

AUGUST 22, 1958

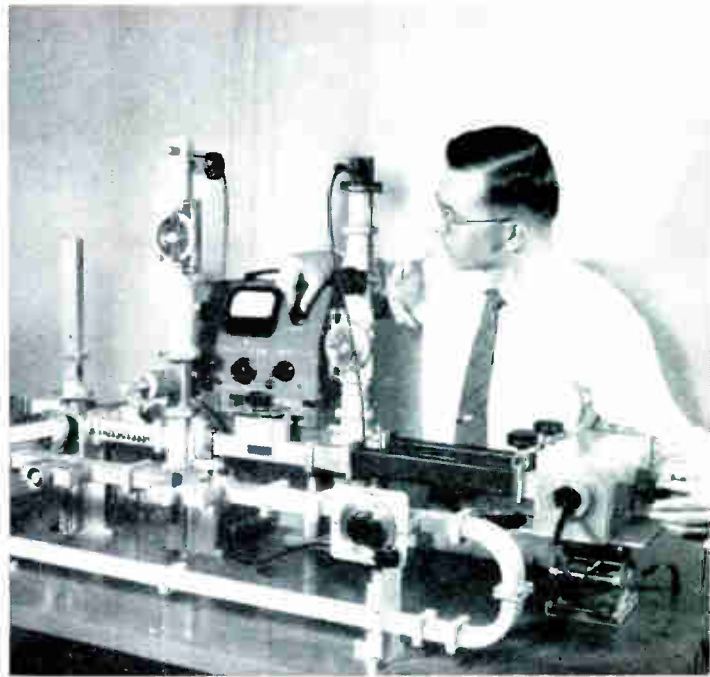
# electronics

business edition

A MCGRAW-HILL PUBLICATION • VOL. 31, NO. 34 • PRICE FIFTY CENTS

## Cold-War Insurance

Traveling wave tubes and video tape ferret out hostile signals... p 16



## Our Industry at Mid-Year

Special market report shows factory sales may top 1957 figure by 5.4 percent... p 13

1958 - \$8.4 BILLION

1957 - \$7.9 BILLION

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# Shoptalk . . .

**ELECTRONIC FERRETS.** The ferret is a red-eyed polecat used in Europe to hunt rats. An electronic ferret is a military reconnaissance unit that hunts radio, radar and missile-guidance signals, anywhere in the world. Behind the diplomatic give-and-take both sides in the cold war are waging a secret ferreting war. Latest electronic techniques are used to detect and analyze electromagnetic radiation.

**It's hardly a subject that anyone concerned with military electronics wants to discuss. But two British exservicemen spilled part of the story in an undergraduate magazine recently.**

With their clues in mind, Associate Editor Janis searched through reams of recently published material, spot-checked government and industry sources for technical information to dig out pertinent nonclassified facts. These and some obvious conclusions may be found on p 16.

**HALF-TIME SCORE.** At midyear our industry's sales outlook is bright. Second half sales for most products are expected to outpace the first six-month results. Total annual sales should reach \$8.4 billion, up 5.4 percent from 1957.

**Sales to the armed forces account for 55 percent of the 1958 total, as against 53 percent in 1957. Industrial sales may pass entertainment sales this year.**

Special report was prepared by Associate Editor DeJongh. The McGraw-Hill Washington Bureau covered the defense sales picture. Pacific Coast Editor Hood, Midwest Editor Harris and New England Editor Maguire reported on conditions in their areas. Their story begins on p 13.

**ROAD TO MARKET.** Recent predictions by the Electronics Industries Association are that by the end of this year, the electronics distribution business will ring up about 2.65 billion in profits.

**Spot interviews with manufacturers' representatives whose organizations range from one-man shows to nation-wide firms indicate that EIA's prediction has every chance of becoming a reality.**

On p 17, Associate Editor Emma traces some of the paths traveled by several kinds of electronic products on the way to market and some of the dollars-and-sense questions that arise.

**NEW LIGHT ALLOYS.** Metallurgists report progress in developing iron-aluminum and silicon-aluminum alloys. And—as usual—our Components and Materials department carries the whole story. The emphasis is on how these new light alloys can help the electronics manufacturer. There's a clear, easy-to-read, informative chart with the story.

**Such coverage is not extraordinary. In fact, it's only one phase of the job Associate Editor Sideris does with his department. He breaks hot news. Often he takes conversational loose ends from in-the-field interviews and ties 'em up into an interpretive roundup. See p 19.**

**Coming In Our August 29 Edition . . .**

## **Coming In Our August 29 Edition . . .**

● **Music By Lamplight.** Designers of electronic organs have long sought a method of overcoming the basic instability of neon-lamp relaxation oscillators so that they might be used as tone sources. According to R. H. Dorf, consultant to the Kinsman Manufacturing Co., neon lamps are ideal for this application. They are cheap, require little power, generate little heat. They yield a saw-tooth waveform which makes possible many realistic imitations of organ and orchestral sounds.

Heretofore, efforts to synchronize to a master oscillator through a frequency divider chain have met with seemingly insurmountable problems. Dorf describes a successful new method where 12 neon tone generators mounted on six printed circuits supply 12 notes of the chromatic scale.

● **Transistor-powered photoflash.** The list of commercial applications of transistors is growing at a tremendous rate. One of the latest incorporates the versatile semiconductor device into d-c/d-c converters for electronic photoflash units.

Associate Editor Manoogian presents a survey of typical design approaches used in modern photoflash equipment. Transistorized power supplies in this application are small and light, draw little idling current between charging cycles, contain no moving parts. The new circuits described can also be used wherever d-c/d-c or d-c/a-c conversion is required.

To get his story Manoogian took several representative units apart, traced their circuits, measured critical values, photographed waveforms and construction details.

● **Undersea ultrasonics.** Sensitive instrumentation for studies in the variation of attenuation and propagation time of ultrasonic signals in sea water is the subject of an article by W. C. Gore, Assistant Professor of Electrical Engineering at Johns Hopkins University.

A 50-watt transmitter operating between 25 and 150 kc energizes an underwater crystal transducer. Output from the receiving transducers is fed through filters to the input of two receivers.

● **Meteor-burst Communications.** An experimental teletype communications link using propagation of radio signals by reflection from ionized meteor trails has performed reliably for over 18 months, according to B. M. Sifford and W. R. Vincent of the Stanford Research Institute, Menlo Park, California.

In their article, Sifford and Vincent describe an 830 mi meteoric-scatter propagation link between Montana State College in Bozeman, Montana, and Stanford Research Institute in Palo Alto.

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**electronics**

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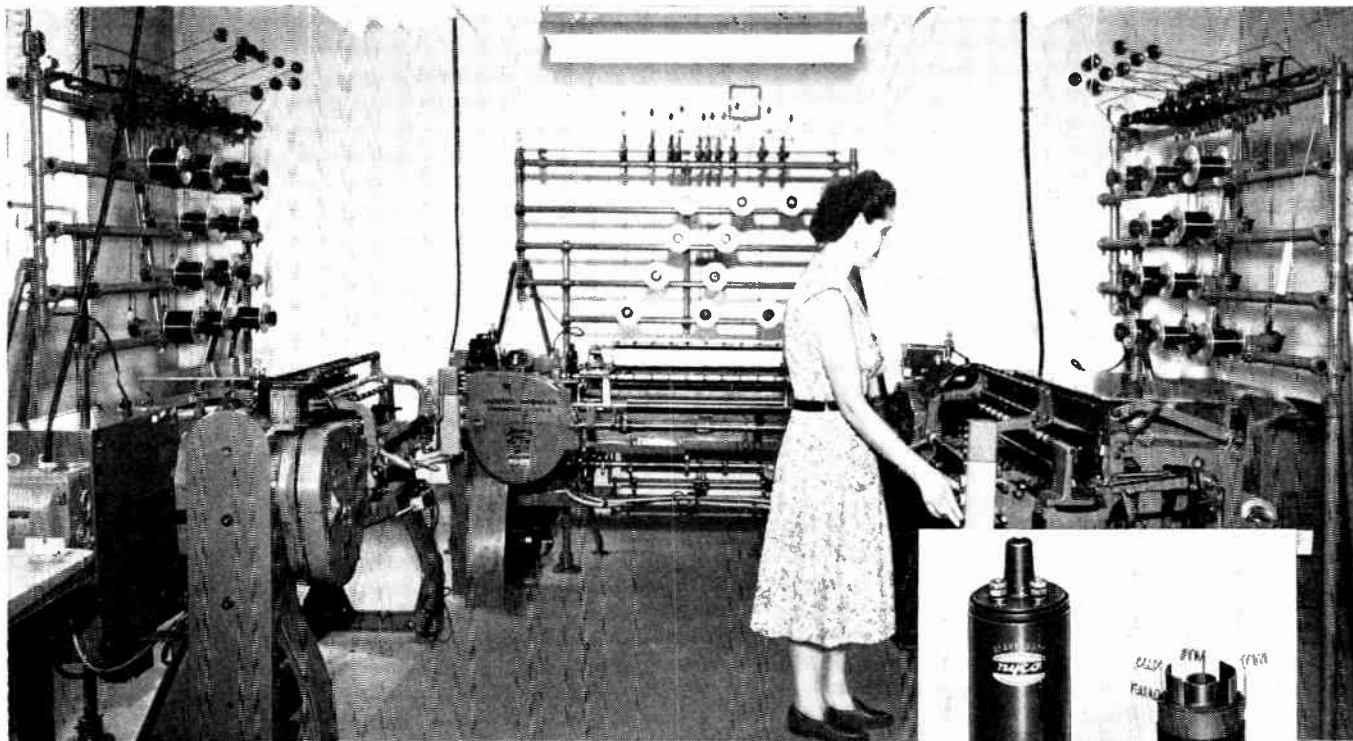
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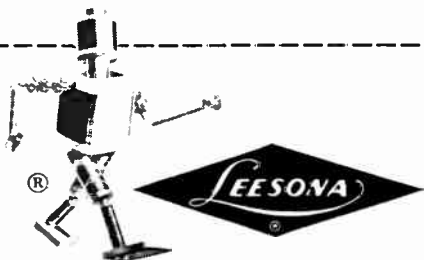
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# Cost-Plus Bonus

**One firm's incentive bonus in a cost-plus-fixed-fee contract may pave the way for others. But officials are cautious on question**

THE AIR FORCE has awarded a \$23-million Doppler radar contract with unique incentive provisions to an electronics firm. This was disclosed recently by Henry W. Harding, president of Laboratory For Electronics.

Financial observers are taking note of the fact that the contract provides for fees varying from five to seven percent of estimated cost.

Target cost has been set at \$22 million, and target fee at six percent, or \$1.3 million. Twenty cents of every dollar of actual cost below target will be added to the fee. But on the other hand, 20 cents could be subtracted from the \$1.3-million fee for every dollar by which actual cost exceeds the target.

However, both maximum and minimum fee limits have been set. Maximum has been set at \$1.535 million, or seven percent of target, and minimum at \$1.1 million, or six percent.

Incentive fees in LFE's contract vary solely with cost. But, in other contracts, says Col. Albert James, Air Force assistant deputy director of procurement, payments for incentive can also be granted for surpassing delivery targets and product performance standards. However, if the development is so new that no one can reliably estimate the target cost, incentives are not likely to be given. A space-ship might be one example of this.

Both DOD and Air Force procurement officials take a cautious position on the question of incentive provisions in cost-plus contracts. Procurement officials claim no basic change has occurred in procurement policy. They cite an Armed Services Procurement Regulation in 1955 which gave formal approval to the individual armed services to grant this type of contract.

Congressional interest in stimulating military manufacturers to greater effort as a result of Russia's technological gains has had an effect, says Colonel James.

Also, more DOD officials are swinging to the opinion that the government will get more for its money if it holds out an opportunity for manufacturers to earn a little more profit, says Col. Albert Pregosi, staff director for procurement policies at DOD.

# SHARES and PRICES

MAGNETIC-TAPE industry's currently mushrooming sales are arousing investor interest in the stocks of firms that manufacture magnetic tape.

Tape industry sales are increasing at the rate of 35 percent a year. Sales in 1957 were in the neighborhood of \$18 to \$20 million.

At present new markets are opening up for both sound recording and precision or instrument tape.

Sound recording tape represents the biggest share of the tape market today, currently estimated at 60-65 percent of total sales.

Important part of sound record-

ing sales are to owners of home recorders and hi-fi sets. Sharply-rising sales curve of stereophonic high fidelity equipment means more and more tape sales. Many new home entertainment units being readied for fall contain tape recording equipment or provisions for inclusion at a later date.

Advent of video magnetic tape recorders has opened up a new market among professional users of sound recording equipment. Widespread use of tape among radio broadcasters indicates the possible sales potential of video tape among tv broadcasters. Many live radio broadcasts are recorded on tape in order to have a record

of the show and for rebroadcast purposes. In addition, many other radio shows are broadcast directly from tape.

However, magnetic tape's growth possibilities may be even greater for high precision tape. This tape is used with electronic computers and for evaluating and recording missile and aircraft operations. Other uses are in telephone toll call recording, geophysical oil exploration and with industrial control equipment.

Precision tape's current share of the market is estimated at 35-40 percent of total sales. Some estimate its share will soon mount to 50 percent or more.

Typical Magnetic Tape Manufacturers	Recent Price	Latest 12 Mos Dividend	Percent Yield	Earnings Per Common Share			1958 Price Range	
				1958	Period	1957		
Audio Devices .....	14 $\frac{3}{8}$	..... <sup>2</sup>	.....	0.185E	(6 mos.)	0.24	ASE	7 $\frac{1}{4}$ -15 $\frac{1}{2}$
Minnesota Mining & Mfg .....	91 $\frac{3}{8}$	1.20	1.3	1.05	(6 mos.)	1.17	NYSE	73 $\frac{1}{2}$ -94 $\frac{1}{4}$
Orradio Industries .....	17 $\frac{3}{4}$ <sup>1</sup>	.....	.....	0.23	(year) <sup>3</sup>	0.28	OTC	14 $\frac{1}{2}$ -21 $\frac{1}{4}$
Reeves Soundcraft .....	3 $\frac{1}{8}$ <sup>1</sup>	.....	.....	.....	.....	.....	OTC	2 $\frac{1}{8}$ -3 $\frac{1}{4}$

<sup>1</sup> bid

<sup>2</sup> stock

<sup>3</sup> years ended Feb. 28

E-estimated

# MERGERS, ACQUISITIONS and FINANCE

• **CGS Laboratories**, Ridgefield, Conn., offers its first public stock issue, 60,000 shares at \$8 per share. Principal products of the firm are: controllable inductors, panoramic receivers, Morse-to-teleprinter code converters, countermeasures equipment and multicouplers. About 95 percent of its sales are to the government. Some \$200,000 of stock issue proceeds will be used to repay bank loans. Part may be used for construction of a plant in the Ridgefield-Stamford area. Balance will be used to purchase material and supplies and for other working capital purposes. Sixty percent of stock is owned by directors and executives while 35 percent is owned by Payson & Trask, New York venture capital firm. Hayden, Stone & Co. of New York City is underwriting the issue.

