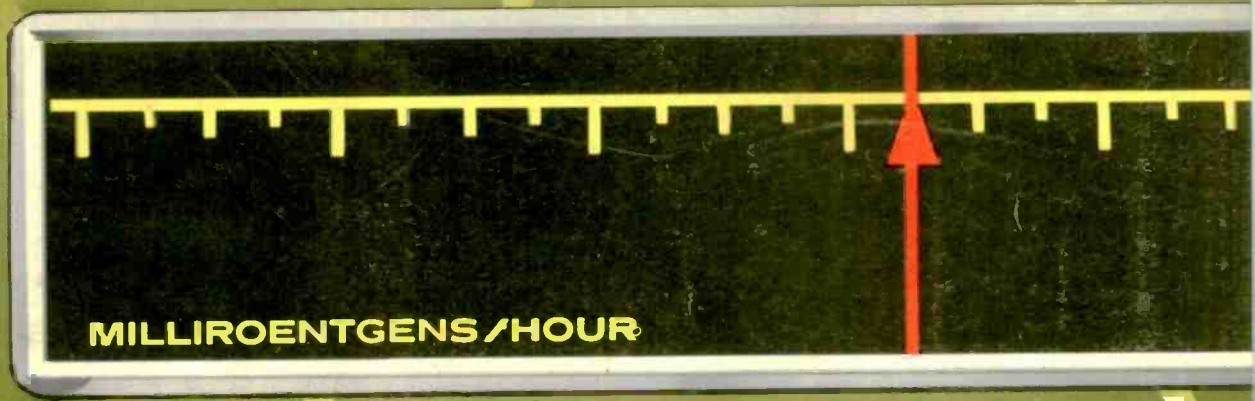
ELECTRONIC TECHNICIAN

including 16 pages of latest
CIRCUIT DIGESTS



ELECTRONIC DEVICES DETECT RADIATION

ALSO IN THIS ISSUE:

Whipping TV Transformer Problems

How to Install FM Auto Converters

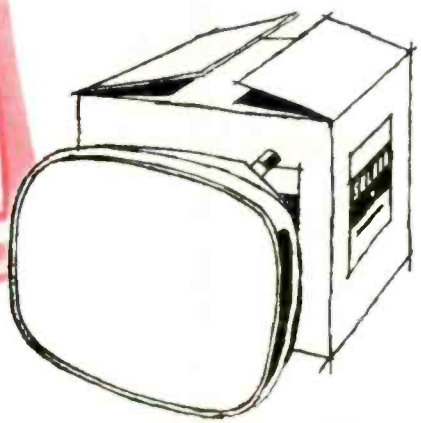
60¢ MARCH 1962

3,516,032 facts of life!

• At Seneca Falls, New York, Ottawa, Ohio, and Fullerton, California—where Sylvania manufactures picture tubes—engineers give Silver Screen 85's hours upon hours of severe performance and life tests. Tubes taken at random from production lines are actually operated in commercial TV sets typical of those your customers own. Additional tubes are placed in specially designed life test racks, where operating conditions are even more severe than in normal receivers. In this way, Sylvania gets all the facts of tube-life. These facts provide the feedback data that are essential to a continuing program of producing top-level quality picture tubes.

• What is the significance of 3,516,032? This is the number of hours of severe life testing to which Silver Screen 85's were subjected in the year 1961! Covering some 120 tube types, these over 3½ million life test hours assure Sylvania and *you* that Silver Screen 85 picture tubes remain second to none in life and sustained top performance. It is your most reliable assurance of no costly callbacks due to premature picture tube failure, or complaints of unsatisfactory picture performance. Remember Sylvania's 3,516,032 hours of quality monitoring—they can mean more profits for you.

Electronic Tubes Division, Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.



Sylvania Silver Screen 85—
available wherever there is TV.

SYLVANIA

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- - - for more details, circle 48 on page 50

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1" tubular aluminum, weatherpro redwood back, seat and arms. 6" rubb tired wheels, plastic covered 2" thic soft poly-foam cushion. 3 position Folds compactly for storag Ideal for indoors or ou doors, porch, pati or sunroon

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AD 3993

AD 3989

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$25 LESS WITH BONUS CHECK

- - - for more details, circle 38 on page 50

MANY OTHER OFFERS NOT SHOWN

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Nylon Bag, Gloves

Clutch style purse with gold finished chain. Nylon palm stretch gloves to match. Black only.

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Ronson CFL Shaver

1962 Mark II Electric Shaver. $23.50 value. Multi-blade miracle cutter gives quickest shaves.

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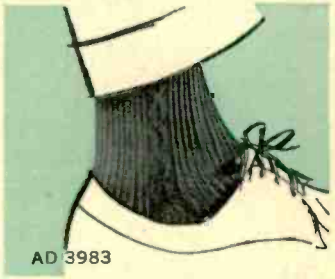

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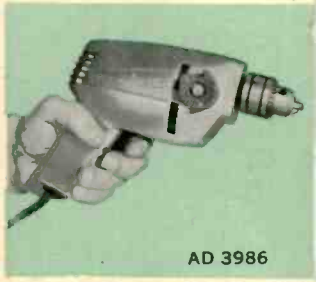

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ELECTRONIC TECHNICIAN

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WORLD'S LARGEST ELECTRONIC TRADE MAGAZINE

March • 1962 Vol. 75 • No. 3

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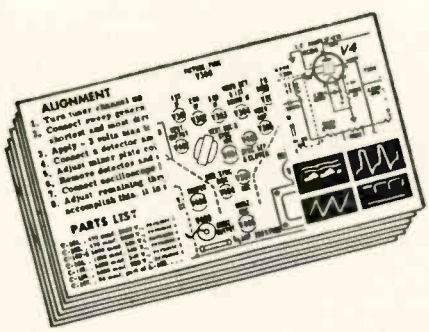
FRONT COVER Radiation cannot be observed by human senses. Consequently, devices are employed to detect it, such as specially treated material that changes color to indicate "danger" or instruments that buzz or can be read on a meter. The latter two are of interest to us since they are electronic devices and measure amount of radiation as well as "danger." Circuitry and operation of these instruments are discussed starting on page 26.

FEATURES and ARTICLES

DEPARTMENTS

CIRCUIT DIGESTS . . . . . PRECEDING BACK COVER



IN THIS ISSUE

(16 pages latest schematics and data)

ELECTROHOME: TV Chassis CHT-213-611

EMERSON: TV Chassis 120507A,-8B, 120515C,-16D, 120541C,-42D

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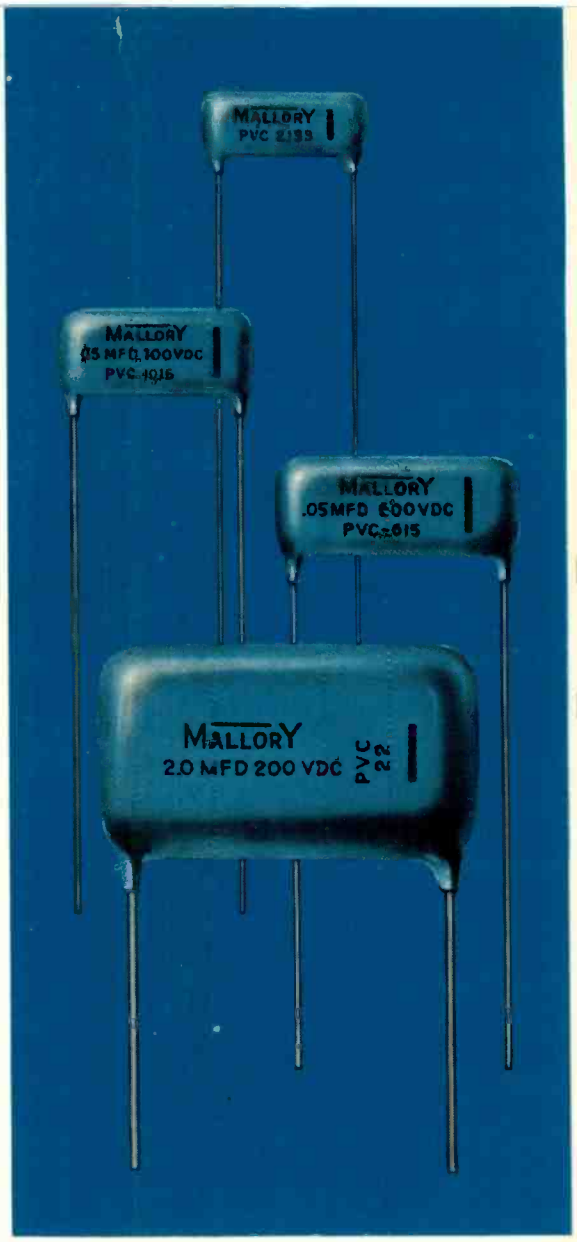
MONTGOMERY-WARD: TV Models WG-4234A, WG-4334A

TRAVLER: TV Chassis 1156-89

ZENITH: TV Chassis 16J28QS

PVC



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TC TUBULAR ELECTROLYTICS

Economical filter capacitors. Also special TCX type for —55°C. Twin-pack keeps leads free from kinks.

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Original 85°C capacitor, now better than ever. Etched cathode gives hum-free performance. Chassis or printed circuit mounting.

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End searching and waiting. Your distributor can custom-build, in just 30 seconds, any of over 38,000,000 single or dual controls.

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Quietest ever made . . . for the best in auto radio servicing. Buttonless contact design gives longest trouble-free service.

★Advt. No. 9-2-5100—2 facing pages, 2 colors—PF Reporter—March, 1962
Electronic Technician—March, 1962

STOP CALL-BACKS WITH MALLORY PVC MYLAR* CAPACITORS

Best thing about Mallory PVC coupling and by-pass capacitors is that you can install 'em and forget 'em. They won't drift, won't pop out. Not even when you put them in a hot spot, load 'em up to full voltage (or even higher). Not even when the weather stays hot and wet for months. Here's why.

All Mylar dielectric. Not a combination of paper and Mylar that invites moisture absorption and causes voltage failure and capacitance drift. There's nothing but Mylar between capacitor foils. And you *know* that's the most moisture-impervious dielectric used today.

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Foolproof leads. Flexible PVC case lets you bend leadwires at sharp angles without breaking the moisture seal.

Small and handy. Rating for rating, Mallory PVC Mylar capacitors are almost one-third smaller than other capacitors. And they're furnished in a handy, zip-close reusable package.

There's a wide range of ratings, priced lower than you'd think possible for so much quality. Get Mallory PVC Mylar capacitors—and all other Mallory quality components—from your Mallory distributor.

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MALLORY RMC DISCAPS®
Ceramic capacitor replacements . . . tops for customer satisfaction. Long the quality standard in original equipment.

MALLORY MERCURY BATTERIES
Tops for transistor radios. Steady power, up to 3 times longer service . . . they live for years when idle. Guaranteed leakproof.

GEMS
Rugged, moistureproof tubular capacitors. Handy five-pack keeps stock clean, leads kink-free.

- - - for more details, circle 35 on page 50

EDITOR'S MEMO

It's not unusual for customers to complain that TV sets are unreliable. Reliability, of course, is a relative thing.

Because electrical and electronic devices utilize such intricate parts which demand very critical performance, their reliability cannot be measured in terms of relatively simple devices.

To indicate that these problems are not limited to the radio-TV field, consider the fairly complex construction of an automobile. Besides the engine, automatic transmission, steering and differential, there are many other mechanical linkages. Yet it is the electrical system which is the biggest headache.

The American Automobile Association, for example, reports that of the 65,000,000 car service distress calls received during a year, some 38%, or 25,000,000 of these calls, are attributed to failures in the electrical system. And remember, the automobile electrical system is not nearly as complex as a TV receiver.

Further evidence of reliability problems being inherent in electrical and electronic equipment are the all too frequent failures in some of our guided missiles. Here, despite the most advanced engineering, despite the fact that no cost is spared, failures still occur. It's in the nature of the beast.

When one considers that TV sets have improved substantially over the past 15 years, it is to the industry's credit that this accomplishment has been accompanied by a decrease in price. Nowhere else can the consumer buy such a wealth of entertainment in such an intricate unit for, perhaps, $200.

I think it is a feather in the cap of the TV service industry that in spite of built-in limitations, technical problems and financial difficulties, at any one time the public has over 98% of its TV sets in suitable condition for operation.

So we ought to be grateful for little things at least.

Think of the woman who bought a parrot, and after having him in the house for a day, returned him to the store complaining that the bird was undesirable. It spouted a steady stream of profane language.

The petshop owner told the woman that she should not be unhappy with the parrot because of this one small shortcoming. After all, the bird did not smoke, drink, gamble or run after wild women!

Al Forman

CAN YOU SOLVE THIS MYSTERY?

(Using the clues below, identify the Company that offers you the industry's best service)

Service technicians—and set manufacturers, as well—use this company's capacitors oftener than any other brand.

Providing the right sizes, styles, ratings, mountings, this company offers the industry's most complete capacitor line.

Replacements for new capacitors in latest model sets are promptly made available to the service technician.

A continuous research program, employing a staff of over 500 scientists, engineers and technicians, assures our ability to keep up with new capacitor needs.

Guaranteed for performance and dependability, every type of capacitor we make is double-checked by our rigid quality control program.

Unequalled service aids include replacement guides, wall charts, service manuals, capacitor calculators, and other technical helps which simplify your job of correct capacitor selection and replacement.

Effective posters and advertising mats are available to you as part of our customer relations program for dealers.

WHO ARE WE? If you still don't know the answer, read the initial letter of each of the sentences above. This is the name that stands for the most complete and best quality line of capacitors, unsurpassed service help, continued technical assistance—and less call-backs for our friends, the service technicians.

- - - for more details, circle 51 on page 50

LETTERS TO THE EDITOR

Radiation Instruments

Editor, ELECTRONIC TECHNICIAN:

Radiation measurement instruments are beginning to get into the customer's hands. Please publish an article on understanding and servicing these units. A technician should study radioactive monitoring as a service to himself and the country.

WILLIAM H. ANTHONY
Washington, D. C.

• *Electronic technicians can certainly play a vital role in civilian defense. The cover story article in this issue on radiation detection devices should be an aid in the national effort, and open new earning opportunities for interested service dealers.—Ed.*

Foreign Tube Replacements

Editor, ELECTRONIC TECHNICIAN:

I have a "Philips," of Holland radio in for repair. The Model No. is B3X66U with a tube complement of UCH81, UF89, UY42, UL84, UBC81. I checked these on my tube checker and the last two are bad. I cannot find any American tube listed as a substitute, and cannot find out where to order the exact replacements.

I would appreciate any help you can give me on this.

ARTHUR D. ERICKSON
St. Paul, Minnesota

• *The tube type equivalents are:*

Foreign	*U. S.*
UCH 81	19D8
UF 89	12DA6
UY 42	55N3
UL 84	45B5
UBC 81	.....

All are US equivalents except the last which does not have one. The foreign tubes or equivalents can be purchased from: Amperex Electronic Corp., 230 Duffy Avenue, Hicksville, New York and International Electronics-Mullard Corp., 81 Spring St., New York 12, New York.—Ed.

Sensitive Sensitivity

Editor, ELECTRONIC TECHNICIAN:

In November's article, "Replacing Components in Transistor Radios," second paragraph on page 46, Anthony Stern used sensitivity instead of selectivity. This made his paragraph incorrect. You see, the lower the sensitivity figure, the better the receiver and the greater its ability to bring in distant or weak stations. Mr. Stern used the word sensitivity in the opposite fashion. The word to make his paragraph correct is selectivity, not sensitivity. Se-

New TRANSISTOR RADIO ANALYST

makes it Easy and Profitable to Service all Transistor Radios

B&K Model 960

TRANSISTOR RADIO ANALYST

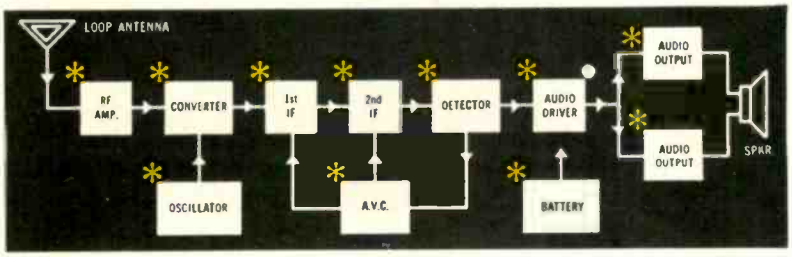
with Exclusive DYNA-TRACE Single-Point Probe—and Built-in Metered Power Supply and VTVM

Complete Transistor Radio Service Shop in One Instrument

Signal-Generator, Power Supply, Milliammeter, VTVM, Battery Tester, Ohmmeter, and Both In-Circuit and Out-of-Circuit Transistor Tester— All in One

Check all circuits - Pinpoint any trouble ... in minutes

Now you *can profit* from transistor radio servicing! This amazing new B&K "960" ANALYST gives you *everything* in *one* complete easy-to-use instrument. Makes transistor radio servicing *quick and easy*. Nothing else is needed except the transistor radios themselves waiting to be serviced. Brings you new customers for service, parts, and batteries. Makes this new business *yours*.



EASILY TROUBLE-SHOOT ANY STAGE BY UNIQUE POINT-TO-POINT SIGNAL INJECTION

The ANALYST gives you a complete signal-generating source for point-to-point signal injection. Easily enables you to trouble-shoot any transistor radio—check all circuits stage-by-stage—isolate and pinpoint the exact trouble in minutes.

Supplies modulated signals, with adjustable control, to check r.f., i.f., converter, and detector. Supplies audio signal to check audio driver and audio output. Provides unmodulated signal to test local oscillator. Provides separate audio low-impedance output for signal injection into loudspeaker voice coils to check speaker performance.

BUILT-IN METERED POWER SUPPLY FOR EASY SERVICING

Makes it easy to operate radio under test, while you inject your own signals. Provides from 1 to 12 volts in 1½ volt steps. Supplies all bias taps that may be required.

SIMPLIFIES IN-CIRCUIT TRANSISTOR TEST WITH NEW DYNA-TRACE SINGLE-POINT PROBE

Unique single-point probe needs only the one contact to transistor under test. No longer are three wires required to connect to emitter, base, and collector. Gives fast, positive meter indication. Saves time. Makes trouble-shooting simple and easy.

BUILT-IN VTVM

Includes high-input-impedance vacuum-tube voltmeter, which is so necessary for transistor radio servicing.

TESTS ALL TRANSISTORS OUT-OF-CIRCUIT

Meter has "Good-Bad" scale for *both* leakage and beta. Also has direct-reading Beta scale, calibrated 0-150. Assures quick, accurate test. Also automatically determines whether transistor is NPN or PNP. Meter is protected against accidental overload and burn-out.

Model 960. Net, **$99.95**

Solve Every Service Problem and Profit with a Modern B&K Service Shop. See Your B&K Distributor or Write for Catalog AP18T

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Export: Empire Exporters, 277 Broadway, New York 7, U.S.A.

---for more details, circle 12 on page 50

LETTERS TO THE EDITOR

lectivity is the ability of the receiver to bring in weak stations without interference.

DAVID CRUMPTON

Brooklyn, New York

• *The author was referring to sensitivity, rather than sensitivity rating or figure. With a loss of sensitivity, the sensitivity rating increases (that is, more microvolts are required at the antenna). Incidentally, as the sensitivity loss becomes greater, the band pass peak is lower, thereby broadening the response curve and affecting the selectivity. Just keep in mind that the more sensitive a receiver is, the lower its sensitivity rating.—Ed.*

Manufacturer Address

Editor, ELECTRONIC TECHNICIAN:

Can you give me the name of the manufacturer of the Seco VT Grid Circuit Tester?

• *The address is Seco Electronics, Inc., 5015 Penn Avenue South, Minneapolis 19, Minn. All manufacturer addresses are listed in the annual May Directory issue.—Ed.*

Evaluating UHF

Editor, ELECTRONIC TECHNICIAN:

I cannot help commenting on your editorial in the December issue of ET concerning the FCC and UHF television. For several years in New Orleans we were in the position of having two nearby UHF stations, Channel 61, which later changed to Channel 20, then finally to Channel 13. This gave us, and other TV servicemen quite an opportunity of evaluating UHF versus VHF in both communities.

Personally, in the immediate service area (20 odd miles) I consistently found UHF vastly superior to VHF TV if two important considerations were taken into account. First, the TV receiver which was mainly a matter of which manufacturer and secondly, the antenna.

It would seem to me that if the FCC makes the drastic decision to return UHF to the American public, this is a step in the right direction, provided that the industry maintain proper engineering. The failure of UHF lay primarily in the lack of public acceptance, which was due to faulty engineering of the products. Of course, the service technician got the blunt of the blame.

Being a radio engineer and physicist myself, I was able to evaluate the products. Some manufacturers would show a good picture and good sound with as little as 50 microvolts of signal from an indoor antenna. Other sets would re-

Continued on page 16

TESTS All TV and Radio Tubes—Old and New

TESTS the Nuvistors

TESTS the New 12-Pin Compactrons

TESTS the New 10-Pin Tubes

TESTS for True Dynamic Mutual Conductance (Gm)

TESTS European Hi-Fi Tubes, Voltage Regulators, and Most Industrial Types

OBSOLESCENCE PROOF Designed for Maximum Use Today and Tomorrow

NEWEST *FINEST* MONEY-MAKER *for Professional Servicemen*

Multiple-Socket Speed with Gm Accuracy PLUS OBSOLESCENCE PROTECTION

Model 700
DYNA-QUIK

Fastest, Most Complete Most Up-to-Date

DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER

See your B&K Distributor, or Write for Catalog AP18-T

TESTS BOTH OLD AND NEW TUBE TYPES—SELLS MORE TUBES PER CALL

Again you benefit from proved B&K techniques! This up-to-date, obsolescence-proof, professional instrument is designed for maximum use *today and tomorrow.* Provides multiple-socket section to quick-check most of the TV and radio tube types the *true dynamic mutual conductance way—plus* simplified switch section to check new tube types in Dyna-Quik emission circuit. Also includes provision for future new sockets.

Makes test under set-operating conditions. Checks each section of multi-section tubes separately. Checks for *all* shorts, grid emission, leakage and gas. Makes quick "life" test. Exclusive adjustable grid emission test provides sensitivity to over 100 megohms.

Makes complete tube test in seconds. Checks average set in a few minutes. Discovers weak tubes that need replacement. *Satisfies more customers. Sells more tubes. Saves call-backs. Insures your reputation.*

Patented automatic compensation for line voltage variation. Large 4½" plastic meter with easy-to-read "Replace-Good" scale. Lists most commonly used tube types with settings directly on socket panel for fastest operation. Complete listing in reference chart in cover. Phosphor-bronze contacts for long life. 7, 9, and 10-pin straighteners on panel. Operates on 117 volts 50-60 cycle a.c. Handsome leatherette-covered carrying case.
Size: 16⅛" x 15¾" x 5⅞" deep. Net wt: 15½ lbs.

Net, **$169.95**

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- - - for more details, circle 13 on page 50

TUNING IN

CUSTOMERS NO LONGER PAY for removal and re-installation of Motorola car radios during the one year warranty, said C. J. "Red" Gentry, Car Radio Sales Manager in introducing their new line. In the past customers have had to pay if the set needed to be removed for repair during the warranty period. This expense will now be borne by the factory, according to Gentry, thus freeing dealers and distributors from this expense.

COLOR TV studies are continuing at Westinghouse, but the company has no firm plans for marketing a color receiver during 1962, according to O. H. Yoxsimer, TV-radio division general manager. He said they believe color TV is an increasing factor in TV receiver sales, probably accounting for three percent of total 1961 TV receiver sales.

TV RECEIVER factory sales for 1962 are expected to rise by more than 300,000 units over the total sold in 1961, and sales of radio sets and phonographs may remain at about the same levels as last year, according to estimates released by EIA. Estimates for 1962: TV Receivers, 6,201,000; Radio, 11,463,000; Phonographs, 3,915,000. Although firm statistics for 1961 factory sales are not yet available, EIA estimates totals as: TV Receivers, 5,900,000; Radio, 11,500,000; Phonographs, 3,900,000.

"Yes, we can give you terms. How about 27 dollars down and 25 cents a month for the next two months?"

COLOR CRT PRODUCTION

Solder application machine helps accelerate production of color CRT's at RCA's $10 million Lancaster, Pa. plant, where $1.5 million expansion program is underway to meet anticipated 250% increase in 1962 demand. The machine spreads a thin ribbon of special glass-sealing solder to the edge of a 21-inch type CRT envelope while it is rotating.

ONE-GUN COLOR CRT by Paramount Pictures Corp. under consideration by domestic and foreign TV set manufacturers. Sony Corp. of Japan has just been licensed and will be the first to make and use the tube for entertainment purposes.

THREE OUNCE RADIO, reportedly world's smallest seven-transistor receiver, is made by Standard Radio Corp. of Tokyo. The "Micronic Ruby" measures 1-9/10 inches by 1-7/10 inches by 8/10 inches, about the size of a flameproof pocket cigarette lighter. Retails at about $22 in Japan and will be introduced in the United States this spring.

AUDIOPHILES BECOME HAMS. "It's no secret that amateur radio operators were among the earliest

THE PICTURE

hi-fi fans," says Bill Colbert, president of Audio Exchange Stores, Inc., a New York hi-fi sale chain. "Today, the average Ham is bound to be interested in hi-fi and every hi-fi enthusiast is a potential Ham. It's come the full circle." The firm has, therefore, developed a unique "4-Way Trade-In" system for trading equipment: hi-fi for Ham; Ham for hi-fi; Ham for Ham; and hi-fi for hi-fi.

"COMPACTRON" TRADEMARK ABANDONED by the General Electric Co. The trademark, as applied to multi-function electronic devices, is now in the public domain. L. Berkley Davis, vice president and general manager of G-E's electronic components division, said the general acceptance and use of the term by the public has caused its loss of distinctiveness as an indication of origin of goods. He said he anticipates that other manufacturing companies, making compactrons, will continue to join G-E in using this term as a common generic term to designate these multi-function devices.

