomas Ma-
guire.

Art Director, Harry Phillips, Roy
Thompson.

Production Editor, John C.
Wright, Jr., Bernice Duffy, Jean L.
Motin.

Research, Charles B. Graham,
Marilyn Koren.

Editorial Assistants: Gloria J.
Filippone, Arlene Schilp, Patricia
Landers, Catherine McDermott,
Eleanor Schaefer, Carol Weaver.


JAMES GIRDWOOD, *Advertising
Sales Manager*. R. S. Quint, *As-
sistant Advertising Sales Manager
and Buyers' Guide Manager*. Fred
Stewart, *Promotion Manager*.
Frank H. Ward, *Business Manager*.
George E. Pomeroy, *Classified
Manager*. Hugh J. Quinn, *Acting
Circulation Manager*.

New York: Donald H. Miller,
Henry M. Shaw, Martin J. Gallay.
Boston: Wm. S. Hodgkinson. *Philo-
delphia*: James T. Hauptli. *Chi-
cago*: Bruce Winner. *Cleveland*:
Warren H. Gardner. *San Fran-
cisco*: T. H. Carmody, R. C. Alcorn.
Los Angeles: Carl W. Dysinger,
D. A. McMillan. *Denver*: J. Patten.
Atlanta: M. Miller. *Dallas*: Gor-
don L. Jones, Robert T. Wood.
London: E. E. Schirmer. *Frankfurt*:
Michael R. Zeynel.

Issue at a Glance

- Risk Capital on Way. Electronics industry will be a top investment target for biggest venture capital operation in history.....p 4
- Mergers, Acquisitions and Finance.....p 5
- Figures of the Week.....p 5
- Washington Outlookp 6
- Executives in the News. Hope of SoundScriber Corp.....p 8
- Commentp 8
- Payload for Pioneer III. Payload instrumentation for Army's Pioneer III rocket, which rose 66,654 mi early this month, furnished scientists with a wealth of new data about man's celestial environment.....p 11
- Checking Sidewinder. Air-to-air Sidewinder missile's infrared "eye" and complete guidance and control system are checked out on simulated flight test equipment.....p 12
- Electronics in Europe. Our industry leaders regard the European Economic Community as a good omen for American business. Data-processing, communications and consumer electronics demand seen rising with mechanizationp 13
- Production and Sales. Tv set sales to climb 15% in 1959.....p 14
- Broadcasters Buying Multiplex. A close look at the present status of multiplexing indicates a promising future for equipment sales. Broadcaster enthusiasm is at peak level, with a large share of the credit due to stereop 15
- Missiles Squeeze Small Firms. Higher missile spending lowers small business share of prime contracts. Armed services stress need for weapons system concept in selecting primes and urge small firms to shoot for sub-contractsp 16

DIGEST CONTINUED ON NEXT PAGE

CREATIVE MINDS NEEDED to explore new fields in Space Age Electronics. Join one of the fastest growing engineering and scientific organizations in the new field of Space Electronics. Thus far, Hallamore has had a remarkable participation in nearly all of the space frontier programs...some of which are: 1. Development and manufacture of 4 tracking and telemetering stations for Explorer satellites. 2. Development and manufacture of 6 tracking and telemetering stations for United States Air Force lunar probe. 3. Development and manufacture of 4 tracking and telemetering stations for United States Army lunar probe. 4. Ultra-sensitive receivers for atomic cloud propagation studies. 5. Airborne reconnaissance TV system. 6. Underwater electromagnetic wave communications studies. 7. Automatic checkout equipment for space missiles. Such programs are on contract, and equipment is in field operation at the present time. If you have a highly creative mind, with an educational background of BS to PHD and an active interest in theory, circuit development, or project engineering, we invite you to join our outstanding team, to search into the future and to share in the rewards of Hallamore's dynamic growth. For further information, please write or call: Frank W. Lynch, V.P. Engineering, Hallamore Electronics Company, 8352 Brookhurst Avenue, Anaheim, California / Prospect 4-1010 : a division of The Siegler Corporation. 



HALLAMORE

Risk Capital On Way

Electronics industry will be a top investment target for biggest venture capital operation in history

ELECTRONIC FIRMS will receive major financial benefits from the biggest venture capital operation in history, the Small Business Investment Corp. licensing program now getting under way.

The first group of Small Business Investment Corporations is expected to be in operation by first of the year. Ground rules were laid down earlier this month by Small Business Administration.

SBI money is expected to home in on electronics firms like infrared guidance on a jet aircraft exhaust.

More Money Coming

Small Business Investment Act passed by Congress last Summer gave Small Business Administration power to stimulate the program with \$250 million. Fifty million was appropriated until June. Moreover, these amounts will be more than matched by individual sponsors of SBI's, and the government is expected to supply additional funds if needed.

Before the Act was passed, congressional studies found that most small businesses were unable to tap public security markets and big institutional lenders for long-term funds because of their size. Congress also found today's high tax rates prevent small firms from generating growth capital by retained profits.

Purpose of the act is to stimulate flow of long-term risk capital needed by small business to finance growth and modernization through SBI equity investments and long-term loans.

All investments in small business firms will be made by individual SBI's, none by the SBA. The Federal agency will put its money into the SBI's by supplying up to \$150,000 of original capital and by loans—another \$150,000 maximum. Also, SBA will not pass on individual investments. It will exercise control by licensing and supervising SBI's.

Inquiries Pour In

SBI's are venture capital groups whose financial function will be similar to other venture groups familiar to our industry. But in addition to the handful of venture firms that exist today there will be hundreds of new SBI's. Ten thousand inquiries concerning the program have been received by SBA.

Prominent on the list of groups which have solicited SBA on prospects of forming SBI's are those backed by commercial and investment bankers, savings and loan associations, community and state development groups, venture capitalists and other private investment groups.

Commercial bankers see SBI Act as way to get back into investment banking business, to better serve old customers and to win new ones. Area development groups see the Act as a way to get funds to develop industry in their regions. Prospects of developing big customers for tomorrow from small SBI customers of today appeal to investment bankers.

Who qualifies for SBI investments?

Only small business, which is defined as all U.S. businesses except those with:

- Assets of more than \$5 million.
- Average profit over \$150,000 in past 3 years.
- Stock traded on any of 16 exchanges.
- Stock actively traded over-the-counter.
- Sales of more than \$300,000 of stock to public in past three years.

Those who cannot meet these requirements but maintain they are small business can apply to SBA for an exception.

It is expected that investments will be made primarily through purchase of debentures convertible into common stock. By law SBI's can also make loans with terms up to 20 years. But few think the long-term loans will be attractive to SBI's. They must pay SBA 5½ percent for use of its money and are restricted in interest charges to local legal rates.

"No one expects that SBI's will be able to live on interest income," said SBA advisor Bernard J. Cahn at a recent AMA conference on the SBI program. "They will make their profit by picking a good growth company, nursing it along until it is big enough to issue public stock and making a capital gains profit on sale of the securities."

See Immediate Impact

As a result, unincorporated firms will have a hard time winning SBI investments because they cannot issue debentures convertible into stock. There already has been a big increase in rate of incorporations, says SBA administrator Wendell B. Barnes.

Also, firms looking for SBI investments should be prepared to part with a portion of their equity. SBI's just won't enter into deals with firms not agreeable to either public stock or merger sale, financial experts say.

Necessity of selling some equity is regarded as one of the problem areas. Government and financial leaders believe the number of small business owners converted to "virtues of selling equity" will increase as a result of the program.

Immediate impact of the program on the electronics industry is expected to be tremendous.

More small-size investments will be available. Average SBI investment is expected to be about \$50,000. Over the years, venture capitalists have not made investments below \$100,000, and they have preferred \$500,000 ones.

MERGERS, ACQUISITIONS and FINANCE

• **Aerojet-General** common stock is expected to be listed on American Stock exchange this week. Stock was recently traded at 53 bid, 57½ asked, in over-the-counter markets. Some 4,320,000 shares are to be listed, of which 3,770,000 shares, or 87.4 percent of the total, are owned by **General Tire & Rubber Co.**

• **Northeast Telecommunications, Inc.**, Plantsville, Conn., issues 300,000 shares of common stock at \$1 per share through **Pearson, Murphy & Co.** and **Reilly, Hoffman & Co.**, both of New York. Corporation was formed last September. Firm plans to increase its activities in design and development of two-way mobile radios, telemetering equipment and radio control for the missile program. It reports that **Westinghouse Electric** has entered into an agreement to make certain models of its two-way mobile radio units under the

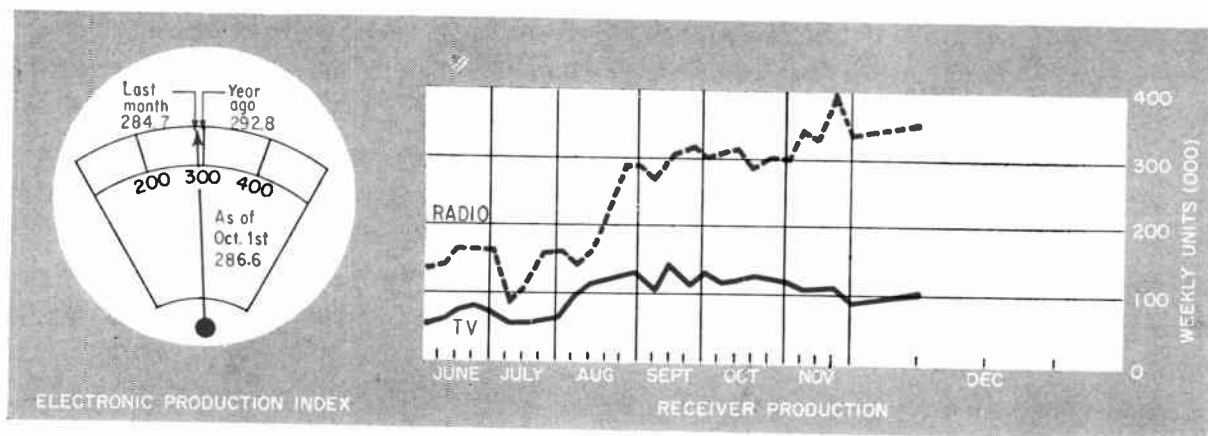
Westinghouse label. Financing proceeds will be used to purchase test equipment, provide additional working capital and for other corporate purposes.

• **Transonic, Inc.**, Bakersfield, Calif., plans to offer 72,726 shares of common stock at \$2.75 per share. Half of the shares will be sold for account of the company and half for a selling stockholder. Money will be used to pay off part of firm's bank debt. **Stephenson, Leydecker & Co.** of Oakland, Calif., will head underwriting group.

• **Advance Research Associates**, Kensington, Md., plans to issue 400,000 shares of common at \$6 per share through **Wesley Zaugg & Co.**, of Kensington, and **Williams, Widmayer, Inc.**, of Washington, D. C. ARA has a firm commitment for purchase of the first 17,000 shares; remainder will be offered on

a "best effort" basis. Underwriting commission on shares sold to general public will be 85 cents per share. No commission is being paid on stock sold to employees and sales reps. Firm was organized last May. It is engaged in developing advanced electronic systems in the aviation field, but no products are yet in commercial production. Proceeds will be used to finance initial commercial production, research and development, for working capital and for equipment.

• **Six electronic and aircraft firms** expect to receive refunds of about \$4.2 million from San Diego taxing agencies. Refunds are based on recent State Supreme Court ruling that property and tools owned by the federal government and used by defense contractors are tax exempt. **Convair, Solar Aircraft, Rohr Aircraft, Ryan Aeronautical, Bill Jack Scientific** and **Narmco** may be beneficiaries of refund.



FIGURES OF THE WEEK

RECEIVER PRODUCTION

(Source: EIA)	Dec. 5, '58	Nov. 28, '58	Dec. 6, '57
Television sets, total	103,539	99,618	109,339
Radio sets, total	358,987	338,887	387,597
Auto sets	140,662	109,098	121,784

STOCK PRICE AVERAGES

(Source: Standard & Poor's)	Dec. 10, '58	Dec. 3, '58	Dec. 11, '57
Radio-tv & electronics	77.37	74.02	43.07
Radio broadcasters	78.15	77.13	52.88

FIGURES OF THE YEAR

	Totals for first ten months		
	1958	1957	Percent Change
Receiving tube sales	333,258,000	388,738,000	-14.3
Transistor sales	35,982,133	22,386,300	+60.7
Cathode-ray tube sales	6,801,706	8,304,181	-18.1
Television set production	4,067,806	5,251,158	-22.5
Radio set production	9,484,678	11,945,534	-20.6

LATEST MONTHLY FIGURES

EMPLOYMENT AND EARNINGS

(Source: Bur. Labor Statistics)	Oct. '58	Sept. '58	Oct. '57
Prod. workers, comm. equip...	372,300	368,400	412,000
Av. wkly. earnings, comm.	\$83.62	\$84.24	\$76.44
Av. wkly. earnings, radio.	\$82.01	\$83.64	\$74.40
Av. wkly. hours, comm.	40.2	40.5	39.0
Av. wkly. hours, radio.	40.2	40.8	39.0

TRANSISTOR SALES

(Source: EIA)	Oct. '58	Sept. '58	Oct. '57
Unit sales	5,594,856	5,076,443	3,544,000
Value	\$13,461,857	\$10,811,412	\$7,075,000

TUBE SALES

(Source: EIA)	Oct. '58	Sept. '58	Oct. '57
Receiving tubes, units	41,540,000	40,061,000	47,075,000
Receiving tubes, value	\$34,362,000	\$33,951,000	\$38,421,000
Picture tubes, units	957,041	891,803	995,629
Picture tubes, value	\$19,351,907	\$17,704,289	\$19,495,574

American Blower suggests: CONSIDER COOLING EARLY!

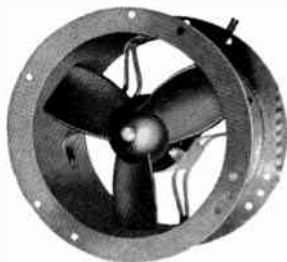
Before your designs for electronic equipment get too far along, be sure to provide for dependable cooling. Specify an American Blower packaged air-moving unit. Numerous sizes and designs to choose from — many can be modified as needed. Or, if necessary, we can start from scratch and design a fan or blower to fit your exact needs. Individual specification bulletins are available; write, detailing your requirements. American-Standard,* American Blower Division, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

COMPACT TUBE COOLER



Designed for military applications. Capacity: 35 cfm @ 4" sp to 80 cfm @ 1.5" sp @ 8000 rpm approx. Write for Bulletin 312.

FOR AIR-FLUSHING CABINETS AND RACKS



Tubeaxial fan, double-flanged for mounting at either end. Capacity: 295 cfm, free delivery @ 1550 rpm. Bulletin 5112.

* AMERICAN-Standard and Standard® are trademarks of American Radiator & Standard Sanitary Corporation.



CIRCLE 2 READERS SERVICE CARD

6

WASHINGTON OUTLOOK

WEEDING out of what Defense Secy. McElroy calls "marginal" missile projects is going on with a vengeance at the Pentagon. Up to press time the latest casualty was Fairchild Engine & Airplane Corp.'s Goose decoy missile, under development for the Air Force. Ramo-Wooldridge was associate contractor on the project for electronic systems. Pentagon insiders say other air-breathing missiles may be on the cancellation list.

Although the Defense Dept. euphemistically credits "changes in operational concepts" for missile cancellations in official pronouncements, real reason is the pinch on the defense budget.

The administration has clamped ceilings on military expenditures for fiscal 1960, starting next July 1. In laying out detailed plans for the new budget under the spending restrictions, the Pentagon has already set the overall programs for procurement of missiles, aircraft, electronics, and other hardware. Now the services are scrambling to decide what individual projects they can keep alive over the next year.

Goose's cancellation comes on the heels of the Air Force cancellation of Bell Aircraft's Rascal air-to-surface missile. At least \$70 million was spent on development of lightweight, fiberglass Goose, including costs for facilities. Prior to the cancellation, a \$33-million production contract had been in the works.

Despite the cuts, however, the Pentagon is allowing the Navy to go ahead with its long-planned Eagle air-to-air missile project. Bendix Aviation has been awarded the prime contract for development, with Grumman Aircraft as subcontractor for the airframe.

- The Air Force's controversial "make-or-buy" contract policy clause will go into effect shortly. It's aimed at tightening military control over the volume of subcontracting work in prime contracts. Under the new policy, prime contracts will include a "make-or-buy" list spelling out the components to be made by the prime contractor and the items to be produced by subcontractors. During the life of the contract, formal Air Force approval will be required before the prime can make changes in the list.

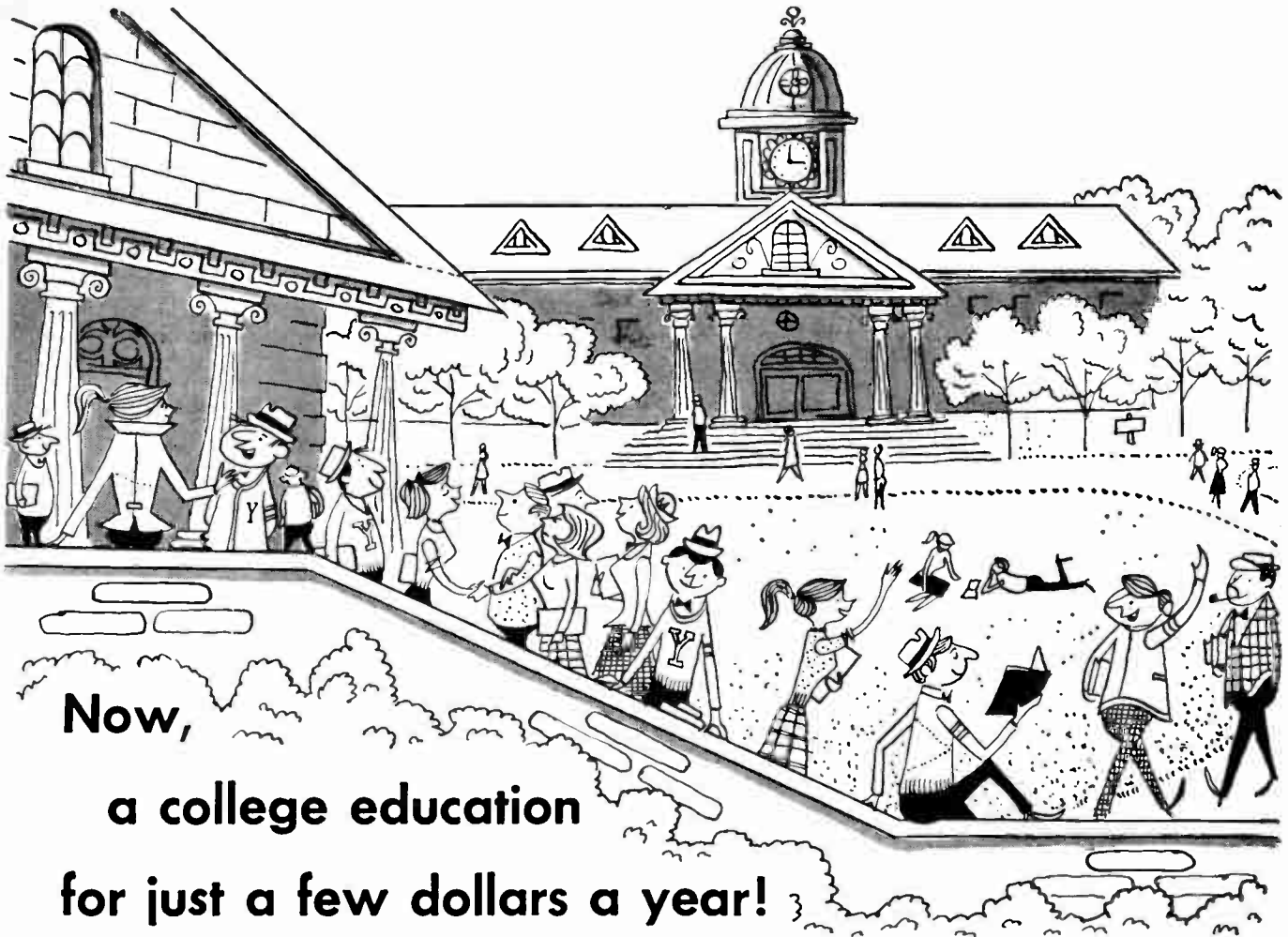
A "make-or-buy" decision is required in a new prime contract under these conditions:

- (1) If production of the item by the prime creates a need for new government-furnished facilities;
- (2) if the in-plant work proposed by the prime contractor is significantly different from normal in-plant operation;
- (3) if the item has been already subcontracted and the prime wants to pull the work back into his own plant where government-owned facilities would be used.

Certain types of procurement contracts will not require the new "make-or-buy" clause: formal advertised procurement contracts; fixed-price contracts which aren't subject to price redetermination, don't contain incentive provisions, or don't require the use of government-furnished production facilities; and R&D contracts for "products not intended for USAF inventory" and which do not require additional government-furnished facilities.