• **Ling Electronics** of Los Angeles and Dallas acquires all of the common stock of the **Calidyne Co.**, Winchester, Mass. Price was not disclosed. Both firms have in-

terests in electronically driven vibration systems.

• **Hall-Scott**, Berkeley, Calif., tells stockholders it hopes to combine its electronics division, located at Burbank, with another company through merger or purchase. In addition to electronic cable and components, H-S makes sheet metal assemblies and photo-lighting equipment. Firm's directors have asked New York investment banking firm, Allen & Co., to assist with plan to join forces with another business.

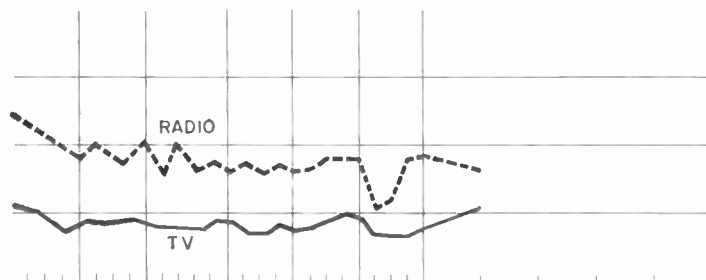
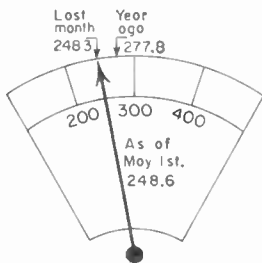
• **New Haven Clock & Watch Co.** offers stockholders rights to subscribe to 300,000 shares of additional common stock at \$1 per share on the basis of one new share for each share held. Firm's **Condenser Products Division** produces capacitors, high-voltage power supplies and pulse forming network. L. D. Sherman & Co. of New York City is underwriting the issue.

• **Topp Industries**, Los Angeles,

is in the last stages of negotiation for two acquisitions. Purpose of acquisitions is to bring firm into more widely diversified markets. No further details available.

• **Haydu Electronic Products**, Plainfield, N. J., sees need for new financing for plant expansion and purchase of machine tools. A financing plan is being developed for submission to stockholders shortly. It will take the form of either a stock or a convertible debenture issue.

• **Picker X-Ray**, White Plains, N. Y., purchased by **CIT Financial Corp.**, giant sales finance company. CIT is giving 341,063 shares of its common stock, with a market value of about \$18 million, in payment for all of Picker stock. Purchase is a step in CIT's industrial diversification plan. The White Plains manufacturer of X-ray and radiation equipment will be operated as an "autonomous organization" under present management.



## FIGURES OF THE WEEK

### RECEIVER PRODUCTION

(Source: EIA)	Aug. 1, '58	July 25, '58	Aug. 2, '57
Television sets, total	99,929	60,164	117,438
Radio sets, total	153,552	173,079	180,608
Auto sets	38,994	49,771	61,537

### STOCK PRICE AVERAGES

(Source: Standard & Poor's)	Aug. 6, '58	July 30, '58	Aug. 7, '57
Radio-tv & electronics	51.03	50.59	48.97
Radio broadcasters	64.17	62.20	62.79

## FIGURES OF THE YEAR

	1958	1957	Percent Change
Receiving tube sales	190,406,000	221,175,000	-13.9
Transistor production	18,452,324	11,199,000	+64.5
Cathode-ray tube sales	3,689,587	4,814,659	-23.4
Television set production	2,167,930	2,722,139	-20.4
Radio set production	4,961,293	7,187,294	-31.0

## LATEST MONTHLY FIGURES

### EMPLOYMENT AND EARNINGS

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

### TRANSISTOR SALES

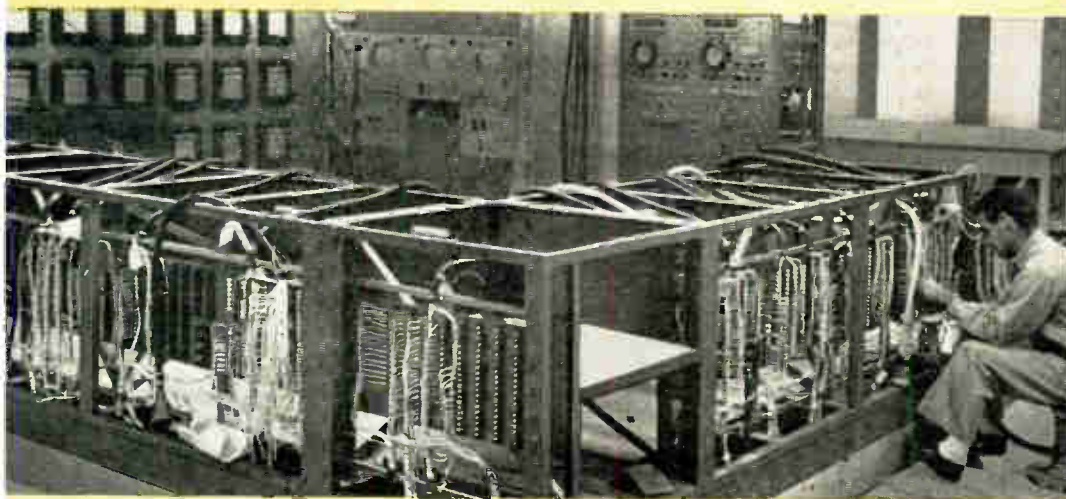
(Source: EIA)	June, '58	May, '58	June, '57
Unit sales	3,558,094	2,999,198	2,245,000
Value	\$8,232,343	\$7,250,824	\$6,121,000

### TUBE SALES

(Source: EIA)	June, '58	May, '58	June, '57
Receiving tubes, units	36,270,000	36,540,000	35,328,000
Receiving tubes, value	\$31,445,000	\$31,406,000	\$31,314,000
Picture tubes, units	725,846	560,559	1,104,013
Picture tubes, value	\$14,203,381	\$11,237,147	\$19,981,319

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# WASHINGTON OUTLOOK

THE JUSTICE DEPT. is starting legal action on behalf of defense contractors hit by tax suits from state and local authorities.

In recent months, contractors—including electronics producers—have come under increasing fire from city and state governments claiming real and personal property tax payments from Defense Dept. and AEC contractors on land, buildings and materials owned by the two agencies but in the contractors' hands.

The growing volume of new claims stems from the Supreme Court's March ruling that property owned by the Federal Government and used by private companies for profit is no longer immune from local taxes.

Under a provision in most defense contracts, the companies can pass on the new costs to the Federal Government. Pentagon lawyers estimate the extra cost could run as high as \$250 million a year just to cover personal property taxes on military-owned inventories.

Government lawyers are now working on a slew of local or state tax suits levied on defense contractors. Among the contractors involved: Martin, Cal Tech's Jet Propulsion Labs, Convair, Aerojet-General and ACF Industries.

As the Federal lawyers see it, the Supreme Court's decision implied that in cases where the sole beneficial use of the property involved can be proven to be the government's, the property continues to be immune from local taxation. Presumably, if this cannot be fully justified, the government will not step in on the contractor's side.

- The administration's appointment of T. Keith Glennan, president of Cleveland's Case Institute and former AEC commissioner, to head the new National Aeronautics and Space Administration came as a surprise to Washington. It had been generally assumed that Hugh L. Dryden, director of the National Advisory Committee for Aeronautics, NASA's predecessor agency, would get the nod.

But in recent weeks, Dryden incurred the wrath of the House Space Committee in spelling out his ideas on what NASA should do. The congressmen thought Dryden's plans lacked what one congressional source calls a "sense of urgency." Dryden, who is a highly respected figure in scientific circles, has been named NASA's deputy administrator.

Glennan, the new NASA administrator, has a substantial background in electronics. During World War II, he headed the Navy's Underwater Sound Laboratories at New London, Conn. He's a Yale graduate in electrical engineering and was an executive with Western Electric.

- Look for a big speed-up in government translations of Russian technical information. Congress has voted \$500,000 for the Commerce Dept.'s Office of Technical Services to set up a clearing-house for government-translated Russian technical material. Initially, OTS will offer subscriptions to some 140 Russian technical journals that will be translated and abstracted on a regular basis—several in the electronics field. Cost of the abstracts will be 50 cents each on an annual basis. For instance, if a particular journal is published monthly, the annual cost would be \$6. Write to OTS, Dept. of Commerce, Washington, for a list of available material.

CIRCLE 5 READERS SERVICE CARD →


 AMPEX  
CORPORATION

## AMPEX INSTRUMENTATION TAPE improves recorder performance

Some significant differences will show up in tests that you can make

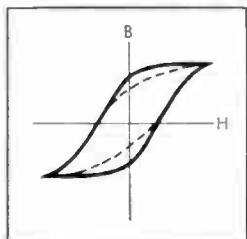
It's like buying premium gasoline to get the most out of a new 10-to-1-compression automobile engine — (except that this is the deadly serious business of collecting elusive facts). After you've acquired the best instrumentation tape recorder you can buy, you will get the most out of it by using the best tape that knowledge and skill can produce. In instrumenting a jet engine, programming a computer or firing a missile, great sums are expended solely for the data they produce.

By comparison, a small extra price you pay for Ampex's premium-quality tape shrinks to insignificance. Highly tangible differences in Ampex Instrumentation Tape are a smoothness of surface, squareness of hysteresis curve, and precision of reel. The latter is optional — usually well worth its price.

### EXTRA SIGNAL-TO-NOISE RATIO

In direct recording the tape generally determines signal-to-noise ratio. This is of particular importance on frequency-multiplexed data where combined peaks can result in high signal levels. Unless the tape has exceptional qualities, the consequent intermodulation distortion gives severe interchannel interference and signal degradation. Ampex attacks the problem on both ends, extending the linear portion of the tape's recording curve and reducing noise components.

The hysteresis curve of a magnetic tape is the key to this extended linearity. Call it the tape's personality. It can sluff over in a lazy curve, or like Ampex tape it can sit up straight and square. The effect is easy to measure and compare. Set your recorder for optimum bias for each tape. Then record increasing signal levels until 1% third harmonic distortion is measured. One of our published papers gives full details.



And about the noise. Amplitude modulation is an important source that we can reduce. On sine waves it looks like whiskers on the peaks. It is due to incremental variations in effective magnetic characteristics — whether caused by changes in coating thickness and composition, or by surface roughness that lifts the tape slightly away from the heads. Ampex pays special attention to oxide preparation and coating techniques. And the exclusive Ferrosheen process gives a smooth polished surface. For a test comparison, saturate sample tapes in one direction. Then measure the comparative noise levels on playback.

*FM-carrier recording and NRZ digital are also improved by tape-surface smoothness and Ampex's squareness figure of merit — (subjects for future numbers in this series). In the meantime if you like your facts in depth and want to make your own tape tests, we would be pleased to send our recently published technical papers on tape. A technique for setting optimum bias is included and will be particularly useful. Write Dept. E-17*

# NOW...1 to 80 polaroid exposures in ONE loading with the newest BEATTIE OSCILLOTRON!



*LABORATORY recording of oscilloscope traces is far more efficient with this new camera.*

Key to the versatility of the new Beattie Oscillotron with a polaroid back is the feather-touch Multiple Exposure Positioning Bar. Now you can get one-to-one presentation or up to 10 exposures on a



single frame—by a simple adjustment. Other features: f/1.9 lens, shutter speeds from 1 sec. to 1/100 sec., time, and bulb.

This new Oscillotron camera fits the same periscope to which all other Beattie Oscillotron cameras are attached.

Multiple Exposure Positioning Bar

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CIRCLE 6 READERS SERVICE CARD

10

## EXECUTIVES IN THE NEWS



### Metcalf: for Atlas, a cold nose

MAN behind the development of the Atlas nosecone, and top weapons systems exec in General Electric, is George F. Metcalf, who became GE's regional v-p for defense activities on the first of the month.

Born in Milwaukee on Dec. 7, 1906, Metcalf took his BSIE at Purdue in 1928, went to work immediately at GE's research labs, did some research in basic technology, then graduated to radar. During the war he served in the Army Signal Corps, wound up as director of the radar lab at Wright Field. Then he came back to GE to manage its electronics laboratory.

In 1955 he took over as general manager of the firm's missile and ordnance systems department. This big (6,500-man) Philadelphia-based R&D outfit developed for Atlas and Thor the nose cones that have proved capable of withstanding the searing heat of reentry, and for Polaris its guidance and fire-control systems.

The department also does research in aerosciences and space technology, a field Metcalf recognizes as being in a "primitive state." Future research, he feels, should be based on both "brute force approaches, based on known techniques, and high-risk, novel approaches." As far as weapons systems development is concerned, he feels that the "major limitation will be our ability to manage creatively."

Metcalf is a genial and approachable man—"thoroughly human," comments an aide. He is remarkably clear and articulate about the responsibilities of working in the forefront of the technology, where he has worked for so long. He believes in letting people develop themselves to their best abilities, carries this over into his private life. His son, no follower of father's footsteps, is currently working toward his PhD in history.

## COMMENT

### Speaking of Nosecones

You report (Engineering Report, Aug. 8, p 23) that an Advanced Research Projects Agency scientist, Herbert York, told a House com-

mittee about the ionized airstream formed by a reentering missile.

This phenomenon has been known to the technology for quite some time, and has been the subject of much speculation. I suppose it's typical of our Federal government that they're only now be-

August 22, 1958 — ELECTRONICS business edition

ginning to try to make use of the ionized layer as a possible radar target. Interestingly enough, although careful design—use of exponential-curve surface topologies, for example—may reduce the front end of a missile to a single-point target, such design is completely foiled by the ionization of the air, because the ionized layers always assume a roughly conical configuration, thereby increasing the apparent target size. Furthermore, ionized air is a fine radar target, better than many metals, as anyone who has ever tracked chunks of sporadic E-layer could tell you.

What I don't get is Mr. York's statement that ground trackers can "home on electromagnetic signals produced by the nose cone." The ionized airstream at the nose can produce only noise; even transmissions originating inside the missile, such as telemetering or transponded guidance signals, couldn't get through the layer. What is he talking about?

JAMES MICHAELSON  
NEW YORK, N. Y.