CALENDAR OF COMING EVENTS

Mar. 20-25: 1962 Los Angeles High Fidelity Music Show, Institute of High Fidelity Manufacturers, Inc. (IHFM) Ambassador Hotel, Los Angeles, Calif.

Mar. 21-23: 9th Annual Spring Convention and Technical Sessions, Audio Engineering Society, Ambassador Hotel, Los Angeles, Calif.

Mar. 26-29: IRE International Convention, Coliseum and Waldorf-Astoria Hotel, New York, N. Y.

Mar. 28-31: 11th biennial Electrical Industry Show and Conference. Electrical Maintenance Engineers Association of Calif. Shrine Exposition Hall, Los Angeles, Calif.

Apr. 1-4: Annual Convention, National Association of Broadcasters, Conrad Hilton Hotel, Chicago, Ill.

Apr. 11-13: S. W. IRE Conference and Electronics Show, (SWIRECO) Rice Hotel, Houston, Texas

Apr. 29-30: 91st Convention, the Society of Motion Picture and Television Engineers, Ambassador Hotel, Los Angeles, Calif.

May 21-24: 1962 Electronic Parts Distributors Show, Conrad Hilton Hotel, Chicago, Ill.

FOGHORN FOR BLIND

A "foghorn for the blind," has been developed by Standard Telephones and Cables Ltd., ITT British affiliate. Sound from a special, transistorized, high-frequency dog whistle, blown by the blind person, is selectively picked up by a microphone on the device and causes a self-contained bell to sound. The direction and intensity of the bell's sound enables the blind person to estimate his position in relation to the known location of the device. The range of the device is about 60 yards.

HARASSING NOISE in his home, complained Schenectady suburbanite Eugene Binkowski, in a letter to President Kennedy. Investigating technicians, from the Griffiss Air Force Base, told Mrs. Binkowski that her family's hearing is so acute it picks up high-pitched sounds others do not hear. A hearing test given a six-year old son shows that he hears sounds in the 20,000-21,000 cps range, twice the normal hearing range for high-pitched sounds. Mrs. Binkowski said one of the technicians told her the house is in the midst of a hot-bed of electro-magnetic radiation. Transmission towers of three radio stations are within sight of the house.

EMOTIONAL OUTLET FOR SMALL FRY . . . Shooting darts at moving characters on the TV screen! Patented recently, a dart game for children consists of a transparent target, which fastens over the face of a TV set, and darts with rubber suction cups. Its purpose is to provide a means for children to discharge psychic energy stimulated to highly emotional levels by TV programs.

LETTERS TO THE EDITOR

Continued from page 12

quire 300 to 1000 microvolts from a good outside antenna and still get a bad picture, with inadequate sound.

One of the primary failures of sets were the older 21-26 mc i-f, where adaption to UHF reception was done by strips. These strips contained an oscillator section often obtaining the IF by beating the incoming UHF signal against the third, fourth, or even fifth harmonic of the oscillator. These almost never gave a proper picture without the best of antennas. These sets were more often better treated with a converter on an unused VHF channel.

I have measured some "directional" UHF antennas, to find that the ratio between signal strength with the antenna in the advantageous position, versus the signal strength with the antenna rotated to the least advantageous position was something like 300 microvolts to 298 microvolts, hardly a directional beam at all. One of the problems concerning UHF antennas was the flagrant use of aluminum, which is one of the worst materials manufactured for antennas in the world. The velocity of radio waves (in the UHF region) in aluminum is very poor compared with copper.

I join you with your wish that the FCC has good luck with this venture, but I differ with you since I believe the real reason for failure of this medium lies with industry.

CHARLES R. MADUELL, JR.

Delta Electronics
New Orleans, La.

Rewiring Multiplex Adaptors

Editor, ELECTRONIC TECHNICIAN

We are writing a few lines commending you for the splendid job being done by you and your staff in explaining the new multiplex system for keeping us posted on all new developments in the TV field. We have had several calls from owners on multiplex adaptors which were bought before FCC adopted the Zenith-GE method—as you know these adaptors were made for the Crosby system. We would like to know, is there a way to convert these without too much expense, and is it legal?

FRANK CERRONE

State-Television-Service
Valley Stream, N. Y.

• *It's perfectly legal to redesign receiving equipment. However, it would be a tricky, time consuming job to rewire your adapter. It may be less trouble in the long run to interest the customer in a new unit. — Ed.*

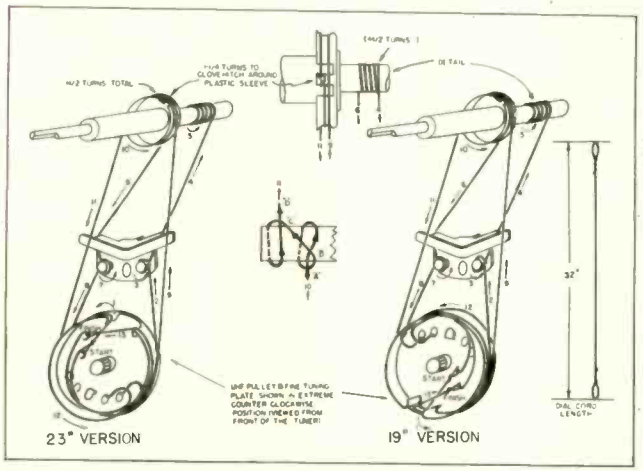
- - - for more details, circle 19 on page 50

TV MANUFACTURERS TECHNICAL DIGEST

GENERAL ELECTRIC

TV Chassis MW—Correcting UHF Tuning Problem

If fine tuning of the UHF on "MW" receivers becomes difficult, the problem may be caused by the dial cord slipping on the fine tuning plate. The direct



UHF tuning problems in General Electric "MW" TV chassis caused by dial cord slipping on fine tuning plate, can be cured by revisions.

drive operation will perform normally, but the fine vernier tuning is affected.

This condition can be cured by restringing the assembly to provide more tension on the fine tuning plate. This revision also requires the addition of a tension spring to the UHF pulley, identical to the one already used, and employment of a slightly longer dial cord.

Note the position of the two springs on the UHF pulley, one for start and the other for finish, placing tension at each end of the dial string. Note that the springs are placed in separate holes in the pulley. Correct looping of the dial string around the ears on the fine tuning plate is important. This provides the necessary drag-increase on the fine tuning plate. Both the 19 in. models and the 23 in. set require the same length of dial cording. However, placement of the opening in the pulley in the start position differs.

MAGNAVOX

TV Chassis 38 Series—Production Changes

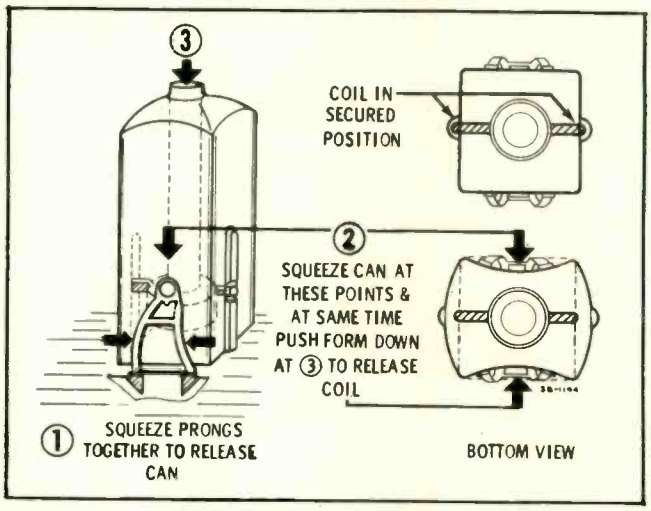
The following changes have been made in production to improve Magnalux circuit operation:

1. The 180K resistor (R529) in series with the brightness control has been changed to 150K, 5% tolerance.
2. The 47K resistor (R528) connected across the series combination of the LDR and the 3.3K resistor has been changed to 33K, 2W.
3. The 150K, 10% resistor (R530) in the CRT cathode has been changed to 150K, 5% tolerance.
4. Note that the schematic diagrams on pages 5 and 6 of Manual 7248 are incorrectly identified in the heading. Should read "38" instead of "36."
5. R526 is incorrectly shown on the schematic as 3.3, instead of 3.3K.

MOTOROLA

TV Chassis TS 581 Series—Removing Coil Shields

The shielded coils in this series are locked in position inside the shield. To gain access to the coil and components located within the shield, the shield must be separated from the coil form as illustrated. If coil form and shield do not separate easily, more pressure must be exerted at the sides of the shield in order to release the tabs of the coil form. Reshape shield before replacing coil. Be sure coil form locks into position



Coil shields in Motorola TS 581 series chassis can be removed for coil component replacement by following the steps outlined here.

inside the shield and that the shield prongs lock into the chassis. Coils which are dipped in wax must be replaced as an assembly to maintain proper moisture protection in high humidity areas.

PACKARD BELL

TV Combination Chassis Model 23DK2 — Separate Radio Operation & Production Changes

The radio section of this combination can be op-

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Actual Selling Price (2 @ $4.25 ea.)	$8.50
Dealer Cost (40% off) (2 @ $2.55 ea.)	5.10
Profit on Sale	3.40
Charge for Installation	6.00
Total Profit	**$9.40**

Result: The service-dealer makes and keeps a handsome profit—the customer gets the antenna that is the precise electrical and mechanical mate for his portable TV.

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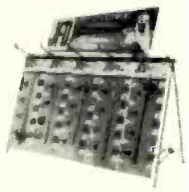

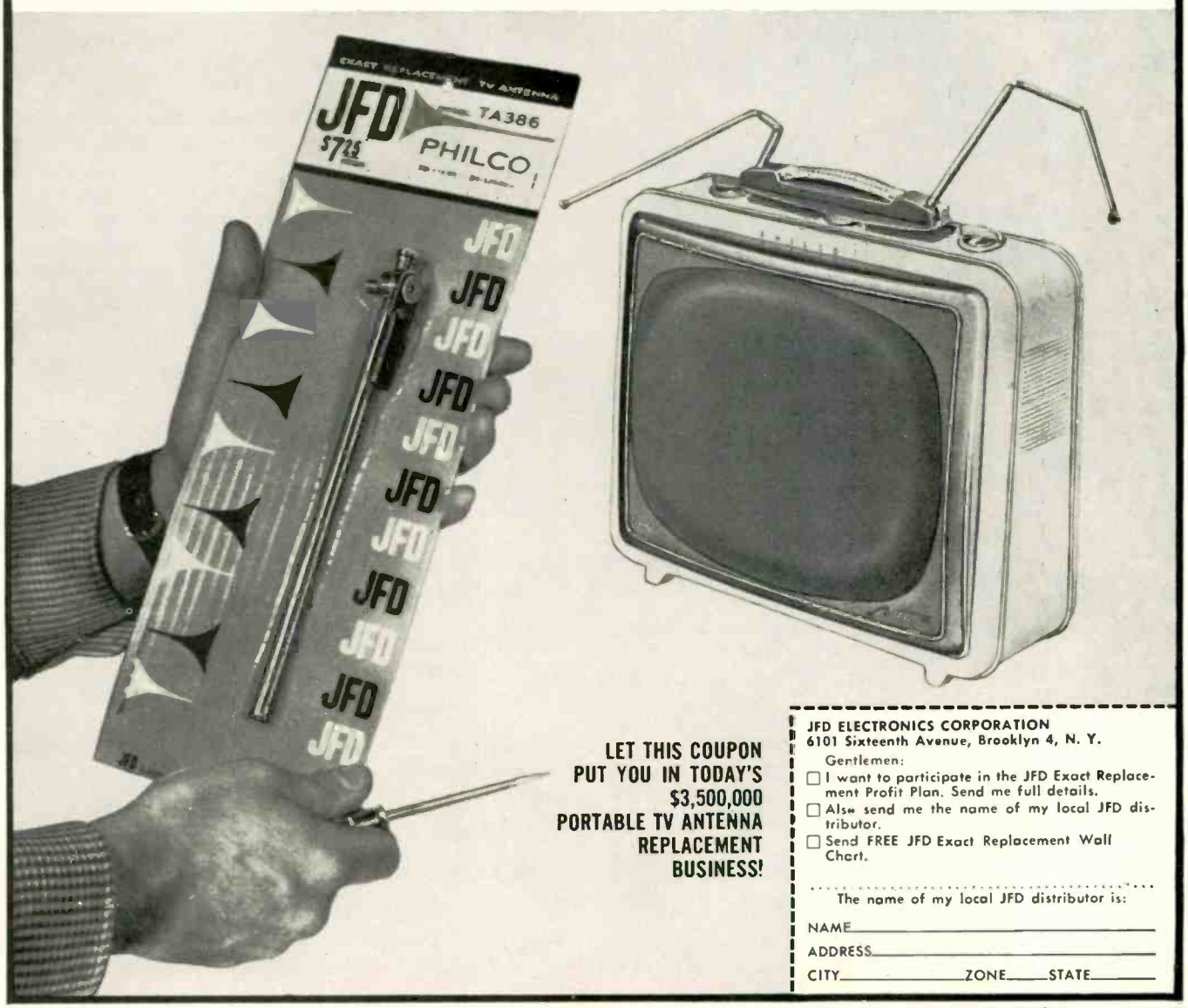

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- - - for more details, circle 31 on page 50

TV MANUFACTURERS TECHNICAL DIGEST

erated without the TV section by inserting the a-c cord from the DPA-30 amplifier into an a-c outlet. Operation may be desired while the TV chassis is out for repair. This connection will bypass the a-c switch on the tuner panel, and the radio section power will be on as soon as the cord is plugged in. The plug is removed from the wall outlet to turn the set off.

The TV can be operated without the tuner chassis. Pins 2 and 3 (ccw, top view) of the 7-pin socket must be shorted together. This can be done with a 7-pin adapter plug. The socket is located at the top right corner of the chassis. Be sure the remote control cable is plugged in (two plugs) before connecting the a-c cord to the wall a-c outlet.

In some sets the two resistors, R-430 and R-431, across the loudness and balance controls, are 180K ohms instead of 150K. Change to 150K if excessive rumble is encountered.

If additional sensitivity is needed for AM reception the detector diode 1N295A should be replaced with a 1N541 diode (PB-72089). This change will be made in tuners stamped 3325 or higher. Capacitors C-204 and C-205 in tuner 8TU4 were changed from 68 pf to 150 pf (23942) to decrease tendency to oscillate. Changes will be made in chassis stamped 3353 or higher.

Two resistors, R-401.1 and R-401.2, were added in the Gorler f-m tuner as a production modification to prevent drift. R-401.1 is 500K ohms, ¾ watt, with a negative temperature coefficient, part number 73785 (special), while R-401.2 is a standard 4700 ohms, ½ watt resistor.

PHILCO

TV Chassis 12N50 Series—Production changes

1. Run 2. Transformer T5 was changed from part No. 32-4745-2 to part No. 32-4745-4, to improve sound sensitivity.

2. Run 3. Capacitor C38 was changed from .02 μf to .01 μf, part No. 30-1262-53, to reduce drive lines.

3. Run 4. Resistor R57A was changed from 4.7 megohm to 5.6 megohm, part No. 66-5568340, to improve interference rejection. Resistor R-19 was changed from 470 ohms to 560 ohms, part No. 66-1564350, to center vertical linearity control.

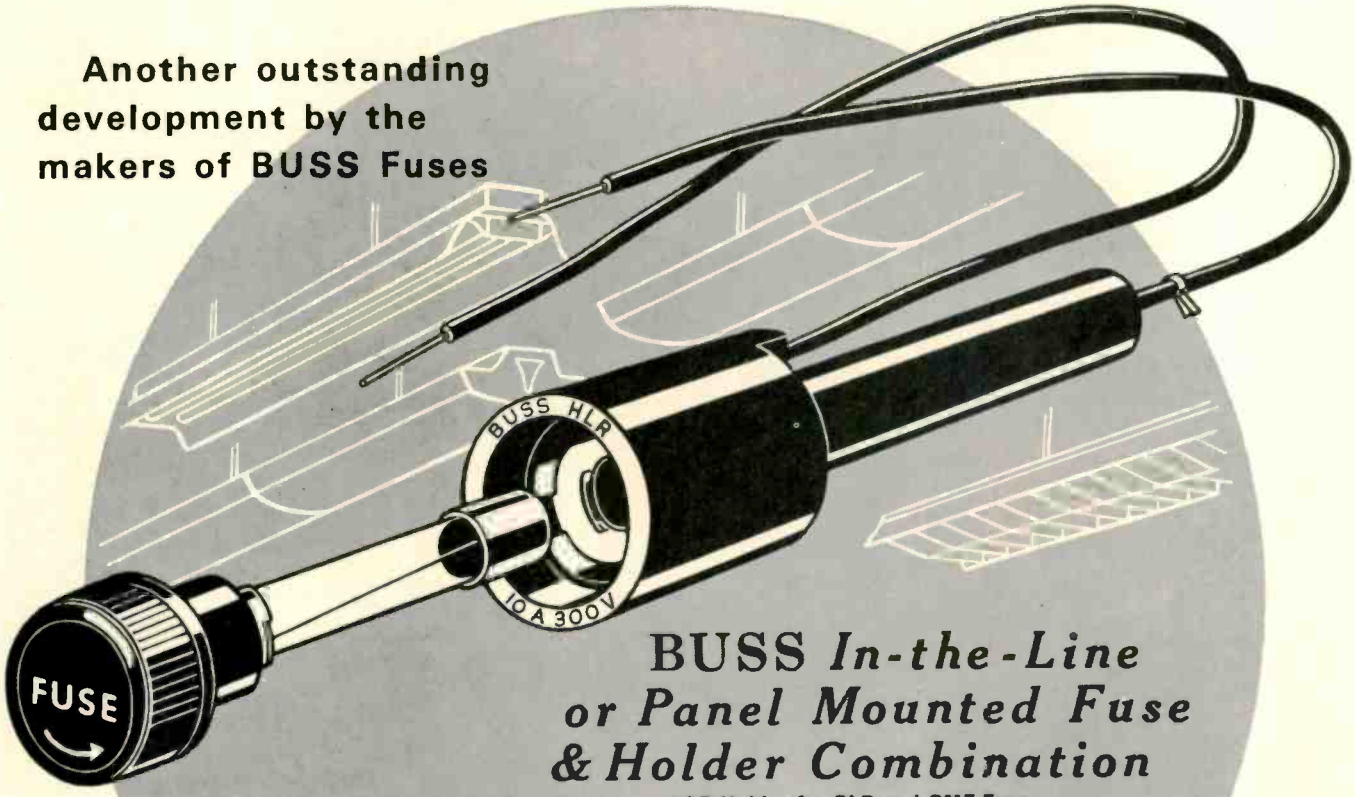
4. Run 5. A four inch piece of vinyl tape was added to the 1G3 high voltage rectifier tube cap to prevent corona.

WESTINGHOUSE

TV Models With "Mobile-Sound"—Circuit Operation

A system employing an amplitude modulated r-f transistor oscillator rebroadcasts TV sound so that it can be received on any a-m radio, while the TV speaker remains silent. Sound level can be adjusted by the radio's volume control. The oscillator is attached

Another outstanding development by the makers of BUSS Fuses



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BUSS GLR *fast-acting* type fuses or BUSS GMF *slow-blowing* type fuses are used in combination with BUSS HLR fuseholders. Fuseholder can be installed in-the-line or panel mounted.

Fuse and knob of fuseholder are in one piece. When a fuse blows, the entire fuse knob assembly is replaced. Cap of holder is insulated to protect user against possibility of shock.

Why safety demands that fluorescent fixtures be protected.

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To get the full story, write for BUSS bulletin SFH-6.

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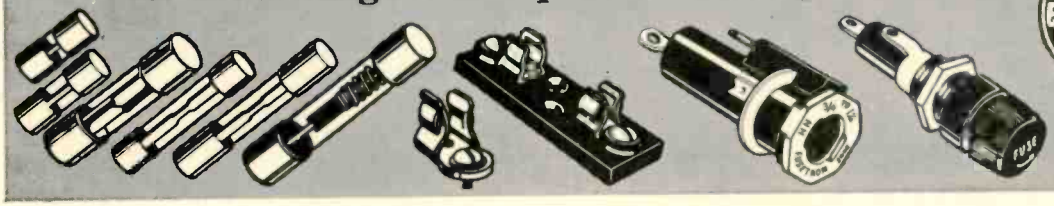

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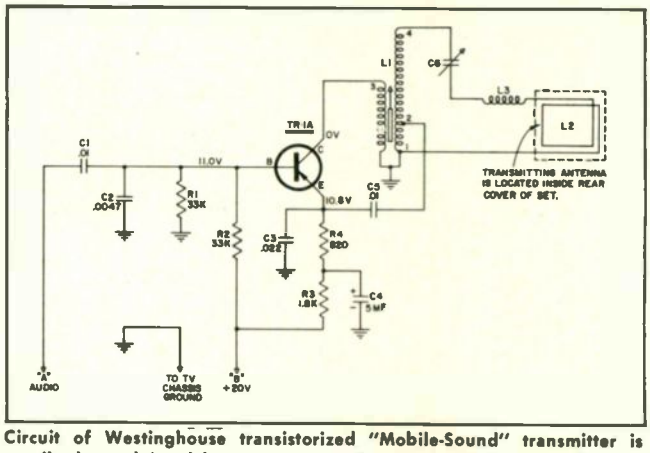
BUSSMANN MFG. DIVISION
McGraw-Edison Co.
ST. LOUIS 7, MO.

- - - for more details, circle 15 on page 50

TV MANUFACTURERS TECHNICAL DIGEST

to the inside cabinet base. A plastic shaft, projecting through the TV's rear cover, is attached to a tuning capacitor (C-6) which is adjusted by the customer so that the TV sound is received at a remote point on one or more a-m radio sets. The TV sound is tuned in at a spot on the radio dial where no station is transmitting.

The oscillator circuit consists of TR-1A; the primary of L1, C6, L3 and transmitting antenna L2; feedback capacitor C5; and C2—for r-f ground. It operates as follows: TR-1A is cut off during most of each cycle by the reverse bias that exists between its base and emitter. However, when the positive feedback, coupled to the emitter through C5, becomes sufficiently positive, the instantaneous emitter voltage will rise above the base voltage. TR-1A is now forward biased for an instant. The transistor operates Class C—beyond cut off—but is driven into conduction during each cycle.



Circuit of Westinghouse transistorized "Mobile-Sound" transmitter is amplitude modulated by a TV set's audio signal. Unit "transmits" the TV set's sound to any nearby a-m broadcast receiver.

A +20 volt source, tapped from the TV set's audio output tube cathode is supplied to TR-1A through a stepping relay. This voltage is divided by R2 and R1 to provide the proper base voltage, and by R3, R4 and TR-1A to provide emitter voltage. The collector is at zero volts since there is no appreciable d-c drop across the primary of L1.

The audio signal is supplied to TR-1A through points on the stepping relay. It is then coupled through C1 and placed across the transistor's base and emitter. This audio signal varies the base to emitter bias, causing collector current to vary at an audio rate.

The collector current flowing in the primary of L1 causes a similar current to flow through its secondary and also L2, the transmitting antenna. Thus a modulated r-f carrier is transmitted.

L3 is used to suppress harmonics which could cause tweet interference; C4 drops the bass level slightly to compensate for a small loss of treble through C2; C3 equalizes the amount of oscillator output over the tuning range of C6.

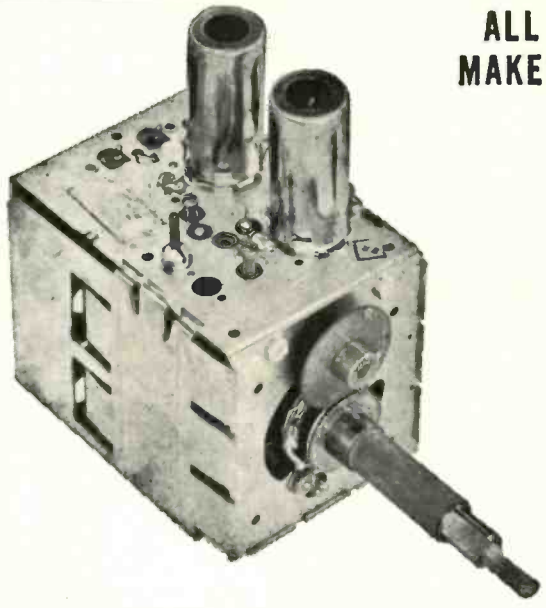
The "transmitter" has been built to comply with FCC regulations and should not be modified.

