

MAY, 1950

Radio
**SERVICE
DEALER**



The Professional Radio-TVman's Magazine

IN THIS ISSUE:

One-Man TV Antenna Orientation
Auto-Radio Drive-In
Elements of TV Signal Distribution, Part 1
First-Aid to Cabinets, Part 2
TV Sync-Sweep Tracing With Lightning Speed
Landlords, Tenants, and TV Antennas

AM-FM-TV-SOUND

Paid Circulation Of This Issue: Over: 23,500
Total Distribution Of This Issue: Over: 25,000

New



Mallory Plascap*

... Made with Amazing Mallocene*!



World's First Completely Engineered Plastic Tubular Capacitor

Here's the plastic tubular that's years ahead of its time . . . made possible *now* by Mallocene, amazing Mallory plastic development that gives you *four exclusive* performance firsts, leaves ordinary plastic tubulars far behind!

Gone is the old bugaboo of "call-backs" due to construction weaknesses beyond your control. For the Mallory Plascap is dependable. No oil leakage, no unsoldered leads, no off-center or deformed cartridges, no messy outside wax coating, no insulation problems. The Mallory Plascap makes your service job easier! See your Mallory Distributor.

The Secret of Mallocene . . .

There is only *one* logical way to build a molded type plastic tubular capacitor . . . with a plastic that sticks to the metal leads! But with ordinary construction methods, this has been impossible, for such a plastic would stick to the metal mold!

Here's the secret of the Mallory Plascap. First, an extremely tough plastic shell is molded. The cartridge is carefully centered within this shell. Then, the cartridge is surrounded with Mallocene. When Mallocene hardens, it actually becomes part of the outer plastic shell, and *sticks to the metal leads!* Thus, Mallocene provides a solid plastic tubular capacitor with the *first* moisture-proof construction!



TRISEAL CONSTRUCTION—Sealed *three* ways —with moisture-free Mallotrol* . . . tough outer plastic shell . . . exclusive Mallocene!



DISTORTION-FREE WINDING — No flattened cartridges due to molding pressures . . . no failures due to "shorts"!



FASTITE LEADS—Permanently fastened . . . sealed with Mallocene . . . unaffected by soldering-iron heat!



TRU-CENTER CARTRIDGE—Cartridge centered every time . . . uniform insulation guaranteed at all points!

Plus these **Top Features**: Operates at 85°C . . . No messy outside wax coating required . . . Great mechanical strength . . . Small in size . . . Light in weight . . . High dielectric strength . . . Lead to outside foil clearly identified . . . Handsome yellow case . . . Legible part-numbers and ratings.

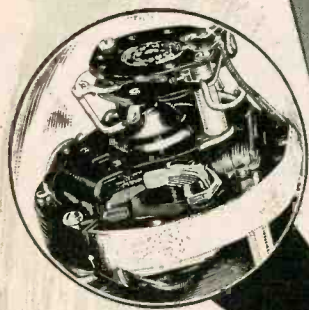
*Trade Mark

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AHEAD
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Compare it... You can't beat a
RADIART TELE-ROTOR**



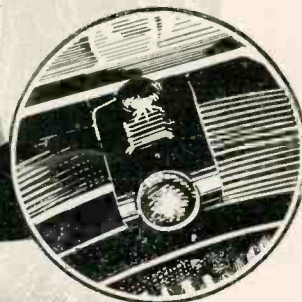
HEAVY DUTY MOTOR... most powerful of all TV rotators



Streamlined Weather-Proof Housing, Keeps Out Water, Snow and Ice



HEAVY DUTY Precision STEEL GEARS



12 Heavy Duty Ball Bearings in 6½" diameter Ball Bearing Races



THE RADIART CONTROL BOX with the **PERFECT PATTERN** dial... fingertip control with instant indication of Antenna Position shown on the illuminated two-tone face

Available in the following models:

- **TR-1** ... rotator and Control Unit with end of rotation light (uses 4 wire Cable) **\$37.45**
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You Can't Beat a RADIART ANTENNA on a TELE-ROTOR... It's TOPS!



IT'S RIGHT WHEN IT'S RADIART

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CLEVELAND 2, OHIO



- ROTATORS
- TV ANTENNAS
- VIBRATORS
- AUTO AERIALS
- POWER SUPPLIES

RADIO SERVICE DEALER • MAY, 1950

EDITORIAL

by S. R. COWAN

Small TV Tubes Passe

RMA's latest report on production figures gives the TV Trade a jolt. Besides mentioning that C-R picture tube production has reached a new record high, the report states: "In February 96% of all cathode ray tubes sold for new TV receivers were 12 inches or larger and 35% were 14 inches or larger." It is the tip-off that small TV sets are passe. More on this subject is covered on page 6 of this issue, in "I Told You So".

The Poor Public

It is common knowledge that the general public is not overly informed, especially on the subject of TV. Otherwise certain TV set makers could not get away with so much nonsense in claiming that their sets work "satisfactorily" with built-in antennas. But that's beside the point so here is a true story proving more about public gullibility: A friend sailed to Europe last week. We went to the pier to see him off and wish him the customary Bon Voyage. Our friend carried into his stateroom a nice new portable TV set such as many retailers are dumping for around \$50 in the mid-west. When asked why he was taking the set along this friend replied, "So I can watch TV programs while traveling around Europe, you dope!" Ah well—what's the use?

BBB Complaints Increasing

The March issue of "Monthly Memo", (New York City's Better Business Bureau's bulletin), reports: "Radio and TV complaints are SOARING."

In January and February, 1950 this Bureau handled 766 actions . . . more than a 100% increase over the 374 cases handled in Jan.-Feb. 1949."

The actual case-history file on practically every one of the complaints shows that the underlying trouble originated at the source of the sale, meaning the radio retailer. It seems that some retailers will promise a potential customer "almost anything and everything" in order to elinch a sale . . . and then become merely "distinterested" parties. Most basic complaints came from folks who are not getting the kind of reception promised from sets that operate on built-in antennas. When apprised that "the trouble" can be corrected or eliminated by simply spending additional money for a proper outside aerial, the public vents its wrath on the technician who makes such a diagnosis rather than on the retailer who sold the set under false pretenses.

It's a tough problem, one which TV Manufacturers themselves are contributing to also in their avid desire to sell more sets. Yours truly has tried to be the Jeanne D'Arc who would lead the technical fraternity's battle against unscrupulous foes, but, on me the skirts don't fit, mainly because there aren't enough well organized technicians' groups to back up our efforts.



Sanford R. Cowan
EDITOR & PUBLISHER

Samuel L. Marshall
MANAGING EDITOR

COWAN PUBLISHING Corp.
342 MADISON AVENUE
NEW YORK 17, N. Y.

Vol. 11 No. 5

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FOR BETTER SERVICE

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5 display assortments

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SMALL — LOW-COST STOCK
Handles Most Service Requirements

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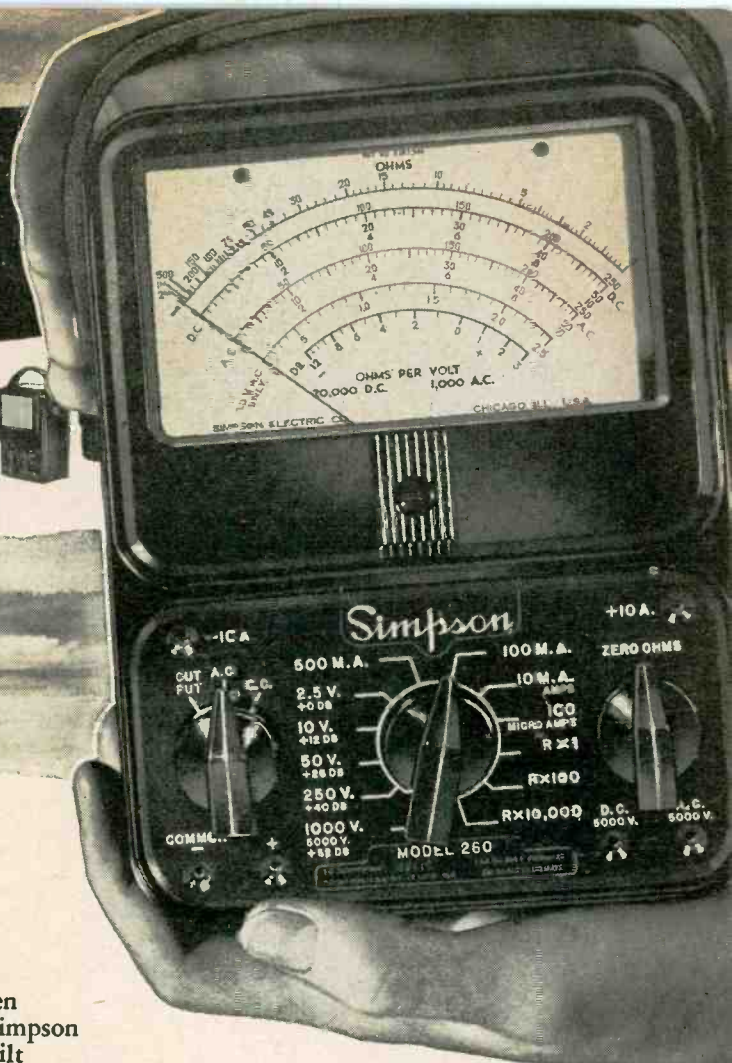
Just imagine!

**the 260,000th World Famous
Volt-Ohm-Milliammeter is now**



Simpson
INSTRUMENTS THAT STAY ACCURATE

Simpson Model 260 serving its owner!



Never before has a test instrument of this type been accorded such acclaim! The Simpson Model 260 is compactly built with a large 4½" easy-to-read meter. But, piled one on top of another, 260,000 Model 260's would equal the height of 121 Empire State Buildings*, with a few floors left over! More impressive is this fact: *There are more Simpson Model 260 Volt-Ohm-Milliammeters in use today than all others combined!* The Model 260 also is available in the famous patented Roll Top safety case with built-in lead compartment. This sturdy, molded, bakelite case provides maximum protection for your 260 when used for servicing in the field or shop.

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**Reaching 102 floors toward the sky, the 1,250 foot high Empire State Building is the tallest structure in the world.*



RANGES

20,000 Ohms per Volt DC, 1,000 Ohms per Volt AC
VOLTS: AC & DC: 2.5, 10, 50, 250, 1,000, 5,000

OUTFUT: 2.5, 10, 50, 250, 1,000

MILLIAMPERES, DC: 10, 100, 500

MICROAMPERES, DC: 100

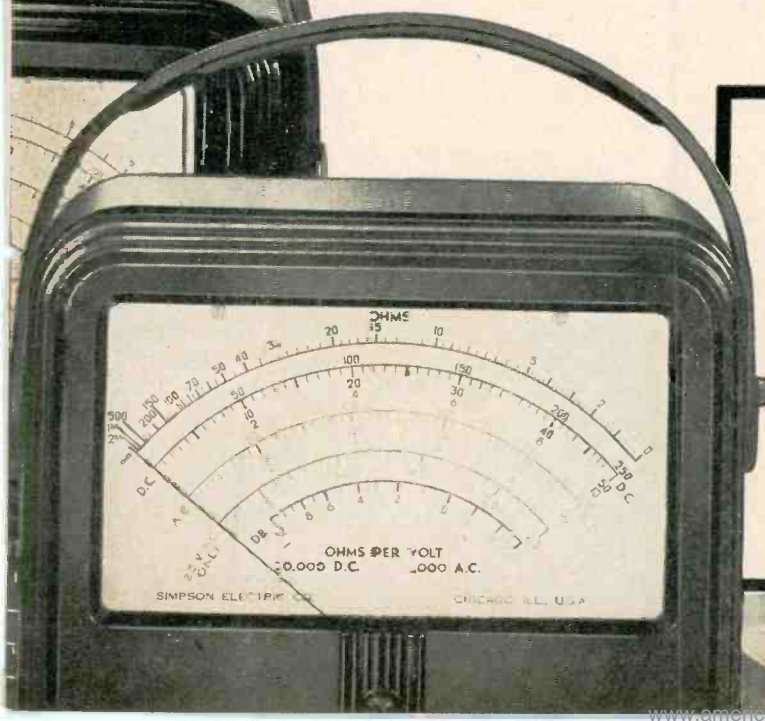
AMPERES, DC: 10

DECIBELS: (5 ranges) —12 to +55 DB

OHMS: 0-2,000 (12 ohms center), 0-200,000 (1,200 ohms center), 0-20 megohms (120,000 ohms center).

Prices: \$38.95 dealer's net; Roll Top \$45.95 dealer's net. Complete with operator's manual.

25,000 volt DC Probe for television servicing, complete, for use with 260, \$12.85



I TOLD YOU SO

by San D'Arcy

Color Television: Despite the fact that RCA has demonstrated to FCC a new all-electronic 3 color TV picture tube and a transmitter that sends pictures in color to sets which can reproduce in color and which will also give a black and white picture on sets which only have conventional black and white picture tubes, it must be emphasized that the marketing of color television is still a long way off. The FCC has always insisted that color TV transmission systems must operate in a 6-megacycle channel; that existing TV sets designed to receive pictures in accordance with present transmission standards shall be able to be converted to receive color programs by minor modification. While RCA's original color TV system required a 12.5 mc band and CBS's proposed color system required a 16 mc band, now both RCA and CBS have systems designed to operate in a 6 mc channel. But there still remain many serious problems concerning interference and propagation characteristics and the elimination of picture distortion which have not yet been solved to FCC's satisfaction. For example, FCC still does not know whether color TV is more or less susceptible to co-channel or adjacent channel interference than black and white stations. When the answer to this question is found FCC can determine what mileage separation will be required between stations — and thus you have the really basic reason for the "freeze".

TV Antenna Troubles: In April many communities were plagued by sudden wind storms, none of which were really violent. But these storms blew down a much too high a percentage of TV antennas which caused the set owners dissatisfaction and the service contractors tremendous sums in wasted time and effort repairing the damage. If an installer does not base and guy a TV antenna properly at the outset he is making a mistake which will be expensive to correct. It is about time that TV installers who try to cut corners and do it the easy way stop such practices and work on the premise that if a job is worth doing it is worth doing right the first time.

Picture Tube Size & Shapes: The misleading claims that some TV set makers have issued in regards to the efficiency of their sets' built-in antennas was bad enough but now some of the more enterprising ones are adding insult to injury by making fabulous claims for their receivers simply because they utilize either rectangular tubes or produce round image pictures (as differentiated from a round tube masked to give a rectangular framed picture). Add to this the fact that every day TV tube makers are announcing new types, and that can become a troublesome matter in time as jobbers will not be able to carry a complete stock of replacements. For example, in January 1949 "RSD" published a CR Tube Chart listing 27 picture tubes then in current use. "RSD's" March 1950 issue CR Tube Chart listed 61 such tubes and now, two months later, our records show that over 90 tube types are on the market. If this keeps up the Standards Committee of RMA will have to "do something", and by that we mean boil the thing down so that there are less than 30 or 40, at most, preferred types.

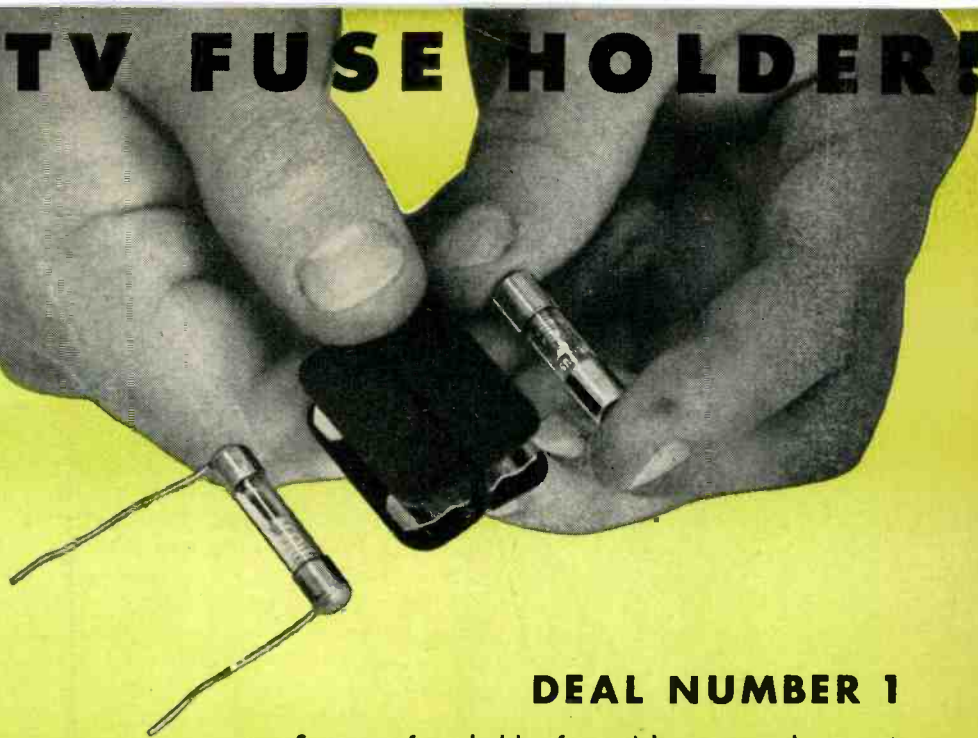
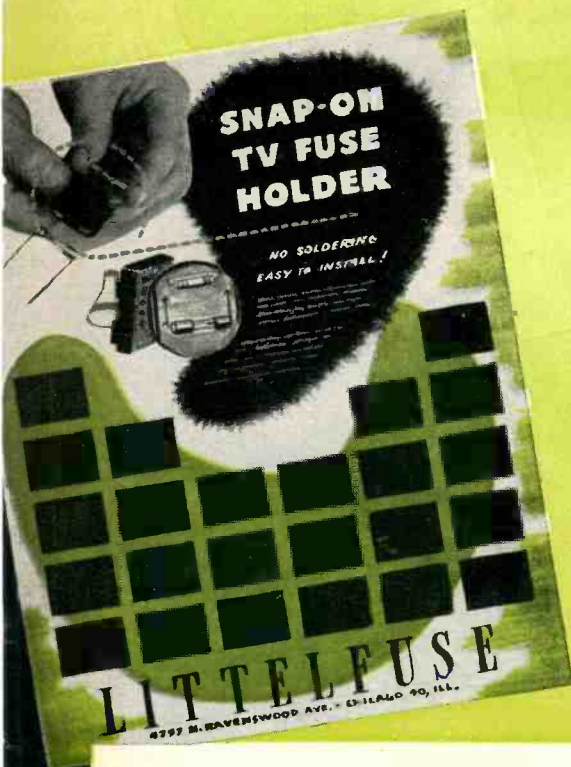
"Pardner, this Amphenol
INLINE* Antenna is up to
stay! Our boss knows his
business, because these
people will get the best
possible pictures and we
won't have any call-back
time here."