Reader Michaelson spotted something that gave us a bad moment or two, too. Scientist York's statement did not refer to radio-type signals originating inside the missile; he told the committee that the nose cone "probably produces some kind of electromagnetic signals by itself." Frankly, we feel that he was being cagey in his choice of words; remember, infrared radiation qualifies as an electromagnetic signal.

#### Somebody Goofed

Someone goofed and switched identification of oscilloscopes shown in New Products, p 28, July 25.

I thought you would like to know this. . . .

VINCENT SICLARI  
SANBORN CO.  
BROOKLYN, N. Y.

We did know it, but only after we got our copies from the press. Our printer was standing on his head again, and put the captions on upside down. Top caption in all three columns belongs on bottom picture, and vice versa.

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**"Increased Our PW Board  
Production from  
4 to 20 Units Per Hour  
CUT LABOR COST  
80%"**

*. . . Says Nathan Bylock, Production  
Manager, Teletronics Laboratory, West-  
bury, Long Island, N. Y.*

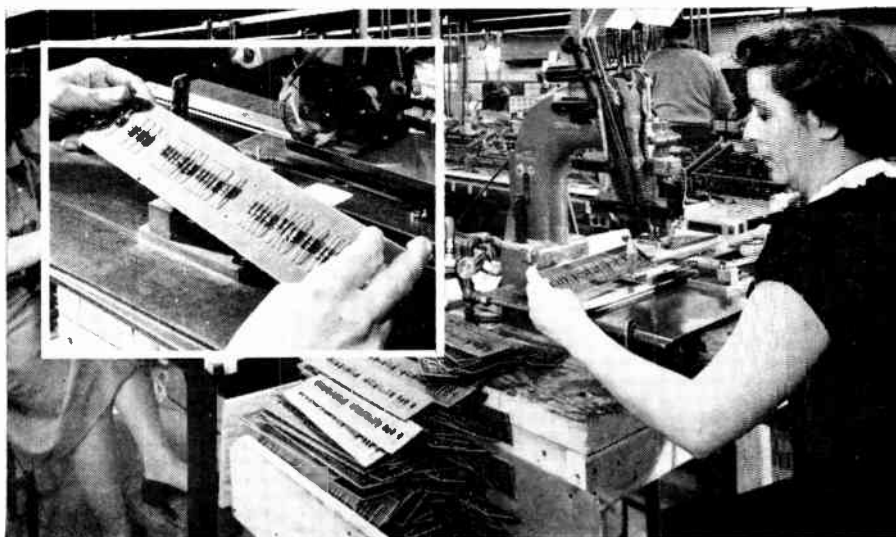


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"Our Dynasert machines are currently inserting ½- and 1-watt resistors into printed circuit boards used in Clear Text Monitors. One operator can average 1,000 insertions per hour.

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If you are inserting components by hand, the same type of production savings can be yours. Call us as soon as you are ready to cut your component inserting costs.



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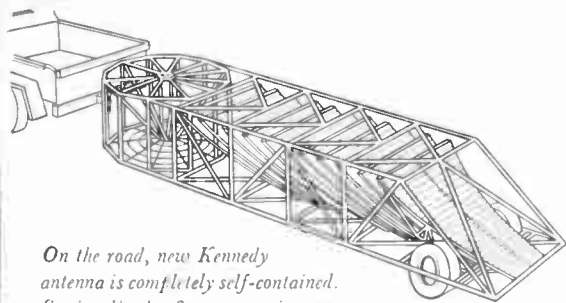
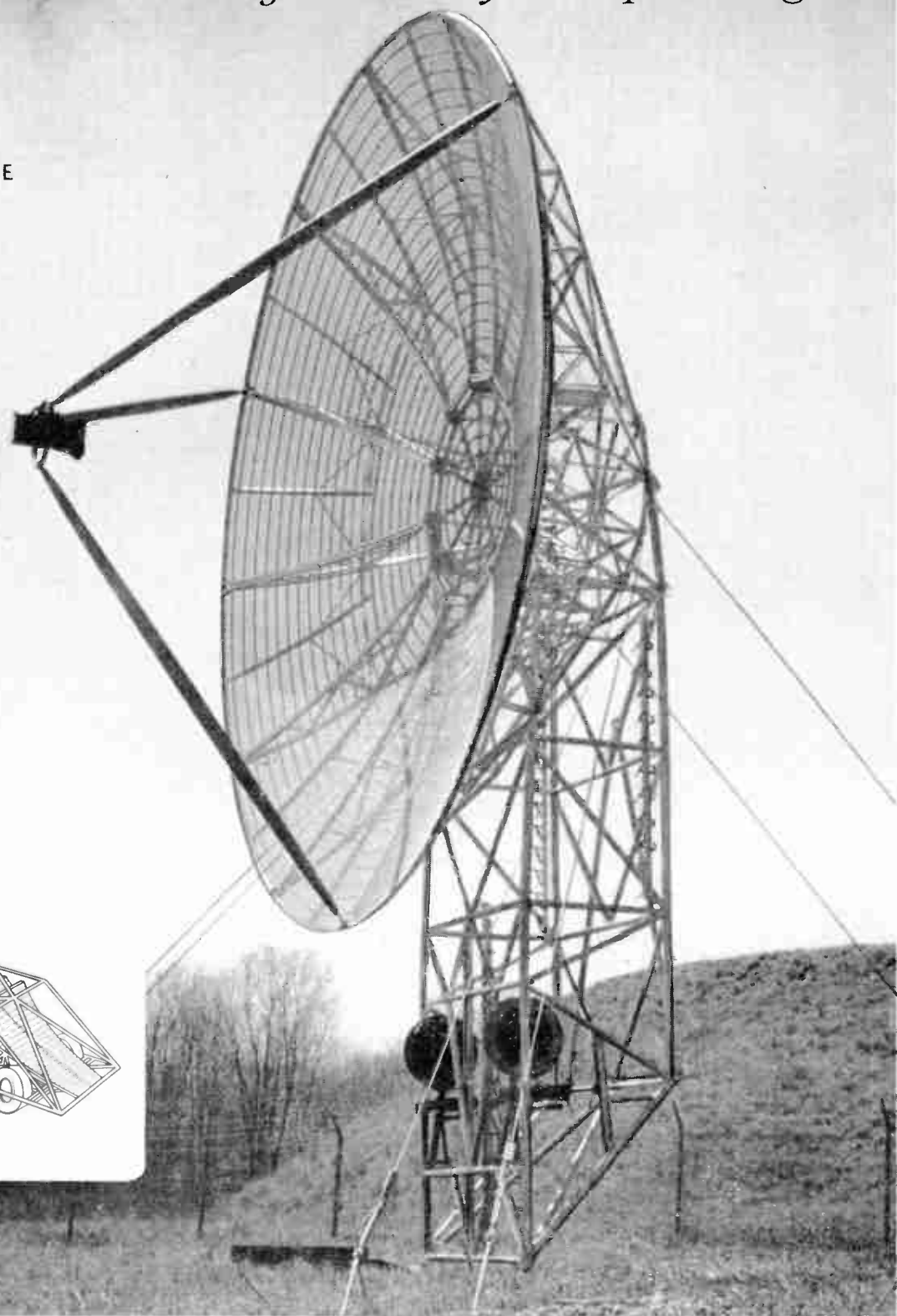
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*on the spot:*

distance  
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*On the road, new Kennedy antenna is completely self-contained. Sectionalized reflector nests in tower. Retractable wheels convert tower to trailer.*

Now, a giant step forward in scatter system planning—a mobile, 28' scatter antenna that can be towed to the site and quickly erected for actual on-the-spot testing *before* erection of the permanent installation!

Thus, expensive, time-consuming trial-and-error guesswork is eliminated. The *right* location is determined *before* installation, with an assurance never before possible. And shipping and handling costs are greatly reduced.

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World Radio History



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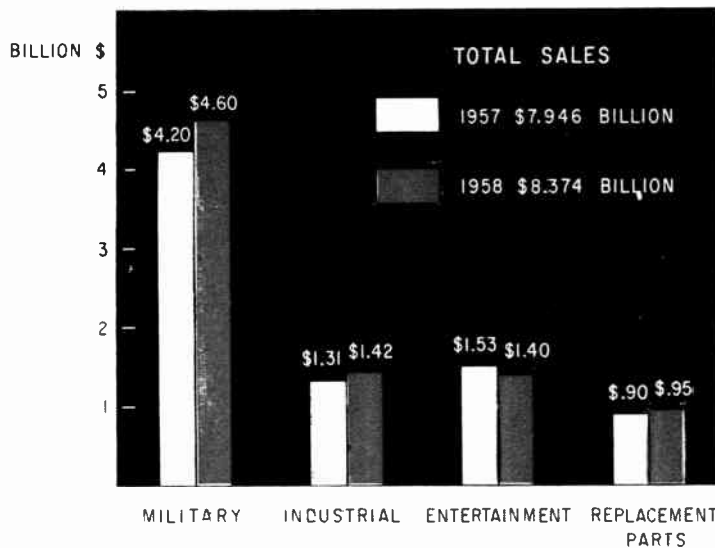
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## FACTORY SALES OF ELECTRONIC EQUIPMENT AND REPLACEMENT PARTS



# electronics

## business edition

AUGUST 22, 1958

# Our Industry at Midyear

**Factory sales of electronic equipment and replacement parts will hit nearly \$8.4 billion, up 5.4 percent from 1957**

**Military electronics will account for 55 percent of all sales; industrial electronics sales pass entertainment**

By **EDWARD DE JONGH** Associate Editor

**M**IDYEAR CHECK of the 1958 sales outlook shows the electronics industry is fast recovering from effects of recession and last fall's military spending cutback.

Second half sales for most products are expected to show considerable improvement over sales in the first six months. Factory sales of electronic equipment and replacement parts should reach \$8.374 billion, \$428 million more than the 1957 sales total.

Military sales are stronger, with aircraft electronics still a dominant factor. Missile guidance sales are jumping sharply over 1957 levels.

Industrial and commercial sales are continuing to increase despite plant spending cutbacks. The industrial sales total for the year is expected to exceed entertainment electronics product sales for the first time.

Sales of entertainment electronics products are expected to slip slightly below the 1957 total. But renewed consumer confidence in general business conditions, along with more optimistic forecasts for

1959 auto sales, has upped early 1958 estimates.

The figures in this midyear estimate are based on actual and estimated manufacturers' sales of electronic end equipment and replacement parts only. They exclude broadcasting revenue, distribution income and intra-industry sales of parts and components.

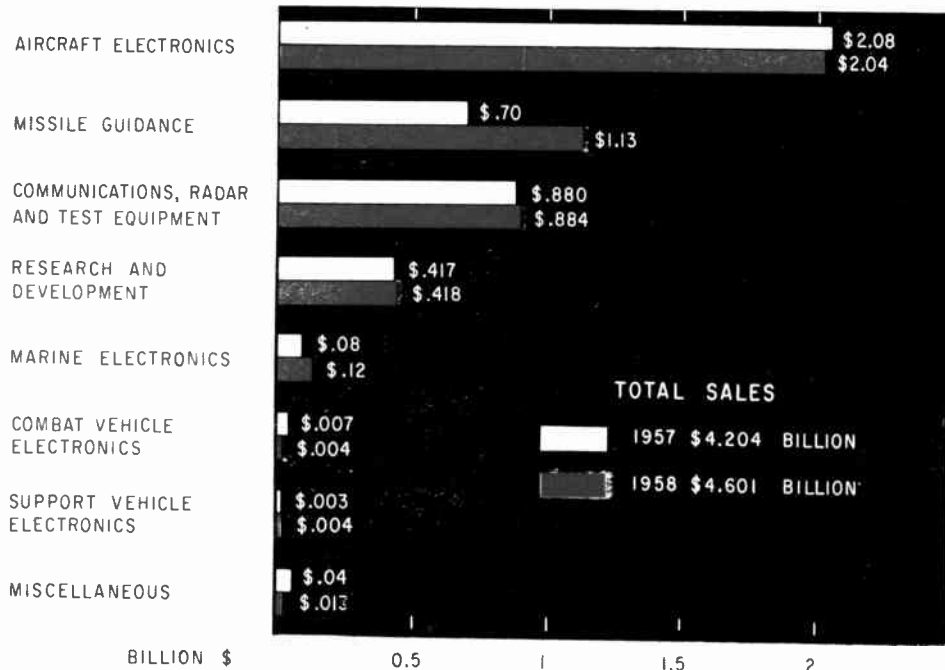
In the industrial and commercial product categories we have subtracted sales of off-the-shelf items to the armed forces, which are included in the military electronics figures.

Our method of estimating military sales has been revised. Military estimates for 1957 and 1958 are higher than in previous *ELECTRONICS* estimates. Revised method is based on new information on electronics proportion of military procurement totals, uncovered by McGraw-Hill's Washington Bureau.

**MILITARY**—The electronics industry's dependence

SPECIAL MARKET REPORT

## FACTORY SALES OF MILITARY ELECTRONIC EQUIPMENT AND REPLACEMENT PARTS



on defense spending is increasing. In 1958 some 55 percent of factory sales will be to military customers, as against 53 percent last year.

Military sales this year are expected to total \$4.601 billion, up \$397 million, or 9.5 percent, from 1957 sales of \$4.204 billion.

Aircraft electronics is taking the biggest share, \$2.038 billion, although this is about 2 percent less than last year's total of \$2.077. Aircraft electronics is the largest single product sales group in the electronics industry. The 1958 estimate represents 44 percent of military electronics spending for the year and 24 percent of total industry sales.

Both 1957 and 1958 figures shown here are considerably higher than previous **ELECTRONICS** estimates. The proportion of electronics business in total aircraft procurement had been previously understated. The missile guidance proportion has been too optimistic. The figures used here estimate guidance equipment at 35 percent of missile value; some estimates have been reported as high as 50 percent.

The R & D percentage has also been increased.

Increasing emphasis on missiles is reflected in a 60 percent hike in spending estimates for the electronic equipment, from \$700 million in 1957 to \$1.125 billion in 1958.

Guided missiles now make up the fastest growing sales area in the industry. Missile electronic sales this year should account for 24 percent of military electronic spending and 13 percent of industry sales.

**INDUSTRIAL**—Projected industrial and commercial sales for the year total \$1.420 billion, a forecasted increase of eight percent over 1957 sales.

Sales of industrial and commercial electronics products in 1958 are expected to contribute 17 percent of the industry's sales total for 1958. Relationship to total industry sales is about the same as 1957. But, by merely holding its share of sales, the industrial and commercial sales category is moving ahead of entertainment electronics sales totals.

A significant part of industrial and commercial sales are, it should be noted, related to military spending. Industrial buying of data processing, test instruments, industrial control and atomic instruments is often done in order to prepare for military production and R & D contracts. Estimated sales of these four product groups account for \$713 million, or 50 percent of the total industrial and commercial market.