Tarzian offers

FAST, DEPENDABLE TUNER REPAIR SERVICE

ONLY $8.50 INCLUDING

ALL MAKES



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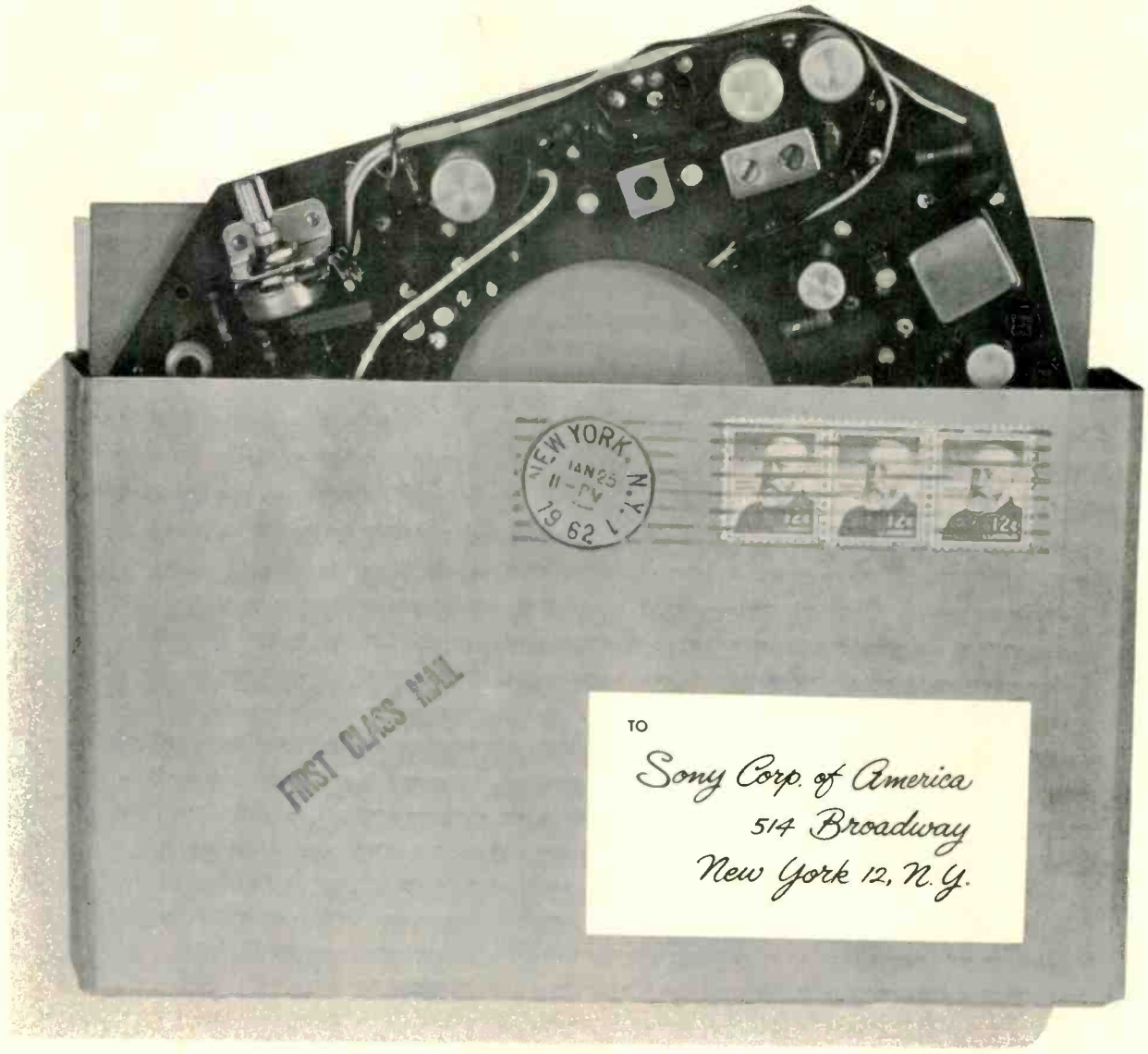

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ET VIEWPOINT

A Bold Approach to Industry Problems

The electronic service industry suffers from many an ache and pain. Some are the fault of service dealers, while others are caused by manufacturers and distributors who take advantage of the dealer's inability or unwillingness to act forcibly.

Two elements operate in the area where the service technician has no one to blame but himself. First, it has always been deplorable that the great majority of technicians do not recognize the importance of being active in their local service associations. This deprives the technician of a unified voice capable of correcting industry ills. It's a cumulative effect at that, since the weaker association offers still less appeal to the unaffiliated technicians who are sitting on the fence.

The second point which operates against service dealers is their frequent reluctance to operate under sound business practices. If you made a financial analysis, you would see that there's an insufficient profit return on house calls that charge $3.00. Furthermore, all businesses borrow money to expand and merchandise additional profitable products. Too many service dealers are hesitant to do so. Look at other businesses in your community. Locksmiths sell affiliated hardware products; watchmakers sell such gift items as radios and pens. The service dealer should at least be the community supply source for consumers who want to buy antennas, transistor portables, hi-fi components, and various hobby devices over the counter.

There is also the need to meet competition on its own ground. When self-service tube testers became popular a few years ago, some service dealers bemoaned the fact—and lost the business. More enterprising dealers set up their own tube tester routes, and so recouped the tube sales lost.

Now let's look at some of the people who take advantage of the service dealer's all too frequent inferior position. High up on the list must be the so-called distributor who buys from a manufacturer and sells retail to the public, by-passing the dealer who is often his major customer. In those communities where the dealers stood up on their hind legs and told the distributors that they must be either retail or wholesale constructive results have been obtained. However, in other communities, technicians take the "why fight City Hall" attitude, and the unhappy status quo remains. If a distributor is willing to serve your interests, travel the extra distance or pay the extra few pennies to patronize him. In the long run, it will cost a lot more in terms of business loss when you support the distributor who doesn't think, much less care, about your welfare.

Manufacturers are far from blameless. Just as the technician catches the consumer's ire for improperly made products, and the distributor may receive the wrath of a technician, many a manufacturer is also deserving of a figurative horsewhipping. Not only do they cater to distributors who care not a fig for the service dealer, but they even turn around and push their products as hard as possible in channels entirely outside the electronic industry. When electronic products are sold through drugstores, supermarkets and department stores, particularly TV system parts and components, only the uncaring manufacturer benefits. The distributor and dealer both lose their normal business. Even the consumer often ends up spending more than he should for an improperly selected product.

We hope that readers who recognize these distasteful situations in their own community will write directly to the manufacturer. The addresses of all manufacurers are listed in our annual Directory published each May.

Lest these statements be misinterpreted, we wish to make clear our recognition of those distributors and manufacturers who do work for the welfare of the service dealer. Also, a number of enterprising service dealers can be held up as prime examples of what the industry should be doing. We have, however, emphasized the undesirable aspects because these are the ones that need attention and correction if the electronic service industry is to thrive.

Reminder for the Big Show

The 1962 Institute of Radio Engineers International Convention will be held in New York City's Coliseum, March 26-29.

Though the great emphasis is on military and industrial products, we are sure that our readers will find many informative and interesting displays.

Those technicians who are looking forward to a possible career in industrial electronics will obtain a bit of insight at this show. In this regard, you may be interested to hear what the general maintenance foreman of a large guided missile company had to say about background requirements for electronic maintenance personnel: "Radio or TV repair experience is far more vital than any other electrical repair experience."

Furthermore, to increase one's professional knowledge and status, technicians should also consider applying for IRE membership.

Fig. 1 — Victoreen's Model 489 Thyac II transistorized meter detects alpha, beta and gamma radiation.

How Geiger and scintillation detector circuits operate

Electronic Devices Detect Radiation

by Allan Lytel

■ Radiation detectors are used for monitoring radiation leakage from X-ray machines, observing radioactive materials used in industry, and for radioactive ore prospecting. These detectors take many different forms. A typical portable unit with searching probe attached is shown in Fig. 1. The probe contains the detector and all of the circuitry is in the case. Some units have the detector built into the case itself.

Electrically, these are not complex units as may be seen from the schematic shown in Fig. 2. Radiation energy causes conduction in the ion chamber and a current flow I_1. This appears across R as an IR drop which is amplified by the two tubes. Output is read on M in the plate circuit of tube No. 2. Note the feedback and balance of E-2 is equal to V-2 so there is no meter reading for zero radiation.

Some radiation detector units are equipped with a flashing neon lamp as well as earphones, or speaker (See Figs. 3 and 4) which provide both visible and audible signals indicating the presence of radiation. The heart of these devices is the radiation detector, usually a Geiger Mueller tube, for picking up the different forms of radiation. Some units employ photomultipliers in scintillation detectors.

Geiger Mueller Tube

The Geiger Mueller (G-M) tube is generally employed in low-cost Geiger counters for radiation detection. The Geiger tube consists of a thin wire of tungsten passing through an inner cylinder of thin metal or coated glass. This assembly is placed inside an outer cylinder which is filled with a gas. In effect, the tube is somewhat similar to a gas-filled voltage regulator tube.

A voltage is applied to the G-M tube, with the center wire positive, and the inner cylinder negative. As a particle of radiation enters the tube through a window in the cylinder, the particle collides with a gas atom inside the tube and the atom loses an electron. The atom then becomes a positive ion. The freed electron is attracted to the positive wire but, in its travel, it collides with another gas atom and produces another free electron, etc. Thus, for each single particle of radiation many free electrons are produced. These are all attracted to the positive wire which acts similarly to a plate in an amplifier tube. The total number of free electrons arriving at the wire becomes the output current. The positive ions are attracted to the cylinder which has a negative potential. Here they are neutralized by picking up electrons to make them neutral gas atoms again.

Thus, when a single particle of radiation reaches the G-M tube, a

rapid multiplication of free electrons occurs, and in a very short time all of the free electrons arrive at the wire and all the gas ions arrive at the cylinder. The tube has provided an output and is now ready for the next particle.

Based upon the detection action of the G-M tube many simple, portable Geiger counters can be built. The design depends upon the nature of the particular tube and the final desired cost. Models are available from the most simple to quite complex units with complete amplifiers and several types of detectors.

Forms of Radiation

Radioactive elements, such as radium and uranium, throw off particles and rays in the process of natural disintegration. These particles and very high frequency waves are used as a means of detecting the presence of radioactive materials. This radiation has essentially three types of energy: alpha and beta particles, and gamma rays.

Alpha particles have high energies but they travel only a few inches —being stopped by a few centimeters of air. They can also be stopped by thin aluminum foil or a sheet of paper. These particles are equivalent to helium nuclei, or helium atoms which have been stripped of their orbital electrons. They are made up of two neutrons and two protons and carry a positive charge.

Beta particles are high-energy electrons with greater force than alpha particles and they travel far greater distances before they are stopped by collision with other materials. At average speed, a one-eighth inch thickness of aluminum is required to stop them. Of course, they carry a negative charge.

Gamma rays are extremely short wave-length electromagnetic radiations, or photons. They are a type of X-ray radiation which are very powerful and move easily through most materials. Depending upon their speed, they can pass through several inches of lead.

Other Detector Types

Radiation from radioactive materials can be converted into visible

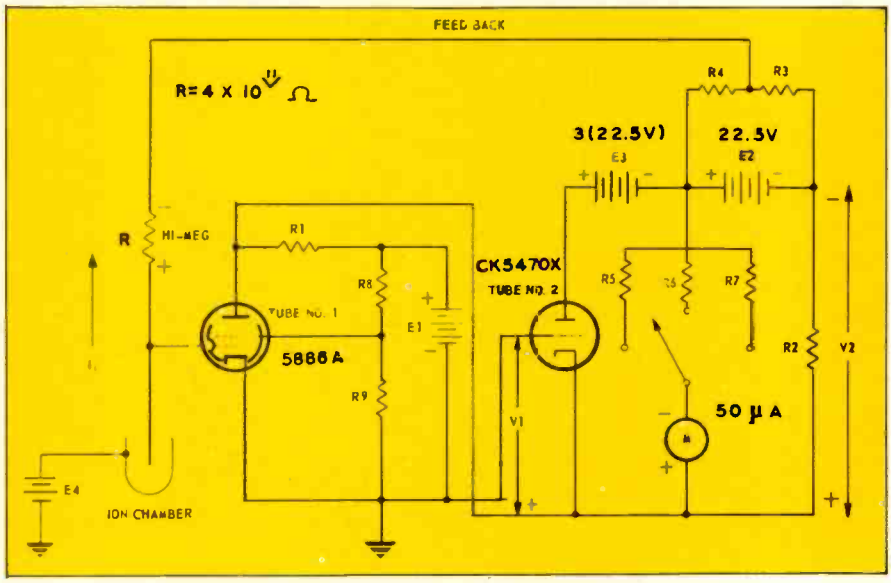

Fig. 2—Basic schematic of a portable radiation detector using a microammeter.

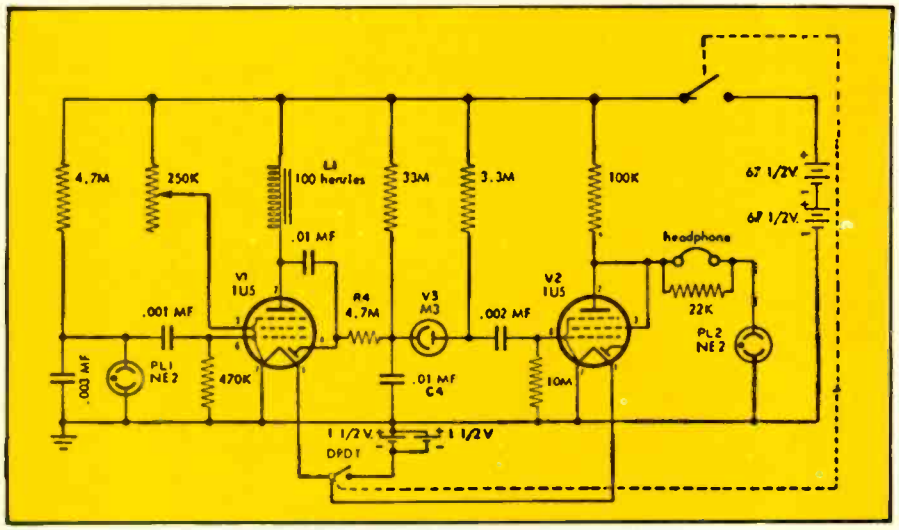

Fig. 3—Schematic of EICO's Model 803 portable radiation detector employs headphones and neon lamp for aural and visual radiation indications.

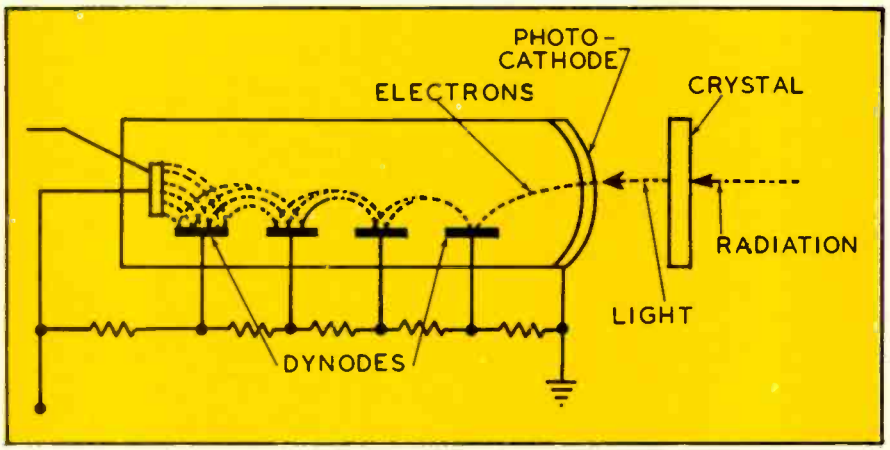

Fig. 5—Phosphor crystal converts radiation to light. Light sensitive photo-cathode converts light into electrons which are progressively increased by the photo-multiplier tube anodes.

light by using the flourescent effect of certain substances. Among these substances are zinc sulphide and calcium tungstate. When a radiation particle strikes a transparent crystal phosphor made of ore of these materials a flash of light or a scintillation is produced. While these scintillations themselves may be used as indications, they are usually too faint, and must be amplified.

Scintillation detectors may be used to record alpha, beta, or gamma radiations depending on the type of materials used. These counters are more sensitive than Geiger counters and they can also detect particles which are close together. It is possible by the use of counters to record in an accurate manner a large number of pulses in a very short time. In this way the scintillation detector is sensitive to both the rate (frequency per unit of time) and the strength of the radiation. However, because the phosphor screen converts the radiation into visible light, an ordinary vacuum tube amplifier cannot be used. A different type of amplifier is required.

When radiation falls on the transparent crystal phosphor it creates scintillations of visible light. And this small signal must be converted into an electrical signal and then amplified.

Any photo-cell sensitive to visible light can be used to convert light to a flow of current. Light falling on the cathode causes the emission of electrons. The photocathode is transparent just as with television camera tubes. The light, created by the radiation reaching the crystal phosphor, falls upon the transparent photo-sensitive cathode. Electrons are emitted by the photocathode where this weak signal is amplified by electron multiplication. As shown in Fig. 5, a series of small anodes (plates) are connected so that each has a higher electrical potential.

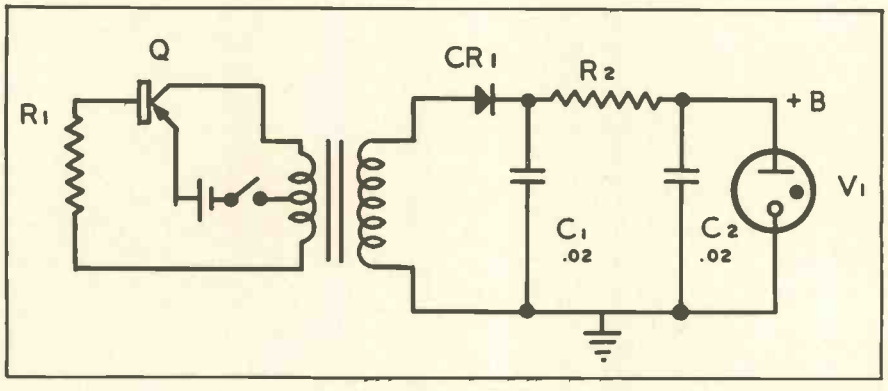

Fig. 6—Simple radiation detector power supply employs a transistor oscillator and a transformer to boost voltage.

Typical Circuit Functions

G-M tubes require a power source in the range of 1000 volts or more but with currents of only microamperes. Because of these requirements d-c to a-c converters are used to take the low-voltage and step it up. First the d-c is used to power an oscillator. Next the oscillator's output goes through a step-up transformer. The resulting high-voltage is rectified and filtered. Any frequency from audio to r-f can be used and less capacity is required to filter the higher frequencies.

Various oscillators, including blocking-tubes and multi-vibrators, are used to generate the required a-c. A simple tapped transformer, as shown in Fig. 6, can be used for a high-voltage supply. An audio oscillator using a transistor, for example, a 2N255, is connected to

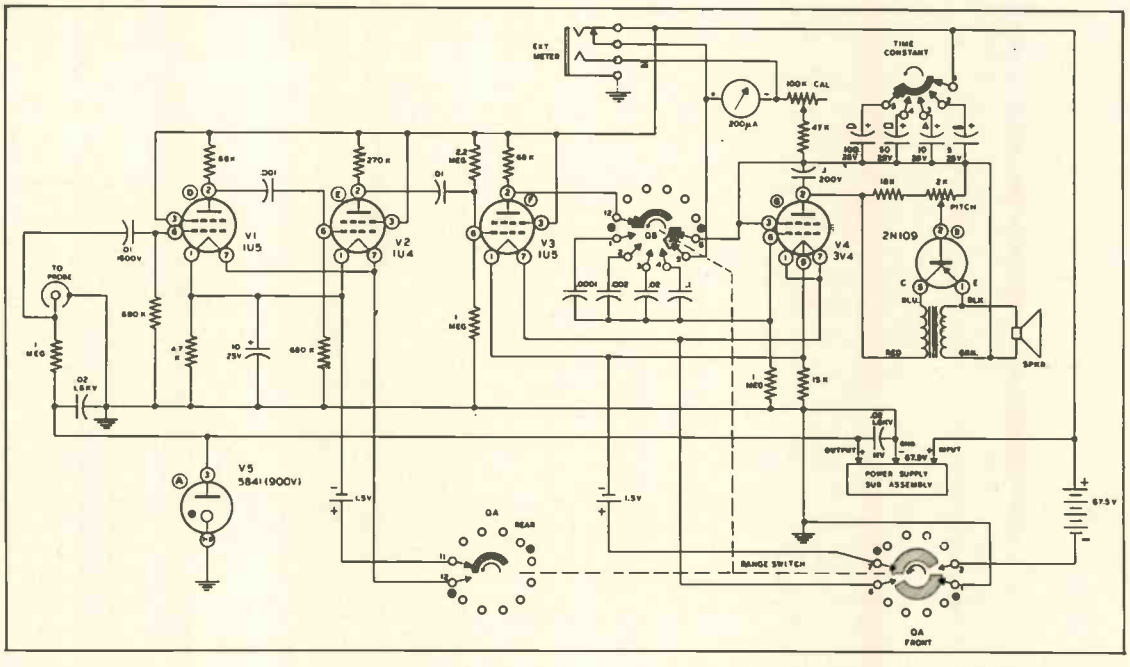

Fig. 4 — Diagram of amplifier, range and indicating section of Heath Model RC-1 portable radiation counter.

a transformer such as that used for filament voltage. When the switch is closed the transistor oscillates, in the audio range, because of the inductive feedback. R-1 limits the base current and also determines the amount of power output. Transformer T provides about a 20 to 1 stepup of voltage. Usually about 1000 volts can be obtained with this circuit which, because of the R-C filter and rectifier drop, provides an output in the 900 volt range at 1 mill or less. This is all that is required for most G-M tubes.

The rectifier diode and filter capacitors must have at least a 1000 volt rating, or more for a safety factor but several components can be used in series to cut down the peak voltage rating required. For example, two capacitors, each .05 μf at 500 volts will provide .025 μf at 1000 volts when used in series. Voltage multipliers are also used to provide the required high voltage. In addition, automatic control circuits are employed to make the output voltage substantially independent of normal load variations on the secondary as well as the normal range of battery voltage.

A typical radiation detector schematic is shown in Fig. 7. The various radiation detector probes are powered by the same high voltage supply with a regulated output voltage of either 900 volts or 1200 volts. The 900 volt output is required for the Geiger tube detectors and is labeled GM on the internal selector switch, S-2. The 1200 volt output is selected for the scintillation probes and is labeled SCINT. This high voltage supply is a blocking oscillator driven "fly-back" type circuit where the blocking oscillator portion of the circuit is Q-2, R-7B, transformer T-2 windings 3-4 and 5-6, and batteries BT=1 and BT=2.

When the instrument is turned on, Q-2 conducts and an increasing current flows through winding 3-4. This current also flows through the collector of Q-2 and induces a voltage in winding 5-6 which maintains conduction of Q-2. The collector current increases until Q-2 has sufficient current gain to remain saturated, when the circuit rapidly turns off because of the regenerative action of the transformer. During the turn-off action, large fly-back voltages appear across all transformer windings. A voltage peak of about 1100 or 1400 volts (depending on whether the 900 or 1200 volt output is selected) appears across winding 1-2 because of the large number of turns in this winding. This voltage "fly-back" is rectified by diode CR-5 in a conventional half-wave rectifier. R-12 and C-4 form a filter to smooth the pulsations of voltage across C-5. A corona discharge type regulator V-3, regulates the output voltage at 1200 volts throughout the battery life, when the switch S-2 is in its SCINT or open position. When S-2 is switched to the GM or closed position, another corona regulator V-2, regulates the output at 900 volts. When V-2 is connected across V-3 by the switch S-2, the 1200 volt regulator V-3 does not conduct at all, V-2 taking all of the power supply current and preventing V-3 from firing.

The high voltage, through connector J-2 is fed to the radiation detector across the load resistor R-11. A current pulse from the detector caused by an ionizing event then appears as a negative voltage pulse at the input connector J-2 With some exceptions, the pulse shaping circuit is a blocking oscillator similar to the power supply.

This circuit is held "cut-off" by the bias formed by resistors R-9 and R-10 and the power supply battery. The blocking oscillator consists of components Q-1, T-1, L-1. CR-1 and C-1. The coupling capacitor C-1 couples the negative pulses from the radiation detector to the base circuit of Q-1. Inductance L-1 forms a high impedance for these pulses while providing a lower impedance path for direct

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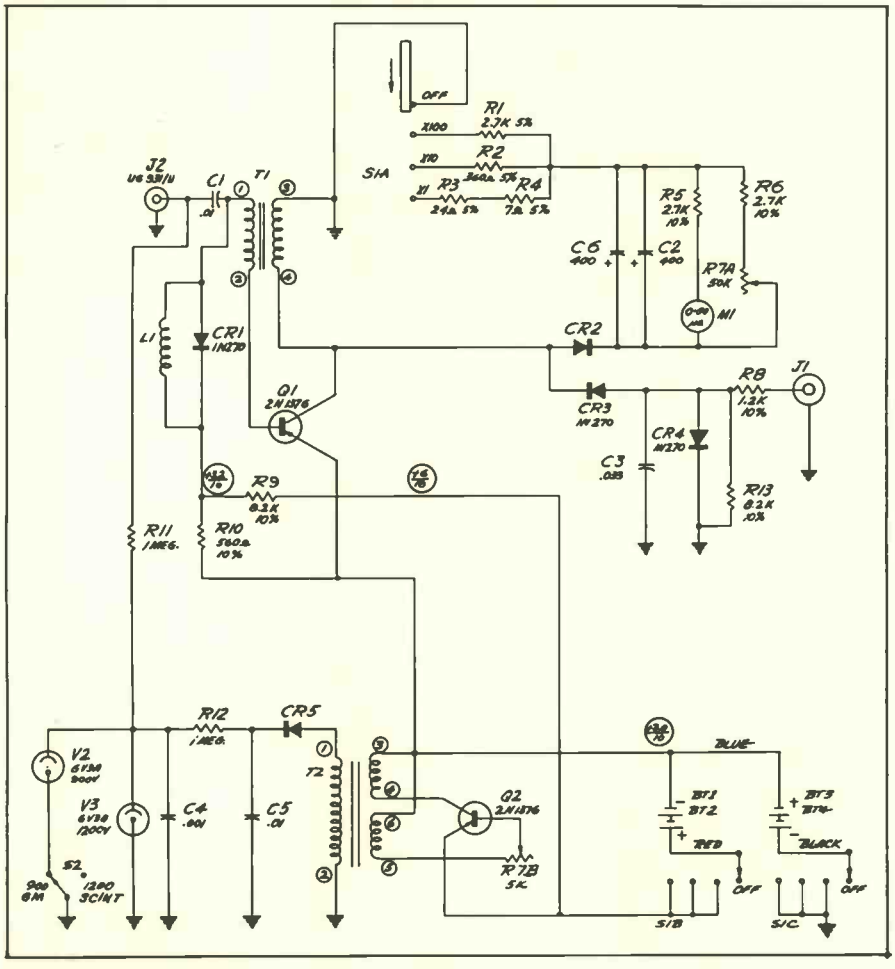

Fig. 7—Schematic diagram of the Model 489 Victoreen radiation counter which is designed to use either a Geiger-Mueller or a scintillation probe.