AMERICAN PHENOLIC CORPORATION
1830 SO. 54TH AVENUE • CHICAGO 50, ILLINOIS
*U. S. PATENT NO. 2,474,480

AMPHENOL

RADIO SERVICE DEALER • MAY, 1950

SNAP-ON TV FUSE HOLDER!



DEAL NUMBER 1

Snap-on fuse holder for quick, easy replacement of TV pigtail fuses. Snap one side of holder on blown pigtail fuse in set. Snap regular replacement fuses in other side—the job is done. No more cutting out the pigtail. No more messy soldering. No more fuses blown by hot irons. Save time, save work, save the customer's money, and still make big TV profits. Service dealer cost, 15c each.

LITTELFUSE INC.

4757 N. RAVENSWOOD AVE., CHICAGO 40, ILLINOIS

2 TV PROFIT DEALS!

DEAL NUMBER 2

TV fuse kit—10 assorted fuses that service all TV receivers — Admiral, Philco, RCA, Zenith, Emerson, Hallicrafters, etc., etc., etc. The serviceman needs the right fuse in his box — it is in this kit when he needs it. Saves time, saves profit. Service dealer cost, 98c each.

LITTELFUSE INC.

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TV FUSE KIT

ATOM®



TWIST-
LOK®

Every

SPRAGUE
TV

dry electrolytic
is processed

FOR 
185°F (85°C.)

OPERATION!

Sprague leads again with the largest, most complete line of replacement electrolytic capacitors for television receivers. Each type is engineered especially for tough video applications and will stand up under the high temperatures, high ripple currents and high voltage surges encountered in TV equipment. *Every Sprague TV capacitor rated at 450 d-c working voltage or less has been processed for 185°F. (85°C.) operation.* Send postcard for special TV Bulletin.

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71 MARSHALL STREET
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TRADE FLASHES

A "press-time" digest of production,
distribution & merchandising activities

New Town Meeting Program

A national program representing one of the most extensive non-commercial, cooperative efforts by big industry to help small businessmen was announced today by R. C. Sprague, Chairman, Town Meetings Committee, Radio Manufacturers Association.

The project will attempt to improve sales, merchandising and advertising, and business management practices among radio and television dealers in some 60 marketing areas throughout the nation, Mr. Sprague said.

The entire program will be managed by the Philadelphia firm of Howard Browning, Public Relations, which has acted as consultant to the Committee since inception of its educational work. Mr. Browning announced that the films will be produced for him by Marshal Templeton, Inc. of Detroit and Chicago.

New TV Handbook

"Television Components Handbook" written by A. C. Matthews, television cost engineer for Philco Corporation, has been made available to television engineers, whether in manufacturing or broadcasting, as well as to television service engineers, technicians and students.

The book is being distributed by the Accessory Division of Philco Corporation, and may be purchased by writing to: Accessory Division, Philco Corporation, "C" and Tioga Streets, Philadelphia 34, Pa., or from Philco distributors in principal cities. Price: \$2.50 postpaid.

Sylvania Executive Passes Away

Walter E. Poor, sixty-four, chairman of the board of Sylvania Electric Products, Inc., died recently at St. Lukes Hospital.

A native of Salem, Mass., Mr. Poor was graduated from Massachusetts Institute of Technology in 1908 with the degree of electrical engineer. As electrical engineer for Hygrade, predecessor of Sylvania, Mr. Poor took over the development and production of tungsten lamps, later becoming vice-president and general manager.

In 1940 he was made executive vice-president and in 1943 was elected president. He became chairman of the board in 1946.



The late Walter E. Poor

Surviving Mr. Poor are his wife, Mary Bradshaw Poor, two sons, George Russell and Arthur Phippen, and his brothers, Frank A., founder and chairman of the finance committee of Sylvania, and Edward J., who retired a few years ago as chairman of the board.

61,745 Vets Learn TV

Fifteen percent of all World War II veterans studying in schools below the college level under the GI Bill are training in radio, television and other communications courses.

Veterans Administration disclosed this fact in a course breakdown of veterans' enrollments under the GI Bill on November 1, 1949. Two-thirds of all the veterans studying radio courses in 1949, or 61,745, were learning to be radio and television mechanics.

Coy To Address Convention

Chairman Wayne Coy of the Federal Communications Commission has accepted an invitation of RMA President R. C. Cosgrove to speak at an industry banquet which will conclude RMA's 26th annual convention June

"Leave it to Sylvania!"



SYLVANIA ANNOUNCES...

"Another Sylvania advance!"



Two Outstanding New

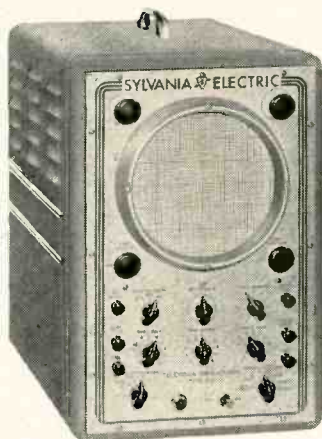
"That's great news for TV Service men!"



TV Test Instruments!

Sylvania's early pioneering in radio testing devices naturally places this company in a position to step ahead in the field of television testing equipment.

So again Sylvania comes through! This time for service dealers everywhere, with a splendid new line of TV Test Equipment. Here are the first two instruments in this line. A new TV Marker Generator will be announced soon. Mail coupon for prices and latest specification sheets.



Type 400

Sylvania TV Oscilloscope

Here's an entirely new high gain, wide band oscilloscope especially designed for television. Accurately displays any TV pulse, wave-shape or signal on a large 7-inch screen. Has excellent tilt, rise-time, and overshoot characteristics. Features include: 3-position frequency-compensated attenuator; vernier gain control; low internal hum level. Mail coupon for full details.

Sylvania TV Sweep Signal Generator

This compact instrument is equipped with electronically controlled sweep circuits to eliminate the complexities inherent in mechanical type sweeps.

The smooth attenuator gives continuous control of the output from 300 microvolts to the maximum of .1 volt. Voltage-regulated power supply insures good frequency stability. Double shielded to prevent unwanted signal leakage.



Type 500



RADIO TUBES; TELEVISION PICTURE TUBES; ELECTRONIC PRODUCTS; ELECTRONIC TEST EQUIPMENT; FLUORESCENT LAMPS, FIXTURES, SIGN TUBING, WIRING DEVICES; LIGHT BULBS; PHOTOLAMPS; TELEVISION SETS

SYLVANIA ELECTRIC

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Advertising Dept. R-1605
Emporium, Pa.

Please send me full details about Sylvania's new TV Test Equipment.

Name _____

Street _____

City _____ Zone _____ State _____

...after 9 months of daily use

ON 30,000 MILE TREK THROUGH AFRICAN JUNGLE

with Arch Oboler

Famous Radio Playwright.

**E-V CARDYNE takes everything...from
the heat and humidity of the Congo to
the rain-swept slopes of the Mountains
of the Moon, to the snow and ice of
16,000 foot Mt. Kenya's glacier fields!**



Shows Arch Oboler recording Masai savages in Kenya, British East Africa

*"...trip was made by boat,
pack horse, jeep and foot under
most difficult conditions...appa-
ratus had to endure penetrating
dust and great variations in humid-
ity...used the Cardyne almost
entirely...never failed, during
months of use and abuse...*

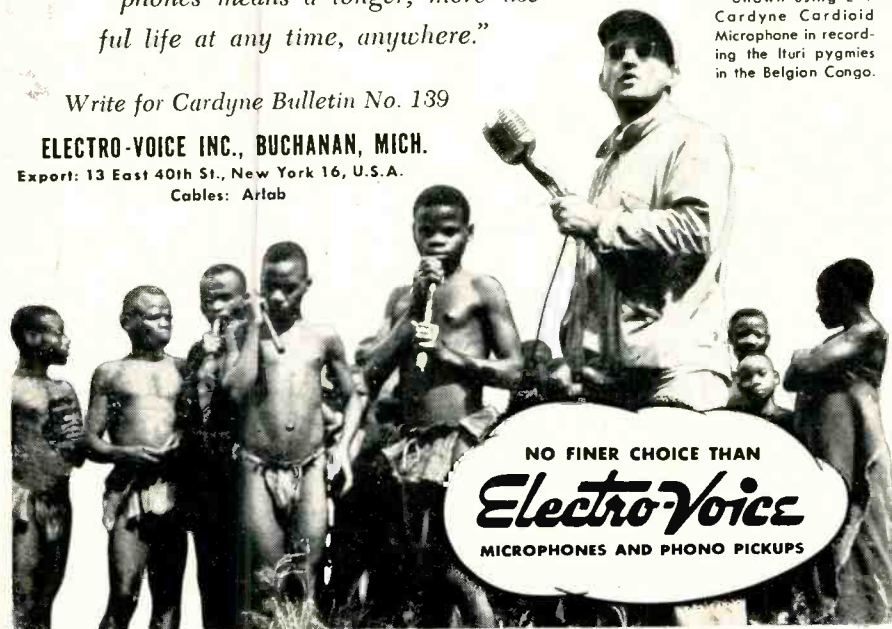
*made recordings of experiences on African
safari...for a series of transcribed radio
broadcasts...after return to U.S., found
the Cardyne to be in thoroughly opera-
tive condition from every standpoint
...built-in ruggedness of E-V micro-
phones means a longer, more use-
ful life at any time, anywhere."*

Arch Oboler...Author-Director. Winner of Radio's Top Awards, including the Peabody Award (Radio's Pulitzer).

Shown using E-V Cardyne Cardioid Microphone in recording the Ituri pygmies in the Belgian Congo.

Write for Cardyne Bulletin No. 139

ELECTRO-VOICE INC., BUCHANAN, MICH.
Export: 13 East 40th St., New York 16, U.S.A.
Cables: Arlab



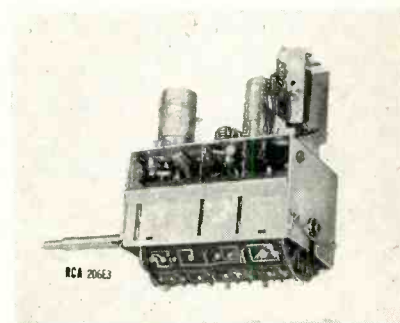
8 at the Stevens Hotel, Chicago. It will be Mr. Coy's first appearance before the television and radio manufacturers.

The RMA convention will cover four days, beginning on June 5, and will include meetings of all major groups, including the annual membership meetings of all five RMA divisions, and the annual membership luncheon. New officers and directors where terms will expire also are to be elected.

Printed Circuit TV Tuner Announced By RCA

The television industry's first "printed-circuit" television tuner, a major development in home-receiver design which provides "greatly improved performance, including superior reception in fringe areas as well as in receivers operated with built-in antennas", has been announced by the RCA Tube Department.

In design, the new RCA unit is a cylindrical turret-type tuner. The turret assembly employs individual coil strips or segments, each containing the printed circuit for a separate television channel. The strips are easily removed for service or replacement. All the tuned circuits are printed with the exception of the oscillator coils for channels two to six.



RCA's printed circuit TV Tuner

Tuning is accomplished by rotating the turrets by means of a conventional channel-selector switch which connects with the proper coils for each channel. Special features have been incorporated in the tuner to insure durability and trouble-free service. These include stator contact springs of solid hard-spring silver, and turret contact rivets of solid coin silver. The unit is capable of withstanding well over 40,000 complete revolutions of the turret.

Initial designs of the new tuner are intended for use with a stagger-tuned picture system having a carrier of 25.75 megacycles per second and a sound system having a carrier of 21.25 megacycles per second, as employed

Picture of the Successful T-V Serviceman



© Allen B. Du Mont Laboratories, Inc.
*Trade-mark.



For superlative pictures, he installs Teletrons — in the 12½, 15, 16 and 19 inch sizes — selected from this Teletron Catalog. Write for your copy!



DUMONT

FIRST WITH THE FINEST IN T-V TUBES

Teletrons

ALLEN B. DU MONT LABORATORIES, INC. • TUBE DIVISION, CLIFTON, N. J. • PLANTS AT ALLWOOD AND PASSAIC, N. J.

RADIO SERVICE DEALER • MAY, 1950

11

New RACON Sound Equipment for Best Performance and Highest Profits!

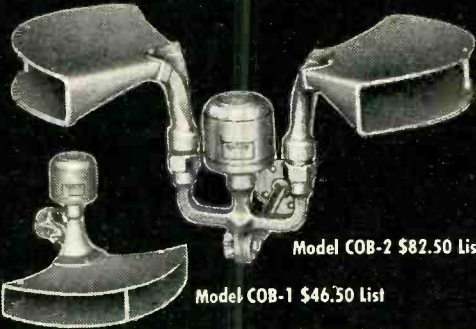
Only the New RACON DRIVER UNIT has all these Exclusives:

- Lowest List Price — \$37.50
- 25 Watts Operating Capacity
- 50 Watts Peak Capacity
- Completely Waterproof and Tropicalized
- Built-in Vacuum Impregnated Line Transformer
- Primary Terminals: 500, 1000, 1500, 2000 Ohms
- Secondary: 15 Ohms
- Alnico V Magnet
- Aluminum Wound Voice Coil for Maximum Efficiency
- Combined Solder Lug and Binding Post Terminals
- Frequency Range 90-6500 Cycles
- Thread Size 1 3/8" — 18



Model PM-708TR \$37.50 List

Here's Why New RACON COBRA LOUDSPEAKERS SUCCEED when ordinary speakers fail!



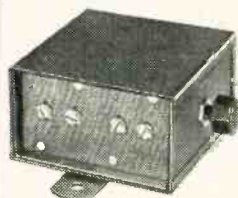
Model COB-2 \$82.50 List
Model COB-1 \$46.30 List

- Widest Sound Pattern (Adjustable from 120-240°)
- Designed for Voice Range: 370-6500 Cycles
- High Conversion Efficiency
- No Re-entrant Members
- 25 Watts Continuous Capacity
- 50 Watts Peak Capacity
- Completely Waterproof
- Tropicalized Driver Unit
- Vertical or Horizontal Adjustable Mounting
- Aluminum and Bronze Castings

RACON CROSSOVER NETWORKS



Model CON-20, \$22.50 List.
Highest quality LC network.



Model CON-15R, \$11.00 List.
Efficient RC high-pass filter network.

RACON TWEETER



Model CHU-2,
\$37.50 List.

Wide distribution pattern!
Clean output to 15,000 cycles!
When used with crossover network,
handles amplifiers of 25-30 watts.

SOUND TECHNICIANS AND SERVICEMEN — For full details on our complete line of Public Address and Wide Range Loudspeakers, see your favorite parts jobber, or write for Catalog D.

ALL RACON PRODUCTS ARE GUARANTEED FOR 18 MONTHS

ACOUSTICAL EXCELLENCE



Racon Electric Co., inc.

Sound
Equipment
Manufacturers

52 East 19 St.
New York 3,
N. Y.

in the 630TS type of television receiver. This type of receiver, now using the RCA 201E1 (KRK-2) or similar turret, may be changed over to the new tuner with only two minor electrical changes and only minor mechanical modifications.

The new printed circuit tuner provides high and substantially uniform gain of between 28 and 35 decibels on all channels under typical operating conditions. Other features include an excellent noise factor, high rejection of spurious responses, very low oscillator radiation, a temperature-compensated Colpitts circuit for oscillator stability, and a low-reflection coefficient in the transmission line.

In addition to the removable coil strips and turret, ease of servicing is provided for in the new tuner by an oscilloscope terminal to facilitate tests and antenna and r-f transformer alignment adjustments.

The new RCA printed circuit tuner, which has already been subjected to extensive field tests, is now available to manufacturers of television receivers. It will also be available for replacement purposes through RCA parts distributors.

A bulletin containing full technical details covering electrical and mechanical features, as well as a circuit diagram of the new tuner, is now available from Commercial Engineering, RCA Tube Department, Harrison, N. J.

Rider Announces Title Changes

John F. Rider Publisher, Inc., 480 Canal Street, New York 13, N. Y., announces the title of its forthcoming text New Cathode-Ray Tube At Work has been changed to Encyclopedia On Cathode-Ray Oscilloscopes And Their Uses.

The text deals with oscilloscopes and synchroscopes manufactured during the past ten years.

The title The Theory And Practice Of 30-1000 MC Receiving Antennas has been changed to TV And Other Receiving Antennas.

The book deals with approximately 100 different types of antennas in the 30-1000 MC band, and their variations.

Both books will be available very shortly at all Rider distributors.

Also announced is the new Rider Television Manual Volume 4, currently at all jobbers.

Retaining the practical enlarged page size format, 12" x 15", established with Rider TV Manual Volume 3, TV 4 incorporates the following features: all pages are filed in their proper places; equivalent of 2296 pages (8 1/2 x 11); factory-authorized coverage from October 1949 through Feb-

SALES CLOSERS

THE METROPOLITAN . . .