Data processing continues to be the biggest item in the industrial and commercial products list, with sales of about \$250 million estimated for 1958. The forecast is less than the \$300 million spent on data processing last year only because of the decline in spending for plant equipment. An early reversal of this trend is expected as plant spending resumes.

Biggest sales increase has been in aviation equip-

### SPECIAL MARKET REPORT

August 22, 1958 — **ELECTRONICS** business edition

### Factory Sales of Industrial Electronic Equipment

	1957	1958 Est.
Broadcast Equipment.....	\$74,000,000	\$70,000,000
Mobile Radio.....	55,000,000	65,000,000
Microwave Relay.....	18,000,000	20,000,000
Marine Equipment.....	13,000,000	16,000,000
Aviation Equipment.....	70,000,000	130,000,000
Other Communications.....	16,000,000	21,000,000
Data Processing.....	300,000,000	250,000,000
Test Instruments.....	195,000,000	220,000,000
Industrial Controls.....	170,000,000	195,000,000
X-Ray.....	111,000,000	115,000,000
Atomic Instrumentation.....	36,000,000	48,000,000
Electronic Heating.....	34,000,000	40,000,000
Industrial Television.....	6,000,000	8,000,000
Commercial Sound.....	152,000,000	155,000,000
Theater Equipment.....	38,000,000	42,000,000
Miscellaneous.....	20,000,000	25,000,000
<b>Total Sales.....</b>	<b>\$1,308,000,000</b>	<b>\$1,420,000,000</b>

ment. Aviation products are expected to enjoy an 86 percent sales increase over 1957 because of the big shift to jet planes and because of big increases in spending for airway traffic controls.

Sales of industrial television and atomic instrumentation are moving ahead at a fast pace. Both industrial television sales and atomic instrumentation sales are scheduled for one-third increase over 1957 sales. Industrial television sales are projected at \$8 million and atomic instrumentation at \$48 million.

**ENTERTAINMENT**—The set-manufacturing end of the electronics industry is in momentary decline. Entertainment electronic sales which totaled \$1.534 billion last year have been estimated at \$1.403 billion for 1958.

Home and portable radio sales were hurt by a tight clasp on consumer purses in the early part of the year. Home radio sales for this year are estimated at 4.894 million units and \$103 million. In addition, portable sales not included above, should total 3.463 million units at \$86 million.

In 1957 home radio sales were 6.667 million units, \$130 million, while portable sales totaled 3.265 million units at \$82 million.

Auto radios, depressed by weakness in automobile sales, are expected to drop from 5.496 million units and \$137 million dollars in 1957 to 3.400 million units and \$87 million.

Black-and-white tv is suffering both from recession effects and the high degree to which it has saturated its market. In 1958 some 5.3 million black and white sets, worth \$647 million, are expected to be sold.

### Factory Sales of Electronic Entertainment Equipment

	1957	1958 Est.
Home Radio.....	\$130,000,000	\$103,000,000
Portable Radio.....	82,000,000	86,000,000
Auto Radio.....	137,000,000	87,000,000
Color Television.....	52,000,000	80,000,000
Monochrome Television.....	833,000,000	647,000,000
Phonos, Tape Recorders, HiFi.....	300,000,000	400,000,000
<b>Total Sales.....</b>	<b>\$1,534,000,000</b>	<b>\$1,403,000,000</b>

This compares with 6.4 million black-and-white sets, worth \$833 million, sold in 1957.

Color television continues to be a yet unrealized great hope for the future. Sales of about 200,000 color sets, valued at \$80 million, have been projected for 1958. This figure is still subject to revision.

Bright spot in this year's entertainment picture is booming sales of hi-fi and stereo phonographs and tape recorders. Dollar sales of this group should reach \$400 million and top 1957 sales by 25 percent.

**PARTS**—Replacement part sales should increase by \$50 million this year. Sales of \$950 million are expected for 1958 as against \$900 million last year.

Sales of replacement black-and-white picture tubes show substantial gain. Actual 1957 sales were \$140 million, and \$167 million has been forecast for 1958.

Replacement receiving tubes, perhaps showing the effects of semiconductor competition as well as recession, declined. Estimated sales for this year are \$130 million, compared with \$139 million last year.

**FUTURE**—Total electronics industry sales should top \$9 billion in 1959.

A clear military spending road is ahead and there should be no after-effects from military cutbacks to be overcome. The Mideast crisis is intensifying congressional interest in raising military spending.

Fact that the nation's economy once again ap-

### Factory Sales of Replacement Parts

	1957	1958 Est.
Monochrome Picture Tubes.....	\$140,000,000	\$167,000,000
Receiving Tubes.....	139,000,000	130,000,000
Color Picture Tubes.....	14,000,000	16,000,000
Other Parts.....	607,000,000	637,000,000
<b>Total Sales.....</b>	<b>\$900,000,000</b>	<b>\$950,000,000</b>

pears to be moving ahead should benefit both entertainment and industrial-commercial electronics sales.

A modest pickup in general business conditions is already helping entertainment electronics business. Estimates of second half sales made earlier in the year have had to be revised upwards. Expectations are that the set business will make further recoveries next year.

And 1959 could be a better year for color television. Some tv manufacturers have been waiting for the next upswing in economic conditions to get the color tv bandwagon on the road.

Sale of industrial electronics products, heavily influenced by spending totals for new plant and equipment, is expected to start climbing again sometime in 1959. But willingness to increase spending is not rapidly translated into higher equipment sales; it may not be a factor until late in the year.

# Ferrets: Cold War Insurance

**PROBLEM**—Find out what limited war weapons, what all-out nuclear weapons could be used against you

**SOLUTION**—Detect them electronically from land, sea, air

**METHOD**—Ferret with broadband receivers using traveling wave tubes and ferrite devices and “can” the signals with video-type recorders for later analysis

FERRETING, the detection by electronic means of electromagnetic radiation for military intelligence purposes, today is a full-time by-product of the cold war.

Recently, a British Government prosecutor, during a trial of two Oxford university students charged with violating the Official Secrets Act, confirmed the truth of “some of the matter” in an article they wrote for an undergraduate magazine.

The article stated: “All along the frontier between east and west, from Iraq to the Baltic, perhaps farther, are monitoring stations, manned largely by National Servicemen trained in Morse or Russian, avidly recording the least squeak from Russian transmitters—ships, tanks, aeroplanes, troops and control stations.”

Soviet students who served in the armed forces have not been known to write the same type of story about Russian ferreting. But it is known that Russian ferret planes have alerted our DEW Line defenses; the number of times, dates and places are secret.

Any electromagnetic radiation is subject to ferreting, as is active sonar. This includes not only radar, but also missile guidance signals, telemetry, radio communications and clandestine broadcasts. Ferrets aim to discover the type of signal being sent out, its power, frequency and modulation, where it originates and, finally, what kind of information is being transmitted.

The threat of nuclear devastation by missiles has put a new premium on electronic intelligence. This threat spawned development and use of 1,000 mile missile detection radars as early as 1955. More sophistication and brute force will enable new radars, like those for BMEWS, our planned ballistic missile early warning system, to reach out and grab signals 3,000 miles away (ELECTRONICS, p 15, Apr 4).

Communications systems present another new challenge to ferreting right now, involving interception of signals on transmission systems that did not exist five years ago.

Not all of the phenomena associated with scatter techniques are completely understood. Some phenomena appear to increase the exposure of the systems to ferreting.

Logical trend in ferreting gear:

- Higher frequency capabilities, with intercept gear design to cover 50,000 mc and up instead of the 4,000 mc covered by the best of World War II gear.
- Use of broadband receiving and recording equipment, in which the traveling wave tube and video magnetic tape recorders may play major roles.

Twt's could become widely used as components of ferreting systems. High gain over a wide frequency range make them useful for the front end of a ferret receiver. Recent overall twt production figures are unavailable but, comments one source, a 1957 estimate of \$700,000 worth of twt's annually “seems very low indeed.”

Broadband tape recorders capable of handling video-type signals could also become invaluable. These machines make it possible to “can” any signal for later analysis in ground-based labs.

**Development of ferrite materials has also been a boon to ferreting.**

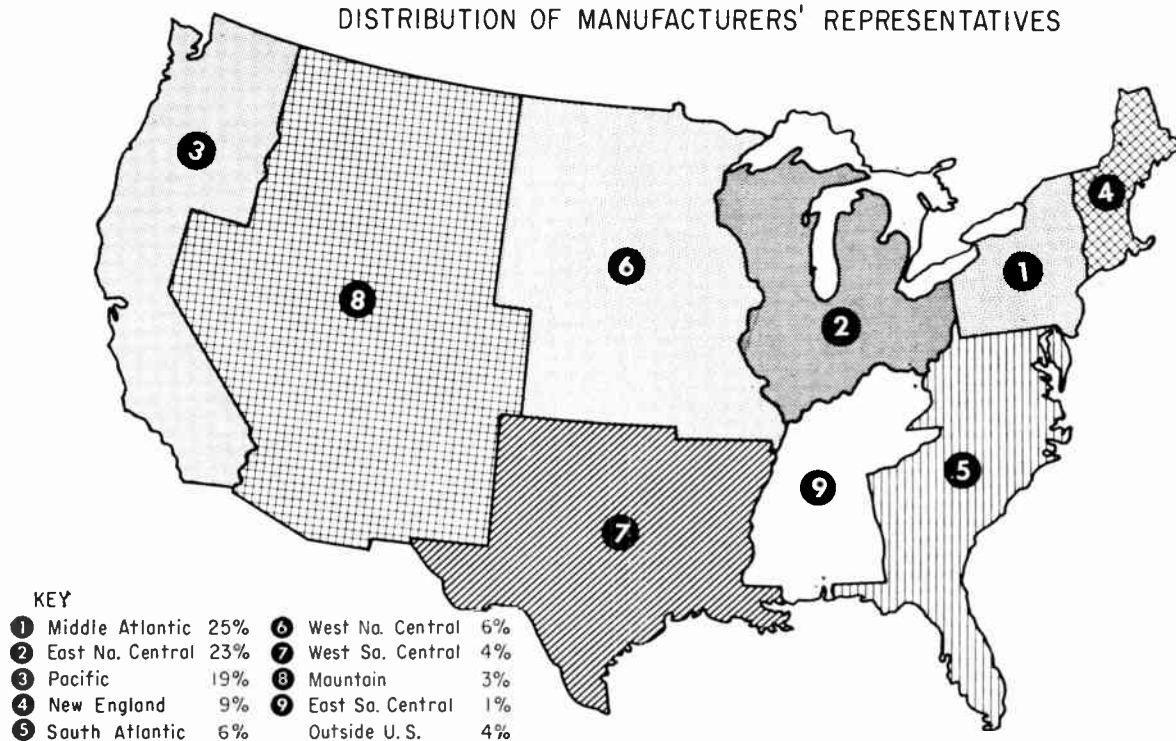
- Ferrite isolators were experimentally developed for traveling wave amplifiers a few years ago. Their purpose: to separate one circuit from another and for directing microwave energy over different waveguide paths. With the ferret receiver required to be wide open to all kinds of energy, such isolators could become vital components.

Ferrite materials help realize more of the potential maximum gain of twt's.

- Ferrite switches with switching times of a millisecond or less are likely components of a ferreting system too. These switches will let monitors keep up with rapid frequency changes as ground radars seek to avoid detection.

Ironically, many of the techniques of ferreting and much eavesdropping equipment could be used in disarmament inspection, if both sides in the cold war agreed to this.

## DISTRIBUTION OF MANUFACTURERS' REPRESENTATIVES



# Distribution Profits Improving

**Representatives and jobbers anticipate earnings of \$2.65 billion by year's end as the business of selling electronic products resumes its upward climb**

FALL UPTURN expected by many in the electronics industry will depend in good measure on the men who operate the pipelines through which our industry's goods go to market.

Representatives and distributors expect to net about \$2.65 billion this year from selling the wares of more than 3,600 electronics firms which manufacture some 2,200 different classes of components and equipment.

One road to the market is the rep. Reps currently number about 1,800, according to a recent Electronics Industry Association estimate. Highest densities of reps roughly parallel U.S. population density (See map).

Through reps, manufacturers reach most industrial accounts, many wholesale distributors and some retailers. Reps are instrumental in selling off-the-shelf gear and even some custom-made gear to the military.

Manufacturers' representatives commonly operate within fixed geographical territories. In addition to selling, they often conduct regional promotional programs, usually with ammunition supplied by the manufacturer. Some act as technical consultants for their product lines, and occasionally even take

on legal and public relations assignments.

Commissions for reps range between 3½ and 15 percent, depending on product, volume, and other factors. According to a survey by *ELECTRONICS*, 85 percent are technically trained men.

Wholesale distributors (or jobbers—the terms are sometimes interchanged) serve retailers and some industrial customers. They usually buy and stock competing lines. Biggest single area of the wholesalers' business is in parts. Annual distribution profit from components was \$150 million at the end of World War II, is now over \$600 million.

EIA estimates that 1,200 distributors serve the electronics industry. (National Electronic Distributors Association agrees, figures its 550 members as about half the U.S. total. A fourth of the more than 1,000 electrical wholesalers sell electronic items.

Big customers for distributors are those heavy industry accounts which use distributor-furnished materials as part of a process or end product.

In industrial sales efforts, reps and wholesalers often work together. Industry buys much of its special custom-built equipment through reps, while jobbers furnish many shelf-stocked items.

# Nuclear Navy Gets Largest Sub

**Triton, with 100,000-mile range, will serve as radar picket ship**

LAUNCHING Tuesday (Aug. 19) of the radar picket submarine *Triton* brings total nuclear Navy to eight vessels and chalks up a new record in the world's submarine annals.

*Triton* is the largest, heaviest submarine ever built. At 447 ft and 5,900 tons surface displacement, it is longer by 47 ft and heavier by 200 tons than the Japanese I-400, which previously held the record. The I-400, launched in 1944, carried three seaplanes, was a slow and cumbersome craft—which was why she was captured less than a year after her commissioning.