Whipping TV Transformer Problems

Fault symptoms point way to isolation of defective components

by Jack Hobbs
Technical Editor

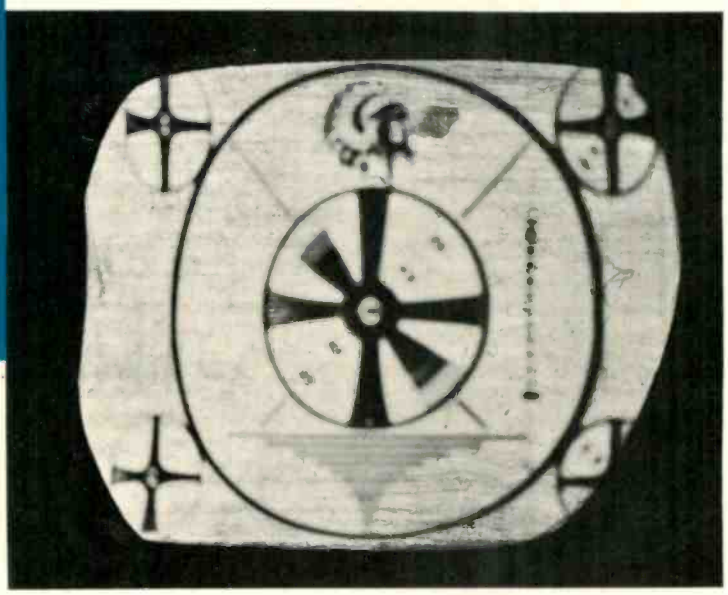

Fig. 1—Picture on TV screen after one leg of rectifier winding opened on transformer. Shrinkage and neck shadow were accompanied by a substantially darker picture.

■ Technicians are frequently confronted with troubles in one or more of five basic TV-receiver transformer types. These include the a-c power transformer; video i-f; vertical blocking oscillator and sweep output; horizontal sweep output, and audio detector and output transformers.

Technicians should have a good knowledge of symptoms which indicate defects in each transformer type and be skilled in quickly isolating trouble in each area.

Low Voltage Transformers

Low voltage power transformers supply the total "fuel" needed in all TV sets except the series-string or series-parallel string types. These transformers are generally used in full wave tube, selenium or silicon rectifier circuits, and usually have a 117-120 v, 60 cycle primary winding, a step-up secondary winding supplying from 250 to about 380 a-c volts, and one or more step-down secondary windings which supply tube heater voltages.

When the power transformer fails, completely or in part, a number of different symptoms are immediately observable in the TV set. For example, the set may be completely dead—no picture, no sound, and no raster. Tube heaters may or may not be lighted. Then again, there may be sound and no raster. In this case, the damper tube's heater winding on the power transformer may be defective. There are other possible symptoms. One side of the high voltage secondary of the transformer may open, the power supply becoming a half-wave rectifier, with results as shown in Fig. 1.

In most cases, when a regular transformer powered TV set is turned on and its tubes do not light, the trouble is usually in the set's power cord, on/off switch, fuse, interlock connection, or the transformer's primary winding is open. Under certain rare circumstances the tubes may not light because of a poor lead connection from the transformer's heater winding. Also, when a 12.6 volt split-heater transformer is used, one open outside lead can cause part of the tubes being supplied by this transformer winding to remain lighted while the other group is out.

If the set's a-c fuse, or the house fuse blows, or the lights dim suddenly when the set is switched on, the trouble can be caused by a shorting power transformer but this generally results from a defective rectifier, a shorting filter or a heavy external load on the power supply caused by a short somewhere on the B+ line.

When the a-c input of a transformer powered set does not have a fuse, the power transformer may overheat and become damaged

when a rectifier or filter capacitor shorts, or when some other heavy load is placed on the power supply. When this occurs the transformer frequently smokes. Experienced technicians recognize this symptom by the peculiar odor given off by the overheating transformer. This odor will usually linger in the set for hours, even after the set has been turned off. A transformer which has overheated and smokes should be replaced—even though some badly overheated transformers have been known to serve for years without breaking down under normal load.

Although it is easy to determine if a power transformer winding is open by using the ohms function on a VOM, it is not always easy to isolate a shorted transformer winding by the same method.

Perhaps the easiest and most definite way is with a properly fused load-check meter (a-c wattmeter). However, if this instrument is not on hand, a 150 to 200 watt light bulb equipped with test-type insulated socket, plug and flexible leads with insulated clips, can serve as well.

As shown in Fig. 2, the lamp is connected in series with the a-c line to the TV set. The lamp not only acts as a current limiting resistor but can be employed to indicate if a short exists in a power transformer section, a rectifier, filter capacitor, or because of a short at some other point on the B+ line.

If the TV is equipped with an a-c line fuse which blows each time the set is turned on, and the transformer is suspected, remove the transformer's secondary winding connections, including all heaters, replace the fuse, connect the lamp as shown, and switch on the set. If the lamp glows brightly the transformer is definitely defective and should be replaced. If the lamp lights dimly or not at all, the trouble is probably beyond the transformer.

However, in the latter case, the secondary windings of the transformer should be reconnected one by one, including the heaters, but with the rectifier removed from the set at this point. In this manner it can be determined if an individual circuit-section of the secondary is defective or a short exists in heater circuits.

If the lamp still does not glow brightly, replace the rectifier. If the lamp now glows brightly, the rectifier is either defective, or a filter capacitor is shorted or a short exists somewhere in another area of the set on the B+ line. Actually, the rectifier should be checked in the beginning whether suspected or not. The set should be switched off, of course, before each test step.

Some transformers may develop hum or buzz. This is usually known as lamination hum and can be reduced or eliminated by tightening the transformer's four housing bolts.

Whenever a TV requires a replacement power transformer it is highly desirable to obtain an exact physical fit, even if the transformer is a universal replacement type with slightly different electrical specifications or with additional heater windings. A transformer that mounts to the chassis precisely as the original did, will save the technician considerable time in most cases.

Despite all this, it may be necessary on some occasions to drill new holes, enlarge or reshape a mounting hole in the chassis, or fill up a portion of the original hole.

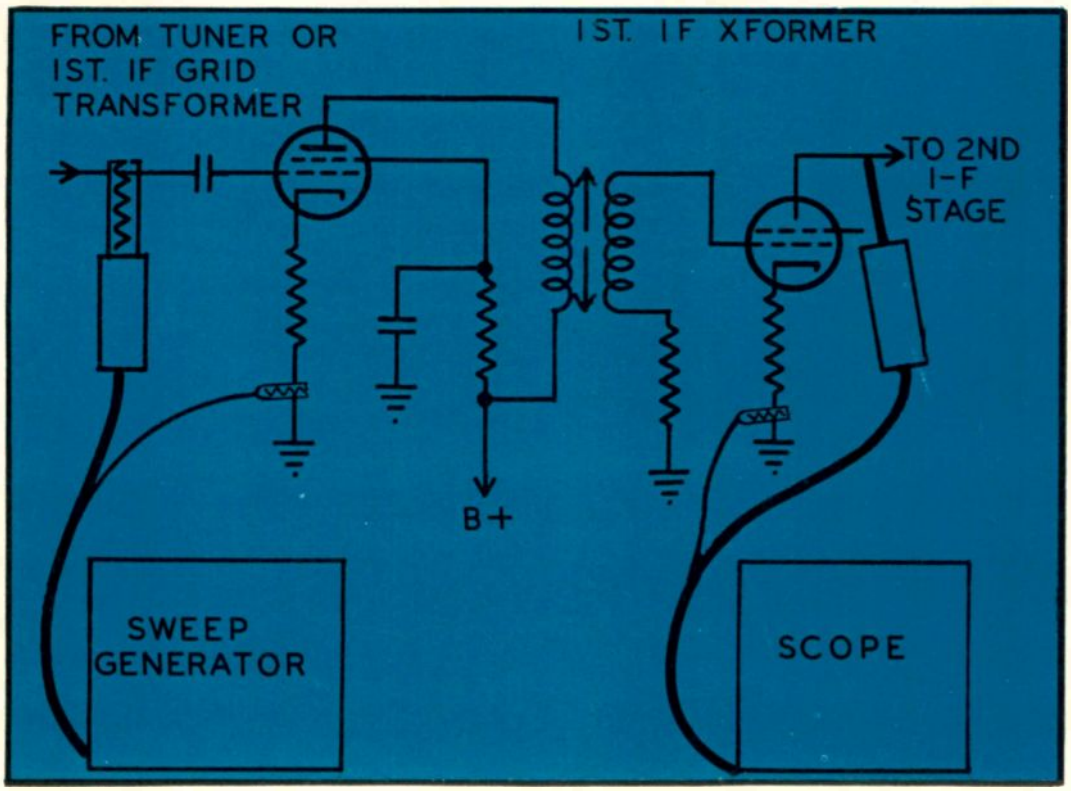

Fig. 3—A sweep generator and scope can be used to locate defective i-f transformers.

Video I-F Transformers

There are a number of i-f coupling methods, including the standard slug tuned primary-secondary transformer. Whatever the configuration, they are all used to obtain a TV receiver pass-band sufficiently wide to pass all composite video frequencies, without distortion, while they are being progressively amplified in the i-f amplifier strip.

The i-f transformers in modern sets are stagger tuned. This means, as we know, each transformer is tuned to a different frequency somewhere in the 4 mc band extending from the 41.25 mc sound channel to the 45.75 picture channel (21.25 to 25.75 mc in some older sets). Loading resistors are frequently used across a slug tuned transformer's winding to aid in broad-banding frequency response.

A defective i-f transformer can cause a complete loss of picture and sound, loss of picture and weak sound, a weak washed out picture (not accompanied by snow); picture smearing, flashing, white areas trailing black areas, lack of definition, poor sync, and other symptoms.

The windings in some i-f transformers occasionally short, burn out or open for other reasons. Many, however, become intermittent because of cold or rosin joints at a point where the fine winding wires join the transformer's lugs.

There are a number of ways to isolate a defective i-f stage. One method is signal tracing. An oscilloscope, with a demodulator probe attached, is employed as shown in the set-up in Fig. 3. With a TV station tuned in, the probe is placed at the tuner output, and the scope's gain is turned to maximum—with its frequency set at 30 cycles. If a composite video signal is observed on the scope's screen, the probe is next moved to the first i-f tube plate. The amplitude of the composite video signal should increase considerably if the tube is amplifying normally. This process is followed alternately from grid to plate of each stage until that stage is located where the signal drops off or disappears entirely.

Another approach substitutes an r-f sweep signal injected into an i-f grid to replace the regular TV signal (Fig. 3). In this case, the scope and demodulator probe is used to observe the pass-bands of individual i-f stages, or the combined pass-bands of subsequent added stages. A loss of signal, an increase or decrease of the response curve's amplitude, or an incorrect curve shape, is significant in finally isolating the defective stage. Some technicians begin first by employing a low capacitance probe on the scope, beginning signal tracing at the video amplifier stage, moving step by step in the opposite direction toward the first video i-f input point. Of course, a demodulator probe must be substituted for the direct probe at the video detector input.

After a fault is isolated to a given stage it can usually be pinpointed by checking the transformer's windings with an ohmmeter, with the set turned off. It is not necessary to disconnect most transformers to check for open windings, except where resistors are shunted across windings, or in some first i-f grid transformers, where the primary and secondary may be connected together. It may also be necessary to disconnect some transformers used at the last i-f output, depending upon the video detector circuit's design.

Intermittent connections can generally be located by carefully probing solder connections on transformer lugs with a small plastic rod while observing the picture on the CRT. If the bad connection is touched, the picture will usually go out momentarily or the CRT screen will be covered with flashes and streaks. A low wattage soldering iron and a drop of solder will usually take care of these problems.

When poor solder joints or open connections are encountered on the inside points of winding connection terminals, some transformer housings can be opened, their windings carefully removed, and repairs made with a soldering iron.

When a transformer replacement becomes necessary, it is again de-

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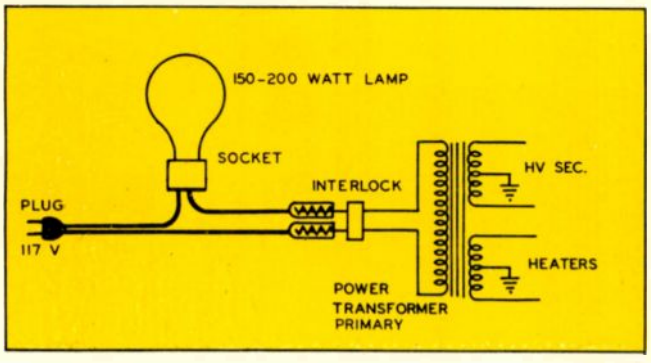


Fig. 2—If a load-check meter is not available, an ordinary lamp can be used to isolate a defective power transformer.

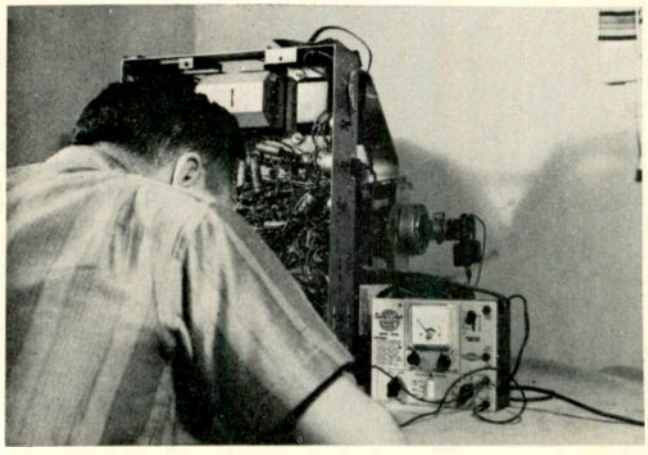


Fig. 4—Sweep-circuit tester is used to check a vertical output transformer by signal substitution.

TOUGH DOG CORNER

Difficult Service Jobs Described by Readers

HV Cage Missing—Sync Unstable

A Teleking TV set, model 174, was taken to the shop with no raster. A shorted capacitor in the horizontal afc discriminator circuit was replaced restoring the raster with picture. After replacing two weak tubes and giving the set a general cleaning, it looked fine — except for one thing. When switched on from a cold start the horizontal frequency was way off.

Both the horizontal hold control and the ringing coil had to be adjusted to sync the picture, and the picture could easily be thrown far out of sync again by rapidly turning the horizontal hold control. This was a marginal condition I felt had to be corrected.

Tubes were substituted first, of course, but without correcting the trouble. I then checked all components in the afc discriminator and horizontal oscillator circuits. Everything checked normal. I even tried experimenting by substituting component values in the afc circuit but without favorable results. The only remaining component left unchecked by direct substitution was the ringing coil. Not having a replacement I ordered one.

The new ringing coil was clipped into the circuit with two long test leads and the receiver was put on test. The results were satisfying. Now the horizontal frequency was rock stable and behaved the way it should. To be 100% sure I switched back and forth from the new coil to the old coil a dozen times or so until there was no doubt that the old coil was defective.

I removed the old ringing coil from its mounting hole on the chassis rear apron and installed the new one in its place. I turned the set on and the picture came on out of sync!

Now I was really puzzled. Several hours of time were lost and I was right where I had started. I tried an experiment. I took the coil out of its mounting hole and hooked it up again with the test leads, laying the coil down on the workbench. I turned the set on and this time it came on as it should. I picked up the coil and moved it closer to its mounting position. As I approached the rear apron the frequency became unstable; as I backed off, it settled down.

Since the high voltage cage on this chassis was missing I surmised that the coil was picking up pulses from the flyback transformer.

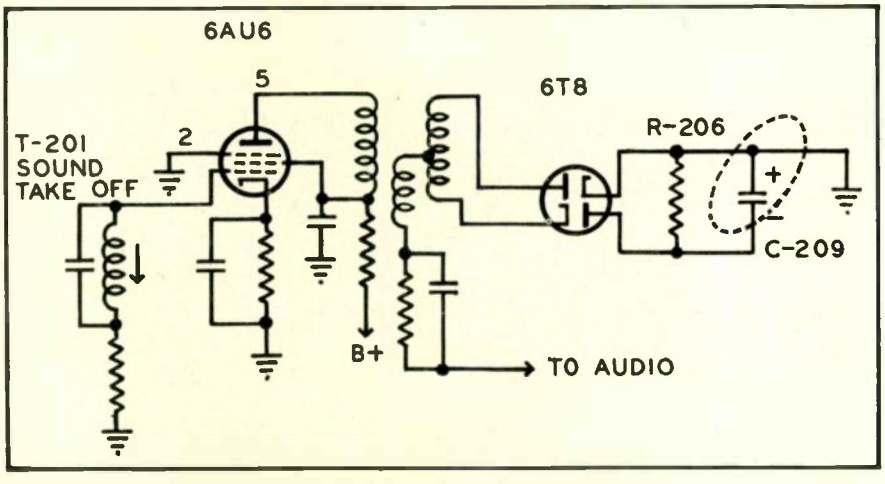
Having no spare high voltage cover, I relocated the coil farther away from the flyback. By mounting it closer to the front apron of the chassis the receiver worked fine. *—Frank A. Salerno, Long Island City, N. Y.*

Static And Varying Sound

I was recently confronted with an unusual intermittent in the audio section of an RCA KCS 108C TV. Symptoms were "static" in the sound, and varying volume. After changing audio tubes in the house without clearing up the trouble, I explained to the customer that the symptoms indicated a transformer in the sound section was breaking down.

With the set on the bench, I changed the ratio detector transformer but the trouble persisted. I pulled the video amplifier tube and tapped and probed all of the sound circuits, but no unusual scratches or noise could be created in the speaker by these methods. I then opened the circuit to the grid of the 6AU6, 1st sound i-f amplifier, and fed in a 4.5 mc signal. Sure enough, at a high input the audio level fluctuated and produced static.

I now came to the conclusion that a resistor in the sound section was arcing internally. A check of R-202, 205 and 206 proved negative. The only component left was C-209, a 5 μf 50 v capacitor. As soon as it was clipped from the circuit the static cleared up. A new capacitor was installed and the set worked well without further difficulty — *Thomas E. Gregg, Yonkers, N. Y.*



Intermittent static and varying sound was caused by defective capacitor C-209.

TROUBLESHOOTING

Hi-Fi Tone Controls

Isolate defective tone networks with specialized test set-up

by Mannie Horowitz
Electronic Instrument Co.

■ Tone controls are used in hi-fi units for a number of reasons. They compensate to a great extent for the normally unequal response of human ears to audible tones; the difficulties of recording at "flat" levels; reproduction deficiencies in speakers, room acoustics, and other reasons.

Technically, a complete tone control system performs five functions: The first two functions are boost and cut of low bass frequencies with respect to the rest of the audio band. This action is usually measured as boost and cut at 50 cycles with respect to 1000 cycles.

The second two functions are boost and cut of the high treble frequencies with respect to the middle and low frequencies. Measurements at 10,000 cycles with respect to 1000 cycles is the most frequently used test. The final and most important function is lack of frequency discrimination. Some position must be found in the rotation of both controls which neither attenuates nor accentuates any portion of the frequency spectrum. If this function is properly accomplished, the output from the amplifier should be perfectly flat within ½ to 1 db from 20 to 20,000 cycles. This, as well as the four aforementioned modes, are illustrated in Fig. 1 for one type of tone control network.

Test Setup

The setup used for testing the response of any type of tone control

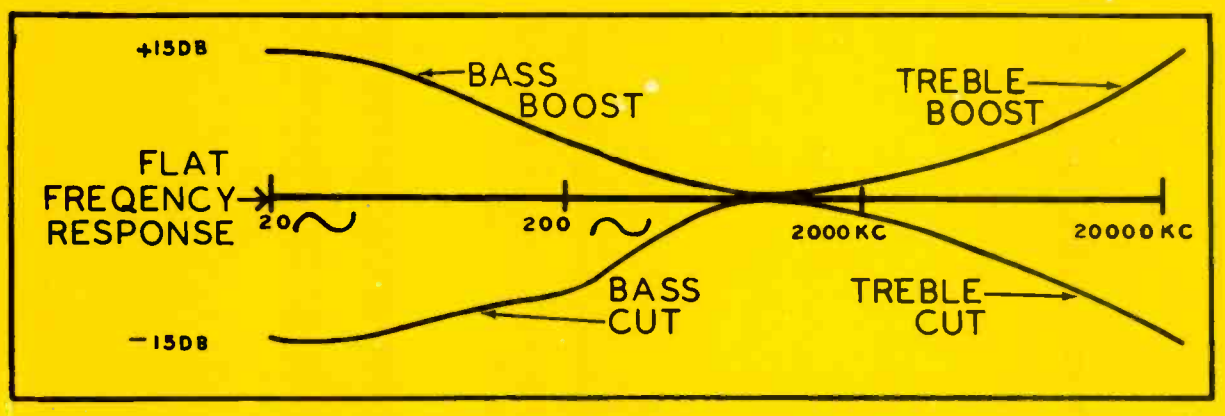


Fig. 1—Graphic Illustration shows the five functions of a typical tone control.

is shown in Fig. 2. A monitored signal from an audio signal generator is fed to the amplifier's input. The voltage output from the amplifier is applied across a second meter, while the waveshape is observed on the scope.

For a reliable test, the amplifier output must be sinusoidal at all times. This requires that the amplifier and signal generator level controls be properly set to prevent amplifier overload. No overload should exist when bass and treble controls are at their maximum boost setting while being checked at low and high frequencies respectively.

Feed a 1000 cycle signal from the generator into an unequalized input. Set the amplifier tone, loudness, scratch and rumble controls to get the maximum flat response (no bass or treble attenuation or boost). Turn the level control on the amplifier to maximum. Set the generator output control to the point of maximum undistorted output as observed on the scope. Read the output meter db scale at this voltage. Now, turn down the signal generator output control until the output meter reads 18 to 22 db below the maximum undistorted reading. Choose a convenient point, for this will be your output reference level. Note this reading as well as the reading in volts on the input meter.

To test the bass control, switch the signal generator to 50 cycles and adjust its output control so that the input meter reads the same voltage as it did at 1000 cycles. Turn the bass control to maximum and then to minimum, observing the readings in db above and below the reference level you previously noted on the output meter. The peak excursions of the output meter around the reference level is the maximum bass boost and cut the tone control can provide. Repeating this procedure at 10,000 cycles with the treble control will indicate the boost and cut capabilities of that function.

Troubleshooting any type of tone control circuit is similar to troubleshooting any other type of electronic network. You must first be certain that any vacuum tube or transistor involved is operating properly. The voltages at the various electrodes should be checked against the manufacturer's published data.

"Losser" Type Controls

This control, still frequently used in high fidelity equipment, is a holdover from public address amplifiers. A drawing of this circuit is shown in Fig. 3.

The circuit is essentially that of a voltage divider. The input is fed across the complete divider consisting of the series combination R-3 Rc and Rd R-4. A portion of the input voltage is developed at the output across the series combination Rd R-4. Because only resistors are used here, there is no attenuation or accentuation of any specific frequency range. Capacitors added to this resistive divider network modify the response, providing the bass and treble control action. The size of these capacitors and the associated resistors in the specific network determine the portion of the audio frequency range to be affected and by just how much.

The treble control network is lifted out of Fig. 3A and is illustrated in Fig. 4A. Resistances Rc and Rd are not shown in 4A because they are shorted out at high frequencies by C-3 and C-4 respectively. They contribute nothing significant to the treble control action.

Perhaps this should be explained briefly. Consider the treble set at the maximum attenuation position. Rb is equal to zero while C-2 shunts R-4 as well as the output. At very high frequencies, C-2 shorts R-4, permitting none of the high frequencies (above the audio range) to appear at the output. At moderately high frequencies, C-2 shunts R-4, resulting in an impedance greater than zero but less than R-4, so that only a small portion of treble signal will be at the output. At middle and low frequencies, C-2 is an open circuit. R-4 is no longer shunted and the maximum signal permitted by the resistive divider network appears across the output terminals.

This will result in the curves shown in Fig. 4B, for the condition when Rb=0. If Rb is not equal to zero, the shunting effect of C-2 will decrease as a function of the size of Rb. Depending upon the setting of the treble control, an attenuation curve intermediate between Rb=0 and the flat response will result.

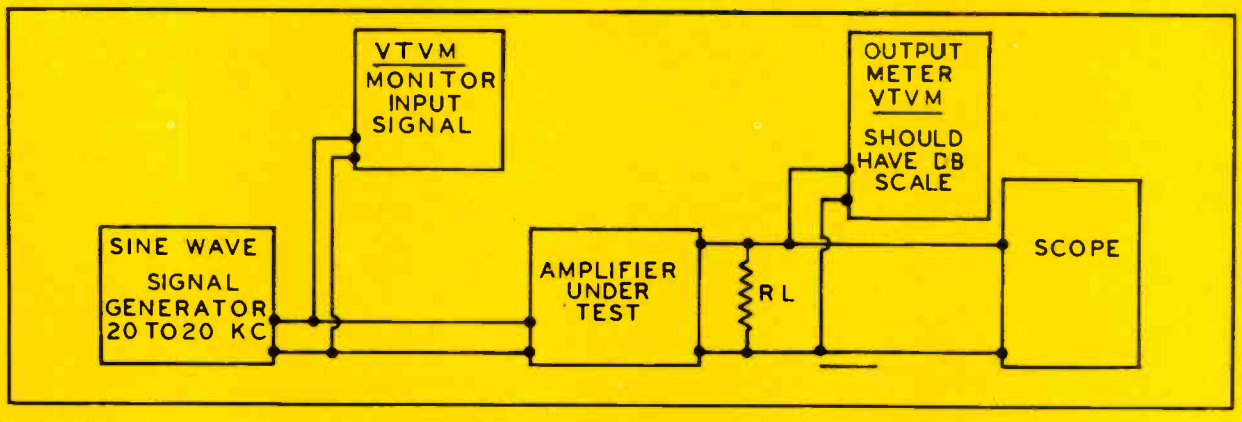


Fig. 2—Test set-up required for checking tone controls. RL is not used when the output is from a preamplifier.