Radion's famed TA-49 . . . the antenna that helped make T-V history . . . recognized tops for all indoor installations . . . more than a million in use right now. Packaged complete. List, \$6.95.

THE SUBURBAN . . .

Radion's new TA-51 . . . a packaged conical . . . a time and money saver—reaches out farther. Completely weatherized . . . fully assembled . . . ready to use. List, \$9.95.

4
SALES AIDS THAT
HELP TAKE THE
"ELL" OUT OF T-V
SET SELLING!

THE TOWN AND COUNTRY . . .

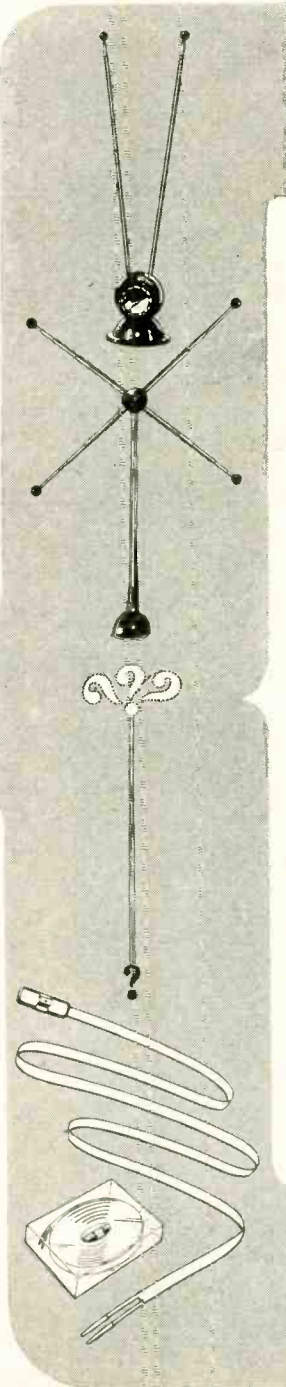
Coming soon! The sensational TA-53 . . . the packaged outdoor antenna designed to clinch set-sales in fringe-areas . . . to minimize local interference. Another Radion "traffic triumph" backed by hard-hitting advertising to boost YOUR sales. Packaged complete. Watch for it!

LINKED LEAD-IN . . .

The new TL-10 . . . ten foot lead-in stripped, split . . . terminals already on . . . packaged complete with combination standoff and insulator. For 20 feet, snap 2 lengths together. A natural for counter sales . . . a time-and-money-saver for service departments! List, 69c.

See us
at the PARTS SHOW
Stevens Hotel . . .
Rooms 654A - 655A

RADIO SERVICE DEALER • MAY, 1950



RADION HAS HELPED CLINCH A MILLION T-V SET-SALES— LET IT HELP GET SET-ORDERS FOR YOU, TOO!

'Phone, wire or write for heart-warming,
purse-gladdening facts!

Radion has helped hoist dealers over the installation-cost hurdle more than 1,000,000 times—which certainly makes it America's Number One *Sales Aid*. Truly "traffic items", all four! Neatly packaged—easily installed by anyone.

And we're not letting any "cat out of the bag" when we tell you that sets with "built-in" aerials are *boosting*, NOT *diminishing*, Radion sales. You probably know that already. So climb on the bandwagon with the Radion profit-package! Mail coupon RIGHT NOW.

Radion

The RADION CORPORATION
1137 Milwaukee Ave., Chicago 22, Illinois

THE RADION CORPORATION

1137 Milwaukee Ave., Chicago 22, Illinois

D-5

For Data on Radion Products and your nearest Distributor, check here:

() TL-10 Lead-in Package () Town & Country No. TA-53 Outdoor Mount
() Metropolitan No. TA-49 () Suburban No. TA-51

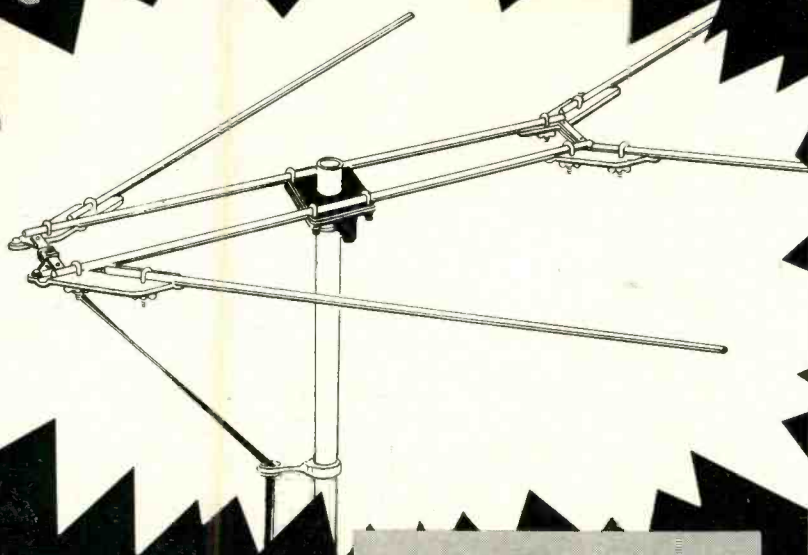
Name

Company

Address

City..... Zone..... State.....

NEW WORKSHOP



DUBL-VEE
TV ANTENNA

Outstanding ALL-CHANNEL Performance

THE "end-fire" DUBL-VEE sets a new standard in TV antenna performance. Higher gain, sharper directivity, and closer match assure superlative reception — clearer, steadier, sharper pictures. In fact, a single DUBL-VEE actually outperforms double-stacked models of most other types. Rugged — easy to assemble — economically priced. Your best buy at any price.

Clearer Pictures—higher gain brings in stronger signal — especially on higher channels

Clearer Pictures — narrow beam cuts down multi-path ghosts

Clearer Pictures—better impedance match on all channels maintains high signal strength

Clearer Pictures — true horizontal polarization—no out-of-phase ghosts

Clearer Pictures—no parasitic elements — all driven

Clearer Pictures—designed by the pioneers in the antenna industry

MODEL VV

Write for Bulletin E

THE WORKSHOP
ASSOCIATES, Inc.

135 CRESCENT ROAD,
NEEDHAM 94, MASS.

\$10.95 LIST

Model 2VV Double-Stack \$21.95 List

Specialists in High Frequency Antennas

bruary 1950; 73 manufacturers represented; cumulative index for TV Volumes 1-2-3-4, and "How It Works" book.

G. E. Sales Promotional Signs

Colorful identification signs, to assist service dealers increase their business, highlight new sales promotion aids recently released by the Tube Divisions of the General Electric Company, according to John T. Thompson, tube replacement sales manager.

Thompson described one of the two new identification signs, as being an indoor electric model, while the other, of all-steel construction, is primarily for outdoor use.

Thompson said that the full sales promotion lines are presented in six-page folders just off the press, available from both General Electric and Ken-Rad tube distributors. The new signs, the window card, and all of the remaining items for each tube brand may be ordered directly from distributors. In addition to a total of eight identification pieces, the remainder of both promotional lines consists of direct mail and newspaper steps toward customer-contact, plus 21 other business-building aids.

Workshop Associates Expands

To increase production and engineering facilities, The Workshop Associates, Inc., has recently acquired a new building on Crescent Road, Needham Heights, Mass. The company was formerly located in Newton Highlands, Mass.

Gardiner G. Greene, president and founder of Workshop, stated that the additional space was required to accommodate greatly increased research and development activities in 1950, and to provide expanded production facilities for a new television antenna the company is currently introducing.

Telrex Acquires New Site

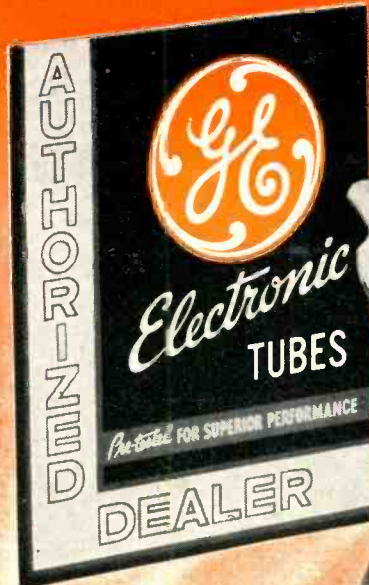
Telrex, Inc., Asbury Park, N. J., designers and manufacturers of the Conical-V-Beams, has acquired, as part of its over-all expansion program, a new testing site on which it is constructing a fully equipped laboratory. The new laboratory, which will supplement existing facilities, will be devoted largely to antenna design and development work.

The 1.5-acre tract, second highest point on the East Coast, is located in Belmar, N. J. just a stone's throw from the former site of Marconi's historic transatlantic radio transmitter.

Acquisition of this ideally situated

[Continued on page 34]

CONFIDENCE STARTS HERE!



DO YOU HAVE THESE G-E SALES BUILDERS?

- NEW 4-way plan for more business
- NEW electric window sign
- NEW outdoor metal sign
- NEW luminescent window card
- NEW decalomania
- NEW tube storage-display cabinet
- NEW newspaper ad mats
- NEW postcard promotion mailers
- Convenient G-E pocket office
- Handy G-E tube puller
- Techni-talk Magazine
- TV service course
- Distinctive shop garments
- Wall plaque
- Giant tube cartons
- Imprinted stationery and business cards
- Repair and tube-test stickers
- Job-tickets and shipping labels

"It's the 'G-E' on my store window that brings in customers. And 'G-E' on the tube cartons on my shelves leads them to buy!" Radio-TV servicemen unite in this statement, for their sales have proved the *pull* of the General Electric trademark.

Also . . . more business comes to G-E tube dealers because *all* their needs are met with a complete line of TV-picture, metal, glass, and miniature types, as well as germanium diodes and selenium rectifiers. Profits are bigger by reason of General Electric's sensational group of plus-powered promotion helps (the list at the left shows how many *new* items there are to give your 1950 sales a jet take-off).

Phone or write your G-E tube distributor . . . today. He'll show you how to make real money from an active local market you can dominate with G-E tubes to install and sell, G-E promotions to help you sell! *Electronics Department, General Electric Company, Schenectady 5, N. Y.*

You can put your confidence in—

GENERAL  ELECTRIC

161-JA4

ONE-MAN TV Antenna ORIENTATION

by EDWARD M. NOLL

AN efficient, well-constructed, and properly oriented antenna is the best asset any television installation can have. It provides the receiver with a good strong signal which is a major requisite for a good picture free of noise, interference, and ghosts. Usually, such an installation requires the services of two men and expensive telephone equipment. There has been developed a new one-man method of orientation which permits measurement of the signal level delivered to the receiver and requires only the use of convenient and portable equipment on the roof. This system operates without running any additional lines up to the roof because the ribbon transmission line serves for telemetering while simultaneously conducting r-f signals to the receiver. If co-axial lines are used, however, it is probably more convenient to use separate temporary leads such as lamp cord for measuring purposes. Thus, a single technician on the roof can observe the effects of antenna orientation on signal strength. This method is particularly helpful when a weak station must be favored or when separate orientation is necessary for high and low-band antenna elements. It is also helpful in finding a median position for antenna orientation to obtain approximately uniform signals from a number of stations in different directions.

General Description of System

This one-man orientation method takes the a-g-c voltage through proper isolating networks from a suitable point in the receiver and feeds it through the transmission line up to the roof where it is measured by battery-operated vacuum-tube or high resistance voltmeter such as the RCA

Describing a one-man method of orienting an antenna for optimum reception from various TV signal sources. It is usual for a crew of at least two men to perform this operation, one man at the receiver and the other on the roof.

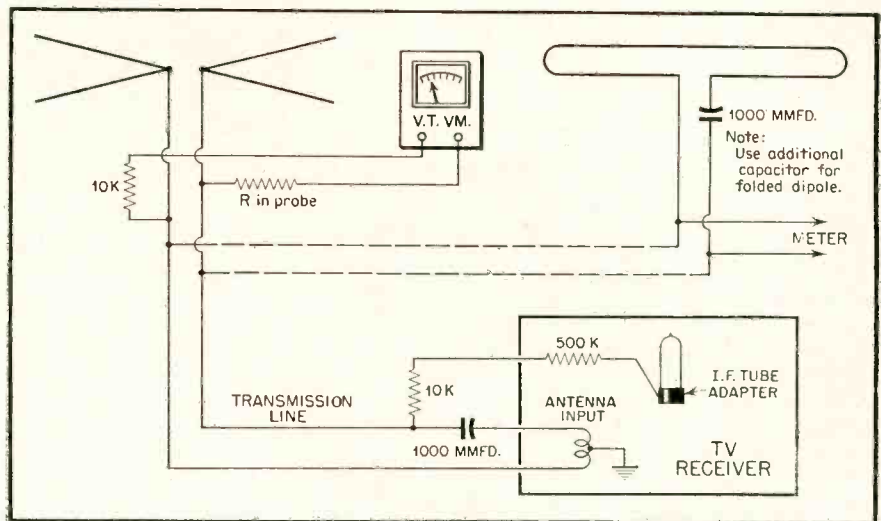


Fig. 1. Diagram of one-man orientation system

battery VoltOhmyst (See Fig. 1). Because a-g-c voltage is directly related to the amplitude of signal delivered to the receiver input, it provides an accurate check of antenna orientation for each channel.

The use of a-g-c bias for this check affords an accurate means for observing signal strength because a-g-c bias is a function of the amplitude of the sync pulse. Sync pulses are transmitted at a constant power level and any change in this level at the receiver changes the a-g-c bias. A change in

the average brightness level of the TV signal however, does not shift this bias. *Caution.* In fringe areas, particularly with receivers having a long a-g-c delay, varying conditions of erratic signal strength may show unsteady meter readings.

As an alternate method, it is also possible to use the d-c component of the voltage drop across the load resistor of the video detector. When checks are made from the detector however, there may be variations in the meter reading because changes

in the average brightness of transmitted scene will change the drop across the load resistor. The most consistent readings are obtained when a test pattern is being received.

In normal-to-strong-signal areas, the a-g-c arrangement, if available, will be found more desirable because of its steady output.

A Specific Example

In a typical case, the schematic of the RCA 8T241 chassis was first surveyed to find a suitable place to take off a-g-c voltage. It was observed that grid bias on the third picture i-f stage is normally 0.03 volts with no received signal and jumps to -3.72 volts when 2200 microvolts of signal are delivered to the antenna input of the receiver. This range is very satisfactory because it can be read on the sensitive 0-3 or 0-5 volt scale of electronic voltmeters. A battery-operated VoltOhmyst is an ideal meter for the job since it has an 11-megohm input, a 3-volt scale, a built-in probe with isolation resistor, and a self-contained power source. In addition, its 1000-megohm resistance range is most convenient in trouble-shooting transmission-line leakage, should moisture or insulation problems be encountered. Other meters not having probe isolation may require an extra series resistor of approximately 10,000 ohms, at the line connection point.

A-G-C voltage is taken from the grid of the i-f tube by means of an adapter such as a miniature test point adapter. The adapter is prepared by attaching a 0.5 megohm isolating resistor to the grid No. 1 pin and adding short piece of hookup wire to the resistor. (see Fig. 2). The wire should be long enough to reach from the socket of the 3rd i-f tube to the antenna-input terminals. This isolating resistor prevents introduction of additional capacitance across the tuned circuits of the i-f stage. At the anten-

Illustration of technician employing one-man orientation principles.



na input a 10,000-ohm resistor is placed in series with the lead and one side of the transmission line. A 1000 μmf capacitor connects this junction to one terminal of the receiver-antenna input. The capacitor prevents placing a d-c shunt across the high-resistance meter and bias line. The resistor prevents unbalancing the antenna transmission line. These connections permit insertion of d-c voltage into the transmission line without affecting the operating characteristics of the receiver. (For connection to a 630TS, see Fig. 3).

Although it may seem confusing to have a 0.5 megohm resistor at one end of a wire and a 10,000-ohm resistor at the other end, these two resistors are used to isolate the wire from i-f signals and antenna signals respectively at points closest to where the

desired d-c connections must be made. The wire could also be bypassed by a capacitor but since little is gained in doing so that item is omitted.

On the roof, two piercing connections are made to the ribbon-type transmission line to make contact with the two wires in the line. (Lightning arrester can be used since it provides a ready device of piercing and connecting to the transmission line—alternate methods can be used at the discretion of the technician.) One lead should be connected directly to a 10,000-ohm resistor, the opposite end of which is the contact point for the common or "ground" lead of the voltmeter. The other lead is attached directly to the voltmeter probe providing it contains an isolating resistor. If it does not, another 10,000-ohm resistor must be inserted between probe and transmission line connections.

A Few Precautions

Perhaps the most important precaution in putting this idea into operation is to have the antenna transmission line clear of grounds. For this reason a capacitor is added in series with the antenna input. Be certain to detach any grounded lightning arrester because it would act as a center-tapped shunt across the meter. Such a grounded point can also become a point where 60-cycle hum may be introduced which, in turn, would feed back into the video and sync circuits via the a-g-c system.

When a folded dipole or any anten-

[Continued on page 38]

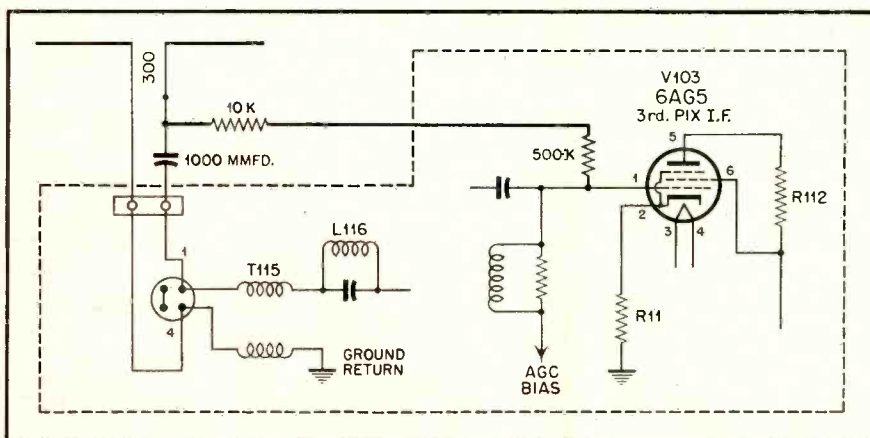


Fig. 2. Method of taking off a-g-c voltage

AUTO-RADIO DRIVE-IN

by **ALLAN LYTEL**

Auto-radio service is fast becoming a specialized service field, what with the requirements of garage space, special types of test equipment, and service procedures of its own. A typical auto-radio establishment is described in this article.

