

ELECTRONIC TECHNICIAN

article
Index
1955-57

Including 16 pages of
Circuit Digests



Special HIGH-FIDELITY REPORT
ELECTRONIC TECHNICIAN tuner tests
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January • 1958

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ELECTRONIC TECHNICIAN

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AUDIO

January, 1958

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FRONT COVER ELECTRONIC TECHNICIAN technical editor Bob Cornell gets ready to run one of series of tests on hi-fi FM tuners. Tests were conducted to check Consumers Union rating of tuners. Enlightening results are included in report starting on page 32.

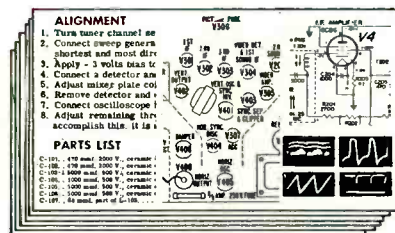
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CIRCUIT DIGESTS



Sylvania TV Damper Tubes

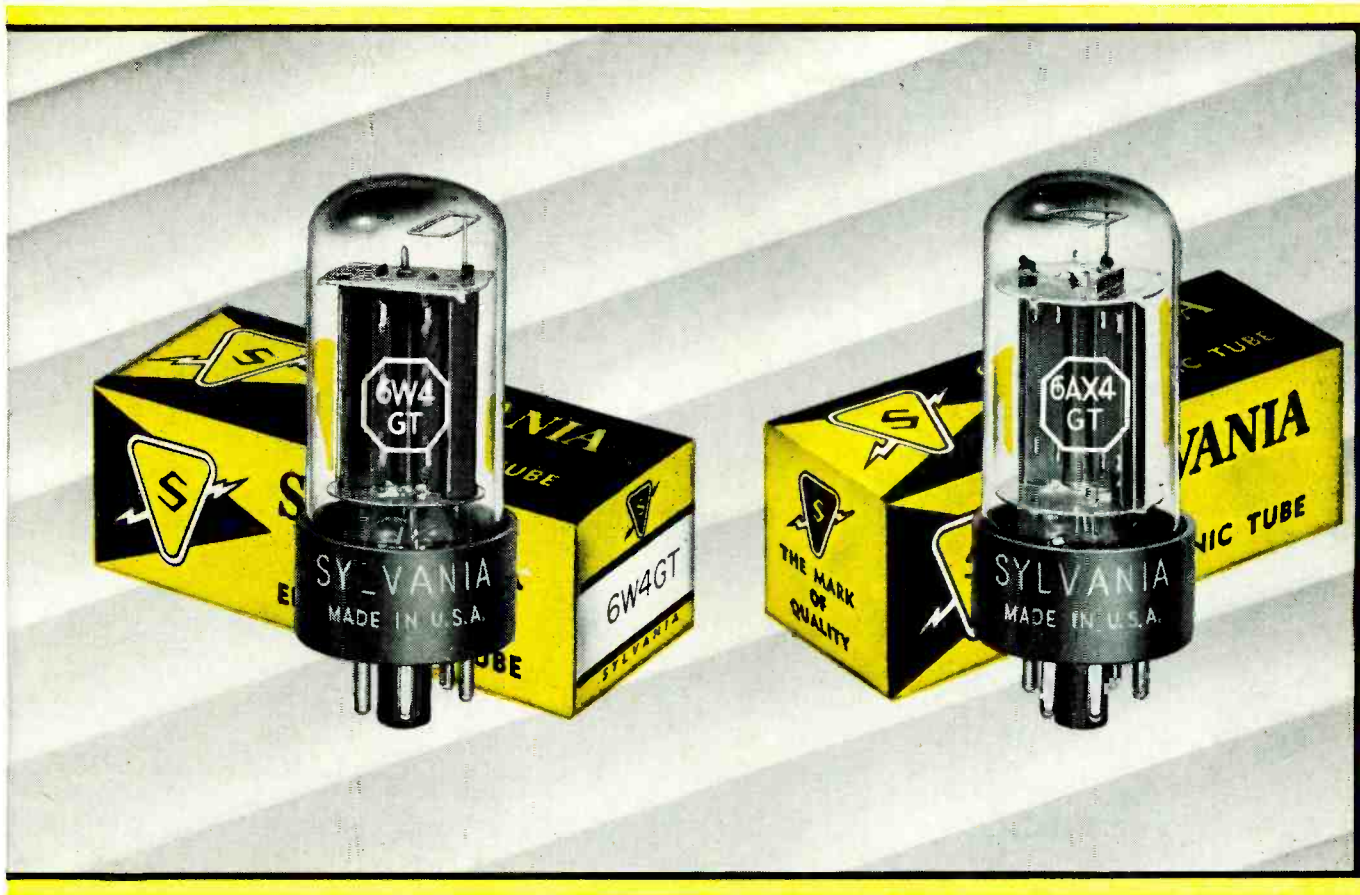


...New design plus



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...er types pass this dynamic
...lying colors. Dynamic tests
...ve now been instituted by
...l important types in every

critical TV function. It's Sylvania's way
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new dynamic tests produce high E.L.A.*

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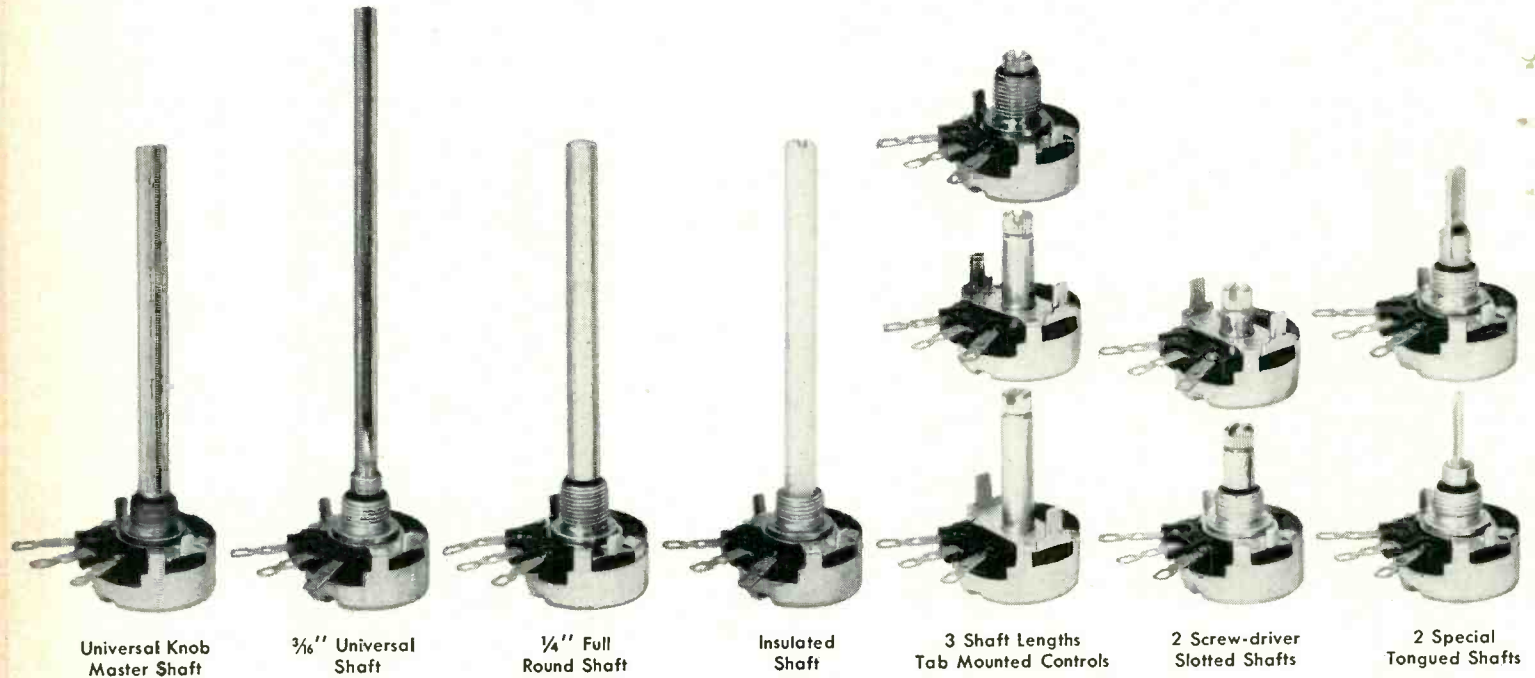
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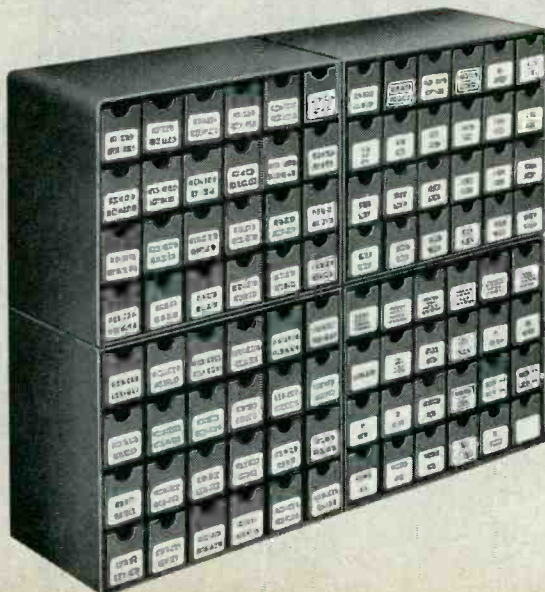


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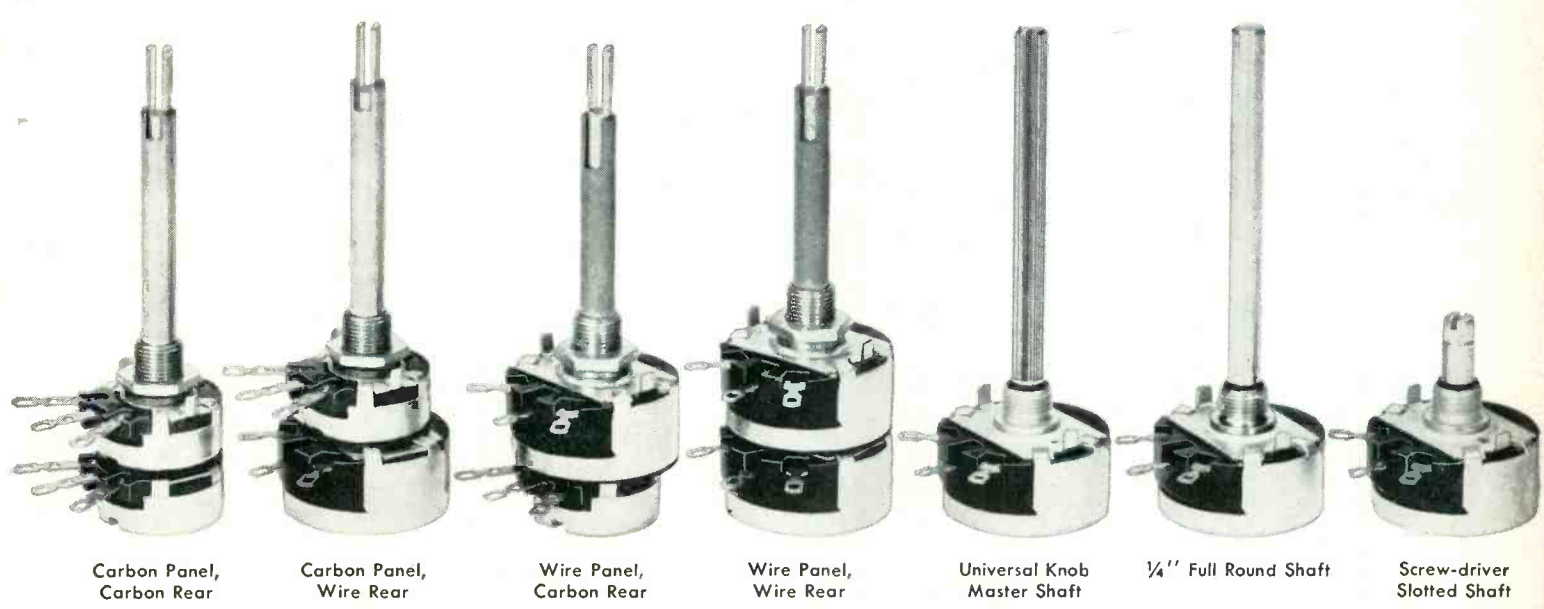
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Editor's Memo

Now, at the start of the New Year, is the usual time people look ahead for the coming 12 months. Other pages of the magazine may peer into the crystal ball for technical and business prospects. However, in this column we'll reflect upon some of the eternal—and possibly offbeat—truths which may guide us until 1959 rolls around.

Thinking of some of the gems of wisdom of our times, the first to come to mind is that Honesty Is the Best Policy. Another way of looking at it is that folks who stretch the truth usually find it snaps back. Yes, laying it right on the line for your customers is a fine way to build good will for the long run. There are fewer frustrations and tensions too.

A good many of the customers whom technicians deal with are women. Many of them are ladies. Here we can reflect upon the everlasting Battle of the Sexes. Patience is the password with the distaff side. Did you ever wonder why there aren't more successful women in business? Of course, household obligations are a factor. But some say that women can't be as successful as men because the gals have no wives to advise them.

Quoting proverbs is not conclusive, as we all know. One fellow says Look Before Your Leap; another admonishes you to Strike While the Iron Is Hot. There's hardly a technician who hasn't kicked himself for buying some test instrument or shop accessory before finding out the different types and brands on the market. On the other hand, who doesn't wish he had spent that \$40 for a whoozis tester while he still had the money? It would have paid for itself by now.

All Work and No Play Makes Jack. One sage claims that successful service operators are those who make hay whether the sun shines or not. Yep, hard work never killed anyone, but as one fun-loving character says: Why take the chance?

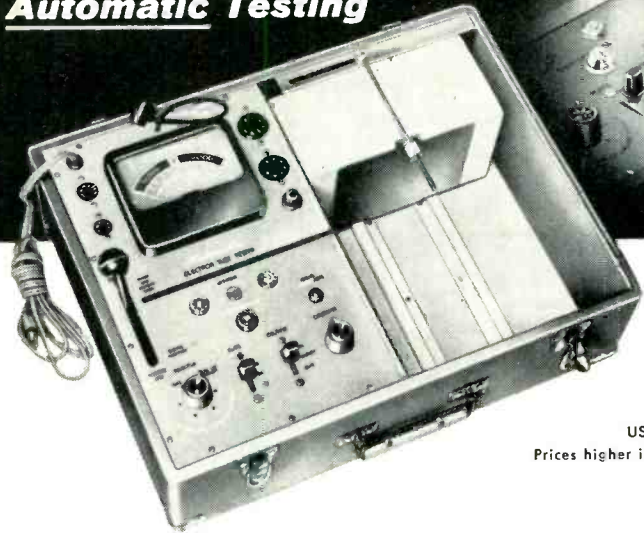
Money Talks. That's one we've heard since we were knee high. Unfortunately, today's dollar doesn't have the cents to say very much.

And it may be that I've said more than enough. Best wishes to you and yours for a successful 1958.

Al Forman

The new RCA WT-110A AUTOMATIC ELECTRON TUBE TESTER

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- test card provided for checking instrument.
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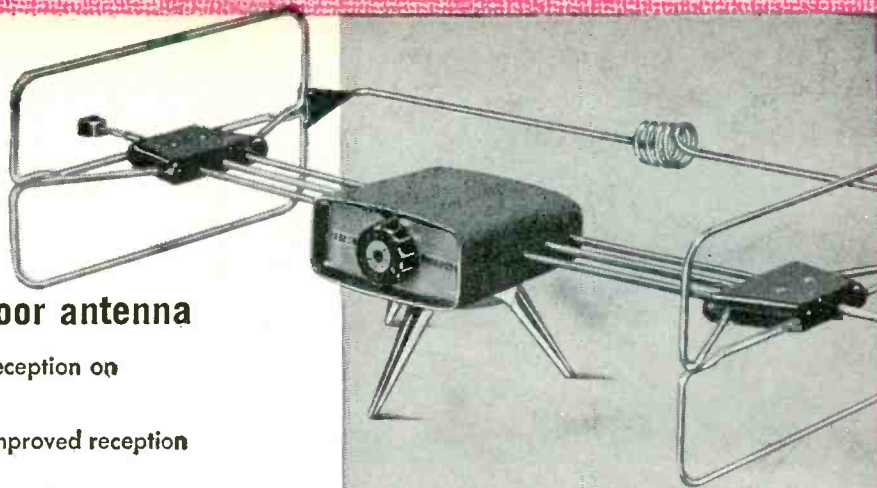


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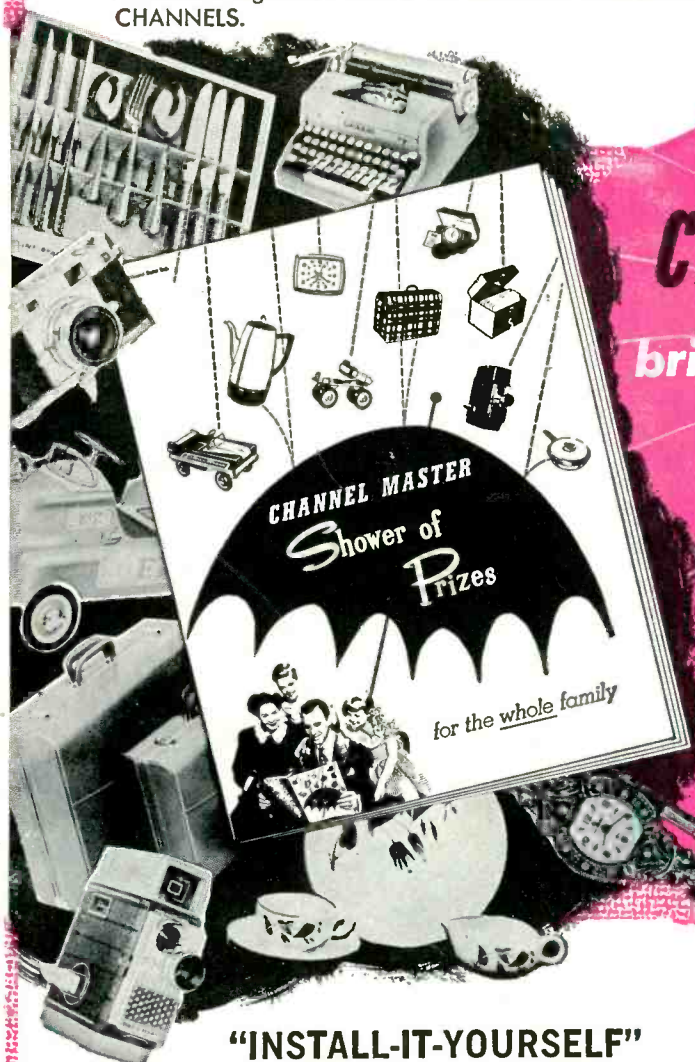
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Pick from more than 135 FREE premiums ... featuring America's best known name brands.

Your Channel Master Distributor has your FREE 16-page catalog. Call him now.

"INSTALL-IT-YOURSELF"
T-W ANTENNA KIT
 An entirely new type of City and Suburban antenna

- Powerful 2-element T-W antenna outperforms a stacked conical.
- Fully Super-Sembled — elements pop out in seconds.

A Complete Antenna Installation in Attractive 3-Color Carton — to help you crack the BIG-PROFIT "Do-It-Yourself" market.

Promotionally Priced at **\$29⁹⁵** list



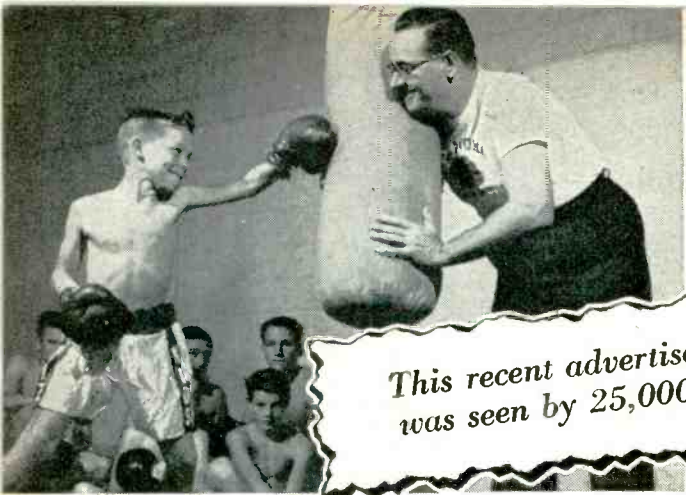
Including: 2-element T-W, combination aluminum mast and tripod mount, wire, and hardware.



CHANNEL MASTER CORP.

ELLENVILLE, N. Y.

copyright 1957 Channel Master Corp.



This recent advertisement in **LIFE** was seen by 25,000,000 people...

GOOD SPORTSMANSHIP is developed by Marcus E. Denham at Whitaker State Orphans' Home, Pryor, Oklahoma, where he assists in recreational activities. He is also prominent in many local community service groups. His work is typical of the many public service contributions of TV technicians everywhere.

BOY SCOUT WORK and assistance to Charlotte, Michigan, youth groups make Bart Rypstra, Jr., another "All-American". He is a member of the Charlotte city council, active in civil defense communications, and belongs to many community service clubs. When time permits, Bart devotes his technical talents to servicing sound equipment, movie projectors and record players at city schools.



JUDGES SELECTED 13 WINNERS to receive this trophy, \$500 for use in community improvement, and luncheon with Under Secretary of Commerce Walter Williams at Washington, D.C.

"ALL-AMERICAN" TV TECHNICIANS WIN GENERAL ELECTRIC AWARDS FOR PUBLIC SERVICE

AMERICANS everywhere responded to General Electric's invitation to nominate candidates for "All-American" Awards, honoring television technicians who have distinguished themselves in public service.

The winners, whose pictures appear on these pages, were selected by a panel of judges composed of *Wendell Barnes*, Administrator, Small Business Administration; *Wendell Ford*, 1956-57 President, United States Junior Chamber of Commerce; *Herman Hickman*, Sports Authority; and *Ed Sullivan*, Columnist and TV Personality.

General Electric has established these awards as another step in its program to recognize the public service contributions made by independent businessmen everywhere.

The accomplishments of these television technicians should serve as an inspiration to all Americans. *General Electric Company, Receiving Tube Department, Owensboro, Kentucky.*

Progress Is Our Most Important Product

GENERAL  ELECTRIC

11-11-101



VOLUNTEER FIREMAN and Instructor John R. O'Brien, Evanston, Wyoming, teaches first aid at neighboring fire companies and schools. He is active in communications during civic emergencies, and lends and installs sound equipment for town functions. Many community service groups benefit from his time and skills.



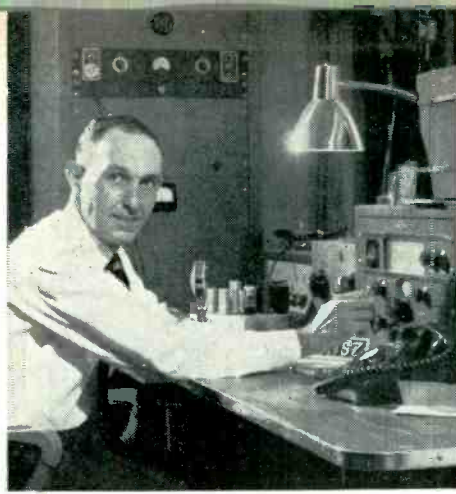
MANY WERE SAVED by Scott Witcher, Jr., during Lampasas, Texas, disaster. Here he shows height of water in raging flood which swept his area. Scott saved lives and helped restore communications to the community. He is active in the National Guard, in civic and youth organizations.



TV FOR THE SICK is provided by Billy Joe Jenkins of Paducah, Texas. By installing antenna cable and servicing sets without charge, Billy Joe has made it possible for patients in Richards Memorial Hospital to enjoy TV. He helps community improvement drives, teaches electronics to Boy Scouts.



GIRLS' DRILL TEAM at St. Joseph's Parish is supported by Remo De Nicola, Quincy, Mass., as one of his many community services. He also gives free television service to a school for retarded children and is always ready to lend sound equipment for charitable affairs.



CIVIL DEFENSE LEADER Richard G. Wells, Jr., Pikeville, Ky., installed television cables from a community antenna to Pikeville College, high school, fire department, Scout building and Methodist Hospital. He is working to give the high school a closed-circuit TV system.



FIVE PUBLIC SERVICE CITATIONS plus a civilian Navy award were given Frank J. Hatler, Roselle, N. J., for his communications work in community emergencies. As local civil defense head, Frank organized communications networks, helped many to get radio licenses.



BLIND CAN SKATE because Philip G. Rehkopf, Jr., Louisville, Kentucky, installed a record player and placed loud speakers around the walls of the gymnasium at the Kentucky Home for the Blind. He developed an electronic device to give scores to blind basketball fans, and tape records text books for blind students.



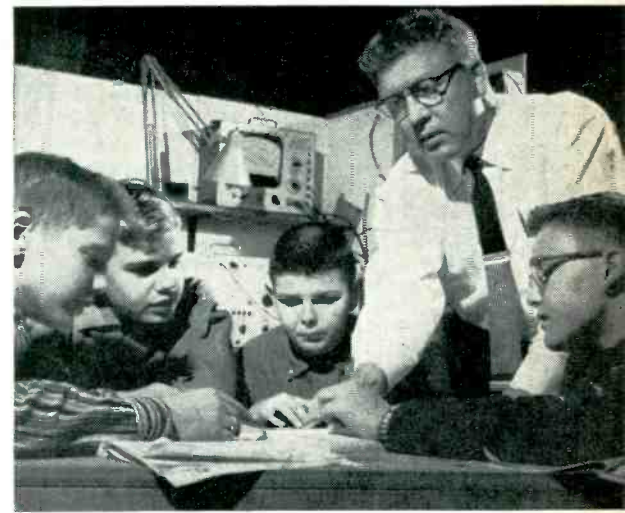
WHEEL CHAIR is no handicap for Mortimer Libowitz of Brooklyn, New York. Though disabled all of his life, Morty has devoted his time to helping others in his community. With a crew of student volunteers, he maintains the radio station at Thomas Jefferson High School, Brooklyn. He also services a Red Cross radio station and is active in civil defense communications. Morty has trained many youths in radio, developing some into amateur operators and skilled television technicians.



ELECTRONICS LABORATORY at Long Beach City College, California, was established with help from Harry E. Ward. Harry serves as chairman of the Business and Technology Advisory Committee and for fifteen years has devoted his time to finding work for students, graduates and others.



STUDENT BENEFACTOR Philip T. Di Pace, of Albany, N. Y., contributes used radio and television chassis and parts to Siena College students who are interested in electronics. Phil now heads a project to finance an athletic field and playground for 75 neighborhood children.



BASIC ELECTRONICS is taught to neighborhood boys by John H. Stefanski, Pontiac, Michigan. He has organized a scientific library for the boys and is now planning a new Pontiac Boy's Club. John has served as chairman of the Business Ethics Board of the Pontiac area Chamber of Commerce. Television sets in the Oakland County Sanatorium are serviced without charge through his efforts.

\$500

worth
of test
equipment
for only

\$69⁹⁵



the versatile Model 97

AEROVOX LC-CHECKER

Truly the ONE piece of service equipment that is most capable of answering all your needs. The all-new Model 97 LC-Checker represents the ultimate in versatility and adaptability in a test instrument. Redesigned and engineered according to the very latest in design theories, the LC-Checker incorporates the newest techniques in printed-circuitry for the most effective instrumentation available to service technicians today.

Use the Model 97 LC-Checker as...
RF Signal Generator... FM-TV Signal Generator... UHF Calibrator...
Frequency Meter... Capacitance Tester.

Just imagine, the LC-Checker can do the work of all these instruments which if purchased individually would cost approximately \$500.00. Yet, the all-new LC-Checker costs you just... **\$69.95**

Write for name of nearest Distributor.

AEROVOX CORPORATION

DISTRIBUTOR DIVISION

NEW BEDFORD, MASS.

LETTERS

To the Editor

Our Time Magazine Letter

Editor, ELECTRONIC TECHNICIAN:

Thank you for giving us technicians the shot in the arm we needed after reading *Time* magazine's comments on the service man. I am grateful for your letter (Nov. 1957, p. 45) to them. I hope in the near future we can show *Time* how unjust they were.

MELVIN FINEBURG

Fine Radio-Television
Los Angeles, Calif.

... Your stand on the side of the independent electronic service technician has the gratitude of ARTSNY.

MARTY BOXER
President

Associated Radio-TV Servicemen
of New York
Brooklyn, N.Y.

... Your refutation to *Time* was excellent, right, and right-from-the-shoulder. On behalf of the RCA Electron Tube Div., thank you for speaking out clearly and promptly.

G. G. GRIFFIN
Manager, Merchandising Coordination

RCA Electron Tube Div.
Harrison, N.J.

... Thank you very kindly for standing behind us by countering such rot.

