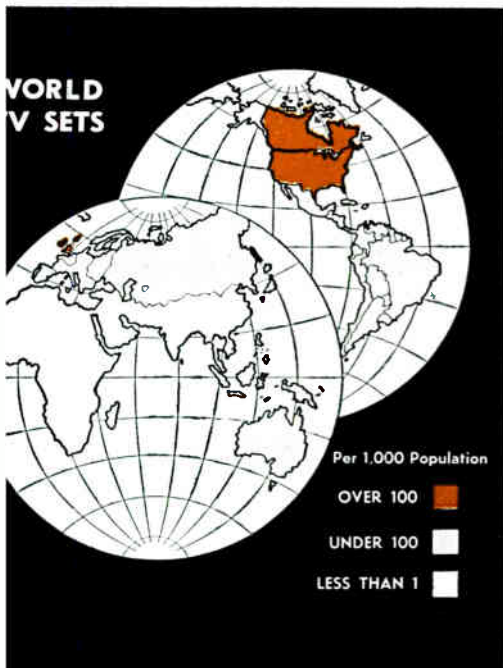


OCTOBER 10, 1957

electronics

business edition

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World Radio and Tv Gain

Radios total 279 million, tv 56 million.

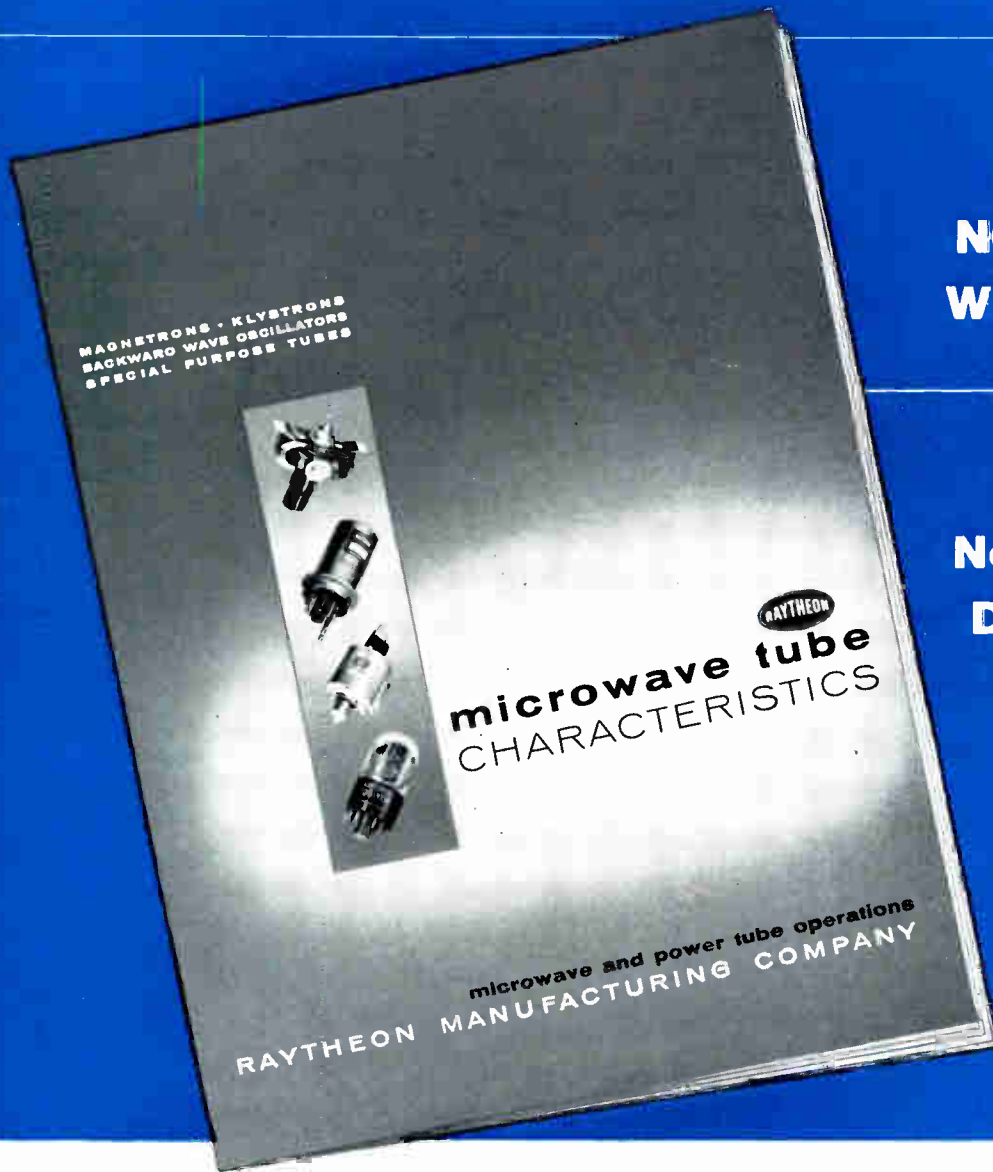
U.S. has $\frac{1}{2}$ of radio, $\frac{3}{4}$ of tv . . . p 18



Airline Tests Doppler Radar

Already a \$100-million military market, Doppler radar is set to go civilian. p 15

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ISSUE AT A GLANCE

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- Airline Tests Doppler Radar.** Results of tests now going in progress may launch doppler into a profitable civilian market. p 15
- Portrait of a Tech Rep.** Today 75 percent of technical representatives in armed forces are in electronics. Here is an intimate closeup. p 17
- World Radio and Tv Gain.** Right now broadcasting is booming abroad. Tv is a comer in many areas, elsewhere radio is still the latest thing. . . p 18
- Quality Hunt Gets Hot.** Military buyers have put the challenge of reliability squarely to our industry. What are we doing about it? p 21
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- Mobile Decision Near.** Industry expects FCC to keep most mobile radio out of common-carrier classification. p 26
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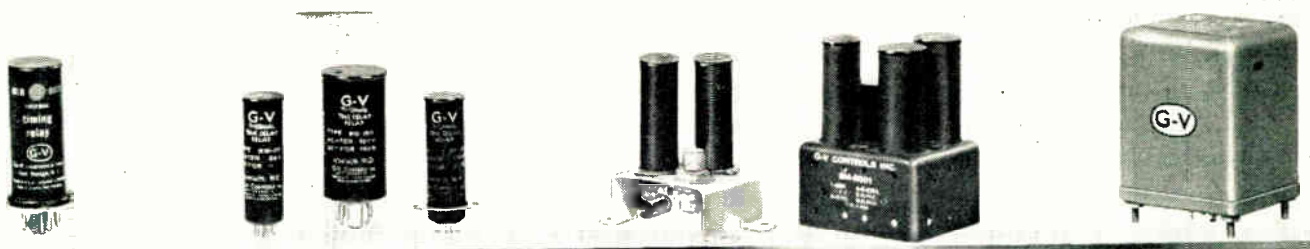


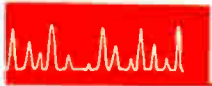
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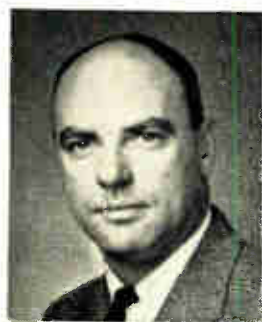
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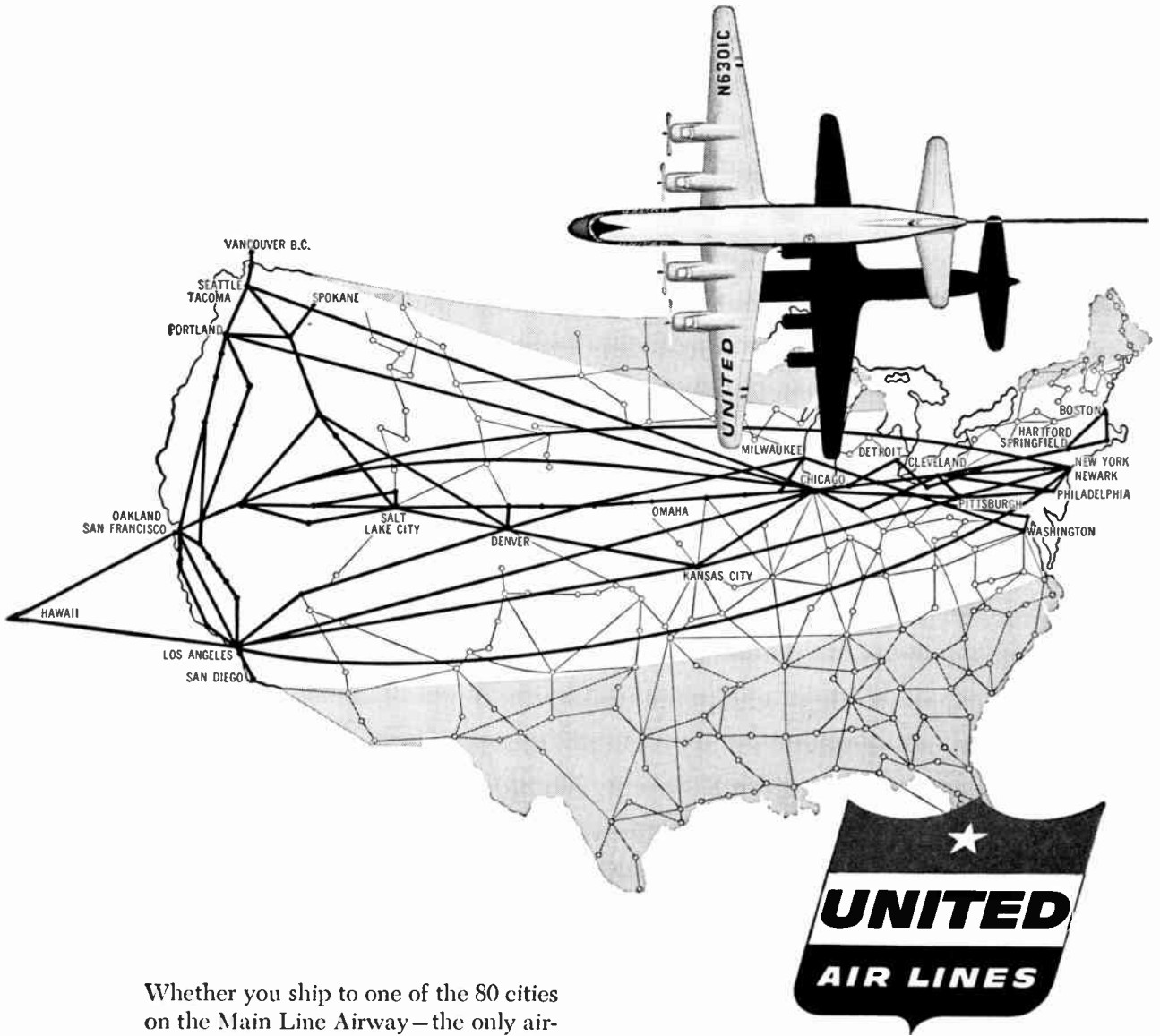


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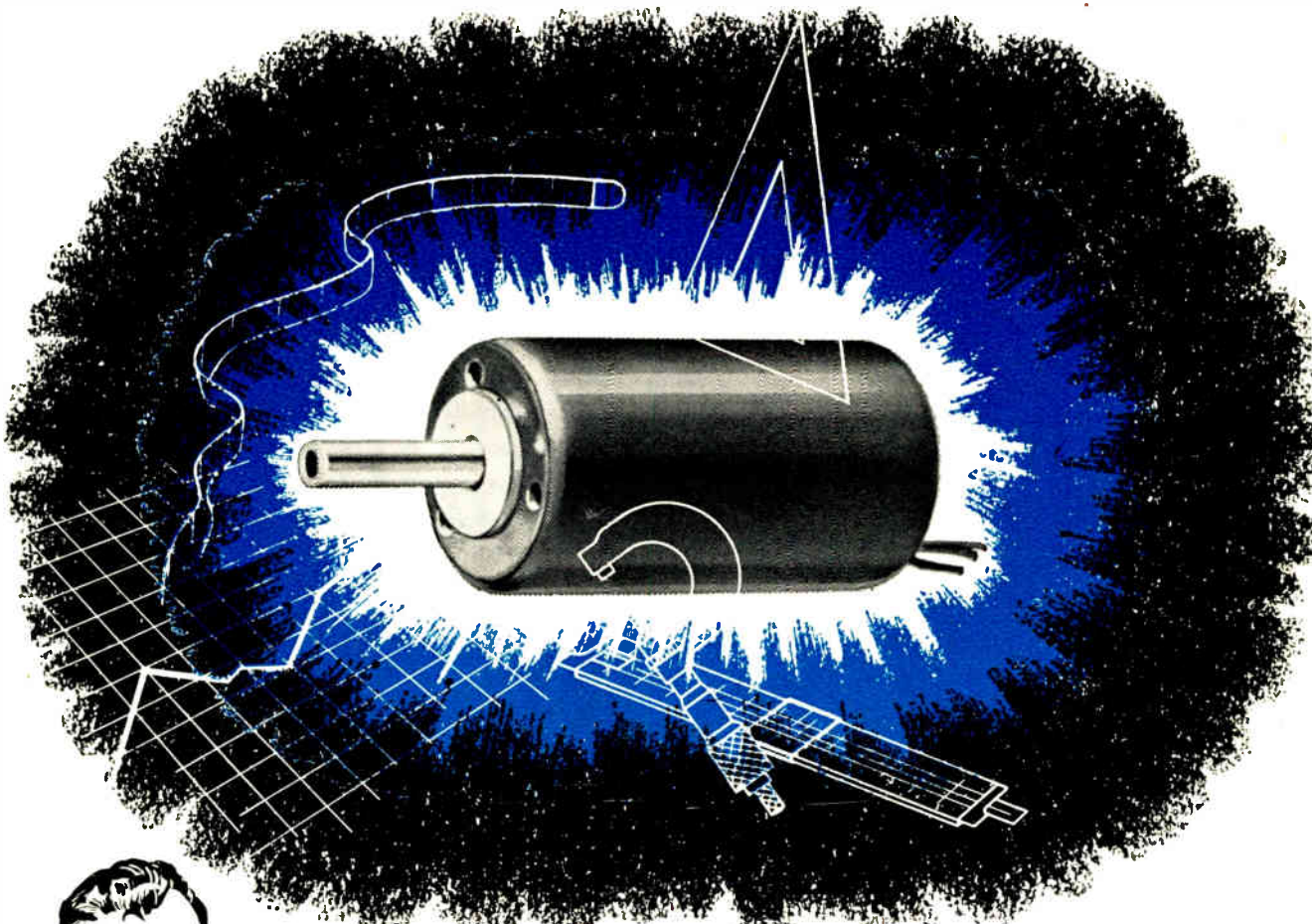
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Warrants Win Favor

Attached to debenture issue, warrants give bird in hand plus two in the bush

WARRANTS to purchase common stock, attached to last month's Sperry Rand debenture bond issue, won the hearts and money of investors last month.

The entire issue was oversubscribed on the date of offering. This success contrasts markedly with the lack of success some investment bankers have had in recent months in selling debt issues without common stock opportunities.

Sperry Rand issue was for \$110 million of 5½-percent debenture bonds due in 1982. For each \$1,000, debenture holders can purchase twenty shares of common stock at \$25 a share until Sept. 16, 1963. Thereafter, the price becomes \$28 a share, but only to Sept. 15, 1967 when warrant privileges expire altogether.

"Without warrants a higher interest rate would have been necessary and the issue might have been sticky (slow-selling)," comments a Lehman Brothers spokesman, one of the chief underwriters.

The tight money market, rising interest rates and the resistance investors have been exhibiting toward new bond issues led to the decision to give buyers an added incentive through warrants, he explains.

The Sperry Rand issue gave investors the opportunity to face both ways at a time of uncertainty. They got security and fixed income through debenture provisions for fixed payments of 5½ percent every year. The warrants gave them the chance to protect themselves against continued inflation and to share in electronics industry growth.

Investment bankers expect that the Sperry Rand issue may set a pattern for other big company debt

issues. They expect that many other firms which in the past had been able to market debentures without warrants or convertible features will add these attractions to future new issues.

An interesting aside to the economic aspects of this issue is that it calls attention to big money profits and also big losses possible by speculation in warrants. Warrants are considered by many to be the nearest thing to trapshooting that the security markets offer.

When the price of a stock goes up the price of companion warrants goes up much faster. A rate of two to twenty times faster is typical of an early bull market, according to the New York Stock Exchange.

For instance, Sperry Rand warrants were selling recently at 4¾. At the same time SR common was selling slightly above 21. If the stock goes up to 40 the minimum value of the warrants would be \$15 as long as conversion price is \$25. It might be higher, depending on investors' guess on the possibility of still higher prices.

However, warrant prices also go down faster when stock prices slide. Also, they become virtually worthless after expiration.

The amount of profit that can be made in warrants at times is fantastic. Currently the case of Hoffman Radio is being highly advertised by dealers in warrants. If you had invested \$200 in Hoffman Radio warrants in 1948, then selling at 5¢ each, you would have realized \$100,000 two years later.

Here's the other side of the coin. One company's warrants were selling at \$8 in 1946. They went to zero four years later when warrants expired.

If you want to try your luck, Advance Industries, Jerrold Electronics, Orradio Industries, Pyramid Electric, Raytheon Manufacturing and Trav-Ler Radio also have warrants outstanding.

SHARES and PRICES

GROWING interest in electronics business by auto firms, recently dis-

closed by ELECTRONICS, directs attention to auto-company securities at this time. In addition to auto and truck manufacturers the list includes representative firms which make a wide variety of parts such as magnetos, wheels, heaters, mufflers, windshield wipers.

Typical Automobile and Auto Parts Manufacturers	Recent Price	Dividend Rate ¹	Percent Yield	Earned per Com. Share		Traded	1957 Price Range
				1957	1956		
Chrysler	74¾	3.00	4.0	10.28 (6 mos)	2.29	NYSE	64½-82¼
Ford	52½	2.40	4.6	3.15 (6 mos)	4.38	NYSE	52½-59¾
General Motors	41¾	2.00	4.8	1.71 (6 mos)	3.02	NYSE	38½-47½
Mack Trucks	26¾	1.80	6.8	2.55 (6 mos)	4.75	NYSE	26¾-32¾
American Bosch Arma	19¾	1.00 ²	5.1	1.56 (6 mos)	2.43	NYSE	18½-27
Arvin Industries	32¼	2.00	6.2	2.21 (6 mos) ³	4.22	NYSE	28½-36¼
Budd Company	17¾	1.40	7.9	1.67 (year) ⁴	1.97	NYSE	17½-21½
Clevite	22¾	1.15	5.1	1.48 (6 mos)	2.06	NYSE	18-25½
Thompson Products	63¾	1.40	2.2	2.96 (6 mos)	4.60	NYSE	62¾-89¾

¹ Indicated

² Plus stock

³ Estimated

⁴ Fiscal ended 3/31/57

Firms Reorganize

Increased concentration on electronics follows organizational changes

TOOLING up the organizational structure for increased concentration of electronic activity occupied a number of firms last month.

Clevite announced a major reorganization of its Brush Electronics Division. The Brush Division as such will no longer be an integral part of the company. Instead a new electronics group, divided into various product areas and reporting to a new vice president will be the new company structure for electronics.

James K. Numan, former director of research for Clevite, has been appointed vice president for electronics. Reporting to him will be the Clevite Ordnance, the Electronic Components and the Instruments divisions, also the Components and Transistor divisions. The Clevite Transistor division in Waltham, Mass will remain independent.

Daystrom has formed a Controlonics group to provide industry with entire electronics systems for the instrumentation and automatic control of industrial

processes. (See p. 45.) Formation of the controlonics group follows the recent organization of the Daystrom avionics group specializing in complete systems for the guidance and control of aircraft and missiles.

The Daystrom units involved in the reorganization include Weston Electrical Instrument, Newark, N. J., Daystrom System Division, La Jolla, Calif. and Daystrom Electric, Poughkeepsie, N. Y.

Danse L. Bibby, executive vice president, said, "This step enables Daystrom to do a complete systems instrumentation and to apply advanced engineering techniques to the growing industrial field."

Beckman & Whitley of San Carlos, Calif. divided its operations into two independent divisions. The Instrument and the Missile Products divisions become virtually autonomous groups. General management of the instrument division will be under John C. Beckman, president and cofounder of the firm. It is engaged in research and development and manufacture of specialized meteorological equipment and high-speed research cameras.