In the maximum boost position, Ra=0 and C-1 shunts R-3. Because C-1 attenuates the lows more than the highs, the parallel impedance of C-1 R-3 will be less at high frequencies than at the middle and low portion of the band. Thus, a high frequency signal will develop across R-4, the output, larger than the middle and low frequency signals, resulting in the curve shown in Fig. 4B. As Ra is increased, the effect of C-1 is decreased, providing intermediate degrees of boost.

Trouble Symptoms

Considering treble control operation, troubleshooting this circuit is quite obvious. Little or no treble cut is caused by a defective C-2 while little or no treble boost is caused by a defective C-1. Of course, R-3 and R-4, the control, can be at fault, but are unlikely suspects. These components can easily be checked with an ohmmeter.

Bass boost and cut are merely a matter of controlled mid and high frequency cut and boost respectively. When properly accomplished, mid and high frequency cut is the equivalent of bass boost. Mid and low frequency boost can be considered the equivalent of bass cut.

Observing the bass control network in Fig. 5A, first consider the maximum boost position when Rc and C-3 are shorted and Rb is at its highest value. The large Rd is shunted by C-4. C-4 bypasses the large Rd at middle and high frequencies, so that these frequencies are attenuated. The attenuation is controlled by the value of R-4, resulting in flat response at the high end. C-4 shunts Rd more at the high frequencies than the low frequencies, resulting in less attenuation for the extremely low bass frequencies than for the higher bass frequencies. The resulting curve is shown in Fig. 5B. As Rc increases and Rd decreases, the effect of C-4 is lessened, resulting in less bass boost.

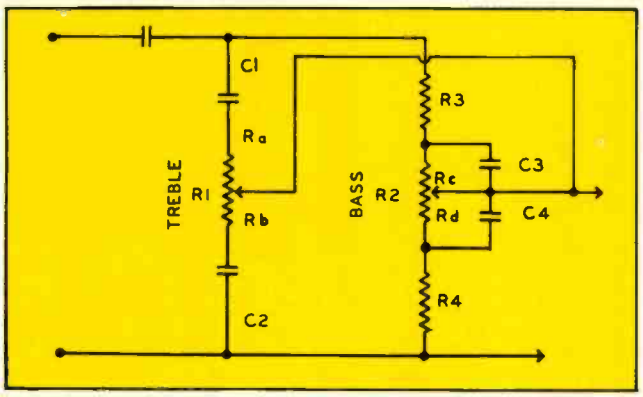


Fig. 3 — Functional diagram of "Losser" type tone control network.

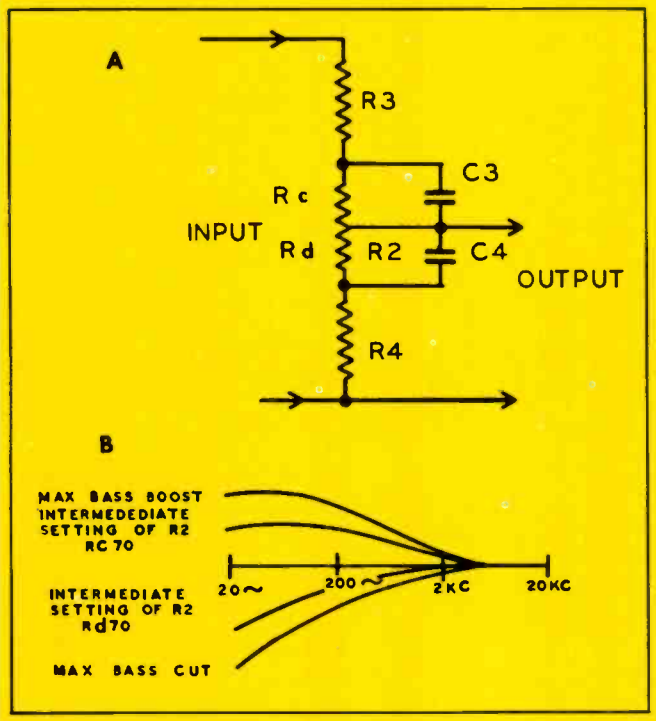


Fig. 4 (A)—Treble control network. (B)—Curves resulting from treble control action. Note that curve for intermediate setting affects center frequencies.

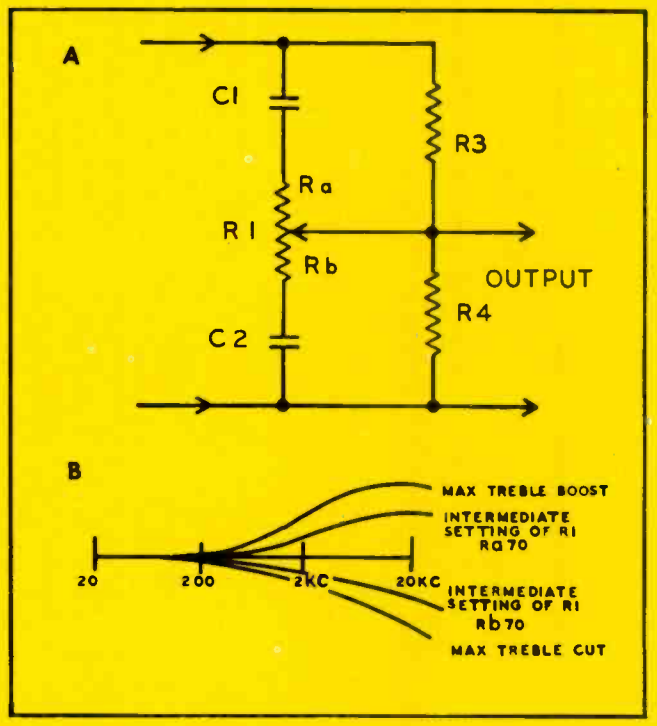


Fig. 5 (A)—Bass control network. (B)—Curves resulting from bass control action and curve for intermediate control setting affects center frequencies.

Bass attenuation is obtained through action of C-3 and Rc. When Rd=0, the maximum cut position, C-3 shunts Rc, permitting the highs to pass freely to the output through C-3, while attenuating the lows. R-3 limits the treble and mid-frequency boost, to keep the upper end of the spectrum flat. The boost at the high end and middle frequencies with respect to the lows, is the equivalent of bass cut. Decreasing Rc provides the intermediate modes of bass attenuation because of the diminishing effect of C-3.

Once again, the lack of proper action is generally caused by defective capacitors. While a defective C-3 will not permit the bass cut to behave properly, a defective C-4 will affect the bass boost. If the middle and high end does not have flat response, R-3 and R-4, as well as C-1 and C-2, are probably at fault. If the low end is not flat when the control is set at the center of rotation, one of these capacitors will frequently be found defective.

Some controls may perform only a portion of the functions outlined above. The principle of operation as well as probable component failures remain unchanged.

Baxendall Feedback Type Networks

Feedback type circuits employ networks similar to those used in the Losser tone control described above. The important factor to remember is that if you feed back a signal through a capacitor, you are feeding back more of the high than the low frequencies. The resultant signal will be an emphasis of the low end with respect to the highs. The size of the capacitor and the rest of the resistance network will determine if this network will provide treble cut or bass boost.

The most frequently employed feedback network, designed by Baxendall, is shown in Fig. 6. The feedback is from the plate, through capacitor C-4 and the resistors R-2, R-4/R-3, and back to the grid. Other feedback paths are possible, such as through C-4, R-2, C-2, C-1, R-1, half of R-5, C-3, and to the grid.

Complete analysis of this circuit involves a discussion of operational amplifiers, virtual ground, etc. Although very interesting, these details are involved and will not help in the troubleshooting of this network. Table I was designed to help you troubleshoot this circuit from observed symptoms.

Table I specifies the characteristics if there is an extreme defective condition, such as an open or shorted component. If resistances changed to larger values or capacitors decreased in value, the performance of the circuit would approach open circuit conditions. A tendency towards shorted component symptoms would be evident if resistance values have decreased and capacitance changed in the upward direction.

The curves produced by this circuit are shown in Fig. 7. Note that the curves on intermediate positions affect only the extremes of the band

Continued on page 48

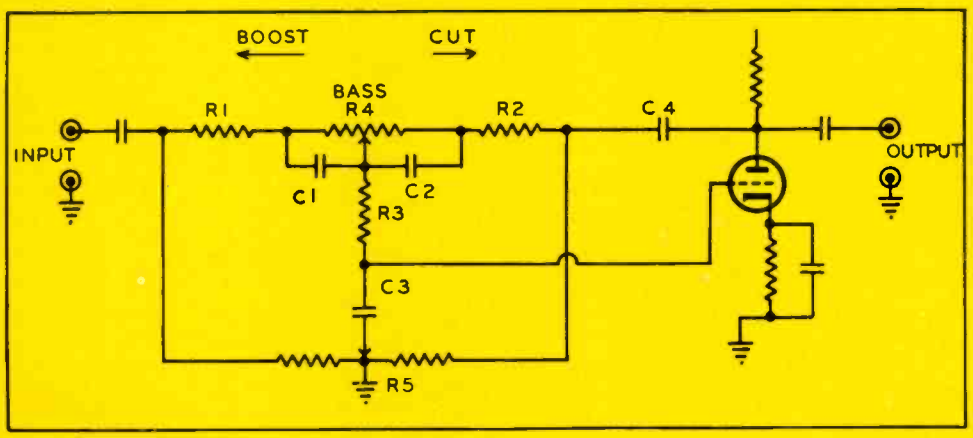


Fig. 6—Basic circuit of Baxendall feedback type tone control network.

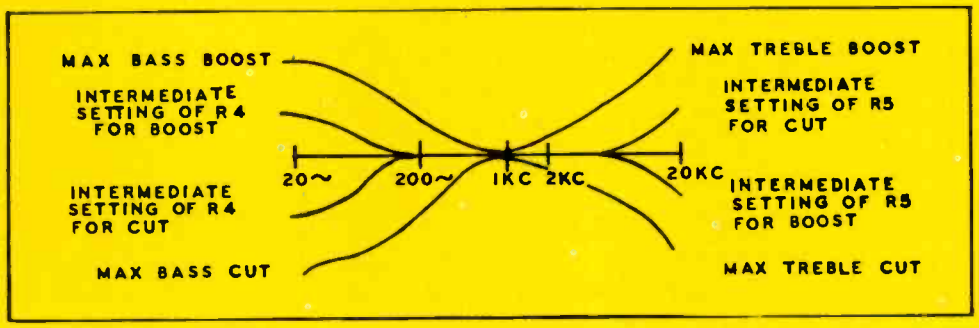


Fig. 7—Curves resulting from settings of Baxendall tone control network. Only tones at ends of band are affected.

New Test Instruments

For Bench And Caddy

ET editors examine five test units this month: a battery eliminator-charger for auto radio service work; resistor-capacitor decade box for component substitutions; Citizens Band transmitter tester for checking CB units; a combination transmitter dummy load and attenuator; and TV sweep circuit analyzer for testing horizontal and vertical circuits.

GC Electronics, Resistor-Capacitor Selector, Model 36-524 at $24.95—A resistor-capacitor substitution unit is an asset to any electronic service shop. It enables techs to substitute a questionable part quickly. The unit examined here offers individual selection of 23 1-watt resistors (33 ohms to 10 megohms) and 22 capacitors (0.0001 μf to 300 μf, rated at 600 volts and higher values at 450 volts).

There's nothing complicated about operation of substitution boxes, of course. For this unit, the user simply sets a slide switch to "Resistance" or "Capacity" and sets the selector switch to the desired value. Integrated test leads with alligator clips are then connected into the circuit. A push button is depressed for capacitor operation. Release of the button automatically discharges the capacitor for the user's protection. Test leads are marked for polarity, which is necessary when substituting electrolytics.

Besides its obvious use as a quick substitution device, the unit can also be a great help when trying to determine the value of an unmarked or charred component.

Precision Apparatus, Battery Eliminator and Charger, Model P-28 at $64.95—This is a relatively inexpensive low-ripple auto radio power supply that meets all the needs of an auto service specialist —and then some.

It's designed to meet requirements of transistorized auto radios and vacuum tube types with 6 and 12 volt ratings. The battery eliminator can also operate as a battery charger for wet cell auto batteries.

The unit has two meters: d-c volts and d-c amps, both with a range from 0-to-20. Output voltage is continuously variable from 0-8 volts d-c and 0-16 volts d-c. It also has output terminals for vibrator-type radios and special output terminals for transistor or hybrid tube-transistor radios.

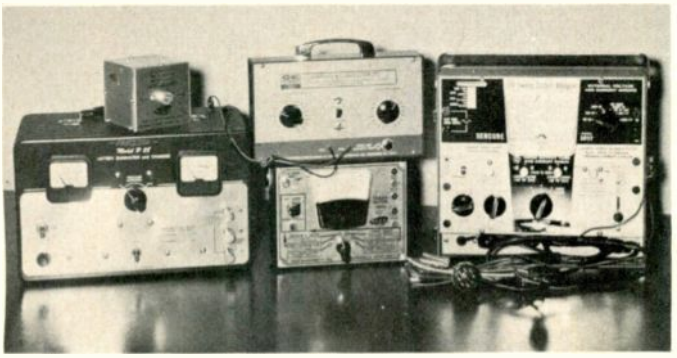
A variable voltage control and indicating meters are invaluable features. The output voltage may be lowered to determine if a vibrator commences operation at, say, 5¼ volts, and if it doesn't operate at this voltage, slowly raise output until it does operate. A vibrator that doesn't operate at approximately 5¼ is a questionable component.

Another service aid offered by variable voltage is locating intermittent troubles by raising voltage beyond the normal 6 volts to around 7½ or so. The higher voltage often results in a breakdown state of the intermittent part. The d-c amperes meter should be observed while raising voltage because an excessive reading could indicate a short in the receiver.

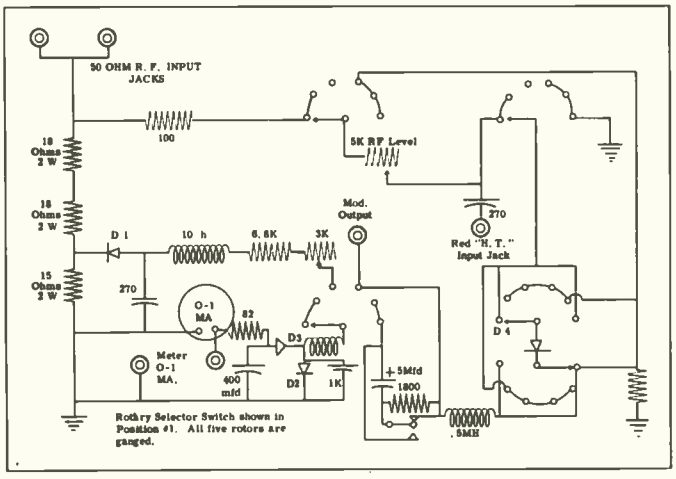
Sencore, Sweep Circuit Analyzer, Model SS-117 at $89.50—Here's an instrument that enables TV service technicians to pinpoint television receiver sweep troubles with great speed. It's a signal injection unit, plus a yoke substitute, flyback checker, and voltage reading instrument, among others. Essentially, it's the same type as the Company's predecessor, Model SS-105 (see ET April 1961). However, it has many new, improved features which make it even more useful than the older model.

In addition to providing horizontal and vertical pulses which permit dynamic tests of TV sets, this new instrument has a separate vertical yoke output signal which drives a CRT to full vertical deflection. Also, greater output is available for horizontal and verti-

ET editor inspecting Seco's transmitter tester with a Citizens Band unit.



Test instruments shown, left-to-right, are: Seco Model 510 Attenu-load, Precision Model P-28 Battery Eliminator and Charger, GC Model 36-524 Component Selector, Seco Model 510 CB Transmitter Tester, and Sencore Model SS-117 Sweep Circuit Analyzer.



Schematic of Seco's Model 510 Citizens Band transmitter tester.

cal pulses than the older model, resulting in fuller rasters.

The instrument permits users to monitor cathode current of the horizontal output tube through use of an adaptor socket (also used to check screen voltage without test leads). It measures 2nd anode voltage to 30 kv, too, as well as lower d-c and a-c p-to-p voltages. A 300 μa meter is utilized for minimum circuit loading. Sync pulses, negative or positive, can be employed to troubleshoot sync circuits.

In truth, this unit has all needed provisions to allow a user to troubleshoot any part of a TV's sweep circuit without resorting to guesswork. Capping this neat test package, it has a roll chart which indicates operating data of horizontal output tubes, an all-steel carrying case with a full mirror in its cover, and two 115 volt a-c outlets in the unit's cable department. Properly employed, this unit can no doubt save the average technician considerable time.

Seco, Transmitter Tester, Model 510 at $46.95, and Attenu-load Model 511-A at $21.50—Here are two pieces of equipment which technicians can use to great advantage when installing, testing, and servicing CB transmitters.

Model 510 combines functions of a number of transmitter test instruments. The tester measures percentage of both positive and negative modulation, r-f ma, and power output in watts. It also doubles as a field strength meter or remote indicator; the latter requiring the use of a special r-f attenuator cable. The manufacturer also suggests that the tester may be used as an a-c voltmeter or an audio output meter.

The "Attenu-load" can be used as a dummy load bank or as a transmitter power attenuator.

The 510 test unit was designed for use with low power transmitters such as CB equipment, but when used with the model 511-A Attenu-load, the instrument's capacity can be extended to 50 watts. The Attenu-load may also be used as a dummy load for r-f power to 50 watts.

Although Citizens Band transmitters are limited to 5 watts input by FCC regulation, if in doubt about the maximum power output of another transmitter to be tested (up to 50 watts), the transmitter is not connected directly to the tester. Instead, a 50 ohm coaxial cable supplied with the tester, is connected to the transmitter's antenna terminals and then to the Attenu-load input. A switch on the back of the Attenu-load is thrown to the "INT" position before transmitter power is applied. The transmitter tester can then be safely connected to the Attenu-load output. Power attenuation is 10 db, which represents a 10:1 power step down ratio.

This equipment should prove helpful to any shop engaged in CB installation and repair.

Recommended practices for the home entertainment electronics industry. Requirements for avoiding deceptive pricing and bait advertising

TV Industry Advertising Guide

An advertising code for the home entertainment electronics industry has been published by the Electronic Industries Association. Included with this industry-recommended plan are reprints of the FTC guides against deceptive pricing, bait advertising and deceptive advertising of guarantees. The EIA code text was submitted to the FTC for review, and recieved approval as an aid to better understanding of FTC law.

It is the EIA's view that their legal position does not allow them to enforce these recommended practices. Therefore, in the interest of keeping our readers informed, and in particular those readers who are also retailers, we are abstracting the highlights of the FTC guides, and publishing the EIA code in its entirety.

By having this information readily at hand, readers can be guided in the presentation of their own advertising, and also have a tool for monitoring the advertising of others in the industry.

EIA Recommended Advertising Practices Comparative Sales Price Advertising

A. When an advertisement, by words, figures or in any other manner states or implies a reduction from the advertiser's usual price of the model advertised, the advertiser himself should have made actual sales at the higher price in his recent, regular course of business.

B. A statement representing or implying a reduction or savings from an established retail price should be used in advertising only if for the specific model advertised, such price has been either (a) the advertiser's usual price of the same model in his recent, regular course of business; or (b) the price charged for the same model by other sellers in the trade area in their recent, regular course of business; and (c) the advertisement clearly shows from which of these two prices the saving or reduction is claimed or implied.

C. The terms "sale," "special sale," "clearance sale," "E.O.M. (end of month) sale," "advance sale," or any other terms which imply a price reduction should not be used unless in his recent, regular course of business, the advertiser's price of the model advertised has in fact been higher. (If the advertiser has not himself offered to sell the model to which the price reduction applies, the advertiser should use such terms only if the usual and customary retail price of other sellers is higher in the trade area where the claim is made and the advertisement clearly shows that the claim is based on such comparison, i.e., the prices of other sellers. The claim should not be made if it is based on infrequent or isolated sales by other sellers.)

D. No article should be 'pre-ticketed' with any price figure, either alone or with descriptive terminology, which exceeds the price at which the article is usually and customarily sold in the trade area or areas where the 'pre-ticketed' article is offered for sale. This rule applies to those who disseminate 'pre-ticketed' price figures for use in connection with the offering for sale of articles at retail by others, even though they themselves may not be engaged in retail sales. The term 'pre-ticketed' includes the use of price figures affixed to the article by tag, label, or otherwise, or in material such as display placards, which are used, or designed to be used, with the article at point of sale to the consuming public.

Other Price Advertising Practices

A. Whenever a price is advertised:

1. The model to which the price applies should be identified by model number, and also,
2. Any other model illustrated

in the same advertisement should be identified by model number.

B. The terms "as low as," "from," etc., should not be used in connection with a price unless a particular model is in fact available at such price in reasonable quantities and the model is identified in the advertisement by model number.

C. When prices of display models are being advertised, such models should be specifically identified in the advertisement as display models. Display models include floor samples, demonstrators, and the like.

D. When the price quoted in an advertisement is "with trade," and the trade allowance is dependent upon the model or condition of the item to be traded in, this fact should be stated.

E. Outboarding. When the advertised price does not include delivery, normal installation, service, or warranty, the advertisement should clearly and conspicuously state that there will be an additional charge for an such excluded item.

F. When reference to periodical payments is made in an advertisement:

1. If a down payment or trade-in may be required, the advertisement should so state.
2. If a terminal or balloon payment may be required, the advertisement should so state.
3. If the periodical payment applies only to certain models, the advertisement should so state.

G. When the word "free" is used in advertising the offer should be bona fide factual. If the offer is conditioned in any way, the conditions imposed should be clearly and conspicuously disclosed at the outset of the advertisement (and not merely by a footnote) so as to leave no reasonable probability that the terms of the advertisement might be misunderstood. The word "free" should not be used where the advertiser has, in connection with the offer, increased the price of the merchandise required to be purchased or reduced its quality.

H. If a premium is offered in connection with the purchase of an instrument, the statements about the premium should also conform to these advertising practices.

I. No statement should be made in advertising which implies that the advertiser's prices or terms have any special factory sponsorship or endorsement, unless the statement is true.

Bait Advertising

A. No advertisement containing an offer to sell a product should be published unless the model advertised is then being displayed by the advertiser, is available for prompt delivery at the price and upon the terms set forth in the advertisement, and will be willingly sold by the advertiser.

B. If display models are advertised as being available at specified prices or at savings, the quantity of such models available should be specified in the advertisement, or the advertisement should state that the quantity available is limited in supply.

C. If an advertised model will be sold at all outlets listed in the advertisement, a sufficient quantity of the advertised product should be available to meet reasonably anticipated demands, unless the advertisement clearly and adequately disclosed that the supply is limited and/or the advertised product is available only at designated outlets.

D. When an advertiser anticipates that the demand for an advertised model, such as a close-out item, will exceed his ready supply (from stock, from supplier or from another regular source), the advertisement should state that the quantity available is limited.

E. The advertiser should not disparage by acts or words the advertised product or the guarantee, credit terms, availability of service, repair or parts, or in any other respect.

F. The advertiser should not show or demonstrate an advertised product which is defective, unusable or impracticable for the purpose represented or implied in the advertisement.

Product Claims

A. When an advertisement contains a claim as to the quality, performance, or features of a particular product, the person originating the claim should be prepared to support it by suitable demonstration or credible statistical data. No illustration should be used in any advertisement which creates a false impression of the quality, performance or features of a product.

B. Comparisons between products of different manufacturers, whenever made, whether on radio or television, on the sales floor or elsewhere, should be bona fide factual and not made in such a way as to mislead the listener or viewer. There should be no unfair comparisons between the advertised product and the other product with regard to performance, features or other characteristics. There should be no comparisons under any condition unless the advertised product and the other product are of similar and comparable merchandise generally available for purchase at a comparative price in the same trade area or areas as the advertised product or, if not so available, that fact is clearly disclosed.

C. When an advertisement specifies a warranty period, but the warranty period applies only to certain parts, and not to all parts, then that fact should be stated.

D. The terms "Satisfaction or Your Money Back," "10-Day Free Trial," or similar terms, should refer to the return of the full purchase price, unless otherwise specified.

E. No advertisement containing a warranty should be published, unless the advertiser will promptly fulfill his obligations and stand behind his representations.