MARK T. FINCH
Finch Radio & Television Co.
Lima, Ohio

Canada Calling

Editor, ELECTRONIC TECHNICIAN:

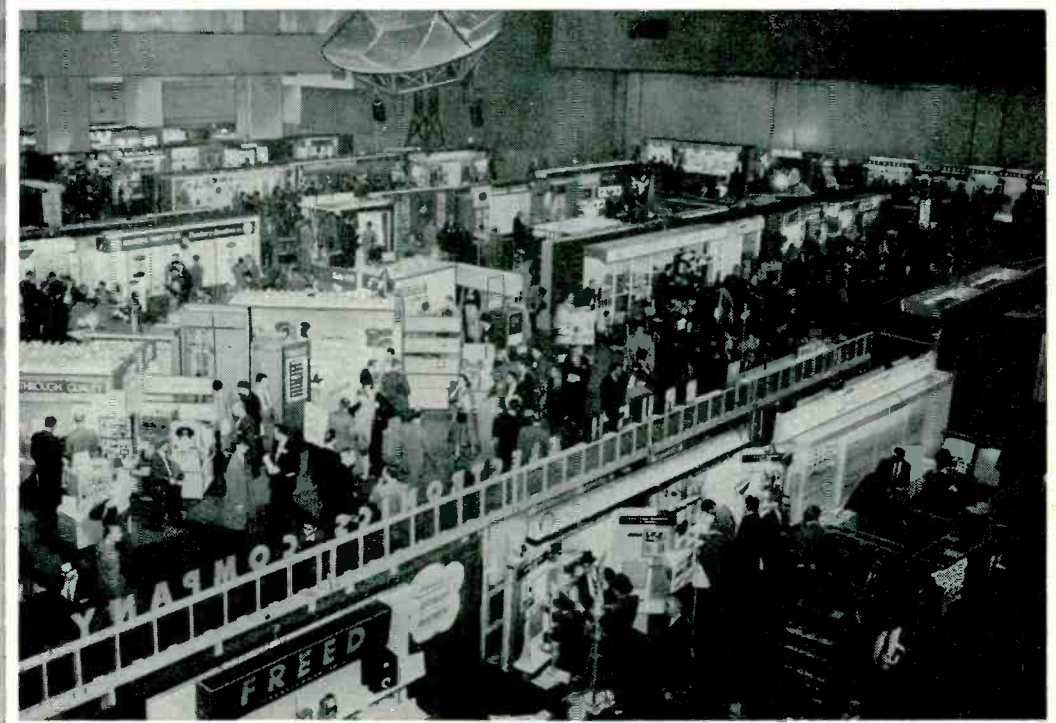
As an ELECTRONIC TECHNICIAN subscriber of some years standing, I feel the time is overdue for me to ask that *Circuit Digests* be made to cover Canadian circuits. Where the manufacturer is a Canadian subsidiary of a U.S. manufacturer, the circuits can be cross-referenced. How about it?

H. ALEXANDER
Victoria, B.C. Canada

• Roger! Last month we had *Sparton of Canada, Ltd.* This month it's *Canadian General Electric Co., Ltd.* However, the important point is that many Canadian sets have essentially the same circuits and chassis designations as U.S. units. For example, the *RCA Victor Co., Ltd.*, (Montreal) issues circuits equivalent to the U.S. RCA.—Ed.

(Continued on page 16)

No Grass Grows Here!



The 1958 IRE Convention and Show will be the source of new ideas for more than 50,000 radio engineers. Be sure you are there.

MARCH 24-27

THE IRE NATIONAL CONVENTION

Waldorf-Astoria Hotel
and The Radio Engineering Show
Coliseum
New York City

PRODUCTION
INSTRUMENTS
AND COMPONENTS
COMPONENT
PARTS
SYSTEMS

REGISTRATION: IRE Members \$1.00
Non-members \$3.00



THE INSTITUTE OF RADIO ENGINEERS 1 East 79th Street, New York 21, N.Y.

OUT OF CONSIDERATION FOR SERVICEMEN WE USE

NO PRINTED CIRCUITRY

in our television chassis. Every servicing dealer knows that printed circuitry in a television chassis often leads to costly servicing and may also cause service delays. At Zenith we use *no* printed circuitry in our TV chassis, even though Dr. Alexander Ellett—the daddy of printed circuitry through his work with the U. S. Office of Scientific

Research and Development—is head of our Research Department, and although Zenith was among the first to use printed circuitry in the proximity fuse. Zenith's handcrafted standard circuitry in television means greater operating dependability and fewer service headaches.

**YES, IT COSTS US MORE TO DO IT THIS WAY,
WITH HANDCRAFTED STANDARD CIRCUITRY, BUT
IT MEANS MORE SATISFIED CUSTOMERS FOR ZENITH DEALERS**

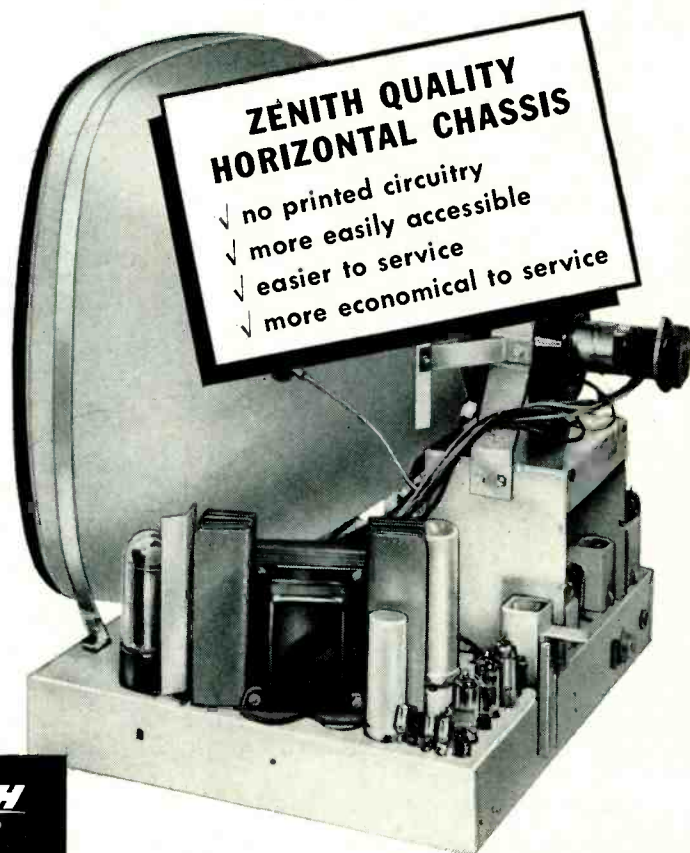
EASIER TO SERVICE . . . MORE ACCESSIBLE

HORIZONTAL CHASSIS

There are no screwball construction arrangements in Zenith's famed Horizontal Chassis that has established a reputation as the finest performing chassis in the industry—either in the fringes or

close in. Zenith's Horizontal Chassis is more accessible and easier to service when servicing is required—another big advantage to servicemen and customers alike.

**WE THINK IT'S WORTH THE
EXTRA COST AND EXTRA CARE
OF HANDCRAFTED STANDARD
CIRCUITRY TO GET THE BEST
PERFORMANCE AND LEAST SERVICE
HEADACHES AND SO DO
THOUSANDS OF DEALERS WHO WOULD
SOONER SELL CUSTOMER SATISFACTION
THAN A PRICE TAG!**



ZENITH RADIO CORPORATION
CHICAGO 39, ILLINOIS



Here's one reason why

ZENITH TV

OUTPERFORMS THEM

ALL... MEANS LESS

SERVICE HEADACHES



QUALITY BY

Zenith

the Royalty of Television

Backed by 38 years of leadership in radionics exclusively. Also makers of Radio, High Fidelity Instruments and fine Hearing Aids.

The quality goes in before the Zenith name goes on.

Orchids

Editor, ELECTRONIC TECHNICIAN:
Congratulations on publishing one of the finest technical magazines. We receive ET at the shop, but I still won't be without my own personal copy.
ROBERT M. SAMODELL
Cleveland, Ohio

Cut Raters

Editor, ELECTRONIC TECHNICIAN:
Enclosed is a circular advertising "tubes 70% off list . . . free technical advice." It was placed in a customer's mailbox. Where do these geniuses come to convey technical information to the layman? Who can listen to a customer's complaint and give full details on the trouble?

FRANK SANTORE &
VINCENT SHARKY

Frank's Radio & TV Repair
Brooklyn, N.Y.

Unhappy Statistics

Editor, ELECTRONIC TECHNICIAN:
Incomplete data frequently gives inaccurate conclusions. Hence your article on the personal life of the technician, Nov. 1957, can only have academic interest. Thinking technicians will be disinclined to accept your statistics without clarification. You state the replies, 86% of them shop owners, showed the 1956 income to be \$5600 (average income, \$7377.) By comparison a female secretary can earn as much. If your figures are accurate, the picture is far from promising.

G. WARREN HEATH

Brooklyn, N.Y.

• Though technician earnings are well above the national average, we too believe they are not yet high enough. Most promising point is that 1957 median income is up \$400, average up \$522, over 1956.—Ed.

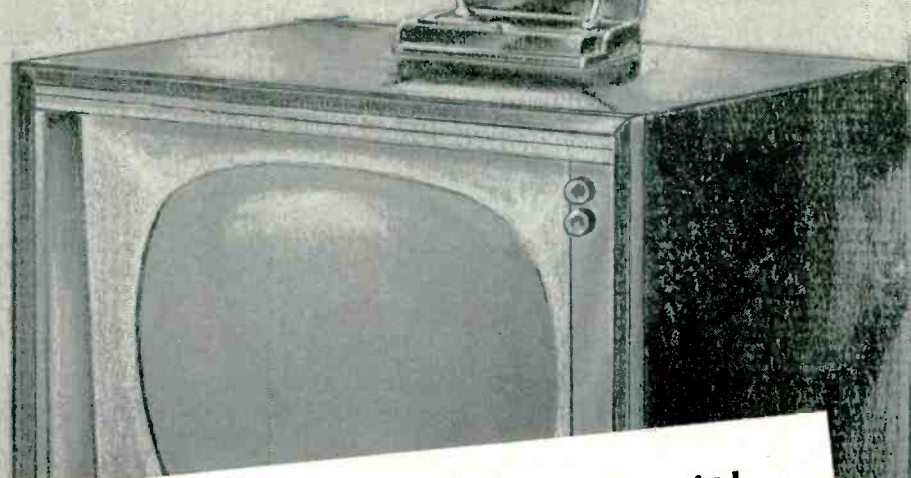
Tear Problem

Editor, ELECTRONIC TECHNICIAN:
I installed a new picture tube, fly-back and several new tubes in a Crosley 466A TV receiver. A tear has developed on the right side, involving at times one to three triangular tears that pull across the picture. Capacitor C83, 1300 μ f, was replaced, as was C80, 220 μ f, in the horizontal circuit, but the pulling is still present. Can you help me?

D. FRANK KING

Rochelle, Ill.

• Manufacturer's schematic for this chassis (see Circuit Digest 199, June 1955) does not show capacitors below number C141. However, we suggest you check for video information past the sync clipper, and for hum. Sync compression could cause this trouble. Check the area switch and local area control for proper setting. A scope check at the sync amplifier output will tell you if your trouble is before or after this point.—Ed.



INDOOR TV ANTENNA with true VIDEO FIDELITY

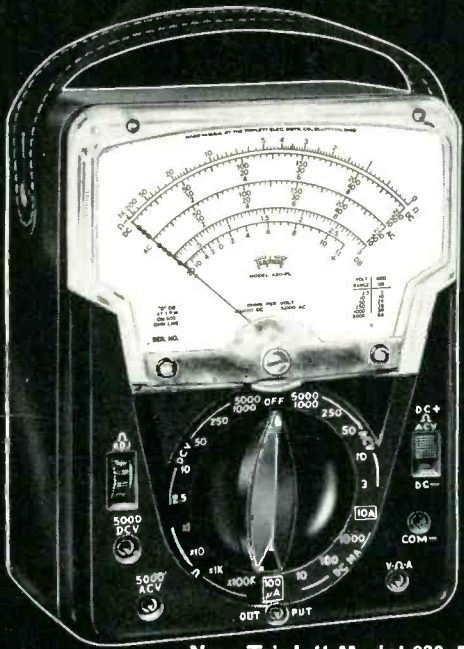
Antennas can't be tested in ads—only on the TV set! If you don't already stock Vi-Fi, order now and try it. Find out why we named it Vi-Fi—see by the picture quality on your set that "video fidelity" is not a catch phrase but a true description of this antenna's amazing performance.

BIG EXTRA SELLING FEATURE—SLENDER LINE STYLING. Ask the women! Performance is important, of course, but "how will it look at home?" Vi-Fi's trim shape is the answer—here is an antenna that's truly beautiful, with

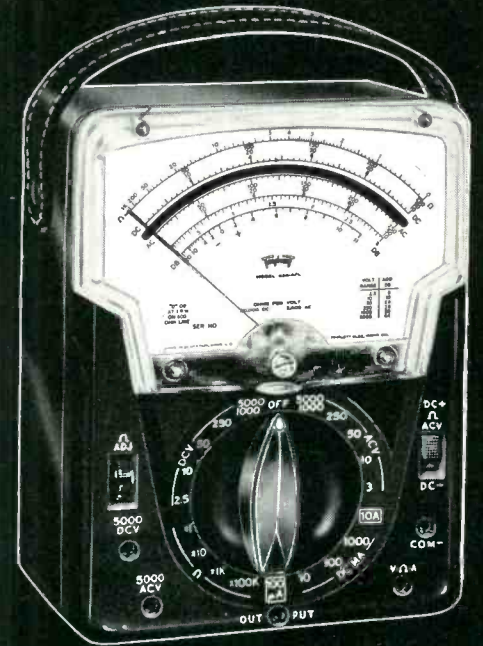
new
SLENDERLINE STYLING



the mighty nine plus two!



New Triplet Model 630-PL



New Triplet Model 630-APL

TWO NEW VOLT-OHM-MILLIAMMETERS

Now the Triplet Mighty Nine Has Expanded to A Line of 11 VOMs Tailored to Meet Your Preference, Purse or Purpose. Only Triplet Offers So Complete A Variety.

With the new 630-PL and 630-APL you get these important new features:

- Voltage scales for those who want ranges reading by 10's (2.5-10-50-250-1000-5000).
- Instant-vision, wider spread scales; streamlined case, handsome modern design.

- D.C. Polarity Reversing Switch.
- 5 to 500,000 Cycles per second frequency response in A.C. measurements.
- 5000 ohms per volt sensitivity in A.C. ranges; 20,000 ohms per volt D.C.

Both new testers — with the popular continued Models 630 and 630-A—offer these proved Triplet advantages:

- One switch will select any range; minimizes chance of incorrect settings and burnouts.

- Reads from .1 ohm (4.4 ohm center scale) to 100 megohms; four ranges.
- Molded circuit panel for instant component replacement.
- Models 630-APL and 630-A feature 1/2% resistors for greater accuracy; long mirrored scales to eliminate parallax in reading.
- Banana-type leads for low contact resistance at jacks.

how do you want it?

X 3s or X 10s

Triplet Models 630 and 630-A read volts 0-3-12-60-300-1200-6000; or Triplet New Models 630-PL and 630-APL reading 2.5-10-50-250-1000-5000.

Choose your preference in range reading.

MODEL 630-PL... Dealer Net \$44.50

MODEL 630-APL... Dealer Net \$54.50

MODEL 630..... Dealer Net \$44.50

MODEL 630-A.... Dealer Net \$54.50

Only Triplet offers 11 VOM's — a line complete enough to give you exactly what you want.

TRIPLET

Triplet Electrical Instrument Co.
Bluffton, Ohio

53 Years of Experience



Triplet Model 630



Burton Browne Advertising

Triplet Model 630-A



630



630-A



630-PL



630-APL



630-NA



630-T



631



310



666-HH



625-NA



666-R

GUIDE AUTRONIC-EYE[®]

TRAINING COURSES

MEAN MORE

BUSINESS FOR YOU!



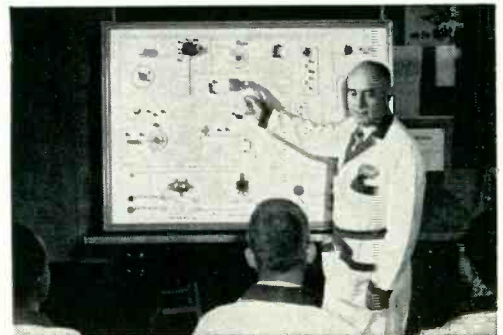
Courses for experienced service technicians provide latest repair information—enable you to do the job faster and more efficiently.

Quick, accurate circuit diagnosis and repair to factory specifications boosts your profits. That's why so many qualified auto technicians attend these Guide training courses at no cost other than transportation and living expenses.

The Guide Lamp diploma, awarded only to those who successfully complete the course, is proof that you're equipped to give more and better service to more people—and that means business.

If you're an auto radio service dealer, come yourself, or send your technicians. There's one of 30 GM Training Centers near you. Apply through your local United Motors Service Division Distributor or write

GUIDE LAMP DIVISION • GENERAL MOTORS CORP. • ANDERSON, INDIANA



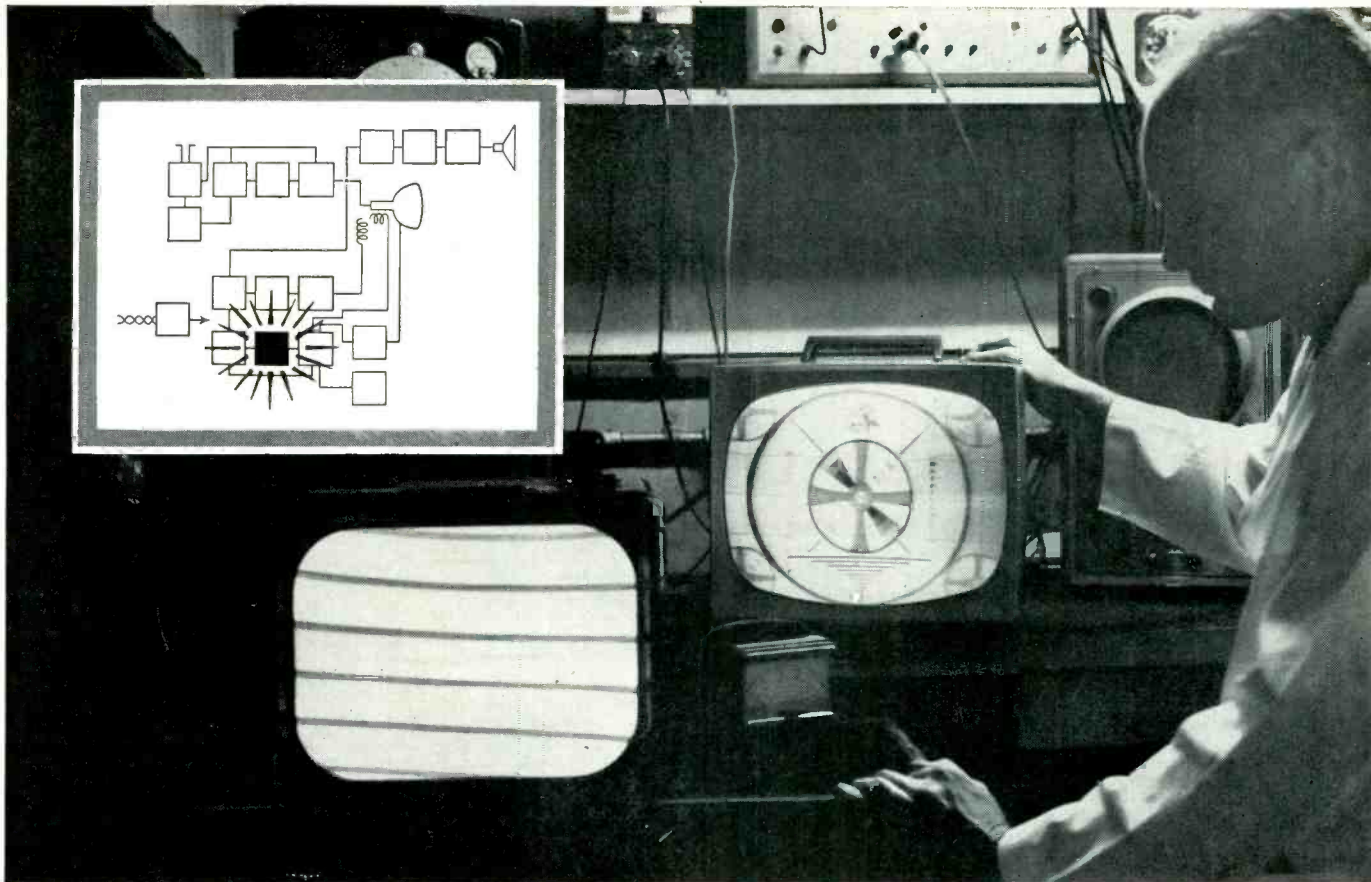
Jumbo-size operational panel of Guide's Autronic-Eye Circuit puts all parts out front for better, more efficient instruction.



Thirty modern GM Training Centers offer newest equipment and latest service techniques. There's one nearby . . . no matter where you live.



BLINKY MEANS BUSINESS!



Here General Electric Application Engineer C. L. Taylor shows what can happen when an old-style horizontal-oscillator tube is used in two different TV sets. Image at left is completely

out of sync. To avoid this hazard, the cut-off and other electrical characteristics of General Electric tubes are held within limits that bring satisfactory operation in all television circuits.

Built-in high quality of G-E horizontal-oscillator tubes means fewer TV-servicing call-backs!

Call-back demands from television owners are cut when you install General Electric horizontal-oscillator tubes.

For example: tube microphonics in multivibrator circuits can cause eccentric sync, especially when a set such as a portable is moved or shaken. With G.E.'s 7AU7 and 12AU7, extra-heavy micas, the tight fit of grid side rods, plate, and cathode, and sturdy over-all construction result in minimum microphonics and a steady television picture.

Also, uniform tube-to-tube cut-off characteristics—achieved by care in grid manufacture and rigid testing—enable you to install General Electric types in any receiver knowing that minimum adjustment will be needed for superior picture performance.

Blocking-oscillator circuits require that a tube

throughout its life be able to produce peak plate currents 10 to 15 times higher than average. In the 6CG7 and 6SN7-GTB, General Electric scores with a specially processed high-emission, long-life cathode. Peak current capabilities remain high; sync drift is avoided.

For every set, for every socket, G-E receiving tubes mean greater assurance of owner satisfaction . . . and your G-E tube distributor makes prompt delivery. Phone him today! *Distributor Sales, Electronic Components Division, General Electric Co., Owensboro, Ky.*

Progress Is Our Most Important Product

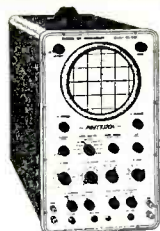
GENERAL  ELECTRIC

161-1A9

7 ways to solve your Color and Monochrome TV Servicing Problems...

PRECISION
TEST INSTRUMENTS
are designed with
your future in mind...

Your future is **PRECISION's** future.
This is why **PRECISION** makes only
the instruments you really need
... makes all the instruments
you really need.



for Color and
Monochrome TV

Model
ES-550

HIGH-SENSITIVITY, WIDE-BAND
5" OSCILLOSCOPE

- 5 Mc bandwidth with 10 mv per inch vertical sensitivity
- Built-in P-P voltage calibrator

Net Price: \$235.00



for Color and
Monochrome TV

Model E-420 DOT & BAR GENERATOR

- Provides white dot, cross hatch, vertical and horizontal bar patterns
- Both direct video and RF outputs

Net Price: \$150.00



for Color TV

Model E-440 COLOR BAR GENERATOR

- Provides all required test signals for adjustment of color TV circuitry, including phasing and matrix networks

Net Price: \$235.00



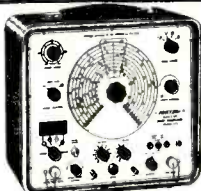
for Color and
Monochrome TV

Model E-200C

SIGNAL-MARKING GENERATOR

- Direct frequency reading
- 1% accuracy on all bands
- Built-in AGC override bias supply

Net Price: \$95.00



for Color and
Monochrome TV

Model E-400

SWEEP SIGNAL GENERATOR

- Direct freq. reading from 3 to 900 Mc
- Wide and narrow-band sweep circuits

Net Price: \$160.00



for Color and
Monochrome TV

Model 220 MARKER-ADDER

- Greatly increases the accuracy and speed of front-end and IF alignment of color and monochrome TV, and FM

Net Price: \$52.50



for Color and
Monochrome TV

Model 98 MCP WIDE RANGE VTVM

- 55 ranges, 9 functions—including P-P voltage ranges up to 3200 volts
- Extra-high sensitivity—22.2 megs/volt at 1.2v DC

Net Price: \$119.50

PRECISION ... designed for tomorrow
... available today!

Available and on display at all leading electronic parts distributors.
Write for new descriptive catalog—it's packed with useful information!

PRECISION Apparatus Company, Inc.
70-31 84th Street, Glendale 27, L. I., N. Y.

Export: 458 Broadway, New York 13, N.Y., U.S.A. • Cables: MORHANEX
Canada: Atlas Radio Corp. Ltd. • 50 Wingold Ave. • Toronto 10, Ont.



News of the Industry

TUNG-SOL ELECTRIC, INC. announces the appointment of **JOHN M. MALONE**, electronic equipment sales manager, to the post of assistant general sales manager.

PHILCO CORP. announces the most important transistor price break in its history. Silicon transistor prices have been reduced as much as 60 percent.

RAYTHEON MANUFACTURING CO. has opened a new electronic laboratory at Santa Barbara, Calif. In addition to fulfilling the needs of government agencies, this new laboratory will service the aircraft and missile industries.

GENERAL TRANSISTOR CORP. reports that they will start production of germanium and silicon computed diodes and silicon rectifiers early this year, and expects to be turning out diffused base transistors in the near future. The firm has acquired its fourth plant on Long Island, New York.

WESTINGHOUSE ELECTRONIC TUBE DIVISION reports that **DR. HILARY MOSS** has joined the advanced development section of that division. Dr. Moss is a native of England and a member of the British Institutions of Electrical Engineers and Radio Engineers. The firm also announces the establishment of a microwave tube center at Ithaca, N. Y., to be headed by **E. C. OKRESS**.

GENERAL ELECTRIC CO. announces the retirement, from GE, of **Dr. W. R. G. BAKER**, one of the world's leading pioneers in electronics. A vice president of GE since 1941, Dr. Baker left the Company on his 65th birthday under the provisions of its pension plan. Simultaneously, Chancellor **William P. Tolley** of Syracuse University announced that Dr. Baker had been appointed Vice President for Research at the University.

SPRAGUE ELECTRIC CO., in an expansion move on the Pacific Coast, will shortly begin construction of a new plant at Visalia, Calif. The new plant will house all manufacturing facilities presently located at Venice, a Los Angeles suburb, thus bring the firm's manufacturing facilities to a mid-way point between Los Angeles and San Francisco. Headquarters of the firm's Pacific Division will remain at the Venice location.

(Continued on page 22)



**.1 MF GMV
500 WVDC
5HK-P1**

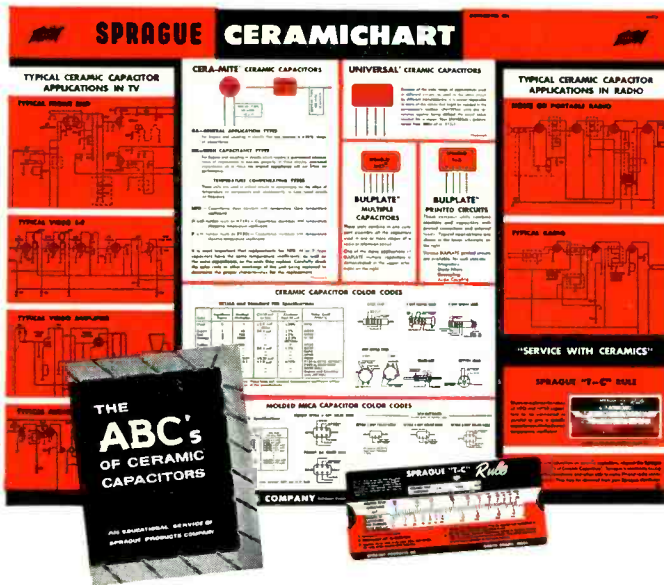
**... versatile CERA-MITE* CERAMIC CAPACITORS
with handy identification tags**

Sprague's complete ceramic capacitor line is now individually tagged for quick, *complete* identification—capacitance, tolerance, voltage, and type. No fumbling, no guessing about ratings ... you're always sure with Sprague *tagged* disc capacitors. Use them all the time. You'll find that they also make excellent replacements for molded mica, ceramic tubular, and paper tubular capacitors in many applications

Stock up today! Ask your distributor about Sprague CERAMIKITS ... they contain the ceramic disc capacitors you need most ... they keep them in order ... ready to use.

*Trademark

**... helpful INFORMATION on what, when, and how
of ceramic capacitors**



Sprague offers you plenty of service information ... the kind you need and use everyday:

Sprague CERAMICHART: illustrates various types of ceramic capacitors and shows where to use them; details color codes.—FREE

Sprague "ABC's of Ceramic Capacitors": a compact booklet containing basic facts on all types of ceramic capacitors.—FREE

Sprague "T-C" Slide Rule: shows at a glance the values of the N750 and NP0 type ceramic capacitors to connect in parallel to equal a capacitor of desired intermediate temperature coefficient of the required capacitance; available from your distributor for only 15c.

Be sure you get this useful and valuable information from your Sprague distributor, today! Or write Sprague Products Co., Distributors' Division of Sprague Electric Company, 65 Marshall Street, North Adams, Mass.

Pioneer in ceramic capacitors ... First in ceramic capacitor information

don't be vague ... insist on

SPRAGUE®

world's largest capacitor manufacturer

SPRAGUE RESEARCH IS CONSTANTLY PRODUCING NEW AND BETTER CAPACITORS FOR YOU

(News, continued from page 20)

RADIO CORP. OF AMERICA states that 138 radio, TV and electronics students were graduated by RCA Institutes.

FOTO-VIDEO LABORATORIES reports the acquisition of a new plant in Cedar Grove, N. J. as part of a general expansion program.

WHITE'S RADIO LOG, a directory of AM, FM, TV and short-wave broadcasting stations, has been acquired by Science and Mechanics Publishing Co., a subsidiary of The Curtis Publishing Co.

BRACH MANUFACTURING CORP. distributor sales manager DAN ROSENMAN states that jobbers and dealers he visited in the west are optimistic about the business outlook, and that the seminars promoting "Speedmount" Auto Antennas were effective.