The missile division makes devices and mechanisms used in missiles. It will be headed by E. William Place, former missile devices product manager.

MERGERS, ACQUISITIONS and FINANCE

- **Siegler Corp.** completes merger with **Unitronics Corp.** of New York and **Hafford Corp.** of El Segundo, Calif. Headquarters of surviving Siegler Corp. will be in Anaheim, Calif. Its stock, previously traded over the counter, has been listed on the American Stock Exchange. The combined company will have an annual sales volume of about \$75 million with more than \$50 million in electronics. Siegler had previously merged with Hallamore Electronics. The mergers are part of a plan to develop an organization that is capable of handling complete missile systems contracts, comments a director.

- **American Electronics** of Los Angeles signs agreement to acquire **Taller & Cooper** of Brooklyn, N. Y. American would exchange 46,110 common shares for all Taller & Cooper outstanding stock and would pay two and a quarter million for over 60 patents. T & C manufactures electronic control systems, digital and analog computers, monitors, printers, recorders

and annunciators as well as punch-card equipment. The acquisition will bring American Electronics' industrial and commercial business to about 50 percent of total sales. Combined sales are estimated at \$22.5 million for 1957.

- **Microtech Corp.** of Pasadena, Calif. is purchased by **Federal-Mogul-Bearing** of Detroit. Microtech is a manufacturer of miniature ball bearings used in precision instruments, electronic equipment, aircraft and guided missiles.

- **Norbute Corp.** of New York City purchases assets of **Kurman Electric**, Brooklyn, N. Y. Kurman manufactures relays and vibrators for military and commercial use. Norbute is a diversified company. It manufactures laboratory equipment and institutional furniture, safety switches and circuit panels. It is also engaged in mineral exploration and development. With Norbute's financial assistance Kurman expects to grow at a more rapid rate than in the past.

- **Controls for Radiation, Inc.** is formed in Cambridge, Mass. William E. Barbour, Jr., founder and former president of **Tracerlab**, will be the new concern's president. It was formed to carry on programs for control of radiation. It will lease and maintain instrumentation for monitoring radiation at nuclear facilities.

- **Narda Microwave**, Mineola, N. Y. forms a new subsidiary, **Narda Ultrasonics Corp.** In addition to selling and renting ultrasonic equipment the new company will serve as a source of ultrasonic components for original equipment manufacturers.

- **Assembly Products** of Chesterland, Ohio plans its first public stock offering of 30,000 shares at \$10 a share. L. B. Schwinn & Co. of Cleveland will underwrite the issue. Shareholders have voted to increase outstanding stock from 15,000 to 300,000 shares. Present outstanding stock will be split 10 for one.



For permanence of high absorption ... Raytheon specifies McMillan microwave absorbers

Peak quality products are prime requisites at Raytheon Manufacturing Company. As one of the outstanding contractors in *aircraft weapons systems, guided missile systems, major defense radars and fire control systems*, their superior quality work requires the finest radar testing facilities. They must have *both* high initial performance *and* stable, guaranteed performance. To satisfy these conditions they specify McMillan Microwave Absorber Products.

In their 17 large test stations at Maynard, Bedford, Lowell, and Andover, Raytheon has installed McMillan products — either block absorber material or modular prefabricated “free space” rooms. For all types of antenna and radome testing McMillan Absorber Products are specified because their high attenuation characteristics are long lasting.

In the main illustration above, a permanent test area has been “walled” with McMillan “BL” Plastic Foam Block. Inset shows a McMillan

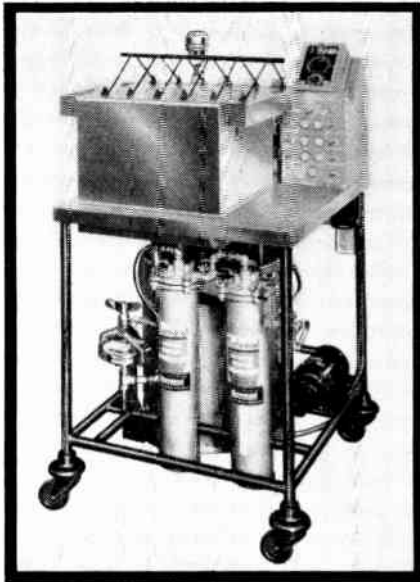
Prefabricated “free space” Room. McMillan Microwave Absorbers are available in hair material, plastic foam block and thin flexible material, for ground, shipboard and airborne use, for frequency ranges from 40 mc to 35,000 mc.

With their long experience in the field, backed by complete design, testing and manufacturing facilities, McMillan engineers are ready to assist you in any antenna and/or radome testing problem.

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WASHINGTON OUTLOOK

SIGNIFICANT changes in military procurement and mobilization policy are shaping up under pressure from the defense economy drive. Wide-ranging aspects of procurement policy—multiple production sources, standby production capacity, plant dispersal, procurement programs and methods—are shifting. These shifts will have an impact on many electronic producers who sell to the armed forces.

Up to now, plans for large-scale procurement of guided missiles and other key weapons invariably included more than one production source for critical components and even the end-item itself.

Now, with the scaledown in military buying, this program is going by the boards. The services are starting to lop off second and third sources of supply. So far, no examples in electronics have shown up publicly; but such cases do exist in other areas.

Along the same lines, there's a big shift in weapons development. In the past, the Pentagon would simultaneously pour huge sums into development of two or more weapons with similar missions but different design approaches.

Military planners can no longer be so liberal. Even more important, they're being forced to make quicker production decisions on rival development projects. A decision would inevitably have had to be made, for example, on whether the Air Force's Snark or Navaho strategic missile would be put into volume production. Even without economy, quantity production of both missiles would not have been allowed by the defense department.

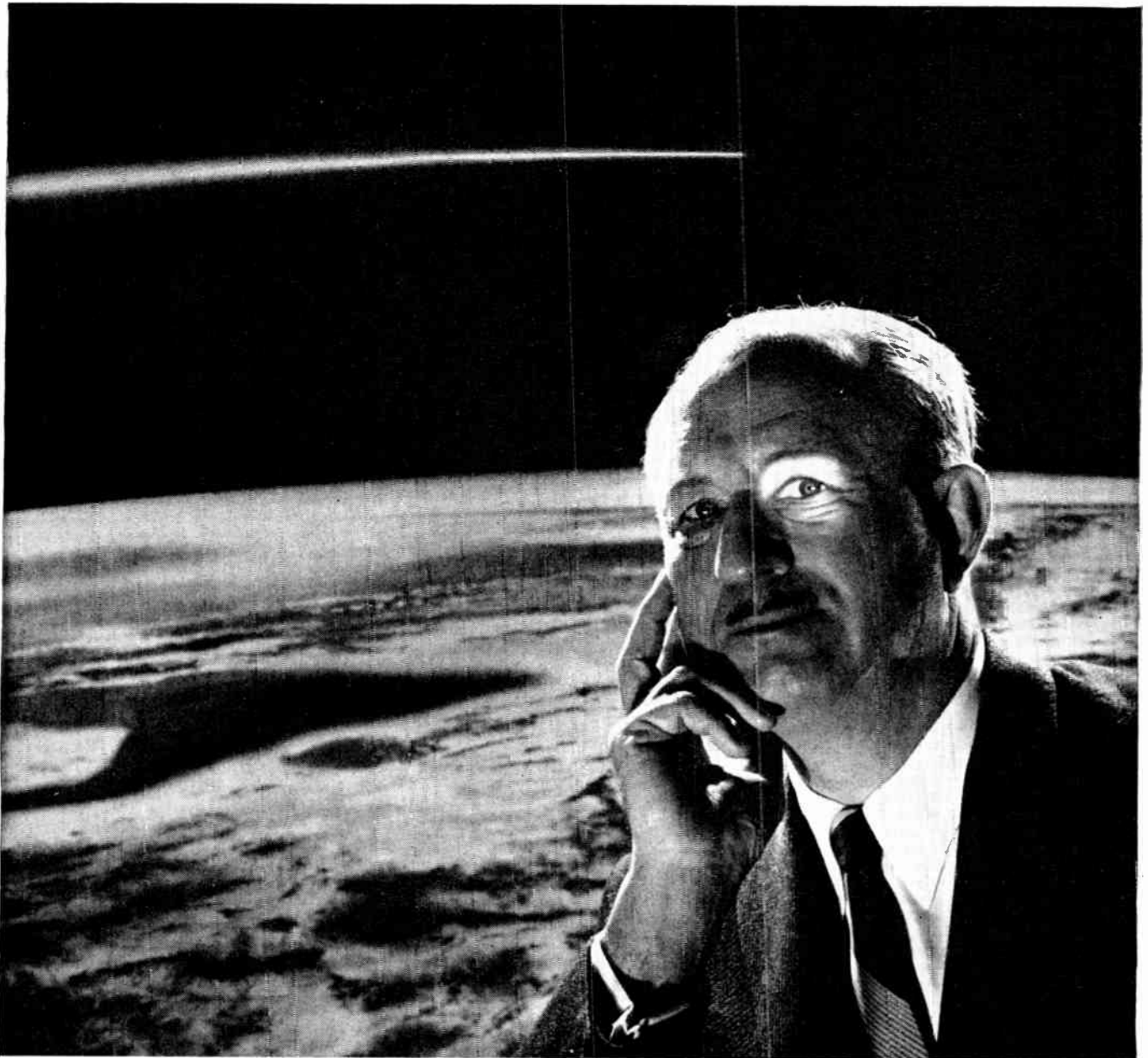
But under the drive to sweat out "excess" expenditures, Navaho got killed well in advance of the time ordinarily required to evaluate rival weapon projects. The Navy's recent decision cancelling the Triton long-range ship-to-shore missile (Kearfott was guidance contractor) was made in the same setting.

Most mobilization policy changes had previously been made to fit into new strategic concepts based on nuclear war. In the main, this meant reliance on forces in being in a possible future war rather than dependence on accelerating production and converting idle or civilian plants to war production on an emergency basis.

The weight of budget-cutting, however, has stepped up the trend toward shelving full-scale mobilization plans—notably, the breaking up and disposal of standby production facilities. The military services would like to maintain standby capacity for key electronic components where military demand has diminished and for which there's little civilian demand to keep producers going. But they've got no money to do this, so production lines are being broken up.

- The President's small business conference, centering on R&D matters, has been attacked by Democrats as "diverting attention from the real problems of small businessmen" such as tax cuts and government contracts.

The conference put the spotlight on distribution research in particular. The experiences of a small Ann Arbor, Mich. electronics firm, Wedemeyer Electronic Supply Co., was given attention. The firm surveyed its customers to see which produced the most profit in relation to sales effort, decided that customers with monthly orders under \$75 were marginal and could be dropped.



E. Howard Perkins, Board Chairman of Brooks & Perkins, Inc., asks you:

“How fast will our new earth satellite travel?”

“Hundreds of miles high, the new earth satellite will streak through space, circling our globe each 90 minutes!

“But this speed, estimated at 18,000 miles an hour, is achievable only in the remote emptiness above our atmosphere. Down here, the satellite had to travel fast, too, to meet the schedule of Project Vanguard, assigned to the U. S. Navy.

“We have built a number of these satellites on tight production schedules.

“The satellites had to be shipped quickly to the U. S. Naval Research Laboratory in flawless condition, ready

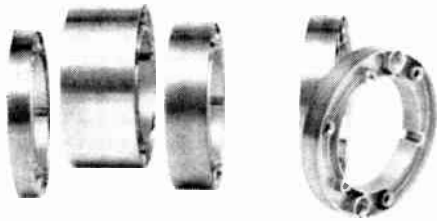
for the final metal coatings which make them look silvery. So, we used Air Express which delivered all our shipments without a scratch!

“The fact is that Air Express never fails us. It expedites pick-up and delivery with radio-controlled trucks. Its private wire network can ‘keep an eye’ on each shipment. Time is saved by Air Express’ use of the *first* scheduled plane—there’s no wait for full plane loads. Door to door, Air Express carries our valuable products on schedule—every time!”

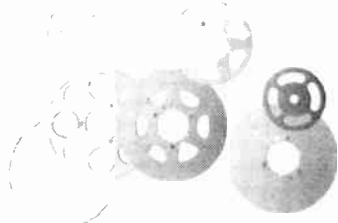


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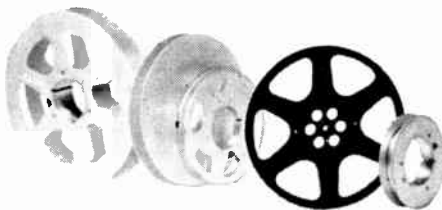
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EXECUTIVES IN THE NEWS



Perelle: long road to the top

LAST week, American Bosch Arma announced its merger with Cleveland auto accessory manufacturer Hydramotive Inc. The merger is a landmark in president Charles W. Perelle's long bootstrapping operation. When he took on his job with ABA in 1954, the company was going broke. In three years, he has pulled it out of the red, reinstated dividend payments, restored labor peace and laid a foundation for expansion.

Perelle's manner fools people. The 54-year-old son of a Yukon miner is somewhat shy, his voice is soft, he smiles easily. But he's a hardheaded businessman with a long memory and a knack for pulling companies out of financial hot water.

He drifted into finance "kind of by accident" when he discovered that what appear to be production or engineering difficulties frequently turn out to be money problems. "It's an oversimplification to say that financial mismanagement causes most corporate troubles," he'll say. "Production, research, marketing, finance—they're all inter-related." But when he describes his experiences as president successively of GarWood Industries, ACI Brill and Bosch Arma, one gets the feeling that finance is the real key.

His Boston University degree in business administration (1924) has been reinforced continually with schooling. He himself still studies; at Arma, he requires it of all management men. "It's a long road to the top," he says, "and it's not easy."

He'll also admit that he doesn't spend as much time with his wife and son as he'd like to. "Spare time," he comments, "is a fiction." When he does take time to relax, he plays golf, works in the garden, or goes up to his fishing camp in Canada's Georgian Bay. He drives a lot, says he does some of his best thinking behind the wheel.

STRICTLY PERSONAL

Brainstorming

Was at the home of a friend the other night and read your "Engineers Try Brainstorming" (Sept. 20, p 17).

The whole idea of using brainstorming on engineering problems looks pretty silly to me. If you're trying to cough up approaches to an artistic subject—or even a quasi-artistic one, like advertising—it

probably works; the subconscious mind, since it can cross-refer in unusual and undisciplined ways, can produce associations that are different, interesting and unusual.

But engineering is supposed to be a fairly rigid discipline. Unusual approaches are not a first desideratum. You need practical approaches based on existing technology, and a disciplined conscious mind is the thing that'll provide them.

Lord knows people do enough reasoning and generalizing from insufficient data and in irrational forms already. Engineers should be the last to encourage more of it. Is something wrong with logic that we have to resort to illogic to design electronic gear?

And how can anybody, especially an inner-directed engineer, think constructively with all that babble going on?

C. F. HAYWARD

QUEENS COLLEGE
NEW YORK, N. Y.

Prospector Tools Wanted

We have read the article "Prospectors Buy \$15 Million (June 10, p 20).

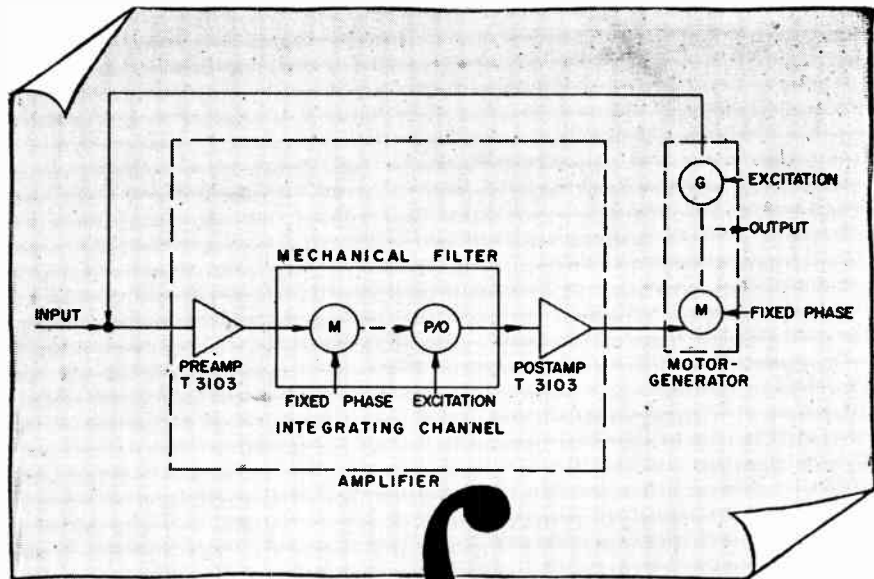
We are starting here in Italy a campaign for sale of small apparatus for prospection of uranium and we expect that our requirements may easily reach the number of several thousands of pieces.

We should be very grateful if you will kindly get us in touch with some American concerns that make economical apparatus for the prospection of uranium and possibly with concerns that have available stocks of such apparatus being no longer requested in the American market and which anyhow can be obtained at quite convenient prices.

As we are rather anxious to establish our program which we intended to diffuse on a national scale, we would recommend you to point out to those who may be interested in our request that it is most important for us to receive technical leaflets and offers within the shortest possible time.

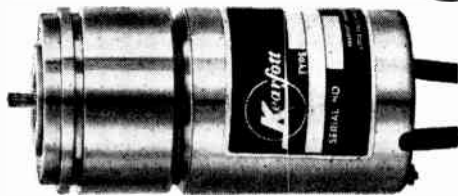
LUIGI TERRA

ELETTRONICA LOMBARDA
MILAN, ITALY



This diagram illustrates an optimum configuration of a precise integrating servo system. The essential components are shown below.

$\int (f) dt$



SERVO MOTOR GENERATOR

This size 15 unit represents the latest in design for precise integrating tachometers. Temperature stabilized to within 1° C; linearity, 0-3600 R.P.M., .03% of 3600 R.P.M., 0-4800 R.P.M., .05% of 3600 R.P.M.



MECHANICAL FILTER

This size 11 filter, used in conjunction with amplifiers shown, provides an integral-plus-proportional circuit. Eliminates quadrature and noise in the error signal and the need for high gain, critical amplifiers.



TRANSISTORIZED AMPLIFIERS

This T3103 amplifier provides a 40 v., 6 w. output. Meets the requirements of MIL-E-5400. Dimensions 1 5/8" x 1 5/8" x 1 7/8" high, weight 4.7 oz.

The above units are available as components for your specific applications or as packaged sub-assemblies.