*Triton* will be a floating electronic island for anti-aircraft and antimissile rather than antisubmarine duty. Her mission includes acting as an advance early-warning station for the fleet, or as a mobile listening post in the continental early-warning system. She will have all the capabilities of a radar

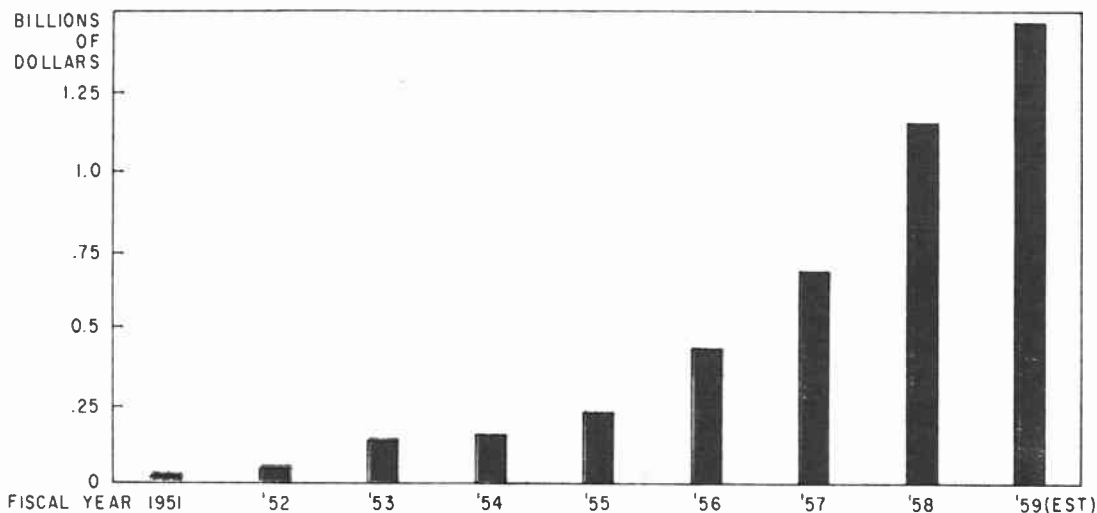
picket destroyer—in fact, she's bigger than most destroyers—with the advantage of being both submersible and able to cruise over 100,000 miles without refueling. She is also able to stay permanently on station as a fixed picket.

The great mass of radar, sonar and com gear that *Triton* will carry forced the builders—General Dynamics' Electric Boat division—to abandon the sleek *Albacore*-type hull that characterized the attack submarine *Skipjack* (see *ELECTRONICS*, p 15 June 13) and revert to the broader *Nautilus*-type hull.

Three days before the *Triton* slid into the Thames at Groton, Conn., the nuclear *Seadragon* was launched at Portsmouth Naval Shipyard in Portsmouth, N. H. *Seadragon* is the fourth of the *Skate*-class attack subs (*Skate*, *Swordfish* and *Sargo*). These are torpedo-armed ships with scaled-down *Nautilus*-type hulls, about 165 ft long and displacing 2,400 tons. As attack subs with an antisubmarine mission, they are crammed with electronic gear, mostly sonar, radar, navigation aids and fire-control.

## PRODUCTION and SALES

ELECTRONICS PORTION OF MISSILE SYSTEM SALES



## Missile Systems Sales Climb

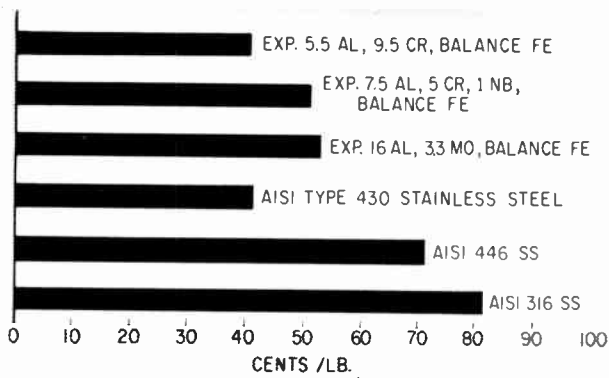
MARKET for missile systems equipment and components will continue to grow. By the mid-1960's, 60 percent of our air defense force will be missiles, 40 percent manned interceptor planes. That's the recent prediction of USAF Maj. Gen. C. S. Irvine, Deputy Chief of Staff Materiel. Total combat force by that date, he said, would be 65 percent aircraft and 35 percent missiles.

Qualified estimates as to how much of the cost of a typical missile system goes for electronics vary from as low as 30 percent to as high as 50 percent. Using the reasonably conservative factor of 35 percent, electronics' portion of the missile systems pie in 1955 comes to \$1.25 billion. This bite is an increase of more than 60 percent over fiscal 1957. That year the Defense Department spent an esti-

mated \$700 million for the electronics in missile systems.

Electronics continues to take larger and larger chunks of the billions going for defense armament, see p 14, "Our Industry at Mid-Year."

Not only will expenditures for missile systems assuredly grow in the near future but, according to most observers, so will electronics' share of the tab.



Potentially lower cost, plus indications of high strength with lower weight, are giving a boost to research on . . .

## New Aluminum Alloys

Metallurgists report progress in development of iron-aluminum and silicon-aluminum alloys

ELECTRONICS manufacturers seeking hardy, lightweight metals for structural and mechanical parts may find some of the answers in aluminum alloy research fostered by aircraft and automotive needs.

Iron-aluminum alloys, already providing high permeability magnetic materials, are also showing promise as inexpensive stainless structural materials.

Martin Co. researchers, speaking at the Society of Automotive Engineers summer meeting, indicated that:

- Fe-Al alloys could compete in cost with chrome stainless steel. Being nickel-free, the Fe-Al alloys are inherently cheaper than austenitic stainless steel (see graph).

- Iron-aluminum alloys with chromium show high resistance to high temperature oxidation, a resistance which can exceed that of stainless steel.

- Chrome steel still has the edge in combating room temperature corrosion, such as salt spray.

Fe-Al alloys present problems of brittleness at room temperature, only moderate high-temperature strength and welding difficulties. Addition of columbium, silicon,

tantalum, molybdenum, or beryllium appears to be beneficial.

Martin's experimental alloys compare favorably in strength with ferritic stainless steel. Annealed sheet of the 5.5 Al-9.5 Cr alloy, for example, shows a tensile strength of 82,900 psi at room temperature.

SAE also heard a report on an aluminum-silicon alloy being studied by Aluminum Co. of America. The aluminum is alloyed with 20 percent silicon, 2 copper, 1 magnesium and 1/2 percent manganese.

Since silicon is lighter than aluminum, the alloy is of low density. Machine tool wear has often prevented use of this type of alloy, but the new alloy's wearing effect on tungsten carbide is about the same as for 380 die-casting alloy.

At elevated temperatures, the alloy is harder than many commercial casting alloys. Hardnesses of 130 Brinell at room temperature and 80 Brinell at 400 F after 100 hours were measured. Tensile strength went up to 41,000 psi.

Alcoa is testing the alloy as a liner for motor cylinder walls. Wear was less than for another aluminum alloy developed for cylinder walls and considerably less than chrome plate, sprayed molybdenum or cast iron.

## Alumina Sales Hit \$3-4 Million Level

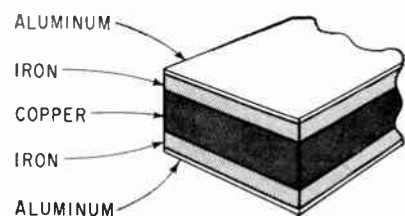
SALES of high alumina ceramics reached a plateau of \$3 to \$4 million a year in 1955-57, according to a report prepared by the market research staff of ELECTRONICS.

Sales in 1952 were \$1 to \$1.5 million. Manufacturers are hopeful of reducing costs sufficiently to stimulate a market of \$6 to \$8 million in 1962. High alumina ceramics are primarily used by the electronics, electrical and nuclear industries.

Electronic applications include structural members and envelopes for electron tubes, semiconductors, radomes, terminal seals, printed circuit bases, microwave windows, capacitor and resistor cores, antenna masts and housings and insulators.

## Plastic Stands Up to 6,500 F

SERIES of low density, high temperature, moldable plastics has been developed by Hastings Plastics. Applications include lightweight potting, radomes and thermal insulation. Continuous temperature resistance of stock formulations ranges from 300 F to 1,200 F; intermittent resistance, 400 F to 3,500 F. In a lab test, a formulation withstood 6,500 F for 30 seconds with only slight melting, the firm reports.



## Anode Cooler

Five-ply tube anode material has copper core to facilitate heat dissipation. Strips for punched parts are as thin as 0.007 in. with 40 percent of that copper. It was developed by Metals and Controls Corp. and GE.

## East-West Nuclear Monitoring Accord?

**EAST-WEST TECHNICAL TALKS** in Geneva were reported at press time to have reached a point of near agreement on the electronic detection system needed to monitor a ban on nuclear weapons testing. Soviet scientists were reported to be close to the Western position on the number of detection stations that would be required. But details of the Western position were not disclosed.

However, before the talks began, a proposal of 25 stations in the USSR and 7 in the U.S. was discussed in official circles. Proposal was made by Jay Orear, Assistant Professor of Physics at Columbia University, in a technical paper that was part of a recent study report entitled "Inspection for Disarmament." If there were 25 stations in the Soviet Union and 7 in the U.S., any point in the two countries would be within 300 miles of a monitoring station. Main nuclear detection techniques involve electronic detection of acoustic waves, seismic waves, and electromagnetic radiation, and detection of radioactivity. Says Orear: "The microbarographic technique of (acoustic) detection is the most sensitive and would usually be the most relied upon."

**MOTIVATIONAL SURVEY OF 1,500 ENGINEERS** of all kinds has just been reported by Deutsch and Shea, Inc., New York consultants. Survey showed more than 80 percent felt the greatest opportunities for advancement were outside of technical specialization; 65 percent believed

administrative work offered greater opportunities, and 17 percent cited sales as offering more opportunities. Six most-mentioned factors that decided these engineers on their jobs and the percentage who cited them were: type of work, 45 percent; salary, 34; location, 31; advancement opportunities, 30; challenge to abilities, 17; and reputation and prestige of company, 14 percent.

**USE OF NUCLEAR RADIATION** in industrial processes shows long-range promise of opening new opportunities for electronics and other industries. That's the report from Rear Admiral John D. Small, USN (ret.). Small is executive director of the CEM (for chemicals, electronics, metallurgy) Group, which is conducting a technical high-level radiation for the Atomic Energy Commission. Emerson Radio & Phonograph Corp., of which Small is a v-p, is the prime contractor; General Aniline & Film Corp. and Revere Copper and Brass are other members of the CEM Group. Arthur D. Little, Inc. is sub-contractor for technical aspects of the study.

**SKATE AND NAUTILUS FEATS** in voyaging beneath the North Pole ice were completely dependent on electronics for navigation and control. "Only a nuclear submarine, with the type of electronic equipment that it carries, could have made such a trip," commented Navy spokesman. Nautilus sonar found "lakes" in ice on earlier trip.

## TECHNICAL DIGEST

- Magnetostrictive rod 10 feet long, with barium titanate transducer at one end and sliding receiving coil on rod, gives variable calibrated time delay in British National Coal Board technique for measuring velocities of sonic pulses in flawed materials such as coal. Pulsed 100-ke signal is fed simultaneously through delay line and coal specimen. Received pulses are fed to two-beam oscilloscope, and sliding coil is adjusted until pulses match. Results reveal best way to break up coal in mine seams.

- Transducer snake for decontaminating piping in nuclear proc-

essing plants uses magnetostrictive transducers supported inside wire spheres strung together like beads. Pipe is filled with detergent and snake is slowly pulled through while transducers are energized through coax, in technique being studied by Acoustica Associates.

- Electronic vacuum pump combining effects of ionization, excitation and sputtering replaces oil and mercury diffusion pumps on tube production lines, and is economical for individual pumpout of small tubes. In Varian version, titanium cathode plates are bombarded by positive ions of gas to be pumped. Titanium atoms sput-

tered thereby on anode walls of pump serve for getting. Life of pump is limited only by supply of titanium, there being no moving parts and no heated filaments. Power consumption at start of pumpout is about 50 watts.

- Statistical telemetering, in which high-frequency transducer data is statistically analyzed immediately in missiles or aircraft and only the slowly varying low-frequency results transmitted, conserves spectrum bandwidth and shortens data reduction time on ground. Prototype hardware is being built by ASCOP for Army and Air Force.



# Man-Machine Simulator

ELECTRONIC CONTROL systems have become so complex that system designers are turning more in the direction of simulation. Mathematical models, with their limitations, are being supplanted with models that incorporate a considerable array of physical equipment.

Such models still have a major shortcoming—they do not include the human element. In order to overcome this limitation, the National Bureau of Standards has designed an advanced research tool that simulates the interactions between electronic control systems and a team of human operators.

A prototype model is being constructed to be used in designing man-machine control systems. It was developed under the sponsorship of the Wright Air Development Center, with the advice of psychologists from the Aero Medical Laboratory.

The prototype will be used to establish the feasibility and estimate the cost of a simulator that would permit dynamic as well as operational analysis of a planned system. It is hoped that the simulator will enable prediction and optimization of final systems in the laboratory, effecting important savings in time and money.

The present equipment is particularly suited to the simulation of sampled-data systems. As an example of a high-performance sampled-data system involving human operators as components in a control loop, the ground-controlled in-

terceptor problem was chosen for the first experiments. The facility could be adapted equally well to many other systems, such as air-traffic control, ground-controlled approach or landing, weapon assignment or missile guidance.

In the laboratory, the real situation is simplified for the study. A digital computer is programmed to simulate a large number of aircraft observed by search radar. A console including crt displays simulates the ground control station. Here, aircraft are manually assigned and automatically tracked.

A model airplane cockpit enables a human operator to imitate the actions of an interceptor pilot. A control panel operated by the research team permits modification of the hypothetical situation.

A general-purpose electronic analog computer simulates the dynamics of the aircraft in real time and activates the flight instruments in the cockpit directly or through special-purpose equipment. The velocity components of the interceptor aircraft are converted to a ground reference system and integrated over one scanning period of the radar. These increments in position are then sent through specialized real-time conversion and input equipment to a general-purpose digital computer (SEAC).

SEAC stores the position of the controlled interceptor aircraft in its memory and updates the information each sampling period of the system. The digital computer also controls the experiment, generates the trajectories of the preprogrammed aircraft and simulates the interceptor control computer. The SEAC output is connected to specialized continuous output and conversion equipment that activates the display equipment for the ground crew, operates a monitor scope, and sends data to an X-Y plotter on both a selected enemy target and an assigned interceptor.

Navigation commands from the ground crew are sent to the air crew by voice or a simulated data link that activates navigation instruments. Airplane control movements are signalled to the analog computer, closing the loop.

# MEETINGS AHEAD

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

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

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

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

Sept. 15-18: American Rocket Society, Fall Meeting, Hotel Statler, Detroit, Mich.

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

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

Sept. 24-25: Industrial Electronics, 7th Annual Conf., IRE, AIEE, Rackham Memorial, Detroit, Mich.

Sept. 28-Oct. 2: Electrochemical Society 114th Meeting, Chateau Laurier Ottawa, Canada.