While the new policy is strictly Air Force so far, there's a strong chance that the Defense Dept. will order the Army and Navy to adopt similar rules.

December 26, 1958 — ELECTRONICS business issue



**Now,
a college education
for just a few dollars a year!**

Some time ago, a man called your name, and you walked across a stage, and were handed a diploma. Were you proud! You were educated. The world was your oyster.

You promised yourself then that you would keep your education alive. That you'd go back and earn that graduate degree. Or brush up at night school, or some summer seminar. But then you met that pretty girl. A few years later — the stork, the new house on Cedar Road . . . everything seemed to happen at once.

Meanwhile, back on the job, you were busier and busier. Company expanding. New products. New problems. Nights when you got home, you were really beat. After dinner, you'd park yourself in your easy chair, find your mind wandering to the future — "Am I slipping? Is management passing me by?"

May we help you help yourself? May we suggest a method for moving ahead, a proved road to new opportunity? Do you know that you can

still get that advanced education you promised yourself — and for just a few dollars a year?

Yes, you can get it right here in the pages of this publication. The currency of news and fact about your industry as only McGraw-Hill's editorial facilities and competence can bring it to you. The knowledge that is the power of authority. For here you learn the most efficient, adult way — by active participation. You share common problems, objectives, and job interests with men just like yourself.

If you are so fortunate as to have a personal subscription to this McGraw-Hill magazine, the few dollars it costs you will return you many thousands in greater distinction in your present work — richer dividends in promotion. If you happen to share your copy on a routing list . . . please consider the advantages of your own subscription. But no matter whose copy you read, really read it! Every extra minute you put into it is preferred stock in your own future.

McGRAW-HILL SPECIALIZED PUBLICATIONS

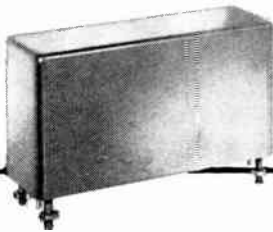
The most interesting reading for the man

most interested in moving ahead



CRYSTALS FILTERS

Compact, rugged, hermetically-sealed and stable, JK Crystal Filters (band pass filters) have a Frequency Range: 20 kc to 17.5 mc., and are available for special filtering purposes to 150 mc. Band Width at 6 db: 0.01% to 4% of nominal on most frequencies, up to 12% for certain frequencies. Write for complete data.

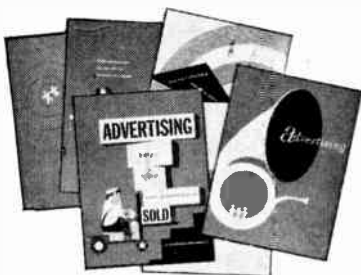


The
JAMES KNIGHTS COMPANY
Sandwich 1,
Illinois

CIRCLE 4 READERS SERVICE CARD

Here's how you can **MERCHANDISE** **YOUR** **ADVERTISING**

with these handy 9" by 12" folders



Keep your sales, management and distribution people informed on your advertising. Circulate pre-prints, reprints, schedules and other material in these folders, and make your advertising dollars work over and over for you.

Write for illustrated folder and price list

Promotion Dept. . . . Room 2700
McGraw-Hill Publishing Co., Inc.
330 West 42nd Street, New York 36, N. Y.

EXECUTIVES IN THE NEWS



Hope: for NAM, a new image

NEW PRESIDENT of National Association of Manufacturers is Stanley C. Hope, president since August of SoundScriber Corp., North Haven, Conn. Hope, 65, was elected to the top slot of the businessmen's group at the 63d Annual Congress of American Industry early this month.

The man at the helm of the nation's best-known industry group is a man who retired from one longtime industry career only to take on a new one. Last July 31, when he quit the presidency of 28,000-man Esso Standard Oil (nation's second biggest moneymaker in 1958), he moved over to 125-man SoundScriber. Of Esso, he says "I thought it was time to retire and enjoy life." He feels that retirement at 65 is wise "generally speaking," but "didn't want to just sit back and relax." Of SoundScriber, he comments "it's a great field; I'm quite enthusiastic about it."

A native of Springfield, Mass., he worked for pumpmaker Gilbert & Barker for many years. The Springfield-based firm, a wholly-owned affiliate of Esso, makes the gasoline pumps in many service stations. After becoming president of Gilbarco before World War II, he naturally looked to the parent company for room to grow. In 1948, he became exec v-p of Standard, and 15 months later became its president.

He considers himself a salesman: one of his major chores in the '30s was an 8-year stint in Europe modernizing gasoline distribution systems. He adds: "A good salesman has to be an optimist, and I am an optimist." Like a good salesman, he also likes people, admits to having missed close personal contacts during his presidency of Standard.

With NAM, he foresees for himself a year of trying to alter the organization's public image, which he regards as inaccurate. "We are not reactionary," he points out, "but it's sometimes hard to tell the public that."

And of his own putative retirement, he says "I have my own office, and I'm free as a breeze." He adds musingly "I think I'll write a book on retirement; I'm enjoying it."

COMMENT

Our Exposed Frontiers

The disclosure that Russia has developed nuclear-powered aircraft and 9,000-mile missiles, with work being pushed in the Soviet Acad-

emy on nuclear-fueled missiles, is rather appalling.

We're pouring millions into the crash program for the ballistic-missile early-warning system to cover the northern frontier. But a 9,000-mile missile could make it across the Pacific from China, or over our

eastern frontier from Poland.

Furthermore, if (as has been said) the Russians are using command guidance for these missiles, it'd be more efficient to operate across the latitudes than through the freakish ionospheric and atmospheric encountered at the pole.

So here we sit with all this defense at our northern frontier, and our big fat eastern and western exposures wide open. Now what? More panic-on-the-Potomac?

GENE C. GOODMAN
PHILADELPHIA

No—for a change the Pentagon will probably not ride off in all directions. The Russian developments were foreseen, and a project has been underway for a couple of years which will put long-range eyes and ears at our sea frontiers. We will be bringing you this story of airborne early-warning networks very shortly.

One Best Bet in 1959

Congratulations on your decision to return to the same editorial format for each issue. *ELECTRONICS* has been my favorite for years—if you can gear up to produce it weekly, so much the better.

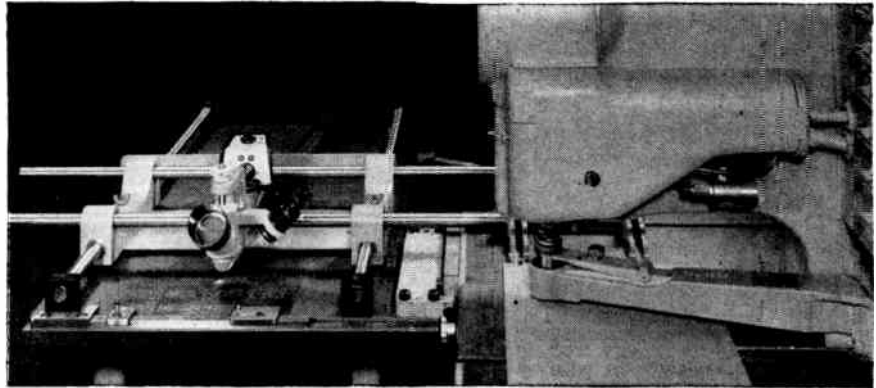
LT. CDR. J. A. CHASTAIN
NAS GLYNCO
BRUNSWICK, GA.

Well, of course, we've been producing it once a week all this year. But it's gratifying to see the favorable reaction to our plan for publishing technical and engineering features on a weekly basis.

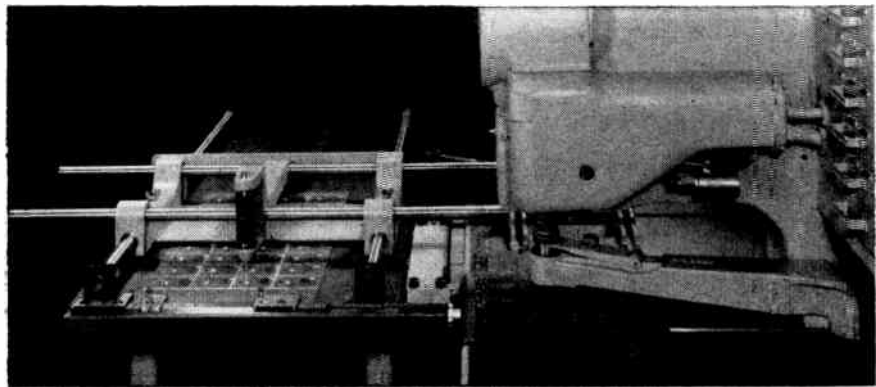
Idea

Your Nov. 21 issue, article "Electronics and the American Automobile" (p 73), goes gadget-haywire but says not a word about a really long-needed improvement: headlights which are linked to the steering control. Can't they ever get beyond the age-old fixed carriage lamps, so that one can see around turns?

B. F. MIESSNER
MORRISTOWN, N. J.



a faster way to **cold-punch** printed circuits



The DUPL-O-SCOPE

Firms punching and notching printed circuit boards—or any sheets up to 1/4" mild steel—know how profitable it is with a Strippit Fabricator-Duplicator. Now, it's even faster with the new Dupl-O-Scope, which eliminates the template drilling and layout step!

Readily mounted in the Duplicator stylus bracket, this precision optical pickup device quickly translates a drawing, layout or printed circuit sample into a punched metal template—ready for rapid-fire cold punching and notching on the Fabricator-Duplicator using standard interchangeable tools or "specials" made up to your requirements.

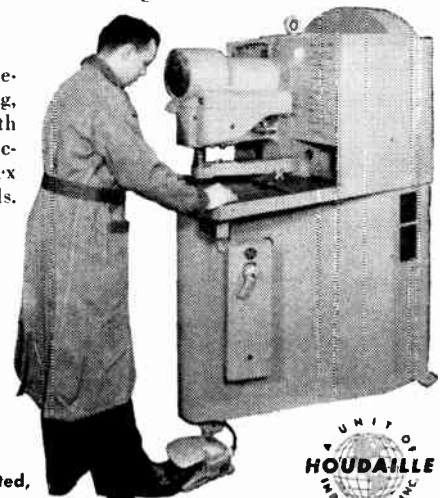
Write today for catalog and an actual demonstration on *your* work at *your* plant by a Strippit Mobile Unit.

Warehouse stocks at Chicago and Los Angeles.

The versatile Strippit Fabricator, one-machine shop for quick-change punching, notching and nibbling—available with positive Duplicator for high-speed production punching and notching in complex patterns including printed circuit boards.

WALES
STRIPPIT
Company

225 Buell Road, Akron, New York
In Canada: Strippit Tool & Machine Limited,
Brampton, Ontario



IMPROVED SWITCHING CHARACTERISTICS!

**DELCO HIGH POWER
TRANSISTORS
OFFER UNSURPASSED
PERFORMANCE
FOR HIGH VOLTAGE,
HIGH POWER
APPLICATIONS**



TYPICAL CHARACTERISTICS AT 25°C

	DT100	DT80	2N174A	2N174
Maximum Collector Current	15	15	15	15 amps
Maximum Collector Voltage (Emitter Open)	100	80	80	80 volts
Saturation Resistance	.02	.02	.02	.02 ohms
Thermal Gradient (Junction to Mounting Base)	.8	.8	.8	.8 °C/watt
Nominal Base Current I_B ($V_{EC}=2$ volts, $I_C=5$ amps)	135	100	135	135 ma
Collector to Emitter Voltage (Min.) Shorted Base ($I_C=.3$ amps)	80	70	70	70 volts
Collector to Emitter Voltage Open Base ($I_C=.3$ amps)	70	60	60	60 volts

*Designed to meet MIL-T-19500/13A (Jan) 8 January 1958

HERE IS A LINE OF TRANSISTORS SPECIALLY DESIGNED FOR SWITCHING APPLICATIONS.

Check your switching requirements against the new characteristics of Delco High Power transistors. You will find improved collector to emitter voltage characteristics. You will find higher maximum current ratings—15 amperes. You will find that an extremely low saturation resistance has been retained.

Another important improvement is the solid pin terminal. And, as always, diode voltage ratings are at the maximum rated temperature (95°C.) and voltage.

Write today for engineering data on the *new* characteristics of *all* Delco High Power transistors.

DELCO RADIO

Division of General Motors • Kokomo, Indiana

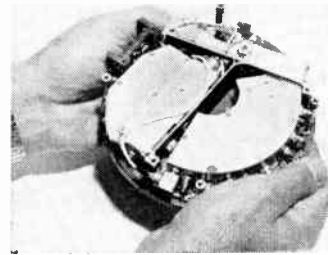
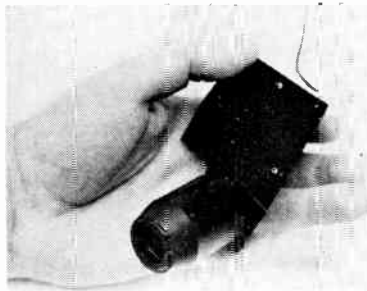
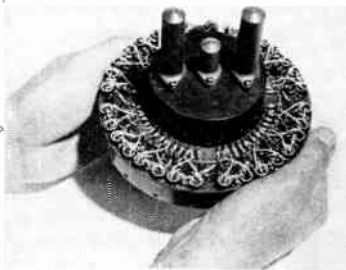
BRANCH OFFICES

Newark, New Jersey
1180 Raymond Boulevard
Tel: Mitchell 2-6165

Santa Monica, California
726 Santa Monica Boulevard
Tel: Exbrook 3-1465



Electronic Payload for Pioneer III . . .



. . . included Geiger tubes (left), photoelectric scanner (center) and radio transmitter

PAYLOAD INSTRUMENTATION for Army's Pioneer III rocket, which rose 66,654 mi early this month, furnished scientists with a wealth of new data about man's celestial environment. Here's a look inside the 13-lb gold-flashed nose cone.

The cone-shaped fiberglass container was 20-in. long, 9-in. in diameter. It included:

. . . Two Geiger-Mueller tubes and associated circuits. Purpose was to measure intensity and physical limits of deadly radiation band encountered 400

miles up, and to report on energy levels in vicinity of sun. Radiation intensity up to levels of 100 roentgens per hour could be measured.

. . . Pistol-shaped photoelectric sensor. Two light-sensitive cells, mounted and shielded so as to be triggered simultaneously only by a comparatively large light source (the moon). They were to be cocked by hydraulic timer when payload reached 140,000 mi altitude. Device was to check feasibility of using such a system to actuate tv scanners in

future lunar probes, scientists now report.

. . . Radio transmitter designed to operate continuously on 960.05 mc for 75 hours. Device weighed 1.1 lb and radiated 180 mw.

Power was furnished by 18 mercury batteries built into periphery of instrument package and creating appearance of large roller bearing. Gold flashing over cone's exterior served as telemeter antenna.

To permit effective viewing by photoelectric cells, a despin mechanism was designed to reduce spin stabilization of 400 rpm to 6 rpm. Two 7-gram weights were attached to 60-in. wires wrapped around payload. When released by hydraulic timer, these were to fly out by centrifugal force and set up counter rotation force.

How It Was Tracked

Temperature within payload from time it left earth's shadow till return was maintained at 43 C. Proportion of exposed gold to exterior paint striping was carefully calculated to hold even temperature. Any deviation in temperature would have been indicated by gradual shift in frequency of signal from temperature-sensitive subcarrier oscillator in transmitter.

Tracking of Pioneer III was accomplished primarily by Microlock stations at launch site, at Mayaguez, Puerto Rico (see cover photo by Collins), and at Goldstone Dry Lake on the California desert. The Goldstone station used an 85-ft parabolic antenna, built by CalTech's Jet Propulsion Labs in record time of three months specifically for the shot. The station can currently pick up signals from as far away as 400,000 mi. Plans call for extension of this range to 4 billion mi by 1962. Tracking data was recorded on tape and automatically relayed over teleprinter circuits to project's nerve center at JPL in Pasadena, Calif. Specially installed IBM 704 computer immediately began analysis of data for feedback to tracking stations.

Provide Additional Data

Backing up data from primary stations was a network of tracking sites provided by Army Signal Corps. These were located at Masters Field, Miami, Ft. Stewart, Ga., and Aberdeen Proving Grounds, Md. Stations located at Manchester, England, and Naalehu, Hawaii, which had used 108-mc Microlock receivers for tracking USAF's Pioneer probes, were adapted to 960.05 mc to provide additional back-up data.

Analysis of data obtained from earlier Explorer satellites indicated that 108-mc signal was deviated

up to one milliradian as satellite approached horizon. Deviation of 960.05-mc signal through ionosphere was negligible.

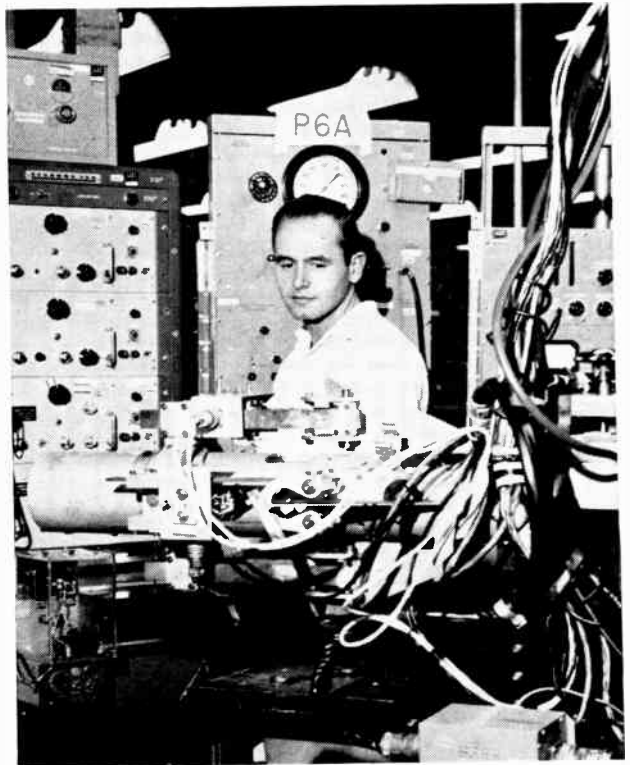
"As developments progress with receivers and extremely low temperature mader amplifiers," predicts a JPL spokesman, "frequencies between 1,000 and 2,000 mc will be optimum for space vehicle tracking."

Accuracy To Improve

Two-way Doppler measurement of vehicle velocity provides more accurate figures than one-way system. Pioneer III, which utilized the latter and had no command capability as did USAF's probe, made use of a stable oscillator. While drift in frequency was impossible to distinguish from change in velocity, satisfactory velocity data was obtained.

Oscillators currently under development promise sufficient stability to enable trackers of future space vehicles to pinpoint frequencies to accuracies of one part in one billion. Such will provide true velocity indications with use of one-way system.

Checking Sidewinder



Air-to-air Sidewinder missile's infrared "eye" and complete guidance and control system are checked out on simulated flight test equipment at Philco's Philadelphia plant. Currently in use overseas, the heat-seeking missile is also produced by GE



On the eve of Common Market starting next week, Italy's Banco di Roma inaugurates its IBM 705 data-processing system—a hint of things to come for . . .

Electronics in Europe

Our industry leaders regard the European Economic Community as a good omen for their business. Data-processing, communications, consumer electronics demand seen rising with mechanization

EUROPEAN ECONOMIC COMMUNITY, which officially starts January 1, is generally regarded by the electronics industry as a favorable trade omen.

Past year has seen stepped up activity by U.S. firms in Europe on many fronts: establishment of wholly-owned manufacturing subsidiaries; joint ventures with European companies; agreements by which European representatives distribute and service American products; and patent licensing agreements that provide royalties for technical knowhow and manufacturing rights.

In a check of some electronics firms with European trade interests, **ELECTRONICS** found substantial optimism with regard to business with the Common Market in 1959 and thereafter.

The six common market countries—Belgium, Netherlands, Luxembourg, West Germany, Italy and France—present the image of a stable, supranational community of 162 million people and a growing market for consumer and industrial electronics.

Industry men feel that the Common Market will bring about increased mechanization of European manufacture. They see electronic controls and data-processing equipment as destined to play a key part.

On the consumer side, a higher standard of living is seen as stimulating demand for home entertainment electronics.

For the next 12 years or so the European Economic Community will be in transition. Main objectives affecting electronics are well known, include: Removal of tariff barriers, uniform import

duties, freely convertible currencies and investment pooling. But the six-nation community is also expected to hold the key to a broader 17-nation European Free Trade Area eventually. That would mean a market of 285 million consumers.

Here's how some firms see the recent past and the future of electronics business with Europe:

Arthur K. Watson, president of IBM World Trade Corp., points out that the pattern of his corporation's European business has changed since 1945. Then, he says, 90 percent of IBM products sold in Europe came from the U.S.