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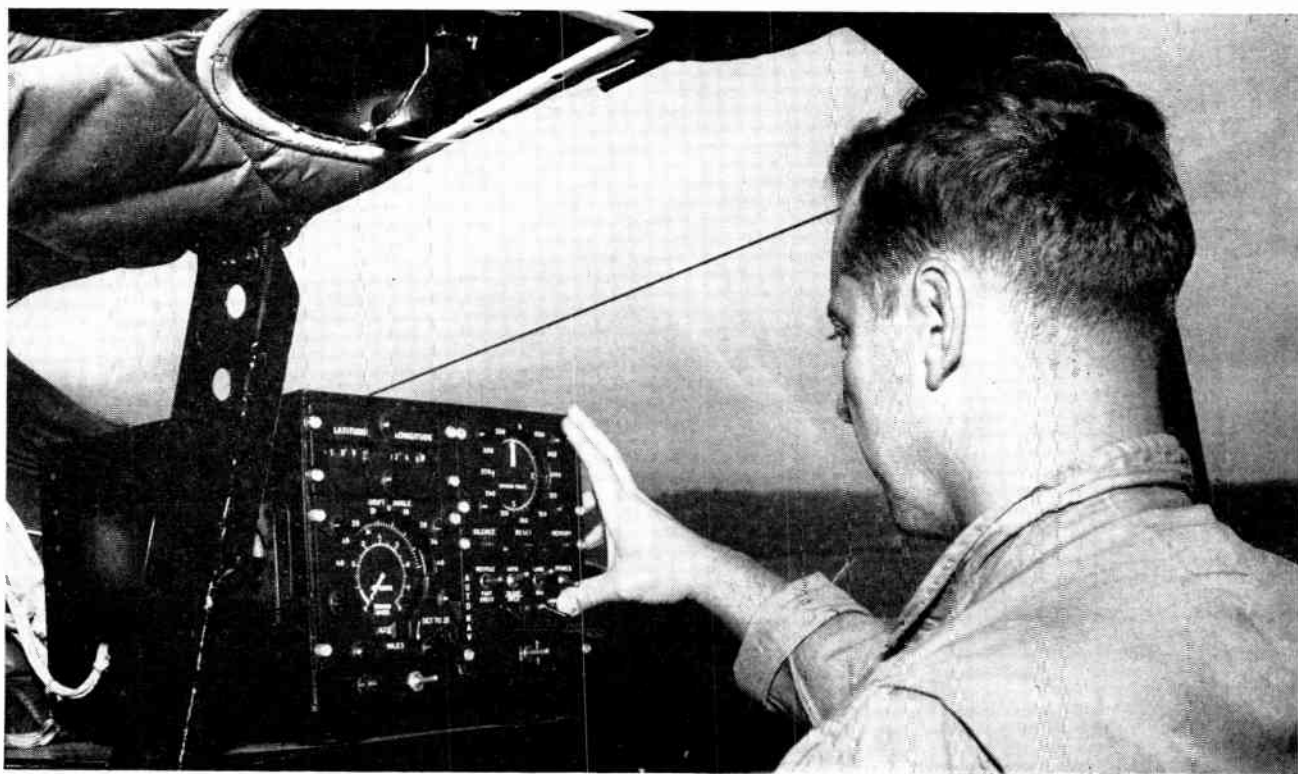
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SYNCHRO FUNCTION	CPPE TYPE	ROTOR AS PRIMARY					STATOR AS PRIMARY					D. C. RESISTANCE		IMPEDANCE			Max. Null Voltage (MV)	Max. Error (Min.)		
		Input Voltage (400~)	Input Current (Amps.)	Input Power (Watts)	Output Voltage (Volts)	Sensitivity (MV/deg.)	Phase Shift (deg. lead)	Input Voltage (400~)	Input Current (Amps.)	Input Power (Watts)	Output Voltage (Volts)	Sensitivity (MV/deg.)	Phase Shift (deg. lead)	Rotor (Ohms)	Stator (Ohms)	Z _{rs} (Ohms)			Z _{so} (Ohms)	Z _{rs} (Ohms)
Torque Transmitter	CGC-8-A-7	26	100	5	11.8	206	8	—	—	—	—	—	—	47	12	54 - j260	12 + j45	80 + j20	30	7
Control Transmitter	CTC-8-A-1	—	—	—	—	—	—	11.8	0.90	2	23.5	410	9	150	24	212 - j684	22 + j115	146 + j60	30	7
Control Transformer	CTC-8-A-4	—	—	—	—	—	—	11.8	0.29	0.8	22.5	390	8	389	64	540 - j1860	90 + j340	540 - j190	30	7
Torque Receiver	CRC-8-A-1	26	100	5	11.8	206	8	—	—	—	—	—	—	37	12	54 - j260	12 + j45	80 + j20	30	30 sp.
Electrical Resolver	CSC-8-A-1	26	0.38	42	10.8	190	20	11.8	0.78	26	23.2	440	11	130	27	286 + j620	45 + j148	350 - j75	30	7
Electrical Resolver	CSC-8-A-4	26	0.38	42	26	454	20	26	0.30	23	14.5	475	12	130	170	286 - j620	250 + j810	350 - j75	30	7
Control Differential	CDC-8-A-1	—	—	—	—	—	—	11.8	0.85	21	11.8	206	9	36	25	38 - j122	27 - j120	48 + j14	30	7
Vector Resolver	CVC-8-A-1	6	0.57	34	11.8	206	10.2	—	—	—	—	—	78	27	203 - j440	8 + j30	—	30	7	

LOOK TO CPPE FOR SYNCHRO PROGRESS **cppe**
 CLIFTON PRECISION PRODUCTS CO. INC. Clifton Heights, Pa.



Operator turns on automatic navigator as . . .

Airline Tests Doppler Radar

Results may launch doppler radar into big civilian business as civil air-navigation aid. With \$100 million already grossed from the military, producers prepare for civilian market: 1,802 commercial and 4,183 executive planes. Cost is not expected to be deterrent

TWO WEEKS from now—if all goes according to plan—a commercial transport plane testing doppler navigation equipment on a North Atlantic run will take off from Idlewild Airport for London.

Businesswise this will be a historic flight. Pan American World Airways' report and recommendations to the Air Transport Association next spring, after some six months' testing, will have far-reaching effects on the civilian future of equipment that has already grossed over \$100 million from military contracts.

Doppler radar measures the frequency difference between a signal and its echo. Its principal use in

airborne navigation systems is to determine ground-speed.

USAF has spent \$90.6 million to date among six American companies developing and producing airborne doppler equipment. Navy has bought directly \$8 million worth of doppler with probably far more buried in weapons-system procurements.

Civilian market that doppler producers are looking toward is the fleet of 1,802 domestic scheduled and irregular air carriers, the 4,183 multi-engined business planes and the foreign airlines.

Estimated price in quantity production of GPL's RADAN—the equipment Pan Am will be

testing—is \$25,000. Rate at which equally costly weather-avoidance radar is selling to the airlines and to executive planes indicates that the cost will not be a deterrent.

General Precision Labs has announced military production contracts since Jan. 1956 alone totaling \$27.6 million. GPL says contracts prior to Jan. 1956 amount to "several times more."

There are three basic forms of modulation used in doppler systems: pulsed, c-w and icw (interrupted c-w). GPL and Marconi used pulsed; Ryan and Sanders use c-w; and LFE, icw.

To bypass the coherence technique, GPL and Marconi use a technique known as Janus. Named for the ancient Roman deity who looked forward and backward at the same time, the technique utilizes two transmission paths instead of one. One path is beamed forward, the other aft. This principle provides the doppler shift without resorting to a coherent system and automatically cancels effects caused by local oscillator drifts.

GLP has developed four basic doppler systems plus six variations, making a total of ten available models. Basic models are APN-81, -96, -89, and PC-201 RADAN. Remaining six models are essentially variations of the basic APN-81.

A big money maker is the 89-lb APN-102, military version of RADAN. USAF has just bought 70 units for \$1.6 million. Civilian version is GPL's hope for entering the commercial air carrier and executive plane market.

Sylvania has been producing since January GPL-developed APN-81 equipment for USAF under a subcontract with GPL. Reason for subcontracting the work: USAF wanted a second manufacturing source.

Laboratory for Electronics has received to date for its two USAF systems (APN-78 and APN-105) \$9 million for R&D and preproduction models. In addition, LFE has recently received a letter contract with

USAF for manufacture of APN-105 systems amounting to \$4.5 million. Final contract for APN-105 is expected to expand this amount to \$10 million.

Ryan Aeronautical, whose work has been primarily for the Navy, announced in July that its APN-67 was in pilot production. A commercial version weighing 100 lbs was also announced at that time.

General Electric has been contracted by USAF to develop the APN-79 equipment. Status: it was service tested last month.

Sanders Associates has developed for BuAer a system for helicopters. Result is Sanders' APN-77, a 30-lb, c-w system, effective up to altitudes of 2,000 feet over water depending on sea state, and up to 8,000 above land. APN-77 supplies course and ground speed in any direction. One production prototype has been delivered.

Although details are classified, Sanders is also doing considerable development work in the pulsed doppler field. It is assumed that Sanders panoramic pulsed doppler radar, both airborne and ground, is connected with antimissile missile work.

Marconi developed its Green Satin system for the RAF. A pulsed Janus system, it was first used operationally in 1955.

Decca Navigation of London has recently announced use of doppler in an integrated system called DIAN. The three systems that comprise DIAN are Decca Navigator for accurate short-range positioning, Deetra for long-range navigation and doppler for positioning in areas where no ground facilities exist. Information from all three systems is presented on the same panel.

Producers of computers adaptable to doppler units are also benefiting from doppler sales. At least a dozen computers could be used with doppler.

Ford Instrument's sales of its 45-lb ASN-6 computer for use with doppler amount to \$30 million. Last January USAF bought \$15 million worth of the newer ASN-7.

PRINCIPAL DOPPLER NAVIGATION SYSTEMS

	RADAN											Green Satin
	AN/APN-66	AN/APN-81	AN/APN-82	AN/APN-96	AN/APN-102	AN/APN-67	AN/APN-78	AN/APN-79	AN/APN-105	AN/APN-77		
Contracting Agency	USAF	USAF	USAF	USAF	USAF	BuAer	USAF	USAF	USAF	BuAer	RAF	
Operational Use	1955	1955	1955	1955	1955	1955	1958	1958	1958	1959	1955	
Power Consumption	d-c:91-205 w	d-c:67-95 w	d-c:86 w a-c:2,145 w 440 lbs	700 w	d-c:20 w a-c:100 w 89 lbs	100 w	600 w	1,400 w	850 w	250 w	d-c:24 w a-c:750 w 241 lbs	
Weight	745 lbs	389 lbs	less than 175 lbs	95	36	200 lbs	100 lbs	70 lbs	130 lbs	30 lbs	52	
Number of Tubes	262	100	100	100	100	36	36	36	36	36	96	
Semiconductors	8,800 mc pulsed	8,800 mc pulsed	8,800 mc pulsed	8,800 mc pulsed	8,800 mc pulsed	13,500 mc c-w	9,750 mc icw	13,500 mc c-w	9,799 mc icw	15,750 mc c-w	8,800 mc pulsed	
Frequency	0.9 sec	0.9 sec	0.9 sec	1.25 sec to 3.0 sec	1.25 sec to 3.0 sec						0.4 sec	
Pulse Duration	50 kc with 2.4 kc modulation r-f Janus	50 kc with 2.4 kc modulation r-f Janus	50 kc to 2.4 kc modulated r-f Janus	83 kc to 200 kc modulated r-f Janus	83 kc to 200 kc modulated r-f Janus		15.6 kc to 250 kc		4 kc to 250 kc		50 kc	
Prf	coherent c-w xmtr	coherent c-w xmtr	coherent c-w xmtr	coherent c-w xmtr	coherent c-w xmtr	coherent c-w xmtr	coherent c-w xmtr	coherent c-w xmtr	coherent c-w xmtr	coherent c-w xmtr	r-f Janus	
Coherence	1,100 w ground speed & drift angle	1,100 w ground speed & drift angle	1,100 w ground speed & drift angle	40 w min ground speed & drift angle	40 w min ground speed & drift angle	ground speed & drift angle	along, cross heading & vertical velocity	along & cross heading & vertical velocity	along, cross heading & vertical velocity	along, cross heading & vertical velocity	0.01 w beam course & vertical velocity	
Transmitter Peak Power											7 1/4 kw ground speed & drift angle	
Velocity Data Components												

Portrait of a Tech Rep

Technical representatives abound in Army, Navy and Air Force and 75 percent of them are in electronics. They are vital cogs in our defense machine. Here's what makes them tick.

THIS WEEK floating on an ice cake north of Thule, Greenland, is a group of men. All but one are in the Air Force working on a communications project. The exception is a technical representative from Philco. For short the Air Force calls him a "tech rep."

The business of a tech rep is not all cold and loneliness; they're scattered across the face of the earth.

The job they do: maintain and operate complicated equipment and train Army, Navy or Air Force personnel to do the same.

The Defense Department says there are 1,200 of them attached to the Army, 1,300 to the Navy, and 5,800 to the Air Force.

But there may be twice as many tech reps actually in the field. When a new piece of equipment is delivered to the armed forces, tech reps often go along to see that it proves out all right. Services of these tech reps are usually taken care of in a cost-plus contract for the equipment they are working on.

Though tech reps handle a variety of gear, the majority are working in electronics.

The Army is only able to estimate the percentage of its tech reps in electronics as "high." The Navy and Air Force each judge that 75 percent are in electronics.

The tech rep came into being during World War II; the number of them went down after the war. The Korean War brought them back. The number has been growing since.

The tech rep, in the most general sense, ranges in experience from a technician who knows one piece of equipment made by a specific firm to a man with a Ph. D. One company, reading the specifications for a communications expert to work with the Korean government, decided only a top-flight telephone executive would do. Accordingly, the company went out and hired a recently retired v-p from a major phone company.

However, most tech reps are men without engineering degrees but with a wide practical knowledge both in maintaining and teaching all types of electronic equipment. Most get their training in the services. They get in the tech rep business in their middle twenties.

Salaries range from \$3,600 to \$20,000 a year. Typ-

ically, a tech rep earns around \$600 a month, and, if he's overseas, he picks up another \$150 in allowances.

Most companies reject those who are blessed or cursed with baby faces. Explains one firm: "A tech rep has to look mature. A guy who looks eighteen even if he's fifty is going to have a rough time dealing with officers and enlisted men."

No extrovert the tech rep, but neither is he an introvert. Federal Electric calls its men "integrated." Philco calls them "average Americans," and RCA says of them, "pleasant." One tech rep interviewed said of himself and his fellows, "adventuresome diplomats."

One thing tech reps are not: heavy drinkers. One firm as a last check on its men after training gives a cocktail party. Drinking habits are closely observed.

Half of them are married. Divorce or separation may be one reason why a man joins up. Although tech reps hold the belief that their occupation is a marriage-killer, one firm's statistics finds that the average divorce rate of tech reps is slightly under the national average of 0.24 percent.

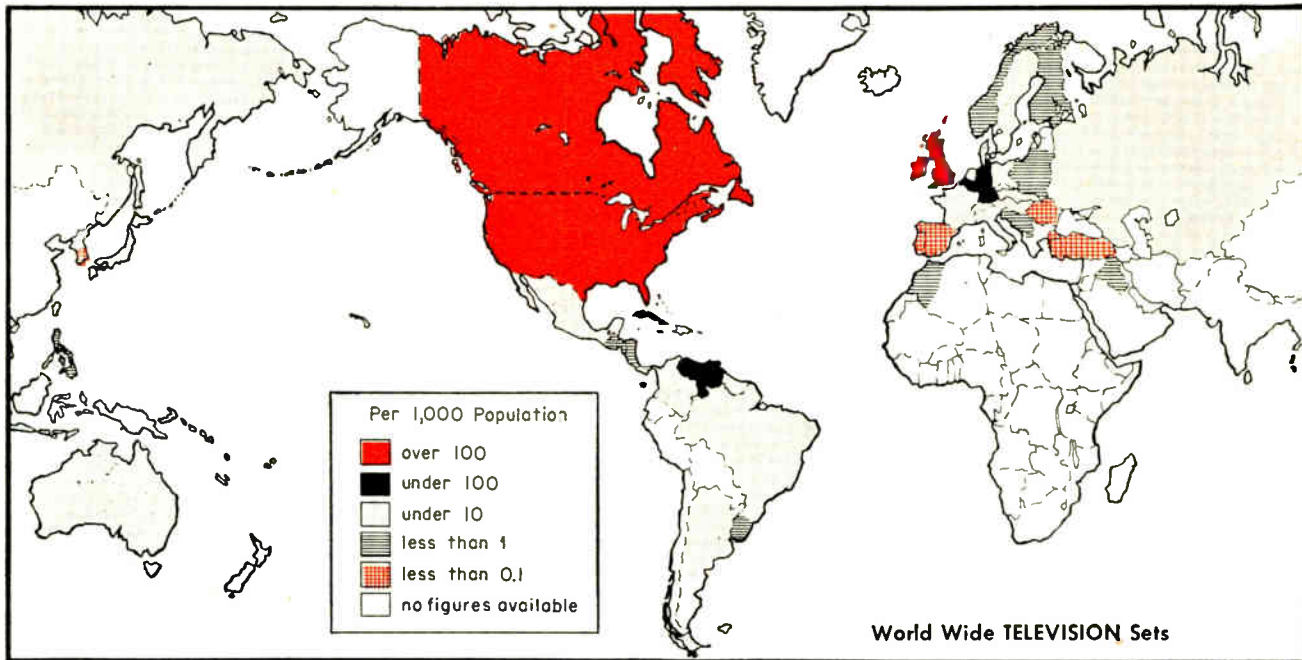
THE BUTTON PUSHERS?

Tech reps are now responsible for much of the defense of the U. S. Would they push the buttons if war should come?

In this missile age, as pushbutton warfare is discussed as a frightening possibility, the tech rep is becoming more and more important in the military setup. Often he's the only one who knows how to operate and maintain the complex equipment now coming into use.

At this moment much of the defense of the United States is in the hands of civilian technical representatives. They are manning and maintaining the Dew Line, the "Texas Towers" and almost entirely operate and maintain SAGE (Semi-Automatic Ground Environmental system), the heart of the whole continental air defense setup.

Now under study by the Air Force is a plan to man all the ground installations of one air division with tech reps.



World Radio and TV Gain

- Global tv set coverage is 55.9 million, 13.7 million outside U. S., Western Europe tops 8.3 million, with 1.3 million in the USSR
- Though growing, radio is still an infant in parts of the world as total reaches 279 million, 130 million outside U. S., Canada

TELEVISION and radio sets in use throughout the world have increased sharply in the last two years but some areas are still virtually untouched.

The maps on these pages are based on the latest available estimates of radio and tv sets. They show by shaded areas the approximate number of tv and radio sets per 1,000 population.

Tv grows steadily in popularity in Europe and will continue to grow. More tv stations are being built. Big gains for tv may be expected in the Communist satellite countries where propaganda looms large in government planning.

Japan is pushing hard for wider tv acceptance, shows great interest in color. A few South American nations may bear watching, too.

Despite inroads, television is unlikely in the near future to make a dent in many areas of the world where radio is still an infant.

Even South America, where tv has made a start, continues as a vast market for radio sets. Brazil, for example, has little more than 100 radios per 1,000 population.

The Middle East, Asia and Africa offer large populations to whom radio is hardly known. Egypt has

30.8 radios per 1,000 persons; Saudi Arabia 1.5 per 1,000 persons; India has 2.9 and Ethiopia 2.5.

An estimated 11,528,200 television sets are in use outside the U. S. and Canada, according to a recent survey. The U. S. has about 42,200,000, Canada about 2,200,000. Total: 55,928,200.

Soviet bloc tv sets are estimated at 1,477,500, with 1.3 million of these in USSR.

A Soviet report received in Vienna claims that more than 30 million tv subscribers will be tallied up by 1960. However, Western experts have consistently downgraded Russian tv predictions. The Russian report says tv centers will be increased from 24 to 75, with more than 250 relay stations added too.

Tv set estimates for other areas are:

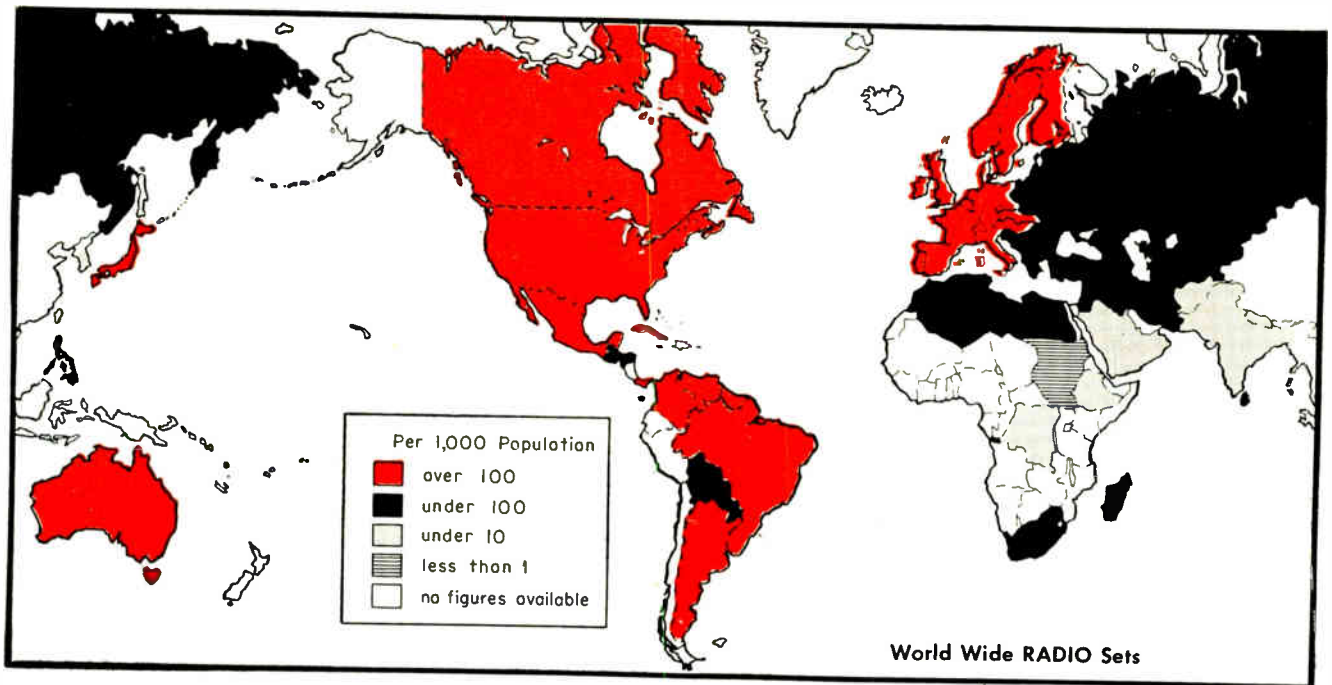
Western Europe—8,367,300

South America—1,190,000

Far East—487,600

Near East, South Asia and Africa—5,800

Radio receivers in all countries except the U. S. and Canada are estimated at 130,498,400 by the U. S. Information Agency. (The U. S. has about 143,500,000 radio receivers in homes, Canada about 4,915,000.)