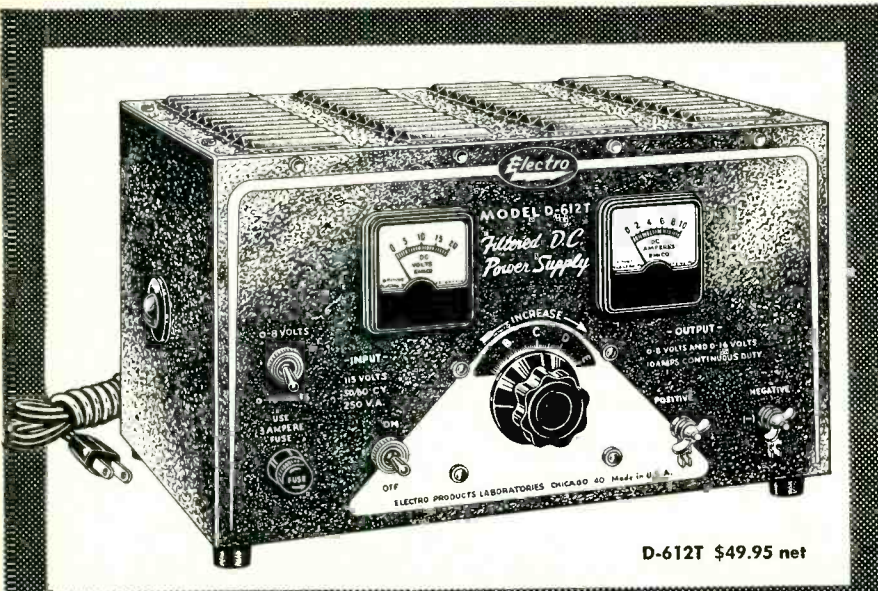
WESTON ELECTRICAL INSTRUMENT CORP. has announced the following appointments: EMIL NICHOLS, manager of test equipment sales, A. R. WALTHERS, manager of tachometer sales, PAUL M. HEILMAN, distributor sales manager.

AMERICAN TELEVISION & RADIO CO. has announced the ATR Certified Independent TV Plan and states that their entire sales effort, in connection with TV Receiver Sales, will be made through Independent TV Technicians. ATR states that their new plan does not require any financial investment nor volume quotas on the part of technicians; and that there are no strings attached, no franchise fees and no stock to buy.

CBS-HYTRON, a Division of Columbia Broadcasting System, Inc., reports the separation of the firm's activities into two separate operations. Heading the two new subdivisions will be ROBERT G. MARCHISIO, vice president and general manager of semiconductor operations, and MICHAEL CALLAHAN, vice president and general manager of receiving tube operations.

ALLEN B. DU MONT LABORATORIES reports the organization of their Research and Development Division into eight specialized laboratories under centralized control and direction. Also, newly appointed regional sales managers for the company's two-way radio communications operation have been announced. RONDAL L. MILLER for the southern region, and HOWARD LARSEN for the midwest. 34 states are now covered by regional sales managers for this operation.

(Continued on page 24)



D-612T \$49.95 net

why buy more when ONE Electro Power Supply operates ALL...

Transistor auto radios
Transistor portable radios
Tube vibrator auto radios

Hybrid tube auto radios
Aircraft radios
Marine radios

1/10-1/2% AC Ripple
Two Variable DC Ranges 0-8 and 0-16 volts

The D-612T is specifically engineered to service newly designed radios and electronic equipment in addition to operating older standard equipment. Why buy power supplies that will be outmoded in one year when you can buy one D-612T that not only does the work of several today but will handle equipment of tomorrow? Use coupon below to cash in on these new fields to make more money. Save time, trouble and bench space with the D-612T . . . pays for itself over and over.

- 10 amperes continuous duty up to 12 volts • Up to 21 volts for transistor portable radio loads • Patented EPL conduction cooling lowers cost per ampere output and lengthens life of unit.

At better Parts Jobbers everywhere

✓ CHECK AND MAIL COUPON FOR ALL THE FACTS



Everything for
DC Servicing

- H 6/12 v. 20/10 amps.
- EFB 0-32 v. at 4 amps.
- NFB 0-32 v. at 15 amps.
- GFA 0-125 v. at 10 amps.

ELECTRO PRODUCTS LABORATORIES

4501-T Ravenswood, Chicago 40, Ill.
Canada • Atlas Radio Ltd., Toronto

Send bulletin(s) on model(s) checked

D-612T, 0-12 v. at 10 amps.

Send name of nearest jobber

Name _____

Firm _____

Address _____

City _____ Zone _____ State _____



Mr. Service Dealer

PHILCO ROTORS

outperform all others

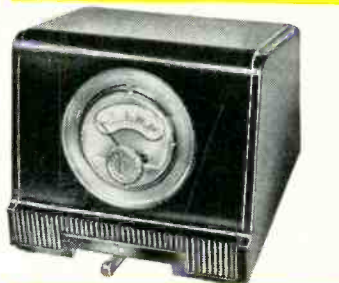
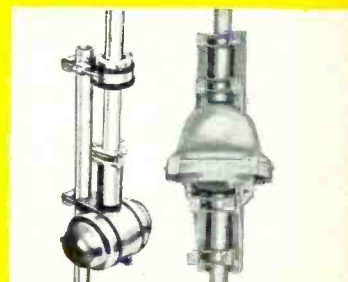
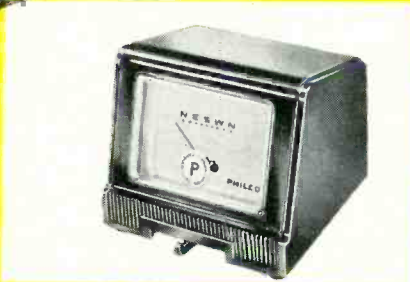


Philco brings you a complete line of quality rotors with a wide range of models designed and engineered to give superior performance. Field and laboratory tests conducted under the most exacting conditions give you complete assurance that a Philco rotor will deliver the greatest performance for your customers.

BRAND NEW FROM PHILCO—MODEL P15

Handsome control in high-impact, break-resistant cabinet with blond or mahogany finish. Instant locking will not drift. Rocker bar gives true finger-tip operation. Easy-to-read dial face. New "zero adjust" permits fast, accurate adjustment after installation.

- Heavy duty cast aluminum housing on rotor.
- Water-proof and rust-proof with tight weather seal.
- High strength . . . low weight.
- Completely assembled . . . installs in a jiffy.



P4A CONTROL—Heavy duty rotor. Accurate direction control with manually operated motor switch and indicator meter. Plastic cabinet of modern design.



P11	P4A
AP1	AP22
ROTOR	ROTOR

◀ **P11 CONTROL**—Manually operated rotor easily handles two bays. Designed for years of dependable service. Rotor fits masts up to 1 1/8" in diameter.

◀ **AP22 CONTROL**—Heavy duty, long-life rotor with automatic control unit providing dependable and fool-proof operation. Also available as AP1.

FOR FURTHER INFORMATION ON THE COMPLETE PHILCO LINE OF QUALITY ROTORS, SEE YOUR PHILCO DISTRIBUTOR OR MAIL THE COUPON BELOW.



WORLD'S LARGEST DISTRIBUTOR OF
 Service Parts • Power Packed Batteries • Universal Components • Long Life Tubes • Heavy Duty Rotors • Star Bright 20/20 Picture Tubes • Long Distance Antennas • Universal Parts and Accessories



Philco Corporation
 Accessory Division
 Attention: Carl Areschoug
 Philadelphia 34, Penna.

I would like more information on genuine Philco Rotors.

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

(News, continued from page 22)

GENERAL ELECTRIC CO. has announced the appointment of **CHRISTIAN J. GOODMAN JR.** to the newly created position of product sales manager in the semiconductor products department. **ARLING WOOLAVER** replaces **MR. GOODMAN** as district sales manager for New Jersey and eastern Pennsylvania.

PHILCO CORP. reports the following promotion: **WILLIAM J. NAGY** to general sales manager of the firm's accessory division from advertising and sales promotion manager of the same division. Also, **ROBERT J. THEIS**, Allegheny regional manager, has been appointed to the new post of merchandising manager for the TV Division.

Reps & Distributors

MOORE RADIO SUPPLY INC., Denver, Colo. Distributor announces opening of a new store at 234 S. Kalamath St., Denver 24, which gives the firm 5,000 square feet of new sales floor and an equal amount of free parking.

LAWRENCE C. FREEMAN announces that he has established an independent sales and manufacturer's representative organization. The firm's offices are at 24 Stephen St., Montclair, N. J. and it will specialize in precision electronic components and instruments. Mr. Freeman resigned as sales engineer at Allen B. Du Mont Laboratories Inc. to undertake the new endeavor.

TOBE DEUTSCHMANN CORP. announces the appointment of the following representatives: **V. AVIS MCCORVEY CO.,** Decatur, Ga., for Tenn., Ala., Miss., Ga., Fla., S. Car. and N. Car.; **JEROME H. KLEKER CO.,** Glen Ellyn, Ill., for Ill., Mo., Kans., and most of Wisc.; **MARVIN H. KIRKEBY,** Minneapolis, Minn., for Minn., Iowa, N. Dak., S. Dak., Western Wisc., and most of Nebr.; **JACK YOUNT CO.,** Dallas, Texas, for Okla., Ark., La., and all of Texas except El Paso County.

TUNG-SOL ELECTRIC INC., reports that **WOMACK RADIO SUPPLY CO. INC.** Danville, Va., sponsored a recent symposium at Winston-Salem, N. Car., at which local service dealers were addressed by **PAUL H. WENDEL**, nationally known authority on radio-TV service management. This was one of a number of meetings in the area at which Mr. Wendel talked on dealer co-operation, customer relations and related subjects.



Simpson COLOR BAR GENERATOR MODEL 430

PROVIDES TRUE 100% SATURATED NTSC SIGNAL—Here's the new color bar generator you've heard so much about. It's literally packed with features to save you time, to do more jobs, to operate simply. And what's more, Model 430 will service any color-TV receiver—past, present, or future. You'll find it to be the finest, most complete instrument of its type.

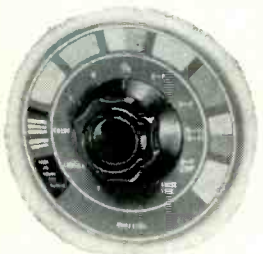
IMPORTANT SPECIFICATIONS

Exceptional Range of Outputs—Y; chroma; color bar (8 bars simultaneously—color phase accuracy, $\pm 5^\circ$); R-Y; B-Y; R-Y and B-Y simultaneously; I; Q; I and Q simultaneously; G-Y at 90° (demodulator color phase accuracy, $\pm 3^\circ$); sync and burst; horizontal sync; high level 3.58 megacycle output; high level modulated RF output; positive or negative video output. 4.5 Megacycle (crystal controlled) marker for proper tuning.

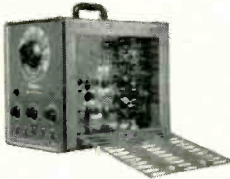
Chroma Level Switch—0 db for checking older style receivers and some current models; -6 db for video check of newer receivers using vestigial IF alignment; -15 db for checking color sync lock under weak signal conditions. Variable chroma control position for other chroma levels.

Color Bar Display Pattern—Left to right: red, yellow, green, cyan, white, magenta, blue, black.

Model 430, complete with Operator's Manual and Leads \$395⁰⁰



SINGLE MASTER CONTROL has all outputs pictured in color. Shows what you should see on TV screen.



HINGED SIDE PANEL opens for fine adjustments and maintenance. Allows use from shelf or bench.

See your Electronic Distributor, or write

SIMPSON ELECTRIC COMPANY

5200 W. Kinzie St., Chicago 44, Ill.

Phone: EStebrook 9-1121

In Canada: Bach-Simpson Ltd., London, Ontario



WORLD'S LARGEST MANUFACTURER OF ELECTRONIC TEST EQUIPMENT

Look No Further...

Here it is!

There's no need to go "around the world" looking for a top-quality, fast-moving, profit-making Hi-Fi phono because *this is it*—the fabulous 'Fidelis'—a sparkling accomplishment in high-fidelity by V-M!

ACOUSTIC CONTOUR CONTROL

*Creates Exciting New Proportions
IN HI-FI MUSIC*

With exclusive V-M Acoustic Contour Control you fill a room of *any* size—small, average, or large—with music that is "shaped" to fit that room. Simply set the dial . . . relax and listen to perfect musical balance so indispensable to full fidelity.

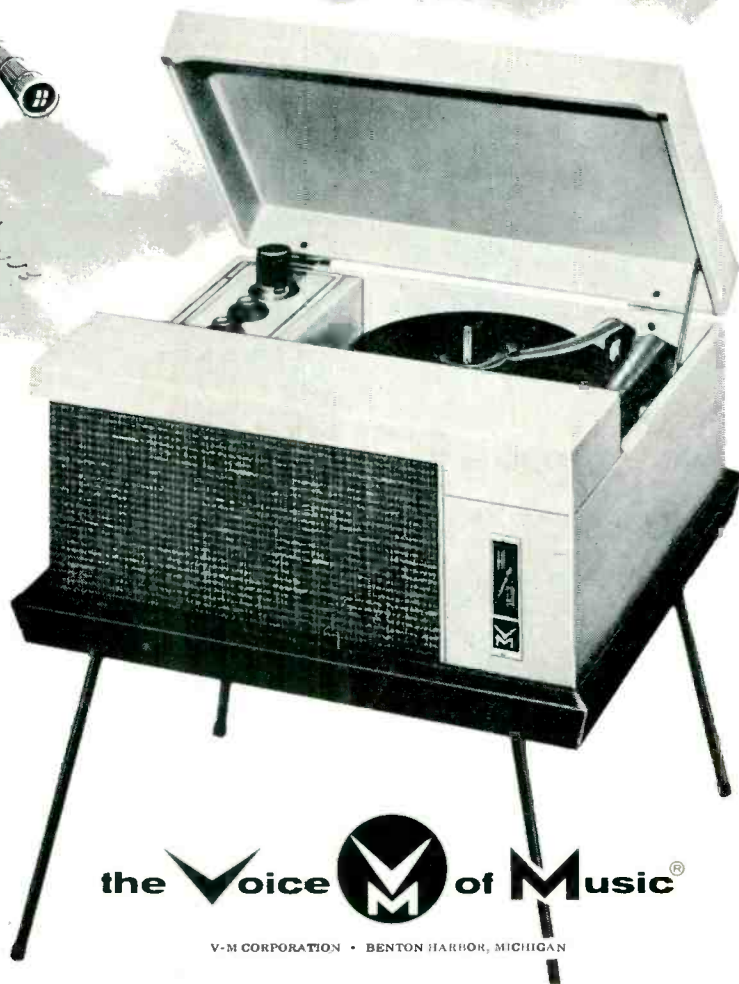
The 'Fidelis' Hi-Fi Consolelette Model 562 by V-M

- New 4-way speaker system
- 4-speed 'Super-Fidelis' record changer
- Separate Bass and Treble Controls
- Stereophonic jack for stereo music now or later
- Optional black or brass legs
- In four luxurious finishes: Blonde or Mahogany \$159.95*
Walnut \$164.95*, Ebony \$169.95*

FIND YOUR WORLD OF PROFIT IN THE FABULOUS 'FIDELIS'
... America's most popular buy in Hi-Fi!

*Slightly higher in the West

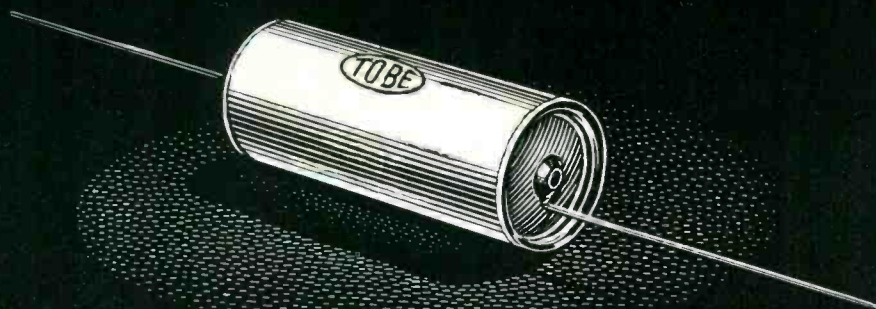
CALL Your V-M Distributor TODAY!



the **Voice**  of **Music**®

V-M CORPORATION • BENTON HARBOR, MICHIGAN

TOBE SERVICE CAPACITORS



Designed exclusively for service

Tobe Service Capacitors are the only capacitors literally "designed from the ground up" to meet the exacting requirements of modern radio and TV servicing. Before a capacitor was ever produced, Tobe engineers determined the ideal characteristics—then borrowed from their 36 years experience in the design and manufacture of high-quality commercial and industrial types. Result: capacitors like the plastic-sleeved streamlined "Jets" that stand up in the toughest circuits.

You owe it to yourself to try Tobe Service Capacitors on your next job. The line is complete—and they cost no more! See your Tobe Distributor today for full details or write Tobe Deutschmann Corporation, Distributor Division, 2900 Columbia Ave., Indianapolis 5, Ind.



TOBE
RADIART
CAPACITORS

Old Hands at Dependability

Catalogs & Bulletins

CHEMICALS: A 28-page bulletin covers the use of oxide cleaners, cements, resin sprays, varnishes, etc. Includes descriptions and technical specifications. Price \$1.00. General Cement Mfg. Co., 400 S. Wyman St., Rockford, Ill., (ELECTRONIC TECHNICIAN No. B1-5)

SELENIUM RECTIFIERS: A bulletin which gives ratings and dimensions for new high current density industrial type selenium rectifiers. It includes data on uprating the rectifiers when cooled by forced air. Radio Receptor Co., 240 Wythe Ave., Brooklyn 11, N. Y. (ELECTRONIC TECHNICIAN No. B1-8)

SCANNERS, TUBE CHECKERS, TEST INSTRUMENTS: A 4-page bulletin for industrial and service shop use. It gives descriptions, illustrations and prices on generators, tube testers, tube and transistor testers, etc. B&K Manufacturing Co., 3726 N. Southport Ave., Chicago 13, Ill. (ELECTRONIC TECHNICIAN No. B1-7)

TV ACCESSORIES: A 6-page, 2-color, brochure on set couplers, antenna couplers, wave traps, baluns, impedance matching transformers and other TV accessories. Gives illustrations, descriptions, and prices. JFD Manufacturing Co. Inc., 6101 16th Ave., Brooklyn 4, N. Y. (ELECTRONIC TECHNICIAN No. B1-9)

TUNERS: A 16-page guide for use in direct replacement of tuners, manufactured by the firm as original equipment. Names of TV receivers are listed alphabetically with the set manufacturer's model number, together with the model number of the original tuner and the replacement tuner. Standard Coil Products Co. Inc., 2085 N. Hawthorne, Melrose Park, Ill. (ELECTRONIC TECHNICIAN No. B1-10)

MASTER TV SYSTEMS: Two new bulletins: MP-97 covers advantages, system layouts, TV outlet connections and a list of installations. Designed for use in contacting motel owners and managers. Form SF-97 shows a complete system layout which may be used in 90% of the motels in the United States. Includes equipment locations, cable and wire routes, outlet box mounting, and total system cost estimates for the dealer. Blonder-Tongue Laboratories, Inc., 9-25 Alling St., Newark 2, N. J. (ELECTRONIC TECHNICIAN No. B1-6)

New Products

UAP SPEAKER

The WIGO ER85, 8½" extended range high-fidelity speaker is suitable for installations requiring minimum space without loss of quality. Specifications are: response 40-15,000 cps; cone resonance 70 cps.; impedance 16 ohms; power rating 15 watts. United Audio Products, 202-4 E. 19th St., New York 3, N. Y. (ELECTRONIC TECHNICIAN 1-41)

Drake SOLDER POTS

Three-in-one solder dip pots are specially designed for printed-circuit servicing. Smaller pots slip over a No. 100 pot and allows the technician to remove and replace only those parts which require servicing without damaging other parts on the board. Round and oblong shaped pots facilitate work. Available with or without thermostat. Drake Electrical Works, Inc., 3654-56 Lincoln Ave., Chicago 13, Ill. (ELECTRONIC TECHNICIAN 1-28)

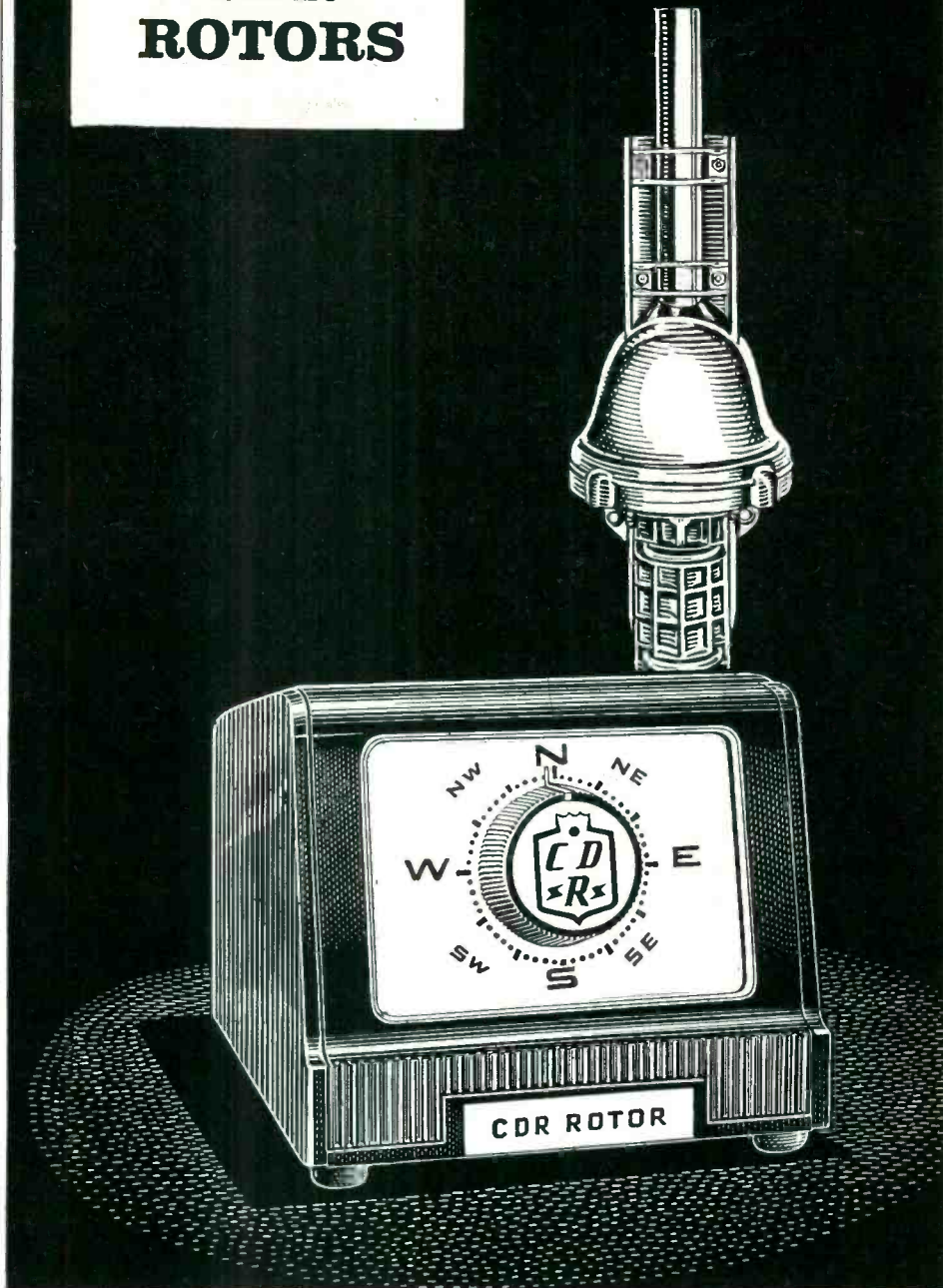
Proto WIRE STRIPPER

A new design Wire Stripper No. 299 is 5" long, features a thumb-operated gauge, and strips all commonly used insulated wire from 14 to 24 gauge without nicking or cutting. Specially hardened edges cut easily. A big advantage is that all settings can be made quickly. Spring-loaded gauge will not slip out of setting. "Handeze" plastic grips lessen fatigue and increase user comfort. Streamlined design permits work in tight places. Proto Tool Co., 2209 S. Santa Fe St., Los Angeles, Calif. (ELECTRONIC TECHNICIAN 1-29)

GE 6AF4

Life tests on the newly-designed 6AF4 indicate normal usage in home TV sets now could average 3 years—as compared to an average of 3 months for the older design. Tests on this UHF oscillator tube show that satisfactory oscillator activity is continuing past 6,500 hours, whereas the median older type stops oscillating at 500 hours. Normal home TV set use is 6 hours per day. Test measurements of oscillator grid current are made with line voltage reduced, simulating the difficult conditions encountered in home use during early evening hours. The company would not reveal precisely how long life is obtained in the newly designed tube other than to state that it is due to "a combination of new materials usage with new manufacturing and test methods." The new design does not succumb to the severe electrical stresses and the relatively high current densities encountered in this service up to 900 mc. The new design features are being built into other types in this family—the 2AF4, 2AF4-A, 3AF4 and 6AF4-A. General Electric Co., Receiving Tube Dept., Owensboro, Ky. (ELECTRONIC TECHNICIAN 1-33)

CDR ROTORS



All-weather dependability

CDR rotors are noted for their ability to perform consistently and dependably under all weather conditions . . . no "freezing" of gears, no "drift" in heavy winds, no drop-off in accuracy over the years. That's why CDR rotors are virtually service-free . . . why they are the choice of Radio Hams.

Fact is, if it's an antenna, a CDR rotor will turn it. And there's a CDR rotor for every job—from simple dipoles to stacked arrays.

CORNELL-DUBILIER ELECTRIC CORP.
South Plainfield, New Jersey

THE RADIART CORPORATION
Indianapolis, Indiana



CDR Antenna Rotors

Old Hands at Dependability

Mr. Independent Service Dealer:
**are you helping to support
 your "competitors"?**



Not if you buy and use Raytheon Television and Radio Tubes. Raytheon does not have a factory TV-Radio service organization — does not compete with you in any way for service business. Raytheon believes that TV-Radio service is *your* business and serving you is Raytheon's.

Every time you buy a Raytheon Tube you buy from the first tube manufacturer to help independent service dealers. For more than thirteen years Raytheon, through their Distributors, has offered independent service dealers the many benefits of the Raytheon

Bonded Dealer Program. Support through national advertising, Western Union Operator 25 service and Group Life Insurance are among other business building dealer helps that Raytheon has pioneered for "independents".

But most important of all, Raytheon makes TV and Radio Tubes that are ideal for all replacement work, because they are designed to provide quality performance in all makes and models of TV and Radio sets. Use them with complete confidence that they are best for you . . . and for your customers, too.



RAYTHEON MANUFACTURING COMPANY

Receiving and Cathode Ray Tube Operations

NEWTON 58, MASS. CHICAGO, ILL. ATLANTA 6, GA. LOS ANGELES 7, CALIF.
 55 Chapel Street 9501 Grand Ave. (Franklin Park) 1150 Zonolite Rd. N.E. 2419 So. Grand Ave.

Raytheon makes all these

{ Receiving and Picture Tubes, Reliable Subminiature and Miniature Tubes, Semiconductor Diodes and Transistors, Nucleonic Tubes, Microwave Tubes.



ELECTRONIC TECHNICIAN

Including
Circuit Digests

What's Ahead for '58!

The nation's electronic repair bill will continue to climb in 1958, thanks to the growing number of home and commercial devices in use. The rise should be at least 5%, bringing the total slightly over the \$2.5 billion mark.

Television will remain the maintenance industry's bread and butter. With some 7,000,000 sets expected to be sold, the total number in use should exceed 50,000,000. Radio is slated for another excellent 14,000,000 unit sales year. Nine out of ten repair dollars will be attributable to television and radio, but audio and industrial electronic work will account for a substantially larger—though still modest—percentage than in 1957.

High fidelity equipment sales should take a sizable jump, the total probably topping \$225,000,000. Repair of home audio gear should total over \$100,000,000 for labor and parts; for public address and commercial audio, some \$60,000,000 in maintenance may be anticipated.

Industrial electronic maintenance, including such products as two-way radio and factory controls, is expected to rise some 20% to \$65,000,000.

We foresee very little increase in the production of receiving and picture tubes. Only the growing demand for replacements will hold tube sales above 1957's high level.

Transistors are skyrocketing in production. We can look forward to about 45,000,000 units for the year, including some 2,000,000 to 2,500,000 used by or sold through electronic technicians.

In addition to replacement parts, dealer-technicians will sell a very considerable amount of sets and equipment: \$440,000,000 for TV-radio sets; \$27,000,000 for home hi-fi components; \$30,000,000 for home hi-fi packages; \$14,000,000 for public address and commercial sound; and \$12,000,000 for industrial electronic and communications sales.

There's a big year coming—a \$2.5 billion year. With proper planning, you can reap your share.

Pulling No Hi-Fi Punches

For many years, Consumers Union has rated how acceptable various products are. A "best buy" rating could mean a substantial sales boost for the fortunate manufacturer. A low rating would often—to put it mildly—not help sales.

Since we are electronic specialists, we do not feel qualified to evaluate Consumers Union ratings of nylon stockings, soaps and the like. However, in testing and rating electronic products, we feel at least as qualified as CU.

Here's the story.

In Oct. 1957, CU published their study and ratings of hi-fi FM tuners. *Electronic Technician* editors undertook the study of some of these same tuner models. The results were a real eye-opener.

According to our laboratory tests, the CU ratings did not prove a dependable guide for us. On the contrary, a number of our findings were significantly opposite to those of CU.