"But today," Watson reports, "less than 10 years after the formation of the IBM World Trade Corp., only seven percent of such products come from the U.S." He sees "opportunity" for the future, adds:

"We think that the Common Market—and the free trade area, if it comes into being—will give us the chance to introduce into Europe a system that is working effectively in the U.S. This is the product-by-plant form of production, where each plant is devoted to the exclusive manufacture of one particular product to the exclusion of all others."

Clary Corp., San Gabriel, Calif., reports sales to Europe of slightly more than \$1 million in the first 10 months of this year, 40 percent above 1957 and 80 percent over 1956.

Joseph M. Klein, head of Clary's international division, anticipates a 20 percent sales increase in Europe in 1959. Electronic products sold in Europe include a small computer and readout equipment. Firm, which leases a plant in Rastatt, West Germany, has a European investment now of about

\$100,000. Clary told *ELECTRONICS* it plans to double this over the next two years.

Philco made two moves recently in Britain which could bring better opportunities for trade with the Common Market: First, a wholly-owned subsidiary introduced a new tv receiver. Secondly, Philco transistors have been produced in the last six months by another firm owned jointly by British interests.

In Italy Philco has had a licensee producing and marketing Philco tv receivers for several years.

Harvey Williams, president of Philco International Corp., sums up his outlook this way: "We feel that the gradual development of the Common Market will increase the purchasing power of the European community in the six countries involved. Therefore we anticipate a wider use and greater sales of consumer durables . . . during the next two decades."

International Telephone and Telegraph Corp., whose International Standard Electric Corp. has manufacturing firms in all Common Market countries except Luxembourg, faces tough sales competition but sees growth ahead—at a pace less rapid than in the first postwar decade.

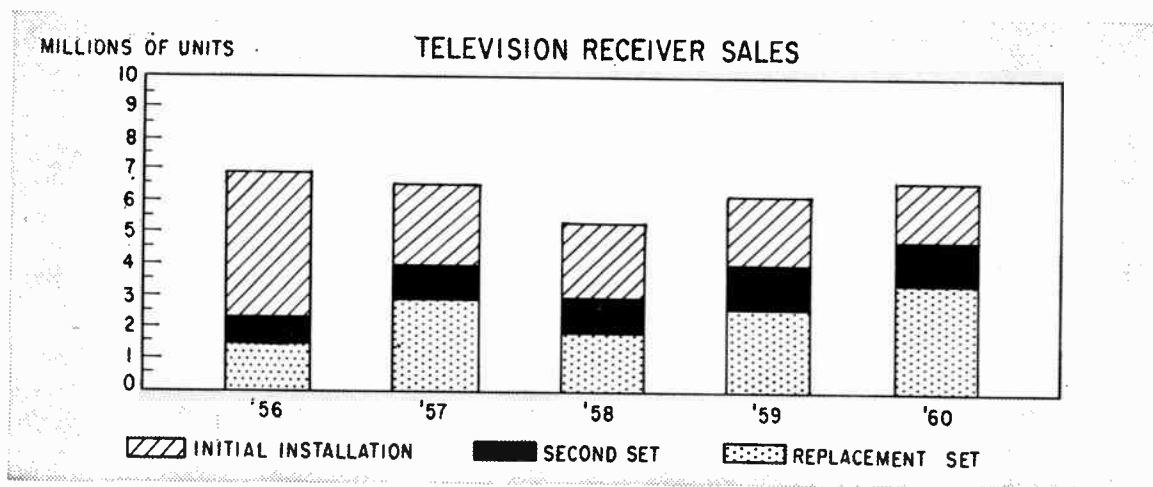
ISF, manufacturing and selling communications gear, military systems, components, radar and navigational aids, expects 1958 sales in Western Europe and Britain of about \$355 million, around the '57 volume.

Total ISE European investment in plant property and equipment went from \$61.5 million in '56 to \$70.4 million in '57. For 1958 the total is about \$78 million. Increase in net plant investment for 1959 and after, ITT told *ELECTRONICS*, will be about \$5 to \$6 million per year.

Some instrumentmakers have made sizeable commitments in Europe. Perkin-Elmer, Norwalk, Conn., for example, is making infrared analytical instruments in plants in West Germany and Britain. Size of the four-year-old West German plant has already been doubled.

Van Zandt Williams, P-E executive vice president, recently urged industrial instrumentmakers to establish manufacturing operations in Europe. He argued that this was necessary to participate in the Continent's economic growth.

PRODUCTION and SALES



Tv Set Sales to Climb 15% in 1959

SALES of tv receivers will rise in 1959, reaching 6 to 6.25 million units, up 15 percent from 1958's 5.3 million.

New record 7.5 million will be reached about 1962, exceeding 1955, peak year of tv boom, when 7.4 million receivers were produced.

Consumer purchases break down into three categories, illustrated in chart above. Despite population growth, initial installations are gradually decreasing as tv saturation of households, 86 percent now,

increases. Second set market, over a million a year in 1957 and 1958, is steadily increasing and will pass 1.5 million about 1966. Replacement market is almost the largest segment now and is growing fast. It was nearly two million receivers in 1958, will reach about 2.7 million next year, and will pass the five million mark in 1962-63.

By 1965 the total market will be about 8.5 million. Of this total, replacements will account for 5.5 million, while initial installa-

tions and second set sales will reach almost 1.5 million each.

Information is based on detailed studies conducted by Frank W. Mansfield, Director of Sylvania Electric's Market Research Department. Data also reveals that each year about 20 percent of remaining non-tv homes purchase first set. Until now the average life of sets has been considerably under 10 years, but it is expected to run considerably closer to that figure in the future.

Broadcasters Buying Multiplex

A close look at the present status of multiplexing indicates a promising future for equipment sales. Broadcaster enthusiasm is at peak level, with a large share of the credit due to stereo

A RECENT SURVEY among f-m broadcasters indicates that 18 percent plan to be multiplexing within a year, and another 49 percent have long-range plans to follow suit.

Survey questionnaires were sent out this Summer by General Electronic Laboratories to 824 broadcasters and others interested in multiplexing. By the end of the six-week survey period, 61 percent of the addressees had replied.

Of the estimated 80 or 90 broadcasters currently multiplexing, 65 responded to the inquiries. About 70 percent of the respondents rate the technical performance of equipment they are using as "excellent" or "good". An additional 23 percent term performance of their equipment as "fair". The others feel either that their equipment is giving less than satisfactory performance, or decline to answer this question.

From comments broadcasters added to the survey forms, the sponsors conclude that where dissatisfaction with equipment is reported, the units are of early vintage and "not representative" of present technical capabilities of up-to-date multiplex equipment.

Further comments sent in indicate that most currently operating f-m transmitters are suitable for multiplex operation provided they have received proper care and maintenance during their period of use.

An area probed by the survey is the matter of types of home receivers that will be picking up multiplex broadcasts. More than 50 percent of respondents to the survey indicated concern over quality of home reception. Several manufacturers are now beginning to send multiplex receivers to market, and broadcasters who commented on this anticipate a high degree of buyer selectivity.

Among those who answered one question asking if station equipment had to be modified to allow multiplexing equipment to be added, replies were evenly divided, 30 affirmatives and 29 negatives.

An overwhelming majority reported their multiplex equipment meets their stability requirements. Among the 62 respondents to this question, only 8 found fault.

The second section of the survey report covered

future plans for multiplexing. Respondents to questions in this area totalled 317 operating f-m stations.

Of these, 61 say they hope to be multiplexing within a year. A total of 168 broadcasters say they have "long-range" plans to do so, and 88 say they have no plans at all regarding multiplex operation.

Forty-seven broadcasters planning to start multiplexing during the coming year expect to go into background music operation, while 35 intend to enter stereo. A remaining 26 say they have other plans which may include relay or facsimile service, educational use, or paging system. All plans are, of course, subject to FCC approval.

Plans to engage in stereo broadcasting are more popular among the "long-range" respondents. Comparative score between those who will choose stereo and those who will provide background music is 93 to 79. Plans to provide some third form of service are popular among 73 of the remaining broadcasters now engaged in long-range thinking. (Cover shows GEL equipment.)



Among receiver equipment types on market is this one being demonstrated by Crosby Laboratories president Murray Crosby

Missiles Squeeze Small Firms

Higher missile spending lowers small business share of prime contracts. Armed services stress need for weapons system concept in selecting primes and urge small firms to shoot for subcontracts

"THE SHORT SPAN of a decade may well see the complete disappearance of the small firm as a direct supplier to the defense establishment."

This conclusion was recently reached by the Senate Small Business Committee after investigating the role of small business in defense missile procurement.

Between 1952 and 1958 missile spending grew from 1.5 percent of major defense procurement to 24.5 percent. But small suppliers' share of both research and development and production prime contracts declined.

For instance, the small business (less than 500 employees) share of all missile prime contracts dropped from 1.9 percent in fiscal 1957 to 0.8 percent in first half of fiscal 1958. The small firm group saw its share of R&D contracts drop from 4.3 percent in 1957 to 3.2 percent in first 11 months of 1958. Its percentage of all defense contract dollars declined from 19.8 percent in 1957 to 16.2 percent in the first 11 months of 1958.

The complex and costly weapons required under the new concept of warfare have been blamed for this decline. Argument advanced is that the small supplier cannot participate in these programs because of plant facility, financial and manpower limitations.

Top administrators and procurement men in the Department of Defense and the armed services were recently quizzed by the Small Business Committee to explore these general claims and become acquainted with military procurement policies.

Picture outlined by DOD representatives is this: **In many areas of missile contracting small business is unable to function as a prime. They and many armed services leaders urge small firms to accept the role of subcontractor.**

"Because missile procurement must be for large parts and complete missiles, we have been forced to use businesses of considerable size with large engineer staffs," said William M. Holaday, Director of Guided Missiles for DOD. "We are unable to break the prime contracts into small bites that small firms can handle."

Perkins McGuire, Asst. Secy. for Supply and Logistics, has made similar statements.

But high technical requirements in missile work, coupled with the small number of units purchased, give small business a competitive edge over mass-production business in subcontracting, Holaday said.

Most military groups favor large firms for missile prime contracts.

However, the prime contract procurement door has a wider opening for small firms in some areas of the defense establishment than others.

Summaries reflecting divergent procurement policies among military contracting groups follow:

Advanced Research Projects Agency: Sees small business as ideally suited to supply one-of-kind, hand-made type of instrumentation. Plans to use small industry to a greater degree than other agencies.

Navy Bur. of Ordnance: Uses a modified weapons system concept of procurement. Lead contractor coordinates component elements and compatibility. But bureau contracts directly with other sources to furnish specialized R&D services. In production stage, prime contracts are let for major components, such as guidance, control package, fire-control equipment, launchers and propulsion.

Navy Bur. of Aeronautics: Gives prime contractor entire responsibility for the job.

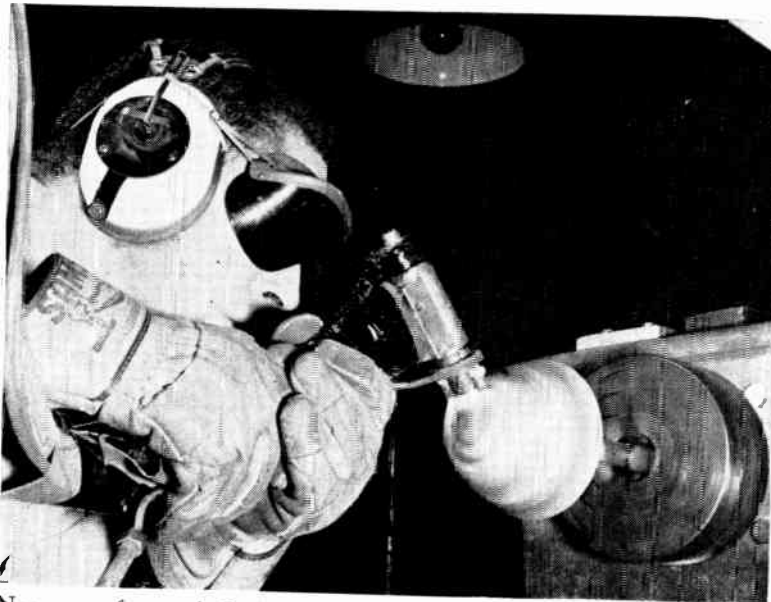
Air Materiel Command, Non-Ballistic Missiles: Selects a weapons system contractor for each missile because of the complex management problems presented by each system.

Air Materiel Command, Ballistic Missiles: Uses separate associate prime contractors. Agency believes no one contractor has the technical capabilities of accomplishing the complete weapons system integration of a ballistic missile.

Army: "Until missile designs become more stabilized, the principal role for small business in missile purchasing is as subcontractor to the prime." This statement made by Frank H. Higgins, Asst. Secy. for Logistics, best indicates Army procurement policy.

Most procurement secretaries held out hope that as the U.S. proceeds further into the "hardware stage" of missile production, small business will have greater opportunities.

While other missile leaders also stated that "we probably never will have specifications since we are moving fast in our weaponry" the Small Business Committee noted that it was discounting these "rosy" statements of future possibilities.



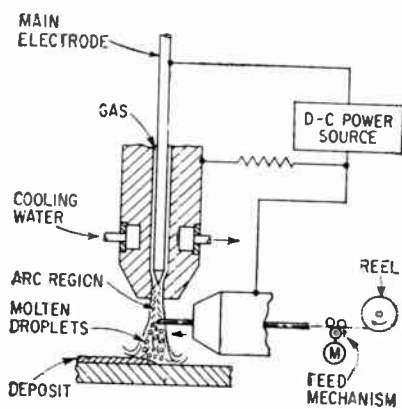
Nose cone for a missile is given a pure tungsten covering by. . . .

Plasma Jet Plater

Tungsten and rhenium tube parts can be made with powder and high pressure electric arc

PLASMA ARC TORCH is now being used by the Linde division of Union Carbide Corp. to fabricate component parts made of materials with extremely high melting points. The method is basically flame plating with a tool similar to the plasma jets used to simulate re-entry conditions in missile research.

Materials which melt without decomposing can be worked. Among these are pure tungsten, rhenium, tantalum, molybdenum, niobium and the refractory borides, carbides and oxides. These are fed



Wire-fed torch. A similar type sprays powder metals

as wire or powder into the torch.

Temperatures in the torch range from 10,000 F to 30,000 F due to constriction of the arc by an inert gas. The gas also insulates the torch walls and ejects at near sonic speeds melted particles of the material used.

Effective power is multiplied by constriction of the arc. If 50 kw are delivered through a nozzle $\frac{1}{8}$ in. in diameter, the power concentration is three megawatts per sq. in. Tools this powerful are in experimental use.

In addition to fabricating or flame-plating rocket and missile parts, the torch is being used to make electronic component parts. Parts such as tungsten heaters, grid bars and cages, targets, cathode cups can be formed.

To make such formed shapes, a coating is deposited to the required thickness on a brass mandrel. The brass is removed in an acid bath and the remaining shape, if tungsten, for example, is fired in an inert atmosphere furnace for two hours at 1,400 C.

Before firing, the tungsten has a density of 94 to 95 percent. After

firing, its density is 97 to 98 percent, its modulus of rupture is up to 57,000 psi and its volumetric shrinkage is 2.2 per cent.

The torch has also been used to coat crystalline and amorphous boron to nickel parts used for electron suppression. Coatings of nickel containing barium and strontium carbonates have been applied to moly cathode cups to serve as low temperature electron emitters.

Other applications have been the coating of contacts with tungsten, protective platings of platinum and palladium on thermocouples, production of crucibles and plating reinforced plastics.

Anodize Protects Magnesium Parts

MAGNESIUM chassis, housings and other parts are being hard anodized on an R&D basis with a recently developed process.

Experimental results reported by Anadite, Inc., show that the coatings withstand up to 40 hours salt spray in corrosion tests, have a dielectric strength up to 350 volts. Coating thickness up to one mil has been produced in light and dark brown colors.

Synthetic Quartz



Large single crystals of quartz are being grown in a pilot plant by Western Electric. Crystals up to three inches thick and six inches long are grown from seeds placed in solutions of natural quartz and sodium hydroxide subjected to high temperature and pressure

Pioneer III Scores a Telemetry "First"

TELEMETRY TAPES of Pioneer III space probe show solid data for both the launch and the trip back to earth. Information is available "for the first time," said William H. Pickering, Jet Propulsion Laboratory director, "as to some of the energy levels in the radiation belt as well as some idea of the physical limits of the belt." He said telemetry "also shows that the method used by JPL to control the interior temperatures of the instrumentation worked perfectly." Temperature reached 43 C shortly after launch, remained at that level for the probe's life.

USE OF SATELLITES in communications offers the prospect of great advantages and economies, T. Keith Glennan, administrator of the National Aeronautics and Space Administration, said this month in a speech. He added that interest in this field was so keen that "several of our most profit conscious electronics companies are spending money of their own to insure, if possible, that they have the competence" to participate in such satellite operations.

SOVIET ENGINEERING EDUCATION is planned as an integral part of the whole USSR economy. That's the word from a group of engineering educators who just returned from USSR.

New seven-year economic plan calls for 90-percent-a-year increase in the number of engineering grads over average rate for previous seven years. Master plan specifies number of students entering engineering schools, number training for each specialty and jobs available at graduation time.

NUCLEAR INSTRUMENTATION and safety systems using transistors and other solid-state devices exclusively will be supplied by Stromberg-Carlson for the Enrico Fermi Atomic Power Plant now being built near Detroit. Fast neutron breeder reactor will be completed in 1960.

FIVE FORWARD SCATTER TRANSMITTERS are reportedly planned for England's east coast as part of NATO's defense communication system. No details on transmitter powers and antenna arrays have been disclosed.

MISSILE WARNING RADAR STATION in northern Scotland is reportedly being discussed by U.S. and Britain. New link in NATO's warning system would be built at U.S. expense. It would be capable of detecting missiles fired from Russia within a minute or two of launching and give North America 15 minutes warning; 3,450 mi. range would reach into central Siberia.

TECHNICAL DIGEST

- **Radioactive lightning rods** increase protection range by ionizing particles of surrounding air and thereby increasing conductivity of air as far as 1,500 ft away. Rod designed at National Electrotechnical Institute in Turin, Italy, uses radium inside silver point, surrounded by highly hydrogenated beryllium compound that gives off neutrons when bombarded by alpha rays of radium. Neutrons bombarding silver produce artificial beta and gamma rays to augment those coming directly from radium. Lead disk below point of rod blocks downward radiation, to protect occupants of building from harmful rays.

- **Dielectric embossing** of metallized Mylar film bonded to sup-

porting vinyl is achieved at General Motors by using image die under embossing die. Image die controls electric field of r-f electrodes vertically, minimizing voltage gradient that would otherwise cause discoloration and burning of conductive coating. Contoured upper embossing die, closest to metallized coating, makes contact with entire surface of plastic. Image die, below, is separated from plastic by padding and is smooth, because it serves only to spread out electric lines of force.

- **Indium-antimonide** photoconductive infrared cell by Mullard has time constant below 1 microsecond, permitting use with cathode-ray displays having scanning frequencies up to 10 kc. Sensitive area of cell is only 0.5 mm wide and 6 mm long. Sensitivity is high

enough to give reliable response to temperatures only a few degrees above or below room temperature.

- **Magnetic disk** provides adjustable time delay for auditoriums to equalize differences in travel time to audience of sounds from artists on stage and from loudspeakers in room. This eliminates interfering echoes and synchronizes sounds from loudspeaker with those directly from stage. In Telefunken design for unattended operation, recording, playback and erasing heads are mounted 0.03 in. away from disk to eliminate wear. Recording head can be adjusted along circumference of disk to give delays anywhere between 30 and 975 milliseconds. Additional groups of three heads can be added to take care of additional loudspeakers.

Ultrasonics Judges Livestock

EXPERIMENTAL electronic device can measure size of a potential steak or chop in a live animal. It may prove highly beneficial in livestock marketing and breeding, U. S. Department of Agriculture scientists say.

The device uses ultrasonics to determine depth of back fat and depth and width of loin eye muscles in cattle and hogs. These measurements are particularly important in selecting animals that produce a high percentage of their weight in the more desirable cuts.

R. L. Hiner, head of meat-quality studies for USDA's Agricultural Research Service at Beltsville, Md., says that ultrasonic waves go through tissue without harm to the animal. Time needed for these sound waves to pass through and bounce back from the interfaces or borderlines between fat, lean and bone varies with distance or depth. The device uses these time differences to determine the depths of the various interfaces.

Preliminary tests of the device are being conducted by ARS animal husbandmen and agricultural engineers. So far, comparisons of animals measured by ultrasonics before slaughter with actual measurements of the dressed carcasses show a high degree of accuracy for

the experimental apparatus.