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

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

Oct. 2-4: Upper Midwest Trade Exposition, Electronic Wholesalers Assoc., Minneapolis Municipal Auditorium, Minn.

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

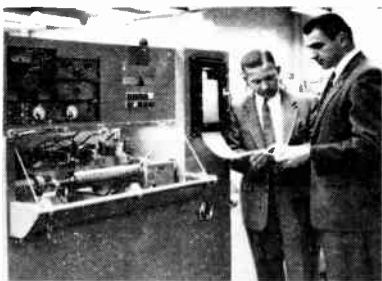
Oct. 8-10: IRE Canadian Convention and Exposition, Electronics and Nucleonics Exhibition Park, Toronto, Canada.

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

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

Oct. 20-21: USA National Committee, URSI Fall Meeting, Penn State University, University Park, Pennsylvania.

# Gages Check Cams



Cam dimensions are inspected at 2,160 points by machine developed by IBM and Airborne Instruments Laboratory. Electronic gaging equipment compares cam with master and charts any error in 12 minutes. Hand inspection required 12 hours

# Moon Photos Hoped For

**Lunar probe test vehicle will be worthwhile, says ARPA, if it goes beyond previous satellites**

THOUGH the ultimate triumph of USAF's lunar probe test would be to orbit the moon, the Department of Defense's Advanced Research Projects Agency will consider the project worthwhile if the first vehicle gets outside the 2,466 mile-high region already explored by U.S. satellites and sends back data.

Next hope is to sample the moon's immediate environment, within 50,000 mi. The DOD says there's one chance in ten that this will happen. Optimism for achieving this, however, is borne out by the fact that a photoelectric scanner, developed by the Naval Ordnance Test Station, is being carried along for observing the moon in case it is sighted close up.

Of greatest interest would be receipt of telemetered data, picked up by the scanner, of the moon's never-before-seen far side. To accomplish this, however, all of the system's 300,000 parts would have to function perfectly. And this is not considered likely.

Whatever information is obtained will be distributed through normal IGY channels to scientists throughout the world.

First stage of the test vehicle is Douglas' Thor. Second stage is a modified second-stage Vanguard rocket manufactured by Aerojet-General. A solid-propellant third-stage rocket by Allegheny Ballistics Laboratory will carry the terminal rocket to point of launching.

Besides the photoelectric scanner, instrumentation in the vehicle includes a magnetometer, temperature gage, micrometeoritic impact recorder, transducers, telemetry transmitter, receiver for the ground-commanded radio signal to fuze the terminal rocket, inertial guidance and stabilization for the package.

Tracking stations are located at USAF missile Test Center, Fla., Lincoln Labs, Mass., Manchester, England, Singapore and Hawaii. Headquarters is at the USAF Ballistic Missile Division, Inglewood, Calif. Signal to fuze the terminal rocket for its trip to the vicinity of the moon will be directed from Inglewood but actually triggered from Hawaii.

Though no new cost figures have been released for the lunar probe project, the estimate last March by Maj. Gen. Frank A. Bogart, Director of Budget, Comptroller of the Air Force, was \$16 to 20 million for five to seven shots.

Best periods for launching a missile to the moon, due to its relative position to the earth, are Aug. 17-20, Sept. 18-21, and so on at 28-day intervals.

## MILITARY ELECTRONICS

- Inertial guidance system for Army's 500-mi range, solid-fueled, two-stage Pershing missile will be built by Bendix Eclipse. Bulova Watch will produce the fuzing and arming system. Weapons systems manager is Glenn L. Martin.

- Army Research Office, Arlington, Virginia, spends approximately \$90 million a year on more than 2,000 research projects. Organized as a part of Army's Office of the Chief of Research and Development, ARO supervises and coordinates all Army activities in basic and applied research that are carried out by its seven technical services.

- Navigator for the Navy blimp, ZPG-2, currently en route to the

Arctic, is Sanders Associates' APN-77 Doppler system. Designed and developed under a BuAer contract, the c-w system weighs 30 lbs, uses 52 tubes, 96 semiconductors and operates at 15,750 mc (Electronics, p 16, Oct. 10). Sanders says American and European helicopter firms are also exploring the gear.

- NACA gets \$24½ million expansion authorized by Congress for Wallops Island, high-altitude solid-fueled rocket test station. New money will be used for liquid-fueled rocket and small earth satellite launchings.

- Launching pads for SAC's diversionary missile, Bull Goose, will be built at Duluth Municipal Airport, Minn. and Ethan Allan AFB.

## CONTRACTS AWARDED

Autonetics div. of North American wins a \$10-million contract with Warner Robins Air Materiel Area for electronic spare parts for the Autonetics-developed MG-4 armament control system installed in the F-86K. The shipment will go to four NATO countries where the planes are in use. North American also gets a \$3,440,000 contract with the Air Materiel Command for the Phase I development program for the B-70. Also, a \$274,718 contract with AMC for cempod development for the F-100D.

Radioplane gets a \$9,069,071 contract with Army Signal Supply Agency for SD-1 drones.

Texas Instruments gets a \$2,475,-

794 contract with CAA for 50 backfit kits for existing airport surveillance radar systems. After modification, the radar units will display only moving targets and have an automatic transmitter performance monitor. Also, a \$1,361,238 contract with BuAer for AN/APS-80 radar sets.

GE gets an \$80,168 contract with AMC for development of a low noise K-band traveling wave tube for detection of thermal radiation and radar signals. Also a \$3,723,-810 contract with BuAer for indicators for airborne sonar devices (AN/AQA-1). A Rome AF Depot contract for three radar sets, AN/PPS-37, amounts to \$3,409,585.

Consolidated Electrodynamics gets a \$1.5-million contract with Convair for design, development and production of ground-support equipment for the Atlas ICBM. The instrumentation will include three high-pressure helium and nitrogen control systems.

Lewyt wins a \$7,514,563 contract with Army Signal Supply Agency for ground radio communications equipment. AN/GRC-81.

Siegler receives two Army contracts totaling more than \$½ million for three tracking stations for the Explorer satellite. Basic element in the stations will be Microlock receivers initially developed by JPL and now manufactured by Siegler.

Airtemp div. of Chrysler wins a \$4,220,014 contract with Cincinnati Army Ordnance District for a range finder plus mounts and spare parts and for a ballistic computer.

Hiller Helicopters sells H-23D helicopters to BuAer under \$4,758,048 contract. (Almost \$1 million of this will go for electronic gear).

Sperry is awarded a \$3,474,962 contract with Army Signal Supply Agency for 462 portable search radar sets. AN/PPS-4.

Westinghouse gets a \$12,812,471 contract with BuShips for radio transmitting sets and antenna tuners.



## GREEN ENGRAVERS

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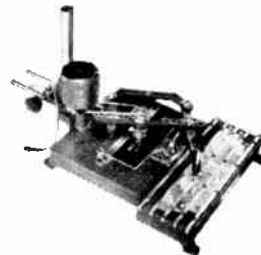
- Spindle speeds up to 26,000 rpm to engrave or for machining modern materials
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- Cutter grinders, rotary tables, master letters, compound slides, name plate blanks and all required accessories

### MODEL D2 HEAVY-DUTY 2-DIMENSIONAL

- 575 pounds-rigid, sturdy, precise
- Vertical adjustment of copy table automatic with Pantograph
- Unobstructed on three sides to take large work
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- Ball bearing construction throughout — super precision ball bearings in spindle
- Ratios 2 to 1 to infinity — master copy area 26" x 10"

### MODEL 106 PORTABLE BENCH MODEL-2- OR 3-DIMENSIONAL

- 40 pounds of unbeatable speed and accuracy at a reasonable price
- Perfect for all machining applications within its range
- Ball bearing spindle has three speeds up to 14,000 rpm
- 5 positive, accurate pantograph ratios
- One copy carrier (supplied) accept all master sizes
- Height of pantograph and position cutter are continuously adjustable
- Work up to 10" by any width
- Taper shank cutters



## GREEN INSTRUMENT CO., INC.

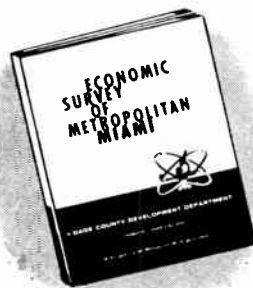
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John N. Gibson, Director

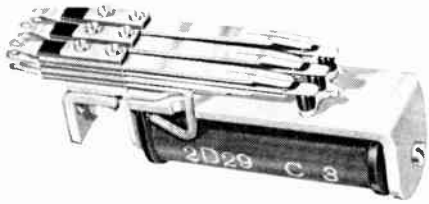
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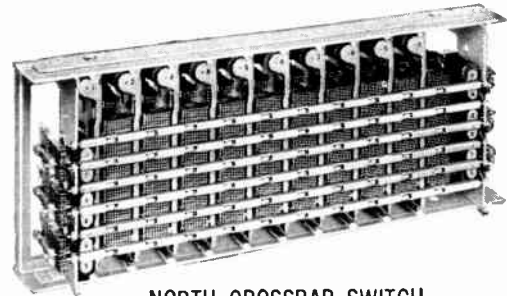
An agency of the Metropolitan Miami government





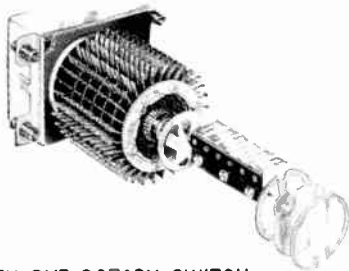
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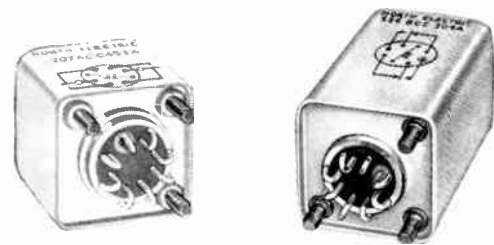
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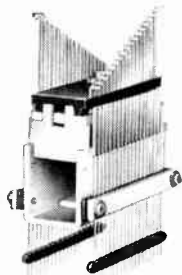
*Advanced bank and wiper design affords new flexibility in rotary switch application.*



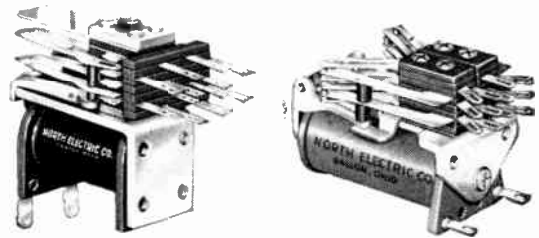
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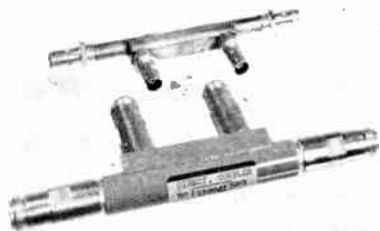
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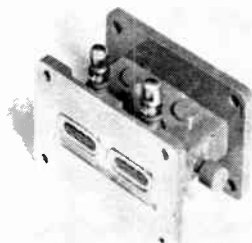
Available in Canada through  
 Ericsson Telephone Sales of Canada, Ltd., Montreal 8, P. Q.

August 22, 1958 — **ELECTRONICS** business edition

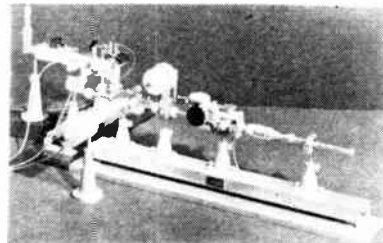
# Microwave Spurs New Parts



Maury & Associates  
directional couplers



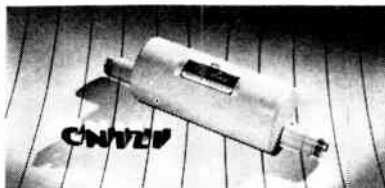
Microwave Associates, Inc.  
dual TR tube



British Industries Corp.  
waveguide components



Microwave Engineering Labs, Inc.  
bandpass filter



Cascade Research  
load isolators



Advance Industries, Inc.  
maser amplifier

VERSATILITY of microwave systems depends largely on equipment used. New equipment designs, in turn, rely on availability of new microwave components. Here are some of the latest.

Cascade Research division of Monogram Precision Industries, Inc., 53 Victory Lane, Los Gatos, Calif., offers the model CN121 coaxial ferrite load isolators. Four in the series operate from 4 to 7 kmc, 5 to 7 kmc, 2.7 to 2.9 kmc and 2.5 to 3.8 kmc. They provide 10, 20, 20 and 10 db isolation respectively. (50).

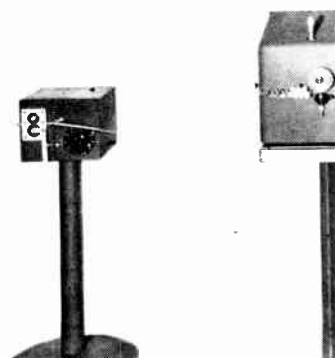
New directional couplers are announced by Maury & Associates, 10373 Mills Ave., Pomona, Calif. Their inherent directivity factor of 20 db minimum is constant from 100 to 1,000 mc above coupling factor which is 30 db at 100 mc and 10 db at 1,000 mc. Coupling and directivity accuracy are  $\pm 1.0$  db. (51).

British Industries Corp., 80 Shore Road, Port Washington, N. Y., has available new Hilger & Watts waveguide components for use in the 8-10 mm waveband. Small size and reasonable component cost are among the advantages of operation in this band. Also, frequencies between 30,000 and 37,500 mc occupy a window between two high attenuation bands. (52).

In production at Microwave Engineering Laboratories, Inc., 943 Industrial Ave., Palo Alto, Calif., is the model FS-1, a 2-4 kmc bandpass filter designed for use in microwave measurements and systems. Unit has less than 1 db insertion loss in the pass band. (53).

Advance Industries, Inc., 640 Memorial Drive, Cambridge 39, Mass., has developed the Versitron, a low temperature, solid-state maser amplifier for operation at microwave frequencies in either S-band or X-band. Firm says it was specifically designed for radar, telemetry and communications research, development and field test applications. (54).

Now being marketed by Microwave Associates, Inc., Burlington, Mass., is a new dual TR tube conservatively rated at 200 kw for use in X-band radar duplexers over the 8,500 to 9,600 mc band. It protects crystals over the  $-55$  C to  $+85$  C range. (55).