We hope our test report, starting on page 32, will prove as enlightening to you as it was to *Electronic Technician* editors.

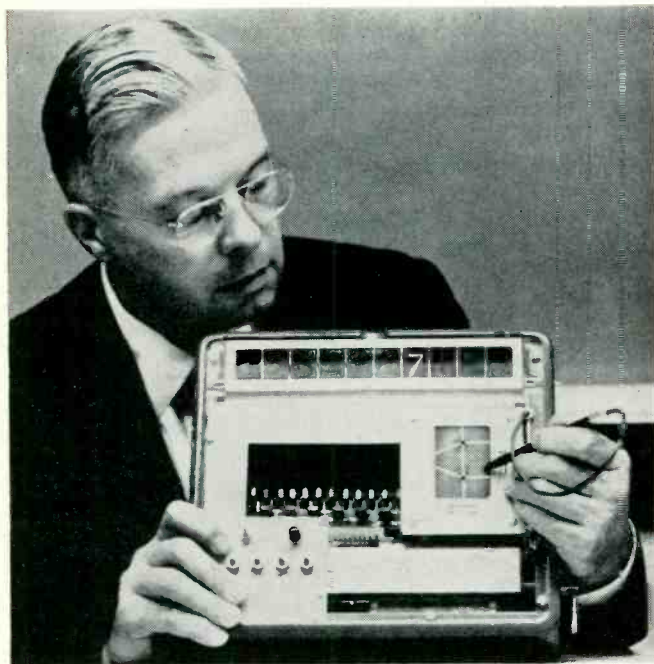
Tuning In the

ELECTRONIC SIGHT for the blind is possible. A woman who has been blind for 18 years had wires implanted in her brain. The wires were connected to a photoelectric cell, and she was able to tell when the room light was turned on. This showed that the brain cells relating to sight do not atrophy when not used.

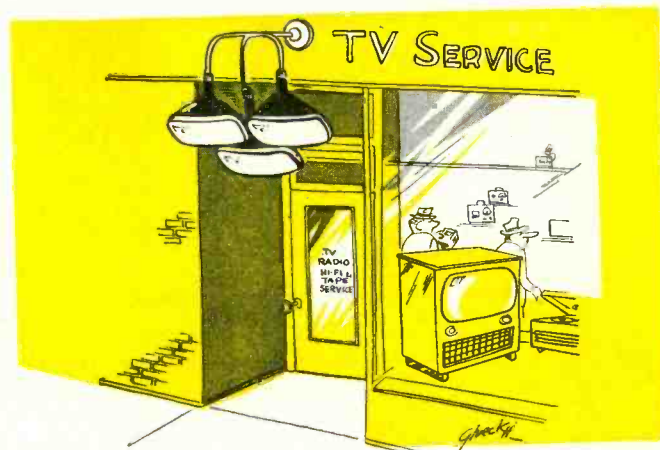
WANT TO SEE \$12 MILLION of the latest electronic equipment? The 1958 National Convention of the Institute of Radio Engineers (IRE) will display this imposing array of gear at the New York Coliseum, March 24 through 27. This largest of professional shows drew 53,811 engineers and technicians last year.

UNION CONTRACT for TV technicians has been signed with several San Francisco stores. The International Brotherhood of Electrical Workers agreement calls for a \$3 hourly rate, 7½% over the previous rate. For the second year of the contract the rate increases to \$3.15.

ELECTRONIC HANDWRITER READER



Transistorized reader by Bell Labs recognizes handwritten numerals. Writing is done by metal stylus on prepared surface. Two dots are reference points. Seven sensitized lines extending from dots enable machine to recognize numbers, depending on which lines are crossed. Previously written numerals may be read if conductive-lead pencil was used.



QUITE A FUROR has been kicked up by subliminal advertising. Subliminal means below the threshold of conscious perception, and subliminal ads are those that are flashed before you so quickly that you are not aware of seeing them—but they do make an impression on your subconscious. An experiment in a New Jersey movie theater showed that when a "Drink Coca-Cola" message was flashed on the screen for about 1/3000 second, though it was not consciously recognized, Coke sales soared. In TV the fastest anything can be flashed on the screen is one field, or 1/60 second, but by keeping the light intensity down the subliminal effect may be achieved. Afraid of the consequences of this hidden sell, the three major TV networks and the National Association of Broadcasters have gone on record against it. The FCC is investigating whether or not to ban subliminal ads from the air.

RADIO SIGNALS used to transmit images of printed material have been bounced off meteor trails 60 to 100 miles above the earth, reports RCA. A 20-kw transmitter operating at 40 mc sent the data 910 miles. Meteors enter the upper atmosphere several times each minute, breaking down air particles into positive and negative ions. This trail of ionized air, which may persist for 0.1 second to as much as several minutes, reflects the facsimile transmissions back to earth.

HIGH SPEED CIRCUIT TESTER developed by California Technical Industries is programmed by a punched paper tape. The tape selects any two test points from 300 test leads on a crossbar switcher. The pushbutton operator could be an unskilled production worker.

Picture



CALENDAR OF COMING EVENTS

- Jan. 12-16: Southwest Seminar of National Electronics Distributors Association and Electronic Industry Show Corp., Galveston Hotel, Galveston, Texas.
- Jan. 13-15: NARDA Annual Convention, Conrad Hilton Hotel and the Merchandise Mart, Chicago, Ill.
- Jan. 17-19: Radio & TV Guild of Long Island, Hempstead Armory, Hempstead, New York.
- Jan. 27-30: Plant Maintenance & Engineering Show, Int'l Amphitheatre, and the Palmer House, Chicago, Ill.

- Feb. 2-7: Special Industrial Radio Association Meeting, Detroit, Mich.
- Feb. 8-11: Television Service Ass'n Midwest Electronic Forum, Detroit, Mich.
- Mar. 17-21: Atomfair & Nuclear Congress, Int'l Amphitheatre, Chicago, Ill.
- Mar. 24-27: IRE National Convention, New York, N.Y.
- Mar. 27-29: Ninth Biennial Electrical Industry Show, sponsored by Electrical Maintenance Engineers Association of Southern California, Shrine Exposition Hall, Los Angeles.
- Apr. 10-12: Southwest Regional Conference & Electronic Show, Municipal Auditorium, San Antonio, Texas.

ALL-AMERICAN AWARDS. GE cites 13 electronic technicians for public service. Hailing from nine states across the nation, they were selected from letters of nomination sent in by persons acquainted with their community activities. Some of the winners are proprietors of their own businesses; some are employees. Five of the thirteen are licensed amateur radio operators. Each will receive trophies and checks for \$500

for use in a community activity or charity of their preference. The awards were presented at a ceremony in Washington, D.C. Hon. Walter Williams, The Undersecretary of Commerce, was the guest speaker. Judges for the awards were Ed Sullivan; Herman Hickman; Wendell Barnes, administrator, Small Business Administration; and Wendell Ford, 1956-1957 president, National Junior Chamber of Commerce. Irv-

ine D. Daniels, general manager of G. E.'s Receiving Tube Department served as chairman of the Committee.



Harry E. Ward, Long Beach, Calif., for assisting and encouraging education in electronics, maintaining placement files, and efforts to educate the public in safety measures—all without compensation.



John R. O'Brien, Evanston, Wyo., for instructing groups in first aid free of charge, setting up PA systems at community functions, and saving several children and adults from drowning.



John Stefanski, Pontiac, Mich., for encouraging and helping youths interested in electronics, promoting better business ethics, and offering free TV service to patients at the Oakland County TB Hospital.

Richard G. Wells Jr., Pikeville, Ky., for installing TV cables in public schools, aiding in the January flood emergencies, and encouraging youths in electronics.



Mortimer Libowitz, Brooklyn, N. Y., for assisting youths interested in electronics and employing his amateur radio station K2BDQ in civil defense communications.



Scott A. Witcher, Jr., Lampasas, Texas, for saving lives in the disastrous May 12 floods and for directing local civil defense communications through his amateur radio station W5YIS.



Billy Joe Jenkins, Paducah, Texas, for installing TV cable and for servicing TV sets free at Richards Memorial Hospital, assisting Boy Scouts and Little League, and supplying PA systems at community functions.



Philip G. Rehkopf Jr., Louisville, Ky., for installing a system of loudspeakers to enable blind children to roller skate without accidents, putting textbooks on tape for the blind, and repairing electronic equipment free.



Philip DiPace, Albany, N. Y., for activities with Boy Scouts, church activities, working for higher business ethics, and performing free radio and TV service for older people unable to pay.



Frank J. Hatler, Roselle, N. J., for emergency communications work through his amateur radio station W2EUI and helping in rescue work in three aircraft disasters.



Marcus E. Denham, Pryor, Okla., for voluntarily helping in youth training programs and wide community service through a number of organizations.



Remo De Nicola, Quincy, Mass., for assisting youth groups and church organizations in community functions and giving free repair service for needy persons.



Hi-Fi Test Report on

Laboratory measurements by *Electronic Technician*

ALBERT J. FORMAN, EDITOR
ROBERT CORNELL, TECHNICAL EDITOR
ELECTRONIC TECHNICIAN

This report presents laboratory data reflecting substantial disagreement with certain data published by Consumers Union in the October 1957 issue of "Consumer Reports," which rated various high fidelity FM tuners.

The CU rating listed 17 FM tuners, only 3 of them receiving the check of acceptability. Considering the reputable standing of certain of the high fidelity producers listed, considering that there is not as yet a broadly accepted and specifically stated technical definition of "high fidelity," and further considering the many thousands of satisfied owners of the listed tuners, our curiosity was aroused.

The ELECTRONIC TECHNICIAN organization set out to double-check the CU findings. On

our own initiative, we purchased 4 tuners over jobber counters, much as any audiophile might do. The manufacturers involved had no prior knowledge of our intention, and no influence on the results. In order to attempt to duplicate the CU testing procedures and facilities, we asked CU to show us a copy of the original lab report and the testing facilities used. Our request was refused.

Our next step was to seek a properly equipped screen room from a company not involved in the CU tuner ratings. Allen B. Du Mont Laboratories was kind enough to place the required testing facilities at our disposal. However, the authors of this report are entirely responsible for its contents, and nothing contained here should imply the approval or disapproval of Allen B. Du Mont Laboratories.

In some respects our findings were in agreement with those of CU. However, certain of our tests proved to be significantly different

from CU's. We believe our results are accurate, based on the knowledgeable audio-electronic backgrounds of 3 engineers conducting our tests.

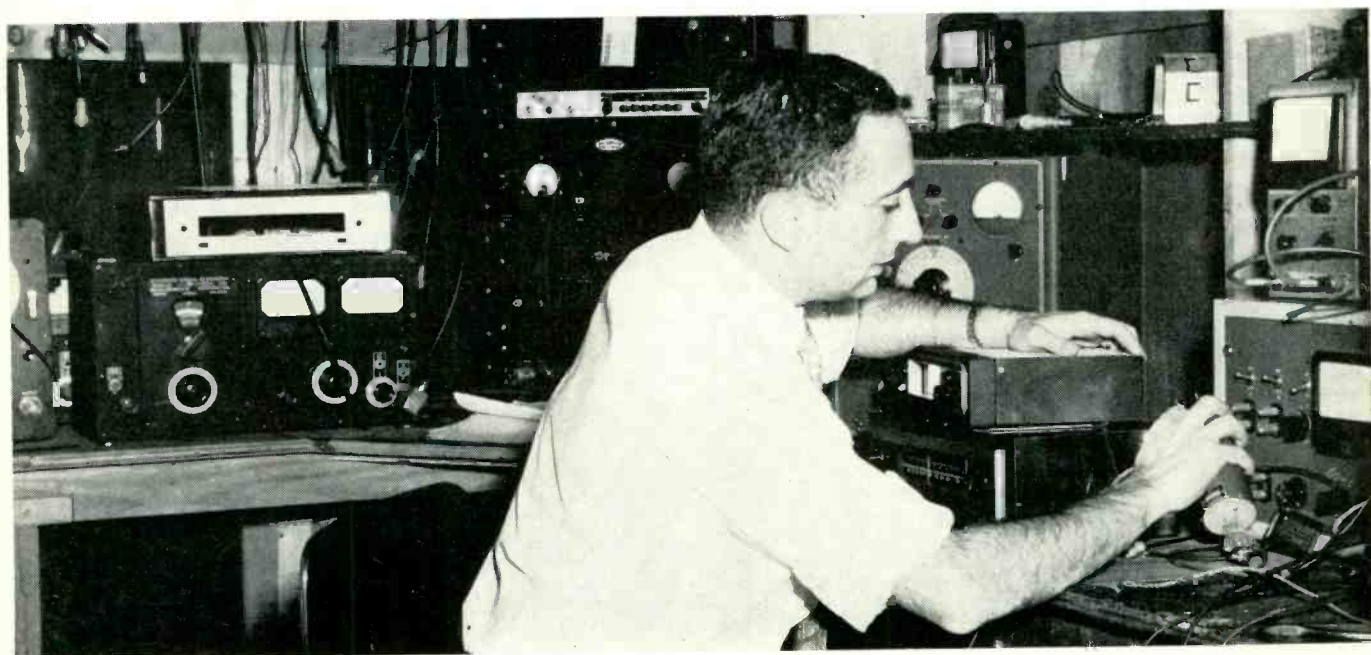
Assuming as we do a similar personnel-equipment competence for CU, we can only conclude that the differences between our respective findings derive from one or both of the following facts:

1. The units we tested, though the same model types as CU tested, were not the same actual tuners. In mass production, identical performance of numerous units cannot be achieved generally.

2. Testing procedures—and evaluation of which tests are most important—are areas in which qualified men may honestly disagree to an extent. Since CU refused to furnish us with the information requested on their procedures, we must rely on our own.

The FM tuners we purchased for our tests were the Sherwood S-3000 @ \$104.50 with case, (which was

Tuner tests in laboratory screen room are performed by editor Albert Forman, one of three engineers on the project.



"Consumer Reports"



editors dispute Consumers Union rating of FM tuners

CU-rated acceptable, "best buy"), and the following (which did not receive the CU check of acceptability): Bogen FM50 @ \$91.50 with case, Harman-Kardon FM-100 @ \$99.95 with case, and Pilot FM-530 @ \$89.50 with case. OUR TEST SHOWED THAT THE SHERWOOD WAS INDEED A GOOD TUNER, AS CU STATED. HOWEVER, THESE TESTS ALSO SHOWED THAT THE OTHER 3 TUNERS ALSO EMINENTLY QUALIFIED FOR CUSTOMER ACCEPTANCE, CONTRARY TO THE CU RATING.

We will present here the actual measurement figures resulting from our tests. With a few brief exceptions, CU failed to include this objective data. *It should be noted that no single tuner was best in all measurement criteria; no single tuner was worst.* To judge overall performance superiority, each purchaser must weigh subjective evaluations as to which of several testing criteria are most important.

One more point should be emphasized to place this report, or any report of this kind, in proper perspective. We caution readers not to infer from our report that the performance of different units of these models would be the same as is reported here. This report is not a rating. It simply presents data at variance with that found by CU.

Listening Test

Perhaps the most important test is the one by human ears instead of electronic instruments . . . the listening test. Three different people experienced in audio listened while the four tuners were switched one at a time directly into the same hi-fi speaker system. Each received the same broadcast transmission. Despite subsequent findings of differences in distortion, hum, etc., there was no difference of any consequence in listening quality, except for a loss of lows in one tuner. Simple adjustment of the amplifier's

bass and treble controls made it practically impossible to detect one tuner from another by listening alone. We would challenge anyone to pick out one tuner from the others.

Contrast these findings with CU's contention that the most cursory listening tests clearly established the importance of distortion, and that only the CU-acceptable tuners were near-perfect after alignment.

It should be emphasized that the good audio quality produced by all 4 tuners in the listening test does not imply that inexpensive or poorly designed tuners would also perform well. These 4 tuners are in the same general price range, and are produced by highly reputable companies.

Alignment

We disagree with CU in three essential respects in regard to alignment.

1. CU stated that the tuners not receiving the CU check of acceptability (including the three we tested) gave much poorer performance than the check-rated tuners, and could not be aligned for low distortion. Our measurements showed this to be untrue for the units we tested, and as will be seen in the section on distortion two of the non-checked tuners had low distortion more or less comparable to the "best buy," depending on signal-to-noise and how tuning was accomplished.

2. CU claimed that practically all tuners were badly misaligned when received. We found that the tuners were aligned when received. It was possible for us to improve the distortion figure a slight bit, but only by hairline adjustments using the distortion analyzer as an output indicator. From a practical viewpoint, this small improvement would not be realized by the user, except by chance, because minimum distortion critically depends on how the listener tunes in the station.

3. CU stated that servicemen

were either unaware of alignment problems, do not have the know-how, or do not have proper instruments to measure distortion adequately. On the contrary, we believe that a growing number of service technicians are obtaining "advanced" instruments. Many of those who do not own such test equipment can and do make required adjustments, even if they can not—and certainly need not—make laboratory measurements as a research engineer would do. For example, we aligned the tuners in three ways. Using an intermodulation distortion meter was the most effective way; using an oscilloscope was almost as good; aligning for maximum output was the third technique. Just as technicians align TV sets when needed, we believe there are a great many capable service technicians equipped to make hi-fi tuner alignments using the scope and the VTVM. CU may be unwilling to recognize this since it would contradict their distrust of electronic technicians, based on comments published in the Feb. 1952 issue of Consumer Reports. Ultra-precise alignment is not the basic prerequisite for hi-fi.

Frequency Response

As we noted earlier in this report, listening to the tuners proved that the ear was more sensitive to the range of frequencies passed by the tuners than to moderate distortion or other criteria. As a matter of fact, in CU's report on AM/FM tuners in Oct. 1951, major emphasis in both instrument measurements and listening tests was placed on frequency response, listeners selecting or rejecting tuners on the basis of treble or bass loss. However, in the CU Oct. 1957 report under consideration here, CU listeners appear to have become under-conscious of frequencies, over-conscious of distortion. CU failed to discuss frequency response capabilities of non-checked tuners.

Essentially flat response is, of course, most desirable. Plus or minus 3 db is considered essentially flat. As shown by our test measurements reproduced below, all the tuners were very good over the audible range, with one exception. The limited low-frequency response of the Pilot (which could be perked up by boosting the bass control on the separate preamplifier) is attributed by the manufacturer in some degree to inadequate filtering in the AFC circuit. Pilot reports they are adding a capacitor in their new FM-530's, which eliminates this shortcoming.

Frequency Response (98 mc input)

CPS	Harman-Kardon	Bogen	Sherwood	Pilot
50	0 db	0.5 db	-1.0 db	-13. db
100	0	0.5	-0.5	- 8.0
400	-0.3	0	-0.5	- 1.0
1,000	0	0	0.	0
5,000	1.8	-1.	0	0
7,500	1.75	0.25	0.25	0.75
10,000	1.15	1.25	0.25	0.75
15,000	1.0	1.5	-1.	0

Sensitivity

With regard to sensitivity, we are in agreement with CU that most tuners have more than adequate sensitivity. Our measurements showed the Sherwood to be most sensitive. Bogen was the only tuner whose measured sensitivity was actually better than the specifications claimed in hi-fi catalogs (figure in parentheses is claimed figure). Of course, the lower the μv , the better the sensitivity.

Quieting	Sensitivity	
	Harman-Kardon	Bogen
20 db	3.5 μv (2)	2.4 μv
30 db	9.5 μv	4.0 μv (5)
40 db	16.0 μv	20.0 μv
	Sherwood	Pilot
20 db	2.0 μv (0.95)	4.5 μv (3)
30 db	3.0 μv	8.0 μv
40 db	10.0 μv	12.0 μv

Intermodulation Distortion

Though our listening test indicated that it was practically impossible to detect distortion differences in these four tuners, our measurements showed there were wide variations in IM distortion, depending on how the units were tuned. The "minimum" IM distortion figure, as tuned with a costly IM meter, would not be obtainable by the typical audiophile who must rely on the

dial indicator for tuning. CU's statement of higher distortion in one tuner is supported by our findings presented below; a similar CU claim of high distortion in another found no support here. The Bogen has no tuning indicator, so a VTVM was used in the output for one sample reading.

The Harman-Kardon has a special feature, an automatic noise gate (ANG), which provides quieting between stations. The manufacturer states that the relatively high IM distortion shown here is caused by the ANG under certain conditions of ANG control setting which set the circuit at its operating threshold. Starting with Sept. 1957 production runs, circuit modifications, such as reducing the ANG coupling capacitance, are reported to have been made, which substantially reduce distortion in the latest FM-100's.

Intermodulation Distortion

Tuned For Minimum Distortion	Harman-Kardon	Bogen	Sherwood	Pilot
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80% Modulation @ 1100 μv input

6.4%	0.95%	0.45%	1.4 %
------	-------	-------	-------

30% Modulation @ 1100 μv input

1.5%	0.48%	0.22%	1.7 %
------	-------	-------	-------

80% Modulation @ 40 db S/N input

17.5%	1.5 %	3.0 %	1.85%
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30% Modulation @ 40 db S/N input

6.0%	0.6 %	0.85%	1.3 %
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Tuned for Maximum Output or best indication on set with tuning eye or meter:

80% Modulation @ 1100 μv input
AFC switched off

6.4%	—	1.6 %	5.0 %
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Then turned AFC on
Tuned with AFC on

6.4%	0.95%	1.0 %	1.4 %
6.6%	—	1.9 %	1.4 %

Regeneration

CU reported spurious oscillation in the Bogen, and regeneration in the Harman-Kardon and Pilot to an extent which did not allow proper alignment. We did not find such regeneration in any of the tuners.

Selectivity

Selectivity, the ability to pick out a desired signal when an interfering signal is close by in frequency can be important in crowded bands. It

is expressed here in terms of the strength (microvolts) of such interfering adjacent channel (200 kc away from the tuned signal) which will produce an output 30 db down from the desired channel output. In other words, the higher voltage noted here the better, since it reflects the tuner's ability to reject strong adjacent signals. These figures are based on 1,100 μv input on the adjacent channel, (at very high desired inputs, say 11,000 μv , all but the very strongest of adjacent channels are attenuated more than 30 db).

Selectivity

Harman-Kardon	Bogen	Sherwood	Pilot
1930 μv	630 μv	1100 μv	1840 μv

CU did not discuss this criterion very extensively.

Hum

The annoying hum so prevalent in inexpensive ac/dc radios was not evident in any of the tuners so far as the listening test is concerned. The Harman-Kardon, Sherwood and Pilot units had almost identical hum figures (the larger the number, the better). The Bogen had a relatively high hum level, as CU reported, but was improved to the level of the others when we added a 50 μf capacitor in parallel with the first capacitor in the power supply filter. The following figures are not weighted (made larger) for the ear's low frequency insensitivity. The larger the figure the better.

Harman-Kardon	Bogen	Sherwood	Pilot
44.5 db	32 db	44 db	43 db

(44 db with capacitor)

Tuning Ease

The Harman-Kardon uses a meter for a tuning indicator, and was the easiest unit to tune accurately. The Sherwood employs an eye which is tuned to close, and was second easiest. The Pilot's eye is tuned for parallel "shading," and was a close third in ease of tuning. The Bogen has no tuning indicator, and the use of a small lighted pointer with no scale illumination could make the scale difficult to read in low ambient light. The Sherwood scale was, incidentally, not level with the face cut-out.

Tuning Accuracy

Closely allied with tuning ease is tuning accuracy, or the average deviation in megacycles of the tuner's
(Continued on page 70)

1957 TV-Electronic Industry Statistics

TELEVISION

New sets	6,900,000
\$ volume at retail	\$1,220,000,000
Sets scrapped	2,900,000

TELEVISION SETS IN USE

U.S. homes* with b & w sets	39,500,000
Secondary sets in above homes	4,400,000
Sets in business places, institutions	3,000,000
Color sets	340,000
Total TV sets in U.S.	47,240,000

RADIO

New sets	14,200,000
\$ volume at retail	\$ 497,000,000

RADIO SETS IN USE

U.S. homes* with sets	52,800,000
Secondary sets in above homes	47,500,000
Sets in business places, institutions	12,900,000
Automobile sets	40,800,000
Total radio sets in U.S.	154,000,000

* Includes all dwellings such as apartment hotels, etc.

ANNUAL RETAIL BILL FOR SERVICING

182,000,000 replacement receiving tubes	\$ 310,000,000
6,300,000 replacement picture tubes	\$ 230,000,000
Antennas, components, parts, instruments	\$ 760,000,000
Labor	\$1,100,000,000
Total servicing bill	\$2,400,000,000

INDUSTRIAL ELECTRONICS

Industrial electronics, factory sales	\$1,300,000,000
Industrial electronic & communications maintenance (22.8% of outlets)	\$ 59,000,000

TV-ELECTRONIC TECHNICIANS

Major service outlets	62,000
Parts jobber business accounted for	69%

TUBES MANUFACTURED

Picture Tubes	
Number made (including 3.2 million rebuilt)	13,400,000
Total manufacturer value	\$307,000,000
% used for replacement	47.6%
Receiving Tubes	
Number made	480,000,000
Total manufacturer value	\$384,000,000
% used for replacement	38%

TELEVISION STATISTICS 1946-1956

Year	Sets Manufactured	Total Sets in Use	TV Stations on Air
1946	10,000	8,000	5
1947	250,000	230,000	20
1948	1,000,000	1,000,000	44
1949	3,000,000	3,800,000	100
1950	7,500,000	10,500,000	107
1951	5,600,000	15,750,000	108
1952	6,300,000	21,800,000	123
1953	7,300,000	28,000,000	350
1954	7,300,000	33,000,000	415
1955	7,800,000	39,000,000	465
1956	7,300,000	43,900,000	495
1957	6,900,000	47,240,000	512

AUDIO

Home Hi-Fi Service (56% of outlets)	\$82,800,000
PA Installation & Repair (37.1% of outlets)	\$57,400,000
Phonographs sold	4,700,000
Phonographs \$ volume at retail	272,000,000
Phonographs in U.S.	35,200,000
Tape recorders sold	490,000
Tape recorder \$ volume at retail	\$ 93,200,000
Hi-Fi audio \$ volume	\$ 190,000,000

Power-Resistor Decade Box

• Good old Ohm's Law works well on the slide rule. But when its readings are applied to actual circuits and under operating conditions, there may be considerable discrepancy between theory and practice. In other words, the trial-and-error method is still followed to a remarkable degree by engineers and even more so by technicians in arriving at the best functioning resistance values.

Starting from that premise, it was realized that an adjustable and calibrated power resistor device covering the entire range of usual resistance values in increments of as little as 1 ohm, and usable in actual circuits under actual operating conditions, could save untold time and fuss in the lab and service shop.

Having developed the Greenohm power resistors (wire-wound units coated with inorganic cold-setting cement that withstands on-off thermal shock, climatic conditions and long service life), the Clarostat Mfg. Co. decided upon a design, and constructed a power resistor decade box

that could be used under working loads. It is rated at 225 watts, 1000 volts maximum. It provides for any required ohmage from 1 to 999,999 ohms in increments of 1 ohm. Either a known or unknown resistance value can be selected by a simple switching action and then read di-



rectly from the decade dials. If the resistance value is already known and a resistor of that value is required for given circuit or operation, it is immediately obtainable by simply dialing that ohmage. There is no

need for having a large assortment of power resistors on hand, or having to order and wait for such resistors. The decade box has a tolerance of 5% for the 1-9 ohm range, and 2% for any value from 10 to 999,999 ohms.

The power resistors are mounted on metal brackets and connected with corresponding detent switches. The six dials follow the usual decade-box system, with X-1 for 1 to 9 ohms, X-10 for 10 to 90 ohms, X-100 for 100 to 900 ohms, and so on. Dial readings are taken from left to right, with the last right-hand dial dealing in the final precise ohmage.

Many uses suggest themselves for this handy instrument. It can serve as a: voltage dropping device; calibrated load for testing fuses, ballasts, relays and other current-actuated mechanisms; critical current flow control; shunt for ammeters; etc.

Instead of lengthy mathematical calculations often followed by more or less experimentation for best results, this instrument permits trying out a wide range of resistance settings until best performance is obtained. •

Installation Techniques For Two-Way Mobile Radios

Practical Tips On Locating The Set, Speaker, Antenna, Control Head And Cables.

JACK DARR

• While the auto-radio man working with the new cars may have problems, especially if he is attempting to install a radio not custom-built for the car, his problems are comparatively small compared with those encountered by the two-way radio technician, in the same car. The size of the units, the longer and more conspicuous antennas, and other added equipment make these problems quite acute, in many cases.

Added to the purely physical difficulties of locating the equipment is the owner's problem, or to be more specific, the owner's-wife. While the husband wants the two-way radio installed come what may, wives are often understandably allergic to having their gleaming new car bored full of holes. A little care on the part of the installation technician, together with a bit of applied customer psychology, will often result in much

greater customer satisfaction, and a neater installation. Complete concealment of all possible equipment, wiring, etc., is the goal, and extra care when working around the new car, will minimize damage and avoid embarrassment.

New Car Problems

The late model passenger car does not offer too many brand-new problems. Modern radio equipment is also becoming smaller and more compact. Receivers and transmitters are combined in one unit, usually a drawer-type case made of heavy steel, and equipped with a detachable lid for easier servicing. This leaves only three units to install, control head, speaker, and antenna. Of course, there is also a fuse-block and control relay, but these units are small and can be mounted under the hood. Intercabing between radio set and control head, in most cases, has been brought down to one 3/4 inch diameter multi-conductor cable and

a power cable. Even the power cable has been reduced. The use of a 12-volt electrical system has enabled the set designer to use much smaller conductors. Instead of a large pair of power cables in the older 6-volt sets, the new 12-volt systems require only one small cable, less than 1/4 inch in diameter. Ground cables which ran all the way back to the battery, have been reduced to about 18 inches and is connected directly from the set to the nearest solid ground.