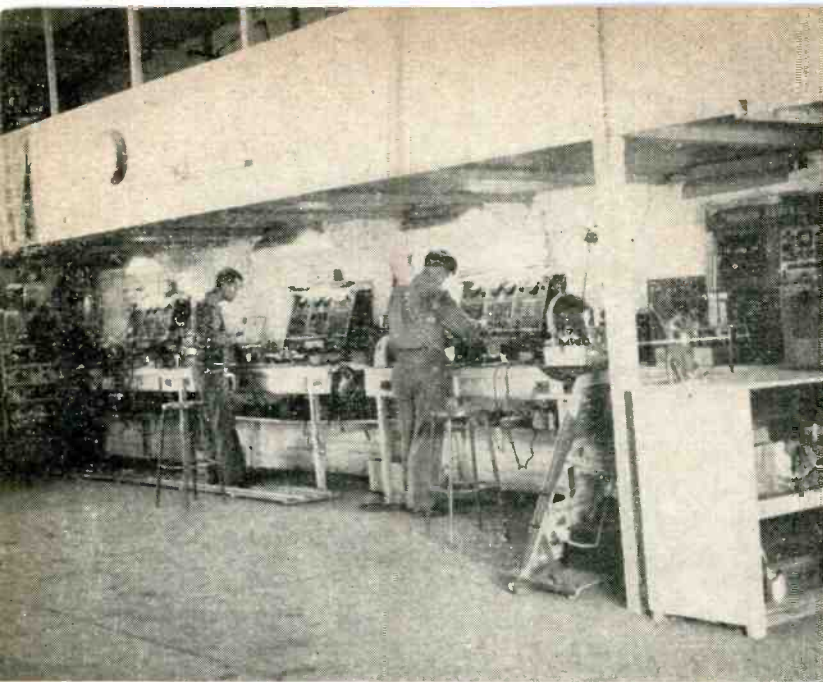


Fig. 2. Shop test bench with men at work.

AUTOMOBILE radio repair has become a specialized field of radio work since there are special problems involved. Every repair man knows that automobile radios use vibrator power supplies and a 6 volt d-c filament supply. There are also special problems involved in mounting the receiver and in eliminating static.

The unique nature of these problems has made auto-radio repair an individual branch of radio repair work and many shops are equipped to handle only this type of work. This article illustrates the operation of such a drive-in auto radio repair and installation shop, located in the city of Philadelphia. This particular street on which the shop is located has a concentration of automobile showrooms, garages and used-car lots. The location of a shop such as this is vital to its ultimate success; it will be seen from this neighborhood that there is a higher than normal interest in automobile radios. It follows quite naturally that any business section that

buys, sells, or repairs automobiles is a likely spot for a location of a specialized drive-in radio repair shop.

Figure 1 illustrates the front entrance which is available by means of a driveway directly from the busy street. This drive-in feature serves



Fig. 4. Shop exit.



Fig. 3. Testing receiver in car.

two important functions: parking space is very difficult to find in a crowded section and business would be lost unless the prospective customer had a place to leave his car while making an inquiry. At the same time, the car is driven right into the repair shop where equipment may be used on the receiver with a minimum of time and effort. There is room in the shop for several cars at once and with several efficient repairmen, the

receivers may be fixed on the spot.

Figure 2 shows this test bench with three radio repairmen working. In order to make the most economical use of the space the balcony as shown in the picture is used for storage of spare parts. There is room for three men to work simultaneously and thus three jobs may be completed at the same time while the customers wait. In the foreground of this picture, the rear of a display panel showing an automobile radio will be seen. The use of displays such as this is very important in selling new installations of radios. A shop of this nature can build up a large trade by references from nearby automobile dealers, who can send prospective customers with their automobiles to examine the display of radios for installation.

Figure 3 illustrates the technician working directly on the radio receiver mounted in the car. In this particular photograph, the repairman is checking for a possible antenna short by means of an ohmmeter. The preliminary

[Continued on page 38]



Fig. 1. Shop entrance.

Elements of TV

SIGNAL DISTRIBUTION

by SAMUEL L. MARSHALL

(From a forthcoming book, "Television Service Techniques")

Part I

In the first section of this series the author explained the derivation of the various signal components present in the composite television signal. The second section, of which this article is the first installment, deals with the progress of these signal components in the receiver, and the manner in which they make their effects felt in the various sections of the receiver.

TWELVE channels are in use at present for v-h-f television transmission and reception. Each channel is six megacycles wide, and all are generally grouped into two divisions: *low channel* and *high channel*. Fig. 2-1 illustrates this division, Channels 2 to 6 being identified with the low frequency channels and 7 to 13 with the high frequency channels. Channel 1, or what was formerly Channel 1 (44-50 mc), is now assigned to another Service.

In order to provide an equitable distribution of available TV facilities the F.C.C. divided the country into special TV Areas with their centers separated by about 200 miles. To each Area one to seven channels have been assigned depending on the population density of the Area. The Metropolitan Area of New York has seven channels assigned to it.

Generally, the channels assigned to any Area are separated by a frequency gap corresponding to one channel, except in the case of channels 4 and 5, where a 4 mc gap already exists. Thus, in New York we find channels 2, 4, 5, 7, 9, 11, and 13 in operation. This practice has been made necessary in order to prevent adjacent channel interference.

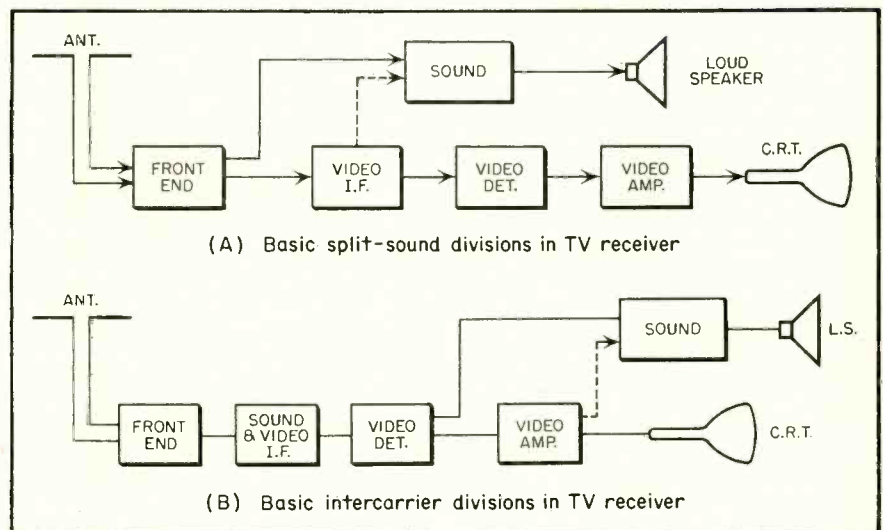


Fig. 2-2: The two basic receiver systems used in TV.

Propagation and Reception of TV Waves

Because of the very high frequencies employed in TV its transmitted waves behave much in the same manner as light waves. They travel in straight lines; beyond the horizon they shoot off into space; they are cut off when blocked by objects placed in their path; and they are reflected by all kinds of surfaces.

The Television Receiver

In a conventional AM receiver the broadcast signal entering the antenna terminals contains the following components:

1. High frequency carrier
2. Sound signal (which amplitude modulates the h-f carrier)

In comparison, the television signal contains the following information:

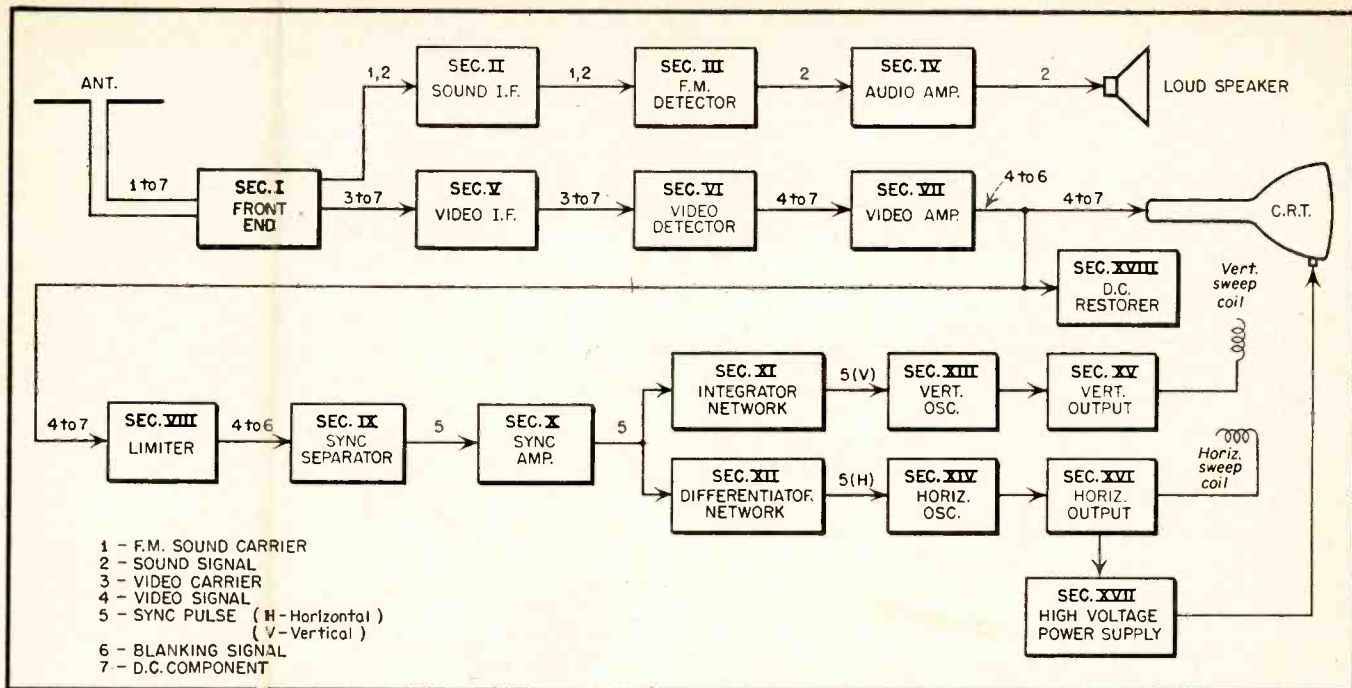


Fig. 2-3: Block diagram of Split-Sound receiver

1. FM sound carrier
2. Sound signal (which frequency modulates the FM carrier)
3. Video carrier
4. Video or picture signal (which amplitude modulates the video carrier)
5. Sync pulse (which with the video signal amplitude modulates the video carrier)
6. Blanking signal (which with 4 and 5 above, also amplitude modulates the video carrier)
7. D-C component (which is part of the composite video signal consisting also of the video signal, the sync pulses, and the blanking level)

The manner in which the above signals were derived and inserted into the composite TV signal was discussed in Chapter I. We are now ready to analyze the progress these signal components make as they proceed from the antenna to the picture tube and loud speaker.

Receiver Divisions

Although there are many methods by which the composite signal enters the receiver and finally winds up as a combination of sound from the loud speaker and a picture on the kinescope, two basic systems encompass all receivers in use today. These are the conventional Split-Sound and the Intercarrier systems, and are shown in block diagram form in Fig. 2-2.

The Split-Sound system is shown in (A) of this figure. Tracing the progress of the incoming signal in this type of receiver we observe that all

CHANNEL	2	3	4	5	6
BAND-WIDTH Mc.	54-60	60-66	66-72	76-82	82-88

LOW FREQUENCY CHANNELS

CHANNEL	7	8	9	10	11	12	13
BAND-WIDTH Mc.	174-180	180-186	186-192	192-198	198-204	204-210	210-216

HIGH FREQUENCY CHANNELS

Fig. 2-1: Low and high TV channels

components contained in the entire receiver enter a section marked "Front End". The sound and picture signals are split up in this section and enter their own respective sections, each consisting of a complete i-f amplifier, detector, and final amplifier chain. Notice that the pix and sound signals are separated immediately following the Front End.

In the Intercarrier system, shown in Fig. 2-B, the sound and pix signals, are not split up in the Front End, but are fed together into the following i-f section which is designed to accommodate both signals. Separation of sound and pix occurs following the 2nd detector. From this point the picture signal proceeds into the video amplifier section and picture tube. The sound signal, on the other hand, enters its own i-f amplifier, detector, and final amplifier chain, and thence to the loud speaker.

It must be understood that variations of these systems occur in practice. Thus, in the Split-Sound system, separation of sound and pix may

not occur until after one or two stages of i.f., as shown by the dashed lines in the figure. Similarly, in the intercarrier system, separation of the sound and pix signals may not occur until after the video amplifier; also shown by the dashed lines in Fig. 2-2.

Split-Sound Receiver Analysis

In order to facilitate the explanation of how a TV signal makes its way through a Split-Sound receiver we will refer to the more detailed block diagram shown in Fig. 2-3. Each component of the composite signal is numbered, making it a simple matter to locate in which circuits it is present and in which it is removed.

Section I is the Front End which generally consists of the following circuits: r-f stage, mixer, and oscillator. Their operation is similar to that of the same stages employed in a broadcast receiver, except that the r-f frequencies employed in TV are very much higher, being 54 to 216 megacycles. Also the required bandwidth is much higher, being 6 mc as compared to 10 kc employed in AM reception. Naturally, circuits and circuit components are designed around these requirements. Notice that all seven signal components enter and leave the Front End, its main functions being to select the desired channel, amplify its signal, and convert the pix and sound carriers to their respective i-f carrier frequencies.

Section II, which is the Sound I-F section, receives signals 1 and 2, the FM sound carrier and its accompany-

ing sound signal. Sound intermediate frequencies vary between 20 and 40 mc depending on the receiver. As mentioned in Chapter I the maximum deviation from the resting FM sound carrier frequency is 25 kc, plus and minus. However, FM i-f transformers have a much wider response, or at least should have, so that slight frequency variations in the r-f oscillator will not shift the sound signal out of the range of the i-f transformer response.

Section III is the FM Detector, and may employ a Foster-Seeley Discriminator, a ratio detector or a slope detector. Its purpose is to convert the FM signal to a sound signal, thus removing signal component 1, the FM sound carrier, and leaving signal component 2, the sound signal, to proceed to the next section.

Section IV is a conventional Audio Amplifier containing more or less conventional circuits and components depending on the receiver.

Returning now to where the original signal was split up into the sound and pix components, we enter *Section V* the video I.F. chain. Signal components 3 to 7 comprising the video carrier, the video signal, the sync pulses, the blanking signal, and the d-c component enter this section. Proper amplification of the required bandwidth and suitable waveshaping is effected in this chain. The video i-f stages have a bandwidth response of about 4.25 mc. They are always tuned so that the video i-f carrier response is 4.5 mc higher than the corresponding audio i-f carrier. Thus, if the sound i-f carrier is 21.25 mc the video i-f carrier response will be at 25.75 mc.

The Video Detector shown in *Section VI* removes signal component 3, the video carrier. The circuits employed in this stage are essentially conventional diodes which may contain a number of innovations for purposes of better signal stability, such as automatic gain control. The latter has its counterpart in AM receivers as automatic volume control.

Leaving the video detector we enter the Video Amplifier, *Section VII*, with signals 4 to 7. In this section the complete video signal including the sync pulses are amplified in much the same manner as an audio signal in an audio amplifier, except that the required frequency range is much higher, being from about 20 cycles to 4.5 mc. Compare this range with even a high quality audio amplifier which has a maximum response at about 15,000 cycles.

Notice that the signals leaving the

video amplifier 4, 5 and 6, are minus the d-c component (average background brightness information). This intelligence is restored to the signal entering the cathode ray tube by the D-C Restorer, *Section XVIII*. The reason why we lost the d-c component in the Video Amplifier is because the latter is usually an a-c amplifier, and d-c in the signal does not pass through the coupling condenser. Notice that the signals entering the cathode ray tube are the video, the sync, the blanking and the d-c component.

In the cathode ray tube the video supplies the information pertaining to the relative light intensity at a particular spot on the screen. The blanking signal increases the bias on the grid of the picture tube to a very high value during periods of horizontal and vertical retrace, thereby cutting off the electron beam and making the screen invisible to the



retrace lines. Finally, the d-c component restores the background brightness present in the original scene. The sync pulses merely ride along with the blanking signal and their effects come into play later on in the sweep circuits shortly to be discussed.

Signals 4 to 7 from the Video Amplifier and D-C Restorer are also sent into the sync division of the TV receiver. It is in this chain that voltages are developed which sweep the electron beam across the face of the cathode ray tube in synchronism with the beam at the transmitter.

The first link in this chain is *Section VIII*, the Sync Limiter. In this section noise pulses which ride in with the composite signal and which might disrupt the sync action are compressed. The action of this stage is essentially that of a limiter. Left behind in this stage is the d-c component.

Section IX is the Sync Separator. In this stage the video signal along with the blanking signal is removed leaving only the sync pulses, both horizontal and vertical. Thus, only signal component 5 is seen leaving this stage.

Actually, signal component 5 contains two separate and distinct signals, the horizontal and vertical sync pulses. These pulses are separated from each other by *Section XI*, the Integrator, which extracts the vertical pulse, and *Section XII* the Differentiator, which does the same with the horizontal pulse. The Integrator is a network designed especially to pass the 60 cycle vertical pulses, and the Differentiator a network designed to pass the 15,750 cycle pulses.