## Wire Prefeed automatic unit

EUBANKS ENGINEERING CO., 260 N. Allen Ave., Pasadena, Calif. A new automatic wire prefeed maintains a loop of slack wire ahead of wire processing equipment. A variable speed motor, which powers the feed rolls, is set to dercel wire at a rate slightly lower than the rate at which the wire is used, thus creating a slowly diminishing loop. When the wire straightens, lifting the dancer tube, which requires less than one-half oz. of force, the motor speeds up momentarily to regenerate a loop. Designed principally for use with the company's automatic wire cutter and stripper, it may also be used with coil winders and other wire processing equipment. Circle 56 on Reader Service Card.

For more information use READER SERVICE Card

## Accelerometers high-temperature

GILFON INDUSTRIES, INC., 212 Durham Ave., Metuchen, N. J. The AXF-series high-temperature, self-generating accelerometers are capable of continuous operation at temperatures from  $-100^{\circ}\text{F}$  to  $+500^{\circ}\text{F}$ , with an accuracy of  $\pm 5$  percent of actual reading. They feature the



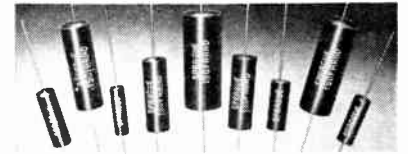
use of bender type piezoelectric construction, which provides superior performance in low acoustic

sensitivity, extremely small size, light weight and high frequency response. Units are available with resonant frequencies as high as 30 kc and sensitivities of up to 10 mv/g. They are designed for the measurement of shock and vibration in aircraft and missiles and cover a range of 1-100 g to 1,000 g over frequencies of 3 to 10,000 cps. Circle 57 on Reader Service Card.

## Film Capacitor high stability

SPRAGUE ELECTRIC CO., 35 Marshall St., North Adams, Mass. Type 145P Isofarad capacitors have practically zero temperature coefficient over the temperature span of  $-10$

$^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$ . They are intended for applications where stability of capacitance is all-important. Such uses include synchroguide circuits in color tv receivers, laboratory test equipment, working standards for general laboratory use and high stability amplifiers. Complete en-



gineering data are detailed in engineering data sheet 2073, available on letterhead request.

## V-R Power Supply magnetic type

KEPCO LABORATORIES, INC., 131-38 Sanford Ave., Flushing 55, N. Y. Model KM-252 is a tubeless magnetic voltage regulated power sup-



ply. It delivers in two ranges—5 to 20 v, 0 to 12 amperes, and 20 to 35 v, 0 to 7 amperes. Regulation for line or load is less than  $\pm 1$  percent. Ripple is less than 0.1 percent. Circle 58 on Reader Service Card.



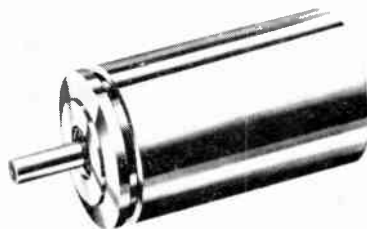
## Nameplates aluminum foil

NORTH SHORE NAMEPLATE INC., 214-27 Northern Blvd., Bayside, N. Y., announces a new type of etched and anodized aluminum foil nameplate, called ThermoMark, which can be instantly applied. The paper liner which pro-

tects the adhesive need not be peeled off—it releases itself at a touch. The nameplates use a sealing material which may be either solvent-activated or heat-activated. The firm says that the special adhesive material bonds permanently even to curved, painted, or crinkle-finish surfaces. Circle 59 on Reader Service Card.

## Motor-Generator small housing

HELLIPOT CORP., Newport Beach, Calif. Model S MG 420-410 servomotor-generator is only 1.350 in. long and 1.9 oz. in weight. Motor and generator reference

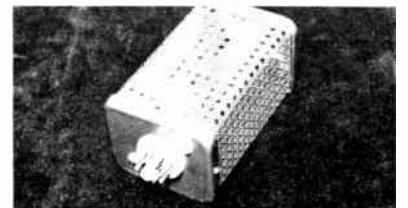


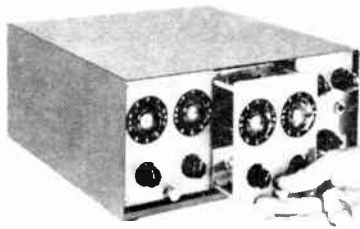
windings operate from a 26-v, 400-cycle source; motor control windings take up to 52 v. Time constant is 5.7 millisecc; generator input power, 1 w; motor input power 2.3 w per phase; no-load speed, 6,000 rpm. Circle 60 on Reader Service Card.

## H-V Power Supply small and compact

ALL AMERICAN ENGINEERING CO., Box 1427 DuPont Airport, Wilmington 99, Del., offers a plug-in h-v power supply unit for photomulti-

pliers and similar applications. It steps up input voltages ranging from 100 to 275 v d-c at 10 to 27 ma to output voltages ranging from 450 v to 1,500 v d-c. Unit measures  $2\frac{1}{2}$  in. by  $3\frac{1}{2}$  in. by 4 $\frac{1}{2}$  in. high. Circle 61 on Reader Service Card.





### Preset Counters modular design

ERIC RESISTOR CORP., 644 W. 12th St., Eric, Pa. Model 320 series preset electronic counters feature a new approach to modular design. They are available in every size from 2 to 6 digits in the standard line. Each standard instrument consists of one pluggable amplifier and control unit plus any combination of pluggable 2 and 3 decade modules. It will count at a maximum rate of 5,000 counts per sec, accepting any standard waveform. The output circuitry provides a wide range of control functions. Circle 62 on Reader Service Card.



### Circuit Breaker thermal-magnetic

E-T-A PRODUCTS CO. OF AMERICA, 5085 N. Elston Ave., Chicago 30, Ill. The miniature 4000 circuit breaker, rated 0.05 to 6 amperes, may be used for automatic telephone systems, communication equipment, electronic control mechanisms and other applications requiring quick-release protection. Coordinated thermal-magnetic operating characteristics assure positive protection against overload and short circuit conditions. Circle 63 on Reader Service Card.

## Literature of the Week

### MATERIALS

Dip Coating Compound. Isochem Resins Corp., 221 Oak St., Providence, R. I. Data bulletin DB-151-8157 covers Isogel 151, a 100-percent epoxy dip coating compound curing at moderate temperature. Circle 64 on Reader Service Card.

### COMPONENTS

Arc Suppression. Bradley Laboratories, Inc., New Haven 11, Conn. A four-page folder describes the use of the company's selenium rectifiers for arc suppression. Besides a brief discussion on arc suppression, the folder lists the physical and electrical characteristics of the vacuum processed selenium rectifiers for a-c and d-c use. Circle 65 on Reader Service Card.

Miniature Components. Grayhill, Inc., 561 Hillgrove Ave., La Grange, Ill. Catalog M-202 covers the company's complete line of miniature electronic components. Included are switches, test clip adapters and binding posts. Circle 66 on Reader Service Card.

Motor Catalog. B&B Electric Motor Co., 206 Lafayette St., New York 12, N Y. A 24-page catalog in a file size folder lists hundreds of geared and non-geared electric motors from 1/2000 to 25 hp. Complete prices and electrical information are given. Circle 67 on Reader Service Card.

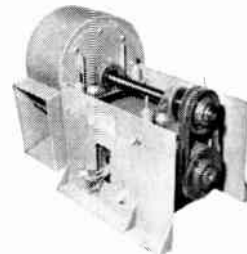
Ruggedized Crystals. Biley Electric Co., Union Station Bldg., Erie, Pa. Bulletin 512 discusses crystals especially designed for use in airborne and missile-borne equipment. The units described have a frequency range of 4 kc to 125 mc and will take vibration up to 2,000 cps. Circle 68 on Reader Service Card.

(Continued on page 29)

## American Blower suggests: EASY WAY TO END HEAT FAILURES IN ELECTRONIC UNITS

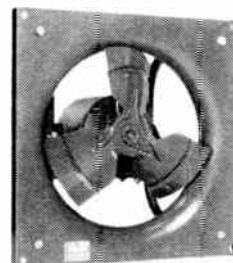
Problem: End malfunctions from self-generated heat in sensitive electronic equipment. Solution: Provide dependable cooling with an American Blower packaged air-moving unit. Numerous sizes and designs to choose from—many can be modified as needed. Or, if necessary, we can start from scratch and design 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.

### FOR COOLING TRANSMITTERS



Heavy-duty, V-belt-driven blower. Capacity: 517 cfm @ 0.25" sp @ 640 rpm and 1400 cfm @ 1.5" sp @ 1642 rpm. Bulletin 2712.

### FOR COOLING CABINETS

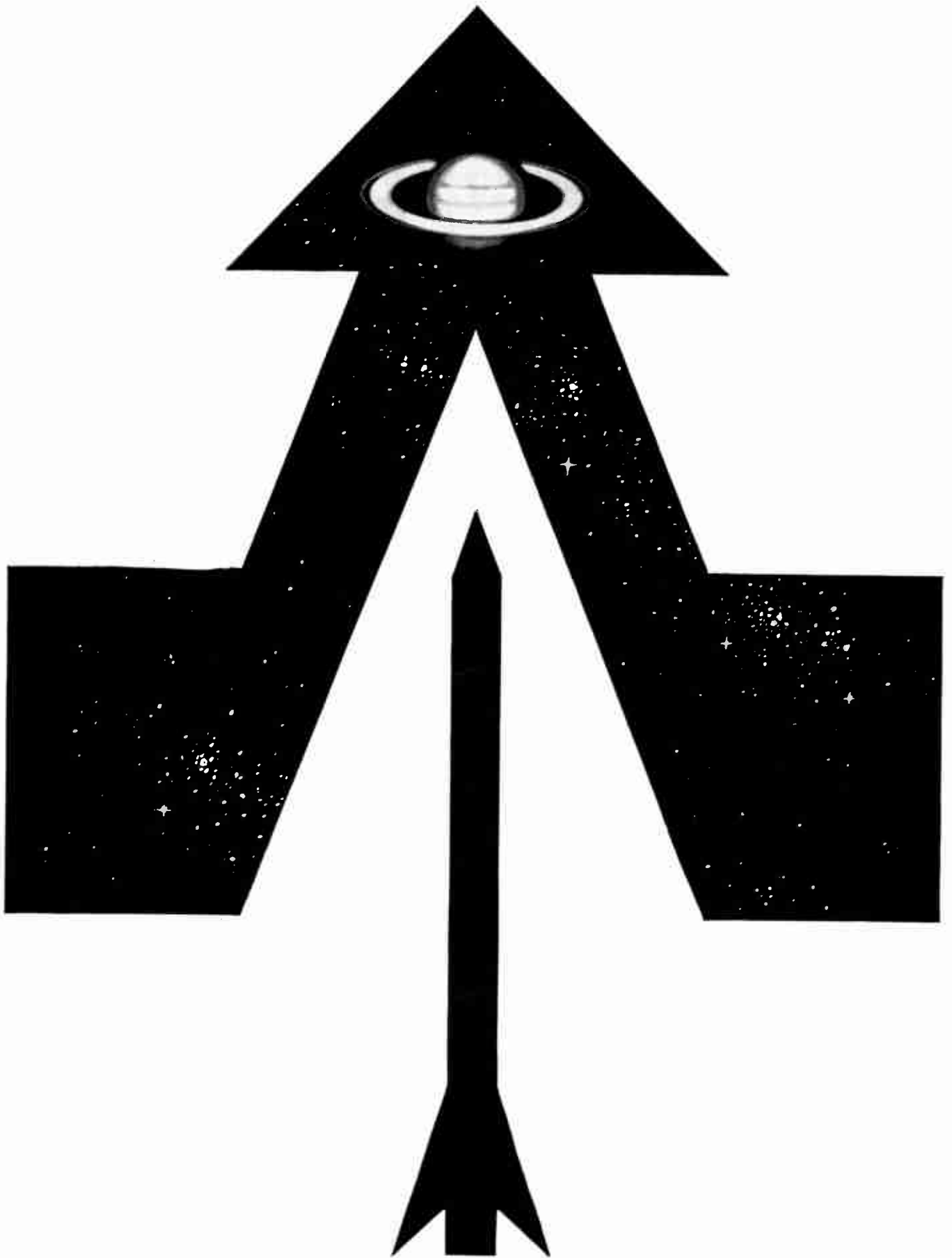


Propeller fan. Capacity: 1325 cfm @ 0" sp to 310 cfm @ 0.62" sp @ 1725 rpm. Write for Bulletin 4812.

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



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Somewhere in the early hours of tomorrow, these two main bodies of creative effort will meet on the threshold of a new age beyond the missile.

**MARTIN**  
BALTIMORE · DENVER · ORLANDO

(Continued from page 27)

**Transistor Chassis Kit.** Vector Electronic Co., 1100 Flower St., Glendale 1, Calif. Bulletin 55 tells how to save set-up time on experimental circuitry with transistor chassis kit-22X. **Circle 69 on Reader Service Card.**

## EQUIPMENT

**Frequency to D-C Converter.** Nacimco Products, 2300 National Ave., National City, Calif. A recent specifications sheet covers the company's frequency to d-c converter which provides a d-c signal that is linearly proportional to the frequency of the input signal. Applications of the unit discussed include the conversion of flow meter, tachometer and other variable frequency signals to analog form. **Circle 70 on Reader Service Card.**

**Marking Machines.** The Acromark Co., 9-13 Morrell St., Elizabeth 4, N. J. The six-page catalog 9A covers peripheral marking machines that hot stamp calibrations and other markings in color with a flat die and slide motion. Machines described are air operated, electrically heated, automatic or semiautomatic. **Circle 71 on Reader Service Card.**

## FACILITIES

**Airline Airfreight Map.** Emery Air Freight Corp., 801 Second Ave., New York 17, N. Y. Manufacturers turning to airfreight to meet the tight deadlines of the accelerated missile program can find the nearest airport to a distant supplier or customer on a new 4-color map of the U.S.A. It shows cities served by airline airfreight and principal airline routes. **Circle 72 on Reader Service Card.**

**Products and Facilities.** Thompson Products, Inc., 2196 Clarkwood Road, Cleveland 3, Ohio. Electronic products for military and commercial use, as well as research, testing and production facilities, are described in a new 28-page brochure. **Circle 73 on Reader Service Card.**

# Production Inspection is Faster and Easier with a J&L Optical Comparator

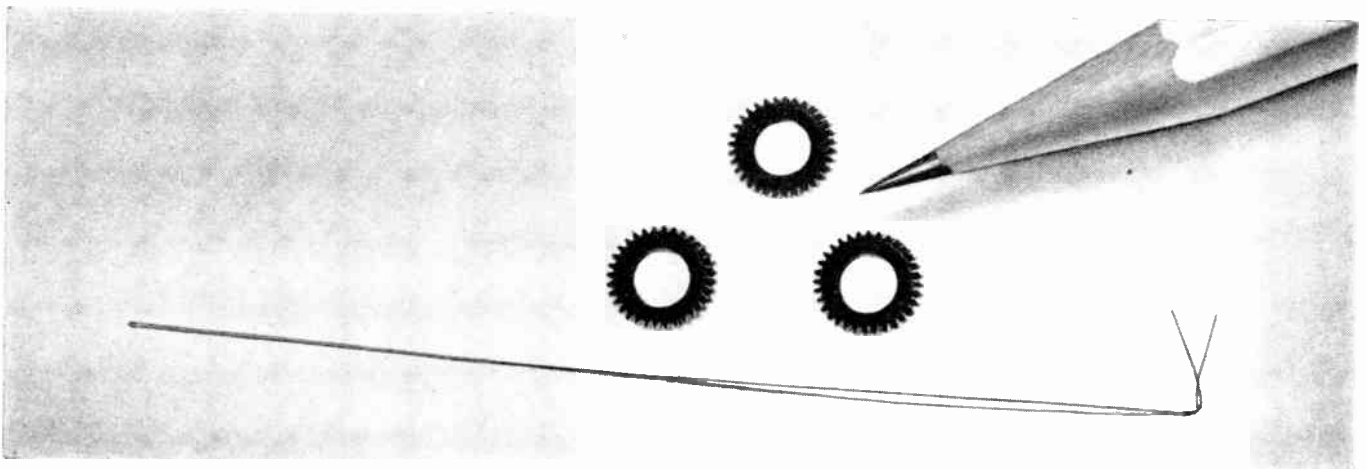
*... and its extreme versatility enables you to perform inspections that used to be "impossible"!*

More and more electronics manufacturers throughout the country are using Jones & Lamson Optical Comparators in their quality control operations. Small shops, as well as the giants, have learned that a J&L Comparator pays for itself in very short order.