Call the owner into consultation, when planning the installation. Explain to him the number and kind of units that must be installed to make the set work. If possible, give him a choice as to where some of the units can be mounted. This will take you off-the-hook in many cases. In other words, be sure to give the impression that you want to cooperate as much as possible and avoid any damage to the car. The goodwill built up will be worth far more than the small amount of added time taken on the installation.

Fig. 1—Two-way radio installation in a 1957 Dodge. Nearby location of antenna makes it possible to use a short lead-in with less loss.

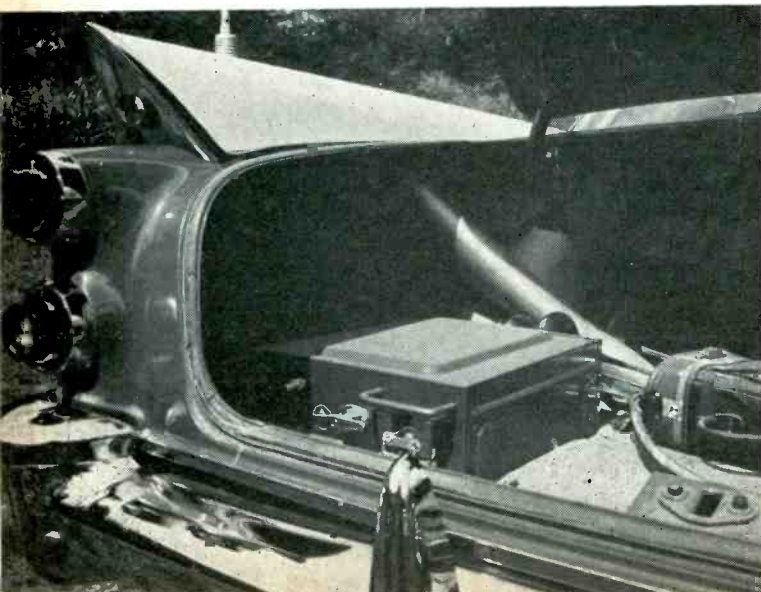


Fig. 2—Front seat installation. Radio dummy plate used to hold control head and microphone. Eliminates drilling new holes.



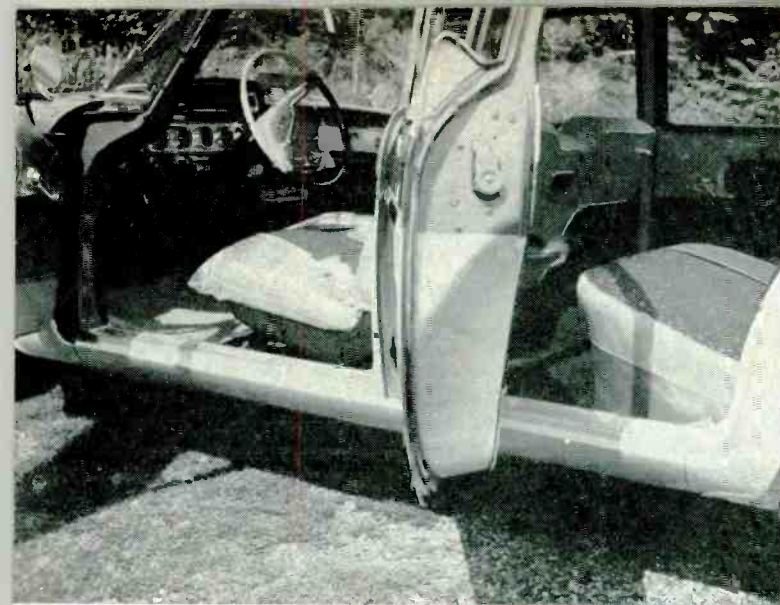


Fig. 3—Aluminum plates on edge of doorsill cover channels which can house the cables. Wires can usually fit under the center-post base.



Fig. 5—Bumper-clamp type trailer hitch modified to hold a standard two-way radio antenna. It is easy to make and very sturdy.

In standard passenger cars the trunk is usually the best location for the 2-way radio set. With larger trunk space available in the new cars, the compact transmitter-receiver unit shown in Fig. 1, takes up a small portion of the total cargo space. The heavy steel housing protects the set from damage. The plugs and cables should be protected. This can be accomplished by positioning or installing a metal guard. The set shown, a Motorola T51-GGV-1, has a spring-loaded metal retainer over the plugs to keep them from being knocked out of the sockets accidentally.

In the ever increasing popular station wagon, set location presents even more problems. In spite of the seemingly greater space available, the technician often finds himself completely stymied by owner objections to various locations. In a recent installation, for example, the back

space was suggested, then vetoed because it would prevent the use of this space for sleeping purposes, on long trips. The next suggestion, on the floor between front and rear seats, was vetoed for the same reason; this would not allow the rear seat to be folded down to clear the back-space. Finally, in desperation, the technician suggested placing the set in the center on the floor in front of the front seat. To his amazement, this was accepted. A saddle-bracket was made to hold the set in place. Actually, this is not too difficult an installation. Brackets are easily made from angle iron. The set is positioned on top of the drive-shaft hump in the floor, and the front of the set faces the rear of the car. The back end of the set is slid under the dash, while the front is elevated, as shown in Fig. 2. When completed, this installation is fairly nice-looking. The owner's children welcomed

it. They said the flat top of the set made an ideal place to set dishes, glasses, etc., when eating at a drive-in restaurant.

Control-Head Mounting

All two-way radios of this type use remote control. A control head containing volume and squelch controls, switches, pilot lights, etc., is mounted within easy reach of the driver of the vehicle. They are furnished with brackets and hardware for mounting underneath the instrument panel. However, the peculiar shape of the instrument panels in some new cars presents more difficulties. The deep sweeping curve and the remoteness of the actual bottom edge of the panel makes control heads, mounted in this manner, almost inaccessible. Heater and other car controls take up almost all of the

Fig. 4—Antenna mounted in position formerly occupied by car insignia. When the antenna is removed, original appearance can be restored.

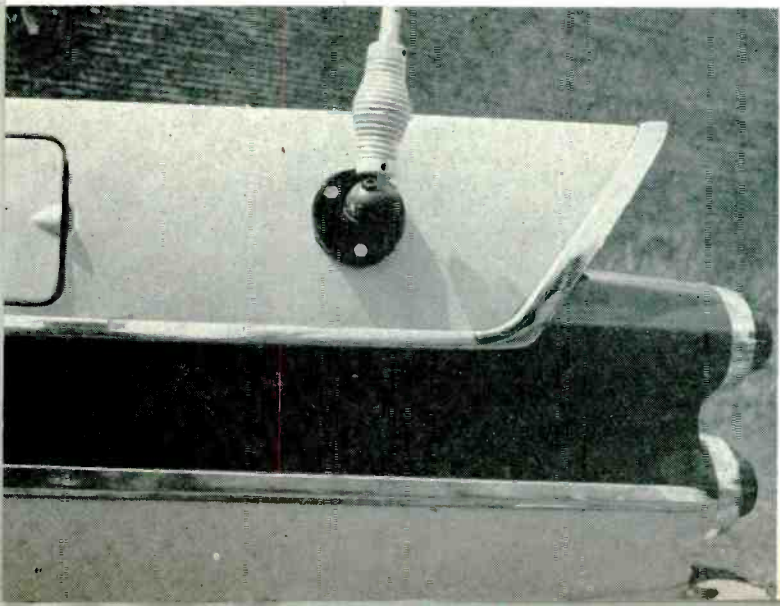
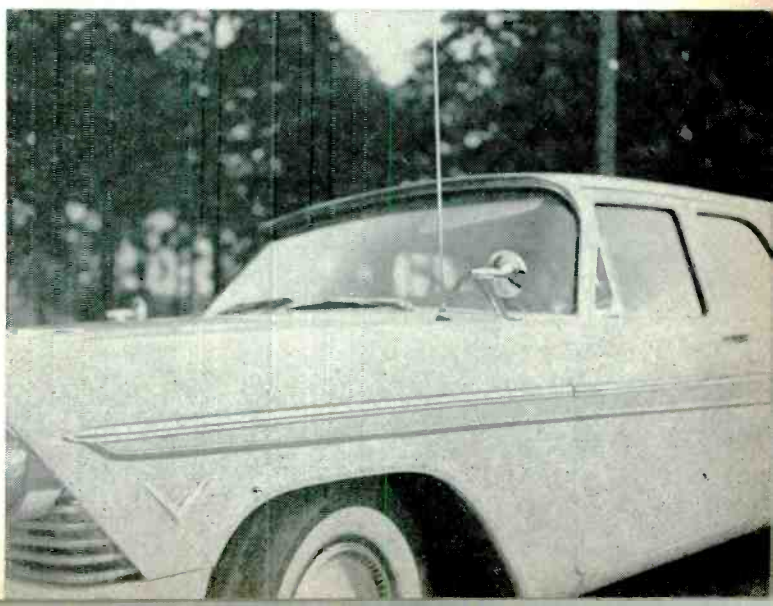


Fig. 6—Disguised type of transmitting antenna is really a solid rod made to look like a conventional auto radio telescoping antenna.



available space, especially at points within the driver's reach. This usually leaves only the far right-hand side of the dash; a location to be avoided if possible.

In cars not equipped with an auto-radio, the dummy plate over the radio opening may be used to good advantage. Some cars provide holes in the dash which are almost exactly the right size and shape for the control head; others have too large an opening. In the latter instance, mount the control head on the dummy plate, also shown in Fig. 2. Suitable openings may be cut in this plate. If the control head is too large for the opening, it may be mounted in front of the dummy plate, instead of behind and flush. Suitable holes can be cut through the plate behind the control head, to allow passage of cables and other wiring. The benefit of this type of mounting is the elimination of drilling new holes in the instrument panel. The dummy plate may be replaced with a new one when the equipment is removed.

Speaker Mounting

The speaker presents another problem, in the overcrowded space under the dash. Heater control rods and wiring, air-conditioning controls and ducts, defroster tubing and other apparatus often fill up the space until there is simply no room for even the small speaker. One solution, if the car has no radio, is to use the regular speaker receptacle in the dash. Most cars will accommodate a 6"x9" oval speaker in this space. If desired, the regular 2-way radio speaker and baffle may be set aside and one of the popular type of speakers substituted for it. Sometimes the two-way radio speaker may be mounted intact, cabinet and all. Simply bolt the mounting bracket to the lower edge of the dash, so that the front of the speaker will be just behind the grille opening. When making this type of installation, be sure that the comparatively heavy case of the speaker is firmly supported. Otherwise, it may rattle against other objects under the dash, or even break loose. The case may be padded or braced with small pieces of rubber or other materials, to prevent excessive vibration.

Another method is to mount the speaker and cabinet behind the rear seat. A standard rear-seat speaker kit may be substituted and mounted in the place provided in most cars. The wires may be run to the control head, or simply dropped down and connected directly into the set, at the control plug.

Cable Routing

When running the control and power cables from the trunk to the front seat and engine compartment, the technician's biggest problem will be to make the job neat and pretty. There are two alternative cable-routes, on the later cars. One is under the floor-mats in the center along the sides of the drive-shaft hump, and the other is along the side of the car at the edge of the body. See Fig. 3.

Most cars now use aluminum strips to hold down the mats and rugs to protect the edges from scuffing. The strips are held in place by four or five short screws. Usually, there is a channel in the floor-pan at the sides, which is just about the right size to house the cables. The rugs used in modern cars are backed with a heavy jute padding, about 3/4" thick. If necessary tear or cut off a strip about 1" wide along the edge. This will allow the rug to fall back into place, over the cables, and not leave a bump.

The Dodge, Plymouth, Chrysler, and DeSoto cars have a small channel along the side of the floor, with some wiring already in it. There is sufficient room in this channel for the radio cables. In 4-door cars, there usually is enough space under the base of the center post for the cables. Run the cables along the side, and up behind the fiber kick-pad, on the side of the driver's compartment. Some pads are held in place with screws, others fit into a channel. To remove the pad, buckle it out by grasping the top edge.

Another consideration is the distance between the control head and radio. Many of the new cars are so long that the standard length of cable may not reach unless the mounting sites are carefully chosen. For instance, if the control head is installed on the far right side of the dash, it would be best to install the radio on the right side of the car. If necessary, the control cable may be run down one side and the battery cable down the other.

The Antenna

Probably the most difficult item in the whole installation will be the antenna. It is the only part that is visible from the outside of the car, and it is the one part which may require boring large holes in the body of the new car. Fortunately, there are several ways to overcome this difficulty. The standard communications antenna uses a spring base, and has a whip ranging from 5 to 8

feet in length. These long-whip antennas, for the 40-60 mc band, are the problem children. The smaller antennas required for the high bands are easier to install and are not so conspicuous. The antennas are usually mounted on one of the rear fenders mainly to get it as close to the set as possible, and secondly for convenience. Due to the box-type of construction employed by many car makers, the front end is full of ducts, braces, compartments, etc., making it very difficult to find enough clear space for the antenna base; this is a 4" circle, which must be clear both outside and inside.

Many new cars have high fins on the rear fenders. These make handy places for antennas; they are high enough to give clearance and are accessible from inside the trunk. Antennas should be mounted on the left rear fender whenever practicable, as shown in Fig. 4, especially if the car is operated in the country, on narrow lanes, through brush, etc. Tree limbs, and the majority of other obstructions are on the right side.

Quite a few cars have medallions or insignia on the rear fenders. This is a useful feature indeed; by removing the insignia, which are held in place by speednuts, a clear space for the antenna base may be found.

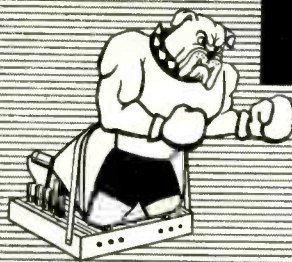
If the antenna is removed, the medallion may be replaced. It will completely cover the holes. It did so in the antenna mount on the 1957 Dodge, shown in Fig. 4. Therefore it would be wise to save the insignia.

If the owner objects to making the necessary holes in the body, a bumper mount may be used. The unit shown in Fig. 5 is home-made. A heavy metal plate was welded to a commercial type trailer-hitch, which clamps to the rear bumper and a standard antenna base was attached. Commercial bumper-clamp antenna bases are available. When selecting one of these, be sure that it is well-built. Check this point carefully, a rod lying in the roadside radiates very little signal. If heavy-duty service is expected, it may be better to make your own. The unit shown is installed on a deputy sheriff's car, which travels over very rugged terrain, in the mountains. It has been in service for more than a year, without any trouble.

An alternative to the standard communications type antenna may be found in the disguised antennas, made originally for unmarked police cars. The presence of the standard transmitting whip could betray the identity of the vehicle. They resemble standard receiving antennas. For

(Continued on page 67)

"Tough Dog"



Corner

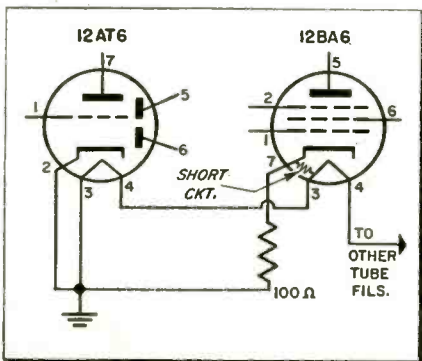
Difficult Service Jobs Described by Readers

Intermittent Hum

This Zenith Model Z519W ac-dc table-clock radio would emit a very loud hum when the set was turned off after being run for a short time and then turned on again. To make matters worse, the trouble would not appear every time this procedure was followed. It sounded like filter capacitor trouble. All tubes checked good on the tube tester. Since it was impossible to cause the set to act up again, I let it cool off. The next day I turned it on again. Sure enough, the loud hum came on full blast. This time I noticed that the 12AT6 filament went out while the other tubes seemed to be operating normally. This changed my mind about a defective filter capacitor. Apparently all that was needed was a new 12AT6.

After inserting a new tube, the set was again tried, and the hum appeared to be louder than ever. The heater on the new tube also failed to light. A voltage reading across the 12AT6 filament turned out to be about 3 volts. Fortunately the set was acting up pretty consistently. I removed the 12AT6 from its socket, the conditions remained the same as before except that the voltage across the filament terminals was now just about normal. This was really confusing. Could it be a defective tube socket? Changing the

Heater voltage for 12AT6 disabled by an intermittent cathode-to-heater short in the 12BA6 tube.



socket would certainly not be a cinch, so I decided to check further. I cut the filament lead between the 12AT6 and 12BA6, but there was no change in the hum level. Since the 12AT6 socket was now isolated from the filament string, it couldn't be causing my trouble. My thinking cap suggested that I recheck the 12BA6. Sure enough the filament and cathode were shorted to each other. A new 12BA6 did the trick.

The intermittent short between pins 3 and 7 of the 12BA6 tube bypassed the 12AT6 filament and at the same time introduced a hum signal. —Americus Molinara, Hatboro, Pa.

Poor Contrast

This Model H626T16 Westinghouse, using a V2172 chassis is hereby nominated Tough Dog of our shop for 1957.

It was a real aspirin user-upper. It was in for weak picture. The scope showed only 1 volt of picture content at the video detector. Assuming a defect prior to this point, all voltages from the r-f stage to the detector were measured and found in full agreement with the manufacturer's specifications. AGC voltage also read correctly. Being of a suspicious nature when it comes to agc I applied a bias box, and strangely enough the picture did not increase in contrast even when the bias was reduced to 3 volts.

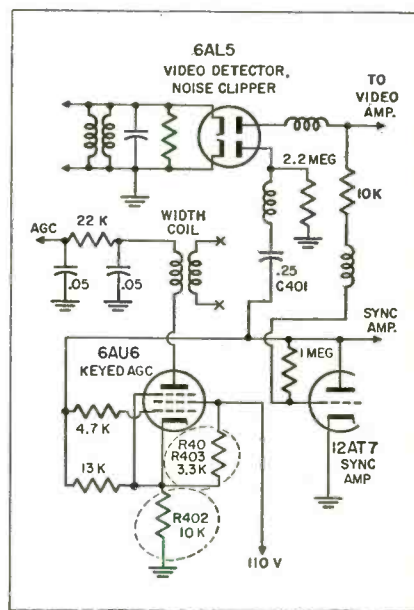
Having seen what poor i-f alignment can do, a bandpass check was made and it showed a slight deficiency; a complete realignment was made, but without much benefit. Next, I figured that something was attenuating the demodulated signal. The detected video signal is also fed to a sync amplifier through a choke and resistor network. The sync is amplified, and fed to the keyed agc tube, noise clipper and sync separator. The noise clipper prevents noise pulses from upsetting the sync. So I decided to look into this area.

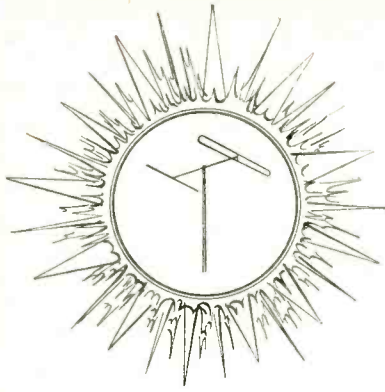
When I disconnected capacitor C401 for tests, the contrast became normal. To my surprise, the capacitor checked good, and when replaced temporarily, it weakened the picture.

From all this checking it now became obvious that the trouble originated before the capacitor. All parts in this section were tested. I found R402 had changed to 8,000 ohms, and R403 had changed to 5,000 ohms. Replacing these parts with the correct values caused the set to perk properly. I might add the resistors had previously been measured in toto, and had read the correct total of 13,000 ohms. Both resistors had shifted resistance in opposite directions.

Oddly, when the set was repaired, voltage checks were made again, and the correct voltages varied only slightly from what they had been when the set was defective. Still scratching my head about this one.—Allan F. Kinckiner, Philadelphia, Pa.

Resistors changed value and caused loss of contrast in this Westinghouse Chassis V2172.





J. RICHARD JOHNSON

Sunspot activity is reaching a peak during the 1957-58 IGY (International Geophysical Year). Results are long range TV reception and mysterious interference. In Nov. 1957, British TV broadcasts at 40 to 50 mc were received in the U.S. This article is being reprinted from our Sept. 1955 issue to answer questions that will face you in 1958.—Ed.

• The already complicated life of the TV technician promises to become even more complicated soon. The reason? "Old Sol," whose "spot cycle" shows promise of producing some queer effects on TV reception which neither the set owner nor the technician will appreciate.

Sunspots influence the ionosphere, which in turn reflects TV signals all over the place from distant stations right onto your (or your customer's) favorite local channel. If your phone has already been ringing occasionally as a result of these propagation problems, reliable scientific predictions and previous propagation experience indicate you should be ready for lots more ringing in the next few months and years.

How do we explain to the cus-

Sunspot Activity and

First Big Cycle of Modern TV Era, on Its

tomor why there are suddenly venetian blinds on his favorite program, or why a boxing match keeps fading into a fashion show? Each of us will have his own way of phrasing the actual explanations, but I know these explanations are bound to be the most understandable after we ourselves have reviewed the how and why of the whole thing.

Direct and Ground Waves

The wave paths important in normal reception are of several types. Direct waves go via the line-of-sight path, and are of course the strongest and most desirable. The direct wave may be reflected from a building, mountain, or ground, sometimes with good effect but more often to plague us with ghosts. The surface wave "creeps" along the earth, or over obstructions on the earth, but is attenuated rapidly at TV channel frequencies and is important only within several miles of the transmitter. The direct wave is extended to a useful range beyond the horizon by *refraction*; such areas are the "fringe areas" of normal reception.

Much has been written about normal reception paths and their practical effects on antenna installations. We shall therefore not dwell on these paths but proceed to a discussion of unusual inter-area interference effects.

The refracted direct wave, which extends the direct wave beyond the horizon normally, is extended even further at times by *temperature inversions*. Cool air, which is ordinarily nearer the earth than warm air, sometimes gets trapped in layers above warm areas. The difference in propagation velocity between air layers of different temperatures causes bending of the TV waves going through them, just as with light waves going through a glass prism. More bending means greater range.

Temperature inversions usually involve stations from 60 to 200 miles away. They can happen any time, but are most frequent on cool evenings after a hot day. They are not related to the ionosphere or the sunspot cycle and their rate of occurrence is about the same for each year. They can usually be distinguished from ionospheric phenomena by the fact that they affect most channels, instead of just the lower ones.

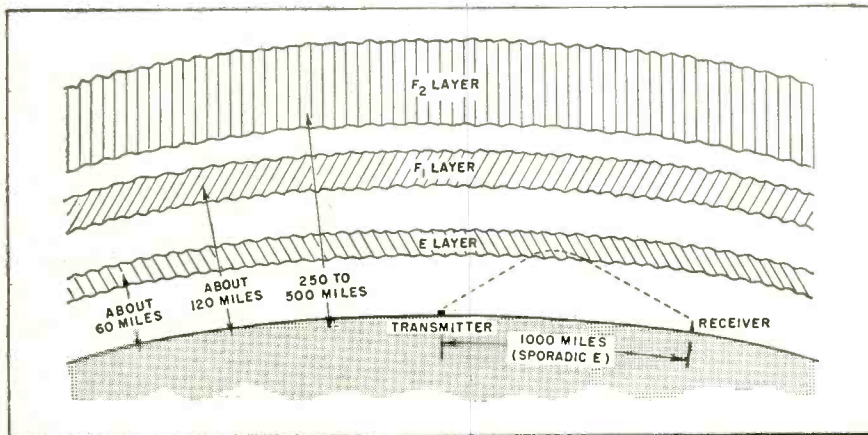
The Ionosphere

The ionosphere is a combination of three layers of *ionized air*, which have the property of refracting and reflecting radio waves back to earth at great distances. It is the agency through which worldwide communications on "short waves" (2-30 mc) is possible. The relative positions of the three ionospheric layers, E, F₁ and F₂, and their approximate height above earth are shown in Fig. 1.

The height and refractive index of the ionosphere varies. This is why short wave reception over a given path may be excellent at one time and non-existent at another. It also explains why distant stations can be heard on the AM broadcast band at night but not in the daytime, and better in the winter than in the summer.

TV channel frequencies were purposely chosen over 50 mc because—normally—ionospheric reflections are rare above that frequency. The highest frequency at which regular direct ionospheric propagation is possible at any given

Fig. 1—Ionospheric layers that refract transmissions. E layer can bounce low-band VHF.



TV Reception Problems

Way, Will Baffle Many. Improved Antennas May Help



Fig. 2—"Sporadic E" starting to build up on a low-band channel (signal normally good) near New York. Interfering transmitter was operating on the same channel in Missouri.

time is generally referred to as the MUF (maximum usable frequency). The term "usable" refers to long-distance short wave communication. The MUF at present writing is reaching about a 15-mc peak each day; its average is even lower (about 10 mc).

However, because of the sunspot cycle, the MUF had been gradually falling since the last maximum in April 1947. Scientific observations and records indicate that the MUF reached its minimum in the fall of 1954 and has started to rise again. Its rise is usually much more rapid than its descent, and it may reach its peak in as little as two years.

The interesting thing to the service technician is that, on its last peak in 1947, the MUF on several occasions went as high as 70 mc! Thus the frequencies of channels 2, 3 and 4 were wide open for country-wide and even international reception. It is significant that this peak occurred just before commercial TV receivers (or transmitters) became really widely distributed; that is why a new ionospheric peak would be something novel in TV.

Sporadic E

The F₂ layer in the ionosphere (Fig. 1) figures most importantly in regular sky-wave propagation, and its properties closely follow the sunspot cycle. It is largely responsible for the antics of the MUF. It must not be inferred that such propagation is anything but a very rare

occurrence but, when it does occur, it can be terrific! However, the E layer of the ionosphere can cause more frequent troubles. It quite often contains "clouds" of ionized air having definite boundaries; these clouds move above and assume temporary positions. The result in some cases is propagation called "sporadic E."

Because of the lower level of the E layer, sporadic E reception occurs at distances somewhat less than those in regular F-layer stuff. Typical effects are over paths about 1,000 miles long. For example, in the New York area, Missouri is one of the most frequently received states by this means. Sporadic E reception becomes more frequent as the sunspot cycle rises toward its peak, and

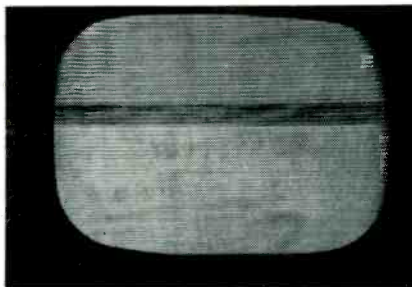


Fig. 3—Minutes after Fig. 1, the picture is gone; vertical sync is partially lost.

there have already been several occasions this year on which TV stations from the middle west, for example, have caused serious interference to local station reception in the New York area.

The abnormal effects described are sometimes expressed as "skip interference" (because there is a skipped area between the end of the normal local coverage and the beginning of the interfering area) or as "sky-wave interference."

Most skip conditions come on rather slowly, sometimes taking as long as an hour to get into full swing. Some just start and never do get serious. On the other hand, there have been some which appeared so suddenly that a received program switched to that of an interfering

station before the viewer became aware of it!

In the early stages of an "opening," a typical effect is that of dark horizontal lines moving up or down the screen, or very closely-spaced bright horizontal lines and what looks like loss of interlace or "line pairing." Some co-channel stations operate on the same nominal frequencies, and these are the ones which experience the dark horizontal line effect. Others are required by FCC to offset their frequencies 10 kc from the nominal values; these stations produce the bright fine-line interference, due to the 10-kc or 20-kc (offsets in opposite directions) beat signal.

An example of such a condition in its early development stage is shown in Fig. 2. This photo was taken in a good signal area 35 miles west of New York City in May, 1955. The interfering transmitter on the same channel was later identified as being in Missouri.

As the interference builds up, the local signal starts to lose sync. It may start to jump and "jiggle" or move back and forth horizontally. Outlines of the interfering picture may become temporarily visible at this stage. Sometimes the whole screen becomes a jumble, as in Figs. 3 and 4.

The final stage, of course, is that in which the interfering picture completely replaces the picture from the local station. How long the "swap" continues is of course un-

(Continued on page 65)

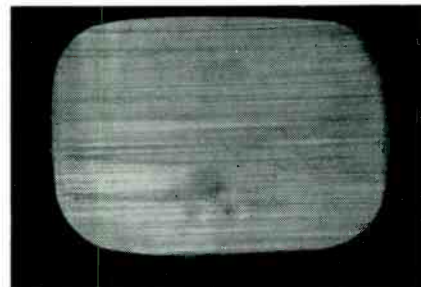


Fig. 4—Condition just before interfering station "took over." Antenna orientation was 180 degrees away from unwanted signal.

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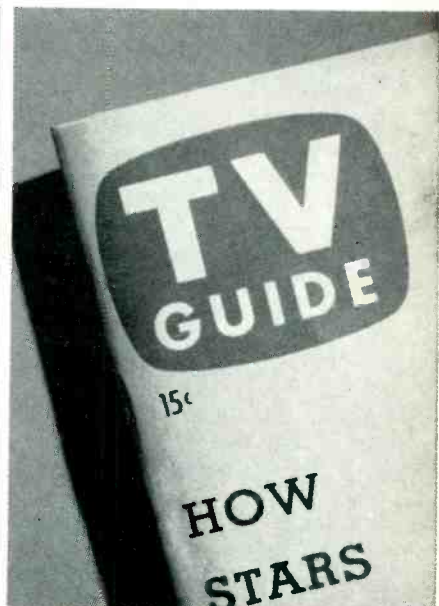
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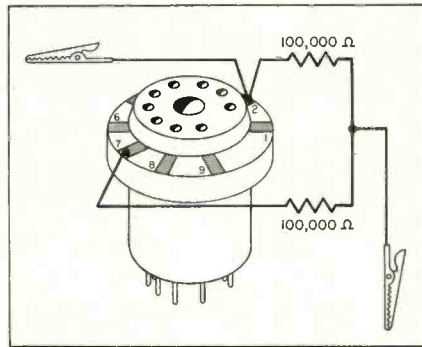
SHOP HINTS



Tips for Home and Bench Service

Alignment Jig

When aligning the ratio detector in the audio section of a TV set as found on GE Model M3 and many other sets using a 5T8, it is necessary to obtain zero output at the electrical center between pins 2 and 7. Normally it would be necessary to temporarily solder in a pair of matched resistors across these two points. The zero output indication would then be taken from the junction of these two resistors and test point V. The top of T301 (secondary) is the adjustment for this purpose. Tune for a dip between two peaks. Other adjustments call for a maximum from pin 2 to ground. Top of T154 (secondary) and bottom of T301 (primary) are used for these adjustments.