If continued tests prove the device's accuracy, it may be helpful in selecting and grading hogs and beef cattle before fattening or slaughter. It might be used by feeders to separate groups of animals into grades to ensure proper finish for slaughter, and thus improve uniformity of marketed livestock.

Appearance of live cattle and hogs may not give a dependable indication of the percentage of fat and lean meat they will yield when slaughtered. Many animals show meat-type characteristics outwardly but are found on slaughter to contain a high percentage of fat and to yield little lean meat.

ARS scientists also see use of this type of electronic device as an aid in increasing effectiveness of breeding programs. Increased accuracy in selection of meat-type breeding stock would reduce significantly time needed to produce superior lines. It would also result in a substantial saving of time needed to measure, probe and judge animals by prevailing methods.

The ultrasonic measuring device has not proved feasible for sheep because of their fleece. Contact with the animal's skin is necessary for accurate readings.

Army Depot Uses Big Computer



IBM tape RAMAC data-processing system, installed at Anniston Ordnance Depot, Anniston, Alabama, has total disk-memory capacity of 24 million characters. U. S. Army Ordnance Corps uses machine to handle its average of 5,500 daily supply transactions

MEETINGS AHEAD

Jan. 12: Medical Electronics Meeting, Detecting Unseen Cancer Cells, PGME of IRE, Inst. for Cancer Research, Philadelphia.

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

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

Jan. 14: Computers and Medical Diagnosis, Rockefeller Institute, New York City.

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

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

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

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

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

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

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

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

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

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

Mar. 26: Quality Control Clinic, ASQC, Univ. of Rochester, Rochester, New York.

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

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

NEW PRODUCTS



UHF Transistors fast switching

TEXAS INSTRUMENTS INC., P. O. Box 312, Dallas, Texas, has announced commercial production of the 2N559 ultrahigh frequency, diffused base "mesa" germanium transistors for highly advanced military and commercial applications. They meet and exceed all reliability specifications as outlined in MIL-T-19500A. Switching speeds into the millimicrosecond range and a typical alpha cutoff frequency of 250 mc make the 2N559 ideally suited for ultra high speed switching applications. It is conservatively rated to dissipate in excess of 150 mw in free air and will operate at temperatures up to 100 C. Circle 50 on Reader Service Card.



Digital Module transistorized

COMPUTER CONTROL CO., INC., 92 Broad St., Wellesley, Mass. The T-Pac static flip-flop model FS-10 contains two d-c coupled Eccles-Jordan flip-flop circuits using surface barrier transistors. This package will serve to implement a variety of functions. There are two independent circuits per card, and each circuit contains a flip-flop with

gated inputs and amplified outputs. The inputs accept normal T-Pac assertion and negation signals (or equivalents) and each output can be connected to thirty gates. Circle 51 on Reader Service Card.

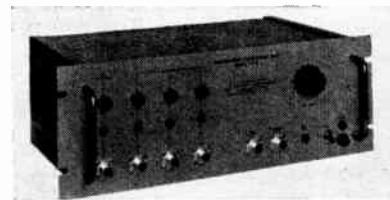


Bearing Tester shows roughness

LEITCH-HUARD CORP., Stark and Commercial Sts., Manchester, N. H. The smoothness running quality of precision instrument ball bearings is easily evaluated by Vibra-Meter. Low speed outer race rotation of the test bearing under a light thrust load produces disturbing forces in the bearing. These forces are directed along the contact angle of the bearing and may be resolved into axial and radial components. The axial component of forces is converted to an electrical signal by a crystal pick-up, amplified, and evaluated by two means: (1) an average reading meter; (2) three peak level trigger circuits. Circle 52 on Reader Service Card.

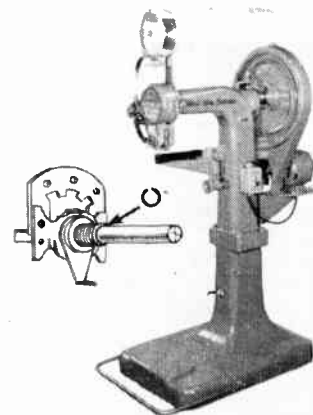
Magnet Wire for moving coils

SECON METALS CORP., 17 Intervale St., White Plains, N. Y., has developed a new type magnet wire which has a high tensile strength and a specific resistance only slightly higher than that of copper. It was engineered for use in lightweight moving coils. This material can be produced in continuous long lengths to as small as $\pm 10,000$ of an in. Copper itself has a tensile strength of approximately 60,000 psi. The new Secon alloy has a tensile strength of approximately 115,000 psi, permits greater winding tensions and ease of use in small sizes. Circle 53 on Reader Service Card.



Coincidence Unit self-contained

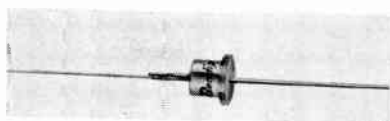
E-II RESEARCH LABORATORIES, 2161 Shattuck Ave., Berkeley 4, Calif. Model 101N coincidence unit features direct drive from photomultipliers, input limiting, and an ultimate resolution of 3 millimicroseconds, with one anti-coincidence and three coincidence channels. The coincidence criterion is set by a variable discriminator in a slow channel; units may be stacked via a fast coincidence output. All bias and supply potentials are electronically regulated for maximum long-term stability. Circle 54 on Reader Service Card.



Wire Stitcher for retainer rings

IDEAL STITCHER CO., 2323 N. Knox Ave., Chicago, Ill., has announced a specially designed wire stitching machine that forms and applies retainer rings directly on shafts. Already applied to electronic potentiometers and switches, where it eliminates separate operations of forming the wire retainer ring and then installation of the ring on the shaft with a press, this wire stitcher is adaptable to many applications

where retainer rings are used on control shafts, motor shafts and to keep covers in place. Circle 55 on Reader Service Card.



Silicon Rectifiers diffused junction

BENDIX AVIATION CORP., Red Bank Div., Long Branch, N. J., announces new $\frac{3}{4}$ ampere diffused junction silicon rectifiers. They have piv ratings ranging from 50 to 600 v and can deliver 750 ma d-c of rectified current at 50 C and 250 at 150 C. The rectifiers are of the diffused junction type for lower forward drop and lower reverse leakage current. The EIA designations are 1N536, 1N537, 1N538, 1N539, 1N540 and 1N547. Besides application to power rectification, these units are useful in magnetic amplifier and d-c blocking circuits. Circle 56 on Reader Service Card.

Vibration Pickup self-generating

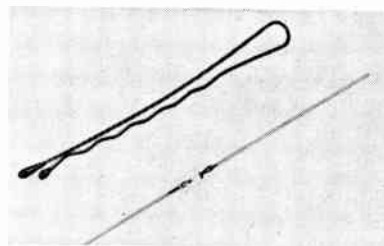
CONSOLIDATED ELECTRODYNAMICS CORP., 300 N. Sierra Madre Villa, Pasadena, Calif. Designed for vibration-analysis problems, the type 4-118 is especially valuable in situations where space is limited, or where a heavier pickup would invalidate test results. Low sensitivity to transverse accelerations, plus accurate performance in any mounting plane, make it ideal for mobile tests. Circle 57 on Reader Service Card.



Input Transformer ruggedly built

MICROTRAN Co., Inc., 145 E. Mincola Ave., Valley Stream, N. Y. A new in-line input transformer is de-

signed to be inserted in cable circuit and is ruggedly built to withstand mechanical abuse. Mu-metal and electrostatic shielding improve signal-to-noise ratio. A 20 to 20,000 cycle ± 2 db response assures broadcast quality. It is supplied with 6 in. shielded microphone cable and mates with Amphenol 91-PC-4F plug. Circle 58 on Reader Service Card.



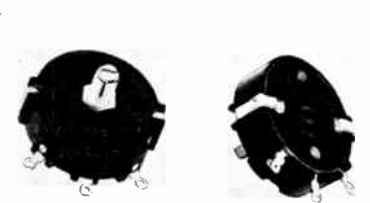
Germanium Diodes point-contact

ERIE RESISTOR CORP., Erie, Pa., has a new line of miniature germanium point-contact diodes. They are encapsulated in hermetically sealed glass cases measuring 0.265 in. maximum length by 0.105 in. maximum diameter and lead lengths of $1\frac{1}{4}$ in. minimum. The units are color coded in accordance with EIA standards. Circle 61 on Reader Service Card.



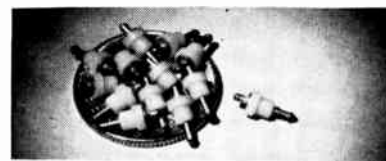
Potentiometer gang type

DAYSTROM PACIFIC, 9320 Lincoln Blvd., Los Angeles 45, Calif. Exclusive design of the model 319 gang type pot makes possible phasing and rephasing of individual resistance wipers without disturbing resistance settings of adjacent cups. Unit is available in resistance values up to 200 K with 0.05 linearity. Power output is 2 watts. Circle 59 on Reader Service Card.



H-V Control many applications

INTERNATIONAL RESISTANCE Co., 401 N. Broad St., Philadelphia 8, Pa., announces a new h-v control designed for use in circuitry with voltages in the kilovolt range. It features higher power and voltage ratings, closer resistance tolerances, and minimum depth behind panel. Applications for the new units are increasing, with new developments in color tv, radar, computers, telemetering, infrared detection, ion accelerators and nuclear research. Circle 60 on Reader Service Card.



Teflon Terminals subminiature

SEAELECTRO CORP., 610 Fayette Ave., Mamaroneck, N. Y. Press-Fit type P-T-SM-125 feedthrough terminal has a truncated end for one of the two lugs, acting as a stop to prevent wrapped wire leads from slipping off until they can be soldered. The other lug is the usual plain pin. Terminal measures only 0.306 in. in overall height. It fits into a 0.081 in. diameter hole, and can be accommodated in any chassis up to 0.035 in. thick. Circle 62 on Reader Service Card.



V-R Power Supply magnetic type

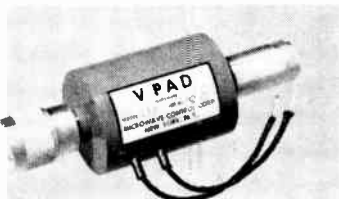
KEPCO LABORATORIES, INC., 131-38 Sanford Ave., Flushing 55, N. Y. Model KM-255 compact tubeless magnetic voltage regulated power

supply delivers in two ranges, 60 to 120 v, 0 to 2 amperes, and 120 to 180 v, 0 to 1.4 amperes. Regulation for line or load is less than ± 1 percent. Ripple is less than 0.03 percent. Other features include a control for optimizing regulation at any given output voltage, excellent resolution, short circuit and overload protection, excellent line transient response. Circle 63 on Reader Service Card.



Helical Pot subminiature size

S. A. ASQUITH Co., 427 W. Chevy Chase Drive, Glendale 4, Calif. Model 1410 is a 1 w, 200 to 25,000 ohms pot for use where the handling of a multiplicity of circuits in the smallest possible panel area is required. The shaft, front bushing and bearing are manufactured from corrosion resistant nickel silver. Wiping contacts are fabricated from noble metal laminates. Bearings are provided front and rear and the shaft and wiper are electrically isolated. The stop mechanism is associated only with the shaft, permitting rotational accuracies otherwise impossible in so small an instrument. Stop strength is better than 8 in. lb. The shaft does not move axially in and out with rotation. Circle 64 on Reader Service Card.



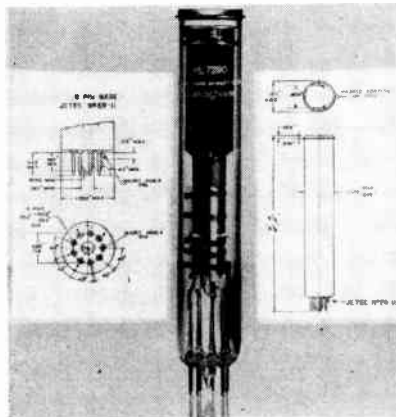
Coax Attenuator variable device

MICROWAVE CONTROL CORP., 250 W. 57th St., New York 19, N. Y. The V PAD broadband coaxial attenuator is electronically variable from 10 to 25 db. The variation is

continuous, being a function of the solenoid current, with the maximum attenuation requiring 30 ma at S band and 70 ma at X band. Featuring low vswr, light weight, small size, no moving parts, V PAD offers increased versatility for buffer and pad applications in signal generator, search receiver and power measuring circuits. Circle 65 on Reader Service Card.

Single-Turn Pot high temperature

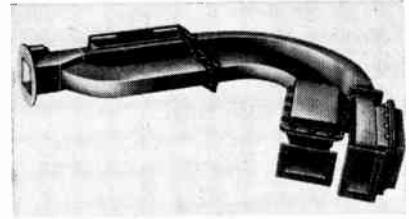
ELECTROMATH CORP., 42-14 Greenpoint Ave., Long Island City 4, N. Y. Model HTC of series 13-225 is a single-turn precision pot designed to meet the constantly increasing demand for high temperature applications. All component parts of the unit have been laboratory-tested to meet peak performance requirements at temperatures in excess of 225 C. Unit may be obtained in linear or nonlinear functions with torque variations to conform with customer specifications. Circle 66 on Reader Service Card.



Vidicon Tube slow scan

WESTINGHOUSE ELECTRIC CORP., P.O. Box 284, Elmira, N. Y., has available a small-size vidicon camera tube (VWL-7290) designed for slow speed scanning operations. Its extremely low residual current permits high resolution, long storage time with higher sensitivity, higher output signal and better signal-to-noise ratio. The VWL-7290 is also

useful for transmitting high resolution information over conventional audio circuits as the system bandwidth requirements are sharply reduced with slow scan. Circle 67 on Reader Service Card.



Dual Feed Horn waveguide input

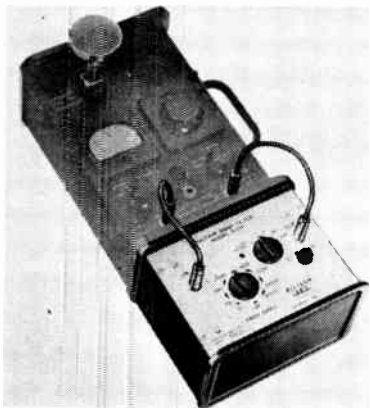
D. S. KENNEDY & Co., Cohasset, Mass. A dual polarized feed horn for large size waveguide having two waveguide inputs has been developed. The unique feature of this primary feed is the waveguide input, since the usual dual polarized horn requires a coax input. The new feature provides the same center of radiation for both signals. Maximum power transmission is obtained in both polarizations. The horn handles 10 kw with more than 30 db decoupling between the signals. The horn has been produced in the frequencies of 1,700-2,400 mc, 755-985 mc and 400-450 mc, but the design is available in other frequencies. Circle 68 on Reader Service Card.



Commutator high speed

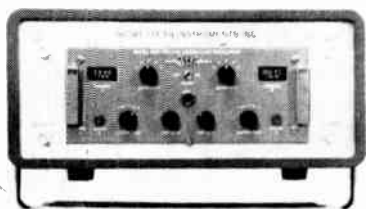
PACKARD-BELL ELECTRONICS CORP., 12333 W. Olympic Blvd., Los Angeles 64, Calif. A new solid state high speed electronic commutator will commutate up to a maximum of 1,000 channels of information at rates of up to 100,000 samples per sec, and can be used with any device requiring this type of commutation. It may be used to commutate either a-c or d-c signals to a voltage-to-digital converter or may

be used to commutate the output of a digital-to-voltage converter into a number of channels. If a holding circuit is required for the voltage outputs, solid state sample and hold circuits are available. **Circle 69 on Reader Service Card.**



Filter Set octave band type

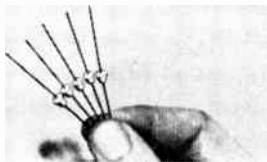
ALLISON LABORATORIES, INC., 14185 Skyline Drive, La Puente, Calif. Model 530P filter set, when attached to the GR1551A sound level meter, allows the operator to make measurements in octave bands. The bands consist of: 20-75 cps, 75-150, 150-300, 300-600, 600-1,200, 1,200-2,400, 2,400-4,800, 4,800 to 10,000 cps. A built-in transistorized amplifier allows for measurement of noise in these bands to more than 36 db below the overall noise level. A switch cuts the filter in and out and allows overall measurements to be made without disconnecting the octave band filter set from the sound level meter. **Circle 70 on Reader Service Card.**



Oscillator voltage controlled

MIDWESTERN INSTRUMENTS, 41st and Sheridan, Tulsa, Oklahoma. Model 956 dual channel voltage

controlled oscillator is designed with future data systems requirements in mind. It includes extended subcarrier frequencies to 250 kc and features two channels in one package with separate plug-in center frequency and deviation networks. Each channel consists of a chopper stabilized d-c amplifier (effecting ultrastable operation), a multivibrator and an output amplifier. Model 956 is designed to produce carriers which are frequency modulated by signals in the ± 2.5 v range. Chassis design allows tubes to project into vertical air flow for convection cooling when units are stacked. **Circle 71 on Reader Service Card.**



Silicon Rectifiers rated at 750 ma

SARKES TARZIAN, INC., 415 North College Ave., Bloomington, Ind. The F series silicon rectifiers are rated at 750 ma d-c with voltage ratings of 200, 400 and 600 v. They are encapsulated into a volume less than 0.004 cu in. The new line is claimed to be the lowest priced 750 ma silicon rectifiers on the market to allow wide commercial use. **Circle 72 on Reader Service Card.**



Servomotor velocity damped

HELIPOT DIVISION of Beckman Instruments, Inc., Fullerton, Calif. Model 8VM420 velocity-damped servomotor offers the same transfer function as a motor-generator, plus the advantages of lighter weight, smaller size and lower cost. It

eliminates the necessity of a feedback channel through the amplifier, lowers power consumption and does away with problems normally associated with residual null voltage. Design of the unit permits use of an undersized rotor which has an inertia of only 0.24 gm cm². Combined with comparatively high stall torque of 0.25 oz in. this produces acceleration at stall of 73,000 rad/sec². **Circle 73 on Reader Service Card.**



Transistor Test Set extended ranges

BAIRD-ATOMIC, INC., 33 University Road, Cambridge 38, Mass. The KP-2 series transistor test sets feature extended testing ranges for analyzing transistors at frequencies from 100 cps to 200 kc. They offer ranges up to 2 amperes, 200 v with two regulated semiconductor power supplies for bias voltages and currents. **Circle 74 on Reader Service Card.**

Buffer Amplifier transistorized

KEARFOTT CO. INC., 1378 Main Ave., Clifton, N. J., announces a dual channel transistorized buffer amplifier designed to drive size 11 R980 winding compensated synchro resolvers. The amplifier-resolver combination has stable gain characteristics and negligible phase shift through an ambient temperature range of -55 C to $+85$ C. By using special packaging and potting techniques, an extremely high resistance to both shock and vibration has been achieved in the amplifier, an important consideration in many modern high-speed airborne applications. **Circle 75 on Reader Service Card.**

- NOW AVAILABLE
- OFF-THE-SHELF DELIVERY



**WINCHESTER
ELECTRONICS
INCORPORATED**

- CONNECTORS
- TERMINALS
- ACCESSORIES

**GREENE SHAW
COMPANY, INC.**
341 WATERTOWN ST., NEWTON 58, MASS.
DEcatur 2-9300 — DEcatur 2-6500

CIRCLE 8 READERS SERVICE CARD

**WE EMPLOY
THE HANDICAPPED**

*WE FIND
IT'S GOOD BUSINESS*



**A MAJOR
ELECTRONICS MANUFACTURER**

Literature of the Week

MATERIALS

Electronic Sealants. Coast Pro-Seal & Mfg. Co., 2235 Beverly Blvd., Los Angeles 57, Calif. A technical data chart describes polyurethane, Thiokol and Silicone based electronic sealants and molding compounds which have excellent electrical properties, high temperature, fuel and cold flow resistance. **Circle 76 on Reader Service Card.**

COMPONENTS

Tube Clamps. The Birtcher Corp., 4371 Valley Blvd., Los Angeles 32, Calif. Catalog 5-KK details 17 types of cooling and retaining clamps of silver and beryllium copper alloy for miniature and subminiature tubes and components including those with 90 deg sockets for printed circuitry. **Circle 77 on Reader Service Card.**

Printed Circuits. Northern Plastics Corp., Ia Crosse, Wis. A 4-page folder describes the company's printed circuits, copper-clad laminates, base laminates and fabricated parts. **Circle 78 on Reader Service Card.**

Miniature Motors. Globe Industries, Inc., 1784 Stanley Ave., Dayton 4, Ohio. A 10-page catalog describes four basic models and sizes of a-c hysteresis synchronous and induction motors and 129 spur and planetary gear reductions. **Circle 79 on Reader Service Card.**

Transistor Guide. Sylvania Electric Products Inc., 1100 Main St., Buffalo 9, N. Y., has available a 20-page booklet describing the electrical characteristics and listing interchangeability features of a wide variety of transistors by type number and manufacturer. **Circle 80 on Reader Service Card.**

Miniature Plugs. Cannon Electric Co., 3208 Humboldt St., Los Angeles 31, Calif. Catalog KM-1 describes and illustrates the series

KM miniature plugs which are designed and qualified to MIL-C-25955 (USAF) specification. **Circle 81 on Reader Service Card.**

EQUIPMENT

Cooling Equipment. McLean Engineering Laboratories, P.O. Box 228, Princeton, N. J., has available a new 34-page catalog on fans and blowers for electronic applications. The units described are specially designed to fit standard electronic racks. **Circle 82 on Reader Service Card.**

Pulse Height Analyzer. Radiation Counter Laboratories, Inc., Skokie, Ill., has published an eight-page pamphlet listing complete specifications and operating characteristics of its improved 256-channel pulse height analyzer, model 20609. **Circle 83 on Reader Service Card.**

Preamplifier Catalog. Control, a division of Magnetics, Inc., Butler, Pa. Bulletin P-15 describes both physical and electrical characteristic curves of the company's standard preamplifier, type PA4401-001. **Circle 84 on Reader Service Card.**

Variable Speed Drives. Magnetic Amplifiers, Inc., 632 Tinton Ave., New York 55, N. Y., has available a four-page and an eight-page brochure covering a complete line of variable speed drives for industrial equipment motor control. **Circle 85 on Reader Service Card.**

FACILITIES

Technical Writing. Harry W. Smith, Inc., 41 E. 42nd St., New York 17, N. Y. A comprehensive review of the activity of engineers in writing articles and papers, as well as suggestions for engineering managers in organizing and maintaining productive article writing programs, are given in an eight-page study. **Circle 86 on Reader Service Card.**

McGRAW-HILL PUBLISHING CO.
330 West 42nd St., New York 36

(Business Briefs in 1958 Engineering Issues appear at end of index.
For index to technical articles printed in 1958 see Dec. 19, p 35.)