World total is 20 percent higher than estimate made from a similar survey in July 1954.

Here's how global radio distribution breaks down by areas:

Western Europe—64,737,100
 Eastern Europe—16,600,000

Yugoslavia—600,000
 Arab countries—2,141,500
 Non-Arab Asia—4,295,600
 Non-Arab Africa—1,158,100
 Far East—19,488,000
 Latin America—21,478,100

TECHNICAL DIGEST

- "Must slide down 4-inch pipe" was the dominant specification for a 200,000-volt Van de Graaf generator to be used by Lane-Wells Co. for oil well logging. High Voltage Engineering Corp. did it in 3 inches, with a unit 47 inches long. Here, deuterons are accelerated to 200 kv and allowed to strike a tritium target, giving an intense beam of 14-Mev neutrons without any interfering gamma radiation.

- One second in 12 days is accuracy of 5850 electronic chronometer made by Times Facsimile Corp. for shipboard, field and lab use. Output of tuning-fork oscillator, compensated for temperature and pressure, is amplified to drive 60-pole variable-reluctance synchronous motor of clock. Secret of accuracy lies in taking 2 to 6 months to adjust tuning fork so drift is negligible.

- Phase shift problems of radio receivers without output transformers are eased by use of new Philips

EL 86 output pentodes in two-tube single-ended push-pull circuit which provides match with direct-connected loudspeaker having 400-ohm voice coil. Plate resistance of tube is only 1,600 ohms at full load. Circuit is stable even when first amplifying stage has positive feedback up to oscillation and this stage together with output stage have negative feedback. Distortion is 0.3 percent to 10 watts output.

- Tiny paired ceramic disks provide a one-bit electrostatic memory that can be read out millions of times without loss of stored information. The disks, conductively coated on the sides, are cemented together to give mechanical coupling. The storage disk is charged electrically in either polarity. For readout, a pulse applied to the other disk provides mechanical distortion, causing an output pulse to appear across the storage disk. Small size of this new Mullenbach Capabit permits extreme miniaturization for high-capacity memories, there being negligible interaction between closely spaced units.

- Stainless steel Dewar flasks having gamma-ray and neutron transparency protect sensitive scintillation counters from 300 F heat 2 miles down during radioactive logging of oil wells by Well Surveys, Inc. The detector is placed in a water-filled steel tube inside the evacuated double-wall CEC flask and liquid carbon dioxide is poured into the flask to freeze the water. This maintains the detector at nearly constant temperature of about 40 F long enough for logging deepest well.

- Coax without a center conductor transmits up to 5,000 kw of 3,600-cps audio-frequency power from a centrally located generator to induction heating units at the forge plant of Ladish Co. The conductors are coaxially formed but the inner conductor is located as tight against the outer as insulation will permit. Power is distributed at 4,800 v and stepped down to 200 or 400 v at each machine. Lower reactance and less copper are chief advantages over conventional cables.

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Quality Hunt Gets Hot

- Some industry men challenge usefulness of traditional quality control and offer a system adapted to special electronics needs
- A new kind of engineering—component engineering—has been started by parts users to reduce failures caused by parts misuse

REVAMPING of traditional quality control methods, accused of often being meaningless in electronics production, appears to be in the cards.

Some quality control people are now throwing down the gauntlet against acceptable-quality-level (AQL) methods, MIL-STD-105A and RETMA No. 42 publications, the present quality control bibles.

Two spokesmen for the anti-AQL's are Marcus Acheson and George Herrold of Sylvania. While they acknowledge the value of AQL in some instances, they said that in others it is like asking for "eight feet of gasoline."

The new methods proposed are understood to have the backing of the influential Aircraft Industries Association's electron-tube committee. Portions of it are informally used by some major electronics firms and buyers.

The chief complaint of Acheson and Herrold against AQL is that it is not tailored to the elec-

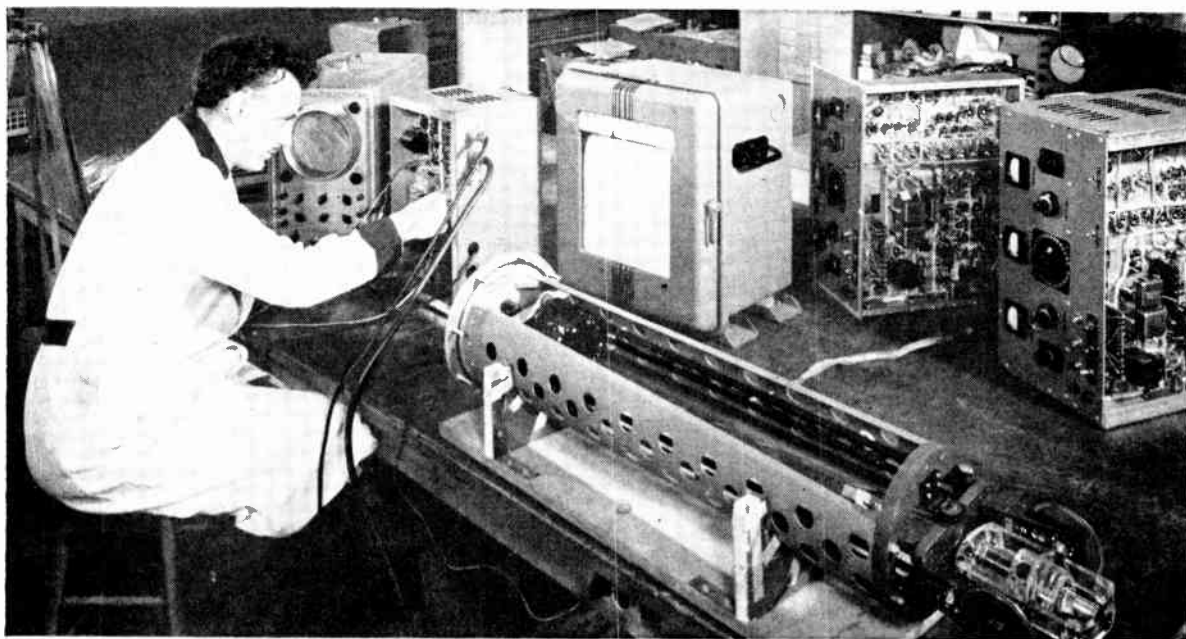
tronics industry. This often leads to wasted effort and confusion among electronic buyers and sellers.

AQL, for instance, does not apply to malfunction without failure. A tube may occasionally introduce misinformation into an information system, but the system does not fail.

After some types of one-time malfunction in tubes, the tube is actually better than an identical tube that has not yet had its malfunction. Other defects might lead to gradual degradation of the system even though they functioned properly in tests before use.

The proposed method would set up a set of mutually understood tolerances on a sliding scale. The quality tolerances would be adaptable to the peculiarities of the electronic product and the user's quality needs.

Among the measures would be acceptable defect levels, acceptable malfunction rates, acceptable time



Electronic Prospectors

Engineers of Hunting Associates Limited, Canada, use oscilloscope to check airborne electro-magnetic detector. Console (center) reveals ore location by recording changes in magnetic field

to failure and acceptable degradation rate, each with a suitable measuring technique.

Other industry men indicate the day-to-day steps are being taken by electronic manufacturers to increase product reliability.

Formation of component engineering groups to supervise component use has been found effective, according to Robert W. Brown, components evaluation supervisor at Boeing.

Electronic component failures are blamed for 60 percent of missile unreliability today, Brown says. But analysis shows that $\frac{2}{3}$ of the parts failed due to misapplication.

The fault, Brown says, really lies with inability to recognize component limitations. The solution is a new kind of engineer, a components engineer, he says.

A components engineer supervises or monitors the choice of parts and their circuit application, packag-

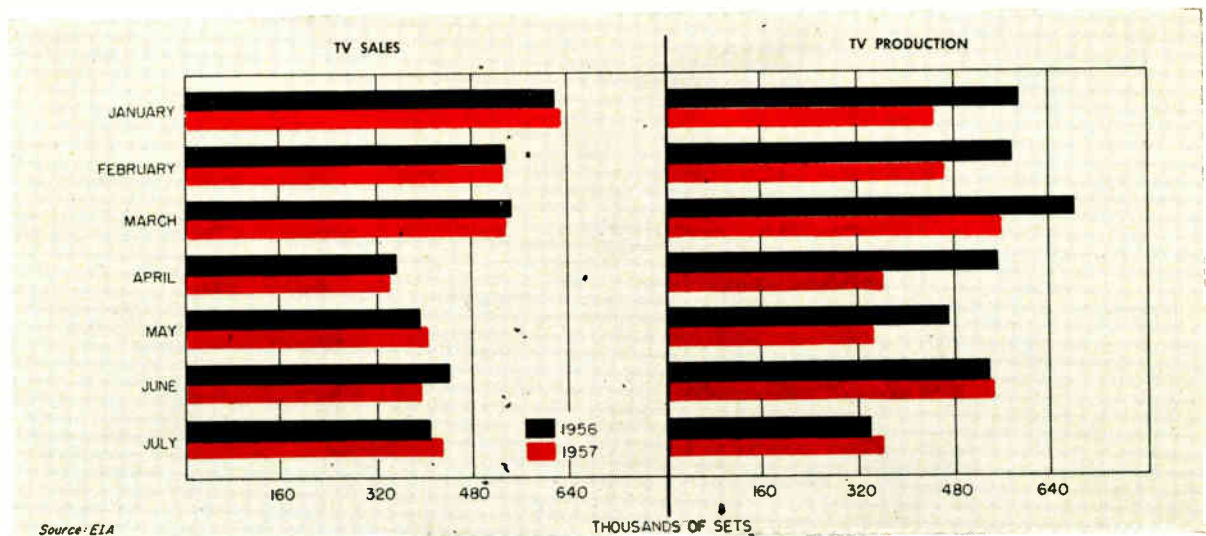
ing, procurement and quality control, installation and investigation of failures.

Motorola provides its missile design engineers with a reliability handbook. It outlines reliability problems and stresses three ground rules:

- Use recommended parts and tubes with adequate derating for higher reliability.
- Allow for realistic variations in parts and use, a statistical approach to circuit design.
- Thoroughly test equipment models and adequately analyze results for corrective action.

F. E. Dreste of Motorola's Western Military Electronics Center, stresses the statistical approach to allowable variation in detail. For example, he has worked out the variations which can be expected in an amplifier circuit's gain. If strips in production at Motorola have actually shown the same gain variation.

PRODUCTION and SALES



TV Sales Near '56 Level

TELEVISION retail sales are picking up and manufacturers now expect that total set sales for 1957 will be only slightly below the 6.8 million sets sold last year.

Cumulative sales through July of this year were 3,237,000 sets, only 37,000 sets less than the 3,274,000 sets sold in the first seven months last year. This July's sales of 426,000 tv sets were ahead of the 405,000 sets sold in July of 1956.

However, sets produced are running well behind 1956. A total of

6 million sets is expected to be produced this year compared with 7.4 million sets last year. Production for the first seven months of this year amounted to 3,083,000 sets compared with 3,752,000 sets in the same period of 1956.

Last July's production of 361,000 sets topped the 337,000 units produced in July of 1956. But monthly production figures for '57 trailed '56 in all of the preceding months.

Reason for the variation of production and sales trends is that pro-

duction has been held down this year while inventories were worked off.

Les Hoffman, president of Hoffman Radio, claims inventories are now at one of their lowest levels. Current low-level inventories combined with a firming of prices have improved tv market conditions materially, he says.

He predicts black-and-white tv sales of 8.5 million sets in 1958 and that the bulk of these sales will be portables.



Foreman, v-p, operator, quality-control manager, plant super discuss spec change, one way of . . .

Using Group Management

Almost everybody gets into the act when a parts supplier adopts Group Approach Management. The system pays off in improved employee morale and faster executive development. But petty politics and personal rivalry can sometimes offset gains

TWO HEADS are better than one. This time-worn phrase has new meaning for at least one firm that has grown 10 times in seven years.

Last week Miniature Precision Bearings attributed its success to GAM (group approach management). Though the principles are not new, MPB applies them with a vengeance.

GAM is another example in the trend toward a more democratic approach to management. Everyone directly or indirectly involved is given the opportunity to express his opinion regarding policies, plans, problems of the company.

To make GAM work, the Keene, N. H., manufacturer of parts for the electronics industry suggests:

- Set the proper climate for it. The company head must like flexibility, informality, be willing to delegate to develop subordinates.
- Use people who like to operate this give-and-take way. Accustom them to more flexibility.
- Try GAM everywhere possible—reviewing policies, planning operations, discussing service needs.
- Have each group represent various organizational levels, specialties. (Its size? Small enough to handle, big enough for wide representation.)
- Select a good group chairman. He's a real key to success. He makes decisions, keeps the problem and discussion direction clearly defined, pulls out facts, builds a plan, points toward solutions, determines when to act.

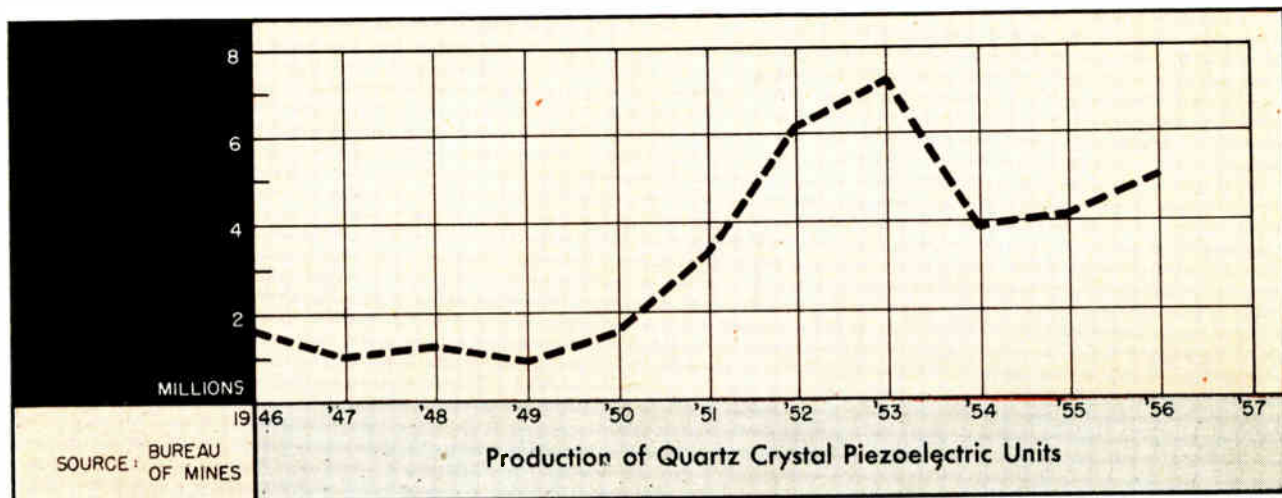
- Make a decision at the group meeting, outline a program, assign duties.
- Don't underrate the ability of specialists to think out broad problems.
- See that group members give opinions, possible problems, ideas, alternate solutions.
- Write down group results as memos or releases.
- Still use your specialist or best qualified person to carry out a group's completed plans.

Group approach management—when done well—can result in:

Speedy action . . . easy and fast flow of communications . . . training lower-echelon men for middle and upper-management posts . . . higher morale, job interest . . . fewer jurisdictional fights among departments . . . a sound base for rapid expansion . . . each section considering effect of a proposal . . . viewing of ideas from all sides at the same time . . . good checks and balances.

Naturally, GAM can have drawbacks. Watch for these:

- Politics. A person pushing an angle or trying to show up someone else.
- Getting bogged down in too much discussion.
- Short-circuiting the chain of command. (After all, that is where action is carried out. To avoid, recognize levels when assigning tasks.)
- Avoid duplication.
- Balance problems so one department isn't always under fire.



End of feast-famine trend may come when . . .

Crystal Filters Bolster Market

- Stiff competition among quartz crystal producers will be eased in a few years by the trend towards crystal filters
- But right now crystal cutters are squeezed in a market below their capacity to produce

QUARTZ crystal manufacturers, faced with a grim market situation today, can take heart from reports emanating from several industry sources.

Military electronic design is firmly pointed at the use of filters. Crystal filter networks will contain several crystals each.

In addition, commercial two-way radio is expected to have an ultimate peacetime requirement of 500,000 crystal filters. This would double the number of crystals presently produced for frequency control.

Irving Azoff, of Army Signal Supply Agency, reported at Wescon that the Signal Corps is in large-scale development of transistorized, miniaturized and ruggedized radio equipment.

Crystal filters for circuit simplification, sharper frequency response, stability and smaller size are being actively investigated. Early procurement will be in job-shop quantities, but future requirements are expected to be high.

Crystal filters have been around a long time, but largely in telephone carrier systems. A Bell Labs speaker said that Western Electric has made \$50 million worth in 50 types.

For the time being, however, crystal cutters are squeezed by a market for oscillators that is below their capacity to produce. Some prices, particularly

military types, have been halved. Contracts are often bid for at below-cost levels.

The 30-odd surviving manufacturers urge government relief, arguing capacity should be protected in case of war.

"If the military wants to keep wartime capacity," states one manufacturer, "they will have to provide a subsidy, or decide who to keep in business."

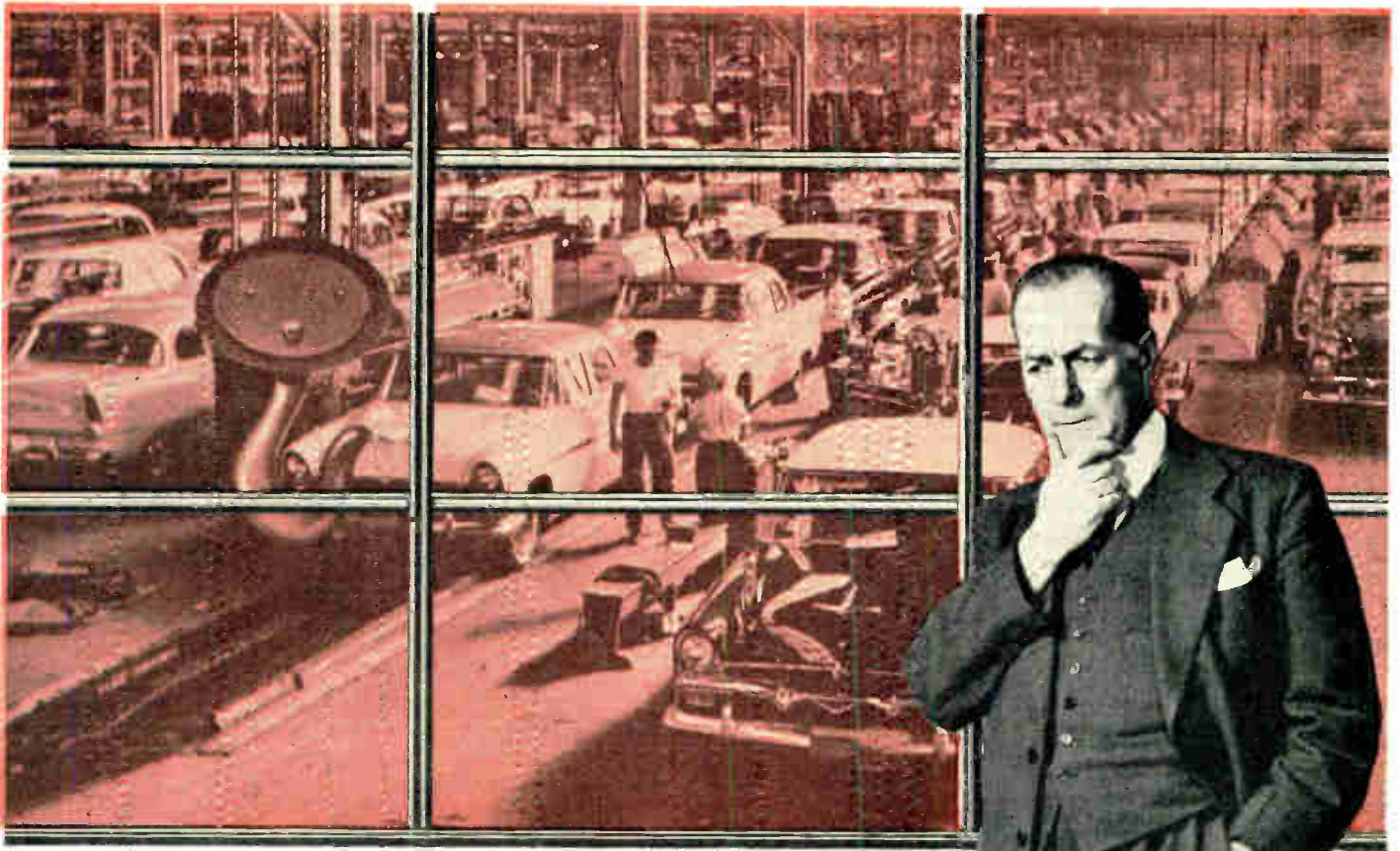
End of government stockpiling of premium grades of raw quartz will squeeze profits a little more. Getting premium quartz out of the mines had created an abundance of lower grades at bargain prices.