Vector Socket becomes handy alignment jig.

CRT Measurements

When voltage and resistance measurements are to be made at the CRT socket and an adapter is not available, I have found the following method to be quick and easy. Cut or scrape a small amount of insulation on the leads going to the CRT socket. It is a good idea to stagger and position these openings in the insulation to avoid contact with each other, or other parts of the chassis. Clip the leads of a VTVM or VOM and take a reading on the ohms scale, to be certain that a good contact has been established. Switch to the proper voltage scale, turn on the set and take the readings.

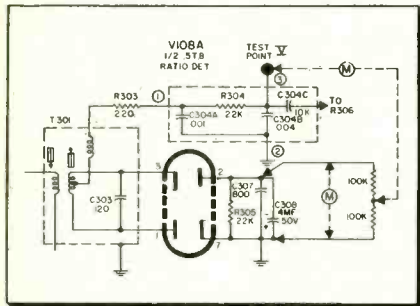
Another advantage this method offers, is that the CRT socket may be disconnected, in a parallel heater string set, to note changes of voltage. Troubleshooting procedure is greatly facilitated, and should help the technician localize troubles in and around the CRT area.

A reasonable amount of care to prevent nicking or cutting the conductors should be observed. A couple of turns of insulation tape should be applied to exposed wire after the tests have been completed. Needle-pointed probes may be used to puncture the insulation, and thus par-

tial stripping is avoided. Ordinary straight pins may be used and the meter's leads clipped directly onto them. If this last method is used, make certain that a good electrical connection is established.—Obert Thomley, Chippewa Falls, Wisc.

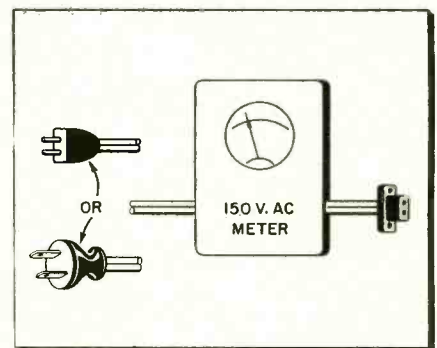
Metered Cheater Cord

In those areas where line voltage variations cause TV difficulties, the combination cheater cord and a-c meter will serve a dual roll. In addition to providing the technician with a convenient arrangement for determining the actual line voltage while the receiver is tuned on, it should help to convince the customer that external power conditions can cause trouble. A conventional male plug or a male cheater-cord plug can be used. The advantage of the latter is that it can be plugged directly



Typical ratio detector showing meter and resistor connections for sound alignment.

To avoid soldering and unsoldering to the printed wiring board, and to speed up alignment procedure, two matched 100,000 ohm resistors are tied together at one end and the other ends soldered to the external portion of pins 2 and 7 respectively of a q-pin miniature vector socket. One alligator clip with a short lead may be soldered to pin 2 and another to the junction point of the two resistors. Insert socket between tube and chassis, tune in a station and hook up a VTVM.—Richard Prestia, Pittsburgh, Pa.



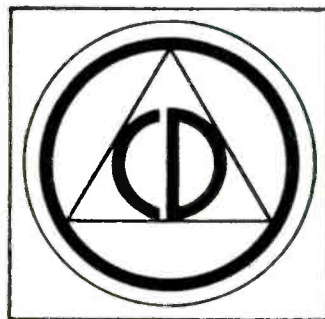
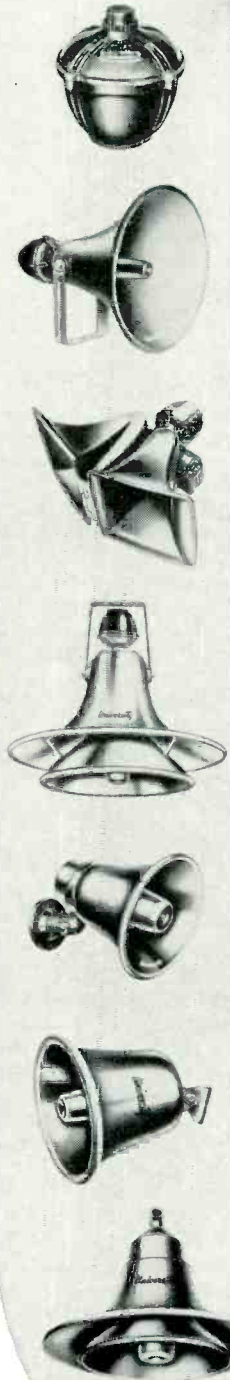
Metered cheater cord facilitates measuring line voltage while the set is turned on.

into the back of the set; and eliminate having to move furniture to find a wall outlet. Other features may be built into the unit, such as additional outlets, a continuity tester using a neon light, etc.—John Paul Huard, Chicoutimi, Canada.

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Latest Test Instruments

Paco BATTERY ELIMINATOR →

A new battery eliminator in kit form features a self-contained, special low-ripple L-C filter output, 0.3% maximum ripple, which is designed to power modern transistor circuits. No external filter adapter is needed. The Model B-10 features both 6 and 12 volt outputs, automatic overload protection, continuously variable voltage, a heavy-duty, louvered steel cabinet, and a two color panel. Case dimensions are 7 x 11½ x 6½ inches. Paco Electronics Co. Inc., 70-31 84th St., Glendale 27, L. I. N. Y. (ELECTRONIC TECHNICIAN 1-17)



Sencore CIRCUIT TESTER →

The Fuse-Safe Circuit Tester, is designed to check either alternating or direct currents or a combination of both. The Model FS3 is connected in place of a fuse, fuse resistor or circuit breaker by two clip leads and automatically indicates whether or not it is safe to make a replacement. It also provides line current and power readings by plugging the receiver into the tester and the tester into the power receptacle. The tester reads up to 1100 watts at 115 volts. \$8.95 Dealer Net. Service Instruments Corp., 171 Official Rd., Addison, Ill. (ELECTRONIC TECHNICIAN 1-18)



B-T FIELD STRENGTH METER →

Precise accuracy over a wide voltage range and a variety of accessory features characterize the new Model FSM-1 VHF Field Strength Meter. It is battery operated and tunes continuously through the frequency range from 54 to 216 MC. Addition of a converter expands signal readings to the complete UHF TV range. Exact signal strengths can be read from 10 microvolts to 3 volts. For shop and field use. Blonder-Tongue Laboratories, Inc., 9-25 Alling St., Newark 2, N. J. (ELECTRONIC TECHNICIAN 1-19)



Kay VTVM

The Microtler VTVM without feedback for wide-band accuracy to 50 mc employs new stabilizing techniques to supplant the previously used feedback arrangement to overcome frequency limitations. It permits the measurement of low-level r-f signals down to 250 μ v and can also serve as a wide-band video amplifier with a maximum output of approximately 0.25 v at 75 ohms and gains of up to 40 db. Frequency Range: 100 cps to 50 mc. Frequency Response: ± 1 db. Voltage Range: 1 mv to 1 v full scale in 7 ranges. Kay Electric Co., Maple Ave., Pine Brook, N.J. (ELECTRONIC TECHNICIAN 1-20)

Motorola SIGNAL GENERATOR

A new, moderately priced laboratory standard r-f signal generator especially designed for servicing land mobile communications systems provides complete coverage of all bands presently used for two-way mobile and base stations radio operation. Six individually calibrated, direct-reading scales cover the 25-54, 140-175, 400-470, and 890-960 mc. bands. Each range is individually calibrated with an accuracy of $\pm 0.5\%$ and is stable to within 0.001% in any five minute interval. Output voltage is continuously variable from 0.1 to 100,000 μ v. Model TU576. Motorola Inc., 4501 W. Augusta Blvd., Chicago 51, Ill. (ELECTRONIC TECHNICIAN 1-21)

Kingston PROBE

The "Probe-Master" has a built-in capacitance network and a neon tube checker. Because of its capacitance network, the instrument makes it possible to by-pass stages, check open capacitors, couple signals from one stage to another in any circuit which self-generates a signal, and to isolate a defective stage without outside signal-generating equipment. It also eliminates time-consuming capacitor substitution. Packaged with step-by-step instructions for use. Kingston Electronic Corp., Medfield, Mass. (ELECTRONIC TECHNICIAN 1-22)

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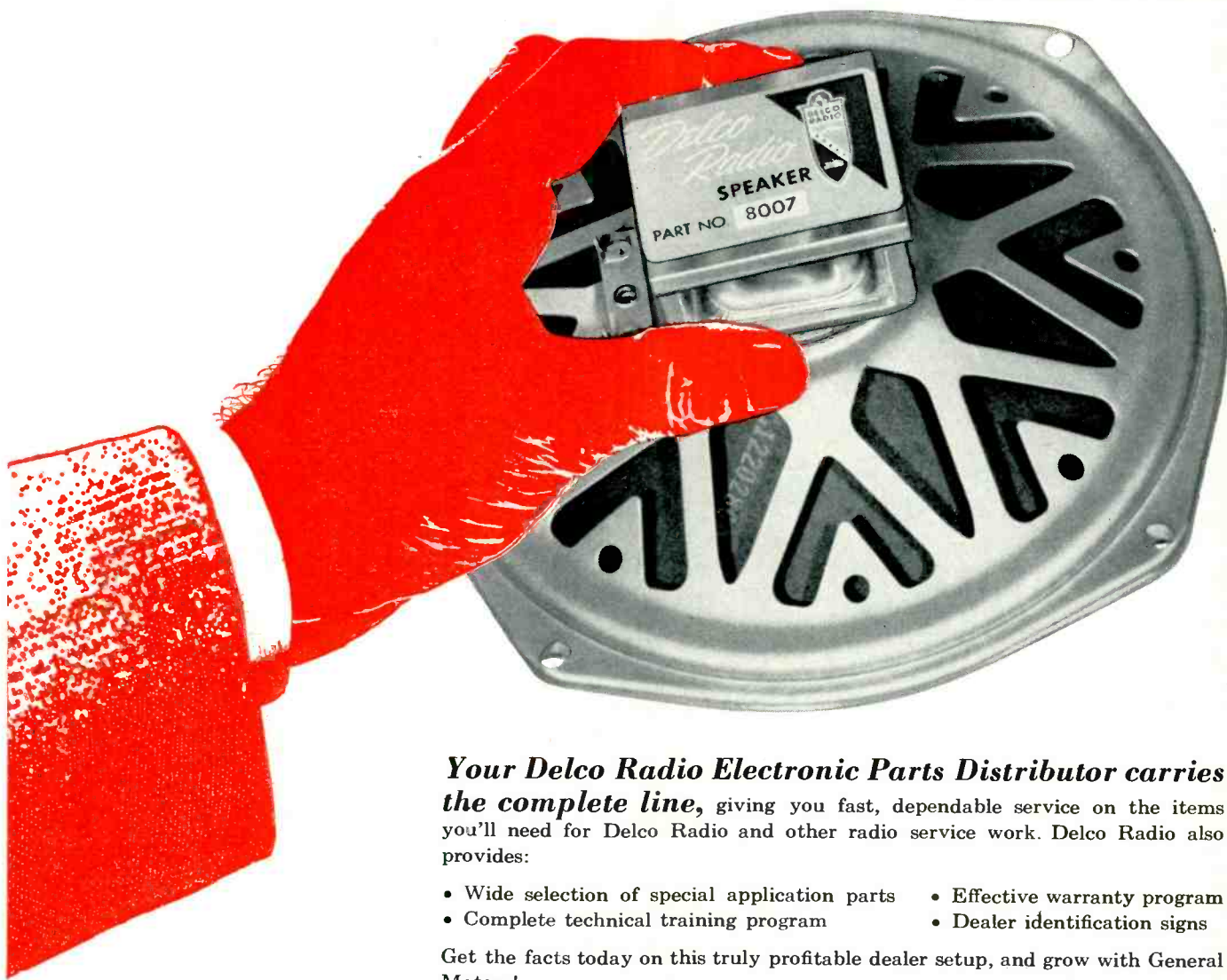
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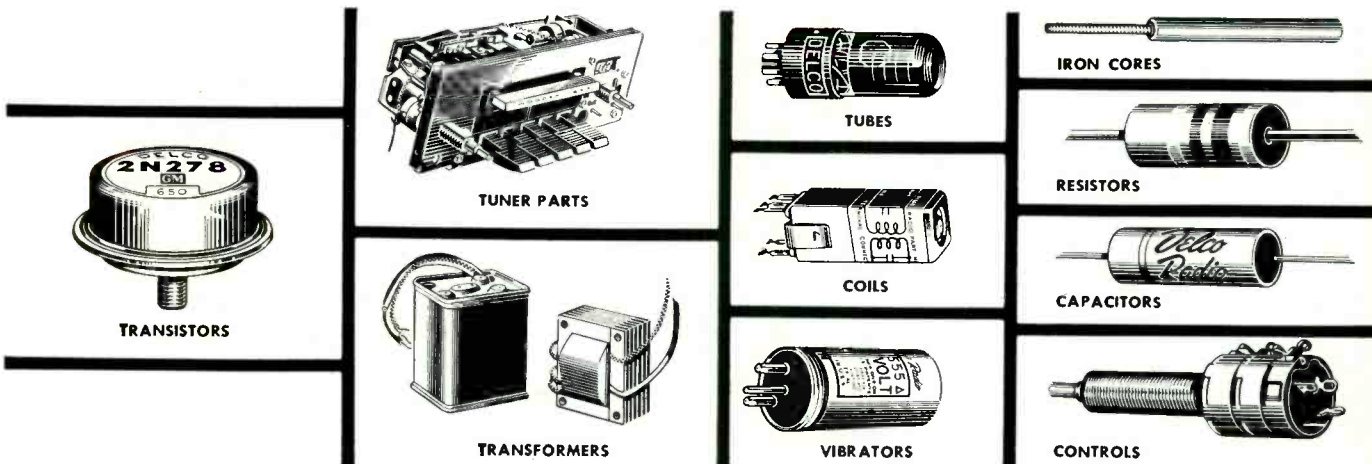
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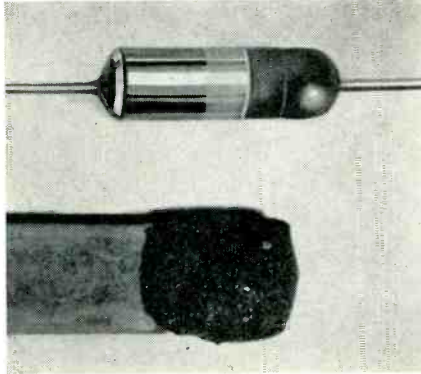


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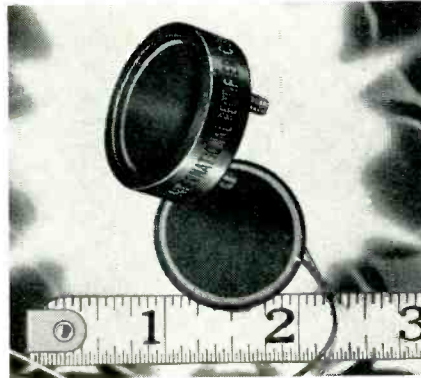
Aerovox CAPACITORS →

Type WT, Wire Tantalum, Capacitors are primarily designed for low-voltage d-c applications such as in transistorized audio amplifiers. They are extremely small in size and have an operating temperature range of -20°C to $+50^{\circ}\text{C}$ with adequate storage life. Satisfactory performance above 50°C is possible. The anode tantalum wire extends through a teflon bushing to which a solderable lead is attached. The welded connection is encapsulated in a thermo-setting resin. Aerovox Corp., New Bedford, Mass. (ELECTRONIC TECHNICIAN 1-1)



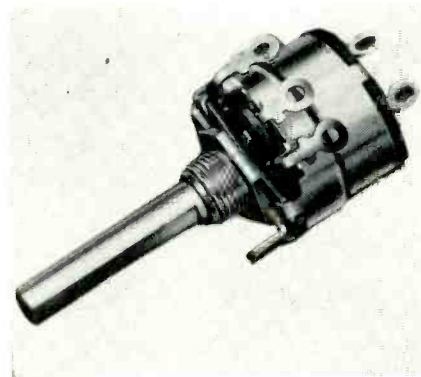
Int'l Rect. SOLAR CELL →

Silicon solar cells for the efficient conversion of light and radiant energy into electrical power of useful proportions are the latest addition to the extensive line of photovoltaic devices available. These p-n junction type cells, when grouped in a series parallel configuration, become a primary power source which may be used in most applications where storage or dry cell batteries would normally be considered. International Rectifier Corp., 1521 E. Grand Ave., El Segundo, Calif. (ELECTRONIC TECHNICIAN 1-2)



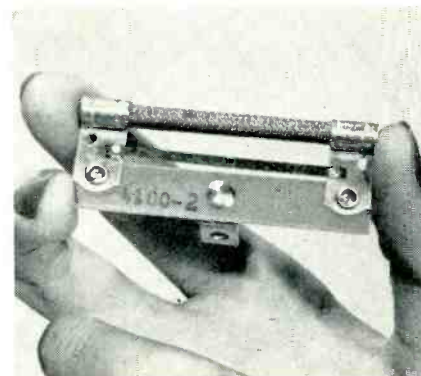
Mallory CONTROLS →

A new type of a-c line switch, with push-pull action, is now available on volume controls. The line circuit closes when the control shaft is pulled out, and opens when the shaft is pushed in. Volume level remains the same because the set is turned on and off without turning the control. Excessive wear on the low end of the element is eliminated. It is available on single and dual controls in ratings to match original controls. P. R. Mallory & Co., Inc., 3029 E. Washington St., Indianapolis 6, Ind. (ELECTRONIC TECHNICIAN 1-3)



Wuerth SURGISTOR →

The Surgistor is an entirely new component combining the functions of a resistor and a relay and is suitable for TV, radio and hi-fi sets. It is easily connected directly into the power-line circuit of any electronic device. It limits the in-rush current until the tube heaters are warmed sufficiently to accept the full voltage without damage. In addition, B+ voltages are temporarily held down to prevent cathode stripping. Wuerth Tube-Saver Corp., 9125 Livernois Ave., Detroit 4, Mich. (ELECTRONIC TECHNICIAN 1-4)



Erie PAC

PAC's (Pre-Assembled Components) field of application has been greatly widened by the use of $\frac{1}{4}$ watt and $\frac{1}{2}$ watt deposited carbon resistors. Inter-connected capacitors and resistors are automatically assembled into a unitized module for quick and easy installation. The new units were tested by subjection to a 1,000 hour humidity test in which they revealed an average change of less than 0.07% and a maximum change of 0.19%. Erie Resistor Corp. 644 W. 12th St., Erie, Pa. (ELECTRONIC TECHNICIAN 1-5)

Stackpole RESISTORS

Coldite 70+, is a new series of fixed composition resistors designed to operate at higher temperatures and in critical environments. They offer particularly outstanding performance in such essential characteristics as load life and moisture resistance. They are made by a cold-mold process that assures production uniformity. Resistance tolerances of 5%, 10%, and 20% can be furnished in all EIA preferred resistance values in $\frac{1}{2}$, 1 and 2-watt sizes. Stackpole Carbon Co., St. Marys, Pa. (ELECTRONIC TECHNICIAN 1-8)

Amperex PENTODE

The 6BQ5A tube is a 9-pin, miniature, power pentode designed primarily for use as a class B power amplifier in hi-fi audio equipment of over 20 watt capabilities. It delivers 24 watts output with only 4% distortion; which is attributed to internal construction improvements, permitting higher power output with less distortion. It is not intended to replace the type 6BQ5 in all applications. The tube is one of a series of preferred types for high quality audio applications. Amperex Electronic Corp., 230 Duffy Ave., Hicksville, L. I. N. Y. (ELECTRONIC TECHNICIAN 1-6)

Radio Receptor DIODE

A uniquely versatile subminiature silicon junction diode, the IN658 is designed for computer, communications, military and general circuit requirements, as well as for moderate power applications, and combines characteristics not heretofore available in a single unit. It will handle an average rectified current of 200 ma and has a power dissipation rating of 200 mw. It permits reducing the number of diode types required and cuts down inventory requirements. Radio Receptor Co. Inc., 240 Wythe Ave., Brooklyn 11, N. Y. (ELECTRONIC TECHNICIAN 1-7)

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MODEL 500



MODEL 510

NEW MODEL 510 ACCESSORY SOCKET PANEL

Adds over 50% more sockets to the B&K Model 500 Dyna-Quik. Enables you to quick-check many more tube types, old and new. Fits inside the cover of the Model 500. The Model 510 Accessory Socket Panel comes completely wired, ready to install and connect. Net, **\$29⁹⁵**

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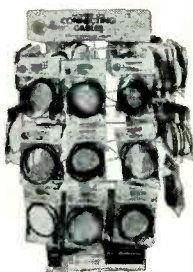
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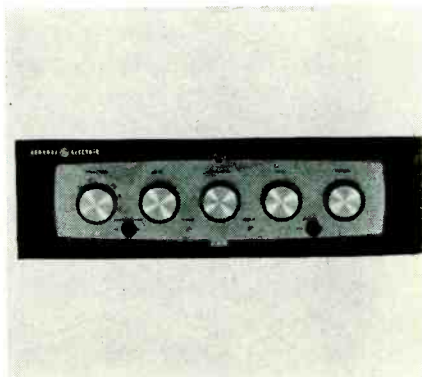
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In Canada: Atlas Radio Corporation, Toronto 18, Ontario

New Audio Products

G.E. AMPLIFIER

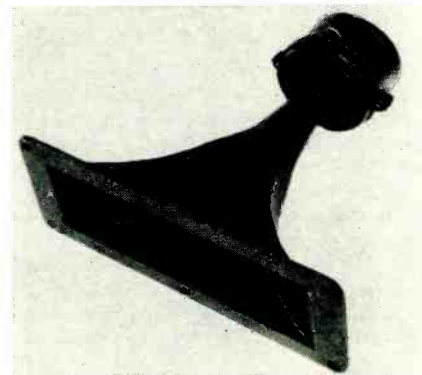
The Model PA-20 high fidelity amplifier is a versatile, moderate-price unit for custom home hi-fi systems. It has a phono input sensitivity of 5 to 7 mv at full output, and accurate phono equalization. Specifications: power output 20 watts; frequency response 20 to



20,000 cycles; harmonic distortion below 1%; hum and noise 60 db below 20 watts on phono input (weighted) 75 db below 20 watts on high level inputs (weighted); 5 inputs; and 3 outputs. Auburn, N. Y. (ELECTRONIC TECHNICIAN 1-35)

Atlas TWEETER

The new Model HR-3 Super Tweeter is a distortion-free tweeter, which features smooth operation and a wide-angle distribution pattern throughout its range of 2,000 to 17,500 cps. Each diaphragm is checked for weight and compliance to assure uniformity. Speci-



fications are: impedance 12 to 16 ohms, power (program capacity) 35 watts, cabinet opening required 6" x 2", and shipping weight is 3 pounds. L. P. \$27.50. Atlas Sound Corp., 1451 39th St., Brooklyn 18, N. Y. (ELECTRONIC TECHNICIAN 1-36)

Pilot ENSEMBLE

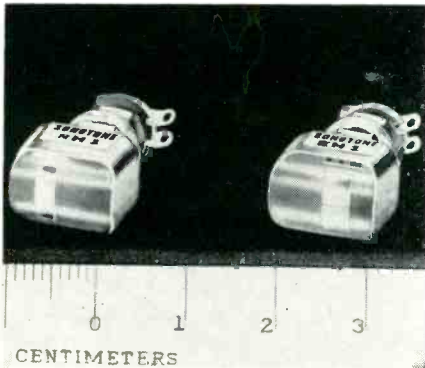
The Model 1055 embodies the FA-550 tuner, 20-watt (40 watt peak) amplifier, a matched 4-way, 5-speaker system consisting of a 15" woofer, 8" and 6" mid-range speakers and two 3" tweeters in acoustically isolated enclosures; the Garrard RC-88 4-speed



record changer with the latest variable reluctance magnetic cartridge and diamond-sapphire styli. 32" high, 39" wide, 16½" deep and features full folding doors. Pilot Radio Corp., 37-06 36th St., Long Island City 1, N. Y. (ELECTRONIC TECHNICIAN 1-37)

Sonotone RECORDER HEADS

A new series of high-fidelity, low-priced tape recorder heads has been developed for home tape recorders. They have a frequency response of 20 to 15,000 cycles. Tape wear and uneven head wear is minimized by having a smooth, hard and unbroken face. The miniaturized heads are rugged and



completely shielded. The thickness of the gap spacer is only 120 millionths of an inch. Three heads are available, a record-reproduce, erase, and a dual record-reproduce and erase. Sonotone Corp., Elmsford, N. Y. (ELECTRONIC TECHNICIAN 1-38)

For more new products see following pages:

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- 58

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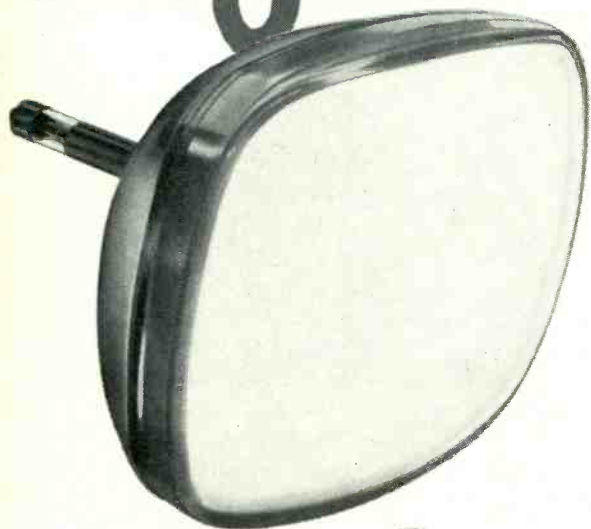
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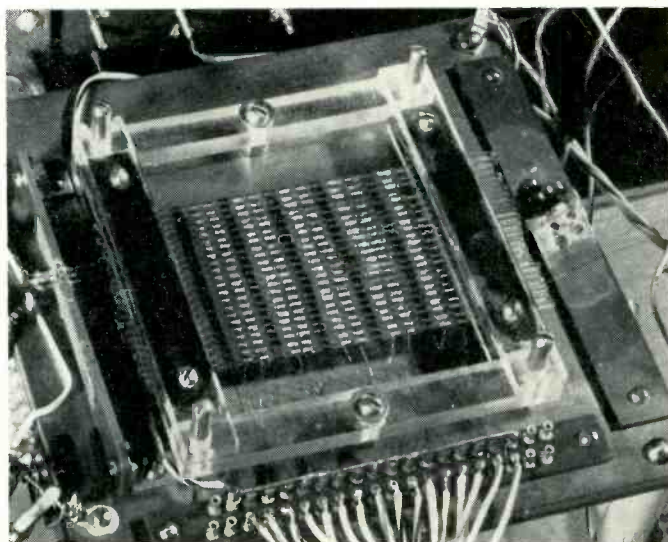
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The Twistor



An experimental magnetic memory array used to evaluate the "Twistor."

• A new concept in memory devices has emerged from exploratory work by A. H. Bobeck at Bell Telephone Laboratories. This concept, which has been named the "Twistor", is expected to make possible memory systems which are simpler to fabricate and more economical to manufacture than existing systems. The "Twistor" concept opens the way for the construction of magnetic memory arrays by merely interweaving horizontal copper wires and vertical magnetic wires, much as window screen is woven. Such a device would be similar in appearance to a ferrite core array, but without the cores, and would operate in much the same manner.

This new concept gets its name "Twistor" from a characteristic of wire made of magnetic material. Torsion applied to such a wire shifts the preferred direction of magnetization from a longitudinal to a helical path. Application of torsion to the magnetic wire in a final device may be unnecessary, as the helical path for the preferred direction of magnetization can perhaps be "frozen" into the wire during processing.