AIRCRAFT

Air-data computer gets checked.....	24 July 25
Air Force gets prefab radome.....	19 May 30
Airframe electronics.....	15 Dec 12
Airplane makers to share tapes.....	45 Feb 7
Airport antenna goes in runway.....	26 Nov 28
Always blueprint for 1962.....	13 July 25
A-Plane avails engines.....	18 Sept 5
Astro now major market.....	13 May 2
Bombers: present and future.....	13 Feb 7
Bombers shun radiation.....	15 Feb 21
Controls under scrutiny.....	20 May 2
Drone market expanding fast.....	13 May 30
Electronic unit boosts radar echo.....	22 April 18
Electronics for new bomber.....	13 Oct 17
Fighter arms stockpile swells.....	17 Sept 5
Fighter market: \$1 billion.....	13 July 11
Helicopters build new market.....	13 Aug 8
Infrared collision warning proposed.....	27 Mar 7
Instruments find crash causes.....	26 April 4
Ions make trouble at Mach 10.....	13 Mar 7
Jet vibration tester is mobile.....	21 July 10
Modified CRT may aid air traffic.....	32 Feb 21
Now producing plane computer.....	47 Jan 10
Outfitting new jet airliners.....	20 Nov 14
Plots get TV map.....	26 Mar 7
Stock shares and prices for aircraft anticom- bustion system developers.....	5 July 11
Stock shares and prices for atomic plane de- velopers.....	7 Jan 24
Tomorrow's new horizons?.....	17 Jan 24
Transistors regulate high power.....	33 Feb 21
Weather probe begins.....	28 Sept 19
What's ahead in 1958?.....	22 Jan 24
What's coming in air control.....	17 May 16

ATOMIC ENERGY

A-Plane avails engines.....	18 Sept 5
A reactor goes on stream.....	22 Feb 7
Atomic sales outlook holds.....	48 April 4
Breakthrough in H-power.....	46 Feb 7
Can electronics check peace?.....	15 Sept 5
Carriers control A-bomb elevators.....	44 Jan 24
Guiding nuclear subs.....	28 Mar 7
Instruments for atomic energy (special report)	21 May 16
Measurements at 750 F.....	40 Mar 21
Monitors ring A-bomb test.....	13 Jan 13
Navy plans heavy buying.....	34 Mar 7
Nuclear Navy gets largest sub.....	18 Aug 22
Nuclear Navy goes electronic.....	15 June 13
Our future in atomics.....	13 Nov 14
Radar radiations hazards.....	15 April 18
Stock shares and prices for atomic plane de- velopers.....	7 Jan 24
Stock shares and prices for typical atomic instrumentation manufacturers.....	5 Sept 5
Tomorrow's new horizons?.....	17 Jan 24
Tv in atomic power plant.....	17 June 27
UK tests new reactor gear.....	36 Oct 3
What's ahead in 1958?.....	22 Jan 24
Zeta's Totus gets checked.....	22 April 18

AUDIO

Binoculars boost hearing aid sales.....	16 May 2
Broadcast stereo increases.....	46 Nov 14
Hi-Fi component sales setting record.....	4 Nov 14
Hi-Fi console sales rise.....	27 Jan 10
Hi-Fi retail sales head for \$ billion level.....	16 June 27
Home music sales to rise.....	17 Sept 5
Sales increase coming in tape recorders.....	16 Oct 17
Stereo boosts Hi-Fi market.....	17 June 27
Stock shares and prices for typical Hi-Fi phono & equipment manufacturers.....	5 June 27

BUSINESS AND FINANCE

1958: Radio's biggest year.....	42 Feb 7
1958: Year of the high plateau.....	13 Jan 10
Airframe electronics.....	15 Dec 12
Bankers buy more electronics.....	15 May 2
Bell system keeps buying.....	18 May 2
CD: \$6.7 million.....	35 Jan 24
Company closes TV tube factory.....	9 Feb 7
Contracting criticized.....	9 Mar 21
Convertible popular.....	5 Oct 17
Cost-plus bonus.....	5 Aug 22
Counter-ICBM spending due.....	17 Oct 3
Defense asks \$2 billion.....	56 Mar 21
Distribution profits improving.....	17 Aug 22
EIA enjoys \$ surplus.....	5 June 15
Electronics grows in printing.....	15 July 11
Electronics R & D.....	5 Nov 14
Electronics stars at Fair.....	13 April 18
Executive salaries.....	6 Sept 19
Failures drop in prices for typical Hi-Fi phono & equipment.....	7 May 7
Fewer bankruptcies.....	5 Apr 18
First quarter earnings.....	5 June 15
Funds eye military.....	5 June 27
Future financing.....	5 Oct 3
Gearing up to conquer space.....	15 Mar 7
Higher R&D profits needed.....	17 June 13
Home stretch looks good.....	15 Oct 17
Home dangles \$ half.....	47 Jan 10
Merger pace holds.....	7 May 11
Military's \$4 billion to set record.....	18 Feb 21
Missile market. (The special market report).....	13 Nov 28
Missiles squeeze small firms.....	16 Dec 26
Money on the way.....	36 Feb 21
More big mergers?.....	6 Nov 28
More lenders eye.....	7 Jan 24
More surface missile buying.....	13 Dec 12
More than a stunt.....	7 Jan 24
Navy plans heavy buying.....	24 Mar 7
New business in chemicals.....	15 July 25
Optimism mounts.....	5 Sept 5
OTC market vital to.....	16 April 18
Outfitting new jet airliners.....	20 Nov 14
Plant charge-offs.....	5 May 30
Plant spending firms 20%.....	5 May 30
Primes give small firms 20%.....	26 June 13
Printer narrows speed gap.....	34 Jan 24
Profits come back a-running.....	18 Nov 28

Profits from space.....	5 Aug 8
Profits in 1957: "Fair".....	18 April 4
Proton lenders.....	7 Feb 21
Puerto Rico profits.....	5 July 25
Raising new money.....	5 Mar 7
Reports win awards.....	5 Dec 12
Reveals missile money facts.....	20 May 30
Risk capital on way.....	4 Dec 26
Shipping electronic products.....	18 Oct 3
Slashes prices of transistors.....	5 Oct 31
Small firm pensions.....	5 Oct 31
Spends \$187 million for R & D.....	5 Oct 31
Stock options tempt execs.....	25 Feb 21
Stocks resist drop.....	5 Jan 10
Stock shares and prices for aircraft anticom- bustion system developers.....	5 July 11
Stock shares and prices for atomic plane de- velopers.....	7 Jan 24
Stock shares and prices for electronics firms with interests in telephone business.....	6 Nov 28
Stock shares and prices for firms which made first public stock offering Jan. 1-June 30, 1958.....	6 Sept 19
Stock shares and prices for large electronic firms.....	5 July 25
Stock shares and prices for some electronics manufacturers providing data on R & D ex- penditures.....	5 Nov 14
Stock shares and prices for some missile de- tection system contractors.....	5 Mar 7
Stock shares and prices for typical applied science firms.....	5 Apr 4
Stock shares and prices for typical atomic instrumentation manufacturers.....	5 Sept 5
Stock shares and prices for typical closed- circuit TV manufacturers.....	5 Feb 7
Stock shares and prices for typical data processing equipment manufacturers.....	5 Jan 10
Stock shares and prices for typical general- purpose analog computer manufacturers.....	7 May 16
Stock shares and prices for typical Hi-Fi phono & equipment manufacturers.....	5 June 27
Stock shares and prices for typical magnetic tape manufacturers.....	5 Aug 22
Stock shares and prices for typical manufac- turers of both rubber and electronics prod- ucts.....	5 May 2
Stock shares and prices for typical microwave component manufacturers.....	9 Mar 21
Stock shares and prices for typical missile guidance system manufacturers.....	5 Aug 8
Stock shares and prices for typical missile prime contractors with production contracts.....	5 Apr 18
Stock shares and prices for typical transducer manufacturers.....	7 Feb 21
Stock shares and prices for typical transistor manufacturers.....	5 May 30
Stock shares and prices for typical ultrasonic equipment manufacturers.....	5 June 13
Stock shares and prices for watch and clock franchises.....	5 Oct 31
Street goes scientific.....	7 Feb 21
The budget and us.....	17 Feb 7
Three firms drop prices.....	24 Jan 24
Time for debentures.....	5 Apr 4
WESCON: What you'll see.....	17 Aug 8
What's ahead in 1958?.....	22 Jan 24
Year of the hard sell the.....	20 April 4

COMMUNICATIONS

1958: Radio's biggest year.....	42 Feb 7
Airport antenna goes in runway.....	26 Nov 28
Amplifier for official cars is transistorized.....	22 Dec 12
Automatic radio repeater station.....	27 Feb 7
Boom in small craft.....	44 Feb 7
Broadcast stereo increases.....	46 Nov 14
Cities buy plan multiplex.....	15 Dec 26
Citizens radio sales grow.....	27 Mar 21
Coaxial T-R tube in production.....	25 May 2
Communications employment facts.....	18 May 16
Control freight electronically.....	19 May 16
Count-down receiver for missile crews.....	24 Aug 8
Does each control Red ICBM.....	28 Mar 21
Electronic scan up radar range.....	26 Nov 14
Electronic unit boosts radar echo.....	22 April 18
Electronics rides "piggyback".....	34 May 16
Electronics speeds traffic.....	15 Oct 31
FCC reports odd cases.....	46 Feb 21
FCC weighs business radio.....	18 May 30
Ferrets: cold war insurance.....	16 Aug 22
Ferrite cores gain momentum.....	35 Jan 24
F-M switches capacitors.....	22 Dec 12
Hans can aid in space study.....	38 Mar 21
Hearings due on TV tests.....	29 May 30
Lebanese jammer fights 3 Nasser stations.....	16 June 13
Men back on the farm.....	27 Feb 7
Meteorology relay VHF.....	32 Jan 10
Missiles challenge telemetry.....	15 June 27
Modified CRT may aid air traffic.....	32 Feb 21
NATO gets scatter link.....	24 Sept 5
One-hand idea stirs TV groups.....	26 July 25
Payload for Pioneer III.....	11 Dec 26
Phone conversation are digitized.....	26 Feb 7
Police radio market grows.....	22 Jan 10
Putting Sputnik to work.....	18 June 13
Radar meets space challenge.....	15 April 4
Radar offers high resolution.....	20 Oct 31
Radar radiation hazards.....	15 April 18
Radio—and the moon rockets.....	16 Oct 31
Radio crashes from Curtin.....	17 Sept 19
Radio stations go mobile.....	44 Aug 8
Radio telescope to hear space sounds.....	23 Jan 10
Rare earth ferrites.....	20 July 25
Satellite transmitter uses transistors.....	26 April 4
Science need not be inarticulate.....	20 Jan 10
Sonar: Key to sub war.....	15 June 27
Soviet brass etes home.....	34 Jan 24
Soviet reports on sunspots.....	5 Feb 21
Special users hit FCC plan.....	35 Feb 21
Stock shares and prices for typical microwave component manufacturers.....	9 Mar 21

Tape disks run radio station.....	35 July 11
Tones may control satellites.....	22 Sept 5
Tv radar attracts buyers.....	17 Nov 28
Twenty-One megawatt microwave.....	19 April 18
Undersea radar station.....	20 Sept 19
U. S. radio weak in Midwest.....	22 Mar 7
What's doing in USAF lab.....	17 Oct 17
Wiring by machine.....	48 April 4
Yes and no.....	27 Mar 7

COMPONENTS

Anodize protects magnesium parts.....	17 Dec 26
Automation emerging slowly.....	18 April 18
Capacitor sales on upswing again.....	14 Dec 12
Capacitor takes 1,200 hours wet.....	29 Feb 7
Cells spark new markets.....	23 Sept 5
Ceramic slugs.....	25 Oct 3
Circuit market leveling?.....	23 Mar 7
Circuit micro-sized.....	18 June 27
Coaxial T-R tube in production.....	25 May 2
Company closes TV tube factory.....	9 Feb 7
Easy-matching contact.....	28 Nov 14
Erchant keeps renewing self.....	24 May 2
Etched wiring grows.....	30 May 16
Ferrite cores gain momentum.....	35 Jan 24
Film pots: over 500 C.....	34 Feb 21
Firm develops new silicones.....	30 May 16
Glassed transistors.....	24 April 18
Hot gas insulators.....	24 Oct 3
Imation uses transistors.....	20 June 27
King size.....	33 Mar 7
Link size.....	44 June 13
Measurements at 750 F.....	40 Mar 21
Mica tariff cut.....	26 Sept 19
Millimicrosecond switch.....	26 Sept 19
Missile parts ride merry-go-round.....	31 Jan 24
Motion doubles tube life.....	42 Jan 24
New surge electron motors.....	26 May 2
New standard slashes costs.....	44 Jan 24
One-step circuit production.....	22 July 11
Oilers tubes.....	25 Oct 3
Parts sellers foresee rise.....	31 May 16
Printed circuits getting smaller.....	28 Nov 14
Reds boast of solar battery.....	33 July 11
Rise in tube rise 18 percent.....	26 May 30
Solar generator works to 750 C.....	16 Sept 19
Stock shares and prices for typical tran- sducer manufacturers.....	7 Feb 21
Stock shares and prices for typical magnetic tape manufacturers.....	5 Aug 22
Strip windings tried in coils.....	21 Oct 31
Tantalum hits.....	29 April 4
Tantalum capacitor sales continue upward.....	14 Sept 5
Tape sales increase 33% to \$24 million.....	18 Sept 19
Tape system uses bobbins.....	20 Oct 31
Three firms drop prices.....	34 Jan 24
Transistor sales rise: tubes about steady.....	16 Aug 8
Tube outlook good.....	19 May 30

COMPUTERS AND DATA PROCESSORS

Air-data computer gets checked.....	24 July 25
Another first: share computer.....	46 Jan 10
Army depot uses big computer.....	19 Dec 26
Bankers buy more electronics.....	15 May 2
Bombers shun radiation.....	15 Feb 21
British computer hopes high.....	36 Oct 17
Can machines translate.....	27 Mar 21
Character tubes help defense.....	22 June 13
Civil engineers boost computers.....	44 Feb 7
Computer cracks oil.....	22 Sept 5
Computer shows Japan gaining.....	49 Mar 7
Computer to control power distribution.....	22 June 13
Computer, converter joined.....	49 April 4
Computers direct movies.....	40 Mar 21
Control freight electronically.....	19 May 16
Converter has 2,000 tubes.....	39 Mar 21
Electronics speeds traffic.....	15 Oct 31
Electronics steers test tractor.....	22 May 2
First SAGE center opens.....	24 July 11
Guiding nuclear subs.....	28 Mar 7
In '59—Data meeting.....	23 Feb 21
Japanese computer stores 2,400 bits.....	26 April 4
Man-machine simulator.....	21 Aug 22
Middle East gets computer.....	34 July 25
More computer progress.....	16 Jan 10
More uses for solid-state art.....	35 Feb 21
More unusual war simulator.....	36 Oct 17
New road jobs for computers.....	20 May 16
New system guides missiles.....	21 June 27
Now producing plane computer.....	47 Jan 10
Numerical tool control pushed.....	20 Mar 7
Phone conversations are digitized.....	26 Feb 7
Post office tries sorter.....	34 Jan 24
Printer narrows speed gap.....	27 May 16
Program control uses transistors.....	22 Oct 17
Pushbutton TV stations.....	52 May 16
Simulator starts work.....	16 Oct 3
Stock shares and prices for typical data pro- cessing equipment manufacturers.....	5 Jan 10
Stock shares and prices for typical general- purpose analog computer manufacturers.....	7 May 16
Tape controls coordinate tables.....	34 May 16
Tape disks run radio station.....	35 July 25
Tape system uses bobbins.....	20 Oct 31
Transistors in new RAT.....	49 Feb 21
Tv gets instant ratings.....	48 Jan 10
What's ahead in computers.....	17 Mar 7
Whiskers provide low-temp data.....	26 Feb 7

CONSUMER PRODUCTS

Electronics in tomorrow's cars.....	13 Oct 3
Hi-Fi console sales rise.....	27 Jan 10
Home stretch looks good.....	15 Oct 17
Solid-state lamps now on market.....	26 Nov 28
Vulc toys go electronics.....	16 Dec 12

EXECUTIVES

Baker, Walter R. G., Syracuse University.....	18 Mar 21
Brooks, John G., Slicker Corp.....	10 Feb 7
Burgess, Carter L., American Machine & Foundry.....	12 Apr 4
Cordner, Ralph J., General Electric.....	10 Nov 28
Cresap, Mark W., Westinghouse Electric.....	12 Jan 24

Dunn, Louis G., Space Technology Labora-	10 Oct 31
tories	
Eppert, Ray Russell, Burroughs Corp.	10 June 13
Fisk, James Brown, Bell Telephone Labs.	12 Sept 19
Gavin, James M., A. D. Little	10 May 30
Glennan, T. Keith, National Aeronautics and	
Space Administration	10 Sept 5
Haggerty, Patrick E., Texas Instruments	10 July 11
Hartz, William, Mid-Eastern Electronics	10 Oct 3
Hickernell, Lathimer F., American Institute	
of Physics	10 July 25
Hoffman, Leslie, Hoffman Electronics	14 May 16
Holaday, William M., Guided Missiles Di-	
rector, Dept. of Defense	10 Jan 10
Hope, Stanley C., Soundscribe Corp.	8 Dec 26
Howard, Lewis W., Triad Transformer Corp.	10 Aug 8
Malraunes, Arthur L., Radio Corporation of	
America	10 May 2
Mallory, G. Barron, P. R. Mallory & Co.	10 Oct 17
Metcaff, George F., General Electric	10 Aug 12
Parsons, William S., Globe-Union	10 Apr 18
Ramo, Simon, Ramo-Woodbridge	12 Feb 21
Ridenour, Louis, Lockheed Aircraft	10 Dec 27
Ryan, Philip, Cutler-Hammer, Inc.	10 June 27
Smith, Percy W., General Railway Signa-	
Co.	10 Nov 14
Sprague, Robert C., Sprague Electric	10 Mar 7