The vertical pulse feeds into a Vertical Oscillator, *Section XIII*, and triggers it to the exact vertical frequency of the incoming signal. Similarly, the horizontal pulse from the Differentiator feeds into the Horizontal Oscillator, *Section XIV*, triggering it to the exact horizontal frequency of the signal. The output of the Vertical Oscillator no longer contains signal component 5 as a pulse. It is now a sawtooth sweep voltage. The same applies to the Horizontal Oscillator.

The vertical sweep voltage is fed into *Section XV*, the Vertical Output stage. The amplifier sweep voltage is then fed to the vertical sweep coil around the neck of the picture tube where it is effective in moving the electron beam within the tube up and down the face of the tube.

In an identical manner the horizontal sweep voltage is fed into *Section XVI*, the Horizontal Output or Amplifier stage. Its amplifier sweep voltage is fed to the horizontal coils around the neck of the picture tube, resulting in a motion of the electron beam across the face of the tube and back.

The high voltage required for the cathode ray tube anode is usually obtained by a special type of power supply which obtains its energy from the Horizontal Output stage. This supply, indicated in *Section XVII*, is often referred to as a "flyback" type. Notice that the its output is connected to the high voltage anode on the picture tube.

In this installment we have tried to give the reader a bird's eye view of the manner in which the TV signal components are distributed throughout the receiver. No attempt has been made to delve into the intricacies of the various sections. These will be dealt with in the pages that follow.

FIRST-AID TO CABINETS

by WILLIAM R. WELLMAN

PART 2

Almost every Service Dealer has attempted to perform cabinet repairs with varying degrees of success. In this article the author attempts to point out the correct steps to be taken in effecting cabinet repairs of various types.

Cracked, Broken or Loose Veneer

Careful observation will show the difference between cracks in the veneer and those tiny cracks in the finish which do not extend down to the wood. If the finish is cracked (or "checked" as it is sometimes called) the cause is usually wide temperature changes. If the extent of the damage is large or if it is very severe, the best remedy is to remove the old finish from the panel affected and refinish entirely, an operation which is beyond the scope of this article. But very often a mild case can be rectified or at least improved by rubbing with a paste rubbing compound. Such rubbing must be done judiciously, otherwise there is danger of going through the layers of finish. Frequent cleaning of the area and close inspection will prevent this.

Sometimes minor cracks in the veneer can be covered up by stick shellac patching, but all too often the veneer which has cracked has also come loose from the wood underneath. When a cabinet has been exposed to dampness, bulges often appear; these are caused by the veneer pulling away from the plywood core. Whether the defect is a bulge or a crack, the remedy is the same: glue must be forced under the loose veneer after which it is held in place by clamping pressure until the glue has set. A bulge or "blister" must first be slit open so that glue may be forced underneath.

Glues suitable for cabinet repair include casein and the various plastic adhesives such as Cascamite or Weldwood. While both types are excellent, it should be noted that in cases where speed is a consideration, the plastic types are to be preferred because casein requires about twenty minutes for preparation. All types mentioned may be bought in small packages, which is advantageous to the worker who performs only an occasional repair.

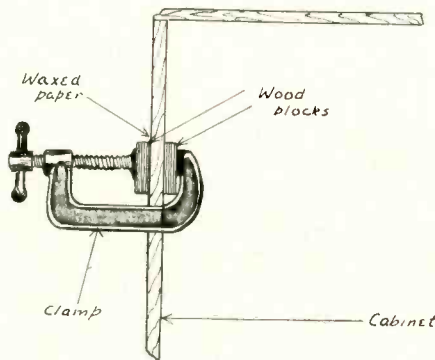


Fig. 5. Method of clamping, using wood blocks and clamp.

Clamping pressure must be applied following all applications of glue, and this may be applied in a variety of ways. On a horizontal surface such as a cabinet top, weights may be used. A lead or iron weight, a sandbag or even several bricks will do the job. Even though the surface is not normally horizontal, it will often be possible to turn the cabinet on its side or end. If weights cannot be used, some type of clamp must be brought into play. If the repair is near an open edge, an iron carriage clamp will serve; wooden hand screws must be used in places that cannot be reached by iron clamps.

Before starting you should have ready the weights or clamps to be used, some waxed paper, a newspaper, one or two wood blocks large enough to span the damaged area comfortably, the glue, one or two razor blades, a small pocket knife, a small brush for the glue and a few toothpicks. Mix the glue according to the directions appearing on the package. Select a wood block of the size needed; if the panel under repair is finished on both sides, a block will be needed for each side. If a clamp is to be used, adjust the opening so that it will accommodate

the panel and the block or blocks. If the defect is a blister which has not split open, slit it with a razor blade. The slit should be at about the center of the bulge, it should extend the entire length of the bulge and it should run in the direction of the grain. From this point on we shall no longer distinguish between a blister and a crack, for in either case you now have an area of loose veneer divided by a slit or crack.

Depending upon which appears to be most convenient, use either a razor blade or pocket knife to pry up one edge of the split veneer from the wood core; do this very gently to avoid breaking the piece away entirely. Hold the veneer in the raised position by means of two razor blades or toothpicks while you work glue under the under all parts of the loose area.

When you are sure that the glue has penetrated thoroughly, remove the razor blades or toothpicks and press the veneer into contact with the wood underneath. In all probability this will cause some glue to ooze out of the crevices; remove it by wiping with a damp cloth. Repeat the process on the other side of the slit or crack and you are now ready to apply pressure.

Place a piece of waxed paper in contact with the repair and follow with several layers of newspaper. Select a wood block larger than the repair and lay it on top of the newspaper; if the panel is finished on both sides use a corresponding block on the opposite side with newspaper under it. See Fig. 5. The purpose of the wood blocks is to distribute the pressure of the clamp and to prevent marring the cabinet finish. Align the clamp properly and tighten it. If you intend using lead or iron weights to provide pressure, it is

[Continued on page 35]

TV Sync-Sweep Tracing

WITH LIGHTNING SPEED

by **MARVIN KAPLAN**

Chief Engineer, Oak Ridge Products

ONE of the major problems in television servicing is the need for an efficient, fast, and inexpensive method of trouble-shooting sync, sweep and high-voltage circuits.

In order to service these sections of a television receiver, it is necessary to have the proper sync and sweep signals available in the test instrument. The Model 104 Syncro-Sweep* Generator described in this article was designed specifically for this purpose.

This test instrument consists of a master R.F. Oscillator transmitting on channels 2-5, modulated by either of four separate modulation frequencies. (Figs. 1 and 2).

In position A, a variable frequency horizontal synchronizing pulse is fed to the oscillator while a horizontal saw-tooth sweep signal is supplied to an output jack. In position B a variable frequency vertical synchronizing pulse is fed to the oscillator while a vertical saw-tooth sweep signal is supplied to an output jack. In position H LIN, a variable frequency is supplied to the oscillator to produce a series of vertical bars on the CRT screen of the receiver. In V LIN, a variable frequency is supplied to the Oscillator to produce a series of horizontal bars on the CRT screen. The oscillator can be tuned to any point between Channels 2-5 by means of a panel tuning knob. The modulation frequency is tuned by means of a panel tuning knob with a reference calibration. The four types of modulation are selected by a switch mounted on the panel. All output leads are

*TM REG. APP. FOR

A new type of instrument is described in this article. With this instrument the Radio Service Dealer may quickly check the operation of the horizontal and vertical sync and sweep circuits. This applies to linearity as well as functional operation. Methods of employing this instrument for the tests just mentioned are also described.

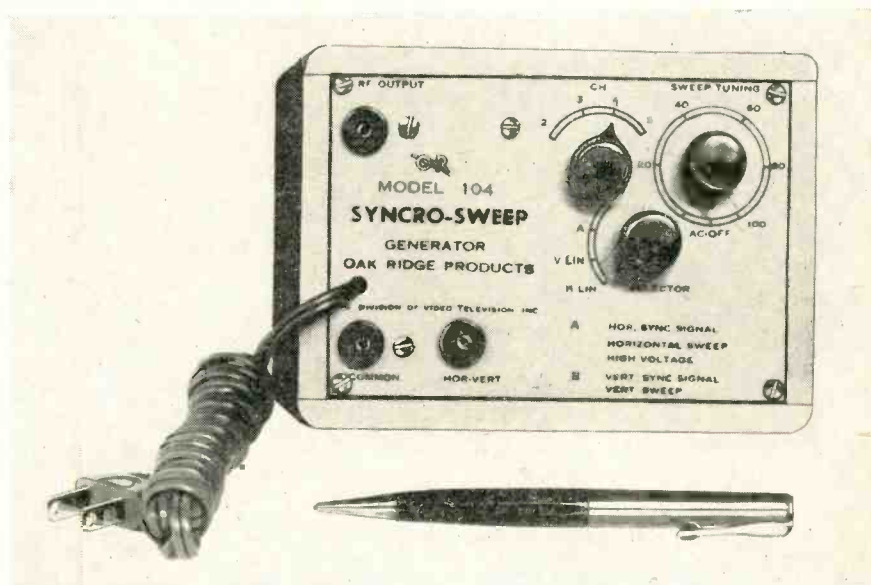


Fig. 1. The Model 104 Syncro-Sweep Generator.

insulated from the a-c line and from any chassis voltages.

By transmitting a horizontal or a vertical synchronizing pulse on a dead channel (2-5), it is possible to immediately determine in which section the sync signals fail to lock in the vertical and horizontal sweeps. If the vertical signal locks in the ver-

tical sweep of the receiver, then the trouble must be between the last sync amplifier stage and the horizontal saw tooth generator circuit. (Fig. 3). This is so because the sync amplifier stages are common to both vertical and horizontal, therefore if the vertical signal is amplified normally, the trouble must be beyond

these stages. There are relatively few parts in the isolated section and repairs should be made quickly.

Horizontal Sync Circuits

If the horizontal sync signal from the Synchro-Sweep locks in the horizontal sweep, the trouble, by process of elimination (Fig. 3) will probably be in the coupling network between the last sync amplifier tube and the vertical saw-tooth generator stage.

Sync Amplifiers

If either the vertical or horizontal sync signals, from the Synchro-Sweep, fail to lock in their respective sweeps then the fault can be isolated to a point between the antenna terminals and the last sync amplifier stage. If a good contrasting signal, although not locked in, appears on the CRT screen the antenna to CRT circuits can be eliminated as troublesome. The defective stage must be in the Sync amplifier circuit because (Fig. 3) they are the only remaining stages which could cause the above described symptom. The sync amplifier stages can be readily checked by using a vertical sync signal from the Synchro-Sweep and probing from point to point until the vertical sweep locks-in place with the probe signal.

Video Amplifiers

If a good contrasting signal does not appear on the CRT screen, then the trouble will have to be either in a stage between the R.F. and Video Det. or between the Video 2nd Detector and the CRT. By using the V LIN signal from the Synchro-Sweep it is possible to determine which of the two above mentioned sections is causing the trouble. By tuning the channel knob on the Synchro-Sweep, a test note should be heard in the receiver loudspeaker, if the R.F., Osc., Mixer, Audio I.F., and Audio Amp. circuits

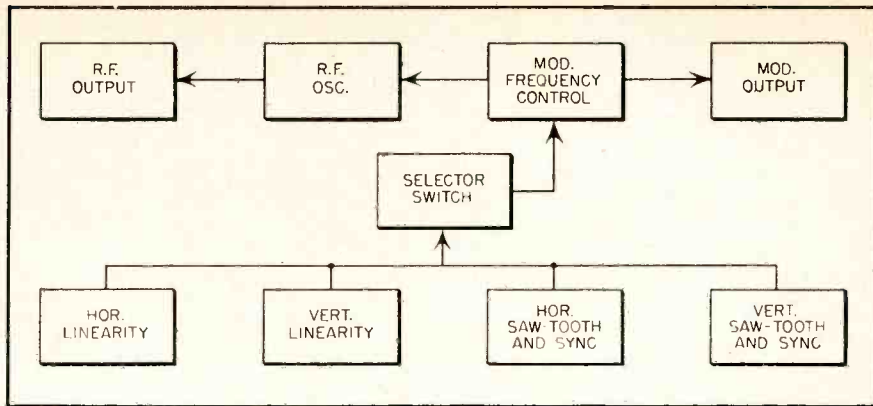


Fig. 2. Block diagram of generator.

are normal. The Video Amp. can be checked by using the V LIN signal from the Synchro-Sweep HOR-VERT jack. This signal can be probed between the Video Det. and the CRT until a strong series of bars appear on the screen. If neither of the two described signal tracings isolates the trouble, then the Video I.F. must be at fault, by process of elimination.

Vertical Sweep

If the receiver CRT screen shows no vertical sweep the trouble can be easily isolated by signal tracing through each stage of the vertical section with a vertical sweep signal. With an output meter across the vertical deflection coil and the Synchro-Sweep probe moved from the coil back through the transformer to the grid of the Vertical output tube, the signal failure will show up. The coil itself can be isolated by process of elimination.

Horizontal Sweep

Due to the fact that most modern receivers use a fly-back type power supply, generated from the horizontal sweep, in general when the CRT screen is dark the sweep may be at

fault. A high voltage meter will check if the trouble is a defective CRT or defective high voltage rectifier circuit. If there is no high voltage present at the rectifier circuit then the sweep transformer, output tube and saw-tooth generator must be checked with a horizontal sweep signal.

With an output meter across the horizontal deflection coil and the Synchro-Sweep probe moved from the coil back through the transformer to the plate and then the grid of the horizontal output tube, the sweep failure will show up. The coil itself, although not the cause of a high voltage failure, can be checked by process of elimination. If the signal on the grid of the horizontal output tube will create the sweep and high voltage in the set then the trouble would be the saw tooth generator stage.

Linearity Adjustments

The Synchro-Sweep can transmit a signal which will produce a series of horizontal or vertical bars on the receiver CRT screen. By adjusting the height and vertical linearity control or the width and horizontal linearity control until the bars are equally spaced, it is a simple matter to adjust the receiver for the proper linearity.

Electrostatic Type Receivers

In receivers using electrostatically deflected picture tubes the essentials, the trouble must be beyond of sweep tracing are the same as with magnetically deflected tubes. In the former type it is necessary to isolate any meter readings at the plates of the CRT with a high voltage condenser.

Although sync, sweep and high voltage failures account for the greatest number of service failures today, the task of properly isolating these troubles can be a simple one. A knowledge of the parts layout and receiver schematic, and the necessary portable miniature test equipment is all that is required to do a profitable quality repair in the consumer's home.

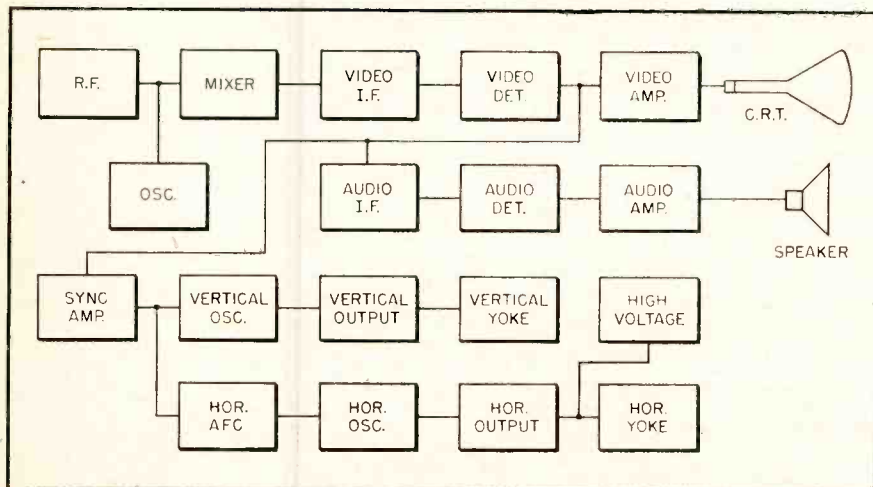


Fig. 3. Block diagram of typical TV receiver.

Landlords, Tenants, and TV ANTENNAS

by Gerard I. Nierenberg

(Attorney for Associated Radio-TV Servicemen of N. Y.)

A revealing article on the relationship, rights, privileges, and responsibilities existing between landlords and tenants, as affecting the installation of TV antennas on roofs.

THERE has been much confusion in the television field with reference to the rights of tenants as opposed to the rights of landlords for the installation of roof and window antennas. The problem has become so acute that certain service companies will quote prices for the installation with what is known as a "sneak" antenna. This antenna is one which cannot be readily observed by the landlord of the premise, it is completely hidden from view, or disguised in such a manner as to appear as a radio aerial.

This article is written in an effort to clarify and compile those legal decisions which have been handed down concerning such problems. So long as the scarcity of apartments exists there will be certain landlords, who will unjustly oppose any installation unless they gain a monetary benefit.

Rights of Landlords

An interpretation had been recently handed down from Washington, D. C. to the Area Rent Office of the Housing Expeditor, permitting landlords to petition such office for a rent increase where the landlord has consented to the installation of a television antenna. The increase allowed the landlords is \$1.00 per month. However, landlords cannot be forced to accept this increase where they refuse to consent to the installation of an antenna.

Needless to say, where the tenant obtains the written consent of the landlord for the installation of an antenna, there is no problem. However, where consent was obtained for the installation of one type of antenna, and thereafter, a new and different type of antenna was installed without the landlord's consent, a decision has been



held that the tenant cannot, during the pendency of a law suit, prevent the landlord from removing this second antenna by a temporary injunction. (*Katz v. Streg Inc.* 85 N.Y.S. 2d 702)

The landlord's oral permission allowing the tenant to install a television antenna, is merely a license and can be revoked at any time by the landlord. If there is continued maintenance and use of such antenna after the landlord demands its removal, such action constitutes a trespass and would be enjoined by the court. (*Barfur Realty Corp. v. Kaufman* 83 N.Y.S. 2d 847) (*Scroll Realty Corp. v. Mandell* 92 N.Y.S. 2d 813)

Of the many cases in which proceedings for eviction have been brought by reason of illegal installation and use of television antenna, I have not been able to find any wherein the landlord has been successful in evicting tenant. Furthermore, the cases show that unless the landlord, before institution of dispossess proceedings, secures a certificate authorizing the commencement of eviction proceedings, from the City Rent Com-

mission, such proceedings will be dismissed as invalid. (*Barfur Realty Corp. v. Kaufman* 83 N.Y.S. 2d 847)

Therefore, we can come to the conclusion that at most the best relief the landlord can obtain from the courts, is an order requiring the tenant to remove the television antenna.