In practice, the circular magnetic field is provided by a current pulse through the magnetic wire, and the longitudinal field by a current pulse through the copper wire which is perpendicular to the magnetic wire. Thus, storing a bit requires two coincident current pulses. One pulse by itself is insufficient to store a bit. Investigations are now under way to determine optimum size and composition for the magnetic wires. It appears that a conductor plated with magnetic material may have some advantages. Diameters as small as one-thousandth of an inch appear to be feasible. At least 10 bits-per-inch may be stored on such a wire without adverse interaction. In conventional magnetic core memory devices, conductors must be threaded through the cores to make up a suitable matrix. When a ferrite sheet is employed, either a threading or a plating operation is necessary to suitably locate the conductors. However, with the "Twistor", the ferrite material is completely eliminated and no threading or plating is necessary. Present indications are that the drive circuits for a "Twistor" array can be readily transistorized. Thus, a memory system using the "Twistor" concept will retain all of the advantages of ferrite core or sheet systems, and will be much simpler and more economical to fabricate. •

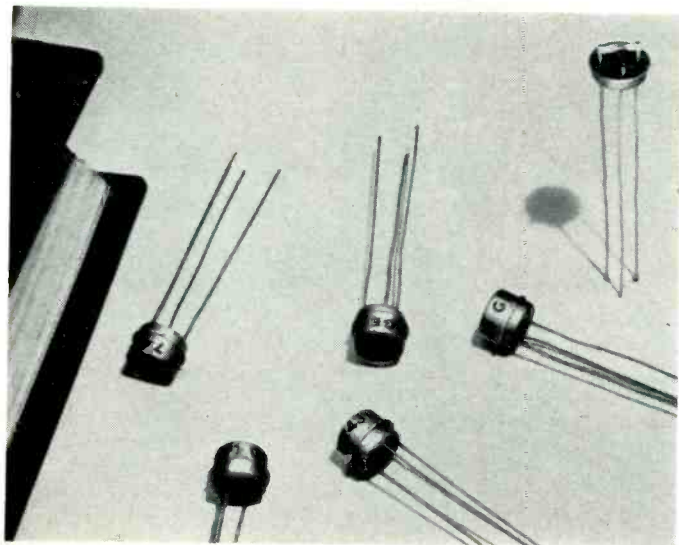
Silicon Unijunction Transistors

• The unijunction transistor, originally called the double-base diode, was invented by Dr. I. A. Lesk of the General Electric Advanced Semiconductor Laboratory. It has been under development for over five years. Although the new electronic device carries the term "transistor" in its name, it is totally different in both its construction and operation from the conventional transistor. The term "transistor" was incorporated in the component's name because it meets the industry-accepted definition for a transistor. A transistor is generally said to be "any active semiconductor device having three or more terminals." The unijunction transistor is primarily useful in switching and oscillator circuits. In addition, it has the unique ability to sense voltage levels and temperature variations. Or by various circuit modifications, it can be made insensitive to temperature and voltage variations. Thus a third and totally new semiconductor component, in addition to conventional transistors and diodes is available. It is the nearest solid state equivalent of a small controlled-grid thyatron.

The devices are particularly recommended for relaxation oscillators, sawtooth and pulse generators, pulse rate modulators, pulse amplifiers, multivibrators, flip-flops and time-delay circuits. Because of their high peak-current rating of 2 amperes, they are useful in medium power switching and oscillator applications where one unijunction transistor will do the circuit work of two conventional transistors. In special voltage sensing and locking circuits, one unijunction transistor has been used to replace five conventional transistors. The unijunction transistor can be operated in a number of different circuit configurations so that any of the three terminals can serve as a signal input or load output.

The internal construction of the unijunction transistor consists of a uniform doped "n"-type single crystal silicon bar and ohmic contacts at each end and an aluminum wire attached to the silicon bar between them. This assembly is mounted in a hermetically sealed enclosure to prevent contamination of the surface of the silicon and to provide a mechanically rugged component. The six types of silicon unijunction transistors, 2N489 through 2N494 have a triangular lead configuration with an orientation tab so that the device may be inserted into printed wiring boards by automatic assembly equipment. •

Silicon unijunction transistor. Originally called double-base diode.



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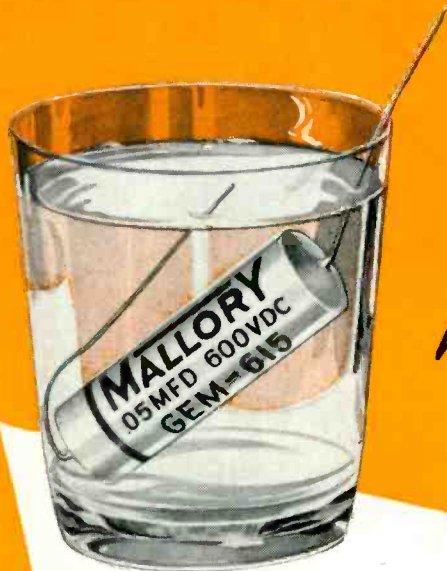
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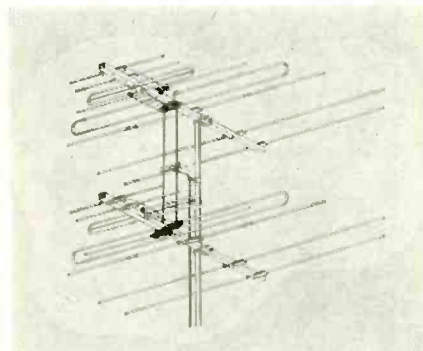
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- Controls
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NEW ANTENNAS

Telco ANTENNA

A new type TV antenna has been designed to operate in VHF fringe areas and UHF primary areas. It has been successfully tested. The Invader utilizes the uni-plane design to facilitate sharp directivity. The 4-bay model has been successful in providing reliable



reception up to 200 miles. High front to rear ratios eliminate ghost and co-channel interference. They are completely preassembled and feature the new snap-lock construction. Telco Electronics Mfg. Co., 400 S. Wyman St., Rockford, Ill. (ELECTRONIC TECHNICIAN 1-9)

Amphenol ANTENNA

The new indoor TV antenna features "slender line." A "slide-rule" tuner inductively matches the antenna to channel frequencies for fine picture adjustment. Transformer coupling matches "Vi-Fi" to TV set impedance. The antenna is said to eliminate ghosts

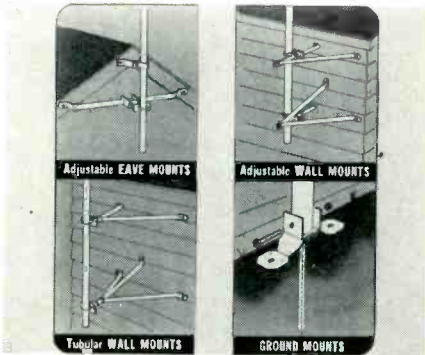


and snow in many areas. Available in VHF and VHF/UHF models. Can be mounted on top or behind the set. Packed in a 3-color counter top display carton to help sales. Amphenol Electronics Corp., 1830 S. 54th St., Chicago 50, Ill. (ELECTRONIC TECHNICIAN 1-10)

NEW ACCESSORIES

Channel Master MOUNTS

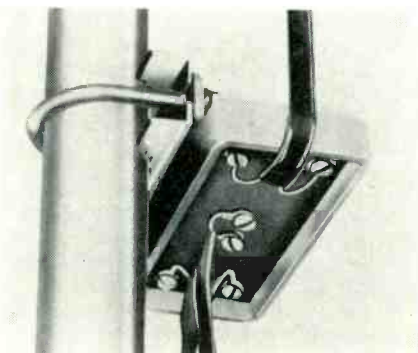
15 new mounts, feature both tubular and flat steel construction. Each mount is zinc electro-plated. The new mounts include: Universal Swivel Base Mount for flat or peak roof installations; Ground Mount with 18" long angled "spike"; Swivel Roof Mount; three



Adjustable Eave Mounts; two Wall Mounts; one 18" and one combination 18" and 3 1/2" Adjustable Wall Mounts; one 8" Snap-in-Wall Mount; and four Tubular Wall Mounts ranging from 12" to 24". Channel Master Corp., Ellenville, N. Y. (ELECTRONIC TECHNICIAN 1-11)

JFD COUPLER

A new line of outdoor TV couplers can be installed on the mast. Each is encapsulated to render the components and network impervious to the effects of rain, snow, ice and dust. Insertion loss is reduced to a minimum. Housings are molded of water-resistant high



strength butyrate. Available in three models as follows: Model AC40, \$3.50 list, for two 300 ohm TV sets; Model AC60, \$4.00 list, for three sets; and Model AC70, \$4.85 list, for four sets. JFD Manufacturing Co. Inc. 6101 16th Ave., Brooklyn 4, N. Y. (ELECTRONIC TECHNICIAN 1-12)

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New MALLORY Push-Pull Switch

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Put "1957-model" convenience into nearly any radio or TV set that needs a volume control replacement—by installing a Mallory control with the new push-pull line switch.

Pull the shaft—the set goes on. Push—and it's off. No more need to readjust volume every time the user turns the set on. No more accelerated wear on the low end of the control element.

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to fit any
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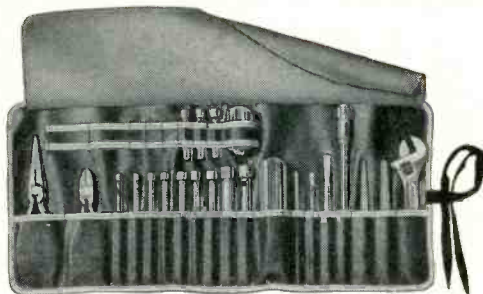
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New Audio Products

(Continued from page 53)

Vitavox SPEAKER

A new, quality British coaxial speaker is now available as a choice companion to low-distortion amplifiers. The Model DU-120 duplex coaxial speaker features a low-resonance, graded density 12" bass cone with a steep roll-off characteristic at high frequencies. The 3" high-frequency tweeter has a polyester-film diaphragm. An electro-mechanical filter system apportions amplifier output between both cones. This provides minimum IM distortion, superior transient response, and improved performance. Nominal response 30-15,000 cps, power rating 15 British watts. Ercona Corp., (Electronic Div.) 551 Fifth Ave., New York 17, N. Y. (ELECTRONIC TECHNICIAN 1-40)

Scotch MAGNETIC TAPE

A new double play magnetic tape, No. 200, is made from durable polyester film which has been "tensilized" by a new process which doubles the strength of conventional polyester film. The tape will withstand a pull of 3.6 pounds before stretching, as compared to 1.8 pounds for other double play tapes. The 7-inch reel, which contains 2,400 feet of tape, is capable of four full hours of recording at 3¾ inches per second. The new tape has the same magnetic characteristics, including improved high frequency response. It is also treated with a patented silicone lubrication process which provides a protective film between the tape and the magnetic head, cutting head wear by a significant degree. Minnesota Mining and Manufacturing Co., 900 Bush Ave., St. Paul 6, Minn. (ELECTRONIC TECHNICIAN 1-39)

Fairchild CARTRIDGE

Developed to play back the 45/45 Westrex stereo groove, the moving-coil cartridge consists of two coils—one placed inside the other, and mounted at right angles to each other at 45 degrees to the vertical axis. Vertical components produce an equal and in-phase output from both coils while lateral components produce an equal but out-of-phase voltage from both coils. This system allows the use of the cartridge not only with stereo recordings but also with either standard vertical or lateral recordings. Crosstalk between channels is attenuated by approximately 20 db at 1 kc and it is likely that further improvements will be made in this respect. The stereo cartridge uses a 0.5 mil diamond stylus and has approximately 3 mv output-per-channel. Fairchild Recording Equipment Co., 10-40 45 Ave., Long Island City 1, N. Y. (ELECTRONIC TECHNICIAN 1-42)

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New Products

Smitty FOLDING WRENCH

Due to many requests by electronic people the popular wrenches are now available with spline (Bristol) blades. The model S-6 features six blades which fold into a small handy handle. Sizes are #4, #6-4, #6-6, #8, #10 and 1/4". Hunter tools, Box 564, Whittier, Calif. (ELECTRONIC TECHNICIAN 1-30)

Clear Beam ANTENNA

In order to facilitate the introduction of a new series of "Piggy Back" Indoor antennas, a new point-of-sale display carton is available. When set up, it contains an antenna mounted as it would actually be installed on the rear of a TV set, illustrating how it eliminates the necessity of placing an antenna on top of the set. Clear Beam Antenna Corp., 21341 Roscoe Blvd., Canoga Park, Calif. (ELECTRONIC TECHNICIAN 1-13)

Taco ANTENNA

Across-the-board promotion, on the Golden Topliner, from factory-to-owner through the distributor and installer has been developed. Materials are available for a complete dealer-aid program which includes banners, newspaper ad mats, consumer mailing pieces, and point-of-sale dealer promotions. Technical Appliance Corp., Sherburne, N. Y. (ELECTRONIC TECHNICIAN 1-14)

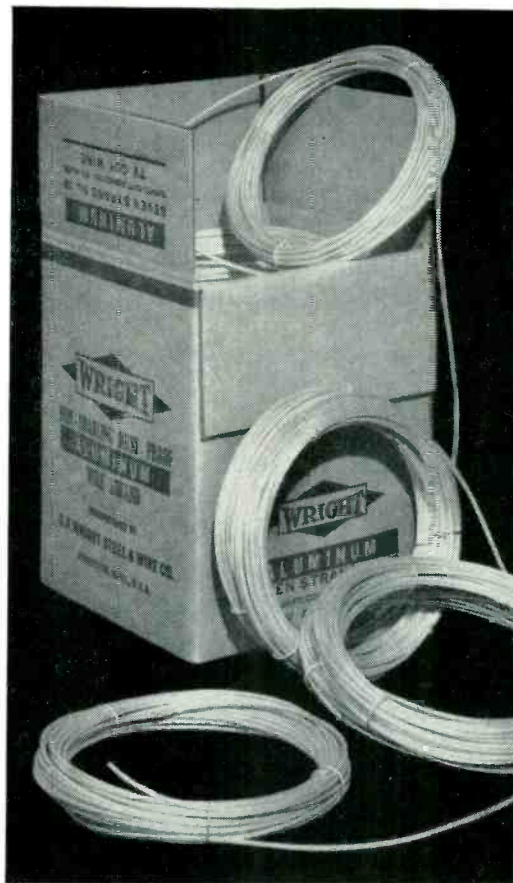
RCA TRANSISTORS & TUBES

The 2N370, 2N371, and 2N372 are drift transistors of the germanium p-n-p type designed for use in all-wave battery-portable receivers. The 2N370 is intended for r-f amplifier service; the 2N371, oscillator service; and the 2N372, for mixer service. These transistors provide the designer of such receivers with a complete transistor complement for high-gain r-f tuners.

The 2N409 and its flexible-lead version, the 2N410, are germanium-alloy junction transistors of the p-n-p type designed especially for 455-kc i-f applications.

The 2N411 and its flexible-lead version, the 2N412, are germanium-alloy junction transistors of the p-n-p type. They have characteristics which are controlled especially to meet the requirements of converter and mixer-oscillator applications in the standard AM broadcast band.

The 6021 is a premium, subminiature, medium-mu twin triode. It is designed for oscillator and amplifier service in industrial and communications equipment operating at frequencies up to 400 mc. Radio Corp. of America, Semiconductor Division, Somerville, N. J. and Harrison, N. J. (ELECTRONIC TECHNICIAN 1-34)



ALUMINUM WIRE STRAND

Aluminum Wire Strand—strong (500 lbs. breaking strength) 7 strand #18 wire—clean handling because of special pre-cleaning process—corrosion resistant—non-snarling—pre-measured—every concentric coil measures 2 feet—connected coil 1000 feet of 50 ft. coils to a carton—an addition to present line of galvanized TV wire—Prompt deliveries from stocks in Worcester, Chicago, New Orleans, Houston, Dallas and Los Angeles.

Sold only through wholesale Electronics and Hardware Distributors.

**G. F. WRIGHT
STEEL & WIRE CO.**

250 STAFFORD STREET
WORCESTER, MASS.

MORE ACTIVE! EFFECTIVE!



**KESTER
"RESIN-FIVE"
CORE
SOLDER**

**THE BEST FOR TV-RADIO WORK . . .
EVERYTHING ELECTRICAL**—Kester "Resin-Five" Core Solder is better and faster than any solder ever developed. It has an activated flux-core that does a perfect job on all metals including zinc and nickel-plate. The flux residue is absolutely non-corrosive and non-conductive.

Available in all practical Tin-Lead Alloys; 40/60, 50/50 and 60/40 in diameters of 3/32", 1/16", 3/64", 1/32" and others.



Printed Circuit Soldering
On Copper-etched boards use 60% Tin-40% Lead Alloy . . . for those that are Silver-surfaced use 3% Silver-61 1/2% Tin-35 1/2% Lead

KESTER SOLDER COMPANY

4264 Wrightwood Avenue, Chicago 39, Illinois • Newark 5, New Jersey, Brantford, Canada

Association News

TSA NEWS

Television Service Association of Michigan is accepting registration for attendance at the Midwest Electronic Forum to be held at the Statler Hotel in Detroit, February 8th through 11th.

Over 425 service dealers and technicians attended a Sylvania service

meeting held by Detroit distributor, Appliance Wholesalers. Walt Dou-thett and Bill Jones conducted the lecture and film. Door prizes and refreshments were also included.

They also report the passing of a law by the Oklahoma Legislature, known as the, "Industrial Selling Act," provides that, "purchase and disposition of articles of commerce through persons for purposes other than use or resale in regular course of business" be illegal. Texas also has a wholesale law to curb retail sales by a wholesaler.

RTG Electronics Fair

The Radio & Television Guild of Long Island, Inc., is sponsoring its second annual Electronics Fair on January 17, 18 and 19, which will be held in the Hempstead Armory in New York.

The Guild also reports that the monthly dues has been increased to \$4.00.

NJTTA

The New Jersey Television Technicians Association has just been formed. Like all associations they are looking for new members. Some of the services offered are: lending test instruments, and technical books; recovery of unpaid bills; and placement service. Officers are: Pres. Robert Labruzzo; V. P. Thomas Palazzo; Sec. Hans Schiffrers; and Treas. Frank Kraszewski. They are located at 20 Norwood Pl., in Bloomfield, N. J.

NATESA Unity

The Electronic Service Dealers Association of Pittsburgh, Pa. voted to affiliate with NATESA.

The NATESA Scope reprinted excerpts of Time Magazine's article on Buttonhook Service in the Push-button Age. They also followed it up with a copy of a letter by Frank Moch which said in part—authors of these articles do not consult the many TV-radio service associations—few isolated cases of fraud and/or incompetence creates the false impression that these are typical of the industry—suggest that the public be made aware of the real service problems—it is high time for publishers to hand a "bouquet"—.

**Our
Guarantee
is printed
on our
product**



On every packaged PLANET electrolytic capacitor sold through distributors you will find this statement:

GUARANTEED FOR ONE YEAR

Because PLANET CAPACITORS ARE "ENGINEERED FOR QUALITY", because they are carefully controlled through all stages of production and because the finished product is given a 100% electrical and mechanical check—our one-year guarantee is not only made possible, but is conservative.

Actually, thousands and thousands of Planet capacitors five, six and even seven years old are performing excellently, every day, in TV and radio sets all around the world. When you solder a Planet capacitor into a circuit your guarantee of satisfactory performance is right there in front of you—and will be in the circuit for a long, long time. So when you order capacitors—order PLANET.

PLANET SALES CORPORATION

228 BELLEVILLE AVE.

BLOOMFIELD, NEW JERSEY



"Jenkins, here, has come up with a money-saving idea. We're going to nail the backs of our sets instead of using screws."

New Books

ELECTRONIC DESIGNERS' HANDBOOK. By Robert W. Landee, Donovan C. Davis and A. P. Albrecht. Published by McGraw-Hill Book Co., 330 W. 42 St., New York 36, N.Y. 1200 pages. Hard cover. \$16.50.

Here is an authoritative reference for engineers and advanced electronic technicians. It's divided into 23 major sections, covering design and performance information on such topics as amplifiers, modulation, receivers, multivibrators, delay circuits, sawtooth generators, power supplies, antennas, etc. Examples of how various design problems are worked out are included.

INDUSTRIAL ELECTRONICS HANDBOOK. By R. Kretzmann. Published by Philosophical Library, Inc., 15 E. 40 St., New York 16, N.Y. 298 pages. Hard cover. \$12.

In factories and other business places, industrial electronics is providing vital service to industry . . . and numerous opportunities to electronic technicians. This volume explains how various devices operate, including electronic relays, counting circuits, timers, rectifiers, motor controls, heating and many special items such as ultrasonic soldering and dust precipitators. This book is not designed for fast reading. It does provide much valuable data on a broad range of industrial electronic products.

REPAIRING HI-FI SYSTEMS. By David Fidelman. Published by John F. Rider Publisher, Inc., 116 W. 14 St., New York 11, N.Y. 212 pages. Paper cover. \$3.90.

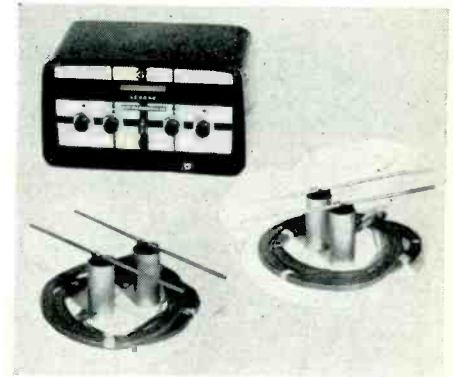
Audio repair work is on the rise.

If you want a readable and practical book on hi-fi servicing, you'll find this book answering your needs for repair information on a basic and intermediate technical level. It discusses test equipment, amplifiers, pickups, speakers, tuners, changers and recorders. Many instructive drawings, waveforms and circuits are included, as well as much "how to" material. Certain advanced techniques concerning alignment, measurement of selectivity, etc., are not included. It is hoped the author will write a book on *Advanced Hi-Fi Repair*; if he does as good a job as he has on the present volume, there should be plenty of buyers.

Gulton BURGLAR ALARM

The Electro-Sentry, a new dimension in electronic burglary protection, is easier to operate than commercial TV sets. The electronic alarm and control system provides three-dimensional protection. Applications include: operating automated components and systems; monitoring uses such as warning people

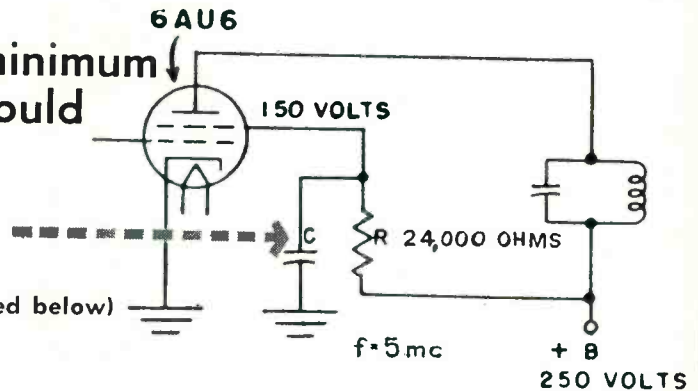
when approaching hazards; activating displays, outdoor advertising, cameras, recorders, lights; etc. In addition to being connected to a central police-warning system, the control unit can also be connected directly or through relays to other alarms such as whistles, bells, sirens and horns. Visual warning is indicated on the face panel of the console after the signal pattern has been disturbed. The Electro-Sentry is capable of operating with four sensing units, each with a radius of 25 feet. Gulton Industries, Inc., 212 Durham Ave., Metuchen, N. J. (ELECTRONIC TECHNICIAN 1-32)



No. 1 of a series of questions for progressive technicians.

Can You Handle This Problem?

What minimum value would you use for C?



(answer printed below)

To many technicians this is a difficult problem. Yet it involves a common principle, fundamental to almost every known electronic circuit. With manufacturers' diagrams the solutions to such problems are simple . . . but can you do them accurately by applying only fundamental theory?

Electronic fundamentals are the key to all electronic equipment. The man who understands these "mental tools" is not tied down to repairing common defects. The great advances in electronic devices demand the services of men who "think Electronics!"

Take Home Electronics, for instance. Of course there's a need for

men who can identify and repair common defects in television receivers. But who's going to service the new electronic home devices . . . the garage door openers, "radar" cooking stoves, closed circuit television, electronic air conditioners, ultra-sonic washing machines, heat controls, burglar and fire alarms, complex hi-fi systems, etc.?

Regardless of your success with the above circuit, it will pay you to find out how you can increase your income by adding to your kit of "mental tools."

Answer to problem above:

Answer: C=25 Micromicrofarads. See coupon below for how to figure this.

Cleveland Institute of Radio Electronics

4900 Euclid Avenue, Dept. T-10, Cleveland 3, Ohio



Please send me detailed solution to problem above and information on how I may prepare for the increasing opportunities in electronics. There is no obligation.

NAME

ADDRESS

CITY

Zone () STATE

Accredited by The National Home Study Council.

T-10

Audio NEWS LETTER

ELECTRO-VOICE President Albert Kahn reveals that the company has formed a Marketing Research Division. William Wennerberg has been appointed to direct the operation.

CBC ELECTRONICS, Philadelphia, has introduced the "Music Minder" switch, featuring automatic shut-off of the entire hi-fi system after the record is played. The relay-actuated device also has a manual switch. List price is \$11.95.

V-M is practicing what it preaches. In conjunction with its color slide film

sales training for selling tape recorders, the firm uses stereo sound on tape synchronized with the slide projector. V-M is promoting stereo recorders.

ALLIED RADIO has released the Knight KN-100 "Bantam" FM/AM tuner priced at \$74.50. It features afc, AM whistle filter, and FM sensitivity reported at 3.5 uv for 20 db quieting.

OCTOBER has been designated National High Fidelity Month by the U. S. Chamber of Commerce. Robert Walcutt, Walco president, is program chairman.

UNIVERSITY LOUDSPEAKERS is promoting the use of its equipment in the 10-week nationwide tour of Fred Waring and his Pennsylvanians.



SPRA-KOAT KIT

IN A CARRY-OUT CARTON

Now you can get the Spra-Koat Products you need at a special price. To introduce this new handy package, G-C gives you 6 pressure spray items, plus the No. 9288 Spray Gun Handle that converts every spray can to a spray gun. Buy now and save!

- Here's What You Get
- No. 8660 Aluminum Paint
 - No. 8665 Acrylic Plastic
 - No. 9123 Hi-Volt Koloid
 - No. 62-12 Telephone Black
 - No. 47-12 Corona Dope
 - No. 8667 Circuit Cooler-NEW

PLUS THIS SPRAY GUN HANDLE FREE!

REGULAR DEALER NET \$10.95

SPECIAL THIS MONTH ONLY \$8.95

SEE YOUR G-C JOBBER NOW • SEND POSTCARD FOR FREE G-C CATALOG

GENERAL CEMENT MFG. CO.

Division of Textron Inc. • 400 South Wyman Street • Rockford, Illinois

NEW! IMPROVED!

SENCORE
TRC4
TRANSISTOR
CHECKER

Another Sencore Time-Saver

America's newest, most popular test instruments

NOW CHECKS:

- ★ **Transistors** for opens, shorts, leakage and current gain. Includes new gain test on power transistors.
- ★ **Crystal Diodes** checks forward to reverse current ratio on all diodes.
- ★ **Selenium Rectifiers** checks forward and reverse currents.

Controls are accurately set for each transistor by referring to replaceable set-up chart on rear. Test leads or socket provides for fast hook-up. See your parts distributor.

SIMPLE TO OPERATE

ONLY \$17.95

Dealer Net

Cannot become obsolete. Approved by leading manufacturers.

Mfg. by **SENCORE**
by **SERVICE**
INSTRUMENTS CORP.
171 OFFICIAL RD., ADDISON, ILL.

Cut out this ad now for further information

TELCO ELECTRONICS division of GENERAL CEMENT-TEXTRON is marketing a new FM antenna kit, No. A-124, listing at \$16.50. It is of dual-dipole turnstile design, requiring no orientation. The kit comes complete with mast, mast base and 60 ft. of transmission line.

INSTITUTE OF HIGH FIDELITY MANUFACTURERS has named subcommittee chairmen for its Standards of Measurement for High Fidelity Equipment Program; Tuners, Daniel Von Recklinghausen, H. H. Scott; Amplifiers, Dick Shottenfeld, Pilot Radio; Speakers, Abe Cohen, University Loudspeakers; Turntables, George Silber, Rek-O-Kut; Changers, Milton Thalberg, Audiogersch Questionnaires are in the works. Program is directed by Joseph Benjamin, Pilot president.

CREST ELECTRONICS, Chelsea, Mich., is offering a new line of high output magnetic tape recording heads for monaural and stereo play. Pole pieces are made of special alloy laminations rather than solid mu metal. Full shielding and special tape guide are other features. The company was formed early this year. William F. Cairns, Jr., is president; Robert G. Dailey, VP & sales manager; Albert C. Sofo, chief engineer.

BOGEN-PRESTO division of the SIEGLER CORP. announces a new alignment of its sales department. With former sales VP Lawrence LeKashman moving to a similar position at ELECTRO-VOICE, Bogen distributor sales manager Mortimer Sumberg becomes responsible for all Bogen & Presto distributor sales. Thomas L. Aye joins the organization to manage sales of professional products. David E. Pear continues as advertising and sales promotion manager. October sales were reported at an all-time record.

SARKES TARZIAN has filed a \$2 million suit in U. S. District Court in Southern Cal-

ifornia against AUDIO DEVICES, George Eannarino and other former Sarkes Tarzian employees. The complaint alleges a conspiracy to convert confidential information to the defendant's own purposes.

1958 HI-FI SHOW DATES firmed down by the Institute: Feb. 26-March 2, Los Angeles, Biltmore Hotel; Sept. 30-Oct. 4, New York,

Trade Show Bldg.; Feb. 14-16, San Francisco regional show, Whitcomb Hotel. A Chicago show is NOT contemplated by the Institute for 1958.

DUOTONE reports the first 100 boxes of its \$50 diamond phono needles have been ordered by Liberty Music Shops. A hi-fi test record is included with each, along with a 75-power test microscope and tools.

you can
hear the
quality of
a

QUAM
Adjust-a-Cone[®]
SPEAKER

When you install a Quam speaker, listen to it carefully. Your ears will tell you why Quam Speakers have earned the reputation of "the Quality Line."

No other replacement speaker offers you all these important quality features: patented Adjust-a-Cone[®] suspension, U-shaped pot, heavier magnetic structures, 4 threaded holes in coil pot, transformer brackets, universal mounting brackets, factory packaging, listing in Howard Sams' Photofacts.

For happier customers,

ask for QUAM, the quality line, for all your speaker needs

**QUAM-NICHOLS
COMPANY**

226 E. Marquette Road

Chicago 37, Illinois

Test Your Tax I.Q.

How much do you know about federal Income Tax? Try this quiz.