On other crystal fronts, the Signal Corps is near success in developing automated production machinery and synthetic quartz competitive in price with better grades of natural quartz. Both may tend to consolidate production in larger firms.

Estimated production cost of synthetic quartz, actually regrown quartz, has dropped from about \$50 a pound to \$30 in the past year. The goal is \$20.

Bell Labs, Western Electric and Brush have made it, though not for sale. Sawyer Labs is making it now for the Signal Corp. Sawyer expects to be in commercial production by early 1958 and reports other firms are feeling out the market as well.

Besides giving a domestic supply of a critical material, grown quartz's controlled size and orientation will cut production steps and increase yield.



TRANSISTORS HERE?

Management executives are asking themselves, and others, "can my business use transistors?" In order to arrive at a practical answer, a knowledge is necessary of what this latest electronic "miracle" does.

A transistor is a miniature semi-conductor which is extremely reliable and features extended life. These small rugged units are easy to store, and handle. Present complex circuits involving many conventional components can be reduced with the use of transistors, thus effecting substantial savings both in material and assembly time. Initial cost of transistors is lower than some comparable conventional components.

The replacement of vacuum tubes is thought of as the present function of transistors . . . but this is only one segment of the broad application possibilities.

The following list of applications, in diversified industries, is an indication of where transistors can be used:

GENERAL TRANSISTORIZED DEVICES

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 ELECTRONIC-EYE BURGLAR ALARM
 COMPLEX COMPUTERS
 NEWLY DEVELOPED HOUSEHOLD APPLIANCES
 IMPROVED DEVICES IN THE COMMUNICATION INDUSTRY
 LOW POWER APPLICATIONS IN THE TOY INDUSTRY
 DEVELOPMENTS IN THE TRANSPORTATION INDUSTRY
 COMPLEX CIRCUITS OF CONTROL EQUIPMENT AND SYSTEMS IN THE PROCESSING INDUSTRIES

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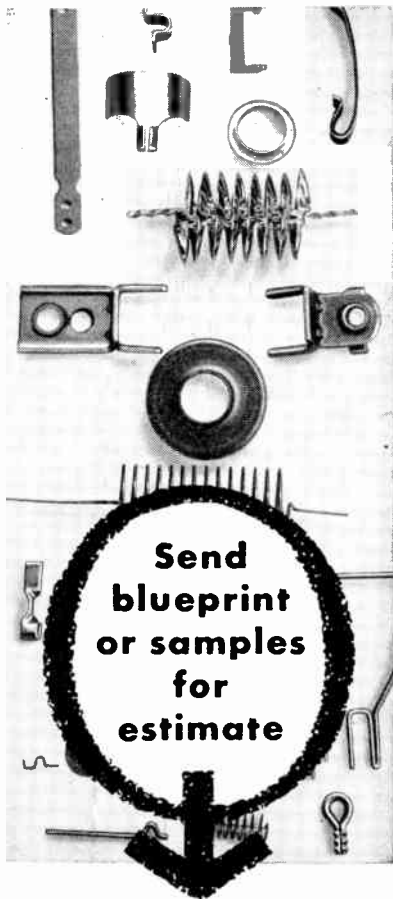


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Mobile Decision Near

Industry expects FCC to keep mobile radio in present state. Justice Department strikes an antitrust note

This week the FCC has under consideration the AT&T proposal for a tariff rate in the heretofore unregulated two-way mobile radio communication field. Private communication systems, such as taxi and truck two-way radio would, if this proposal is accepted, become regulated.

The industry is betting on a negative answer from the Commission.

AT&T agreed in a consent decree last year to get out of all unregulated communications activities by 1961. The company has for the past fifteen years been providing private mobile radiotelephone systems. As of today, AT&T Long Lines department alone has five such customers.

Reaction to the application for tariff rate was quick. Other firms which have been providing mobile radio services (e.g. Philco, Motorola, GE), the Justice Depart-

ment struck a blow. In a strong comment to the Commission it said that if the FCC were to agree to the telephone company's proposal the result "would violate various provisions of the antitrust laws."

The Justice Department also offered the opinion that AT&T's presence in mobile radio would "substantially curtail or eliminate vigorous and healthy competition in this youthful industry."

"We believe," says the telephone company in rebuttal, "that our furnishing these systems is in the public interest and will preserve rather than lessen competition . . . Approval of this tariff would not give a telephone company any advantage over others in the field. Telephone company rates would be regulated and would be the same for all its customers."

The tariff rate proposed by Bell boils down to \$3 a mile per month.

Police Tie In Radio and TV

TRAFFIC and police electronics is making news this month.

In San Francisco, besides re-vamping their entire two-way radio network with a quarter of a million dollars worth of new equipment, police are setting up a fast hookup with the public.

San Francisco's last earthquake clogged all telephone lines with calls from the curious wanting to know what happened. Some emergency calls were not able to get through.

Police last month tied in the local radio and tv stations to their mobile radio setup. The technique got its first test when a jet broke the sound barrier over the city with the accompanying sonic boom. The stations monitoring a police receiver heard a tone signal. One minute later they heard the announcement explaining to the public what the blast was. Seconds later the public knew.

San Francisco's police plan to install an automatic recording system that will capture the announcement even though the station personnel might miss the beep that precedes it. Besides disasters and noise curiosities, traffic snarls will also be announced in the future.

Traffic controls in El Paso, Texas, will shortly come under new design. That sunny city's entire downtown (78 intersections) will come under the control of an electronic computer. It will regulate by radar the traffic lights. Time intervals of the lights will depend on what the computer thinks of the traffic situation.

Wayne County, Michigan (containing Detroit), will install a similar device. A man instead of a computer will change the light sequences. Operating on 960 mc, a transmitted signal will be able to change the red-green light sequence

on any county stretch of road. A police car could rip across the county with a green light all the way. Sluggish traffic or jam ups can be relieved. In February the first few miles will be in operation.

Expect Loran to Sell \$2 Million

Q. How do you beat a tough market situation?

A. Produce something the competition hasn't got.

Arch Brown, Edo's v-p for sales believes his firm has come up with a classic example of the philosophy in its new miniaturized loran receiver especially designed for the new transoceanic airliners.

Edo expects sales in the next few years to be 500 sets, at about \$4,000 each. Three major airplane builders specify them as equipment, and orders from several airlines are firming up. Production has begun, after two years of development.

Commercial loran manufacturing has been perennially tough, Brown says, for two reasons. One is the number of companies producing marine electronics. The other reason is the continuing availability of inexpensive war surplus APN-9's.

Edo's new loran got its start at a boat show. An airline pilot visiting the firm's booth suggested Edo's marine version be repackaged for airline use. Analysis of the market and the APN-9's shortcomings indicated the suggestion was sound.

Overseas airlines were ready to drop the APN-9's. They are not suited to pilot operation, Brown says, and their weight of 65 pounds—often doubled by a safety spare—cuts down valuable payload.

The miniaturized receiver weighs 26 pounds, is rigged for remote control, gives direct readings instead of pips to count, has circuits which ensure either the right reading or no reading and can provide a fix in 90 seconds.

Edo has often turned a dollar by selling specialized versions of marine standbys. A few offshore oil prospectors, for example, have paid \$18,500 for combinations of deep depth sounders and survey depth sounders regularly sold to oceanographers.



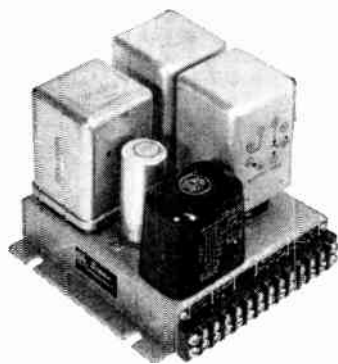
KONRAD R. M. S. ANSBACHER (STANDING) LEADS DISCUSSION OF SIGMA DEVELOPMENT WITH A VARIETY OF SECTION HEADS.

Sigma Advanced Scientific Team

... constant challenge to the pinnaticerebric

Original exploration by Sigma's staff scientists at the top level often yields not only marvelous new concepts, but occasional answers to lower order problems as well. In the unposed scene above (our last meeting), world-renowned theoretical application engineer Ansbacher (plain

"Square" to his colleagues) has made an electrifying suggestion concerning the Series 8000 Magnetic Amplifier Relay: plug it in to see if it works! Here is the kind of unfettered, creative thinking that has made all industry react swiftly at the mention of our name.



Carrying on from their leader's initial discovery, the group rapidly uncovered more and more secrets of the "Mag-Amp"—some by intensive thought, others by unsoldering certain enclosures. It was soon agreed by all members that Magnetic Amplifier Relays were excellent devices for detecting unbalance (a sizable number are in use at Sigma's own plant), and comparing the outputs of low impedance D.C. signal sources. On went the discussion, out came the applications, higher and higher rose the enthusiasm as each new specification was added to the list. Predictions flew of uses in temperature control devices with thermistor bridges, thermocouples and such, light-sensitive equipment, and wherever 0.1 microwatt is the most you can get to switch 1 to 5 ampere loads at 120 V.A.C. A caution was voiced over the Magnetic Amplifier Relay's slow speed (30-300 milliseconds), but was cast aside as usually not a consideration. Final moments were devoted to eulogizing such virtues as ruggedness, long life (in the millions) and availability in practically any state of completeness and with whatever Sigma relays necessary to suit the customer's whims. In the warm camaraderie that comes from the knowledge that one of their products is both useful and in production, the distinguished little group rose and in unison repeated their oath: "Exitus, ab eloquentia confusio."*

*Literally, "Success, from eloquent confusion", but generally interpreted "Go, before you get things any more confused."

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Midwest Voices Optimism

Chicago area manufacturers at National Electronics Conference see rise in commercial and industrial sales next year

CHICAGO area electronics producers are bracing themselves for the 1957 homestretch. Optimism based on broad diversification prevailed this week at the National Electronics Conference.

So far in 1957 some 6.6 million tv sets and 14 million home and auto radios have been sold. Midwest manufacturers have captured 30-35 percent of both totals.

Meanwhile, enthusiasm mounts for high fidelity and phonographs. Edward R. Taylor, Motorola vice president, told dealers that almost \$700 million worth of phonographs, high-fidelity units and component parts will be sold this year.

Zenith v-p for distribution C. J. Hunt says: "Through Sept. 7, we were 6 percent ahead of last year in distributor sales to dealers. Production might be behind that, but fewer tv sets will be sold in the industry than 1956's 7.3 million units. On radios, our unit sales are 6 percent ahead of last year, excluding car radios."

Centralab president Bill Parsons

says: "We're some 18-20 percent ahead in the Midwest. A good healthy fall is in the offing, spread through all phases of electronics. The first quarter of '58 will be at the same level as the first quarter this year. But commercial electronics will grow more in the year ahead than any year before."

Midwest components manufacturers point out that the East and West Coasts are more heavily in military work. A better balance of military, industrial and consumer products, they feel, bodes well for the Chicago region.

Bill Garstang, chief engineer, radio sales, Allen Bradley notes: "Government contracts have slackened this last year, but components for instrumentation radically increased. Our ferrite sales doubled over last year's, and resistors and capacities are ahead."

At Chicago Standard Transformer, sales manager Newton Cook says: "There's a considerable cutback in government spending, but it's not affecting the Midwest."

New Toll-Tv Scheme Proposed

Barely under the wire ahead of the FCC announcement on subscription television, Blonder-Tongue Laboratories has submitted a written proposal to FCC for still another method of toll-tv.

Essentially a multiplex system permitting simultaneous transmission of two programs on a single carrier, the system offers other possibilities but is being promoted heavily for pay-tv. The company's proposal omits circuit details and is confined to system philosophy.

Four video signals are superimposed on the carrier, two for each program. One pair is transmitted in phase and combines additively to present an image at the receiver. The other pair is transmitted out of phase and the combination theo-

retically results in total cancellation and no interference to the first signal. A decoding signal, transmitted either on the carrier or by landline, can flop the first pair into phase cancellation and bring the second pair to in-phase condition.

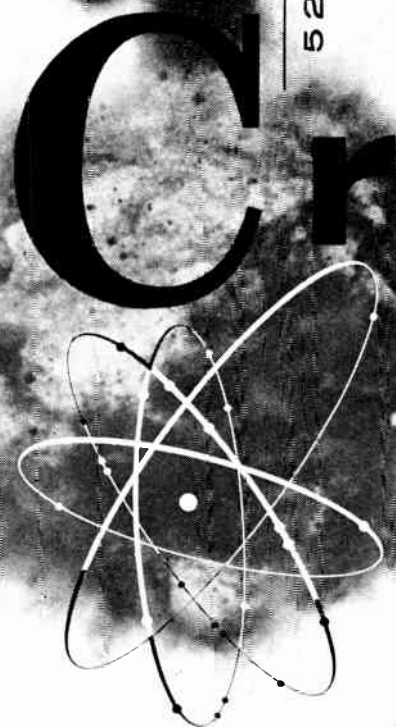
When a telephone line is used to carry the master decoding signal, it is also proposed that the receiver be equipped to transmit in-use data back to the central office for billing.

Other uses for the system, dubbed Bi-Tran, include increased channel allocations for standard commercial and educational tv. Also suggested are military applications and uses for emergency communications services.

ACCEPTED SYMBOLS

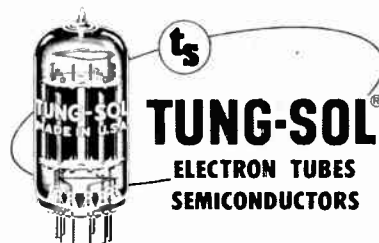
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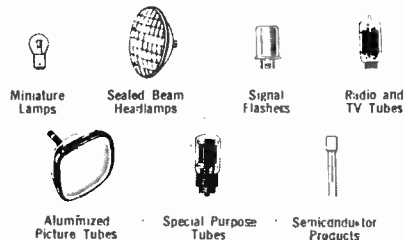
Symbol for chromium . . . the element used in alloy with other metals to increase the strength of grids and other structural parts of electron tubes.

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"Other equally important considerations were good schools and places of worship, progressive government, adequate health services, civic organizations, public-spirited local newspapers, recreational opportunities and suitable housing."

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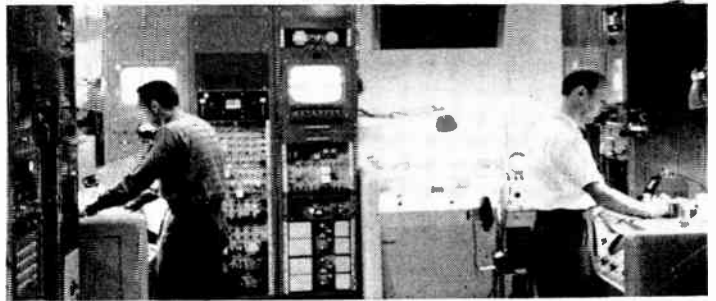
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MATERIALS



TV recorders are hungry for

Tape at \$335 a Mile

That's the going price for tv magnetic tape as one firm swings into production and two others get set to enter market

Two magnetic tape makers are jumping feet first into a booming new market fostered by Ampex's Videotape recorders. A third plans to take the plunge soon. Reason: over \$2 million of the tape a year will be sold.

- Minnesota Mining and Manufacturing (3M) is now in commercial production, at \$306 for a reel two inches wide and 4,800 feet long.

- Orradio, with Ampex stock-buying aid, is building a new \$500,000 plant. Production will be started by early 1958.

- Reeves Soundcraft is still in limited production but plans a new production line. It doesn't want to cut into production of other tapes.

All agree getting into production is tough. In April, one 3M run of 100 reels yielded only three satisfactory reels. Since then, average yield has increased to one-third to one-half.

Videotape must meet tolerances of 30-millionths of an inch, to record 20,000 bits per inch, at a

speed between running tape and revolving recorder head of 1,500 inches per second—with no drop-outs.

The tape has been correspondingly hard to get. When daylight saving time began shuffling network program times, the networks had only 50 rolls on hand. Since then, 3M says, it sold 100 rolls. Reeves has filled only developmental and emergency orders.

All major networks have bought Videotape recorders, at \$75,000 for prototypes and \$45,000 for current production models. Though first costs are high, cost per program is negligible because the tape, unlike film, needs no processing and can be re-used up to 200 times.

3M's magnetic products manager, W. W. Wetzel, sees network tv as only the opening phase of the Videotape market. RCA is developing home video recorders. Armed forces will use Videotape in missile development—the government ordered five of the first machines. Electronic movie cameras may shoot with magnetic tape to avoid film processing.

Ceramics Beat Heat

LIBERAL use of ceramics was feature of a new tube introduced at an IRE meeting in Boston last month. Its parts were stacked vertically and the tube was smaller than its conventionally made counterpart.

Such applications of ceramics are multiplying as electronics moves

deeper into the jet and atomic age. Military and industrial research is developing ceramic-protected components to withstand high heat, stress and atomic radiation.

Components and insulations operable at 500 C have arrived. Researchers are hard at work on elec-

tronic parts able to withstand radiation without bulky shielding for use in atomic aircraft.

Electronics already uses well over \$100-million worth of ceramics in capacitors, resistors, transducers, printed circuits, magnets, coil forms, tube parts, insulations and protective coatings.

A high proportion of new ceramics have electronic applications. A few of these materials are:

- Titanates permitting capacitance values 100 to 1,000 times those provided by conventional capacitors of the same physical size; titania glasses with improved dielectric constants and dissipation factors

- Ferromagnetics 3.5 times as strong as some conventional ceramic magnets, permanent cobalt-based magnets and 1,000-megacycle soft magnets

- High-temperature ceramic foams

- Alumina insulations operable at 50,000 megacycles, 1,200 C and 500,000 psi compressions.

Other ceramics available are harder than diamonds, more heat resistant than tungsten, suitable for missile and jet radomes, capable of being brazed directly to metal. Many can be readily machined to close tolerances.

Auto Company Tests X-rays

NEW x-ray machine that can analyze alloy steel in 10 seconds or magnify the atomic structure of materials 150 million times is under test at General Motors Buick division.

Verne Hense, Buick's chief metallurgist, says the instrument has reduced by more than four hours the time needed to analyze metals.