Types of Tenancies

There are at present three different types of tenancies to which this problem resolves itself:

1. Where the tenant is in possession under an existing lease.
2. Where the tenant is in possession, but his lease has expired and he is now, either a statutory or a month to month tenant.
3. Where tenant entered into possession without a lease and does not have one to date.

Under the first category; the vast majority of leases contain restrictions against installation of radio aerials without first obtaining written consent of the landlord. There is no question, therefore, that before installation might be made of a roof antenna, written consent must be obtained. Many leases also contain a provision that the lessee shall not deface or drill into the building and shall not expose any projection in or out of the window or exterior of the building without written permission of the landlord. The courts have ruled that it is necessary to obtain such written consent before a window antenna can be installed. However, in a case of this nature, although the landlord can proceed in the courts to obtain relief, few will go to the expense. Without an order from the courts, it would be fool-

[Continued on page 32]

THESE LEADING SET MAKERS

Emerson Admiral BENDIX RADIO Westinghouse
 hallicrafters STROMBERG-CARLSON Majestic
 Motorola Spartan PHILCO SETCHELL-CARLSON, INC.
 airOking Sentinel TRAV-LER GAROD CROSLLEY

Seen these Hytron firsts in popular new TV sets? The prominent TV set makers shown are using them. And the list is growing.

Du Mont, for example, now uses the 1X2 and 6BQ6GT. You'll see many more of these famous tubes. And many more new Hytron types designed for low-cost TV for the mass market. When you buy these Hytron firsts, follow the leading set manufacturers. Buy the original. Buy Hytron!

choose one or more of
 THESE HYTRON TV FIRSTS

HYTRON TV FIRST

1X2 compact, high-voltage TV rectifier.



HYTRON TV FIRST

6U4GT high-perveance damping diode.



HYTRON TV FIRST

16RP4 original rectangular TV picture tube.

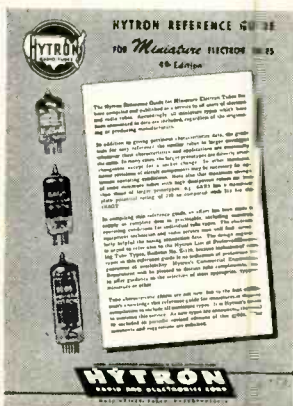
HYTRON TV FIRST

6BQ6GT, 25BQ6GT extra-performance deflection amplifiers.



HYTRON TV FIRST

12BH7 twin-triode sweep amplifier with superior efficiency.



NEW 4th EDITION Hytron Reference Guide for Miniature Electron Tubes

Miniature types are multiplying fast. You need this Hytron Reference Guide. Originated by Hytron, it is unique. Lists all miniatures to date, regardless of make. Six pages of pertinent data. 132 miniatures — 41 of them new. 70 basing diagrams. Lists similar larger prototypes. Free from your Hytron jobber. Get your copy of this old friend brought up to date — today.

OLDEST MANUFACTURER OF RECEIVING TUBES
HYTRON
 RADIO AND ELECTRONICS CORP.



MAIN OFFICE: SALEM, MASSACHUSETTS

Electronics, May, 1950
 Radio Service Dealer, May, 1950

Radio-Electronics, May, 1950
 Radio & TV News, May, 1950
 Radio & TV Retailing, April, 1950

Radio & TV Weekly, April 12, 1950
 Service, April, 1950

SHOP NOTES

Write up any "tricks-of-the-trade" in radio servicing that you have discovered. We pay from \$1 to \$5 for such previously unpublished "SHOP NOTES" found acceptable. Send your data to "Shop Notes Editor".

Electronic Growler

ONE of the first steps required in all systematic receiver or amplifier trouble shooting is to determine whether each of the r-f, i-f, detector, and audio stages is operating. Numerous quick checks have been devised. The simplest of these consists merely of touching tube grid terminals with the finger or with a screwdriver to couple-in stray hum pickup.

at a circuit point where d-c voltage is present. This is made possible by the isolating output capacitor which protects the growler and the circuit under test. The growler also has no moving parts, such as vibrators, buzzers, etc., to stick or become intermittent in action. Although the growler is an a-c/d-c device, shock hazard is not encountered when using it because only one output terminal (a standard test prod) ordinarily is re-

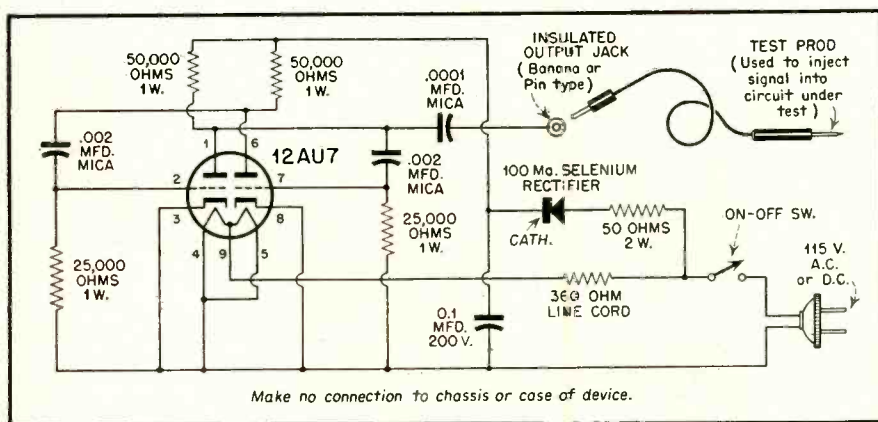


Fig. 1. Diagram of Electronic Growler

Unfortunately, the simplest of these quick checks do not always give a true picture. However, the quick check has a definite place in rapid trouble shooting. When an actual signal is injected into the circuit under test, the results usually are foolproof—either the stage is working and passes the test signal, or it is inoperative and no signal comes out. There is no confusing the test signal with any other type of excitation, because the former can be identified readily by its tone. A disadvantage of the signal system, however, is that separate r-f, i-f, and audio signals are required.

This disadvantage is removed by the simple "growler" circuit shown in Fig. 1. The growler supplies an unmistakable, broad strong buzzing signal which will ride readily through any receiver or amplifier stage that is in an operating condition, whether r-f, i-f, detector, or audio. No switching nor tuning is necessary as the signal probe is transferred from one grid or plate to another. A further advantage of the growler is that it permits the test signal to be introduced without trouble required to inject a serviceable signal

into the receiver or amplifier under test. No ground connection between the growler and receiver is necessary.

The growler is a 5000-cycle multivibrator built around a 12AU7 twin triode tube. The ragged output signal of the uncontrolled multivibrator is rich in harmonics which extend from the audio spectrum well up into the megacycles. The multivibrator plates are supplied by an unfiltered half-wave rectifier which, when the instrument is operated from an a-c power line, switches the multivibrator on and off during each line-voltage cycle. This rapid interruption results in an almost continuous broad signal throughout the audio spectrum and it increases and broadens the r-f and i-f harmonics. The net result is an almost blanketing test signal.

Using miniature components, the growler can be built into a small-sized metal, wooden, or plastic box. It is uncomplicated, inexpensive, and requires no adjustments of any kind.

Submitted by
Rufus P. Turner
Los Angeles, Calif.

Westinghouse—Ratio Detector

Alignment

Although the television chassis and all test equipment should, in general, be bonded to a common ground, it should be noted that difficulty will be experienced during the ratio detector zero adjustment if the common terminal of the VTVM is bonded (either directly or through the instrument case) to the television chassis. Both connection points for the VTVM during this adjustment are above ground in the television chassis, and both VTVM terminals must therefore be isolated from ground.

Westinghouse Elec. Corp.
Service Dept.

Philco Universal Pix Tube

Test Adapter

A test deflection yoke and a 10BP4 test picture tube may be used for checking both 1948 and 1949 10- and 12-inch models if a universal adaptor is used. 1948 models normally use an

	8-PRONG PLUG PIN NO.	11-PRONG SOCKET PIN NO.
Horizontal sweep	1	1
B+	3	8
Vertical sweep	4	9
Ground	5	3
Focus	6	5
B-	7	7

11-prong socket for the deflection cable, and 1949 models use an 8-prong socket. The adaptor consists of an 11-prong socket and an 8-prong plug connected together as above.

Philco Corp.
Service Dept.

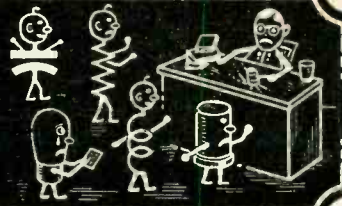
Admiral—Increasing Audio Output On "30 Series" TV Chassis

To increase the audio output on the "30A, B, C and D Series" TV chassis for fringe area operation, the following changes should be made:

1. Remove R620 (the 150,000 ohm Resistor) in the 4H1 tuner chassis.
2. Increase the values of R219 and R220 Ratio Detector 15,000 ohm load resistors to 27,000 ohms.
3. Remove the 6AG5 r-f Amplifier V101 grid return from the center arm of R306A contrast control and connect to junction of R305 and R307. This fixes the grid bias on the 6AG5 r-f Amplifier tube at about 1.25 volts, resulting in more RF gain. However, if the receiver is located in an area where strong

[Continued on page 33]

CIRCUIT COURT



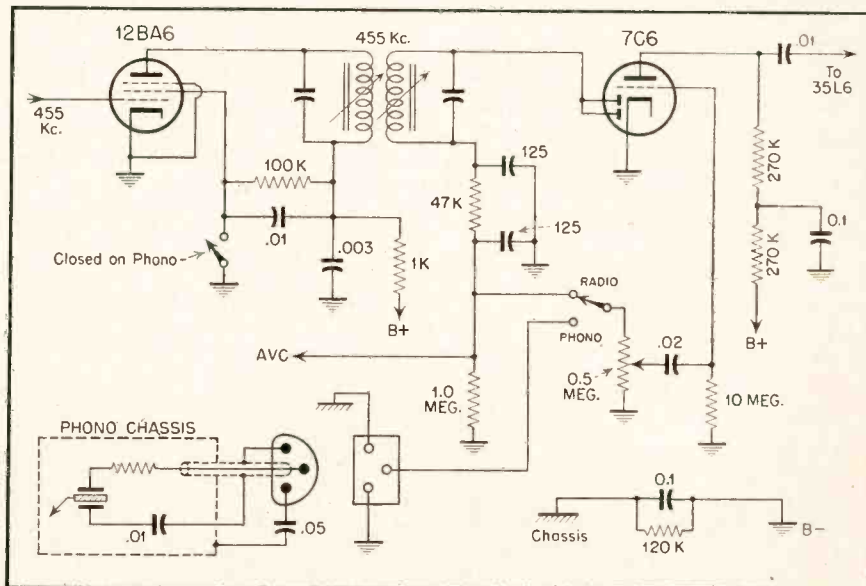
Philco Model 49-1600

Phono-radio operation is provided by this instrument. Five tubes including rectifier are employed. Only broadcast in the 550 to 1500 kc is received. The circuit is of the a-c/d-c type, but the phone motor limits use to a-c power sources. A portion of the schematic is shown, including i.f. detector and first audio circuits.

First item of note is the method of killing radio signals during phono operation. The screen of the 12BA6 i-f tube is fed from the same point as the plate of the tube, but via a 100K resistor. A section of the function switch shorts the screen to common negative during phone use. This removes screen voltage and drops the gain of the tube to substantially zero. Note that the screen is by-passed to the plate source rather than to ground.

Detection and audio amplification are conventional, but the use of a three terminal connector for the pick-up circuit makes it possible to have the chassis and phono components at ground potential, but isolated from the common negative circuits in the set. This provision is of advantage in eliminating hum and at the same time overcoming the possibility of shock when metal parts of the record player are touched.

The use of two 270K resistors in series in the plate circuit of the 7C6



Partial schematic of Philco Model 49-1600.

triode section, with a .1 μ f. capacitor between them to ground, insures generous filtering in this circuit, thus holding hum voltage at a low level on the grid of the 35L6 output tube.

General Electric Models 324 and 328

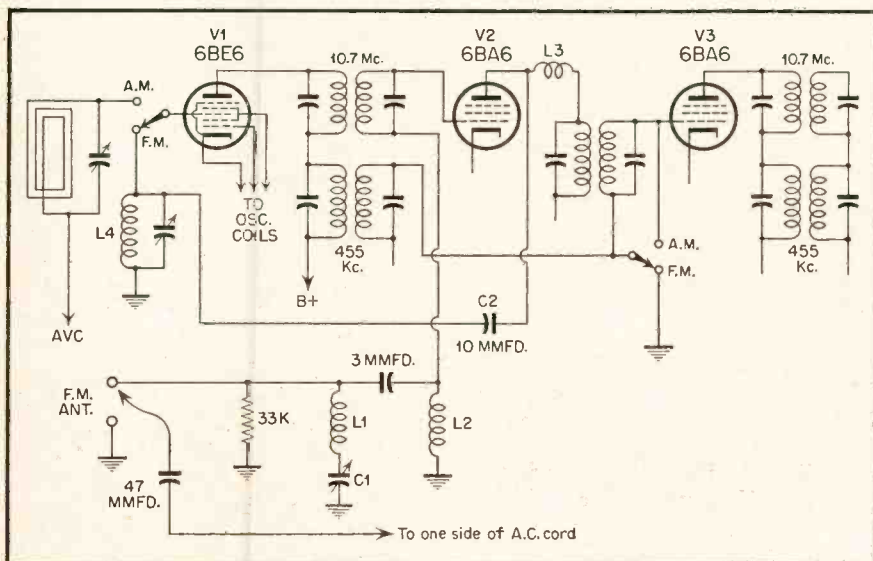
An interesting variation in AM/FM circuits appears in these sets. They are seven tube (plus rectifier) instruments covering the regular broadcast and high-frequency FM bands, and

operating on a-c power. A partial schematic, indicating details of the portions of the circuit under discussion, is shown. The oscillator circuits have been omitted for clarity.

FM signals, picked up on an external antenna or the built-in power line source, develop voltage across a broadly resonant circuit consisting of coil $L2$ and the associated circuit constants. While observing this portion of the circuit note the series-tuned $L1-C1$ combination, resonant at the FM i.f., 10.7 mc. This network serves to by-pass interference at or near the i.f.

The signal developed across $L2$ is applied to the control grid of $V2$, via the secondary of the first 10.7 mc. i.f. transformer. At the high signal frequency the shunt capacitor in the transformer appears as a virtual short circuit.

Amplification takes place at the signal frequency in $V2$, and the output, developed across the r-f choke $L3$, passes through $C2$ to the first variable tuned circuit consisting of $L4$ and one section of the tuning gang. Voltage developed there is connected to the grid of the 6BE6 converter via one section of the band-switch.



FM/AM details of G. E. Models 324 and 328.

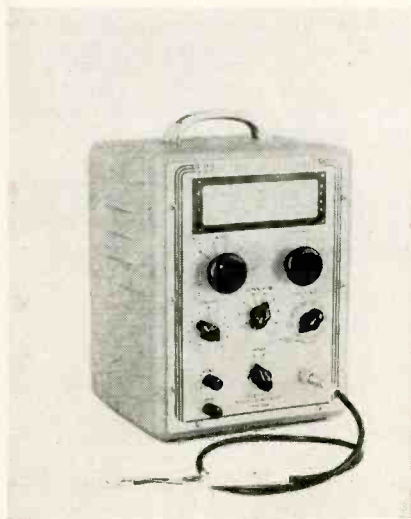
[Continued on page 38]

NEW PRODUCTS

TV SWEEP GENERATOR

A new sweep signal generator, specially designed for servicing FM and television receivers, has been announced by the Radio Tube Division, Sylvania Electric Products, Inc., 500 Fifth Avenue, New York 18, N. Y., according to C. W. Shaw, general sales manager.

FM sweep range is from 0 to 600 kc., television sweep 0 to 15 mc. Fundamental output



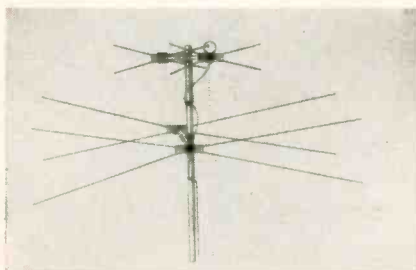
frequencies are provided that range from 2 to 230 megacycles, in four bands.

Output is at least 100 millivolts on all bands controlled by a smooth attenuator. Wide range phasing control permits adequate adjustment for single oscilloscope response curve. Voltage for driving or synchronizing horizontal oscilloscope deflection is provided.

NEW CONICAL-V-BEAM ANTENNA

Telrex, Inc., Asbury Park, N. J., announces the Telrex D-OX, a "Conical-V-Beam" duo-orienting, hi-gain, low-cost array. Perfect for the majority of installations needing a more-than-one-direction antenna.

Assuming the same station line up as above, the Telrex duo-orienting "Conical-V-Beam" al-



lows the bigger unit to be aimed in one direction to effectively cover the low and high band stations. The smaller unit "Conical-V-Beam" is oriented to the other direction and receives the other stations exceptionally well. Solid aluminum elements are used for durability. Comes complete with stainless steel phasing loop and coupling line.