PREPARED BY THE AMERICAN INSTITUTE OF
CERTIFIED PUBLIC ACCOUNTANTS IN
COOPERATION WITH THE INTERNAL
REVENUE SERVICE

1. During the past year you spent approximately \$1,000 for built-in shelves and wall-to-wall carpeting for your office. Since your lease has only four years to run, you may . . .
 - (a) Deduct the \$1,000 on your 1957 tax return
 - (b) Amortize the cost over the next four years
 - (c) Depreciate it over the life of the furnishings
2. When you were transferred to another city, your company gave you a sum of money toward the cost of moving you and your family. For tax purposes you should consider this money as . . .
 - (a) A gift that is not taxable
 - (b) Income that is subject to tax with a deduction for only your personal moving expenses
 - (c) Income that is subject to tax with a deduction for the cost of moving your entire family
3. You have invested in several blue-chip stocks. The dividends received from this investment are exempt up to . . .
 - (a) \$50 whether you or your wife owns the stock
 - (b) \$100 if the stock is held jointly by you and your wife
 - (c) \$100 regardless of who owns the stock, providing you file a joint return with your wife
4. You are *not* permitted to deduct as contributions your donations to which of the following organizations . . .
 - (a) Charitable societies
 - (b) Educational institutions
 - (c) Political parties
5. Your daughter, who was hospitalized for several weeks in the earlier part of 1957, was married in November. If she files a joint return with her husband, you may . . .
 - (a) Not claim her as a dependent
 - (b) Claim her as a dependent and deduct her medical expenses
 - (c) Not claim her as a dependent and you may not deduct her medical expenses
6. You filled very few inside straights during the past few months and lost approximately \$300 to the members of your Thursday night poker club. You should . . .
 - (a) Deduct the loss in computing adjusted gross income
 - (b) Subtract the loss from adjusted gross income
 - (c) Give up poker and start watching television on Thursday nights
7. Last October your car skidded on a wet road and grazed a telephone pole. The damage was not covered by insurance and it cost you \$100 to have the car repaired. To claim a casualty deduction . . .
 - (a) You must have the damage repaired within 30 days of the accident
 - (b) You may simply deduct the amount of the repair bill
 - (c) You must prove that you were using the car in your work at the time of the accident
8. Which of the following may you *not* consider as a deductible business expense . . .
 - (a) A subscription to Electronic Technician
 - (b) Commutation fees
 - (c) The costs of attending the NATESA convention
9. While playing hide-and-peek in your backyard, the neighbor's children trampled and killed several of your more expensive bushes. The cost of replacing this shrubbery . . .
 - (a) May be deducted if it does not exceed the original cost of the bushes
 - (b) May be deducted only if the parents of the children refuse to pay damages
 - (c) May not be deducted under any circumstances
10. Your 16-year old son works during the summer for you in your unincorporated business, and you pay him a weekly salary. Since he is a full-time employee, he is . . .
 - (a) Required to pay social security
 - (b) Not subject to social security
 - (c) Permitted to decide whether he does or does not want social security coverage
11. Last year you gave your church a small piece of property for which you had paid \$500 some time ago. Its value at the time of the gift was \$1,500. As a result . . .
 - (a) You may claim a tax deduction of \$1,500
 - (b) You must pay a capital gains tax on the \$1,000 increase
 - (c) You may claim a tax deduction of \$500
12. There were a few leaks in the shingle roof of your office building; so you constructed a new tile roof. You should . . .
 - (a) Consider this as a repair bill and deduct the entire amount as a business expense on your 1957 return
 - (b) Regard this as a capital improvement and depreciate the cost over a period of years
 - (c) Add the cost of the repair to the value of the property
13. After you have filed your personal 1957 tax return, the Government is allowed to check your return and bill you for additional tax. The period of time in which this may be done ends . . .
 - (a) On the day you file your 1958 return
 - (b) Two years after you file your 1957 return
 - (c) Three years from the due date of your 1957 return
14. On the advice of a friend, you engage a CPA to prepare your 1957

You can find the correct answers to these questions starting on page 68.

(Continued on page 68)

Sunspot Activity

(Continued from page 41)

predictable. Experience to date shows it may be from a few seconds to many hours. When the interfering station does start to die away, the whole process repeats itself in reverse. The interference usually recedes faster than it comes, but not always.

When the TV set owner sees interference like this he of course thinks there is something wrong with his receiver. He calls you and expects action. How much can be done depends upon the location, the nature of the opening, and the details of the installation.

In any event, no matter how much can be done physically, the technician should explain that it is Mother Nature who is primarily responsible and, even if the effects can be minimized in this case, there is always a chance of similar interference which cannot be eliminated but must be "waited out."

The next thing is to consider the directions of the normally-received stations and the interfering stations, and the relative directivity of the receiving antenna. If the normal and interfering stations are in different directions, increase in sharpness of directivity of the antenna will help. Unfortunately, skip signals, especially sporadic E and F signals, come in at such a high angle that they can sometimes come in over reflectors. Large screen-reflectors are best. Naturally, the improvement possible depends on what kind of antenna is already being used. Simple dipoles and indoor "rabbit ears" have such little directivity that considerable improvement can be effected.

Except for the obvious cases of antenna improvement, it is questionable whether much time should be spent on elaborate systems to eliminate interference of this nature. The skip condition may be over by the time you finish and the customer might be unhappy thinking about the cost during the length of time before the next similar "opening" occurs. However, the other benefits of a better antenna system might combine with the advantage in this respect to sell a good installation. It is certainly a valid additional argument in those many cases where the customer is just about getting by with an antenna several years old, which should be replaced with a more up-to-date and sturdier unit in any case. •

ALL OVER THE U.S.
Utah **STANDS for**
UNSURPASSED SERVICE

Yes...
ALL OVER THE U.S.
UTAH STANDS for UNSURPASSED SERVICE

Yes, all over the U. S.—Utah stands for Unsurpassed Service.

US—Utah and the Service Man—because Utah stands behind you—the Service Man.

Utah stands behind you—with a speaker name that for over 30 years has signified the finest in quality, design, engineering and production.

Utah stands behind you with a speaker that gives installation performance. You can sell customer satisfaction with a Utah—because Utah gives performance satisfaction.

Utah stands behind you—with a secure source of supply. Leading jobbers all over the U. S. handle Utah—because Utah has the finest and widest line of replacement speakers available to the trade.

Utah is your one, complete satisfactory speaker source. When you order speakers today — **THINK—then order Utah.**

Utah your one complete speaker source auto * Rear Deck Kits * Standard Replacement * Television * Public Address * High Fidelity * Outdoor * Inter-Com * Wood & Metal Baffles

Get your **FREE** copy of the latest Utah Catalog S-157 listing over 100 replacement speakers. Available at your distributors or write direct.



RADIO PRODUCTS CORPORATION
HUNTINGTON • INDIANA

Export Dept. Fidevox International, Chicago, Illinois



SERVICE MEN KNOW THERE IS JUST ONE

HUSH

Reg. U. S. Pat. Off.

Chemically engineered for tuners and switching mechanism

Hush comes in a 6 oz. pressure can with sufficient pressure to reach all contacts to wash-away that dirt, leaving clean and positive contacts, protected with a lasting lubricant film. Hush also available in 2 oz., 8 oz. and 32 oz. containers. **\$2.25 net**

EVER-QUIET

Reg. U. S. Pat. Off. Pend.

Since 1949 the Original Volume Control and Contact Restorer

EVER-QUIET is a free-flowing liquid that leaves no powder residue. Scientifically designed to seep around the shaft and penetrate the control or potentiometer, cleaning and contacts and leaving a safe protecting film. Harmless to metals, wire or carbon. Will not affect inductance, capacitance or resistance. 2 oz. bottle with handy dispenser (32 oz. size available) **79¢ net**

See your distributor or write to

CHEMICAL ELECTRONIC ENGINEERING, INC. Matawan, New Jersey



the specs are the proof . . .
 the **BEST BUYS** are **EICO**[®]
 for **COLOR & Monochrome TV servicing**



NEW COLOR
 and Monochrome
DC to 5 MC LAB & TV
5" OSCILLOSCOPE

= 460
 Factory-wired
 and tested **\$129⁵⁰**
 Also available as kit **\$79⁹⁵**

• Features DC Amplifiers!

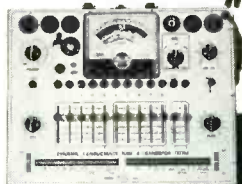
Flat from DC-4.5 mc, usable to 10 mc. **VERT.** **AMPL.:** sens. 25 rms mv/in; input Z 3 megs; direct-coupled & push-pull thruout; K-follower coupling bet. stages; 4-step freq-compensated attenuator up to 1000:1. **SWEEP:** perfectly linear 10 cps-100 kc (ext. cap. for range to 1 cps); pre-set TV V & H positions (30 & 7875 cps); auto. sync. ampl. & lim. **PLUS:** direct or cap. coupling; bal. or unbal. inputs; edge-lit engraved lucite graph screen; dimmer; filter; bezel fits std photo equip. High intensity trace CRT. 0.06 usec rise time. Push-pull hor. ampl., flat to 400 kc, sens. 0.6 rms mv/in. Built-in volt. calib. Z-axis mod. Sawtooth & 60 cps outputs. Astig. control. Retrace blanking. Phasing control.



NEW TV-FM
SWEEP GENERATOR
& MARKER

= 368
 Factory-wired
 and tested **\$119⁹⁵**
 Also available **\$69⁹⁵**
 as kit

Entirely electronic sweep circuit (no mechanical devices) with accurately-biased inductor for excellent linearity. Extremely flat RF output: new AGC circuit automatically adjusts osc. for max. output on each band with min. ampl. variations. Exceptional tuning accuracy: edge-lit hairlines, 6:1 vernier. Swept Osc. Range 3-216 mc in 5 fund. bands. Variable Marker Range 2-75 mc in 3 fund. bands; 60-225 mc on harmonic band. 4.5 mc Xtal Marker Osc., xtal supplied. Ext. Marker provision. Sweep Width 0-3 mc lowest max. deviation to 0-30 mc highest max. dev. 2-way blanking. Narrow range phasing. Attenuators: Marker Size, RF Fine, RF Coarse (4-step decade). Cables: output, 'scope horiz., 'scope vertical.



NEW DYNAMIC
CONDUCTANCE
Tube &
Transistor Tester

= 666
 Factory-wired
 and tested **\$109⁹⁵**
 Also available **\$69⁹⁵**
 as kit

COMPLETE with steel cover and handle.

SPEED, ease, unexcelled accuracy & thoroughness. Tests all receiving tubes (& Color & Monochrome pic tubes with adapter). **Composite** indication of Gm, Gp & peak emission. **Simultaneous** sel of any 1 of 4 combinations of 3 plate voltages, 3 screen voltages, 3 ranges of continuously variable grid voltage (with 5% accurate pot). New series-string voltages: for 600, 450, 300 ma types. Sensitive 200 ua meter. 5 ranges meter sensitivity (1% shunts & 5% pot). **10 SIX-position** lever switches: free-point connection of each tube pin. **10 pushbuttons:** rapid insert of any tube element in leakage test circuit & speedy sel. of individual sections of multi-section tubes in merit tests. **Direct-reading** of inter-element leakage in ohms. New gear-driven rollchart. Checks n-p-n & p-n-p transistors: separate meter readings of collector leakage current & Beta using internal dc power supply.

See the 50 EICO models IN STOCK at your neighborhood distributor. Write for **FREE** Catalog T-1

Prices 5% higher on West Coast



33-00 Northern Blvd.
 L. I. C. 1, N. Y.

HIGH FIDELITY SPEAKERS: An 8-page, 3-color, circular illustrates, describes, and gives audiophile net prices of the new Cathedral Series comprising 14 speakers and one 3-speaker combination board with crossover network. Cletron Inc., 1974 East 61st St., Cleveland 3, Ohio. (ELECTRONIC TECHNICIAN No. B1-1)

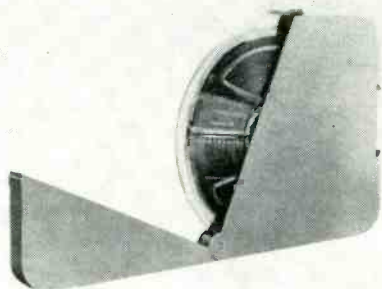
ANTENNAS: 92 different antenna models for VHF and UHF, color and black-and-white TV; and 10 do-it-yourself antenna kits are covered in a 24-page, 2-color catalog. Models are illustrated, described and priced. Telco Electronics Mfg. Co., 400 S. Wyman St., Rockford, Ill. (ELECTRONIC TECHNICIAN No. B1-3)

PANEL & FLASHLIGHT LAMPS. A new chart giving a composite listing, arranged numerically, enabling the user to determine name of manufacturer, bulb type, base, volts, amps and bead color. Bulb types are illustrated with physical dimensions. The Radio-Electronic Master, 60 Madison Ave., Hempstead, N. Y. (ELECTRONIC TECHNICIAN No. B1-4)

TRANSISTOR HOME-STUDY COURSE: 10-lessons. Primarily designed for independent service-dealers. Available through CBS Tube Distributors or by writing to Transistor Course, CBS-Hytron, a Division of Columbia Broadcasting System, Inc., Danvers, Mass. (ELECTRONIC TECHNICIAN No. B1-20)

Ferrodynamics TAPE

A shatter-proof, high-impact polystyrene container for Sonoramic recording tapes. Closes tightly for protection; has a hinged front that pushes the reel forward for accessibility; fits into bookshelves; may be stacked on a table or hung on the wall. Comes with



pressure sensitive index labels and a tape-time ruler. Some features of Sonoramic Tape are: distortion-free recordings; high resistance to abrasion; and maximum performance despite limiting factors, such as line voltage fluctuations, tube age, or condition of recording head. Ferrodynamics Corp., Lodi, N. J. (ELECTRONIC TECHNICIAN 1-51)

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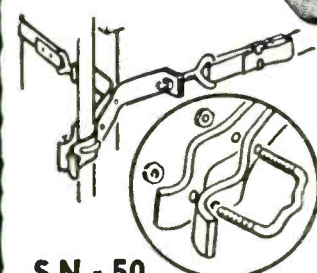
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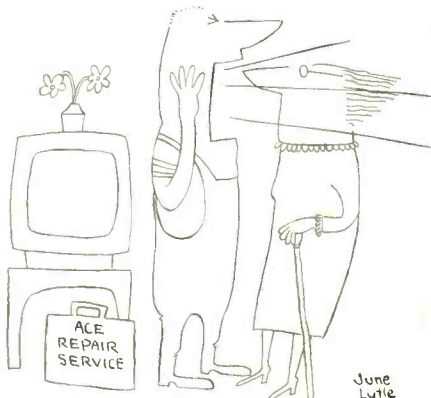
(Continued from page 38)

transmitting service, the telescopic antennas cannot be used, because of the r-f resistance in the joints, and the likelihood of detuning the antenna by attempting to operate with the rod partially telescoped. The disguised antenna is a solid rod having dummy joints. They resemble the ordinary receiving antennas so closely that one unit was damaged by a service-station attendant, trying to make it telescope.

Lead-ins on these antennas are stub-matched, to compensate for the loss of length. A special lead-in must be built for each antenna. They are cut and matched for a particular operating frequency. In the station wagon shown in Fig. 2, this type of antenna was used because of the need for a front mount and appearance.

Mounting procedure for this type of antenna is similar to that for the regular car radio antennas. The unit shown in Fig. 6 looks exactly like an ordinary antenna. A brace and strap in the fender well, helps support the greater weight of the solid rod against normal driving stresses and strains.

In short, the alert technician can find many additional opportunities in installation work of this kind. With the rapid growth of two-way radio in the past few years, and especially with the setting up of so many Civil Defense radio networks, more and more family cars are being equipped. Consideration of the customer's point of view paid off in improved customer relations, more TV work and pride in a job well done. ●



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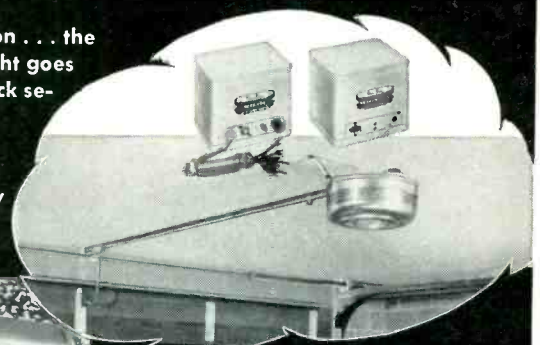
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Your Tax I. Q.

(Continued from page 64)

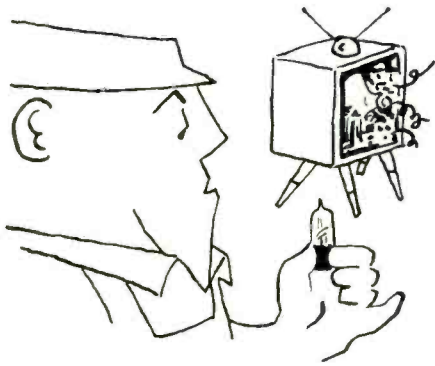
tax return. The fee he charges for this service is . . .

- (a) Not deductible since it is a personal expense
- (b) Not deductible if you are entitled to a refund
- (c) Deductible in full

Correct Answers

1. (b) On leased property, you normally spread the cost of improvements over the shorter period—the life of the improvement or the term of the lease. Since your lease expires in four years and presumably the furnishings will have a longer life than that, you should be able to claim a \$250 deduction on your federal tax return for this year and the next three years.
2. (c) The money you received from the company must be reported as income, but you may deduct the cost of moving your entire family. If the amount the company gives you exceeds your expenses, the excess is taxable. Conversely, however, if your expenses were more than the amount received, the difference is not deductible.
3. (a) and (b) are both correct. All taxpayers are entitled to a \$50 dividend exemption. A husband and wife can combine their exemptions and receive \$100 in dividends tax free, providing the stock is jointly owned. The filing of a joint return will not qualify them for this double exemption if the stock is held in only one of their names.
4. (c) You cannot deduct contributions to an organization which spends a substantial part of its time lobbying or distributing political propaganda.
5. (a) You gained a son-in-law but lost a \$600 dependency exemption for 1957 when your daughter married in November. All is not lost, however. If you provided more than one-half of your daughter's support during the year, you may claim her medical expenses as a deduction on your return.
6. (c) Watching television can be most relaxing and it might even help you to forget your poker losses—which is the thing to do because net gambling losses are definitely not deductible. Net gambling gains are taxable as income; so if you won money in a football pool or other sources, you may use your poker losses to offset these gains.

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7. (b) The IRS has ruled that "if the repairs do nothing more than restore the property to its condition immediately before the casualty and do not add to (its) value, utility or useful life, such repair costs may be used as a measure of the value of the destroyed portion." Where you were going at the time of the accident does not affect the deductibility of car damages.

8. (b) Commutation fees are not a deductible business expense. The cost of going to and returning from work, whether it be by bus, cab, train or plane, is not deductible since it is a personal expense. On the other hand, a and c are deductible.

9. (c) Damage to your shrubbery caused by children, dogs or errant lawnmowers is not deductible. If your home or lawn is damaged by fire, storm or flood the loss not covered by insurance may be deducted. When large amounts are involved it is wise to have an expert appraisal made immediately after the casualty.

10. (b) Since your son works for you, you are not supposed to pay social security tax on his wages, nor is he required to make contributions. If your business is incorporated, however, the corporation must pay social security tax on his salary.

11. (a) Your deduction for a charitable contribution is the value of the gift at the time it is made. You are not considered to have realized a taxable gain or deductible loss when you give property away. You may claim a deduction for the entire \$1,500 so long as this amount does not exceed 20 per cent (30 per cent in some cases) of your adjusted gross income.

12. (b) The roof is considered an improvement, not an ordinary repair. The cost of replacing the roof is deductible as depreciation spread over its estimated useful life.

13. (c) In the absence of fraud or substantial understatement of income, the Government has three years from the due date of your 1957 return to check your return and bill you for additional tax. Since the due date of most individual returns is April 15 and for investigation purposes all returns are treated as though filed on the due date, you should be sure to save all check stubs and receipted bills to prove your declared deductions.

14. (c) The fee which a CPA charges you to prepare a tax return or defend the accuracy of your return before the Treasury Department is deductible in full if you itemize deductions.

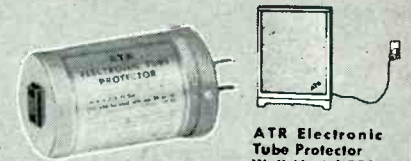
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Electronic Tube Protector

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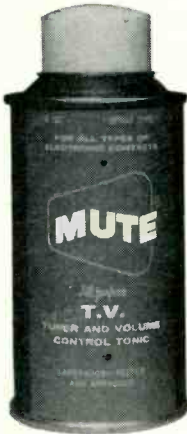
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"Consumer Reports"

(Continued from page 34)

pointer-indicator from the actual frequency being received. This can be important in locating stations that are close in frequency. The smaller this figure, the more accurate the tuning indication.

Harman-Kardon	Bogen	Sherwood	Pilot
0.07 mc	0.3 mc	0.2 mc	0.03 mc

CU did not explore tuning accuracy to any important degree in their report.

Summary

In addition to showing the differences between our test findings and CU's, this report has provided the manufacturers with specific data for making still better products. Constructive action, such as the manufacturers' circuit modifications noted, is the outgrowth.

We do not believe that if we purchased 4 more of these same tuners we would necessarily obtain the same test readings, or even the same relative readings from one tuner to the next, but such differences are not critical to the ear. These differences usually are not large since they would fall within the manufacturer's production tolerances. However, the various makes of tuners are close enough in overall performance to cause changes in rank on the basis of very small performance differences.

It should be of interest for us to summarize, in first (best), second, third, and fourth place orders how the 4 tuners compared for each of the test criteria. Measurements with almost the same readings will be considered tied for a given place. Perhaps, this summary, as much as anything else, will dramatize our belief that no one of these tuners deserves to be singled out as a best buy, while the other three are relegated to a second "checkless" echelon. They are good tuners capable of providing much listening pleasure to high fidelity enthusiasts.

NOTE: It is not possible to obtain an objective composite ranking from the following individual test rankings. It would be meaningless to add up the firsts, seconds, etc., since the individual tests are not necessarily equal in importance. Furthermore, it does not reflect a tie third in one test and a fourth place in another. Nor does it show a weak fourth compared to a close fourth.

Test Rankings

Test	Harman-Kardon First	Bogen First	Sherwood First	Pilot First
Listening Frequency Response	First	First	First	Second
Sensitivity (40 db) *	Third	Fourth	First	Second
Intermodulation Distortion (40 db) **	Fourth	First	Second	Third
Regeneration	First	First	First	First
Selectivity	First	Fourth	Third	Second
Hum	First	Second	First	First
Tuning	First	Third	Second	First

* The difficulty of assigning rankings is illustrated here. Positions are based on tests at 40 db quieting. However, if "the best" figure were used, the one for 20 db, Bogen would be second and Pilot fourth.

** Here again if we sought "the best" or minimum figure, Sherwood would be first. The 40 db 30% modulation test was chosen because it is a representative situation for actual listening. However, this same test at 80% modulation would place Pilot second and Sherwood third. When tuned by the set's own indicator, AFC on, Pilot would be first. It depends on the user's technique and reception conditions. This should underscore the need for being very specific when rating each capability of each tuner.

Contest Winner On the Town

One of the first stops for the grand prize winner of the Pyramid Servicemen's Twist-Mount Contest was New York's Gaslight Club. Shown is Burton Browne telling an amusing story to Mr. and Mrs. R. Berthold,



Springfield Gardens, N. Y. Mrs. Browne (right) is also interested. Berthold won \$100 in cash, and a weekend at the Waldorf in New York. Pyramid Electric Company, North Bergen, N. J., sponsored the contest and were hosts for the evening. Burton Browne Advertising is their agency.

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January, 1958



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since we bought the
JENSEN NEEDLE".*

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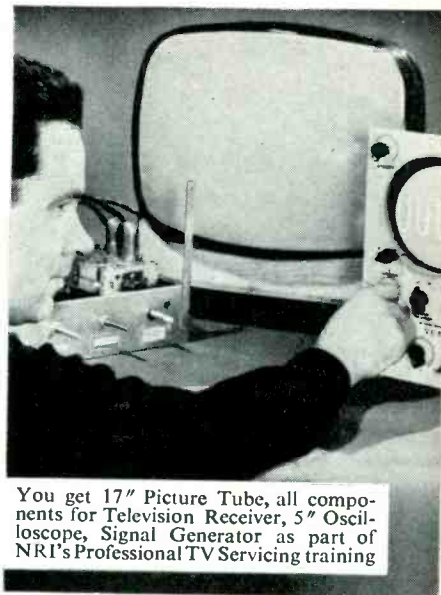
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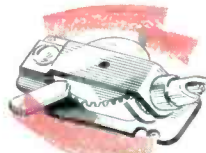
MODEL 76Ds, one 1-mil diamond, one 3-mil sapphire tip. Was, \$21.50 list. **NOW, ONLY \$16.50 list.** Color Code: Pink.

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• BLUE—Model 56, one 1-mil, one 3-mil sapphire tip—\$3.95 list.



• WHITE—Model 76S, one 1-mil, one 3-mil sapphire tip—\$4.25 list.

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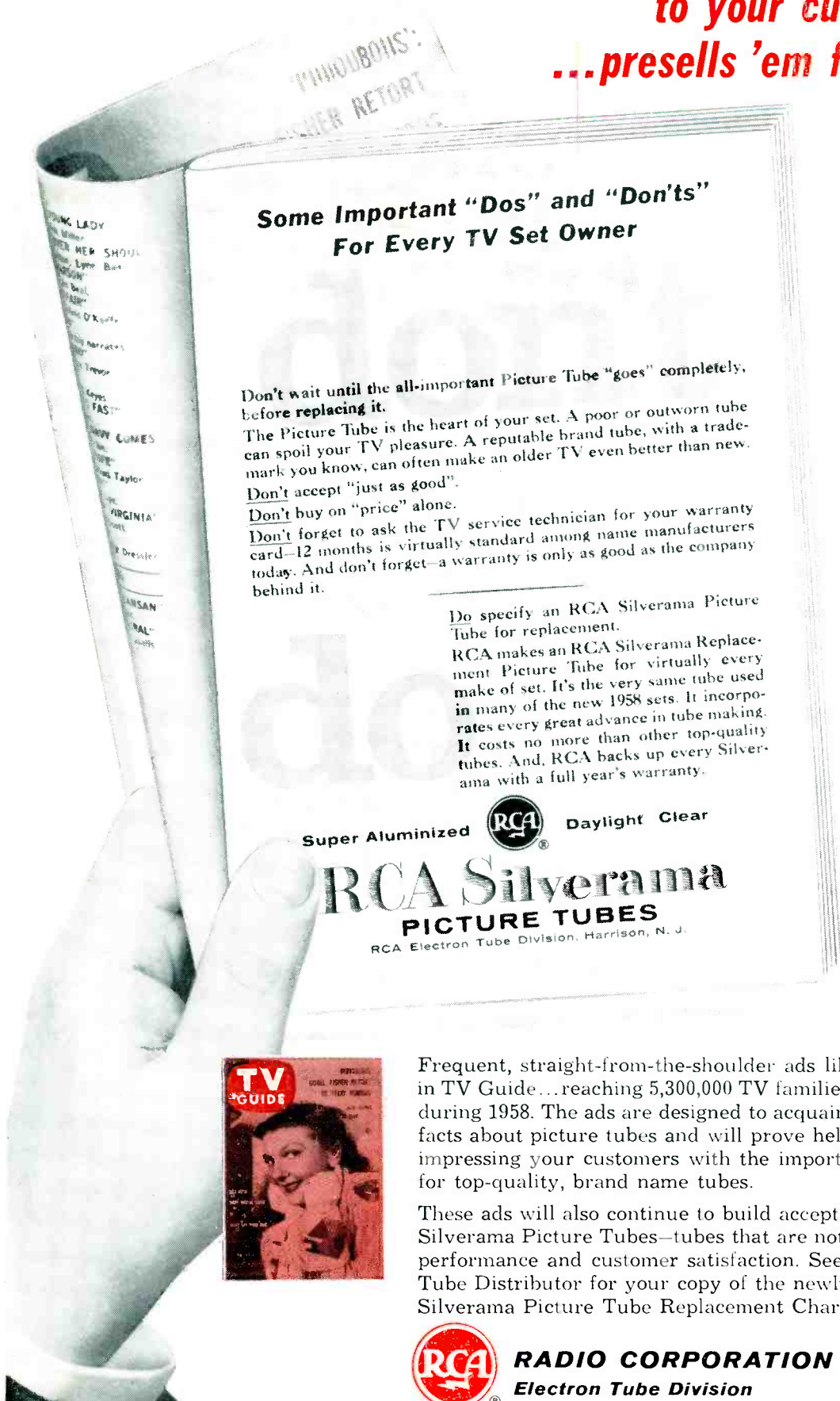
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The Picture Tube is the heart of your set. A poor or outworn tube can spoil your TV pleasure. A reputable brand tube, with a trademark you know, can often make an older TV even better than new.

Don't accept "just as good".

Don't buy on "price" alone.

Don't forget to ask the TV service technician for your warranty card—12 months is virtually standard among name manufacturers today. And don't forget—a warranty is only as good as the company behind it.

Do specify an RCA Silverama Picture Tube for replacement.

RCA makes an RCA Silverama Replacement Picture Tube for virtually every make of set. It's the very same tube used in many of the new 1958 sets. It incorporates every great advance in tube making. It costs no more than other top-quality tubes. And, RCA backs up every Silverama with a full year's warranty.

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TNS-59N A1 7E45B



Frequent, straight-from-the-shoulder ads like this will appear in TV Guide...reaching 5,300,000 TV families coast to coast during 1958. The ads are designed to acquaint the public with facts about picture tubes and will prove helpful in impressing your customers with the importance of asking for top-quality, brand name tubes.

These ads will also continue to build acceptance for Silverama Picture Tubes—tubes that are noted for trouble-free performance and customer satisfaction. See your RCA Tube Distributor for your copy of the newly revised RCA Silverama Picture Tube Replacement Chart.



RADIO CORPORATION OF AMERICA
Electron Tube Division

Harrison, N. J.