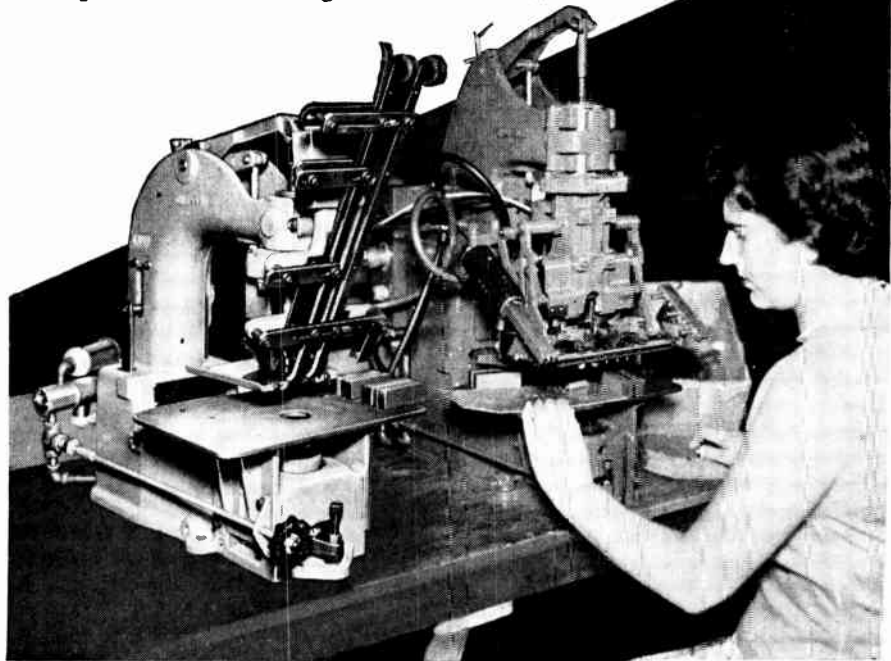
Hense describes the machine as an x-ray spectrometer-diffractometer and microradiography apparatus that fires x-ray beams to probe hardened steels and carbide cutting tools.

The machines' two 50,000-volt x-ray tubes, generating high temperature, are cooled by water jackets.

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AF Missiles Pile Up

Four out of 16 known missile models are now operational; 4 more soon to enter arsenal

United States Air Force's inventory of operational missiles is piling up. Four out of the 16 known guided missile projects are currently activated in groups and wings in the United States, Europe and Formosa.

Four more missiles are nearing operational status—Snark and Rascal will go to SAC this year and

Genie and Bomarc will be assigned (time not yet announced) to CONAD.

Eight—counting the newest and still unnamed air-to-surface missile North American was recently designated to develop—are in the development stage.

In spite of the possible disappearance of Thor from the list in favor of Army's Jupiter and the probable merger one day in the future of Atlas and Titan, USAF's total is bound to increase.

Tremendous stockpile of these weapon types USAF has always required in the past indicates big and continued production business.

OPERATIONAL						
Name	Category	Range Mi.	Prime Contractor	Guidance Contractor	Type Guidance	Remarks
Matador TM-61	Surface-to-surface	500	Martin	Martin	Command	5 groups
Falcon GAR-2A	Air-to-air	.....	Hughes	Hughes	Infrared	CONAD
Falcon GAR-1D	Air-to-air	5	Hughes	Hughes	Radar homing	CONAD
Sidewinder GAR-8	Air-to-air	.....	Philco	GE	Infrared	CONAD
NEAR OPERATIONAL						
Snark SM-62	Surface-to-surface	5,000	Northrop	Northrop	Stell-inertial	SAC (this year)
Rascal GAM-63	Air-to-surface	100	Bell Aircraft	Bell Aircraft	Radar	SAC (this year)
Genie	Air-to-air	.....	Douglas	Hughes F-89	None in rocket	CONAD
Bomarc IM-99	Surface-to-air	200	Boeing	Westinghouse	Radar	CONAD
DEVELOPMENTAL						
Bull Goose	Surface-to-surface	.....	Fairchild	.....	Command	SAC
Green Quail	Air-to-surface	.....	McDonnell	.....	.....	SAC
.....	Air-to-air	.....	Cornell	.....	.....	Bomber defense
.....	Air-to-surface	100+	North American	.....	.....	SAC
Atlas SM-65	ICBM	5,000	Convair	GE/Burroughs	Inertial	SAC
Titan SM-68	ICBM	5,000	Martin	Arma/BTL/Remington	Inertial	SAC
Thor SM-75	IRBM	1,500	Douglas	AC Spark Plug/BTL	Inertial	SAC
Wizard	Anti-ICBM	.....	Convair/RCA	.....	.....	.....
TM-Tactical Missile SM-Strategic Missile GAM-Guided Air Missile GAR-Guided Air Rocket IM-Interceptor Missile						

MILITARY ELECTRONICS

• Redstone Arsenal's Wernher von Braun says FTA for an unmanned, one-way rocket to the Moon is 1962. Carrying 20 to 100 lbs. payload, trip will take five days. Know-how will emerge from the ICBM program.

• Army Gen. L. K. Tarrant announces progress in the Nike family: Hercules will be in production before June and another missile, intermediate between Hercules and Zeus, is now under study.

• Captive firings of Thor by Douglas are scheduled to begin

soon near Sacramento, Calif. Construction of the superstructure that ties the missile to the ground during firing cycle represents a joint investment by USAF and Douglas of more than \$6 million. More than 100 scientists, engineers and technicians will be participating.

• Jet pilot instructors can now observe from the ground trainee's performance in single-seat airborne fighters. New telemetry system developed by ARDC duplicates on the ground the pilot's radar scope. Instructor communicates with the trainee by voice radio.

CONTRACTS AWARDED

Hallamore sells 46 closed-circuit tv systems for monitoring rocket engine and missile testing. Martin's Denver plant will get 24 systems and Redstone Arsenal, 22. Total amount: \$300,000.

Cook Electric gets \$2½ million contract to design and construct a missile range instrumentation system for Navy's Air Missile Test center, Point Mugu, Calif. System includes tracking radars, telemetry receiving stations, ground-control transmitters, communications equipment, flight test-control stations

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Type DCM Capacitors can be supplied in maximum energy content rating of 80-watt seconds in voltage ratings from 15 to 450 VDC. Maximum capacity value of 33,000 mfd. can be supplied at 15 WVDC.

Write for Engineering Bulletin TSC-114C.

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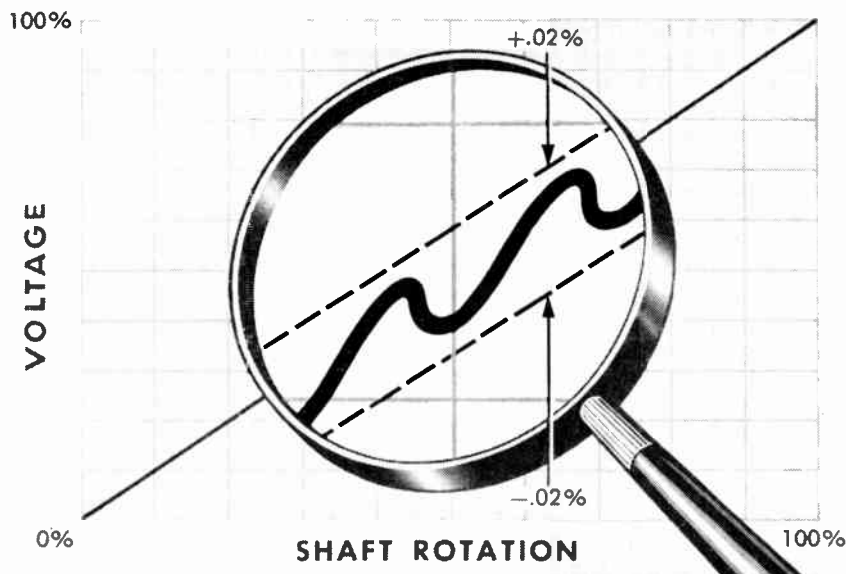


SC57-9

CAPACITY CHART

Rated Voltage	Surge Voltage	Max. Cap. 1 3/8 x 4 1/8	Max. Cap. 1 3/4 x 4 1/8	Max. Cap. 2 x 4 1/8	Max. Cap. 2 1/2 x 4 1/8	Max. Cap. 3 x 4 1/8
5	7	8500	15000	20000	33000	45000
15	20	6000	10500	13500	24000	35000
25	40	4500	8000	10000	17500	25000
50	75	1750	3250	4250	8000	10000
75	100	1000	1500	2250	4250	6000
100	135	675	1250	1500	3000	4000
150	185	600	1000	1250	2500	3500
200	250	300	500	600	1000	1500
250	300	225	375	450	850	1200
300	350	200	350	400	750	1100
350	400	170	300	375	700	1000
400	475	140	250	325	575	850
450	525	125	225	275	500	800

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The Vernistat potentiometer is available in models with linearities as low as $\pm 0.02\%$ and output impedances as low as 45 ohms.

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Model 2B	$\pm 0.04\%$	0.50 mV/V	130 ohms
Model 2B1	$\pm 0.03\%$	0.13 mV/V	470 ohms
Model 2B2	$\pm 0.05\%$	0.47 mV/V	45 ohms
Model 2B3	$\pm 0.03\%$	0.16 mV/V	130 ohms
Model 2B4	$\pm 0.02\%$	0.06 mV/V	470 ohms

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and mobile power supplies. System will be completely mobile.

Conoga has \$1,087,458 BuAer contract for four of its Model 7240 C-band, ground-based radar systems. Designed to track high speed, high performance missiles in flight, equipment will be used at Point Mugu, Calif.

Consolidated Electroynamics will provide magnetic-tape recorder/reproducers and recording oscillographs to Interstate Electronics for a Navy test-range instrumentation system. Contract: \$400,000.

Admiral gets contracts totaling \$10 million. \$4½ million from BuAer for airborne radio receiver-transmitters, almost \$3½ from Army Signal Corps for receiver-transmitters for helicopters, and \$2 million from BuShips for a radar system.

BuOrd spends \$470,000 with six companies for spare parts and components in connection with repair and maintenance of fire control equipment:

Sperry: \$160,000.

GE: \$60,000.

Stavid: \$35,000.

Belock Instrument: \$25,000.

Western Electric: \$120,000.

Ford Instrument: \$70,000.

BuShips has contracted electronics field engineers from six companies. Three largest contracts:

Phileo: \$1,901,293.

GE: \$241,260.

Federal Electric: \$178,118.

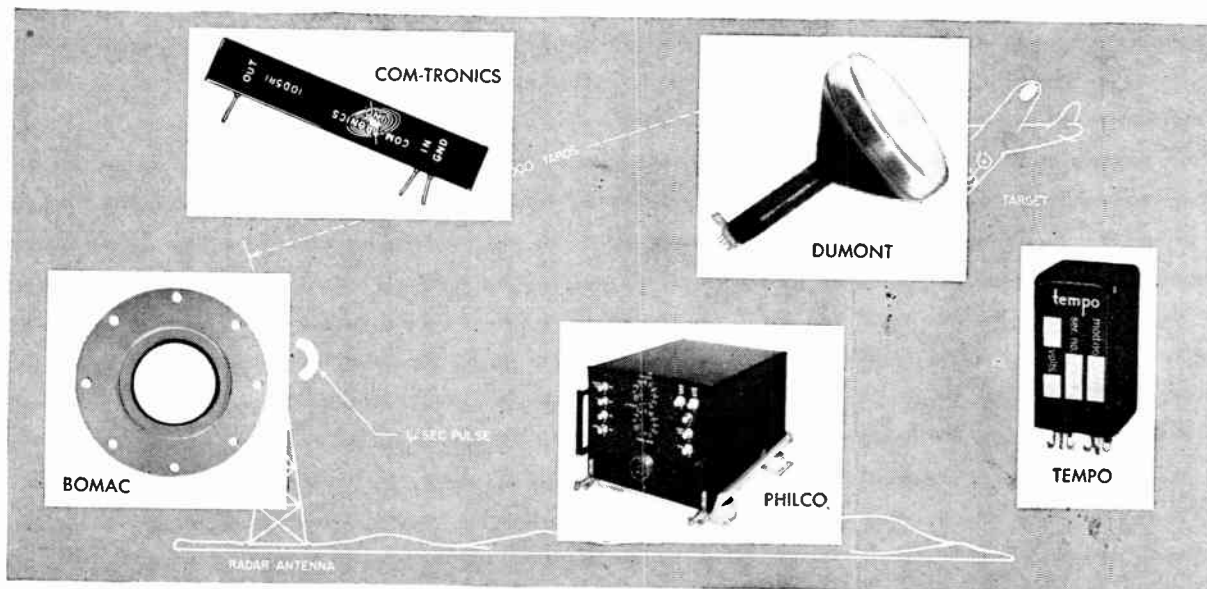
IBM gets \$½ million contract with ANIC for engineering and management services for B-52 integrated bombing-navigation system.

Douglas will provide missile tech rep services to Army Ordnance District, Los Angeles, under \$1,670,064 contract.

Micronics division of Elgin National Watch has three R & D contracts with BuOrd totaling approximately \$½ million for work on guided missile components.

Georgia Tech Research Institute gets \$832,236 contract with Army Signal Supply Agency for work on combat surveillance radar.

Radar Spurs Developments



Weight and Size Decrease

COMPONENTS used in radar systems must be small and light, as well as highly reliable. A line of short-neck, light-weight cathode-ray tubes developed by DuMont (41) for radar applications is available in both magnetic and electrostatic-deflection types. Spiral coils used in Com-Tronics' (42) delay line are said to make possible extremely small size. S-band pressurizing windows that can be used on RG-48/U waveguide and UG54A/U choke flanges are available from Bomac Labs (43).

Transistors and R-C circuits are used in time-delay relays introduced by Tempo Instrument (44). Eight pulse outputs in sequence are provided by Philco's (45) timing generator designed primarily for timing functions in radar systems.

Barnstead Still & Demineralizer (46) announces an apparatus for washing and rinsing transistors and other small electronic parts in hot, distilled, demineralized water. . . . Hermetically sealed, miniaturized toggle switches developed by Krantzer-Weber Tool (47) are said to be usable in explosive atmospheres and at high altitudes. . . . Audio and rectifier transistor transformers are being marketed by Ferrotran Electronics (48) that are said to meet shock and vibration requirements of military specifications.

Preamplifiers for oscilloscopes, made by Jerrold Electronics (49),

are claimed to increase oscilloscope sensitivity by 40 db. . . . Stempel Instrument (50) has machines for sorting resistors at the rate of 4,000 an hour into acceptable, high and low groups with adjustable tolerances from 0.5 to 20 percent.

L. A. Young Spring & Wire (51) announces a new series of f-m and a-m receivers for communications monitoring within the vhf range. . . . Two variable inductors announced by Birmell & Company (52) cover frequency ranges from 30 to 500 cycles and from 50 to 1,000 cycles. . . . Instantaneous Fourier analysis of high-speed vi-

bration, noise, pulses and harmonics are said to be provided by a wide-band spectrum analyzer designed by Probescope (53).

Hand tools for bending the leads of electronic components for mounting in printed-circuit panels are announced by By-Bnk Co. (54) to reduce assembly time and avoid plier damage to leads. . . . Size 18, 400-cycle synchronous motors designed by John Oster Mfg. (55) run at 12,000 rpm and have 0.85 ounce-inch pull-out torque with 20-watt power consumption.

Selenium contact protectors have been developed by International Rectifier (56) to eliminate arcing and erosion across the contacts of relays and switches. . . . Branson Ultrasonics (57) announces ultrasonic generators for use with immersible transducers for cleaning transistors and other electronic parts.

Index stands introduced by Kearfott (58) permit accurate positioning of a synchro rotor shaft with respect to the stator for testing. . . . A system of seven a-c voltage amplifiers offered by Dynamics Instrumentation (59) is suitable for such applications as amplification of transducer signals prior to re-

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... Lug terminals and radial leads are featured in a line of high-temperature resistors announced by International Resistance (60).

Numerical machine-tool control systems developed by Wang Laboratories (61) operate from punched paper tape and require no special computers to generate pulses. . . . Designed for teleprinter, half duplex and synchronous binary operation, a regenerative repeater designed by Northern Radio (62) reshapes and retimes distorted signals for local use or retransmission.

Delco Radio (63) announces three 12-ampere, 5-watt transistors (1N441, 2N442, 2N443). . . . Laminar toroidal transformers by Advance Industries (64) are said to cost less, weigh less and take up less space. . . . Cathode-follower probes have been designed by Gul-ton Industries (65) to couple high-impedance piezoelectric accelerometers to telemetering recorders.

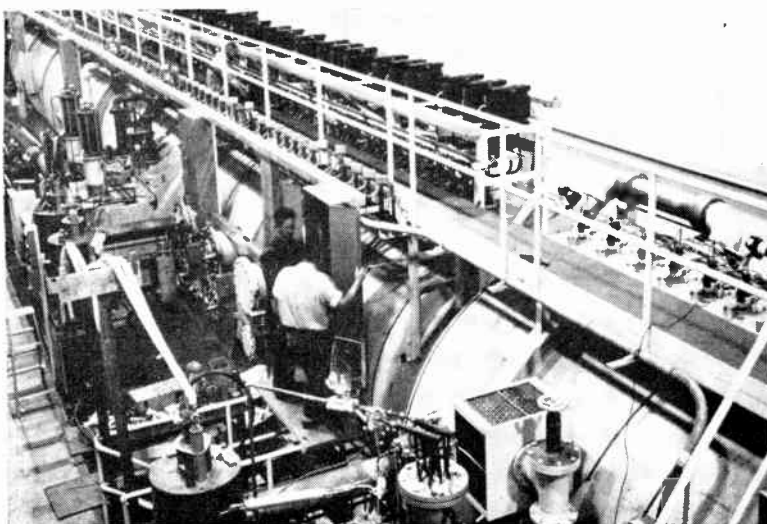
The 7034/4X150A and 7035/4X150D forced-air cooled, beam-power tubes announced by RCA (66) are intended for a-f and r-f power amplifiers, class C amplifiers, oscillators, modulators. . . . Opening any two of three normally

closed monitoring or alarm circuits deenergizes a coincidence relay offered by Certi-Fact Engineering (67).

Pulse transformers available with two or three windings and pulse widths from 0.1 to 16 microseconds are announced by PCA Electronics (68) for blocking oscillators, triggering and counting circuits, impedance matching. . . . Press-fit feed-through and stand-off terminals announced by Sealector (69) feature small size and Teflon bushings.

Subminiature relays offered by Reltron (70) operate continuously at 200 C. . . . High-speed switching circuits in computers are expected to be an important application for glass diodes made by Cle-vite (71) of alloys of silicon and germanium. . . . Perkin Engineering (72) announces transistor-magnetic amplifier power supplies that deliver 0-60 volts at 5 amps for laboratory use and production testing.

Small size and light weight are featured in a squaring mechanism announced by Belock Instrument (73) for squaring and extracting the square root of quantities in analog computers. . . . Operational mag-



Hunting for New Elements

Synthesis of new elements and cosmic radiation is object of this new \$1.7 million linear accelerator at University of California. It is 112 feet long. AEC is sponsoring another at Yale University

netic amplifiers introduced by **Universal Match** (74) are suitable for amplifying signals from thermocouples, strain gages, photoelectric cells, demodulators. . . . The model 293M1725 selenium rectifier offered by **Federal Telephone and Radio** (75) has a rating of 100 amps at 28 volts.

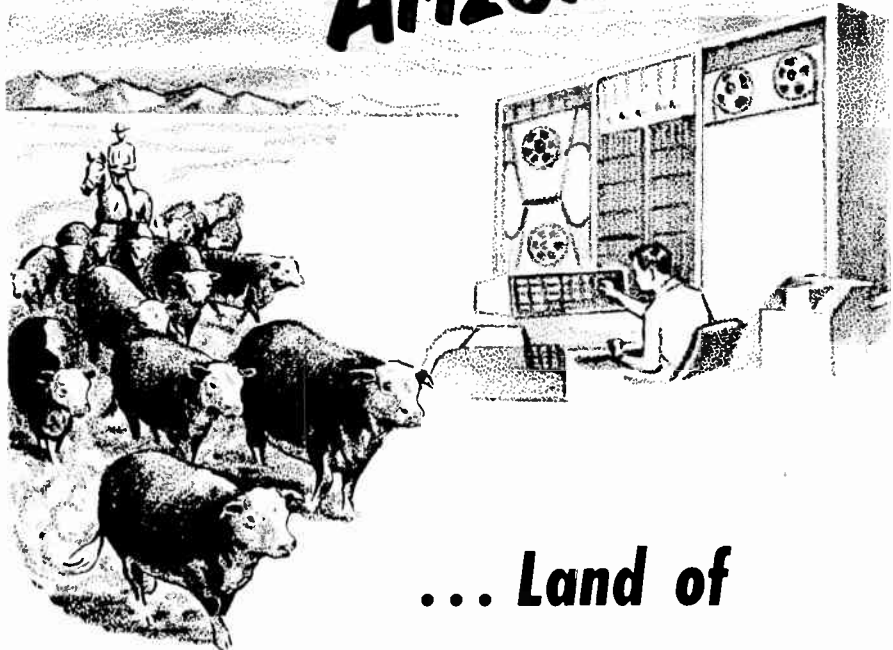
Amperex (76) announces the type 7062 twin triode with separate cathodes for computer applications. . . . Viscous-coupled inertia dampers are available from **Feedback Controls** (77) for use in stabilizing servos. . . . Temperatures from -100 to 1,000 F are available in one cabinet in a temperature chamber offered by **International Radiant** (78)

The B-50 transistorized magnetic shift register by **CK Components** (79) features low power consumption and frequency range from zero to 125 kc. . . . The type 2N384 drift transistor announced by **RCA** (80) has been designed primarily for use as an oscillator up to 250 mc. . . . Battery-operated ultrasonic thickness measuring units by **Magnaflex** (81) are said to locate areas of corrosion in tanks, pipes, ship hulls, airplane wing skins.