Federal Trade Commission — Abstract Of Guides Against Deceptive Pricing

In determining whether or not pricing practices are violative of the laws administered by the Commission, the facts in each matter are considered in view of the requirements of the Federal Trade Commission Act, as amended, and principles enunciated by the Courts in the adjudication of cases. The foremost of these principles are:

1. Advertisements must be considered in their entirety and as they would be read by those to whom they appeal.

Continued on page 72

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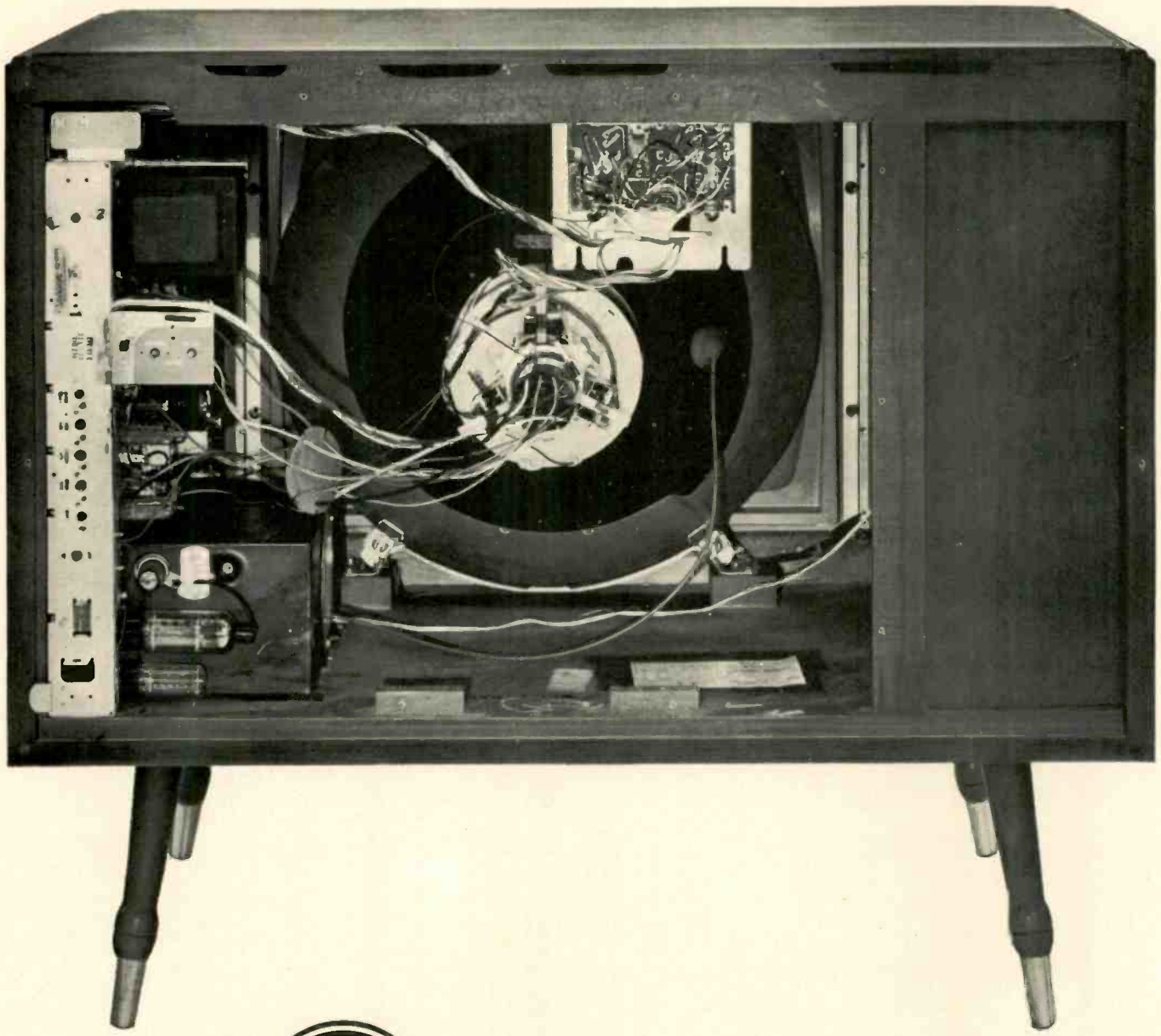

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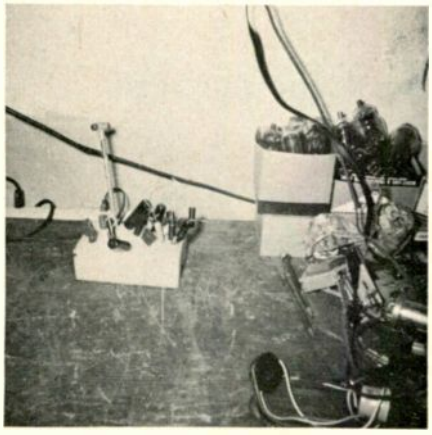
SHOP HINTS

TIPS FOR HOME AND BENCH SERVICE

Novel Tool Holders

A few pieces of Styro-foam, available in some five-and-ten-cent stores, make excellent holders for



Novel tool holders made from Styro-foam material keep small tools handy.

many small tools and other items found around the work bench. This material can aid in keeping an otherwise cluttered-up bench clean and small tools can be easily found at a glance. Items are merely "stabbed" lightly into the material and when needed can be easily removed. — *William R. Lacy, Syracuse, N. Y.*

Radio Hum Intermittent

The other day a small table radio was brought into the repair shop with symptoms of severe 60 cycle hum. Upon examination of this set, the service technician found that the hum temporarily went away if the power switch was first "flicked" off, and then on.

Sets exhibiting symptoms such as these frequently employ a multiple section filter capacitor. The trouble arises when the common lead which interconnects the foils develops a highly resistive contact with one of the sections. This permits hum to be internally coupled from the defective section to those which are functioning normally and the filtering action is reduced. Flicking the set off and then on permits heavy capacitive charging currents to flow through the resistive contact and temporarily weld the bad connection. Unfortunately, the weld is not satisfactory and the connection becomes resistive once again after a short period of operation.

The cure is, of course, replacement of the entire filter capacitor. —*Philco Service-Businessman, Phila., Pa.*

Polish Scuffed Plastic TV Screens

When a portable or other TV arrives in the shop with a scuffed plastic face, the simple procedure outlined here will almost completely eliminate the scuffs, and reduce even deep cuts so they are less noticeable. Minor scuffing is completely eliminated.

Obtain some plaster-of-Paris powder and mix with "Lubriplate" until you have a smooth paste. Place some on the plastic which is to be treated and rub with a circular motion, using a piece of clean cotton or linen cloth. Concentrate first on the badly scuffed area with small circular motions and gradually increase the size of the circular sweep. Watch the surface clear up almost like magic. This will come in mighty handy if a receiver gets scuffed in transit from the customer's home to the shop.— *M. G. Goldberg, St. Paul, Minn.*

Loctal Tube Conversions

Scarcity and cost of some "loctal" type receiving tubes make conversions desirable from the customers point of view, and the technician can profit also.

We have found that a 7 pin printed circuit socket has the same radius as loctal pins. Conversion requires only removal of the loctal socket's prongs, not the socket itself. There are 8 holes, but only 7 pins—the printed circuit socket can be rotated to obtain best advantage of the terminal connections, and the original leads are then connected to the new socket tabs.

With a 14B6 at $5.60, and a 12AV6 replacement at $1.65, the spread makes the deal profitable both ways. — *Willard W. Waite, Wellington, Ohio.*

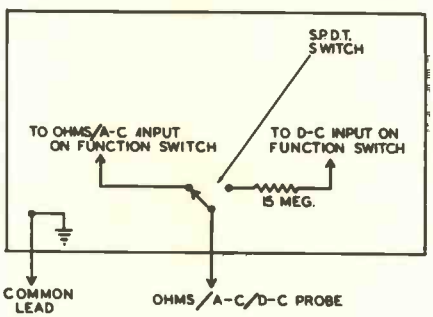
SHOP HINTS WANTED!

$3 to $10 for acceptable items. Use drawings to illustrate whenever necessary. A rough sketch will do. Photos are desirable. Unacceptable items will be returned if accompanied by a stamped envelope. Send your entries to Shop Hints Editor, ELECTRONIC TECHNICIAN, 480 Lexington Ave., New York 17, N. Y.

VTVM Probe-Lead Modification

I have eliminated the inconvenience of 3 test leads on my EICO model 221 VTVM in the following manner:

The ohms/a-c input and the common or ground leads are first removed. The common jack is removed from the chassis and a single-pole-double-throw toggle switch is installed in the same mounting hole after the hole is enlarged.

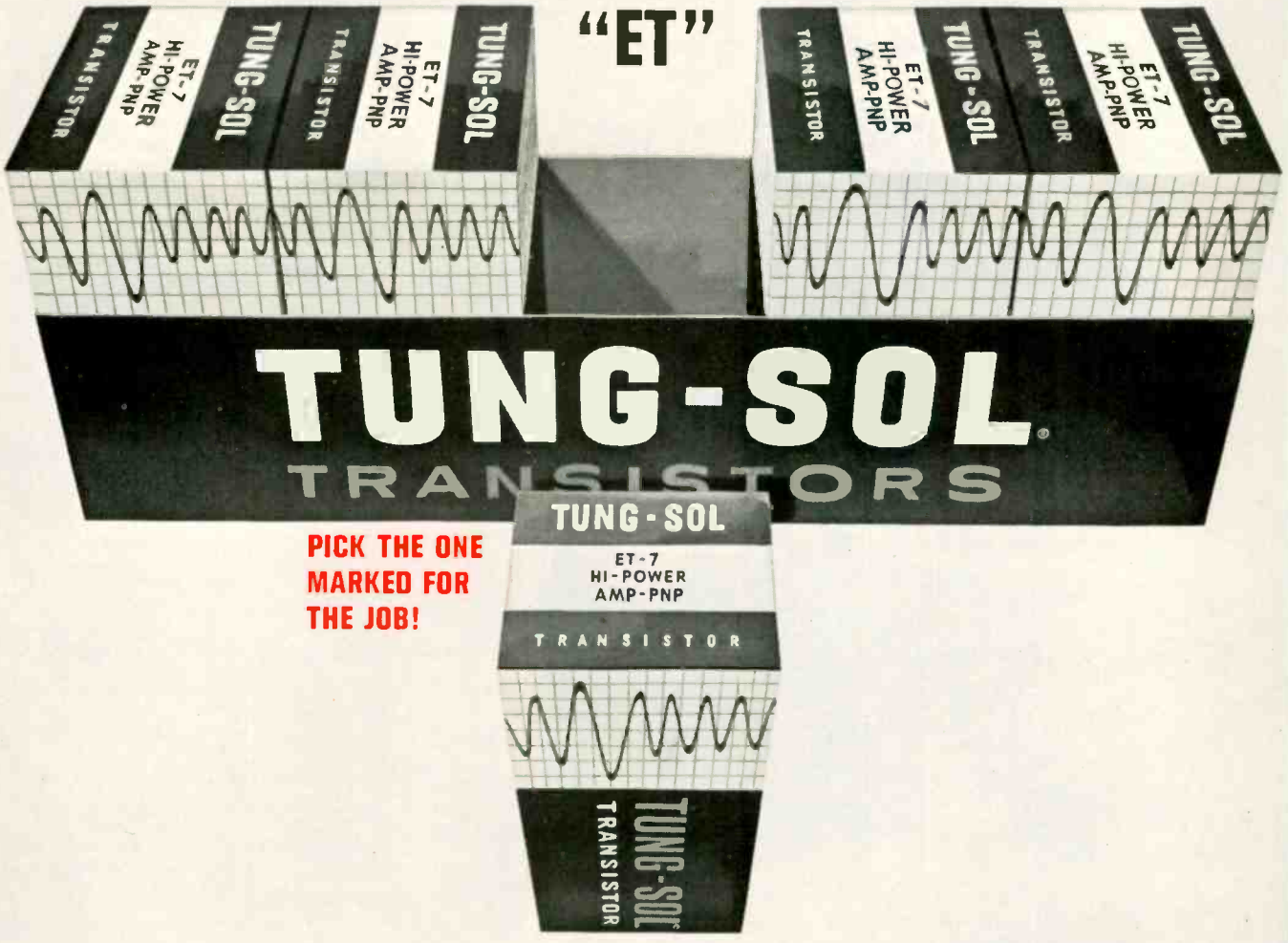


VTVM probe-lead modification employs a s.p.d.t. switch to simplify meter use.

The common lead is permanently installed in the a-c/ohms jack and grounded. The 15 megohm resistor in the d-c probe is removed and one side of it is connected to one toggle-switch contact and the other end is connected to the d-c input on the meter's function switch. The other toggle-switch contact is connected directly to the ohms/a-c input tap on the function switch.

These changes do not endanger

EASY WITH "ET"



Tung-Sol "ET" transistor packages are marked to eliminate guesswork in selecting the correct replacement for every job. Type numbers, class of service and junction polarity is stamped on each end flap. This is a time saving feature as well as a safeguard against service slip-ups. Tells you at a quick glance where your inventory stands.

The compact "ET" line was engineered by Tung-Sol specifically to eliminate confusion in entertainment service resulting from almost endless similarity and duplication of types. Eleven PNP and NPN units replace hundreds of older transistors. "ET" transistors measure up fully to Tung-Sol's one high standard of excellence and reliability. The most advanced quality evaluation techniques assure product uniformity, lot after lot.

When you order transistors, specify "ET." High turnover with low inventory and customer satisfaction will show that it's the profitable way to buy transistors. Tung-Sol Electric Inc., Newark 4, New Jersey.

TUNG-SOL®

A TYPE FOR EVERY JOB

PNP TYPES

Low power

ET1 Mixer/oscillator/converter
ET2 IF amplifier
ET3 AF amplifier 6v.
ET4 AF amplifier 12v.
ET5 AF amplifier 9v.

Medium power

ET6 AF power amplifier

High power

ET7 AF high power amplifier

NPN TYPES

Low power

ET8 Mixer/oscillator/converter
ET9 IF amplifier
ET10 AF amplifier 9v.
ET11 AF amplifier 12v.

Ask your Distributor for the Tung-Sol Transistor Interchangeability Guide

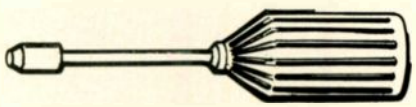
- - - for more details, circle 58 on page 50

SHOP HINTS

the meter or circuits in any way, nor does it upset the normal operating function of the unit. It is now very easy to flip a switch, pick up two probes, and use the meter with ease for any measurement. — *Harold Wolff, Jr., Gonzales, Texas.*

Altered Wrench For Hex-Head Screws

Transformers and other components are frequently mounted in radio and TV sets with thin hex-



Altered hex-head wrench facilitates ¼" screw removal in hard-to-get-to places.

headed self-tapping metal screws. These are sometimes difficult to grasp with a regular hex wrench. I have found that a taper-ground tip of a ¼" wrench is a great tool for removing these screws when they are located in close quarters and hard-to-get-to places. — *Bud Mierkey, Largo, Fla.*

. . . Trouble Shooting

Continued from page 37

rather than the center as well as the extremes shown for the Losser type network in Figs. 4B and 5B.

It is not unusual for a customer to complain of insufficient boost or cut. Your bench tests at 50 and 10,000 cycles will probably show the controls to be operating satisfactorily. Visual examination is very likely to prove the circuit to be of the Baxendall variety.

The answer to this is in the two curves. Because the Losser type affects the mid frequencies more, the effect is more obvious.

Actually, the Baxendall network is probably preferable. The feedback reduces distortion. The system permits control over that portion of the curve where most boost or cut is necessary. The apparent insufficient boost or cut does not condemn the network, but some other weak link in the hi-fi chain. Find this weak link and you will probably have a new component sale on your hands. ■

TRIPLETT

EXTRA QUALITY IS HIDDEN*

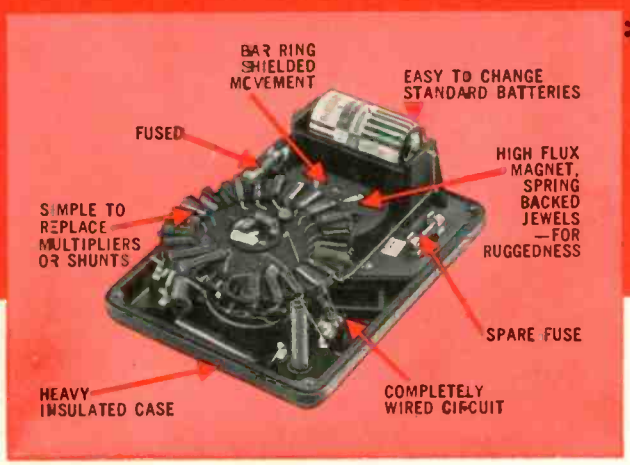
MODEL 630 V-O-M

PRICE† $49.50

Standard Of The Industry

USES UNLIMITED:

- Field Engineers
- Application Engineers
- Electrical, Radio, TV, and Appliance Servicemen
- Electrical Contractors
- Factory Maintenance Men
- Industrial Electronic Maintenance Technicians
- Home Owners, Hobbyists



FACTS MAKE FEATURES:

1. Popular streamlined tester with long meter scales arranged for easy reading. Fuse protected.
2. Single control knob selects any of 32 ranges—less chance of incorrect settings and burnouts.
3. Four resistance ranges—from .1 ohm reads direct; 4½ ohm center scale; high 100 megohms.

Attention to detail makes the Triplett Model 630 V-O-M a lifetime investment. It has an outstanding ohm scale; four ranges—low readings .1 ohm, high 100 megs. Fuse affords extra protection to the resistors in the ohmmeter circuit, especially the XI setting, should too high a voltage be applied. Accuracy 3% DC to 1200V. Heavy molded case for high impact, fully insulated.

†630A same as 630 plus 1½% accuracy and mirror scale only $59.50

RANGES

DC VOLTS	0-3-12-60-300-1,200-6,000 at 20,000 ohms per volt.
AC VOLTS	0-3-12-60-300-1,200-6000 at 5,000 ohms per volt.
OHMS	0-1,000-10,000.
MEGOHMS	0-1-100.
DC MICRO-AMPERES	0-60 at 250 millivolts.
DC MILLI-AMPERES	0-1.2-12-120 at 250 millivolts.
DC AMPERES	0-12.

DB: —20 to +77 (600 ohm line at 1 MW).

OUTPUT VOLTS: 0-3-12-60-300-1,200; jack with condenser in series with AC ranges.

TRIPLETT ELECTRICAL INSTRUMENT COMPANY, BLUFFTON, OHIO

. . . for more details, circle 56 on last page

THE WORLD'S MOST COMPLETE LINE OF V-O-M'S. AVAILABLE FROM YOUR TRIPLETT DISTRIBUTOR'S STOCK

FREE LITERATURE

To recieve the literature below without charge, simply circle the number on the coupon

1 **Antennas:** Literature on citizens band antennas include three new models. Covered also are antenna accessories and the DB-27 display. Antenna Specialists Co.
. . . for more details, circle 301

2 **CB Transceivers:** Literature covers a 5-watt, fully transistorized citizens band transceiver. Cadre Industries Corp.
. . . for more details, circle 302

3 **Capacitors:** A "Periodic Table" covers 18 major types of capacitors. Electrical and operating characteristics, and formulas employed in circuit design included. Chart measures 3'x2'. Cornell-Dubilier Electronics.
. . . for more details, circle 303

4 **Package Shipping:** Literature covers comparative costs by bus, rail express, air freight. Gives facts on products carried, weights, sizes, service, speed and frequency. Greyhound Corp.
. . . for more details, circle 304

5 **Loudspeakers:** Specification sheet CSP-102 gives complete technical details on new model K-950, 8" 2-way coaxial distributed sound loudspeaker. Jensen Mfg. Co.
. . . for more details, circle 305

6 **Home Study Courses:** Booklet covers a number of home study courses including: Television Servicing; Communication Electronics; Automation Electronics; Computer Programming; Transistors; and Color Television. RCA Institutes, Inc.
. . . for more details, circle 306

7 **Suppressors:** Catalog 61-KV-10 covers "Klipvolt" selenium transient voltage suppressors for reduction of transient voltages generated by motors, relays and switches. Available in polarized designs for d-c applications; nonpolarized for a-c. Sarkes-Tarzian, Inc.
. . . for more details, circle 307

8 **Rectifiers:** Illustrated bulletin S-105 covers diffused silicon controlled rectifiers. Includes ratings, characteristics, performance data, applications and specifications. Semicon, Inc.
. . . for more details, circle 308

9 **Transistors:** A new chart lists approximately 2,000 transistor types most commonly used in TV, radio, hi-fi, auto and home equipment, with manufacturer's number and replacement. Includes base diagrams of five types showing locations of the leads. One section is devoted to the firm's American-made replacements for Japanese and other foreign made transistors. Chart measures 17"x22". Semitronics Corp.
. . . for more details, circle 309

10 **Parts:** Kit, model 31T 3890, covered in literature, contains mechanical and electrical parts to be used in conjunction with Sec. II of Standard Cross Reference Guide; and make up 90% of replacement parts most commonly used in field service. Standard Kollsman Industries, Inc.
. . . for more details, circle 310

11 **Antennas:** Literature covers: T-Bird (non-powered) antennas, six models; and T-Bird (powered) antennas, three models. Features include 7/16" tubing and "Delta" ("T" match) feed system. Technical Appliance Corp.
. . . for more details, circle 311

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3-62

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Use this coupon, or your letterhead, before April 20, 1962

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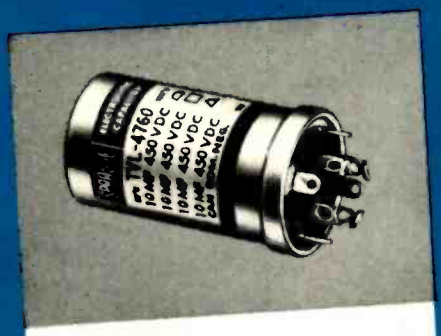
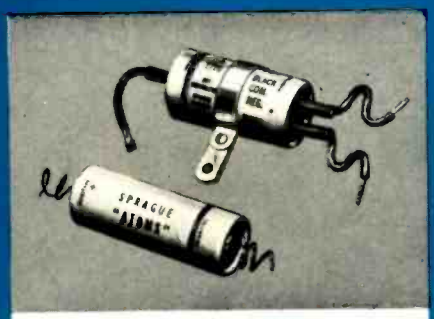


TVL TWIST-LOK® CAPACITORS

These 'lytics take on the toughest TV and radio duty, give maximum trouble-free service, *without HUMMM!* They are dependable at extremely high and low temperatures. Cathodes are etched to meet the needs of high ripple currents, high surge voltages.

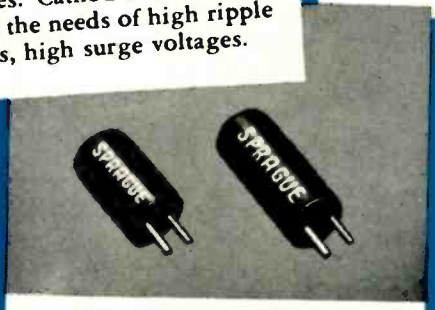


TVA ATOM® CAPACITORS

Atom tubulars are service favorites because they fit anywhere, work anywhere. They're the *only* small size 85 C (185 F) capacitors in ratings up to 450 WVDC. They have low leakage current, long shelf life, and withstand high ripple currents, high surge voltages.

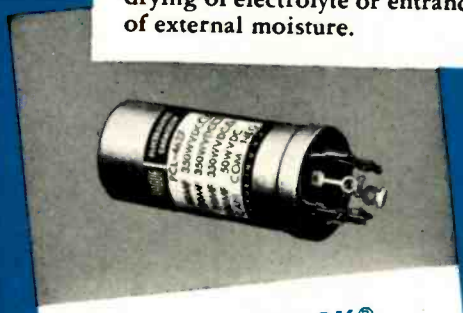
TE LITTL-LYTIC® CAPACITORS

The very best ultra-miniature replacements for transistor circuits, offering unusual reliability through all-welded construction. No pressure joints to cause "open" or intermittent circuits. Long shelf life—extremely important in sets used only part of the year.



VL VERTI-LYTIC* CAPACITORS

These single-ended molded tubulars are the ideal replacement for units of this type found on printed wiring boards.
Keyed terminals assure fast manual mounting and correct polarity. Resin end fill protects against drying of electrolyte or entrance of external moisture.



PCL PRINT-LOK® CAPACITORS

The printed circuit version of the Twist-Lok. Universal base replaces any of the printed circuit 'lytics in use today. No makeshift mounting adapters to damage capacitor or add extra height . . . no possibility of high resistance contacts.

EVERY 'LYTIC YOU NEED . . .

- **every value**
- **every rating**
- **every style**

Shown here are the more popular of Sprague's big family of Electrolytic Capacitors, the broadest in the industry. Other types include Metal-encased Screwbase; Plastic-encased High-MF; Metal-encased Octal-base; Ultra-low leakage Photoflash. All are listed and described in Sprague's NEW Catalog **C-614.** Get your copy from any Sprague distributor, or write Sprague Products Company, 65 Marshall Street, North Adams, Massachusetts.

*TRADEMARK

SPRAGUE®
THE MARK OF RELIABILITY

WORLD'S LARGEST CAPACITOR MANUFACTURER

- - - for more details, circle 52 on page 50

NEW PRODUCTS

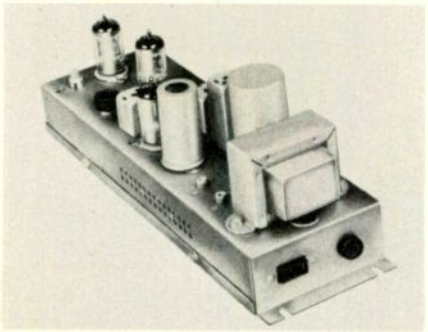
G-E TV RECEIVERS

Three new TV receivers are: "The Century," 19" luggage style portable; has power transformer chassis, chrome carrying handle and 6"x2" front mounted speaker; three luggage finishes; $169 to $179. The "Fashion Designer," 21" table model; has power transformer chassis. front controls and front speaker; two cabinet finishes; $199 to $209. The "Golden Celebrity," 19" portable; has power transformer chassis, fold-away luggage carrying handle and power cord wind-up bracket at rear of set; three cabinet finishes; brass-finish roll-about stand and magazine rack offered free with "Golden Celebrity" but price of set not announced. Radio & Television Division General Electric Co., Electronics Park, Syracuse, N. Y.

. . . for more details, circle 400 on page 50

Fisher ADAPTOR

Multiplex adaptor, model MPX-200, companion to Fisher Universal MPX-100, is designed especially for those who desire a unit for concealed installation. It is self-powered, compact and easily con-

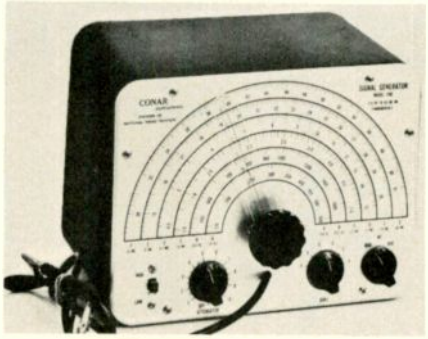


nected. Can be placed up to three feet from the tuner or receiver. Features include: special control for matching exactly to the tuner or receiver with which it is used,. requires setting only at time of installation; two controls to assure identical output levels from both channels; and selector switch to record stereo programs monophonically. Internal circuitry contains a 15 kc steep roll-off, low-pass filter for suppression of the 38 kc sub-carrier and side-bands. $79.50. Fisher Radio Corp., 21-21 44th Drive, Long Island City 1, N. Y.