The Comparator's ability to measure and inspect, through shadow magnification, all sorts of parts and objects

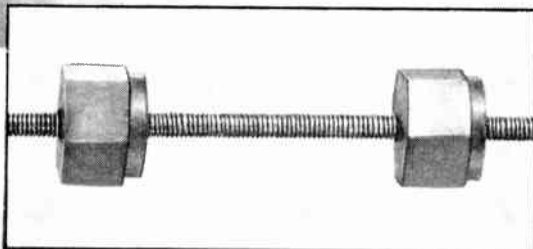
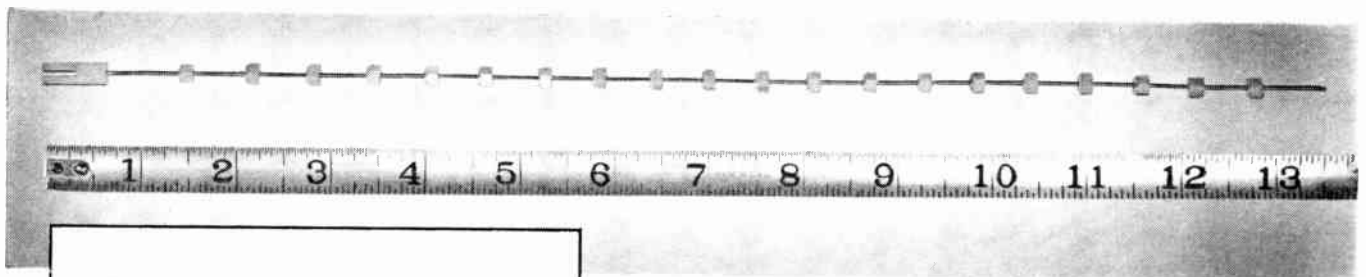
with extreme precision and speed makes it ideally suited for checking electronics components, especially those which are tiny or intricately contoured.

Investigate how the J&L Comparator can help you make your production operations more efficient . . . and more profitable. Write today for a free copy of our new illustrated catalog No. 5700.



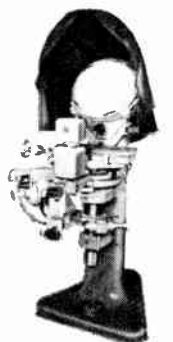
**For Instance** — A customer writes: "One of our assemblies, containing 32 separate circuits, measures only  $\frac{3}{16}$ " dia. by 1" long. The parts which go into this assembly must have perfect shape and tension, which are impossible to check by mechanical

means. Two such parts are these .005" dia. gold wires, and precisely toothed brush spacers. Since using the J&L Optical Comparator in our inspection, assembly failure due to malfunction of either of these two parts has virtually disappeared."



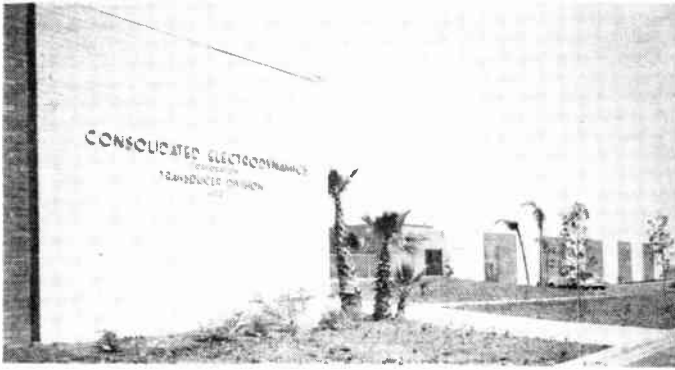
This precisely-threaded rod (used in calculating machines) is of .047" dia. stock, 120 pitch, with continuous threading along its entire 12" length. Threading accuracy and critical dimensions are measured and checked speedily and efficiently with a J&L Comparator.

Model PC-14



## JONES & LAMSON

JONES & LAMSON MACHINE COMPANY, Dept. 710, 539 Clinton Street, Springfield, Vermont



## CEC Moves Two Divisions

CONSOLIDATED Electro-dynamics Corp. recently completed construction of two 57,500-sq ft buildings (picture) for its Systems and Transducer divisions in Monrovia, Calif. Both divisions, formerly located in Pasadena, are now operating in their new facilities.

The \$1.5-million development occupies 13 acres of a 33-acre company site which was formerly the Monrovia Airport. One acre is being leased to Los Angeles Airways, Inc. for a public heliport.

The single-story office, laboratory, and plant buildings are of brick construction, with removable metal walls at one end to allow for future expansion.

Kennett W. Patrick, vice president in charge of the two divisions

pointed out that the move had brought a \$3.5-million payroll to Monrovia. The 625 persons employed at the new facilities make CEC Monrovia's largest manufacturer, he said.

The Transducer Division designs and manufactures sensing devices used in dynamic and static testing systems and is active in the area of telemetry and in the development of basic missile-control devices. It also produces ceramic products, precision optical assemblies and components, and an extensive line of galvanometers.

The Systems Division designs and builds instrumentation systems for high-speed electronic data processing, dynamic and static testing, and industrial control.

## New York Firm Realigns

AN ORGANIZATIONAL realignment resulting in the establishment of two new divisions in The W. L. Maxson Corp., New York City, is announced. The new divisions, Langevin Division and Instruments Division, assume the sales and production formerly handled by the Maxson Instruments Corp. which was dissolved.

Langevin Division, in Long Island City, will be directed by Albert Schneider. It will continue the manufacture and sale of the Langevin line of transformers and audio amplifier equipment.

Instruments Division operations will be in New York City, and will be directed by Michael J. Grassi. This activity will continue development and production of special

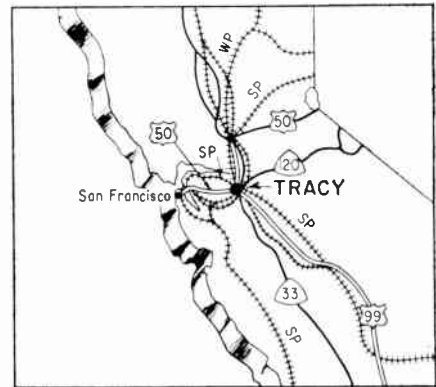
measurement and control instruments, such as oscillators, phase meters, and acceleration sensing devices.

With these two new divisions, The W. L. Maxson Corp. now has six operating divisions.

## DeLuca Elected Acoustica V-P

FRANK P. DeLUCA, JR. has been elected a vice-president of Acoustica Associates, Inc., Mineola, N. Y. and Culver City, Calif. He will be responsible for the operation of the firm's newly-opened facilities on the west coast which are producing an airborne full control system and all related ground support equip-

## TRACY, CALIFORNIA



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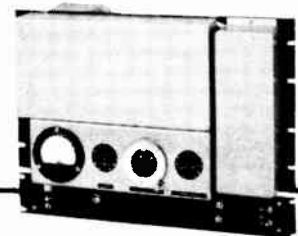
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ment for the 5,500-mile Atlas ICBM.

Prior to his association with Acoustica, DeLuca was associated with the Hughes Tool Co. and the G-M Development Co., both in southern California.



## GIC Sets Up New Division

IN A MOVE to speed up its program of diversification in industrial and government electronics, General Instrument Corp., Newark, N. J., has created a special division for new product development. Lawrence R. Hill (picture) will head it up as divisional manager.

Hill had been with Westinghouse Electric Corp. for 20 years. He established and was operations manager of that company's semiconductor division at Youngwood, Pa., since 1955, and previously was chief of its materials and new products engineering section at Pittsburgh, Pa.

## Former NAM Head Takes Reed Post

EARL BUNTING, former president and chief administrative officer of the National Association of Manufacturers, has been elected chairman of the board of Reed Research Inc., Washington, D. C.

Reed Research is an independent research organization performing

both basic and applied research in most of the physical sciences and engineering fields. Among other projects, the organization has been engaged in work on guided missiles, nuclear power submarines and postal automation.

## News of Reps

F. H. Ring Co. will market GE's Textolite industrial laminates in Missouri, Kansas, Nebraska and southern Illinois.

The Forristal-Young Sales Co. is named sales rep for Shure Brothers, Inc., in western Iowa, western Missouri, eastern Nebraska and Kansas.

Computer-Measurements Corp., N. Hollywood, Calif., announces new reps. Instrument Dynamics Co. will handle Maine, N. H., Vt., R. I., Conn., and Mass. Dayton Anderson Electronic Co. will cover Michigan and Ohio for the firm.

A-F Associates, electronic equipment manufacturers' representatives, has established offices at 385 E. Green St., Pasadena, Calif. Company is headed by Gerry A. Friederici and Tway W. Andrews. Prior to starting the company, both principals were with the G. S. Marshall Co., San Marino, Calif.

Carl M. Segal Co., electronic equipment manufacturers' reps, has been established at 14942 Aztec St., San Fernando, Calif., to handle sales in southern California and Arizona.

Haveg Industries, Inc., Wilmington, Del., has appointed Storm Products Co. as its rep for Teflon wire and cable in southern California, Arizona and Clark County of Nevada. Rep firm will also handle Teflon sheet, rod and tube manufactured by the company.

Trans Electronics, Inc., Canoga Park, Calif., announces appointments of two sales reps in the East:

William I. Duncan & Associates with offices in Philadelphia, Pa., and John W. Richardt Co. with offices in East Orange, N. J., and Long Island, N. Y.



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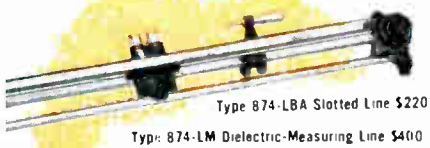
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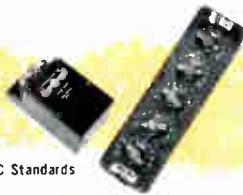
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R, L, and C Standards

Type 1570-A Automatic Voltage Regulator \$510

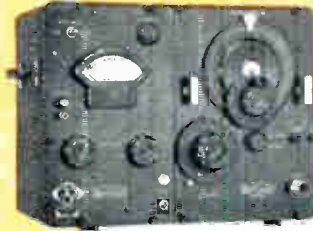


Type 1390-A Random-Noise Generator \$240

Type 1602-B VHF-UHF Admittance Meter \$295



Type 1213-C Unit Time Frequency Calibrator \$260



Standard-Signal Generators



Type 1862-B Megohmmeter \$255



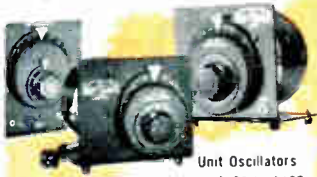
Sweep Drive



Type 1603-A Z-Y Bridge \$370



Type 1505-A Impedance Comparator \$790



Unit Oscillators priced from \$190 to \$465



Type 1210-C Unit R-C Oscillator \$180



Type 1800-B Vacuum-Tube Voltmeter \$435



Type 1551-A Sound-Level Meter \$395



Type 1230-A D-C Amplifier and Electrometer \$440



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Variac® Continuously-Adjustable Autotransformers



Type 1391-A Pulse, Sweep and Time-Delay Generator \$1745

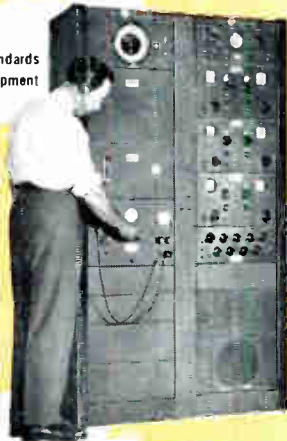


Analyzers



A-M, F-M, and TV Monitoring and Measuring Equipment

Primary Frequency Standards and Measuring Equipment



Type 1932-A Distortion and Noise Meter \$650



Type 1550-A Octave-Band Noise Analyzer \$535



Type 1607-A Transfer-Function Meter \$1665

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**NEW RCA-7199 FOR HI-FI!**



The hum and noise levels of this new triode-pentode are so low you'll want to hear about them, especially if you are facing a design problem involving phase-splitters, tone-control amplifiers or high-gain voltage amplifiers.

A 9-pin miniature, the RCA-7199 combines a triode with a medium- $\mu$  of 17 and a sharp-cutoff pentode with a transconductance of 7000 micromhos...it is designed and controlled specifically for high quality audio applications. A significant reduction in hum is assured by the use of folded coil (single-helical) heaters in the triode and pentode units. Noise and microphonics are reduced

by the use of an exceptionally low cage assembly support and sturdy mount structure which, significantly, requires fewer welds thereby increasing reliability. Separate cathodes for each unit plus an internal shield minimize electrical coupling and permit greater flexibility of circuit design than possible with conventional triode-pentodes.

Keep hum, noise and microphonics down; keep performance up—design around the new RCA-7199. Full details about RCA's Tubes for High Fidelity are readily available from your RCA Field Representative. For technical data, write RCA Commercial Engineering, Sect. H-19-Q-4, Harrison, N. J.



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