Jobbins Electronics (82) introduces aluminum-foil solenoids for use in focusing traveling-wave tubes and klystrons. . . . Broadband resonant absorption ferrite isolators have been developed by **Airtron** (83) for applications in microwave systems operating over the frequency range from 2,350 to 3,600 mc. . . . Servo amplifiers for driving pneumatic or hydraulic servo valves are announced by **Raymond Atchley, Inc.** (84)

A moderately priced single-unit closed-circuit tv camera with associated remote-control accessories is announced by **GPL** (85). . . . **GE** (86) announces an electronic device said to increase the life of image orthicon tubes in tv cameras by preventing burn in. . . . Inert plastic foam material is offered by **McMillan Industrial Corp.** (87) for use as a microwave absorber for

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frequencies from 40 to 35,000 mc.

Raytheon (88) announces six transistors for use in portable radios to function as oscillators, converters, i-f amplifiers, . . . Low-frequency noise generators available from Electronic Noise Generator (89) can be used to study random disturbances in fire-control systems and guided-missile systems.

TV picture tubes announced by GE (90) for military and industrial uses are said to provide much better resolution by using an extremely thin transparent phosphor layer. . . . Single-stage a-c vtvm's offered by Trio Labs (91) for military applications are said to maintain 2 percent full-scale accuracy at temperatures as high as 71 C.

New Product Makers

- 41: Dumont Labs, 750 Blomfield Ave., Clifton, N. J.
- 42: Com-Tronics, 3409 Venice Blvd., Los Angeles 19, Calif.
- 43: Bonac Labs, Salem Rd., Beverly, Mass.
- 44: Tempo Instrument, 210 Old Country Rd., Hicksville, N. Y.
- 45: Philco, 4700 Wissahickon Ave., Philadelphia 14, Pa.
- 46: Hamstead Still & Demineralizer, 2 Lanesville Terrace, Forest Hills, Boston 31, Mass.
- 47: Krautter Wehn Tool, 69-77 12 Ave., Newark 3, N. J.
- 48: Ferotron Electronics, 693 Broadway, New York 12, N. Y.
- 49: Jeunoid Electronics 23 and Chesnut St., Philadelphia 3, Pa.
- 50: Stempel Instrument, Lake George, N. Y.
- 51: L. A. Young Spring & Wire, 801 S. Main St., Burbank, Calif.
- 52: Burnell & Co., 10 Pelham Pkwy., Pelham, N. Y.
- 53: Proscope, 14-05 39 Ave., Long Island City 3, N. Y.
- 54: By-Buk Co., 4314 W. Pico Blvd., Los Angeles 19, Calif.
- 55: John Oster Mfg., 1 N. Main St., Racine, Wis.
- 56: International Rectifier, 1521 E. Grand Ave., El Segundo, Calif.
- 57: Banson Ultrasonics, 40 Brown House Rd., Stamford, Conn.
- 58: Konatott, 1378 Main Ave., Clifton, N. J.
- 59: Dynamics Instrumentation, 118 Mission St., South Pasadena, Calif.
- 60: International Resistance, 401 N. Broad St., Philadelphia 8, Pa.
- 61: Wang Labs, 37 Hurley St., Cambridge 11, Mass.
- 62: Northern Radio, 117 W. 22 St., New York 11, N. Y.
- 63: Deleo Radio, Kokomo, Ind.
- 64: Advance Industries, Cambridge, Mass.
- 65: Gulton Industries, 212 Durham Ave., Metuchen, N. J.
- 66: RCA, 30 Rockefeller Plaza, New York 20, N. Y.
- 67: Gulf Fact Engineering, P. O. Box 774, Sherman Oaks, Calif.
- 68: PCA Electronics, 16739 Schoonborn St., Sepulveda, Calif.
- 69: Sealero, 610 Fayette Ave., Mamaroneck, N. Y.
- 70: Helton, 282 Centre St., Newton 58, Mass.
- 71: Clever, 241 Crescent St., Waltham 54, Mass.
- 72: Polkin Engineering, 345 Kansas St., El Segundo, Calif.
- 73: Belock Instrument, 111 01 14 Ave., College Point, N. Y.
- 74: Universal Match, 1501 Locust St., St. Louis 3, Mo.
- 75: Federal Telephone and Radio, 100 Kin-land Rd., Clifton, N. J.
- 76: Amprex, 230 Duffy Ave., Hicksville, N. Y.
- 77: Feedback Controls, 890 Main St., Waltham 54, Mass.
- 78: International Radiant, 1 Manhasset Ave., Port Washington, N. Y.
- 79: CK Components, Watertown, Mass.
- 80: RCA, 30 Rockefeller Plaza, New York 20, N. Y.
- 81: Magadhya, 7500 W. Lawrence Ave., Chico 9 31, Ill.
- 82: Roberts Electronics, 771 Hamilton Ave., Menlo Park, Calif.
- 83: Antron, 1101 Elizabeth Ave., Linden, N. J.
- 84: Richmond Archley, Inc., 2310 Sawdell Blvd., Los Angeles 61, Calif.
- 85: GPL, Philadelphia, N. Y.
- 86: GE Technical Products, Electronics Park, Syracuse, N. Y.
- 87: McMillan Industrial Corp., Brownville Ave., Ipswich, Mass.
- 88: Raytheon, 35 Chapel St., Newton 58, Mass.
- 89: Electronic Noise Generator, P. O. Box 15311, Airport Station, Los Angeles 47, Calif.
- 90: RE Research Lab, Schenectady, N. Y.
- 91: Trio Labs, 1025 Merrick Rd., Seabrook, N. Y.

Pay-Tv Gets a Maybe Yes

FCC uses some weasel words, but manages to say yes to pay-tv. No specific toll system gets nod

"They did it! Good God, they did it! I didn't think they'd ever do it!" Thus spoke the station manager of a New York City tv station last month. The "they" he referred to were the members of the Federal Communications Commission. What they "did" was give a green light to a test of broadcast subscription television.

Without mentioning any of the five toll-tv systems devised to have the public pay for tv programs, the Commission put the issue up to the tv stations.

Present or proposed stations can now apply for permission to conduct pay-tv broadcasts for a period of three years. These stations will have the discretion as to which of the systems they'd like to employ.

"Our problem" explains FCC chairman John C.

Doerfer, "was whether and under what conditions the proponents of subscription television qualify under that provision of the (Communications) Act which commands the Commission to provide for experimental uses of frequencies and to encourage the larger and more effective use of radio in the public interest."

Though the announcement by the FCC brought immediate huzzahs from some pay-tv proponents, its wording caused some others to wonder if a step toward subscription-tv had indeed been made.

The paragraph that caused the trouble: "Applications will not be acted upon prior to March 1, 1958. This action does not constitute a commitment that any application will be granted nor does this action constitute adoption of a final order."

Commander MacDonald of Zenith, advocate of Phonevision, would not comment until the FCC had filed a detailed document on its decision for public perusal.

FCC ACTIONS

- Cracks down on vessels under the jurisdiction of the Communications Act without radiotelephone installations. FCC will fine such vessels \$500. Each day of navigation without radiotelephone constitutes a separate offense. In addition, the master of the vessel is fined \$100 for failure to enforce or comply with the Communications Act.

- Studies a switch in class B fm allocations. It may give channel 231 to Cincinnati, Ohio, after removing channel 278 from Cincinnati and assigning it to Middletown, Ohio.

- Grants RCA Communications permission to set up rates and regulations for 45 wpm printer subchannels between the United States and Switzerland.

- Amends rules governing stations on shipboard in the Maritime Services, revises specifications for suppression of spurious emissions from transmitters in the vicinity of the carrier frequency.

- Recommends to the marine industry that compact, low-power, short-range vhf apparatus be installed on the bridges of all ocean vessels to enable ships' officers to talk directly with nearby craft. The Stockholm-Andrea Doria collision is pointed out as an example of the possible results of the absence of such gear.

Commission is considering rule changes to encourage early installation of bridge-to-bridge radio telephone communications.

- Orders the New Jersey Bell Telephone Co. to keep the Commission informed annually as to latest developments in carrying out plans to replace present electro-mechanical types of dial central office equipment with electronic switching systems.

- Proposes to put in Motor Carrier, Railroad, Taxicab and Automobile Emergency Radio Service the licensing of radio speed-measuring devices operating on a developmental basis on 2,455 mc and 10,525 mc.

STATION MOVES AND PLANS

KBYE, Oklahoma City, Okla., is sold to Empire Broadcasting by State Broadcasting for \$90,000.

WITT, Lewisburg, Pa., changes antenna and transmitter location to East Buffalo Township.

KMOX-TV, St. Louis, Mo., moves transmitter location from Sappington 2.2 miles closer to St. Louis, increases antenna height from 1,050 feet to 1,100.

KCNY, San Marcos, Tex., control passes from Gonzales Broadcasting to Forest L. Whan for \$25,000.

KHIR, Hood River, Ore., control transfers to Clarence J. McCredie from C. H. Fisher for \$60,000.

WHBG, Harrisonburg, Va., is sold to Robert C. Currie, Jr., and Frederick R. Griffiths by Rockingham Radio for \$65,000.

KWRW, Guthrie, Okla., now belongs to Weldon Sledge. Sledge pays Southern Broadcasting \$27,000.

KCRS, Midland, Tex., is sold to Midland Broadcasting by Clarence,



FAST, CLEAR
COMPONENT MARKING
 with
MARKEM MACHINES



Typical marking problems solved by Markem include automatic color banding with up to six colors on wire lead components; printed circuit work on the new 90S screen process machine; base branding TV tubes in cartons and in sets; imprinting flat disc capacitors, ten foot lengths of rigid conduit, metal and glass tubes, odd-shaped automotive electrical parts.

Ask Markem to study your needs, then recommend the right machine, marking element and compound for your job. Forty-six years of marking experience are ready to help you. Write for Data Sheets.

MARKEM MARKEM MACHINE CO.
 KEENE 5, NEW HAMPSHIRE

Circle 25 Readers Service Card

"SNAPPER" GLASS RELAYS
 —for commercial applications, single-pole double throw snap action.

MAGNETIC AMPLIFIERS
 —custom-designed to fit complex requirements for control systems.

"MEMORY" RELAYS
 —thermally operated bi-stable time delay relays with two separate heater circuits.



FOR
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Specify the Curtiss-Wright "SNAPPER" Thermal Time Delay Relay

Dependable "SNAPPER" Thermal Relays by Curtiss-Wright provide unflinching *snap action* in countless electrical circuit applications involving time delay. In every control phase, "Snapper" Relays eliminate chatter, have single-pole double throw contact and a wide temperature range (-65°C + 100°C). Preset time delays from 3 seconds to 3 minutes are now available in metal envelope and from 5 to 60 seconds in glass envelope. Write for our new detailed data sheet with complete application information.

Component
 Sales
 Department



Jr., and Ruth Scharbauer for \$220,000.

KETV, Omaha, Nebr., goes on the air as an ABC Network affiliate.

WISN-TV AND WISN, Milwaukee, Wis., moves into new \$1-million communications center.

KLLL, Lubbock, Tex., leaves independent status to become a Mutual affiliate.

WTOD, Toledo, Ohio, becomes a Mutual Broadcasting System affiliate.

KIRO-TV, Seattle, Wash., becomes affiliated with CBS Television Network.

WGN, Chicago, Ill., installs new transmitter.

WAUD, Auburn, Ala., installs new transmitter.

KXLY, Spokane, Wash., installs new transmitter.

WCRW, Chicago, Ill., installs new transmitter.

WKMI, Kalamazoo, Mich., installs new transmitter as an auxiliary.

KCHA, Charles City, Iowa, control transfers from Charles J. and Martha D. Ellis, Jack W. Frye and Kenneth J. Burke to LuVerne J. Bromberg for \$20,508.

KGDN, Edmonds, Wash., has a change in its operating company's name. Garden of the King Enterprises is now King's Garden, Inc.

WMAR-TV, Baltimore, Md., installs auxiliary transmitters at main transmitter site.

WTPA, Harrisburg, Pa., changes studio and transmitter location, installs new transmitter and antenna system.

WCRV, Washington, N. J., renovates studios and installs new equipment.

WKPA, New Kensington, Pa., increases power from 250 watts to 1 kw.

WWL-TV, New Orleans, La., installs auxiliary transmitter.

KRE, Berkeley, Calif., installs new antenna.



Engineer enters variable data through keyboard . . .

Cutting Design Time

New small computers now in production are aimed primarily at design engineers. Business uses may grow, too

DESIGN chores of electronics and other engineers consume too much productive time. But with an assist from new lines of small computers now in production, engineers will be able to tackle the more challenging problems of their work.

Recently announced desk-side IBM 610 computer reduces overall programming and calculation time and provides automatic decimal point positioning. It is not a substitute for larger computers performing lengthy repetitive operations, but will aid the engineer in design problems and help in programming the \$1-million computer units. One sixtieth the size of larger computers, the 240-tube 610 leases for \$1,150 per month or can be purchased for \$55,000.

A computer console mounted on wheels, finger-controlled keyboard and specially adapted typewriter make up the new computer. A memory consisting of a 6,500-rpm magnetic drum containing 84 registers is housed within the console. Each storage register holds up to 31 digits, a plus sign and the decimal point. Intermediate or partial results, generated during calculation, as well as final answers,

may be stored on the magnetic drum.

Numeric data can be entered on punched paper tape or manually through the keyboard.

Single-key instructions for such operations as square root, combination division-multiplication [(x/y)z], division, multiplication and addition are provided. Correct positioning of the decimal point throughout all computations and in final results is assured by toggle-switch control. A two-inch crt inserted in the keyboard panel provides visual verification of keyboard instructions.

Output is automatically printed by the high-speed typewriter and headings or other identifying data can be manually added.

How to Test an Annual Report

ELECTRONICS firms who want the most for their annual report dollar might take a tip from airborne electronics equipment maker Topp Industries, Beverly Hills, Calif.

Topp will judge the effectiveness of its new-style report through a questionnaire sent each report

reader. A covering letter asks for criticism and comment.

Among the questions are

- Which parts were most interesting?
- What should be added or deleted in 1958 report?
- Is the report readable? Appearance pleasing? How does it compare with other reports?
- Did the report give sufficient information?

A covering letter explains that since the report is the chief method of reporting company results and plans, it should be made as informative as possible.

Few companies, according to Peter H. Stanton, vice-president, administration and finance, have really tried to find out how effective their reports are.

Often, he says, very large amounts of time and effort are expended in report preparation, yet the company fails to gain a favorable impression by too technical use of copy or graphs, poor layout and other faults.

French Up Sales, Exports in 1956

FRENCH electronics sales in 1956 jumped 25 percent over the previous year, and exports climbed more than 30 percent. This was reported last month by the industry's trade association, Federation Nationale des Syndicats des Industries Radioelectriques et Electroniques.

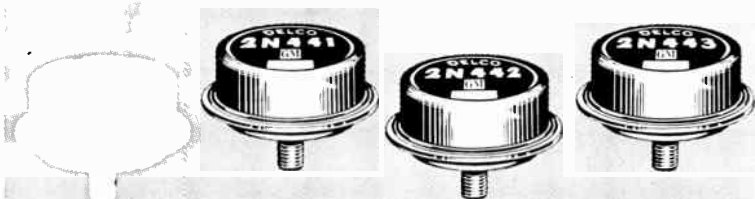
Gross sales last year were 142.4 billion francs, compared to 115 billion the year before. Greatest gains were made by radio and receiving apparatus and spare parts.

Some 12 billion francs worth of equipment was exported in 1956, compared to a little more than 9 billion the year before. Principal export markets were the U. S., Belgium, Luxembourg, Spain, Holland and Italy.

Electronics imports amounted to 9 billion francs in 1956, up from 5.75 billion in 1955. They came mainly from the U. S., West Germany, Holland and Great Britain.

DELCO HIGH POWER TRANSISTORS

Now available . . .
FOUR new types!
 New **LOWER** prices!



Typical Characteristics at 25° C

	DT100	2N441	2N442	2N443
Maximum Collector Current	13	13	13	13 amps
Collector Voltage, Emitter Open	100	40	50	60 volts
Saturation Voltage (12 amps)	0.7	0.7	0.7	0.7 volts
Power Dissipation	55	55	55	55 watts
Thermal Gradient from Junction to Mounting Base	1.2°	1.2°	1.2°	1.2° °C/watt
Nominal Base Current I _B (V _{EC} = -2 volts, I _C = -1.2 amp.)	-19	-26	-26	-26 ma
Distortion (Class A ₁ , 10 watts)	5%	5%	5%	5%

Delco Radio offers four new alloy junction germanium PNP transistors to meet an even wider range of applications. Like all of Delco Radio's High Power transistors, these are characterized by high output power, high gain and low distortion. All, too, are normalized to retain their fine performance characteristics regardless of age. Furthermore—these new types are all in volume production. Other types are available at new, lower prices. Data and application sheets and price lists are available upon request.

DELCO RADIO

Division of General Motors
 Kokomo, Indiana

West Germany Sells Style

Modernistic hi-fi console units with tape recorders and tv boost radio exports; novelties also shown

STYLING and high fidelity this year are gaining West German music consoles wide acceptance and new markets all over the world. Recently, at a radio-phonograph-tv fair in Frankfurt every major German radio manufacturer exhibited a line of music consoles.

Production of 50,000 consoles in 1955 zoomed to 411,000 last year. This year a half million units priced between \$120 and \$952 are expected, mostly around \$250.

Since 1955 the stylized consoles have given impetus to exports. Excluding car and portable radios, U.S. imports of German radios went from 46,000 units in 1955 to 108,000 in 1956.

During the first five months of 1957, the U.S. imported 71,000 units. These figures include the console units, but no breakdown is available. Half of West Germany's radio exports, including con-

soles, is to neighboring European countries.

Smallest consoles contain a radio, phonograph and a space for records. Larger ones offer various combinations of tape recorder, television set, radio and phonograph.

So popular have the high-fidelity consoles become in Germany that they are strongly influencing furniture design and household accessories. Formerly, radio designs lagged far behind modern furniture trends. Most manufacturers reversed this by hiring well-known furniture designers.

And if novelties shown at the Frankfurt fair catch on, windows of radio dealers will look even more like those of furniture shops. Lamps, tables and chairs designed with built-in high-fidelity speakers were shown.

Manufacturers offering the consoles include Siemens, Grundig, Braun, Telefunken, Deutsche Philips, Blaupunkt, Graetz and Saba.

In 1952 West German radio exports were negligible. By 1956 they amounted to 1.6 million units of all kinds. This year manufacturers see the modernistic consoles helping them to reach a new high.

DEVELOPMENTS ABROAD

• London firm Kelvin & Hughes announces a new four-instrument flight data presentation system. A two-instrument flight dynamic reference system accepts signals from a remotely located gyro unit, from radio sources and from a compass system. It computes them and presents the pilot with information on the altitude of his plane, position relative to a ground aid, and heading. The second, or aerodynamic reference system, computes pressure and temperature inputs, corrects them and presents the indicated airspeed and mach number, altitude and rate of climb.

• British Army discloses a new antitank guided missile with an accuracy said to be measured "in inches." The missile, developed in Australia and not yet in service, is guided visually onto the target with a remote piece of apparatus resembling a combination steering wheel and periscope. Details were not given.

• In London a new counter for recording automatically the pressure impulses in pneumatic and hydraulic systems for determining fatigue life has been announced by the aviation division of Dunlop Rubber Co. Typical setting on the 2 $\frac{5}{8}$ by 1 $\frac{1}{2}$ by 1 $\frac{1}{2}$ in. unit would record impulses each time system pressure drops below 500 psi or rises above 1,800 psi.