. . . for more details, circle 401 on page 50

Conar GENERATORS

Model 280 signal generator uses Hartly-type oscillator circuitry for stability plus pre-set, tuned r-f coils on low bands and ceramic trimmers on high bands. Average accuracy, without further alignment, 2%. Frequency coverage, 170 kc to 60 mc on six bands; 60 mc to over 120 mc on harmonics. Planetary drive



tuning capacitor with 6:1 ratio eliminates backlash. Has solid state power supply. Kit, $21.50. Wired, $29.50. Conar Instruments Div., National Radio Institute, 3939 Wisconsin Ave., Washington 16, D. C.

. . . for more details, circle 402 on page 50

Mercury TUBE TESTERS

Deluxe model 1200 dynamic mutual conductance tube tester features push-button settings to permit testing of any tube, under actual dynamic conditions, in a few seconds. It tests new type tubes including nuvistors, novars, compactrons and new 10-pin tubes; foreign and hi-fi tubes, voltage regulators, battery type tubes, auto hybrid tubes, thyratrons and most industrial tube types; black and white picture tubes, transistors, and batteries. Range of operation includes tests for true dynamic mutual conductance (Gm), tests for shorts and leakage between any tube elements, and for gas and grid emission. Has automatic line voltage regulation, 4½" meter; built-in 7-pin and 9-pin straighteners on

panel; and phosphor bronze tube sockets. Housed in leatherette case with compartment for cables. 18¼" x 10¾" x 4¾". $119.95. Mercury Electronics Corp., 111 Roosevelt Ave., Mineola, N. Y.

. . . for more details, circle 403 on page 50

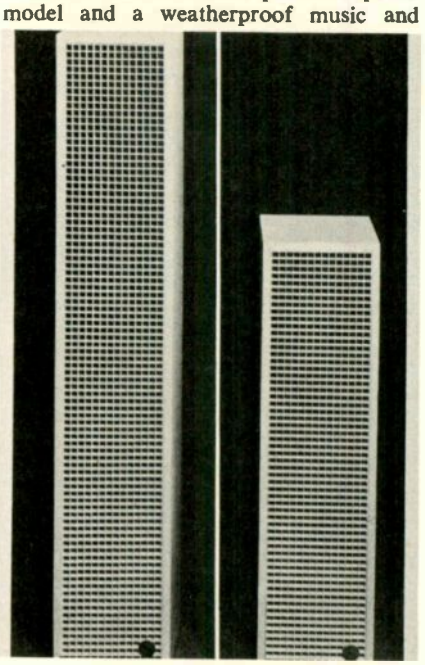
Sylvania RADIOS & TV RECEIVERS

Supplementing 1962 lines, and introduced as "drop in" models at the International Home Furnishings Market are: Table radio models, AT15 and AT16, provides 6-tube performance with one rectifier, 4" front-mounted speaker, direct drive tuning, built-in ferrite rod antenna and engraved circuit chassis. 6"H, 13⅛"W, 5⅞"D. $19.95 and $22.95. Also models 19P11B and 19P11E, newly styled versions of 19P11, 19" portable TV receiver. The 19P11 luggage-style cabinet has a wrap-around metal midsection and molded plastic front and back, is equipped with the firm's Bonded Shield picture tube and Super S-110 engraved circuit chassis, 3x5-inch speaker is mounted on top of set and angled toward the viewer, has top controls and chrome monopole antenna. New version 19P11B has weight-balanced plastic carrying handle. Deluxe model 19P11E has metal carrying handle. Sets are 12⅜" deep. Weight, 40 lbs. A metal stand with 3-inch casters has been designed for each of the new portable models. Model 19P11B with stand $159.95. 19P11E with stand, $169.95. Radio & Television Div., Sylvania Electric Products, Inc., Batavia, N. Y.

. . . for more details, circle 404 on page 50

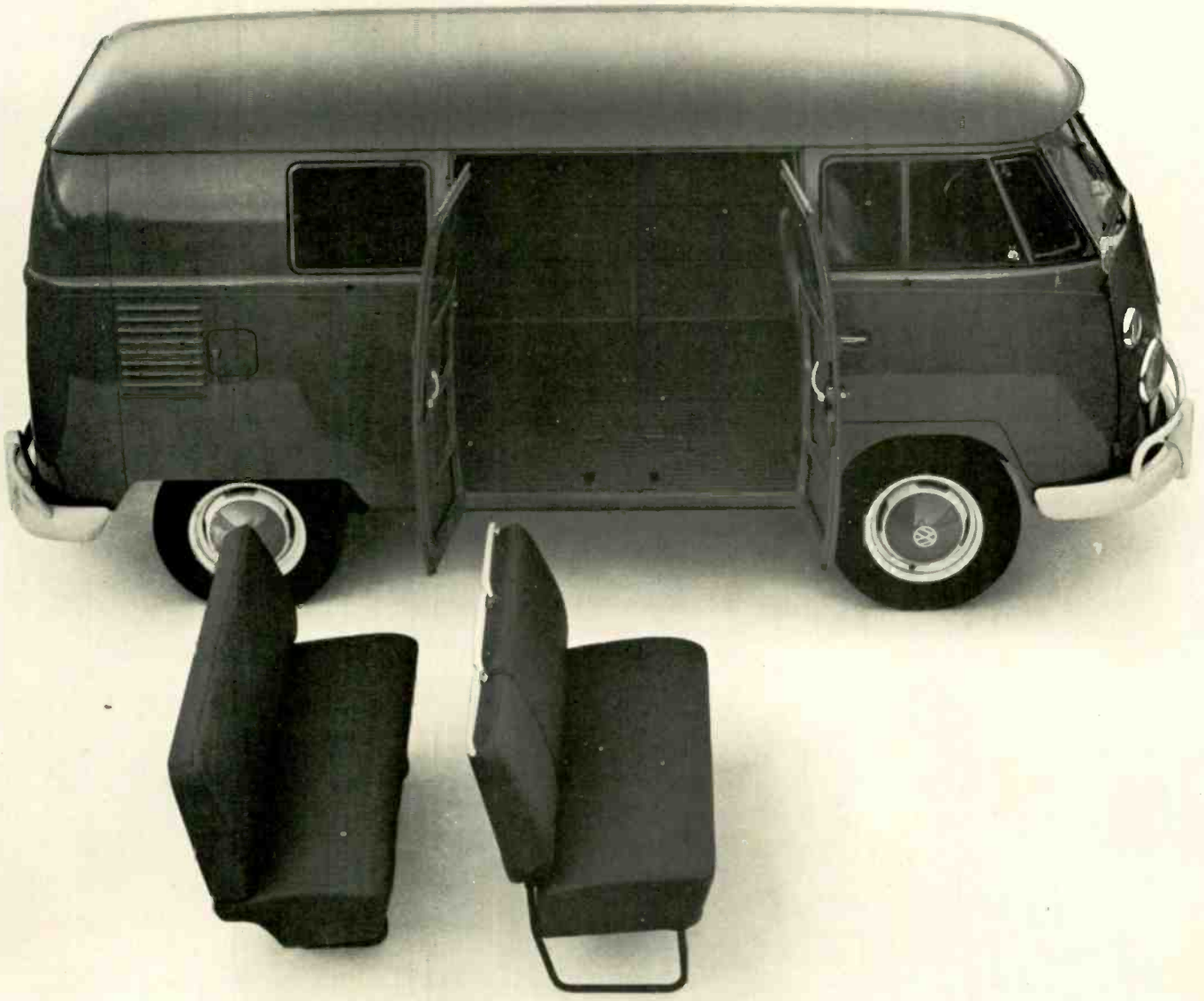
University SPEAKERS

Shown are two Uniline columns now available in PA loudspeakers. Model UCS-6, 60" column (6 extended-range 8" speakers); frequency range, 35-17,000 cps; 150 watts IPM; impedance, 16 ohms. $179.95. Also model CS-4, 40" column (4 extended-range 8" speakers); frequency range, 45-17,000 cps; 80 watts IPM; impedance, 8 ohms. $129.95. Soon to follow will be a lower powered speech model and a weatherproof music and



speech model. University Loudspeakers, Inc., 80 S. Kensico Ave., White Plains, N. Y.

. . . for more details, circle 405 on page 50



The truck that thinks it's a station wagon.

We made it with seats and windows.

But a truck is what it is.

Take out the seats and you can put in 1,786 pounds of anything.

In just about any size or shape. The doorway's almost 4 feet wide.

For business deliveries, this Volkswagen costs so little to run that you can make a profit even on dinky orders.

2½¢ a mile seems to be average for most owners. For gas, tires, everything.

(Almost all our trucks get over 20 miles a gallon. Some even get 30.)

For weekends, you can take 8 relatives anywhere you might want to take 8 relatives.

(If you're just taking them away, there's room for their luggage on the rear shelf. *All* their luggage.)

We call this the Volkswagen Kombi.

All the usual VW virtues go with it. Rear-engine traction in snow and sand. The air-cooled engine that can't freeze up or boil over. And the price, another interesting VW virtue. $2,095.* New.

- - - for more details, circle 61 on page 50

General Electric reporter, Roland Kempton, makes the rounds with the independent service dealers . . .

Don Ellis saved 30 minutes and $3.75 because one G-E *SERVICE-DESIGNED* capacitor takes the place of 4 ordinary types

In minutes and money, Don Ellis and George Bentley, owners of QUALITY TV, Kansas City, Mo., measure some of the advantages of stocking G-E Service-Designed capacitors. Don (shown here) put it this way, "We didn't stock can-type capacitors before because we never knew what types we'd need. Now, with just 25 or 30 capacitors in stock we meet most of our requirements, and we don't have to make special trips to pick up exact replacements. I figure this saves 30 minutes and $3.75 per trip."

And according to George, "There have been many occasions, especially on Saturdays, when we've been able to get the set out because we've had G-E capacitors in stock. Our customers really appreciate it, and we haven't had a single call back."

Yes, it pays to stock General Electric Service-Designed capacitors. Get full details from your G-E capacitor distributor. General Electric Company, Electronic Components Division, Room 1719, Owensboro, Kentucky.

Progress Is Our Most Important Product

GENERAL ELECTRIC

NEW PRODUCTS

Zenith RADIOS

Royal models 90, 125, and 650 small size transistor radios use new advanced design "Powersonic" transistors for greater sensitivity and range. Both royal 90 and 125 provide 80 milliwatts power output and have automatic volume control. Each plays 180 hours on two mercury batteries, or up to 75 hours with two penlite cells. Royal 125, deluxe in design, and equipped with vernier tuning dial. $26.95 and $29.95 respectively, less batteries. Royal 650 personal-size portable has 3½" cone speaker, provides 200 milliwatts of power output, has inverse feedback circuit, operates on 4 mercury cells or 4 penlite batteries. $34.95, less batteries. Empress model FM-AM clock-radio with afc has sleep switch, radio buzzer alarm, appliance outlet, AM-AFC-FM and FM selector switch. $69.95. Dreamland model AM clock-radio has a radio and buzzer alarm. $29.95. Trumpeteer model table radio has advanced AM chassis and direct tuning control. $19.95. Executive model has AM chassis in a cabinet only 3½" deep, 6"x4" speaker and automatic volume control. $29.95. Conelrad or Civil Defense station frequencies, clearly indicated on dial scale of each radio. All models available in a variety of cabinet colors. Zenith Sales Corp., 6001 W. Dickens Ave., Chicago 39, Ill.

. . . for more details, circle 406 on page 50

Sprague CAPACITORS

EK-5 Verti-Lytic capacitor assortment consists of 30 miniature single-ended electrolytic capacitors (two each of the

15 most-frequently-used ratings) in an attractive blue case which has individually identified compartments. Space-saving Verti-Lytics, with their molded phenolic cases and moisture-resistant resin and seals, have low leakage current and long shelf life. Ideal for vertical mounting on printed wiring boards in crowded transistorized radios. Handy plastic case, free. Capacitors, $31.92. Sprague Electric Co., North Adams, Mass.

. . . for more details, circle 407 on page 50

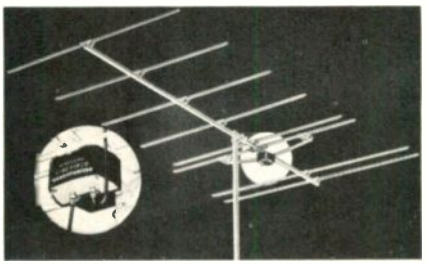
Switchcraft CORDS

Molded replacement headphone cords for Brush and RCA headphones feature a standard parallel cable with gray colored plastic jacket over two tinsel conductors #27 ga. Standard 2-conductor phone plug with cable clamp is molded securely to one end of cable. Molded "Y" junction strengthens the "Y" termination. They are recommended for replacement on most mono headset cables and are exact replacements for cable on Brush BA-200, BA-205 and BA-206 headsets; also RCA MI-38107B headset. No. 05KF88 has 2 feet of cable from phone plug to "Y" junction, $3.00. No. 05KJ88 has 4 feet of cable from phone plug to "Y" junction, 1 foot of cable from "Y" junction to eyelet plugs, $3.20. Switchcraft, Inc., 5555 N. Elston Ave., Chicago 30, Ill.

. . . for more details, circle 408 on page 50

Winegard ANTENNAS

Introduced are two new amplified FM antennas reported to pick up 85% of all FM stations in a 200 mile radius from



any location over normal terrain. Model PF-8 Stereo-Tron Yagi, gold anodized, minimum gain, 26 db over a folded dipole, flat frequency response, —¼ db from 88 to 108 mc. Features built-in TV-FM coupler and has 8 elements with "Tapered T" driven element directly coupled with the transistor amplifier. Available two ways: model PF-8 for 300 ohm twin lead; PF-8C for 75 ohm coax. Electronic turnstile, also gold anodized, non-directional, 16 db gain in all directions over a folded dipole. Has offset mount and transistor amplifier with built-in TV-FM coupler. The Electronic Turnstile model PF-4 has 300 ohm output only. Both models can be used with one power supply and down lead when used with a Winegard Powertron TV antenna. Winegard Co., Burlington, Iowa.

. . . for more details, circle 409 on page 50

Knight TUNERS

Model KN-250M ultra-compact stereo FM tuner features advanced transistor-nuvistor design for both FM stereo and

regular broadcast reception. Intended for addition to existing stereo hi-fi systems, it is not much larger than the average book. Dimensions, 2-⅝ x 9-¾ x 8

NEW PRODUCTS

inches. Housed in dark brown metal cabinet, designed for perfect match with KN-400B amplifier. Has built-in multiplex circuit. Single strength meter shows quickly when tuning in on center channel for peak strength. Usable IHFM sensitivity, 2 μvolts for 30 db of quieting. $139.95. Also, not shown: similar unit without stereo FM, $99.95; and KN-250MC with built-in clock timer, $154.50. Allied Radio Corp., 100 N. Western Ave., Chicago 80, Ill.

. . . for more details, circle 410 on page 50

Sencore SUBSTITUTORS

Model RC121 component substitutor, a new compact unit, is designed for on-the-spot substitution of carbon and power

resistors, capacitors, electrolytics and rectifiers. Each section offers a complete range, can be used independently, and is identical to the equivalent single unit (H36, ES102, PR111 and RS106) except for the electrolytic which is vastly improved. It allows substitution for all dual electrolytics as well as singles. Over 25 combinations of capacitor values can be substituted by using the electrolytics as singles, duals or paralleling them to double capacity. Surge protector prevents arc, spark or heating of capacitors being bridged and automatically discharges both electrolytics when released. $39.95. Sencore, Inc., 426 S. Westgate Drive, Addison, Ill.

. . . for more details, circle 411 on page 50

Ward CB ANTENNAS

Designed around their "8"-ball concept, a new L-Coil Citizens Band antenna is said to work equally well on citizens band frequencies and on AM broadcast reception. Dual L-Coil antenna comes in kit form which can be easily installed in present mounting position on most cars and trucks. Ward Products Corp., Edson St., Amsterdam, N. Y.

. . . for more details, circle 412 on page 50

Hitachi TAPE RECORDERS

Model TRQ-370 seven transistor portable tape recorder has two speeds, 3-¾ inch/sec, and 1⅞ inch/sec, with a max-

imum recording time of 68 minutes. Has "fast forward" speed-up device, single dial "one-control system" and level meter. Operates on four flashlight cell batteries. Printed circuit eliminates wiring breakdowns. Output, 500 mW. Takes 3" recording tape. 2½" PM speaker. Complete with accessories, including dynamic microphone, monitor earphone, reel, tape, extension cord, leather carrying case. $199.95. Sampson Co., 2244 S. Western Ave., Chicago 8, Ill.

. . . for more details, circle 413 on page 50

Seco TUBE TESTERS

Model 350 tube tester has sockets for the newest tubes. The panel includes 86 sockets wired through a selector switch and load system to extend tube type coverage by at least four times, with over 2200 types listed. It incorporates a VTVM type meter circuit, and the power circuit is short-circuit proof. No fuse required. Includes an automatic constant voltage regulated tranformer for 100-130 volts, 50-60 cps and has an accessory panel including electronic battery analyzer, fuse and lamp continuity check and vibrator tester. $179.50. Also, not shown, model 360, 105-125 volts, 50-60 cps. Has manual line adjustment. Does not have accessory panel. $149.50. Seco Electronics, Inc., 5015 Penn Ave. South, Minneapolis 19, Minn.

. . . for more details, circle 414 on page 50

Hermon Scott could make this new kit for $30 less, If...

Hermon Scott faced a basic choice . . . bring out his new LK-48 amplifier kit at $124.95 or make it to sell for $30 less like many other amplifier kits. All his engineering department had to do was make a few compromises.

The LK-48 is rated at 48 watts. By using a smaller power supply, ordinary output transformers, and pushing the output tubes to their limits, the amplifier might still produce 48 watts at 1000 cycles where many amplifier kits are rated. But measured at 20 cycles, where Scott engineers feel power is really important, output would be down considerably. No compromise was made. The LK-48 *actually* produces 28 watts per channel at 20 cycles, and delivers full power throughout the audio range.

Many kits use a one color instruction book. Hermon Scott decided to continue to use full color to insure factory-built performance, even at the hands of a novice.

Important Scott engineering extras like the all-aluminum chassis, DC operated preamp heaters and unique hum-null balancing could have been eliminated. Hum would have been audibly higher and distortion at levels normal to many kits, but Hermon Scott felt that the kit builder was entitled to the same performance he has come to expect from Scott factory-wired units.

Yes . . . Hermon Scott could have made the LK-48 to sell for $30 less . . . but it would have meant compromising life-long standards. This is something he would never do. You can choose any Scott kit with complete confidence — the LK-48, the LK-72 80 watt complete stereo amplifier, the LK-150 130 watt stereo power amplifier, the LC-21 professional preamplifier, the LT-110 multiplex tuner, LT-10 FM tuner or the LM-35 multiplex adaptor. These superb kits have all the features and performance you've come to expect from the world's leader in audio engineering.

H.H.SCOTT

H. H. SCOTT INC., 111 Powdermill Rd., Maynard, Mass. Dept. 140-03

Please rush me your new full-color brochure telling about Scott's full line of superb stereo kits.

Name.....

Address.....

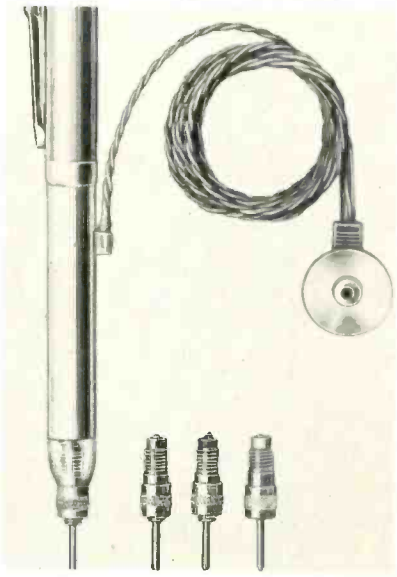
City.....*State*.....

Export: Morhan Exporting Corp., 458 Broadway, N.Y.C.
Canada: Atlas Radio Corp., 50 Wingold Ave., Toronto.
Prices slightly higher West of Rockies.

- - - for more details, circle 46 on page 50

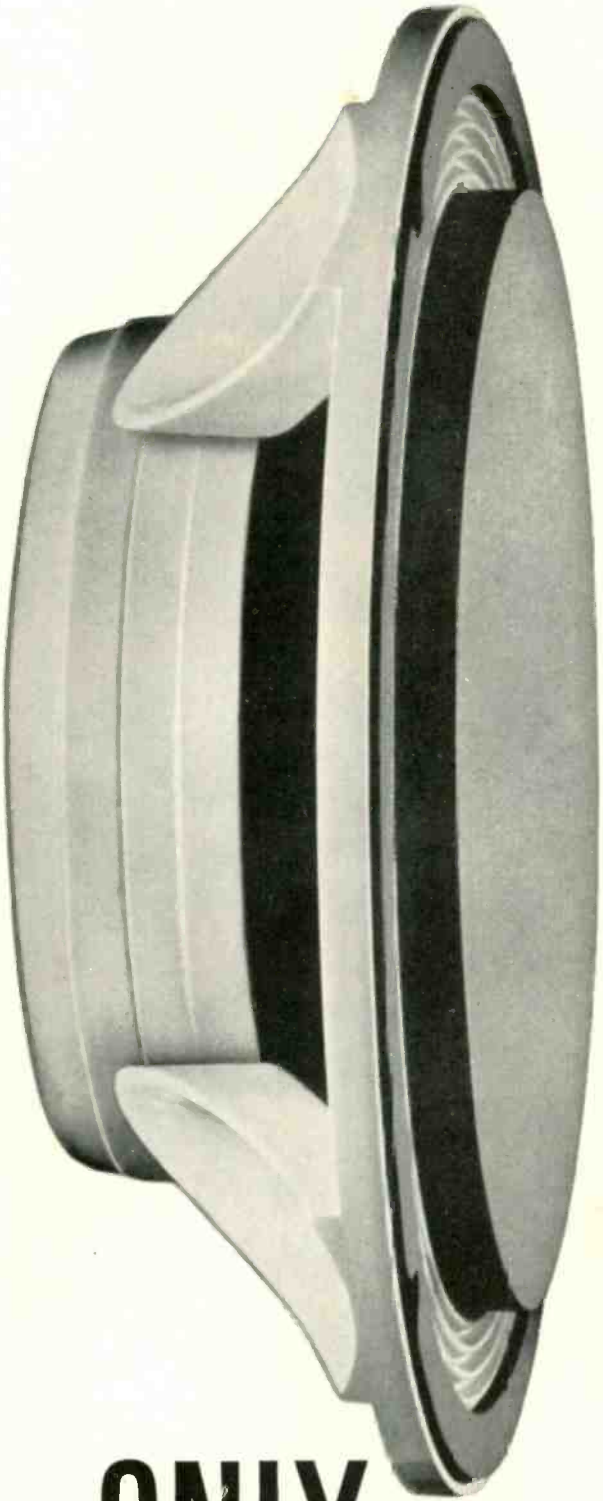
NEW PRODUCTS

Don Bosco SIGNAL TRACERS



The "Stethotracer," a pen-size signal tracer quickly locates hum, oscillations, ground loop, printed circuit breaks, and other common defects. Detects and demodulates any low level μwatt audio or modulated radio frequency signal, and then amplifies it 1,000 times in a button earphone. The signal may also be observed on a scope, using an optical plug-in scope adaptor. It can be used as a pre-amplifier and is ideal for testing and troubleshooting radios, amplifiers, phonographs, magnetic tape recorders, phono pickup cartridges, dictating machines, and hearing aids. Also ideal for running continuity tests on capacitors, transistors, and other components. Complete with earphone, cord, three interchangeable attenuator probes and r-f detector-demodular crystal diode probe, ground clip and battery. $29.95. Don Bosco Electronics, Inc., Littell Rd., Hanover, N. J.

. . . for more details, circle 415 on page 50

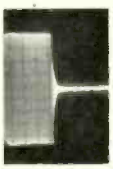


Only Jensen, in the new 3-P systems, has a woofer like this. It has a rigid, circular, POLYTEC* plane piston . . . an ideal acoustic radiator. It is so shallow it can go in a cabinet a mere 3⅝" thin, yet has full-scale, long-travel, big-woofer performance.

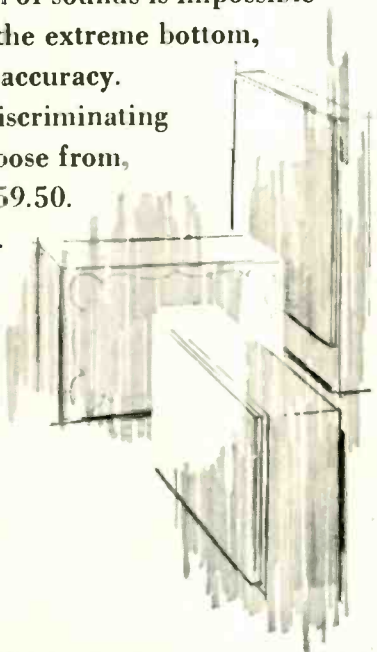
One thing you won't find in 3-P systems is "bass-boom". The low end is so clean, so highly damped that exaggeration of sounds is impossible . . . every note, down to the extreme bottom, is reproduced with rare accuracy.

3-P Systems are for discriminating listeners. Six styles to choose from, priced at $119.50 to $159.50. Write for Catalog 165-G.

*T.M.



Improved transient response means new, clear, clean sound without hangover.



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Division of THE MUTER COMPANY

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Jensen Manufacturing Co., 6601 S. Laramie Ave., Chicago 38, Ill./Canada: Radio Speakers of Canada, Ltd., Toronto/Mexico: Universal De Mexico, S.A., Mexico D.F.

. . . for more details, circle 32 on page 50

NEWS OF THE INDUSTRY

Alpha Wire—MARTIN L. ROTH resigns as sales manager.