FOREIGN ELECTRONICS

Automatic radio repeater station	27 Feb 7
Breakthrough in H-power	46 Feb 7
British computer hopes high	30 Oct 17
Brussels: electronic tooling	42 Aug 8
Canada: TV air submarine show	45 Feb 7
Canadian market looks safe	29 Jan 24
Components gain in Britain	50 May 16
Computer shows Japan gaining	49 Mar 7
Does radio control Red ICBM	28 Mar 21
Electronics in Europe	13 Dec 26
English silicon process licensed	22 July 11
Ferrets: cold war insurance	16 Aug 22
Foreign Aid electronics up	28 June 27
In '59 Data Meeting	23 Feb 21
Is Poland's Door Opening?	58 Mar 21
Japanese computer stores 2,400 bits	26 April 4
Japanese push radiolotopes	40 Sept 19
Lebanese jammer fights U.S. stations	16 June 13
Middle East gets computer	34 Oct 21
Money issue in Latin America	16 June 13
Moscow steals science shows	22 Feb 21
NATO gets scatter link	24 Sept 5
NATO tackles patents	50 Mar 7
Panama invites reexporting	42 Dec 12
Polypromen arrives	24 Jan 24
Progress in British missiles	34 May 2
Radio crashes Iron Curtain	17 Sept 19
Recent export/import trends (special report)	25 Jan 24
Red China: A line on science	44 Nov 14
Red China readies TV gear	36 April 18
Reds boast of Solar battery	33 July 11
Reds plans Sputnik relay	34 Sept 5
Soviet brass elites' hams	19 Oct 24
Soviet reports on susoputs	50 Feb 21
Soviet rocket gear	19 May 2
Soviet translations rushed	15 Jan 24
Soviets test Sputnik instruments	49 April 4
Tax effects curvy French	48 Feb 7
Three-track TV tape system	24 July 25
Tools abroad go electronic	13 Oct 31
Transistors catch British speeders	33 Jan 10
UK tests new reactor gear	36 Oct 3
U. S. radio weak in Mideast	17 Oct 17
U. S. Russian joint earth satellites?	16 Mar 30
USSR shifts industry heads	44 Jan 10
USSR talks up space plans	17 May 30

GOVERNMENT

Agency unifies space work	30 Feb 7
Air day-tv trails "banned"	46 Mar 7
Always blueprint for 1962	13 July 25
A-plane awaits engines	18 Sept 5
Ask national research lab	49 Mar 7
Budget and us	15 Feb 7
Can electronics check peace	14 Sept 25
CD: \$8.7 million	35 Jan 24
FCC reports odd cases	46 Feb 21
FCC weighs business radio	18 May 30
Foreign aid electronics up	28 June 27
Supering out to computer space	15 Mar 7
Hearings due on tv tests	20 Mar 30
If they shake up Pentagon	18 Feb 21
Industry to get space work	36 May 16
Missiles squeeze small firms	16 Dec 26
One-hand idea sirs tv group	26 April 18
Plan new space agency	36 July 25
Post office tries sorter	7 Apr 18
Private tv links win approval	27 May 16
Progress in British missiles	34 May 2
Radio station go mobile	44 Aug 8
Rechts lightening for 7-m	36 May 2
Risk capital on way	4 Dec 26
Soviet translations rushed	15 Jan 24
Special users hit FCC plan	35 Feb 21
What's coming in air control	17 Mar 16
Who'll head space R & D?	15 Mar 7

INDUSTRY

Another first: share computer	46 Jan 10
A reactor goes on-stream	22 Feb 7
Buyers want suppliers nearby	28 Dec 12
Civil engineers boost computers	44 Feb 7
Computer cracks oil	22 Sept 5
Computer to control power distribution	22 June 13
Control freight electronically	19 May 16
Diamond output to leap	34 Jan 24
EIA enjoys \$ surplus	13 June 13
Electronic unit meters corrosion	24 Nov 28
Electronics grows in printing	15 July 11
Electronics stars at fair	13 April 18
Electronics sterilize sutures	20 Feb 21
First quarter earnings	7 May 16
F-M switches capacitors	22 Dec 12
Guide for writing reports	18 July 25
Industrial glue sets in seconds	28 Nov 28
Industry is filling new role	28 Nov 28
Industrial sales hit record high	23 Jan 10
IRE show: broader horizons	34 Mar 21
Kim-sized lead cells	17 Jan 10
Maine dangles \$ bail	18 July 11
Manpower: tightening up?	18 July 11
More computer progress	16 Jan 10
New business in chemicals	15 July 25
Now gear for wind tunnels	15 Aug 8
New road jobs for computers	20 May 16
New standard slashes costs	44 Jan 24
Oscilloscopes check cars	17 Feb 7
Our industry at midyear (special report)	13 Aug 22
Our future in atomics	13 Nov 14
Portable seismograph aids civil engineers	22 April 18

Profits in 1957: "Fair"	18 April 4
Reports win awards	5 Dec 12
Shipping electronic products	18 Oct 3
Silica strains helium from natural gas	20 July 25
Simplex saves money	17 July 25
Stock shares and prices for electronics firms	6 Nov 28
with interests in telephone business	
Stock shares and prices for firms which made	
first public stock offering Jan. 1-June 30,	
1958	6 Sept 19
Stock shares and prices for large electronics	
firms	17 July 25
Stock shares and prices for some electronics	
manufacturers providing data on R & D	
expenditures	5 Nov 14
Stock shares and prices for typical manu-	
facturers of both rubber and electronics	
products	5 May 2
Stock shares and prices for typical ultrasonic	
equipment manufacturers	5 June 13
Stock shares and prices for watch and clock	
firms in electronics	5 Oct 31
Supermarket for engineers	23 Mar 21
Tooling up electronically	15 Nov 14
Ultrasonics judges livestock	19 Dec 26
Use big tubes as furnaces	22 Jan 10
WESCON: What you'll see	17 Aug 8
What's in those reports	20 Feb 7
What's your firm worth?	17 July 11
Women spark plant shifts	20 Jan 24
Year of the hard sell, the	20 April 4

INSTRUMENTS

Can electronics check peace?	15 Sept 5
Controls under scrutiny	20 May 2
Electronic unit meters corrosion	24 Nov 28
Electronics aids in metal studies	26 April 4
Gage aids launchings	22 Oct 3
Gages check cams	21 Aug 22
Instruments find crash causes	26 April 4
Instruments for atomic energy (special report)	
Japanese push radiolotopes	40 Sept 19
Jet vibration tester is mobile	21 July 11
Microscope magnifies 100,000X	27 April 4
More sales to automakers	18 Aug 8
New business in chemicals	15 July 25
New gas tubes	15 Aug 22
Oscilloscopes check cars	17 Feb 7
Our future in atomics	13 Nov 14
Payload for Pioneer III	11 Dec 26
Pickup aids heart study	30 Jan 21
Portable seismograph aids civil engineers	22 April 18
Stocks test Sputnik instruments	49 April 4
Strumentation manufacturers	5 Sept 5
Tones may control satellites	22 Sept 5
Ultrasonic unit photographs arm	26 Feb 7
Ultrasonics judges livestock	19 Dec 26
USSR talks up space plans	17 May 30

MANAGEMENT

Airframe electronics	15 Dec 12
Executive salaries	6 Sept 19
Firms push market research	18 Oct 17
Guide for writing reports	18 July 25
Merger pace holds	5 July 11
More big mergers?	6 Nov 28
Organizing market research	17 Oct 31
Plant charge-offs	5 May 30
Plant spending firm	5 May 30
Science need not be inarticulate	20 Jan 10
Simpler work saves money	17 July 25
Small firm pensions	5 Oct 31
Stock options tempt execs	25 Feb 21
What's in those reports	20 Feb 7
What's your firm worth?	17 July 11

MANPOWER AND EDUCATION

Classroom in space trade	19 Jan 24
College market grows	15 Oct 3
EE grads to increase 20%	18 Feb 7
How to hire sales engineers	19 Sept 19
IRE show: broader horizons	34 Mar 21
Manpower: tightening up?	18 July 11
Street goes scientific	7 Feb 21
Supermarket for engineers	23 Mar 21
Women spark plant shifts	20 Jan 24

MARKETING AND SALES

Airways blueprint for 1962	13 July 25
Alumina sales hit \$3.4 million level	19 Aug 22
Aluminum takes two-cent tumble	24 April 18
Astro now major market	13 May 2
Atomic sales outlook holds	48 April 4
Bell system keeps buying	18 May 2
Business looks for big sales	16 May 2
Broadcasters buying multiplex	15 Dec 26
Capacitor sales on upswing again	14 Dec 12
Cells spark new markets	23 Sept 5
Circuit market leveling?	33 Mar 7
Citizens radio sales grow	40 Dec 12
Closed-circuit tv sales to rise	16 July 25
College market grows	15 Oct 3
Color tv keeps climbing	34 Oct 17
Color tv sales: triple in 2 years?	18 Jan 24
Communications employment facts	18 May 16
Components gain in Britain	50 May 16
Defense spending 17% ahead of year ago	16 July 11
Distribution profits improving	15 May 2
Drone market expanding fast	13 July 30
Electronics growth tops nation's pace	14 Oct 3
Electronics in Europe	13 Dec 26
Etched wiring grows	30 May 16
Factory sales hit \$7.6 billion last year	14 April 18
Ferrets: cold war insurance	16 Aug 22
Fighter market: \$1 billion	13 July 11
Firms push market research	18 Oct 17
Helicopters build new market	13 Aug 8
Hi-fi component sales setting record	14 Nov 14
Hi-fi console sales rise	27 Jan 10
Hi-fi retail sales head for \$ billion level	16 June 27
Home made sales to rise	17 Sept 5
How to hire sales engineers	19 Sept 19
Industrial sales hit record high	23 Jan 10
Industry sales top \$8 billion in '58	16 Feb 7
Instruments for atomic energy	21 May 16
Interceptor missile pile grows	15 Sept 19
Is Poland's door opening?	58 Mar 21
Lead producers seek tariff	26 Feb 7
Long-term sales outlook good	30 Mar 21
Low-cost scenes for color tv	44 April 4
Mica tariff cut	26 Sept 19
Military needs inventions	18 Dec 12
Missile market, The (special market report)	13 Nov 28
Missiles climb	13 Sept 5
Missiles challenge telemetry	13 June 27
Missiles pace defense sales	19 Jan 10
Money issue in Latin America	42 June 13

More sales to automakers	18 Aug 8
New England eyes R & D payoff	23 Nov 14
Organizing market research	17 Oct 31
OTC market vital to us	16 April 18
Our industry at midyear (special report)	13 Aug 22
Outfitting new jet airliners	20 Nov 14
Panama invites reexporting	42 Dec 12
Parts sellers foresee rise	31 May 16
Plato creates new market	49 Feb 1
Profit radio market grows	18 June 13
Recruit circuit getting smaller	28 Nov 14
Relief come back a stunning	18 Nov 28
Recent export/import trends (special report)	25 Jan 24
Relay sales to rise 18 percent	14 May 30
Research spreads	5 Feb 7
Rise seen in taped tv	44 Sept 19
Rising sales predicted at NEC	16 Oct 17
Sales increase coming in tape recorders	16 Oct 17
Silicon cheaper	19 May 30
Silicon supply to pass needs	34 Feb 21
Stereo boosts hi-fi market	17 June 27
Tantalum bind ends	29 April 4
Tantalum capacitor sales continue upward	14 Sept 5
TV sales increase \$300 to \$24 million	15 Sept 19
Transistor output hits new monthly peak	16 Oct 31
Transistors push \$100 million	15 May 30
Transistor sales \$70 million in 1957	16 Mar 7
Transistor sales rise; tubes about steady	16 Aug 8
Transistors: 600 types	33 Mar 7
Tube outlook good	29 May 30
TV first set market nears saturation	25 Mar 21
TV radar attracts buyers	17 Nov 28
TV set sales to climb 15% in 1959	14 Dec 26
TV tapes top 100 mark	54 Mar 21
Ultrasonics judges livestock	19 Dec 26
Weather probe begins	28 Sept 19
West posts 23% of industry's 1957 sales	14 June 13
Yule toys go electronic	16 Dec 12

MATERIALS

Air force gets prefab radome	19 May 30
Alumina sales hit \$3.4 million level	19 Aug 22
Aluminum takes two-cent tumble	24 April 18
Ando cooler	29 Aug 22
Barium titanate measures heat	28 Nov 14
Copper hits bottom	28 Feb 7
Diamond output to leap	34 Jan 24
Electronics aids in metal studies	26 April 4
English silicon process licensed	22 July 11
Explosion forming	24 Oct 17
Film pots: over 500 C.	34 Feb 21
Firm develops new silicones	30 May 16
Industrial glue sets in seconds	28 Nov 28
Lab makes film in 2 dimensions	40 Mar 21
Laminating film needs no glue	24 May 2
Lead and zinc imports pared	25 Oct 17
Lead producers seek tariff	35 Feb 21
Liquids cools inertial components	24 Sept 19
Makes zinc foil by new method	24 Oct 3
Magnesium plate is electroless	18 June 27
Microscope magnifies 100,000X	27 April 4
Mines sponsor research study	31 May 16
Loaded phosphor samples available	19 June 25
New aluminum alloys	19 Aug 22
New gasket material made	21 July 25
New HDP won't keep burning	24 Oct 3
New insulators to cool helium	26 Dec 12
New plastic in pilot production	29 Nov 14
New plastic output soars	28 Feb 7
New tube ceramic	40 Mar 21
Nonferrous is ferromagnetic	23 July 11
Phosphors as amplifiers	26 Nov 28
Plasma jet plater	17 Dec 26
Plastics plant	24 April 18
Plastic radomes take 500-2,500 F	33 Mar 7
Plastic stands up to 6,500 F	19 Aug 22
Polypropylene arrives	24 Jan 24
Quick piezoelectrics	23 Sept 5
Rare earth ferrites	20 July 25
Semiconductors can beat heat	24 June 13
Silicon cheaper	19 May 30
Silica strains helium from natural gas	20 July 25
Silicon supply to pass needs	34 Feb 21
Slabs absorb shock	28 Dec 12
Solder: more strength	21 Oct 31
Solving reentry problems	13 Sept 5
Synthetic quartz	17 Dec 26
Thin film bond ends	20 Apr 17
Tar brightens ten plate	34 Feb 21

MEDICAL ELECTRONICS

Amputees may use electronics	32 Jan 10
Cancer projects surgical procedures	32 Oct 3
Electronics gives beat	24 Mar 7
Electronics rides "piggyback"	34 May 16
Electrons sterilize sutures	20 Feb 21
Monitors ring A-bomb test	14 June 13
Pickup aids heart study	30 Jan 24
Ultrasonic unit photographs arm	26 Feb 7

MILITARY

Agency unifies space work	30 Feb 7
Air force cites needs	57 Mar 21
Air force outlines projects	42 Mar 21
Army depot uses big computer	19 Dec 26
Army shows missile trends	26 July 25
Bombers: present and future	13 Feb 21
Bombers shun radiation	15 Feb 7
Character tubes help defense	22 June 13
Contracting criticized	18 June 27
Contracting criticized	9 Mar 21
Controls under scrutiny	20 May 2
Counter-ICBM spending due	17 Oct 3
Defense asks \$2 billion	56 Mar 21
Defense spending 17% ahead of year ago	16 July 11
Drone market expanding fast	13 May 30
Electronics in Europe	13 Dec 26
Ferrets: cold war insurance	16 Aug 22
Fighter arms stockpile swells	13 Oct 17
First SAGE center opens	24 July 11
Funds eye military	5 June 27
If they shake up Pentagon	18 Feb 21
Industry is filling new role	28 Nov 28
Ions make trouble at least 10	13 Mar 7
Man-rocket guidance ready	22 Oct 31
Military needs inventions	18 Dec 12
Military spending continues to climb	17 April 4
Military's \$4 billion to set record	19 Feb 21
Missiles pace defense sales	19 Jan 10
Money issue in Latin America	30 Nov 14
Moon push underway	26 Apr 18
NATO sparks production	34 Jan 10
Navaho: a helpful ghost	26 Oct 3
Navy eyes electron motors	26 May 2
Navy plans heavy buying	34 Mar 7
Navy probes space	24 Jan 10
Navy system for simular	30 Nov 14
New guidance gear sought	20 Dec 26
New system guides missiles	21 June 27

Nike-Zeus orders coming.....	26 Oct 17
Noise on defense.....	21 Feb 7
Nuclear navy gets largest sub.....	18 Aug 22
Nuclear navy gets electronic.....	15 June 13
Our industry at midyear.....	13 Aug 22
Primes give small missile.....	26 June 13
SAC's weapons timetable.....	15 June 27
Sonar: key to sub war.....	15 June 27
Transistors in new RAT.....	19 Feb 21
Undersea radar station.....	20 Sept 19
Weather: better for us?.....	32 Jan 24
Weather probe beams.....	28 Sept 19
What's ahead in ICBM's.....	22 Mar 7
What's doing in USAF labs.....	22 Mar 7

MISSILES AND SATELLITES	
Army shows missile trends.....	26 July 25
Big noise maker.....	26 Dec 12
Computers direct movies.....	49 April 4
Control wiring failed Vanguard.....	35 Feb 21
Count-down receiver for missile crews.....	24 Aug 8
Counter-ICBM spending due.....	24 Aug 8
Does radio control red ICBM.....	28 Mar 21
Earthbound turntable tests Thor gyros.....	32 Feb 21
Electronics may solve reentry problem.....	26 Mar 7
Fighter arms stockpile swells.....	13 Oct 17
Guidance for Explorer's rocket.....	17 Feb 21
Guiding nuclear subs.....	28 Mar 7
Hans can aid in space study.....	28 Mar 21
Inside our satellite.....	48 Feb 21
Interceptor missile pile grows.....	15 Sept 19
Making a missile brain.....	26 Feb 21
Man into space.....	18 Oct 31
Man-rocket guidance.....	22 Oct 31
Missile market. The (special market report).....	13 Nov 28
Missile ohmmeters use photo cells.....	39 Mar 21
Missile parts ride merry-go-round.....	31-Jan 24
Missile systems sales climb.....	18 Aug 22
Missiles challenge telemetry.....	13 June 27
Missiles pace defense.....	19 Jan 10
Missiles squeeze small firms.....	16 Dec 26
Moon photos hoped for.....	22 Aug 22
Moon push underway.....	26 April 18
More space studies due.....	22 Oct 17
More surface missile buying.....	13 Dec 8
NATO sparks production.....	34 Jan 10
Navaho: a helpful ghost.....	26 Oct 26
New guidance gear sought.....	20 Dec 26
New system guides missiles.....	21 June 27
Nike-Zeus orders coming.....	26 Oct 17
Payload for Pioneer III.....	11 Dec 26
Plate creates new market.....	49 Feb 21
Progress in British missiles.....	34 May 2
Radar meets space challenge.....	15 April 4
Radio—and the moon rockets.....	16 Oct 31
Reds plan Sputnik tv-relay.....	34 Sept 5
Beyonds missile money facts.....	20 May 30
Solving reentry problems.....	13 Sept 5
Soviet rocket gear.....	19 May 2
Stock shares and prices for typical missile prime contractors with production contracts.....	5 Apr 18

Stock shares and prices for some missile detection systems.....	5 Mar 7
Stock shares and prices for typical missile guidance system manufacturers.....	5 Aug 8
Tones may control satellites.....	22 Sept 5
Twenty-one megawatt microwave.....	19 April 18
U. S.-Russian joint earth satellite?.....	16 May 30
USSR talks up space plans.....	17 May 30
What's ahead in ICBM's.....	22 Mar 7
What's new about Explorer III.....	35 Mar 21
Why Explorer beeped again.....	49 Mar 7

PATENTS	
Color tv patent pool studied.....	36 Nov 28
Military needs inventions.....	18 Dec 12
NATO tackles patents.....	50 Mar 7
Recent export/import trends.....	25 Jan 24

PRODUCTION	
Airplane makers to share tapes.....	45 Feb 7
Anodize protects magnesium parts.....	17 Dec 26
Automation emerging slowly.....	18 April 18
Brussels: electronic tooling.....	42 Aug 8
Easy-matching contact.....	28 Nov 14
Electronic inductor.....	24 Sept 19
Ethanol keeps renewing self.....	24 May 2
Explosive forming.....	24 Oct 17
Factory sales hit \$7.6 billion last year.....	14 April 18
Film pots: over 500 C.....	34 Feb 21
Gages check cams.....	21 Aug 22
Laminating in glue.....	28 Sept 19
Magnesium plate is electroless.....	18 June 27
Making a missile brain.....	26 Feb 21
Military spending continues to climb.....	17 April 4
New method bonds plastics.....	24 Jan 24
Numerical tool control pushed.....	20 Mar 7
One-step circuit production.....	17 Dec 26
Plasma jet plater.....	17 Dec 26
Program control uses transistors.....	22 Oct 17
Quick piezoelectrics.....	23 Sept 5
Ripples hasten dip soldering.....	25 April 18
Solder: more strength.....	21 Oct 31
Strip windings tried in coils.....	21 Oct 31
Tape controls coordinate table.....	34 May 16
Tar brightens tin plate.....	34 Feb 21
Tooling up electronically.....	15 Nov 14
Tools abroad go electronic.....	13 Oct 31
Use big tubes as furnaces.....	22 Jan 10
Wiring by machine.....	48 April 4

REGIONAL DEVELOPMENTS	
A reactor goes on-stream.....	22 Feb 7
Buyers want suppliers nearby.....	19 Jan 24
Classroom tv makes grade.....	19 Jan 24
New England eyes R & D payoff.....	23 Nov 14
Oregon taxes drop.....	44 Jan 24
Using more C-C tv.....	49 Mar 7