• In Britain Mullard Ltd. announces a fully transistorized rural carrier telephone system providing up to seven channels. The system, which operates from 24 or 48-volt batteries, is designed for short-haul work over open wires up to a distance of about 75 mi. Frequencies range from 7 kc to 98 kc with channel bandwidth of 2.9 kc in conformity with C.C.I.F. standards for narrow-band circuits. Double sideband techniques are used. Mullard says connection to an open-wire pair with no interference to existing circuits is extremely simple.

EXPORTS AND IMPORTS

In Britain Semiconductors Ltd., jointly owned by Philco and Plessey of England, plans a factory exclusively for transistor production by 1958 at Swindon. Semiconductors says electrochemical techniques developed by Philco will be used in producing high frequency surface barrier and microalloy types now made by Philco's Lansdale Tube division. Other transistors will also be made, including silicon alloy and germanium microalloy diffused transistors.

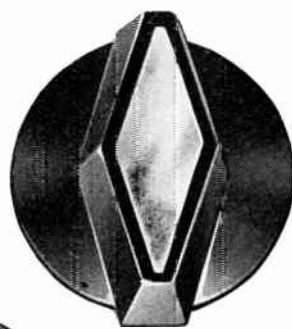
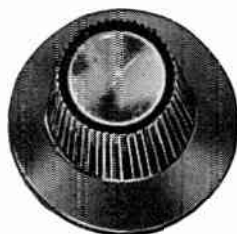
In France a group of electronics and electrochemical companies are setting up a new firm to manufacture soft ferrites. The company is called Compagnie des Ferrites Électroniques. Initial capitalization has been set at 60 million francs, with Compagnie Generale de TSE, Thomson-Houston and Ugine the chief stockholders.

Toronto's Canadian Applied Research Ltd., a member of the A. V.

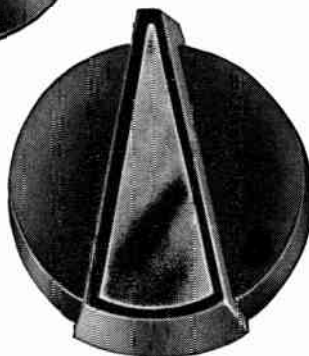
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with these

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Designed by
Robert Podall



These new knobs feature decorative metal inserts, in a choice of chrome, copper, satin brass and gold. Available in a variety of thermosetting materials, both phenolic and urea. Send for details.

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

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

Roc group, has been licensed by Transval Engineering Corp., Culver City, Calif., to produce certain airborne transistorized power supplies developed by Transval.

Canadian Department of Defense Production has awarded an \$8.3-million contract for uhf airborne transceivers to Collins Radio Co. of Canada, Ltd. Equipment is ARC-552 for air-to-air and air-to-ground communications; it provides 1,750 channels in the 225 to 400-mc range.

Export sales and distribution of Hallicrafters communication equipment are now being handled by the International Operations of Raytheon Manufacturing Co.

In Stockholm, Sweden. Aktiebolaget Elektrohalm has been appointed export sales rep for Philco's Government and Industrial division, and will launch a campaign for Philco's new medical electronic equipment.

In Australia several firms are planning transistor manufacture. The Dutch Philips interests are reported planning large facilities in South Australia. Pye is expected to use its Melbourne or Sydney plants. German interests, too, are making plans. At least three Australian firms with close ties to U.S. firms are also known to be planning transistor production under license agreements.

In Wolfsburg, West Germany, automaker Volkswagen has just put an IBM 650 computer to work speeding its accounting procedures and making payroll calculations for 1,000 workers an hour. The machine was built in the Sindelfingen factory of IBM Deutschland, a subsidiary of IBM World Trade Corp. Another 650 was recently installed in the Ghent plant of the Belgian firm Societe d'Electricite et de Mecanique.

Turkey has ordered \$2.8 million worth of Marconi equipment for Radio Ankara, which will double power to 240 kw and increase the number of studios from five to twelve.



R&D Groups Open Shop

BOLD new ventures in industrial research are springing up in the nation's electronics centers.

In New England, ten former members of MIT's dynamic analysis and control lab set up Hydrel Inc. The new independent research group aims to provide "engineering service . . . in the field of automatic control," says president Emery St. George, Jr. St. George, seated at right in the picture with American Brake Shoe v-p and research director Raymond H. Schaefer, was formerly assistant director of the MIT lab.

Most of the new firm's initial financing is provided by American Brake Shoe. Brake Shoe has a long-range diversification program that will take it into the electronic controls field. It acquired a minority interest in Hydrel's voting stock, gave the new group a fat service contract. In addition, Hydrel will cross-pollinate with Brake Shoe's big research lab in Mahwah, N. J.

Association between Hydrel and Brake Shoe grew out of a proselytizing visit by Schaefer to MIT. A chance remark by St. George and Thomas C. Searle, now Hydrel's vice president, that they and associates were figuring on going into business for themselves, caught Schaefer's ear. He missed his plane to talk to the research men, became Hydrel's patron and first customer as a result.

Across the country in Santa Barbara, Calif., Zahorski Engineering Inc. sets up shop to perform research in electronics and mechan-

ics. New firm will specialize in high- and low-temperature research for aircraft and missiles.

President and chief engineer, Adam Zahorski, was formerly with Aerophysics Development Corp.

Back in New England, a new company is formed to provide package services covering nuclear safety and hazards control. The firm is Controls for Radiation Inc., with headquarters in Cambridge, Mass. William E. Barbour Jr., founder and one time president of Tracerlab Inc., is president.

Controls for Radiation will lease and maintain instrumentation for monitoring and controlling radiation. Barbour thinks his new enterprise will meet "an urgent need" for solving radiation problems as they affect public safety, public liability, insurance and labor relations.

In Syracuse, N. Y., a nonprofit organization called Research Corporation will help Syracuse University's Research Institute in its work. The corporation grew out of a year-long study which was aimed at determining ways and means of increasing the school's research activities.

Hycon Gets New V-p's

THREE new vice presidents appear on the rolls of Hycon Manufacturing Co. and its subsidiaries.

O. H. Mackley is new v-p and general manager of Hycon Electronics, instrument-making sub-

sidary of the Pasadena, Calif., firm. Mackley has been manager of the electronics outfit since early this year.

Richard H. Perley moves up from the customer services division to become vice president and general manager of Hycon Aerial Surveys Inc. He was once manager of the photographic products division of the company, where aerial recon cameras and other photogrammetric instruments are made.

Firm's home office has a new v-p for customer relations. Matthew James Leonard slips into the job from Hughes Aircraft, where he was chief of sales and services for one of the product divisions.

Shifts at AC Spark Plug

GENERAL Motors' electronics division, AC Spark Plug, gets a couple of new managers as Warren E. Milner moves out of AC to become general manager of GM's Hyatt Bearings division.

Moving into Milner's old job as manager of AC's Milwaukee operations is Martin J. Caserio. Glen R. Fitzgerald succeeds Caserio as director of engineering and equipment sales for the division's plants in Flint, Mich. Fitzgerald was formerly chief engineer for automotive products.

Milner replaces former Hyatt general manager D. L. Boyes, now general manager of Delco-Remy division. The escalator action results from the retirement of former Delco-Remy general manager H. D. Dawson.

Daystrom Forms Controls Group

HARD on the heels of its formation of an avionics group, Daystrom Inc. comes up with a new one: a Controlonics group, lumping together two of Daystrom's divisions and part of a third.

Controlonics—the word was coined by Daystrom to describe joint functions of measurement, computation and control for industrial processes—will take over in-



he's working
for you

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

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

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

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



McGraw-Hill PUBLICATIONS

strumentation, closed-loop control systems, and other techniques of automation. The group will be an umbrella for Daystrom Systems division, La Jolla, Calif., with its big engineering facilities and Daystrom Electric, Poughkeepsie, N. Y., which specializes in the manufacture of industrial instruments, recorders and controls. Major portion of Weston Instrument will also be part of the new group. (A

piece of Weston will be working with the avionics group.)

Heading up the new operating unit will be Daystrom's marketing vice president, Thomas Allinson. Allinson is a relative newcomer to Daystrom, having left Beckman Instruments earlier this year. He will be responsible for all activities of the group, in addition will keep the responsibility for overall sales planning for the firm.



Lewis Imm Wins Navy Medal

NAVY'S Distinguished Public Service Medal, highest individual civilian award granted by the Navy, goes to Lewis W. Imm, president of Librascope Inc. The award was presented by Rear Admiral Grover B. H. Hall, at right in the picture with Imm.

Citation accompanying the award lauds Imm's "outstanding contributions in the fields of naval ordnance engineering and fire-control techniques." Librascope's special contributions in these areas have been based on the modular principle: gear is made up of small subsystems put together in such a way that one device has several uses. Librascope digital computers are currently used in shipboard fire control systems and bombing and navigation systems.

Pioneer Imm's computer-making California firm, now a subsidiary of General Precision Equipment Corp., was founded in 1937 to produce mechanical-linkage computers

for finding the pre-takeoff optimum center of gravity for planes. Started with only three employees, Librascope has now grown to 1,500.

Northrop Sets up Electronics Division

In Beverly Hills, Calif., Northrop Aircraft creates a division to handle the company's growing activity in design and manufacture of elec-

BUSINESS MEETINGS

Oct. 24-25: Computer Applications Symposium, sponsored by Armour Research Foundation, Hotel Morrison, Chicago.

Oct. 25-26: National Management Association, Penn-Sheraton Hotel, Pittsburgh, Pa.

tronic products and components. New operating unit, called the Nortronics division, collects Northrop's work in electronic and electromechanical technology under a central management.

General manager of the new division is William F. Ballhaus, newly elected a v-p of the aircraft firm. Ballhaus was formerly chief engineer of the company's Northrop division in Hawthorne, Calif.

Nortronics is the fourth division set up by Northrop in its general organizational realignment. Others are the Northrop division, where manned aircraft and guided missiles are developed and manufactured; Radioplane division in Van Nuys, producers of target drones, and Northrop International, overseas marketing arm of the corporation.

KinTel Grows

PLANT facilities of KinTel division of Cohu Electronics have been expanded to the tune of some \$250,000. Management and engineering staffs of the San Diego, Calif., instrumentmaker are now settling into the new headquarters building.

Space vacated in KinTel's manufacturing plant will make room for growing production lines, reports president LaMotte Cohu.

Cohu also hired John A. Hewlett away from Fairchild Camera & Instrument Corp., made him treasurer of the corporation, San Diego lawyer Thomas M. Hamilton becomes secretary and vice-president of the firm.

M-H Moves to Fall River

MINNEAPOLIS-Honeywell is moving into a new \$300,000 plant in Fall River, Mass. Plant was built by the Greater Fall River Development Corp., a nonprofit organization attempting to diversify the industrial base of the New England city, which was once a major textile center. M-H leases the plant from the civic group.

The Fall River plant is M-H's third in Massachusetts, will be a manufacturing unit for the industrial division. Employment in the 37,400-sq ft, one-story building

will ultimately total 200. Plant will be used for manufacture of a new line of industrial electronic controls and recording instruments, according to industrial division president Henry Dever.

General superintendent at Fall River is George W. Hoffmeister, who moves up from the firm's Brown Instruments division in Philadelphia to take charge.

Plant Briefs

LURED by Yankton, S. D., Industrial Corp., which offered complete plant facilities and paid moving expenses, Sioux Radio Products leaves Sioux City, Iowa, and moves to the South Dakota town into a new 6,000-sq ft plant built, at no cost, to Sioux specifications.

New Hampshire Ball Bearings moves into a new \$2-million plant in Peterborough, N. H., which triples work area. Firm is already thinking of adding another wing.

Technicraft Laboratories, Thomaston, Conn., plans a new building to double present manufacturing facilities, buys a 10-acre plot in Costa Mesa, Calif.

Oscar Fisher Co. moves from Peekskill, N. Y. into larger manufacturing quarters in nearby Newburgh, N. Y.

Executive Moves

Physicist Victor B. Corey moves up to take charge of Donner Scientific's marketing program, retains control over firm's technical program.

Electronic Products Corp., Santa Barbara, Calif. moves Harold V. Scollin up to job of vice president and secretary.

At Fairchild Camera & Instrument Corp., Charles J. O'Donnell moves up to become general manager of reconnaissance systems division.

Union Carbide moves Paul V. Malloy up as operations v-p for its Keenet Co., producer of metals for getters and grid wires.

SEARCHLIGHT SECTION

(Classified Advertising)

"OPPORTUNITIES"

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The advertising rate is \$21.75 per inch for all advertising except Employment.

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\$2.10 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

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Experienced Lawyer with some engineering training seeks position with opportunity to assist in growth of the business end of young, aggressive Bay Area industry. PW-5881, Electronics, 68 Post St., San Francisco, Calif.

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QUICK TRIGGER ACTION
SAXL TENSION METER
TENSITRON, Inc., Harvard, Mass.



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Worth 6 3100

Reps Take On Television

GROWING market for closed-circuit television systems is reflected by new rep appointments to handle tv gear.

Blonder-Tongue has two new representatives for its closed-circuit tv products. Southampton, Va., rep Eugene L. Park covers jobber and industrial sales in Virginia, while William F. Hemminger, Miami, will serve Florida except for Pensacola and Panama City.

Columbia Broadcasting's International division is new overseas rep for the tv transmitter gear manufactured by Radio Engineering Laboratories. REL is a subsidiary of Dynamics Corp. of America.

Tv studio and test gear made by Tel Instrument Electronics Corp. is now sold in the West by Joseph F. Sodaro, Culver City, Calif.

Workman Tv appoints Baltimore's Eberle-Schaar Co. as representative in the mid-Atlantic territory.

Dallas rep Jack Morgan becomes national sales agency for the closed-circuit cameras of Electron Corporation.

Phileo's ce-tv and paging systems

get two more area reps. Edward Electric Co., Chicago, handles Illinois; Television Systems Inc., Minneapolis, will serve Minnesota.

Midwest Sales, Cleveland, O., takes on the intercom and other audio products of Mark Simpson Mfg. Co. for Ohio, West Virginia and western Pennsylvania. Larry Zafina, Detroit, will service the line in Michigan.

West Photocircuits appoints three new reps in the West and Southwest. M. F. Klicpera, Houston, Tex., will cover Texas and the delta states. Bray & Carter, Los Angeles, serves southern California, Arizona and part of Nevada, while G. B. Ellis Sales, Atherton, Calif., handles northern parts of California and Nevada.

Power supplies and amplifiers of Magnetic Research Corp. are now merchandised in Arizona, New Mexico, Utah and Colorado by Gene French, Albuquerque, N. M.

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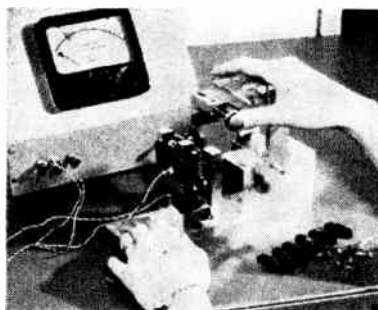
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In Our Oct. 1 Engineering Edition, Don't Miss . . .

• **Double standard.** L. N. Merson of Phileo Corporation shows how a compact transistor preamplifier unit boosts the video line level to permit use of a standard black-and-white or color receiver as a studio line monitor. Unit may also be used as video-line boost or distribution-line isolation amplifier.

• **Atmospheric interference.** A probability computer for noise measurement is discussed by A. W. Sullivan of the University of Florida and J. D. Wells of Westinghouse. Designed to study the amplitude distribution of atmospheric noise and its effect on telegraph, frequency-shift radioteletype and a-m speech, the computer takes the noise signal from the receiver i-f and feeds it to a half-wave detector coupled to an overdriven d-c amplifier that produces a constant-amplitude pulse each time a reference threshold is exceeded by the noise input.



Compliance meter uses phonograph cartridge under test as a frequency-determining component

• **Cartridge compliance.** A simple system for measuring compliance of phonograph cartridges by using a mass and a cartridge as the frequency-determining components of an oscillator circuit has been developed. According to A. R. Kopp of Electr-Voice the meter system, suitable for production or laboratory use, gives compliance readings directly from 0.5×10^3 to 6×10^6 cm per dyne.

• **Transistor testing.** A. B. Jacobsen and C. G. Tinsley of Motorola describe test equipment used in transistor production. Separate parametric and application test units are used for production-line testing of several thousand power transistors a day. Parameter measurement results are indicated by go-no go indicator and also by conventional meter. An application test measures power gain and distribution. Use of semiconductor components in circuitry assures dependable operation.

• **Ultrasonic iron.** Removal of oxide layers on metal by an ultrasonic iron tip, driven at 20 kc by a piezoelectric transducer energized by a Hartley oscillator and two stages of amplification is explained by T. J. Scarpa of Gulton Industries. The sonic field abrades the surface of the metal while molten solder forms an alloy bond before further oxidation can take place.

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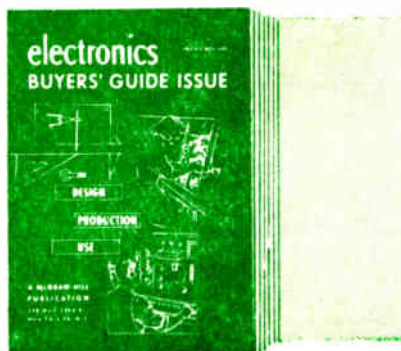
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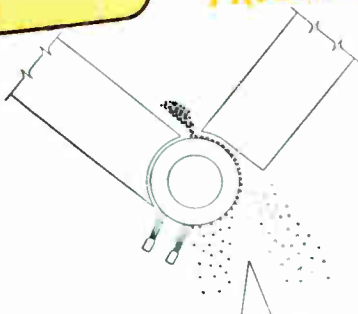
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World Radio History

from the Variac[®] Case Book

PROBLEM:



To achieve accurate and reliable means for the control of the magnetic field and rotor speed of a mineral separator system.

The system: A heterogeneous mixture of minerals is hopper-fed onto a magnetized rotor. The magnetic material adheres to the rotor and is brushed off into a bin. The non-magnetic portion does not adhere and falls through the system into another bin.

The controls for this system must be capable of regulating the magnetic field and/or the rotor speed so that materials of varying magnetic behavior are readily separated. The controls must operate efficiently and give clean separation at high feed rates even for materials with very low magnetic susceptibilities.

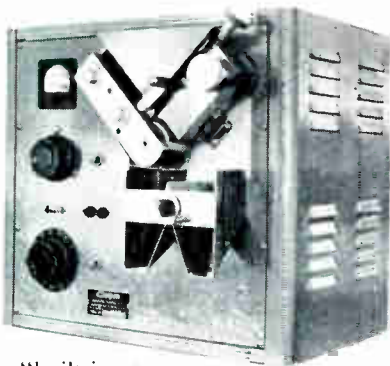


SOLUTION:

Two Type W5 Variac auto-transformers are now used in the separator. One is used to control the magnetic flux, the other is used as the rotor speed control. Their smooth, stepless control and good voltage regulation assure positive adjustment. Rugged Variac construction (will withstand MIL-T-945A shock and vibration tests) insures long life and consistent, dependable service. A silver-plated brush track (Duratrak) gives the Variac additional "life insurance."

Variacs can be easily designed into equipment. They can be panel, behind-panel, wall, or table mounted. Square-cut bases of drawn aluminum alloy give Variacs added strength and mounting convenience.

RESULT:



Carpeo Manufacturing, Inc. of Jacksonville, Florida, uses Variacs in their laboratory model magnetic separator. Designed for mineralogical assay and research work on small samples, it may also be used for production control and development. This separator is another example of how the Variac's "built-in-reliability" aids manufacturers in designing equipment for long, trouble-free service.

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may be ganged for additional capacity
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New horizons in the design of mass-produced equipment operating well into the VHF band are now practical with the commercial availability of RCA p-n-p "Drift" transistors. These transistors offer many excellent features to equipment designers. Some of these features are: low base resistance, low feedback capacitance, high alpha-cutoff frequency, controlled input and output impedances, and controlled power gain characteristics to insure unit-to-unit interchangeability. Design benefits are: high input-circuit efficiency, excellent high-frequency operating stability, good signal-to-noise ratio, good automatic-gain-control capabilities, and wide range of input signal levels. Additional features include high power dissipation and rugged mechanical construction.

For superior-quality semiconductor devices, your best choice is always RCA. For sales information on these and other RCA TRANSISTORS, contact the RCA field Office nearest you. For technical data on specific RCA "Drift" transistor types, write RCA Commercial Engineering, Section J-19-NN-2, Somerville, N. J.

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