Harry P. Bridge Co.—HARRY P. BRIDGE, JR., chairman of the board, died suddenly.

Progress Webster Electronics—elections: MAURICE M. ROSEN as president, succeeding STUART CAINE, resigning; PAUL GOLDSTEIN, as a director and vice president of Frank Industries Div.; RALPH MEHR as vice president of Chester, Pa. division.

Rosen

Connor

Sylvania—Home and Commercial Electronics Div., formed to replace Home Electronics Corp., Batavia, N. Y. with GEORGE C. CONNOR, senior vice president, as general manager and chairman of the Board and PETER J. GRANT as president. WILLIAM J. PETERSON has assumed the additional responsibility of sales service, Receiving Tubes, New York, N. Y. Also negotiations have been completed for the sale of the firm's interest in the Golden Shield Corp., Great Neck, N. Y.

Electric Soldering Iron—WILLIAM W. PURTELL, JR. joins staff as vice president.

Amperex—Semiconductors & Tubes appointments: LARRY MAY as product specialist and MARTIN WOLPERT as commercial engineer.

Westinghouse, Electronic Tube Div.—B. W. SAUTER, general manager, predicts 10% sales growth increase for 1962.

Volkswagen — appointed H. J. RITSCHER as vice president of Administrative Div.

Sprague Products—second edition of 36-page manual entitled, Electrolytic Capacitor Replacement, may be ordered for 10c mailing cost.

Pilot Radio—LUTHER MARTIN SANDWICK, vice president, will become staff director of Consumer Products Div. of Electronic Industries Association on January 15th.

J F D Electronics—donation given to New York City Cancer Committee by ALBERT FINKEL, president, on behalf of employees and customers.

Jersey Specialty—promotes AL GOLDSTEIN from national sales manager to vice president in charge of sales.

Lescarboura Advertising—AUSTIN LESCARBOURA, pioneer electronic writer and advertising leader, died recently.

Motorola—announces plans for huge consumer products advertising program on both national and local level, designed to create new highs in sales action.

Muntz TV—elects SAMUEL W. COE to board of directors.

Brand Name Surveys—Conducting ninth year of manufacturer's questionnaire survey for 25,000 servicemen's preferences in replacement components.

Jerrold — DAN O'CONNELL named sales manager of Taco's Consumer Products Div.

Executone—termination of long standing patent litigation on intercommunication circuitry jointly announced with DuKane, new licensing plan has been formulated for exchange of certain patent rights.

General Electric—stocks of replacement semiconductors for Electronic Component Div. for distributor market now will be maintained in warehouses in Los Angeles, Seattle, Chicago, Clifton, N. J. and Owensboro, Ky., along with franchising wholesale parts jobbers to facilitate distribution.

Philco—included in recent elections for wholly owned Ford Motors subsidiary, Philco Corp., are: board chairman—IRVING A. DUFFY and CHARLES E. BECK as president and chief executive officer. Vice presidents are: HENRY F. ARGENTO for government product planning & marketing; HENRY E. BOWES—Consumer Products Div.; ROBERT F. HERR—TechRep. Div.; HENRY R. NOLTE as secretary and general attorney; DAVID B. SMITH—engineering & research. MARC. J. PARSONS is director of public relations, replacing LARRY F. HARDY, retiring. Consumer Products Div. appointments include: KENNETH COOPER—general sales manager; J. A. WINFIELD—special markets manager and G. B. KENNEDY as marketing manager. A '62 national advertising program will be launched for consumer electronic and appliance products.

Laugh . . . a little!

"Hi! Did you find the buzz that sounded like a swarm of bees?"

"The clouded effect calls for rare and special treatment — a soft cloth, warm water and soap . . ."

- - - for more details, circle 25 on page 50

CATALOGS AND BULLETINS

TOOLS: Covered in illustrated bulletin 1621 is a specially designed terminal wrench for removing spanner nuts on external antenna and ear phone jacks of imported transistor radios. Xcelite, Inc., Orchard Park, N. Y.

. . . for more details, circle 312 on page 50

STEREO CARTRIDGES: Literature covers compact snap-in stereo cartridges, catalog designation "S" and "T" designed as replacements for all crystal stereo cartridges. The new snap-in cartridge complete with two needles makes it easier to change the entire cartridge rather than the needle alone. Jensen Industries, Forest Park, Ill.

. . . for more details, circle 313 on page 50

TUBES: Interchangeability guide (ETR-2773) lists standard prototypes which can be replaced with "Five Star" high reliability tubes. Features, specifications and typical applications included. Receiving Tube Dept., General Electric Co., Owensboro, Ky.

. . . for more details, circle 314 on page 50

CB TRANSMITTERS: Six-page, 2-color, brochure contains description and complete specifications for model 23/S-NINE citizens band transmitter. Browning Labs., 100 Union Ave., Laconia, N. H.

. . . for more details, circle 315 on page 50

AMMETERS: Eight-page, illustrated, bulletin covers complete line of improved Tong Test AC-DC snap-around ammeters. Tong Test is reported as the only ammeter of its type that measures both a-c and d-c. Columbia Electric Mfg. Co., 4511 Hamilton Ave., Cleveland 14, Ohio.

. . . for more details, circle 316 on page 50

STEREO-HI-FI: Literature covers an AM hi-fi stereo console which can be promoted under $80. Has six tubes, four speakers and automatic changer. Also, at same price, an AM/FM, FM stereo table radio with 13 tubes and four speakers. Both units made by the Victor Co. of Japan. Delmonico International Div., Thompson-Starrett Co., 120-20 Roosevelt Ave., Corona, N. Y.

. . . for more details, circle 317 on page 50

TAPE RECORDERS: Swedish-made Luxor Magnefon MP-410-A stereo tape recorder is covered in literature. May be used to record and play back in two track stereo or four track mono from phonograph, microphone, radio, etc. AmeLux Electronics Corp., 60 E. 42nd St., New York 17, N. Y.

. . . for more details, circle 318 on page 50

AUDIO NEWS LETTER

PENTRON reports resignation of Irving Rossman, president.

ROBINS offers felt replacement pressure pads for tape recorders. A package of 40 pads (cat. #PP-1) lists at $1.00.

JERROLD acquires Pilot Radio Corp. on all-cash transaction. Pilot will continue to operate as an autonomous company.

JENSEN INDUSTRIES supplies "reminder cards" to its dealers to help them nudge their customers into replacing worn-out needles.

ALLIED is marketing a new, compact stereo FM adapter kit, model KS-10. Says it can be used with any FM or AM-FM tuner equipped with a multiplex output. $19.95.

LOS ANGELES MUSIC SHOW drawing for rooms resulted in largest assignment in the history of this industry's shows. Fifty-four rooms were drawn, with eighteen remaining available at last count.

BOGEN-PRESTO appoints Heaton-Marco Associates, San Francisco, as factory sales rep for all Bogen products in northern Calif. and northern Nev. Also acquires "Page-master" from Stromberg-Carlson.

SWITCHCRAFT's new molded cable assembly, Part #10FK25, interconnects a stereo mixer to stereo or mono recorders without soldering, wiring or using tools. Designed for stereo recorders with 3-conductor dual inputs. $4.00.

BELL SOUND reports resignation of Andrew Lorant, advertising, sales promotion and public relations manager, effective Jan. 15. Distribution pattern being realigned. Program underway in effort to put the company back on a one-step basis in most markets and combined one-step and two-step distribution basis in key areas for audio components.

ASSOCIATION NEWS

California

Slogan Wanted

CSEA, Sacramento, has asked members to suggest a slogan that is unique and will identify the service industry. It should be equivalent, for the service industry, to the florists' "Say it with Flowers," or the plasterers' "Knock on the Wall."

TSDA, San Francisco, is conducting a survey of its members to determine losses from theft and shoplifting at the TV dealer level. Study results will come before law enforcement agencies.

New York

TV Tube Labelling Law

ESFET, Kenmore, president Douglas Cook, of the Empire State Federation of Electronic Technicians Associations, says very few of the state residents are even aware of the TV tube labelling law which went into effect over a year ago. "This fact has been brought out clearly," said Mr. Cook, "by a recent survey of N. Y. TV technicians who said that few or none of their customers knew the law existed." The 1960 law requires all TV replacement tubes to be labelled as to their true condition—"new" or "used—on both the tube and the carton the tube comes in. It further requires the technician replacing the tube to give a written statement to the customer about whether the tube is new or used.

Ohio

ARTSD, Columbus, elects: Pres., Jack Voiget; V.P., Frank Shannon; Recording Sec'y, Walter Driscoll; Corresponding Sec'y, Rex Rice; Treas., Paul Boyer. Board of Directors: Lou Benhard, George Dykes, Bill Hetrick, Bob Kapp, elected to serve as the Jobber Representative. NATESA Director, John Graham. TESA Ohio Director, Herman Francis.

Pennsylvania

TSA of D. V., Philadelphia. Allen Roberts reports a recent meeting held at Motorola's request with TSA president, Herman Shore, on handling carry in service on Motorola portable and table model TV sets, now carrying one year parts warranty. After lengthy discussion on rates, Pres. Shore requested a meeting with executive sales and management but service would not agree to the meeting. Rates originally discussed were fairly realistic and competitive. The discussions continued and after numerous phone conversations, which were all that could be arranged at the time, the rate structure was suddenly decreased to a ridiculously low figure. Pres. Shore would not negotiate at these figures and again insisted on meeting with the top management. This meeting could never be arranged . . . and at this point negotiations were ended.

Continued from page 29

current. CR-1 prevents oscillation from occurring across L-1. When Q-1 is "turned-on" by a detector pulse, it saturates and nearly all of the battery voltage of BT-3 and BT-4 appears across winding 3-4 of T-1. The current in this winding increases and a voltage is induced in winding 1-2. This induced voltage is in a direction such that conduction of Q-2 is maintained. Winding 3-4 current increases linearly until the transformer core saturates. At this time the circuit rapidly "turns-off" and an inductive "fly-back" appears across both windings.

A rectangular voltage pulse of about 110 microseconds duration appears across winding 3-4 of T-1 for each detector pulse. This shaped pulse charges the integrating capacitors C-2 and C-6 by rectifier CR-2 with an amount of charge determined by the range resistor R-1, R-2, or R-3 and R-4. The charge placed on these capacitors is discharged through the meter M-1 and its series resistor R-5. The meter current then is dependent on the charge per pulse and the pulse repetition rate. Resistors R-6 and R-7A are used to adjust calibration. Three ranges are provided: The first or X-100 requires 80,000 pulses per minute for full scale indicators; the second or X-10, 8,000 pulses per minute; and the third or X-1, 800 pulses per minute. The response time constant of the instrument is fixed essentially by the values of C-2, C-6, R-5 and the meter resistance. It is nominally 8 seconds for 63% response or 24 seconds (3 time constants) for 95% response. Response time can be reduced by removing one of the capacitors C-2 or C-6, or can be increased by adding additional capacity.

The voltage pulse for the headphones is taken from fly-back winding 3-4 by diode CR-3. C-3 is an integrating capacitor to "stretch" the "fly-back" pulse. R-8 is an isolating resistor and CR-4 damps

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"ringing" of the headphones. A pulse between 5 and 10 volts in size with an approximate duration of 60 μs at mid-value is available across a 3000 ohm resistive load connected to J-1. This pulse provides a headphone click.

Calibration and Servicing

The aforementioned unit can be calibrated in counts per minute by applying a pulse generator output to the unit's input and adjusting the CAL adjusting potentiometer. A pulse generator producing negative pulses at least 0.5 volts in amplitude, approximately 5 μs in duration, and a repetition rate of approximately 6000 pulses per minute is required. Calibration is accomplished in the following manner:

1. Remove the case bottom from the instrument.
2. Connect the pulse generator output, in series with a 500 pf 1200 volt capacitor, to the input connector on the case top.
3. Turn the switch to the X-10 range and adjust the CAL potentiometer until the meter scale is identical with the pulse repetition rate of the pulse generator.

The instrument will then be calibrated in all its ranges. The instrument will be about 15% too sensitive on uniformly spaced pulses near full scale on the X-100 range. This added sensitivity on the X-100 range is deliberately built-in to compensate for the dead-time of the Geiger tube and instrument electronics on randomly spaced pulses of high repetition rate. Dead-time correction is not required on the X-10 or X-1 range.

Servicing: When the power supply is operating, a buzz of about 100 cps in frequency can be heard due to the oscillations of the power transformer laminations. If this buzz is not audible, the oscillator section is probably not operating and the setting of R-7B should be checked. This screwdriver adjustment is set properly by the following procedure:

1. Insert a 0-100 ma meter in series with the power supply batteries, BT-1 and BT-2.
2. Turn the "HV" adjustment fully counter-clockwise.
3. Turn the instrument "ON".
4. Advance the screwdriver adjustment clockwise until the meter

reads 33 ma with new batteries.

The high voltage output of the power supply should be tested with an electrostatic voltmeter. The voltage should read 900 volts with the high voltage selector switch in the "GM" position and 1200 volts in the "SCINT" position. This voltage may also be measured with a 20,000 ohms-per-volt voltmeter on the 5000 volt range with new batteries in the instrument.

The nominal resistance values for the transformer (T2) windings are:

Winding 1-2, 4,500 ohms.
Winding 3, 4, 11 ohms.
Winding 5-6, 5 ohms.

To check operation, after indicated continuity tests have been made, the integrating circuit may be tested further with an oscilloscope. The proper pulse wave shape on the collector of Q-1 is a positive 3 volt square wave of a nominal 110 μsec in duration followed by a "fly-back" of about —20 volts in amplitude. If the wave shape at the anode of CR-1 shows "ringing," CR-1 is probably defective. Diodes CR-1 through CR-4 may be tested with an ohmmeter on the R x 10,000 range. One end of the diode under test should be disconnected from the circuit for this test. The indication of a good diode is a very low resistance with the ohmmeter leads connected one way. With the leads reversed, the resistance reading should be 100,000 or greater for CR-1, CR-3, and CR-4. CR-2 should be 1 megohm or greater. Diode CR-5 in the high voltage power supply will not respond to this test. ■

. . . Transformer Problems

Continued from page 32

sirable to obtain an exact fitting component. If a universal replacement type is used, new mounting holes may sometimes be required.

A number of precautions are necessary when replacing i-f transformers. Because of the relatively high frequency, all wire leads to the transformer should be dressed as originally prevailed, and these connections should be the exact same length.

If a load resistor is used across a transformer winding, it should be checked to determine if the resistance value is correct. When removing or changing a resistor, its position and soldered lead lengths

should be similar to the original configuration.

It is sometimes necessary to realign the entire i-f section after changing a transformer if any difficulties, such as smearing, trailing whites, lack of definition or poor vertical or horizontal sync prevail.

Vertical Sweep Transformers

Two different vertical transformers may be employed in some of the modern TV sets made today. A transformer is used in all vertical blocking or feed-back oscillators, and another is used in the vertical amplifier's output. The blocking oscillator transformer couples the oscillator tube's plate and grid circuits, and the vertical output transformer couples sawtooth power from the vertical output tube to the vertical windings in the deflection yoke.

Vertical output transformers usually fail more often than blocking oscillator transformers, perhaps because of the higher currents passing through them. Defects in either may be indicated in a number of ways — usually by a complete collapse of vertical sweep, a few inches of vertical sweep, or insufficient sweep, top or bottom.

Although technicians use a wide variety of troubleshooting approaches when a defective vertical transformer is suspected, the general approach calls for signal substitution. This is true whether a modern signal-substitution instrument is used, a signal is obtained from another operating TV set, or an inexpensive make-shift method is employed to obtain a substitute signal from the ailing TV set's heater windings.

As shown in Fig. 4, a sweep troubleshooter is used to quickly determine if a vertical output transformer is at fault. A vertical sawtooth signal generated by the instrument is fed to the vertical output tube's plate. If the raster spreads substantially in a vertical direction, the amount of spread depending upon the signal input amplitude, it can generally be assumed that the vertical output transformer is good. If no perceptible increase in vertical sweep, the output transformer or the deflection yoke can be at fault.

If an increase in sweep is obtained with a signal at the vertical output tube's plate, then the d-c

voltage at the blocking oscillator's plate should be checked with the volt meter. If this conforms closely with the manufacturer's specification, then check the voltage at the oscillator's grid. The voltage here should be as specified, and may vary from —15 to —30, depending upon the particular oscillator design and the hold control setting. If this voltage appears positive or has a lower-than-normal negative voltage, the blocking oscillator transformer may be leaking. If there is no voltage indicated and the grid reads zero, the transformer winding can be open. Of course, a possible fault in C-1, R-1 or R-2 should be considered.

Blocking oscillator transformer replacements are not too critical, except that one with the exact turns ratio should be obtained. If the physical size or shape is different, it may be necessary to drill one additional mounting hole in the chassis. Vertical output transformers are sometimes critical. An exact replacement should be provided. Most replacement parts manufacturers list exact replacements for most sets in their catalogs, giving essential electrical and physical data. Lead dressing around these transformers should also not be disturbed. Both transformers can also develop lamination hum or buzz.

HV Transformers

Known as the flyback, horizontal output, or high voltage transformer, this TV component supplies high voltage to the horizontal output tube's plate and to the plate of the high voltage rectifier tube. A stepped-down heater voltage for the high voltage rectifier tube is also obtained from the flyback. In addition, the transformer generates, through combined action of the yoke and the damper tube, a B+ "boost" voltage. It also frequently supplies a medium high voltage p-to-p pulse for keyed agc circuits, or to afc circuits for controlling the horizontal oscillator.

Fault symptoms caused by the flyback can be complete loss of raster, insufficient brightness, a "blooming" raster (raster expands when brightness control is advanced), streaks in the raster (internal arcing in transformer), loss of boost voltage, agc or afc pulses.

Here again, the best approach to suspected flyback problems is

signal substitution or injection (See ELECTRONIC TECHNICIAN May 1961). Commercially available equipment for making these tests are ideal. Inexpensive, simple-to-operate flyback checkers are also available. And some technicians substitute voltages from a good operating TV to the dead set in order to isolate faults.

Flyback transformers are highly critical, electrically and physically, and exact replacements should be obtained. All HV leads, including rectifier filament leads, should be dressed as originally established.

Audio Transformers

In addition to the 4.5 mc sound take off, limiter grid input, and sound i-f coils and transformers, which seldom give trouble, the conventional f-m detector and audio output transformers are employed. These are usually the most troublesome. Trouble symptoms may be complete loss of sound, insufficient volume, or distorted sound.

The conventional detector transformer contains two "gimmicks" sealed inside the transformer's housing (small value capacitors) which, in addition to cold and rosin solder joints at winding lead connections, create considerable problems in TV sound sections. Faults should be approached in a somewhat similar manner as those in Video i-f transformers.

An exact replacement with similar electrical and physical characteristics is highly desirable, although in a pinch a larger or smaller transformer can be made to work if electrical characteristics are similar. The transformer should be aligned after replacement, employing a sweep generator, marker generator and scope. Manufacturers specifications for this alignment should be followed closely.

Audio output transformers are designed to match the impedance of the output tube's plate to the speaker, and couple the audio signal voltage to the speaker. They are not exceptionally critical but an exact replacement is desirable to avoid possible complications. Trouble in the transformer can generally be easily isolated by feeding an audio signal to the output tube's plate. If electrical characteristics of the replacement are proper, physical size becomes a problem only in mounting. ■

. . . Advertising Guide

Continued from page 41

2. Advertisements as a whole may be completely misleading although every sentence separately considered is literally true. This may be because things are omitted that should be said, or because advertisements are composed or purposely printed in such way as to mislead.
3. Advertisements are not intended to be carefully dissected with a dictionary at hand, but rather to produce an impression upon prospective purchasers.
4. Whether or not the advertiser knows the representations to be false, the deception of purchasers and the diversion of trade from competitors is the same.
5. A deliberate effort to deceive is not necessary to make out a case of using unfair methods of competition or unfair or deceptive acts or practices within the prohibition of the statute.
6. Laws are made to protect the trusting as well as the suspicious.
7. Pricing representations, however made, which are ambiguous will be read favorably to the accomplishment of the purpose of the Federal Trade Commission Act, as amended, which is to prevent the making of claims which have the tendency and capacity to mislead.

Limitations

No statement which represents or implies a reduction or saving from an established retail price or from the advertiser's usual and customary retail price should be used if, (a) an artificial mark-up has been used to provide the basis for the claims, or (b) the claim is based on infrequent or isolated sales, or (c) the claim is based on a past price, unless this fact is clearly and adequately disclosed.

"Two For One Sales"

No statement should be made in connection with the offering for sale of a product to the consuming public of a "factory" or "wholesale"

price, or other such expression, which represents or implies that the consuming public can purchase the article at the same price that retailers regularly do, and provides a saving from the usual and customary retail price for the article in the trade area, or areas, where the claim is made unless such statement is true.

"Pre-Ticketing"

No article should be "pre-ticketed' with any price figure, either alone or with descriptive terminology, which exceeds the price at which the article is usually and customarily sold in the trade area, or areas, where the "pre-ticketed" article is offered for sale.

Bait Advertising Defined

Bait advertising is an alluring but insincere offer to sell a product or service which the advertiser in truth does not intend or want to sell. Its purpose is to switch consumers from buying the advertised merchandise, in order to sell something else, usually at a higher price or on a basis more advantageous to the advertiser. The primary aim of a bait advertisement is to obtain leads as to persons interested in buying merchandise of the type so advertised.

Guarantees In General

In general, any guarantee in advertising shall clearly and conspicuously disclose—

(a) The nature and extent of the guarantee.
This includes disclosure of—
(1) What product or part of the product is guaranteed,
(2) What characteristics or properties of the designated product or part thereof are covered by, or excluded from, the guarantee,
(3) What is the duration of the guarantee,
(4) What, if anything, any one claiming under the guarantee must do before the guarantor will fulfill his obligation under the guarantee, such as return of the product and payment of service or labor charges;

and

(b) The manner in which the guarantor will perform. This consists primarily of a statement of exactly what the guarantor undertakes to do under the guarantee. Examples of this would be repair, replacement, refund. If the guarantor or the person receiving the guarantee has an option as to what may satisfy the guarantee this should be set out;

and

(c) The identity of the guarantor. The identity of the guarantor should be clearly revealed in all advertising, as well as in any documents evidencing the guarantee. Confusion of purchasers often occurs when it is not clear whether the manufacturer or the retailer is the guarantor.

"Satisfaction Or Your Money Back" Representations

"Satisfaction or Your Money Back," "10-Day Free Trial," or similar representations will be construed as a guarantee that the full purchase price will be refunded at the option of the purchaser. ■

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NEW BOOKS

SERVICING TRANSISTOR TV RECEIVERS. *By Milton Kiver and Charles Gray. Published by Howard W. Sams & Co., Inc. 269 pages, soft cover. $4.50.* This is an inviting book that offers readers a detailed view of transistor television sets. Commencing with two chapters covering basic transistor theory and circuits, the authors then dig into how they're used in TV receivers. Each section of a receiver is examined in turn. How they work and why—including circuit values—is covered in seven meaty chapters. A final chapter discusses servicing techniques, including key test points. The book is well illustrated and lucidly written. Some math is included for those interested, but it may be skipped by readers without losing the flavor of the book. Highly recommended.

WORKING WITH TRANSISTORS. *By A. C. W. Saunders. Published by Electronic Technical Publishing Co., Box 306-Astor Station, Boston 23, Mass. 126 pages, soft cover. $4.95*

Elements of transistors and how they are used in various circuits is presented in this book. It's divided into lessons rather than chapters; perhaps due to its logical building blocks starting with basic theory and concluding with special circuits such as protective circuits and gas fume detectors. The book is easy to read; drawings and schematics are very large and math is limited to simple arithmetic when employed. Good, detailed descriptions of transistor circuit operations will probably untangle some confusing concepts held by technicians not too familiar with transistors. Excellent home study book.

THE HORIZONTAL OUTPUT SYSTEM. *Published by M. A. Schwarz, Petersburg, Va. 34 pages, soft cover. $2.95*

This is a manual that purports to describe a new technique of testing horizontal output systems using a VTVM instrument only. We do not believe it accomplishes its goal. The text's essence is the author's interpretation of how a horizontal output system and its components operate. It includes some ambiguous and incorrect statements. Additionally, it has not been edited properly, in our opinion, for clarity and continuity. We wish we could recommend this book, but unfortunately we can't.

FM STEREO MULTIPLEXING. *By Norman H. Crowhurst. Published by John F. Rider Publisher, Inc. 282 pages, soft cover. $1.25.*

Here's a most timely book. It covers the FM stereo system of broadcasting and reception in a welcome manner. FCC standards are explained and receiver circuitry is thoroughly covered from theory to practical circuit operation. A third of the book is devoted to installation and conversion problems, alignment and performance checks, and troubleshooting procedures. Many schematics of stero tuner sections and complete stereo FM adapters are included. This is an excellent technicians' primer for stereo FM.

HINTS and KINKS FOR TV, RADIO, AUDIO. *Edited by Martin Clifford. Published by Gernsback Library, Inc. 128 pages, soft cover. $2.35.*

Hundreds of gimmicks and gadgets for TV, radio, and audio equipment, shops, and instruments are presented here. They have been selected from items previously published in periodical form. Many will interest technicians; some will probably be used to substitute for unavailable gadgets that could simplify a particular task.

- - - for more details, circle 40 on page 50

- - - for more details, circle 53 on page 50

Important News for Independent TV-Radio-HiFi Service Dealers...

RCA Announces A Major New Program

THIS PROGRAM WILL...

- Identify You as a Trusted Service Dealer
- Highlight Your Technical Competence
- Enhance Your Community Prestige
- Symbolize Your Professional Integrity
- Build Your Public Recognition and Acceptance
- Help Increase Your Business Volume and Profits

See your Authorized RCA Tube Distributor for full details on how you can participate in the RCA *Key to Trusted Service Program*, which is heavily advertised to consumers through TV Guide and NBC-TV.

RCA ELECTRON TUBE DIVISION,
HARRISON, N. J.

RCA The Most Trusted Name in Electronics