RESEARCH AND DEVELOPMENT	
Ask national research lab.....	49 Mar 7
Breakthrough in H-power.....	46 Feb 7
Bombers: present and future.....	23 Feb 21
Can machines translate?.....	26 Mar 21
Electronic car control nears.....	44 Feb 7
Electronic scan ups radar range.....	26 Nov 14
Electronics gives beat.....	24 Mar 7
Electronics in tomorrow's cars.....	13 Oct 31
Electrons may solve reentry problem.....	26 Mar 7
Electronics R & D.....	5 Nov 14
Electronics steers test tractor.....	22 May 2
Electronics to aid eclipse studies.....	24 Aug 8
Ferrite microwave amplifier developed.....	32 Feb 21
Higher R & D profits needed.....	17 June 13
Industry to get space work.....	36 May 16
Infrared collision warning proposed.....	27 Mar 7
Ions make trouble for mach in.....	24 Sept 19
Liquid coils building components.....	24 Sept 19

Magnetic valve redetermined.....	27 Sept 19
Making a missile brain.....	26 Feb 21
Man-machine simulator.....	21 Aug 22
Mapping the heavens.....	48 Mar 7
Maser operates at 2 degrees K.....	30 Jan 24
Minors sponsor research study.....	31 May 16
Moon push underway.....	26 April 18
Moscow steals science shows.....	29 Feb 21
Navy probes space.....	24 Jan 10
New aluminum alloys.....	19 Aug 22
New England eyes R & D payoff.....	23 Nov 14
Nonferrous is ferromagnetic.....	23 July 11
Photons as amplifiers.....	26 Nov 28
Radar radiation hazards.....	15 April 18
Research in a vacuum.....	24 May 2
Research spreads.....	5 Feb 7
Semiconductors can beat heat.....	24 June 13
Slabs absorb shock.....	26 Dec 12
Soviet reports on sunspots.....	50 Feb 21
Spends \$187 million for R & D.....	5 Oct 31
Stock shares and prices for typical applied science firms.....	5 Apr 4
Tomorrow's new horizons?.....	17 Jan 24
What's ahead in 1958?.....	22 Jan 24
What's ahead in computers.....	17 Mar 7
What's coming in control.....	17 May 16
What's doing in USAF labs.....	22 Mar 7
Whiskers provide low-temp data.....	26 Feb 7
Who'll head space R & D?.....	15 Mar 7
Zeta's Torus gets checked.....	22 April 18

SOLID-STATE DEVICES	
All-transistor tv is announced.....	30 Jan 24
Ferrite microwave amplifier developed.....	32 Feb 21
Gage aids launchings.....	22 Oct 3
Glassed transistors.....	24 April 18
Integrations used in control.....	20 June 2
Maser operates at 2 degrees K.....	30 Jan 24
Millimicrosecond switch.....	26 Sept 19
Missile ohmmeters use photo cells.....	39 Mar 21
More use for solid-state art.....	35 Feb 21
Photons as amplifiers.....	26 Nov 28
Ruby maser for new telescope.....	23 Sept 5
Satellite transmitter uses transistors.....	26 April 4
Semiconductors can beat heat.....	24 June 13
Silicon supply to pass needs.....	34 Feb 21
Slashes prices of transistors.....	49 Feb 21
Solid-state lamps now on market.....	26 Nov 28
Stock shares and prices for typical transistor manufacturers.....	5 May 30
Transistor output hits new monthly peak.....	16 Aug 8
Transistor sales rise: tubes about steady.....	16 Aug 8
Transistors: 600 types.....	33 Mar 7
Transistors catch British speeders.....	33 Jan 10
Transistors in new RAT.....	49 Feb 2
Transistors push \$100 million.....	15 May 30
Transistors regulate high power.....	33 Feb 21
Transistor sales \$79 million in 1957.....	16 Mar 7
What's ahead in computers.....	17 Mar 7
Whiskers provide low-temp data.....	26 Feb 7

SPACE ELECTRONICS	
Air Force unifies space work.....	30 Feb 7
Air Force cites needs.....	57 Mar 21
Air Force outlines projects.....	42 Mar 21
Astro now major market.....	33 Feb 21
Control wiring failed Vanguard.....	35 Feb 21
Electronics in space.....	25 Mar 21
Electronics to aid eclipse studies.....	24 Aug 8
Gearing up to conquer space.....	15 Mar 7
Guidance for Explorer's rocket.....	17 Feb 21
Hans can aid in space study.....	28 Mar 21
Insists to get space work.....	36 Feb 16
Inside our satellite.....	48 Feb 21
Man into space.....	18 Oct 31
Moon photos hoped for.....	22 Aug 22
Moon probe carries electronics package.....	26 Nov 14
Moon push underway.....	26 April 18
Mapping the heavens.....	48 Mar 7
Metors relay VIII signal.....	22 Jan 10
More space studies due.....	22 Oct 17
Navy probes space.....	24 Jan 10
Payload for Pioneer III.....	11 Dec 26
Plan new space agency.....	5 Apr 18
Profits for space.....	25 Aug 8
Putting Sputnik to work.....	22 Jan 10
Radar meets space challenge.....	15 April 4
Radio—and the moon rockets.....	16 Oct 31
Radio telescope to hear space sounds.....	35 Jan 24
Reds boast of solar battery.....	33 July 11
Research in vacuum.....	24 May 2
Ruby maser for new telescope.....	23 Sept 5
Solving reentry problems.....	13 Sept 5
Soviet rocket gear.....	19 May 2
Soviets test Sputnik instruments.....	49 April 4
Tomorrow's new horizons?.....	17 Jan 24
U. S.-Russian joint earth satellite?.....	16 May 30
USSR talks up space plans.....	17 May 30
What's doing in USAF labs.....	22 Mar 7
What's new about Explorer III.....	35 Mar 21
Who'll head space R & D?.....	15 Mar 7
Why Explorer beeped again.....	49 Mar 7

TELEVISION	
Air pbs-tv trails "banned".....	46 Mar 7
All-transistor tv is announced.....	30 Jan 24
Canada tv airs subliminal show.....	45 Feb 7
Classroom tv makes grade.....	19 Jan 24
Closed-circuit tv sales to rise.....	16 July 25
Color tv keeps climbing.....	34 Oct 17
Color tv patent pool studied.....	36 Nov 28
Color tv projects surgical procedures.....	22 Oct 3
Color tv sales: triple in 2 years?.....	18 Jan 24
Company closes tv tube factory.....	29 Feb 7
Hearings due on tv tests.....	29 May 30
Live tv uses vidicon chains.....	44 June 13
Low-cost scenes for color tv.....	44 April 4
More than a stunt.....	7 Jan 24
Motion double tube Hfs.....	17 Jan 24
New guidance gear sought.....	20 Dec 26
One-band idea stirs tv groups.....	26 July 25
Pilots get tv map.....	26 Mar 7
Private tv links win approval.....	36 Sept 5
Pushbutton tv stations?.....	32 May 16
Red China ready tv work.....	36 April 18
Reds plan Sputnik tv-link.....	33 Sept 5
Rise seen in taped tv.....	44 Sept 19
Simulator starts work.....	16 Oct 3
Stock shares and prices for typical closed-circuit manufacturers.....	5 Feb 7
Tv offset war.....	48 Feb 7
Three-track tv tape system.....	25 July 25
Tv first-set market nears saturation.....	25 Mar 21
Tv gets instant ratings.....	48 Jan 10
Tv in atomic power plan.....	17 June 27
Tv radar attracts buyers.....	17 Nov 28
Tv rating system starts work.....	24 Oct 3
Tv set sales to climb 15% in 1959.....	14 Dec 26
Tv tapes top 100 mark.....	34 Mar 21

U. S.-Russian joint earth satellites?.....	16 May 30
Using more C-C tv.....	49 Mar 7

TRANSPORTATION	
Bombs in small craft.....	44 Feb 7
Cities buy, plan.....	27 Mar 21
Electronic car control nears.....	44 Feb 7
Electronics in tomorrow's cars.....	13 Oct 31
Electronics speeds traffic.....	15 Oct 31
Modified CRT may aid air traffic.....	32 Feb 21
Oscilloscopes check cars.....	17 Feb 7
Transistors catch British speeders.....	33 Jan 10
Using more C-C tv.....	49 Mar 7

AUTHORS INDEX	
De Jongh, E., Our industry at midyear.....	13 Aug 22
Janis, H. K., Recent export/import trends.....	25 Jan 24
Mason, J. F., The missile market.....	13 Nov 28
Sideris, G., Instruments for atomic energy.....	21 May 16

BUSINESS BRIEFS INDEX

AIRCRAFT	
17 Airlines order new jet trainer.....	16 Oct 10
Aircraft A-power program widens.....	16 May 9
Airline installs reserving unit.....	18 Nov 21
Airline orders \$16 million unit.....	18 Aug 1
Airlines to test infrared warning.....	8 June 6
Air plan means more business.....	8 Jan 17
Airport tv cuts blind spot.....	18 July 4
Armed forces disclose needs.....	8 June 20
Attitude display for helicopter.....	14 Aug 29
Aviation center to test aids.....	8 Aug 1
Copiers get new electronic aid.....	12 Aug 1
Decoder shows plane number.....	12 Aug 15
Exec planes use flight phones.....	16 Aug 1
Fast-scan radar has long range.....	12 Jan 11
Flourishing control booth.....	18 Sept 26
Fuel gage sales hit \$20 million.....	16 Jan 3
Improving I-G systems.....	8 Feb 28
Inertial system to guide alt-15.....	16 June 20
Jets boosting computer calls.....	16 Feb 14
Loudspeaker checks jets.....	14 July 4
New air fleets get radar gear.....	14 Apr 25
New infrared is all electronic.....	8 Feb 28
Reveals USAF's weapons plans.....	8 May 23
Selective tones signal aircraft.....	16 Nov 7
Space age needs manned aircraft.....	12 Mar 14
Tanker plane market grows.....	12 Apr 11
Taxi radar spots planes.....	8 July 18
Test copier systems.....	8 Oct 10

AUDIO	
Audiot will star at British show.....	16 Aug 15
Big stereo push coming.....	18 Aug 15
Buy 1,385 new players for blind.....	18 Sept 26
New stereo disk uses f-m carrier.....	13 Feb 28
Station tries stereo multiplex.....	16 July 18
Style '58 key in hi-fi, tv.....	14 Jan 31

BUSINESS AND FINANCE	
AEC costs up \$400 million.....	12 Jan 17
AF: \$1 1/2 billion to small firms.....	18 Jan 31
Aircraft A-power program widens.....	16 May 9
Airline orders \$16 million unit.....	18 Aug 1
Air plan means more business.....	8 Jan 17
A-plant control bill \$1.9 million.....	12 May 9
Automobile radar seen as market.....	18 June 20
Big stereo push coming.....	18 Aug 15
British exports setting record.....	12 Dec 19
Buy 1,385 new players for blind.....	18 Sept 26
C-C tv speeds freight.....	14 Dec 19
Columbia run water desalter.....	14 Nov 7
Columbia to buy upgrading plan.....	12 Feb 28
Computer corrects itself.....	14 June 20
Costs of R & D increase 4%.....	14 Sept 26
Dial two ways in new systems.....	14 Apr 25
Electronic desk.....	14 June 6
Electronics gets major fusion job.....	14 Mar 28
Engineers study executive roles.....	18 May 23
Financing for tomorrow.....	16 Oct 2
F-m triplecasts seen profitable.....	16 Mar 14
Forces' upkeep \$20 million daily.....	12 Jan 17
Fuel gage sales hit \$20 million.....	16 Jan 3
Fusion boosts electronics role.....	14 Feb 28
Gas plans to buy more gear.....	18 Nov 21
IRE show probes future.....	8 Mar 14
Japanese forming new trade group.....	16 Apr 11
Military backlog \$4.9 billion.....	8 May 23
Mobile counters track radiation.....	16 Feb 28
Mobile radio to double by 1968.....	16 May 23
Antiklystron causes stir.....	8 Apr 25
Armed forces disclose needs.....	8 June 20
Army installs speedy printer.....	12 Nov 21
Army teleprinter hits 2,000 WPM.....	14 Jan 20
Army testing Talos.....	8 July 4
Army to test giant antenna.....	16 Dec 5
Automobile radar seen as market.....	18 June 20
Business band starts Aug. 1.....	18 July 18
Checking ramjet missile.....	18 Sept 12

COMMUNICATIONS	
Air Force using time-share link.....	12 Nov 7
Airlines to test infrared warning.....	8 June 6
Antiklystron causes stir.....	8 Apr 25
Armed forces disclose needs.....	8 June 20
Army installs speedy printer.....	12 Nov 21
Army teleprinter hits 2,000 WPM.....	14 Jan 20
Army testing Talos.....	8 July 4
Army to test giant antenna.....	16 Dec 5
Automobile radar seen as market.....	18 June 20
Business band starts Aug. 1.....	18 July 18
Checking ramjet missile.....	18 Sept 12

Cite advances in h-f power tubes	16 Apr 11
Civil defense test program	16 June 6
Control cuts cochannel noise	16 Apr 25
Data unit aims radar at moon	16 Apr 25
Decoder shows plane number	12 Aug 15
Dial two ways in new systems	14 Apr 25
Electronic desk	14 June 6
Exec planes use flight phones	16 Aug 1
Fast-scan radar has long range	16 Feb 28
F-m controls street lights	16 Sept 26
F-m triplecasts seem profitable	16 Mar 14
Han network lists lectures	18 Nov 7
IRE convention hears "spectrum stretchers"	8 Mar 28
Isolating radar "angles"	8 Dec 5
Japanese radio	16 Nov 7
Makes radar's "missing link"	16 Jan 3
Microwave group probes solid state	18 May 23
Microwave licks rugged terrain	18 Aug 1
Mobile counters track radiation	16 Feb 28
Mobile radio to double by 1968	16 May 23
Network plans rural step-up	14 Jan 17
New air fleets get radar gear	14 Apr 25
New lab tests systems	14 Sept 12
New market in private weather forecasting	16 Jan 17
New microwave installations	16 Mar 28
New unit guards shopping center	16 Nov 21
Pioneer F-3 payload	18 Nov 7
Polaris telemeter	8 May 9
Radio controls seaway traffic	18 Feb 28
Radio eases tunnel traffic	14 Sept 26
Radio paging field spreads	18 Sept 12
Radio to run traffic in N. Y.	18 Aug 15
Railroads launch electronics use	14 Sept 26
Satellite eye	18 Apr 25
Seek new f-m radio uses	16 Aug 1
Sees transistors opening new era	16 Dec 19
Selective tones signal aircraft	16 Nov 7
Station tries stereo multiplex	16 July 18
Subs use Navaho's guidance	8 Aug 29
System monitors TV programming	20 Dec 5
Taxi radar spots planes	8 July 18
Transistors run pipeline webs	18 June 6
Vanguard gear in Explorer	8 Feb 14
Waveguide form ship-radar lens	15 Aug 16

COMPUTERS AND DATA PROCESSORS	
17 Airlines order new jet trainer	16 Oct 10
10,000-transistor computer out	12 May 23
Airline installs reservation unit	18 Aug 1
Airline orders \$16 million unit	18 Aug 1
Analog helps design autos	14 Feb 14
Armed forces disclose needs	8 June 20
Attitude display for helicopter	14 Aug 29
Automobile radar seen as market	18 June 20
Canadians test electronic sorter	14 Apr 25
Computer corrects itself	14 June 20
Control system learns jobs	14 Dec 5
Driving with no hands	18 Feb 28
Electronic cars: how soon?	14 May 23
Electronic machine line	8 Mar 28
Electronic trace	16 May 23
Japanese make giant computer	12 Apr 25
Japan producing better Mark IV	14 July 18
Jets boosting computer calls	16 Feb 14
Magnetic disk delivers 12-v	16 Jan 31
Magnetic disk may speed computers	12 Dec 5
Magnetic papers: new trends	8 Aug 29
Meteorology computers	18 Mar 14
More process controls	8 Sept 26
NEREM spotlights design techniques	16 Nov 21
New computers announced	12 Jan 31
New computers shown on coast	18 May 23
New equipment for moon shot	8 Apr 11
New jobs for computers	8 Dec 19
New lab tests systems	14 Sept 12
New simulator	14 July 18
Numbers run new system	8 Sept 26
Phototube control sets printed page	18 Mar 14
Push computer input storage	8 Jan 3
Rolling seats by computer	18 Feb 28
Sky sentinels use computer	18 July 18
Sorting unit set for British P. O.	14 Sept 12
System counts press runs	16 Feb 14
Use electronics to sort	8 May 9

FOREIGN ELECTRONICS	
Audio will star at British show	16 Aug 15
BRC perfects video recorder	14 May 23
Biggest atomic conference	8 Sept 12
British exports setting record	12 Dec 5
Canadians test electronic sorter	14 Apr 11
Discuss color tv world standards	14 June 6
Economics slows updating abroad	12 Oct 24
French reveal new amplifier	16 Feb 14
Japanese forming new trade group	16 Apr 11
Japanese get transistor queries	8 Dec 5
Japanese make giant computer	12 Apr 25
Japanese radio	16 Nov 7
Japan producing better Mark IV	14 July 18
Needles wind Russian cores	14 Aug 1
New avalanche devices pushed	14 July 4
Sorting unit set for British P. O.	14 Sept 12
Soviet discloses lunar probe gear	8 Nov 21
Soviets describe huge microscope	18 Apr 25
Tv construction booms overseas	14 Dec 19
Tv searches inside reactor	16 Sept 12
USSR plans more industrial gear	14 June 6
Waveguides form ship-radar lens	16 Aug 15

GOVERNMENT	
AEC costs up \$400 million	12 Jan 17
AEC reveals fusion plans	8 June 6
Aircraft A-power program widens	16 May 9
Aviation center to test aids	8 Aug 1
Business band starts Aug. 1	18 July 18
Buy 1,385 new planes blind	18 Sept 26
Civil defense tests alarm	16 June 6
Community tv outside FCC	18 Apr 25
Defense jobs speed updating	14 Oct 24
F-m controls street lights	14 Sept 26
New insulators attracts firms	14 Sept 12
Radio eases tunnel traffic	14 Sept 26
Radio to run traffic in N. Y.	18 Aug 15
Seek new f-m radio uses	16 Aug 1
Standards set for color tv	8 Sept 12
Test "copter systems"	8 Oct 10
Tv aids airport stimulation	8 Nov 21
Tv S. relaxes nickel rules	14 July 4

INDUSTRY	
Analog helps design autos	14 Feb 14
A-plant control bill \$1.9 million	12 May 9
Army sets module specs	16 June 20
Biggest atomic conference	8 Sept 12
Canadians test electronic sorter	14 Apr 11
C-7 tv speeds freight	14 Dec 19
Circuitry run water cooler	14 Nov 7
Columbia tells upgrading plan	12 Feb 28
Defense jobs speed updating	14 Oct 24
Economics slows updating abroad	12 Oct 24

EE grads soon find jobs	16 Oct 10
Electronic cars: how soon?	14 May 23
Engineers study executive roles	8 Mar 28
Feedback runs tin late line	18 May 23
Few plants are obsolete	8 Oct 24
Financing for tomorrow	16 Oct 24
Gas pipers to buy more gear	18 Nov 7
Headlight aimer	14 Apr 25
IRE convention hears "spectrum stretchers"	8 Mar 28
Larger firms set west coast pace & D.	16 Aug 29
MIT reactor aids components R & D.	16 Aug 29
Modernizing tops midwest projects	18 Oct 24
NEC offering varied program	9 Oct 10
NEREM spotlights design techniques	16 Nov 21
New computers announced	12 Jan 31
New conference idea succeeds	12 Dec 19
New England to exhibit products	18 Nov 7
New institute attracts firms	15 Sept 12
New materials make hit	8 Nov 7
New plastics uses coming	14 Nov 21
New seismic amplifier	14 Nov 21
New simulator	14 July 18
Packing goes electronic	8 June 20
Phototube control sets printed page	18 Mar 14
Push computer input storage	8 Jan 3
Radio controls seaway traffic	18 Feb 28
Reliability seen key to space	8 July 4
Retrails seek west coast pace & D.	16 Dec 5
Sound waves weld seams	14 Feb 14
Space electronics group formed	14 Dec 19
Spectrometers in production	12 Jan 3
Spending rises in New England	18 Oct 24
Transistors run pipeline webs	18 June 6
Tv electronics to sort	8 May 9
USSR plans more industrial gear	14 June 6
WESCON awaits 30,000	8 Aug 1
Workers follow taped orders	18 June 20
X-rays measure fruit freezing	8 Apr 11

MATERIALS	
Electronics probes missile's fluids	16 Sept 26
Magnetic rod may speed computers	12 Dec 5
New jobs for computers	8 Apr 11
New materials make hit	8 Nov 7
New plastics uses coming	14 Nov 21
Sound waves weld seams	14 Feb 14
Soviets describe huge microscope	18 Apr 25
Spectrometers in production	12 Jan 3
U. S. relaxes nickel rules	14 July 4