NEW CAPACITORS

Mallory Plascap Capacitors—a line of plastic tubulars introduced by P. R. Mallory & Co., Inc., Indianapolis, provide triple-sealed mois-



ture-proofing, require no outside wax coating and prevent oil leakage. In addition, there is no problem of flattened or off-centered cartridges which sometimes result from the pressure or ordinary molding methods.

All the Mallory units are designed for satisfactory performance at 85°C, are light in weight, small in size, have great mechanical strength and conspicuous lead, part number and rating identification.

Complete details are now available from Mallory distributors and from the Mallory Wholesale Division, P. O. Box 1558, Indianapolis, Indiana.

14-IN. RECTANGULAR TUBE

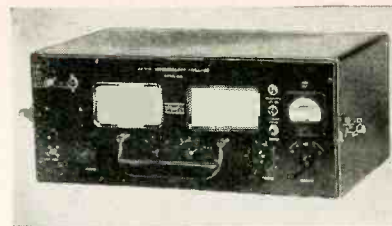
A 14-inch rectangular television picture tube has been added to General Electric's production lines at the company's Buffalo, N. Y., tube plant. The new tube (14CP4) has a useful picture area of 99 square inches and a neutral density faceplate for increased picture contrast and detail. The electron gun in the



tube is designed to be used with an external ion-trap magnet for prevention of ion-spot blemish. Maximum ratings of the 14CP4 are: anode voltage, 14,000 volts; grid No. 2, 410 volts; grid No. 1, 125 volts negative and 0 volts positive bias. Further information may be obtained from the Tube Divisions, General Electric Company, Schenectady, N. Y.

INTERFERENCE LOCATOR

A new radio interference locator for the 550 kc to 30 mc frequency range has just been made available by the Sprague Products Co.,



North Adams, Mass. Designed specifically for use by public utility trouble shooters and others interested in "man-made" radio noise location and reduction, and in power line preventive maintenance work, the Sprague Model 302 Locator is rugged and compact as well as easy to operate.

A complete description of the new instrument is given in Sprague Bulletin M-446, available upon letterhead request. Address inquiries to Sprague Products Co., 71 Marshall Street, North Adams, Mass.

NEW SPEAKER

Oxford Electric Corp., Chicago manufacturing firm, which has been producing speakers for over twenty-five years, announces their newest speaker development.

Displayed at the May Radio Parts Show for the first time by Oxford . . . the New Oxford Flame-Proof and Explosion-Proof Speakers.

This entirely new development is finding wide application in many industries. This type of speaker is adaptable for use in mine installations, gasoline cracking plants, gasoline



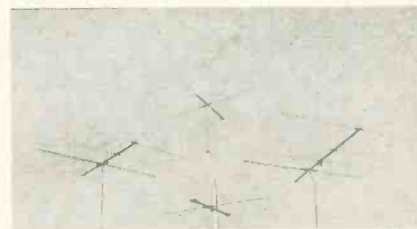
producing plants, any installations where volatile gases exist. The new speakers are being offered for use of the Armed Forces, Bureau of Mines and others working with gases, oils, combustion, etc.

Mr. John Proctor, Jr., general sales manager of Oxford Electric Corp., is shown holding a new flame-proof Oxford speaker.

For further information on this new speaker development or a copy of the new Oxford catalog, write Oxford Electric Corp., 3911 South Michigan Avenue, Chicago 5, Illinois.

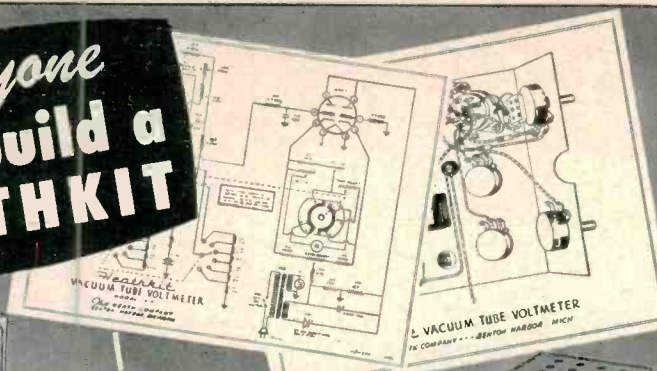
YAGI ANTENNAS

La Pointe-Plascomold Corp., of Unionville, Conn., announces a low price line of Yagi antennas. Known as the "J" Series, these new antennas feature high gain and pin-point



directivity necessary for fringe area reception. This venture into the low price field was made possible by the availability of a new material meeting the standards of the Vee-D-

**Anyone
Can build a
HEATHKIT**



**Heathkit
SIGNAL
TRACER KIT**
\$19.50



**Heathkit
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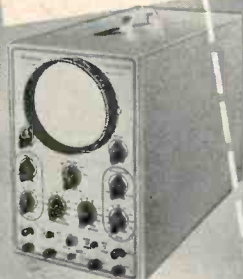


**Heathkit
R. F. SIGNAL
GEN. KIT . . .**
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**Heathkit
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Heathkits are beautiful factory engineered quality service instruments supplied unassembled. The builder not only saves the assembly labor cost but learns a great deal about the construction and features of the instrument. This knowledge aids materially in the use and maintenance of the equipment. Heathkits are ideal for and used by leading universities and schools throughout the United States. Each kit is complete with cabinet, 110V 60 cycle transformer (except Handitester), all tubes, coils assembled and calibrated, panel all ready printed, chassis all punched, formed and plated, every part supplied. Each kit is provided with detailed instruction manual for assembly and use. Heathkits provide the perfect solution to the problem of affording complete service equipment on a limited budget. The basic three instruments — an Oscilloscope, Vacuum Tube Voltmeter, and Signal Generator can be purchased in Heathkits for \$83.50, about the cost of a factory-built VTVM alone. Write for complete catalog.



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EXPORT DEPT., 13 E. 40th T., NEW YORK 16, N.Y. . . . CABLE ARLAB - N.Y.

X engineering laboratories for mechanical durability and electrical radiation properties.

This new Vee-D-X line is not designed to replace the famous heavy duty Vee-D-X RLY and EC Yagi series; but is manufactured to fill a demand of service men and viewers in fringe and near fringe areas for a high gain low priced antenna that will minimize noise pick-up and produce positive results even in poor locations.

VERSATILE TRAINING KIT

The Progressive Electronics Co. of 497 Union Ave., Brooklyn, New York announces the availability of their Progressive Edu-kit which the manufacturer claims practically constitutes a complete radio course.

The kit itself consists of necessary tubes, tube sockets, variable condensers, electrolytic condensers, mica condensers, paper condensers, resistors, tie strips, coils, tubing, hardware, etc. alignment tool, screwdriver, solder, hookup wire, television theory and trouble shooting book. The complete price is \$14.75.

**YOU TOO CAN BUILD
15 RADIOS**



These parts are individually packed and each part is easily identified.

Fifteen different sets and transmitters may be easily assembled from each kit. Accompanying each kit is the Progressive Radio Kit Instruction Book presenting thirty five pages of illustrated circuits. Progressive also furnishes free quizzes as well as a free electrical and radio tester.

NEW INSULATING TAPE

Bishop Mfg. Co., 420 E. 25th St., New York 10, N. Y. announces a new electrical insulating self-bonding tape which fuses to a solid mass after application. Excellent for TV applications, it may be used for antenna connections, coil repairs, taping high voltage leads or covering h-v joints where corona effects are present, etc. Provides a positive and permanent moisture seal.

DETENT SWITCH CONTROLS

JFD Manufacturing Co., Inc., of Brooklyn, New York, announces the manufacture of four Detent Switch Controls for use as replacements in RCA, Emerson, Admiral, Air King, Capehart, De Wald, Garod, Philmore, etc.

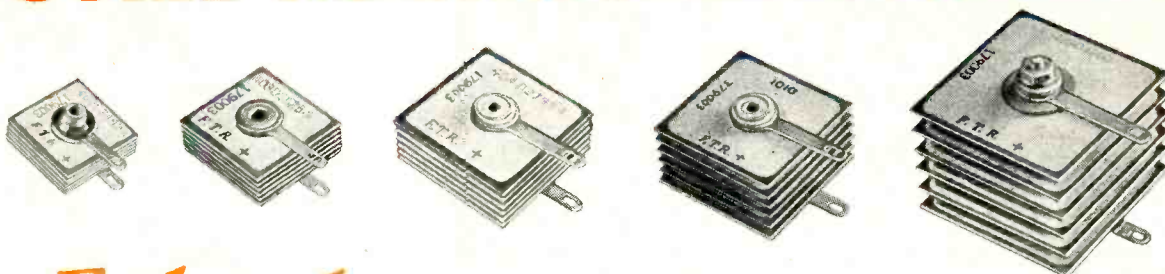


Detailed information and complete reference charts listing all television receiver makes according to the respective detent required is available from the manufacturer.

NEW 3-WAY PORTABLE

Here is the latest AC-DC Battery three-way portable manufactured by Jewel Radio Corpo-

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Now used in TV and Radio Receivers
...Millions more to be installed this
year and every year!

Get your share of this profitable, continuing replacement
market—with FEDERAL—The Original Miniature Selenium Rectifier

MANY of the nation's leading manufacturers have adopted the miniature selenium rectifier as a standard component. It has already been installed in over 10,000,000 AC-DC, portable, table and console radios and TV receivers . . . and its use is increasing by millions yearly!

For servicemen everywhere this means a new and important replacement market . . . a steadily growing source of extra income!

Be ready for this new profit opportunity by being ready to replace selenium rectifiers . . . with Federal . . . the original miniature selenium recti-

fier. Your customers are assured top performance . . . you are assured a good profit. Ask your distributor now about Federal . . . the industry's most complete line of miniature selenium rectifiers for TV and radio—plus many other special purposes.



Federal's Miniature Selenium Rectifier Handbook . . . 48 pages of valuable design and application data. Available from your distributor.

It pays to replace
with the **BEST**
... Insist on
Federal

America's Oldest and Largest Manufacturer of Selenium Rectifiers



Federal Telephone and Radio Corporation

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In Canada: Federal Electric Manufacturing Company, Ltd., Montreal, P. Q.
Export Distributors: International Standard Electric Corp., 67 Broad St., N. Y.

You're Right 3-Ways With BURGESS



1st The RIGHT Line!

BURGESS is America's Best-Known Line of radio batteries. America's best-sellers, too! Cash in with sales on the tradition of quality that has made Burgess Batteries famous throughout the world. And remember BURGESS is the complete dry battery line—the line that helps you sell all portable radio battery customers!

2nd The RIGHT Promotion

FREE SALES-BUILDING KIT—Includes a sturdy floor display merchandiser that puts your minimum stock battery assortment out front where they sell themselves; a big, bold 9"x22" window streamer; a lively new counter-window card; new enclosures; ready-to-run ad mats; dummy display cartons; and the big, new 1950 Burgess Replacement Guide that answers all your replacement questions.

3rd The RIGHT Advertising

BURGESS is advertised in leading national magazines with a heavy concentration of male readers—your best battery customers. Eye-catching, colorful advertising all during the portable radio season will pre-sell millions of portable radio battery users—will pre-sell your customers on Burgess quality and long life.

Get This Minimum
Stock Assortment
that Serves Over

63%

of All
Portable Radios

- 6 No. XX45 67½ v. "B"
- 6 No. M30 45 v. "B"
- 6 No. G3 4½ v. "A"
- 6 No. 4F 1½ v. "A"
- 48 No. 2R 1½ v. "A"
- 3 No. F6A60 7½,
9 and 90 v. "A&B"
- 3 No. T6Z60 7½,
9 and 90 v. "A&B"

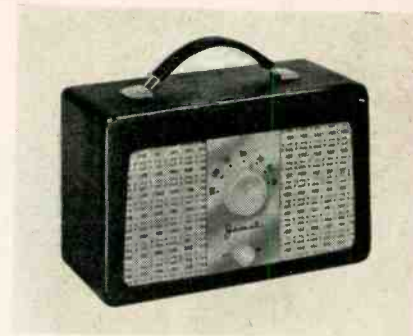
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Model 5010 has a superhet circuit, 4 tubes plus selenium rectifier, large Alnico V P.M. speaker, built-in Jewel Duraloop antenna, and



a large 90-volt "B" battery for increased efficiency.

Cabinet is 6¾" high, 10½" wide, 4¾" deep. Seasoned wood frame is covered with black simulated morocco. Grille cloth is weather-proof, washable, cane-colored basketweave Plexon. Dial is set on a Rich Low Brass plate. Retail Price is \$24.95, less batteries.

LANDLORDS

[from page 25]

hardly for a landlord to illegally enter a tenant's premises in order to remove a window antenna. A very special type of relief in this situation may be obtained by the landlord, but is rarely resorted to by reason of the fact that few people are familiar with this remedy. It is not permitted, under the ruling of the Department of Housing and Building of the City of New York, to have any projections from windows, which might fall. Therefore, through an application to the Department of Housing and Building, the landlord might have said department order the landlord and tenant to remove such violation. The department has taken action against tenants having television antennas extending outside of the window, but only in such cases where a specific complaint has been made. Their contention is that no matter how secure the antenna might be, there is a possibility of its falling, therefore, it must be removed. This only applies to apartment houses and not to two-family homes, for the department has no jurisdiction over such.

Dealing with the second category above referred to even though a tenant does not presently have a lease, if he did have such a lease when he entered into possession or had one at any time during his tenancy, all restrictions contained in this lease are binding upon him, with the exception of the provisions dealing with rent and duration of tenancy. Therefore, the rules applicable to the first cate-

gory are controlling in the second type of tenancy.

Concerning the third group; the law is most indefinite, there being very few cases on this subject, so that upon the erection and maintenance of a television antenna when said tenant immediately occupies the premise, it appears that this may be appurtenant to his tenancy and a part thereof, the same as use of the storage room, elevator and other services provided for by the landlord. This tenant might also install a window antenna so long as he does not damage the landlord's property or create a dangerous condition and does not violate the ruling of the Department of Housing and Building, above referred to.

Nothing in the cases prevents a tenant from using his porch or terrace for the erection of an antenna, so long as such porch or terrace is part of the premises leased.

There is at present a movement, in the New York State Legislature, to pass a bill forcing landlords to permit tenants to install roof antennas. Whatever impetus may be given this movement by the television servicemen is certainly the best solution to the problem, for as the law stands today, the landlord is, in most situations, still in the driver's seat.

SHOP NOTES

[from page 27]

signals are to be received as well as weak signals, this change may cause the contrast control to function improperly on strong signals. If this happens fix the bias at a higher negative voltage by reversing the grid return from the video i.f. and the 6AG5 RF Amplifier from the original wiring as shown in the schematic, by changing the i-f grid return from the junction of R304 and R305 to the movable arm of the contrast control. The r-f grid return of the 6AG5 r-f Amplifier should then be changed from the contrast control arm to the junction of R304 and R305.

4. Realign the ratio detector transformer.
5. Check the 6AU6's (V201 and V202) in the audio i-f. Be sure these are good tubes.
6. Change the 6KGT audio output tubes V512 and V513 to 6V6GT. No circuit change will be needed.

The above changes will improve audio sensitivity and output, but it

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is recommended on receivers where the complaint is low volume on TV in fringe area operation. It must be remembered that in some areas the TV transmitter is only deviating its audio transmission 7 to 10 kc instead of the allowable 25 kc, which will result in low audio volume at the receiver.

If the station is found to be the cause of low TV audio, these changes will improve output but may not produce more than room volume.

*Admiral Corporation
Service Department*

TRADE FLASHES

[from page 14]

promontory site will make possible the intensification of many development projects and investigations presently being carried forward by Telrex, Inc.

Alliance Tenna-Rotor Spring Campaign

John Benita, sales manager of the Alliance Manufacturing Company, has followed up a recent price reduction on Alliance Tenna-Rotors with the announcement that the Alliance Manufacturing Company will continue their extensive television campaign now running on 60 TV stations in and around 50 cities, and will add advertising in key newspapers to create even greater acceptance for Tenna-Rotor.

Trade advertising emphasizes the combination of national television advertising, Underwriters' Approval, a one year guarantee, plus the exclusive advantage of special Alliance 4-conductor cable which simplifies installations because they are faster.

Nief Joins Jewel

Paul W. Nief has been appointed sales manager of Jewel Radio Corporation, Long Island City, N. Y., it was announced today by Don J. Ferraro, president. Mr. Nief, who resides in White Plains, N. Y., was sales manager of McMurdo Silver Co., Hartford, Conn., before joining the Jewel Radio organization.

Chi SVC Mgrs. Approve Genescope

Four of Chicago's leading service managers for radio and television manufacturers met at a luncheon recently to unanimously approve the Simpson Genescope, Model 480, for their FM and TV servicing. They were, Max Schinke of Admiral, Frank Smolek of Zenith, Ed Croxen of Halli-

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News

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New York City Chapter of "The Representatives" hold annual banquet at New Yorker Hotel, April 27, 1950

crafters and Tim Alexander of Motorola.

The Simpson Gene-scope, with an actual weight of 45 pounds and a shipping weight of 54 pounds, is both a signal generator and an oscilloscope combined. The oscilloscope is complete for both alignment and separate general oscilloscope purposes.

Centralab Acquires New Plant

The fifth plant devoted exclusively to the manufacture of electronic component parts was acquired recently by the Centralab Division of Globe-Union Inc. in Milwaukee.

Centralab now has three plants in the Milwaukee area in which elec-

tronic component parts are manufactured. It also has additional plants in Denville, N. J., and Fort Dodge, Ia. The five plants have outstanding facilities for producing parts for radio receivers; television circuits and radio transmitting equipment.

Sylvania Announces 1-Year Pix Tube Guarantee

Effective March 20, all television picture tubes manufactured by Sylvania Electric Products Inc. will carry a one-year guarantee, it was announced here by C. W. Shaw, General Sales Manager of the Radio Tube Division.

According to Mr. Shaw, the new one-year guarantee will greatly simplify procedure and offers the public greater protection and service.