MEDICAL ELECTRONICS	
Electronics aids vision studies	12 Sept 12
New defectors help research	16 Mar 28
New gear makes 3-D X-ray films	14 Aug 1
New jobs for computers	8 Apr 11
Sound cleans surgical tools	16 May 9
Space challenge to electronics	14 Mar 14
Tv stereo disc uses f-m carrier	14 Feb 28
WESCON offers timely panels	18 Aug 15
X-ray amplifier cuts exposure	12 Oct 10

MILITARY	
AF: \$1 1/2 billion to small firms	8 Jan 31
Air Force using time-share link	12 Nov 7
Armed forces disclose needs	8 June 20
Army installs speed printer	12 Nov 21
Army sets module specs	16 June 20
Army teleprinter hits 2,000 WPM	18 May 23
Army testing Talos	8 July 4
Army to test giant antenna	16 Dec 5
Counter monitors fuse assemblies	16 July 18
Forces' upkeep \$20 million daily	12 Jan 17
Han network lists lectures	18 Nov 7
I-4 in Titan "exceeds hopes"	12 Mar 28
Magnetics control Triton	14 Oct 10
Meteorology computers	18 Mar 14
Microwave licks rugged terrain	18 Aug 1
Military backlog \$4.9 billion	8 May 23
Missile system goes to sea	8 Dec 19
New equipment for moon shot	8 Feb 28
New infrared is all electronic	8 Feb 28
New sub killer in action	18 Mar 14
New weapon	14 Mar 14
Outlines future military needs	8 Apr 25
Reactor control is transistorized	12 Aug 29
Reveals USAP's weapons plans	18 May 23
Sky sentinels use computer	18 July 18
Subs to get new antisub rockets	8 July 18
Subs use Navaho's guidance	8 Aug 29
Up and away	8 Feb 28
WESCON offers timely panels	18 Aug 15
Wraps off Thor's guidance	16 Jan 31

MISSILES AND SATELLITES	
Army testing Talos	8 July 4
Checking ramjet missile	18 Sept 12
Electronics probes missile's fluids	16 Sept 26
Gnat gyros for small missiles	18 May 9
I-4 in Titan "exceeds hopes"	12 Mar 28
Improving I-G systems	8 Feb 28
Inertial system for X-15	16 June 20
Infrared scans reentry	8 Aug 15
Instruments get space tests	14 Aug 29
Missile system goes to sea	8 Dec 19
Moon shot on the way?	8 Apr 11
New infrared is all electronic	8 Feb 28
New sub killer in action	18 Mar 14
New weapon	14 Mar 14
Pioneer F-3 payload	18 Nov 7
Polaris telemeter	8 May 9
Ready to record satellite passes	16 Jan 3
Satellite eye	18 Apr 25
Satellite's eye needs tv retina	8 May 9
Soviets describe lunar probe gear	8 Nov 21
Subs use Navaho's guidance	8 Aug 29
Testing moon as reflector	14 Jan 3
Thermonuclear propulsion eyed	14 Apr 11
Thor gets moon task in months	12 June 6
Up and away	8 Feb 28
Vanguard gear in Explorer	8 Feb 14
Von Braun says "5 more firings"	8 Mar 14
Wraps off Thor's guidance	16 Jan 31

PRODUCTION	
Accelerating radiography	18 Oct 10
Automatic feed	20 Dec 5
Control system learns job	12 Dec 5
Counter monitors fuse assemblies	16 July 18
Electronic machine line	8 Apr 25
Electronic trace	16 May 23
Feedback runs tinplate line	18 May 23
Few plants are obsolete	8 Oct 24
Gnat gyros for small missiles	18 May 9
Growing gems	8 Sept 12
Headlight aimer	14 Apr 25
Larger firms set west coast pace & D.	16 Oct 24
Magnetics papers reveal trends	8 Aug 29
Modernizing tops midwest projects	18 Oct 24

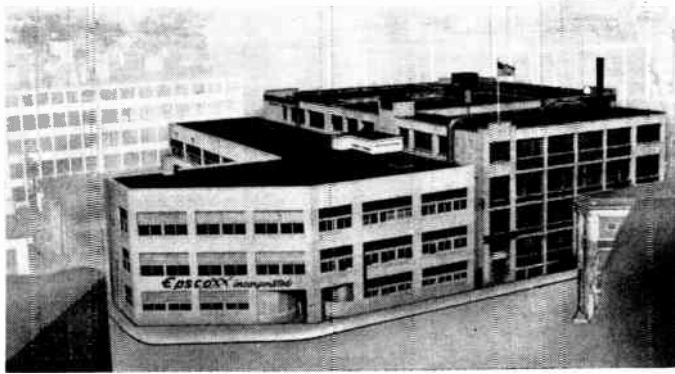
More process controls	8 Sept 26
Needles wind Russian cores	14 July 4
Numbers run new system	8 Sept 26
Packing goes electronic	8 June 20
Spending rises in New England	18 Oct 24
System monitors press runs	18 Feb 14
USSR plans more industrial gear	14 June 6
Way whiskers	12 Sept 26
Workers follow taped orders	18 June 20
X-ray amplifier	18 Nov 21

RESEARCH AND DEVELOPMENT	
Accelerating radiography	18 Oct 10
AEC costs up \$400 million	12 Jan 17
AEC reveals fusion plans	8 June 6
Airlines to test infrared warning	8 June 6
Antiklystron causes stir	8 Apr 25
Cite advances in h-f power tubes	16 Apr 11
Control cuts cochannel noise	18 June 6
Copiers get new electronic aid	12 Aug 1
Costs of R & D increase 4%	14 Sept 26
Driving with no hands	18 Feb 28
Electronics aids vision studies	12 Sept 12
Electronics gets major fusion job	14 Mar 28
Fast-scan radar has long range	12 Jan 17
Ferromagnetic films promising	12 Feb 14
French reveal new amplifier	14 Feb 14
Fusion boosts electronics role	14 Feb 28
Improving I-G systems	8 Feb 28
IRE convention hears "spectrum stretchers"	8 Mar 28
Isolating radar "angles"	8 Dec 5
Labs pushing intermetallics	14 May 9
Loudspeaker checks jets	14 July 4
Magnetics control Triton	14 Oct 10
Magnetic disk delivers 12-v	16 Jan 31
Makes radar's "missing link"	16 Jan 31
Masers probe outer space	14 Jan 3
Microwave group probes solid state	18 May 23
MIT reactor aids components R&D	16 Aug 29
Navy telecasts from 82,000 ft.	8 Aug 15
New computers shown on coast	18 May 23
New defectors help research	16 Mar 28
New gear makes 3-D X-ray films	14 Aug 1
New infrared is all electronic	8 Feb 28
New stereo disc uses f-m carrier	14 Feb 28
New varistor is described	14 Mar 28
Ready to record satellite passes	16 Jan 3
Satellite's eye needs new retina	8 May 9
Sound cleans surgical tools	16 May 9
Soviets describe huge microscope	18 Apr 25
Study printed cryotron circuits	14 Oct 10
Testing moon as reflector	14 Jan 3
Testing thermo-electron engine	18 Apr 11
Thermonuclear propulsion eyed	14 Apr 11
Thor gets moon task in months	12 June 6
Transistorized ignition system	12 July 4
Transistors: next 10 years	18 May 23
Tv multiplex shows progress	14 Mar 14
Urge more nuclear gear	14 Jan 3
Vanguard gear in Explorer	8 Feb 14
Von Braun says "5 more firings"	8 Mar 14
X-rays measure fruit freezing	8 Apr 11

SEMICONDUCTORS	
10,000-transistor computer out	12 May 23
Automatic feed	20 Dec 5
Ferromagnetic films promising	12 July 18
French reveal new amplifier	14 Feb 28
Growing gems	8 Sept 12
Japanese transistor queries	8 Dec 5
Labs pushing intermetallics	14 May 9
Microwave group probes solid state	18 May 23
More uses for cat eye	14 Aug 15
New avalanche device pushed	18 July 18
New materials make hit	8 Nov 7
New seismic amplifier	14 Nov 21
Portable color tv uses transistors	12 Sept 12
Portable tv uses 31 transistors	16 Jan 17
Reactor control is transistorized	12 Aug 29
Sees transistors opening new era	16 Dec 19
Semiconductor sales to leap	14 Jan 3
Study printed cryotron circuits	14 Oct 10
Transistor: next 10 years	18 May 23
Transistor output up, prices down	8 May 9
Transistorized ignition system	12 July 4
Transistors run pipeline webs	18 June 6
Transistors score at business show	16 Nov 7
Way whiskers	12 Sept 26
X-ray amplifier cuts exposure	12 Oct 10

SPACE ELECTRONICS	
Data unit aims radar at moon	16 Apr 25
Inertial system to guide X-15	16 June 20
Infrared scans reentry	8 Aug 15
Instruments get space tests	14 Aug 29
Masers probe outer space	12 Jan 3
Moon shot on the way?	8 Apr 11
More uses for cat eye	14 Aug 15
Navy telecasts from 82,000 ft.	8 Aug 15
NEC offering varied program	8 Oct 10
New equipment for moon shot	8 Dec 19
Reliability seen key to space	8 July 4
Soviet discloses lunar probe gear	8 Nov 21
Space age needs manned aircraft	12 Mar 14
Space challenge to electronics	14 Mar 14
Space electronics group formed	14 Dec 19
Testing moon as reflector	14 Jan 3
Testing thermo-electron engine	18 Apr 11
Thermonuclear propulsion eyed	14 Apr 11
Thor gets moon task in months	12 June 6
Vanguard gear in Explorer	8 Feb 14

TELEVISION	
Airport tv ends blind spot	18 July 4
BRC perfects video recorder	14 May 23
C-7 tv speeds freight	14 Dec 19
Community tv outside FCC	18 Apr 25
Discuss color tv world standards	14 June 6
Electronic desk	14 June 6
More brokers adopt c-c tv	18 Aug 1
Floating control booth	18 Sept 26
Navy telecasts from 82,000 ft.	8 Aug 15
Portable color tv uses transistors	12 Sept 12
Portable tv uses 31 transistors	16 Jan 17
Satellite's eye needs tv retina	8 May 9
Standards set for color tv	8 Sept 12
Style '58 kick in hi-fi tv	14 Jan 31
System monitors tv programming	20 Dec 5
Television sets to boom for bank	18 Oct 10
Transistors: next 10 years	18 May 23
Tv aids airport stimulation	8 Nov 21
Tv construction booms overseas	14 Dec 19
Tv for nurses	12 June 20
Tv multiplex shows progress	14 Mar 14
Tv searches inside reactor	16 Sept 12
X-ray amplifier	18 Nov 21



Epsco Continues to Expand

WITH '58 SALES pegged between \$4 and \$5 million, Epsco, Inc., of Boston, is expanding step-by-step into a Cambridge plant across the Charles River in anticipation of doubled sales next year.

Robert G. Clark, executive v-p of the data control firm says that on the basis of contracts now in process and on growth pattern of the five-year-old company, '59 volume will "at least" double.

Epsco has 15-year lease and two five-year options on Cambridge plant (picture) sold by General Radio Co., which is gradually pulling out to its new facility in West Concord.

Epsco may also continue to use present plant on Commonwealth Ave., Boston. It has taken over one floor of GR plant, and rest will be available in mid-'59.

Epsco employs 425. This is expected to pass 700 in '59. Bulk of newcomers will be production workers.

"We're essentially a hardware company," Clark points out. But base is engineering-in-depth, and heavy R&D cost ratio has been characteristic of firm in years of infancy. Tribute to growth potential is seen in over-counter rating of Epsco stock, one of top three in electronics field in recent months, although firm has never declared cash dividend.

Specializing in digital data control and concentrating on advanced systems concepts, Epsco has large group of "digital pioneers."

But the firm is not in general purpose computer field. It is active

in analog-digital techniques and helped pioneer modular systems design, construction, using standard building blocks for systems.

Epsco expects to turn out one new product line a month in '59, giving it a more complete array of system building blocks, its bread-and-butter line. Substantial share of '59 expansion will be in telemetry equipment, now emerging from engineering stages; also completely new lines of automatic checkout systems for advanced missiles, and control computers for industry.

Four of Epsco's six divisions operate in Boston. Edin Division, designer and manufacturer of data control equipment for medical use, is in Worcester, Mass.; and Epsco West is West Coast sales and systems division. Components Division, previously supplier to other Epsco operations, has branched out as major competitor in delay line and shift register market.

S-C Promotes Ritchart

NEWLY appointed assistant chief engineer of Stromberg-Carlson, San Diego, Calif., is Roy C. Ritchart.

During his association with the company, Ritchart has been an engineering design section head directing activities for the design development and manufacture of readout and display equipment. Prior to joining S-C in 1955, he designed and supervised construction of the first Charactertron produc-

tion equipment at Convair's Charactertron Project. He also worked as an electronics engineer at Convair's Electronics Engineering Laboratories and the Guided Missile Division in San Diego.



California Firm Names President

ELECTION of William J. Miller as president of Trans Electronics, Inc., Canoga Park, Calif., is announced.

Miller joined the company as vice president and general manager in September 1957. His background includes production management positions at Electric Boat Co. (General Dynamics) and Clark Bros. Co., Inc. (Dresser Industries) as well as serving in a sales management capacity at Servomechanisms, Inc.

News of Reps

Egbert Engineering Associates, Palo Alto, Calif., rep firm will cover Washington, Oregon, Idaho, Utah and northern California for Magnetic Controls Co., Minneapolis, Minn.

California Chassis Co., Lynwood, Calif., has two new factory reps. Delzell-Maynard Sales Co., Dallas and Houston, will cover Oklahoma, Arkansas, Louisiana and Texas, except El Paso. The Nelson Co., Denver, will handle Colorado, Utah, Wyoming, western Nebraska, western South Dakota; and Montana and Idaho according to Reps map.

PROFESSIONAL PERSONNEL REQUISITION

ELECTRONIC ENGINEERS

For research, design and development of control components and electronic systems for advanced engine cycles, trainers, simulators, and related accessories.

Requires experience in one or more of the following fields: System design, circuit design, analog techniques, electronic packaging, semi-conductors, magnetic amplifiers, vacuum tubes.

Challenging opportunities on fast growing long term projects. Requires senior level engineers with degree plus a minimum of six years applicable experience. Excellent future, including possibility for group leader. These opportunities are created as a result of Marquardt's expansion on current projects plus acquisition of other companies.

Important work is advancing in many diversified areas, so for a good position with a growing future, look up to Marquardt now.

Contact: Floyd E. Hargiss, Manager, Professional Personnel
16549 Saticoy Street, Van Nuys, California

Advanced power and weapons support
systems for air and space

Marquardt
VAN NUYS AND POMONA, CALIFORNIA - OGDEN, UTAH AIRCRAFT CO.

INDEX TO ADVERTISERS

American Blower Div. of American Standard 6

*Bomac Laboratories, Inc. 3rd Cover

Delco Radio Division 10

*General Radio Co. 2nd Cover
Greene Shaw Company, Inc. 26

Hallamore Electronics Co. 8

*Knights Company, James 8

MacDonald, Inc., Samuel K. 32
Marquardt Aircraft Co. 32

*Radio Corporation of America 4th Cover

Stokes Corporation, F. J. 21

Wales Strippit Company 9

MANUFACTURERS REPRESENTATIVES 32

CLASSIFIED ADVERTISING
F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES 32

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

sending a bill?

It'll get there quicker if you give your postal delivery zone number with your address.

The Post Office has divided 106 cities into postal delivery zones to speed mail delivery. Be sure to include zone number when writing to these cities; be sure to include your zone number in your return address —after the city, before the state.



MANUFACTURERS' REPRESENTATIVES
IN THE ELECTRONIC INDUSTRY
CONTRACT RATES GIVEN ON REQUEST. WRITE
ELECTRONICS

SAMUEL K. MACDONALD, INC.
manufacturers representatives over 25 years
1531 SPRUCE STREET, PHILA. 2, PA.
Territory: Pennsylvania • New Jersey
Delaware • Maryland
Virginia • West Virginia
District of Columbia
Other Offices: Pittsburgh
Baltimore
Washington, D.C.

FOR RATES AND ADDITIONAL INFORMATION

About Classified Advertising
Contact The McGraw-Hill Office
Nearest You

ATLANTA, 3 1301 Rhodes- Haverty Bldg. JACKSON 3-6951 M. H. MILLER	BOSTON, 16 350 Park Square HUBBARD 2-7160 D. J. CASSIDY	CHICAGO, 11 520 No. Michigan Ave. MOHAWK 4-5800 W. J. HIGGINS D. C. JACKMAN	CLEVELAND, 13 1161 Illuminating Bldg. SUPERIOR 1-7000 W. B. SULLIVAN F. X. ROBERTS	DALLAS, 1 1712 Commerce St., Vaughn Bldg. RIVERSIDE 7-5117 GORDON JONES F. E. HOLLAND	DETROIT, 26 856 Penobscot Bldg. WOODWARD 2-1793 D. M. WATSON	LOS ANGELES, 17 1125 W. 6 St. HUNTERLY 2-5450 R. L. YOCOM	NEW YORK, 63 500 Fifth Ave. OXFORD 5-5959 D. T. COSTER R. P. LAWLESS	PHILADELPHIA, 3 Six Penn Center Plaza LOCUST 8-4330 T. W. McCLURE H. W. BOZARTH	ST. LOUIS, 8 3615 Olive St. JEFFERSON 5-4867	SAN FRANCISCO, 4 68 Post St. DOUGLASS 2-4600 R. C. ALCORN
--	---	--	---	---	--	---	---	--	---	---

all the performance . . . half the size!



NEW

BOMAC CRYSTAL PROTECTORS

1/2 the size of previous types . . . yet they perform better!

New Bomac crystal protectors are the smallest available. They pack a maximum of performance into a minimum of space. They're half the overall length of the usual broadband TR tube, but with electrical characteristics that are equal or better. There's a complete line, for all the above bands — and every single one is 100% tested and life-tested with crystals mounted in position. Complete information is waiting for you. *Write today.*

THE BLS-504

PERFORMANCE DATA

BANDS — L S C X X_b K_u K K_a

TYPICAL X-BAND RATINGS:

Power — 10 kw peak
 Insertion Loss — 0.7 db
 including ignitor interaction
 Recovery Time — 1.5 μ sec.
 VSWR — 8565-9487 > 1.3
 8490-957B > 1.6
 Dimensions — approx. 3/4" between flange faces
 Life — 500 hours
 End of life recovery time — 5.0 μ sec.

Bomac LABORATORIES, INC. 
 Salem Road, Beverly, Massachusetts

Leaders in the design, development and manufacture of TR, ATR, Pre-TR tubes; shutters; reference cavities; hydrogen thyratrons; silicon diodes; magnetrons; klystrons; duplexers; pressurizing windows; noise source tubes; high frequency triode oscillators; surge protectors.

Offices in major cities—Chicago • Kansas City • Los Angeles • Dallas • Dayton • Washington • Seattle • San Francisco • Canada: R-O-R Associates Limited, 1470 Don Mills Road, Don Mills, Ontario • Export: Maurice I. Parisier, 741-745 Washington St., N.Y.C. 14, N.Y.

THIS TUBE THRIVES ON HIGH VOLTAGE!



RCA-1B3-GT is designer-preferred...features heavy-duty filament...challenges filament burnout

Preferred Tube Type 1B3-GT is favored by design engineers for high-voltage rectifier service in TV sets. What makes it so good? How was RCA able to make it better?

A redesigned filament of larger wire with a larger coil diameter offers cooler operation. A smoother and lighter coating to assure uniform emission is applied to the filament by means of a special technique. The life of the filament is further safeguarded by a chemically treated anode support which assures a tight bond between it and the glass envelope and prevents leaks that would burn out the filament.

The glass envelope of the RCA-1B3-GT has benefited, too, from improved techniques. Hydrogen firing of the envelope enables it to withstand electron bombard-

ment and therefore reduces strain effects. In addition, contamination and resultant low emission are eliminated by supersonic washing of the anode and getter shield.

That's why the RCA-1B3-GT is a "champion" with high voltages. Your RCA Field Representative has the complete Preferred Tube Types story. See him soon. For technical data about the 1B3-GT and all of the Preferred Tube Types, write RCA Commercial Engineering, Section K-19-DE-2 Harrison, N. J.

If picture tubes are your interest, consider RCA here, too, for RCA picture tubes are engineered for long dependable performance. A word to your RCA Representative will bring you full information.



FIELD OFFICES:

EAST:

744 Broad Street
Newark 2, N. J.
Humboldt 5-3900

MIDWEST:

Suite 1154
Merchandise Mart Plaza
Chicago 54, Ill.
Whitehall 4-2900

WEST:

6355 E. Washington Blvd.
Los Angeles 22, Calif.
Raymond 3-8361



RADIO CORPORATION OF AMERICA
Electron Tube Division
Harrison, N. J.