CABINET FIRST AID

[from page 22]

still a good idea to protect the finish with blocks, but if sandbags are used the blocks may be dispensed with. Incidentally, satisfactory sandbags may be made from cloth taken from an old shop apron, shop coat or overalls; the size will depend upon the particular job at hand. Fill about three-quarters full of fine sand. Regardless of the means used to exert pressure (whether weights, clamps or sandbags) the waxed paper and newspaper should always be used. The repair should stand at least six hours before pressure is released.

When clamping pressure is removed, the treatment of the surface will depend upon its condition. If you started with a bulge or blister and you were careful in slitting it open, a final light rubbing with 6/0 garnet and oil will complete the job. If the original defect appeared as a crack in the veneer, it may be necessary to fill with stick shellac before rubbing can be at-

IN THE SETS OF THE BEST MANUFACTURERS FOR YEARS...

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IMMEDIATE DELIVERY ON ALL TYPES!
PROVED SUPERIORITY!

For manufacturers, Tel-O-Tube has long meant higher picture tube quality at lower cost. The list of famous TV set makers who have specified Tel-O-Tubes for their production is a virtual who's who of the industry—Admiral, Ansley, Crosley, Emerson, Garod, Olympic, Starrett, Tele-King, Tele-Tone, Sightmaster, Video Corporation of America, etc. Again and again, Tel-O-Tubes meet the critical approval of these receiver manufacturers. Here is indisputable proof of Tel-O-Tube superiority!

Now Tel-O-Tube means more replacement sales at lower costs for more profits for you. We have stepped up our production to a new high of 1800 a day, and are pushing higher every week—to fill your replacement needs for the finest picture tubes of every type—with immediate delivery!

Tel-O-Tubes are made in our 3 new modern plants under the newest, most stringent quality controls and test tolerances, backed by the latest engineering "know-how." That's why you get more dependable performance and longer life—get more sales and more profits—with Tel-O-Tubes.



New Tel-O-Tube 16XP4 16" Rectangular

Take a tip from the quality-conscious receiver manufacturers—specify Tel-O-Tube. We have a "honey" of a sales story for every TV serviceman interested in profits in picture tubes. For full details, write NOW to Dept. D-1.

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TOP QUALITY CONSTRUCTION!
Elements made of high-strength, aircraft-type aluminum alloy for greater resistance against vibration and corrosion.

HEAVY DUTY ELEMENT BRACKETS!...
Made with extra-long gripping surface for secure anchoring of elements. No wonder that "Commandair" Conicals will stay put in the face of strong winds, under the strain of ice and snow.

UNIQUE BRACKET FLEXIBILITY!...
An important feature of these amazing Conicals is their unique flexibility, which permits easy conversion from a standard Conical to a 6-element front and 2-element reflector type.

ENGINEERED FOR MAXIMUM GAIN!...
Improved signal-to-noise ratio produces brighter pictures with minimized fading.

NOTE: The "Commandair" Conical is also offered in a separate, lower-priced "Economy" line... of partial steel construction... completely assembled... similar to its all-aluminum counterpart in design and performance.

JFD No. C660 — "Commandair" All-Aluminum All-Band Conical. List Price (less mast) \$9.85

JFD No. C661 — Same as No. C660 but 1/4 wavelength stacked for extra gain and directivity. List \$20.70

Write for FREE literature completely describing the JFD "Commandair" Line of All-Aluminum TV Conicals.

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tempted. The labor of rubbing will be reduced if you are careful to remove all excess glue before clamping the job.

Loose or Separated Joints

Troubles of this kind are the result of either dampness or rough handling and seem to be more common in small table cabinets than in floor models. The remedy is to separate the loose joint as much as possible without causing further damage, work glue into the opening and apply pressure above, but the problem of applying pressure is likely to be a bit more difficult; this is because loose joints are usually at the side or end of a cabinet and a considerable distance must be spanned by the clamping device. In some cases pressure cannot be applied by means of weights, and unless you have access to one or more cabinet maker's bar clamps you will have to improvise. One method of doing this is illustrated in Fig. 6. In this case a piece of rope or heavy cord is used; venetian blind

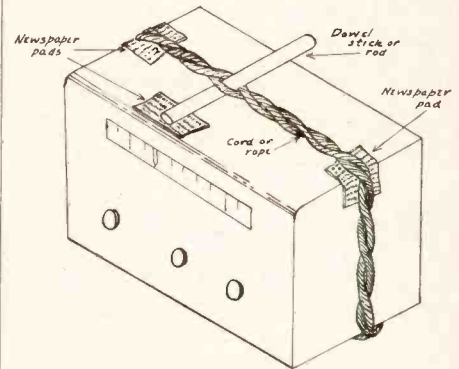


Fig. 6. Repairing Cabinet.

cord is excellent for the purpose. Pass the rope or cord twice around the cabinet as shown and tie the ends in a secure knot. Place pads of newspaper at all points where the cord comes into contact with a finished surface to eliminate possibility of abrasion. Now pass a stick between the two lengths of cord and twist as illustrated. Naturally, the cord will tend to untwist, causing the stick to bear against the cabinet surface; place a newspaper pad at this point to prevent damage. A variety of methods may have to be used to work glue into the open joint, depending upon conditions; a very small brush, a thin sliver of wood or a knife point generally will be effective. If the joint has come entirely apart, by all means scrape away the old glue before reassembling and applying new glue.

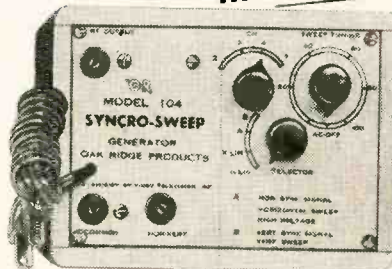
Broken Cabinet Parts

Damage of this kind is relatively rare unless the cabinet has been subjected to unusually rough treatment,

DON'T REMOVE THE TV SET! Now! SHOOT 90%* of TV TROUBLES on-the-Spot with 2 OAK RIDGE

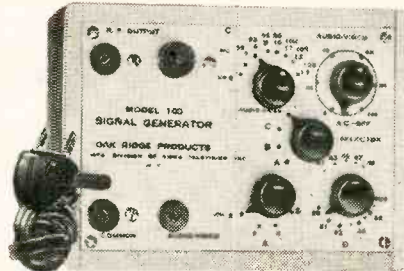
SYNCO-SWEEP GENERATOR (Model 104)

The only unit of its kind in the world! Completely trouble-shoots and tests Horizontal and Vertical Linearity, Sync, Sweep and High Voltage circuits of all TV sets—in less than 8 minutes! Generates Vertical and Horizontal Linearity Bars, and Vertical and Horizontal Sync and Saw-tooth signals! Shoots the trouble trigger-fast, "on-the-nose"—entirely independent of station operation! 5 3/4 x 4 x 2 1/4". Complete with leads, Dealer's Net \$39.95.



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"Lands" any signal failure from ANT to CRT or SPKR with bull's-eye precision in 2 minutes flat! Has 4 separate tuning bands & modulation output and attenuator. Complete tester for RF, Osc, Mixer; Video & Audio IF, 2nd Det and Amplifier; Sound & Adjacent Picture Trap; and ANT Orientation & Sensitivity. Also is complete Marker Generator. 5 3/4 x 4 x 2 1/4". Complete with leads, Dealer's Net \$29.95.



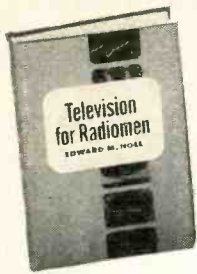
SUBSTITUTION TESTER (Model 101)—Substitutes for most-often-faulty components! Also acts as Audio Signal Tracer. Complete with leads, Dealer's Net \$16.25.
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*National surveys show 90% of all TV troubles occur in those circuits for which Models 104 and 103 are specifically designed.

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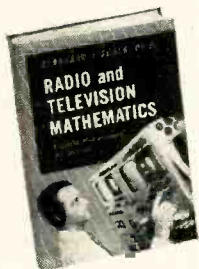
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● This book is not only a valuable handbook on television installation and servicing. It is also a **complete course in television fundamentals**. Written by a man widely known for his articles on television in the radio magazines, it explains in practical, easy-to-understand terms the construction and operating principles of every part of the television receiver and the essentials of television transmission.

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5

Address _____

and when it does occur the repair will generally be beyond the means of the average service shop. The reason for this statement is that in most cases some of the original wood will have been broken away, and even though this may amount to only a few small slivers, considerable shellac patching and color matching will be involved. Assuming, however, that the break has been clean and no splintering has taken place, you might wish to attempt repairs. In the example illustrated in Fig. 7 a top or side rail has been broken. If you have access to suitable bar clamps, this type of job is fairly simple. The problem would then be merely one of applying glue to the

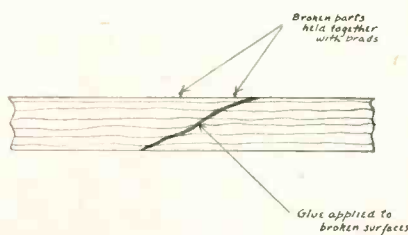


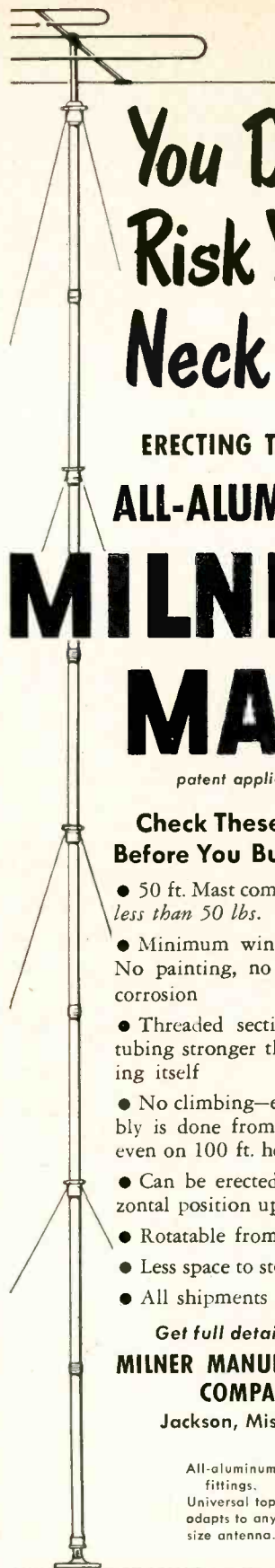
Fig. 7. Repairing broken parts.

broken surfaces and applying pressure, making sure, that the broken surfaces align properly. Without the necessary clamps, you might still attempt a repair if some care is used.

First of all, drill two small holes through one of the broken pieces. These holes are intended to accommodate brads or small finishing nails and should be slightly smaller than the diameter of the brads or nails to be used. Next, apply glue to both of the fractured surfaces. Temporary pressure may now be applied; the rope "tourniquet" described earlier will probably be satisfactory. Bring the broken ends into exact alignment and drive in the brads or nails, allowing the heads to project above the surface. You may release pressure if you wish, although no harm will be done by maintaining it.

When the glue has set, remove the brads with a claw hammer or a large pair of diagonals. Be sure to use a wood block under the hammer head or the cutter jaws to avoid damaging the finished surface. If you removed all excess glue before it dried, little further work will be needed. A light rubbing with garnet paper and oil or with steel wool will smooth the surface. If the joint is still visible, it may be touched up with stain of the proper shade or with colored shellac.

With the exercise of some judgment and surprisingly little practice you should be able to take care of a large percentage of cabinet repairs that come your way. It is obvious that you



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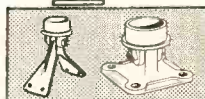
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are not going to attempt cabinet repairing unless you are interested in the subject or you are confronted with an emergency. In the first situation you will probably practice, as suggested, on a discarded piece of furniture or an old cabinet top or side. In

the second case you will very likely take the plunge and learn a great deal from it.

A final word concerning the material needed: many of them, such as stains, shellac, garnet paper, etc., are procurable from any well-stocked paint

store. Your local chain mail-order house will be able to supply others. Complete refinishing kits can be obtained from some radio jobbers, and certain firms which supply cellophane-packaged knobs, dial cables, etc., include a few cabinet repair items in their lines.

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CIRCUIT COURT

[from page 28]

Conversion to the i.f. takes place and amplification in cascade 6BA6 stages, ensues, as indicated in the circuit. The small values of inductance involved at L_2 and L_3 have but little effect at the relatively low i.f.

When the circuit is switched to AM operation, in addition to switching the loop into the grid of V_1 , the 6BE6 convertor, the secondary of the first 455 kc i.f. transformer is switched to the grid of V_3 , the second FM i.f. (but only AM i.f. tube).

The result is a semi-tuned r-f stage on FM reception without the addition of an extra tube to the lay-out.

AUTO-RADIO

[from page 18]

service work is very important as a time saver; a competent repairman can diagnose many installation troubles without removing the receiver from the automobile. Wherever possible, an estimate of the probable time and cost of the repair is an important factor in building up customer confidence. In this shop, a quick preliminary check is given of the receiver in the car if possible.

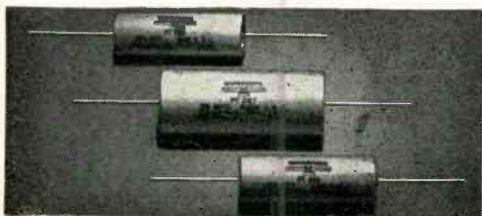
Figure 4 is an illustration of the automobile leaving the drive-in repair shop. Experience with specialized radio service stores such as this has shown that the greatest majority of automobile set owners desire the work to be done while they wait. The convenience of a drive-in and drive-out store adds immeasurably to the success of such a repair shop. The location of the store, of course, is vital since it depends upon heavy automobile traffic to bring in a large volume of business.

ONE-MAN TV

[from page 17]

na system which presents a d-c short from terminal to terminal is used, an additional step must be taken. This step involves connecting a 1000 $\mu\mu\text{f}$

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series blocking capacitor between one lead of the transmission line and one of the antenna terminal temporarily, to prevent the antenna from shorting the d-c meter.

Where folded dipoles are used on a tall mast it may be convenient to open the transmission line at the base of the mast to insert the 1000 μf capacitor. Polystyrene through-connectors, available at distributors, can be used for reconnecting ribbon type line. Coil dope and vinylite tape should be used to waterproof any outdoor joints.

Step-By-Step Procedure

(1) Study the receiver schematic and select one of the picture i-f tubes which receives the full a-g-c bias voltage on the grid. Points carrying B+ should not be used because of shock hazard and because they will have a very limited change in voltage with signal.

(2) Choose a point at a tube pin where a simple tube adapter, such as the RCA Testpoint adapter can be used. With this system no leads need to be opened beneath the chassis. On receivers having intermediate frequencies above 30 mc it is not advisable to connect to an i-f grid. In such cases, a-g-c can be obtained from the a-g-c rectifier or from the plate of the a-g-c amplifier.

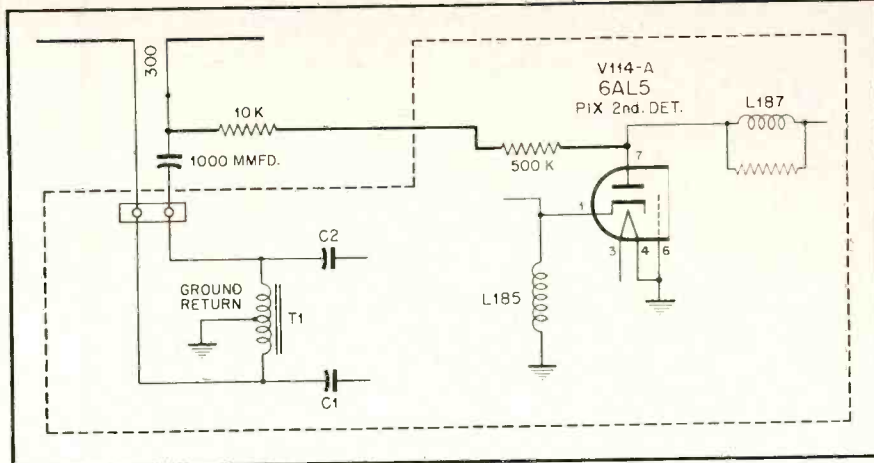


Fig. 3. Connections to RCA Model 630TS.

(3) Block or remove all d-c grounds on one side of transmission line which would shunt a-g-c to ground or put a shunt across the meter. If a folded dipole is used, block one side of the transmission line at the antenna. Connect the meter across the line below that point.

(4) Check the schematic to be sure that other side of transmission line has a d-c ground return either direct or through the antenna input transformer or matching coil.

(5) Set the TV receiver to the channel under test and after it has warmed up sufficiently, check the

transmission line at the receiver for the presence of a-g-c voltage.

(6) Measure the same a-g-c voltage across the transmission line at the antenna mast.

(7) Turn the mast to orient the antenna while observing the meter for maximum a-g-c voltage, and secure the mast where maximum meter deflection is attained.

(8) Switch the TV receiver to the next channel, if any, and repeat step 7. If only one antenna is used, select the maximum orientation response for the weaker signal. If more than one antenna is used, orient each inde-

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pendently and permanently clamp each to the mast at its respective best position for maximum response.

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Roof Probing

If a choice of mounting positions is available on the roof this system can be used to probe the roof to find the best mounting spot for the antenna. Because a definite space pattern exists for the various stations at the heights at which the usual TV antenna is mounted, it is helpful to move the antenna about the roof and watch the meter until a strong signal loop is found. Correct positioning is as important as correct orientation when trying to favor a very weak station.

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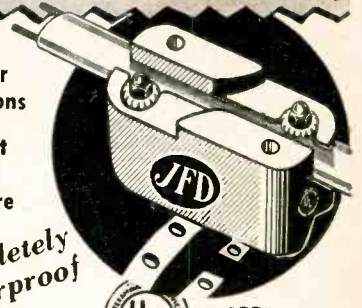
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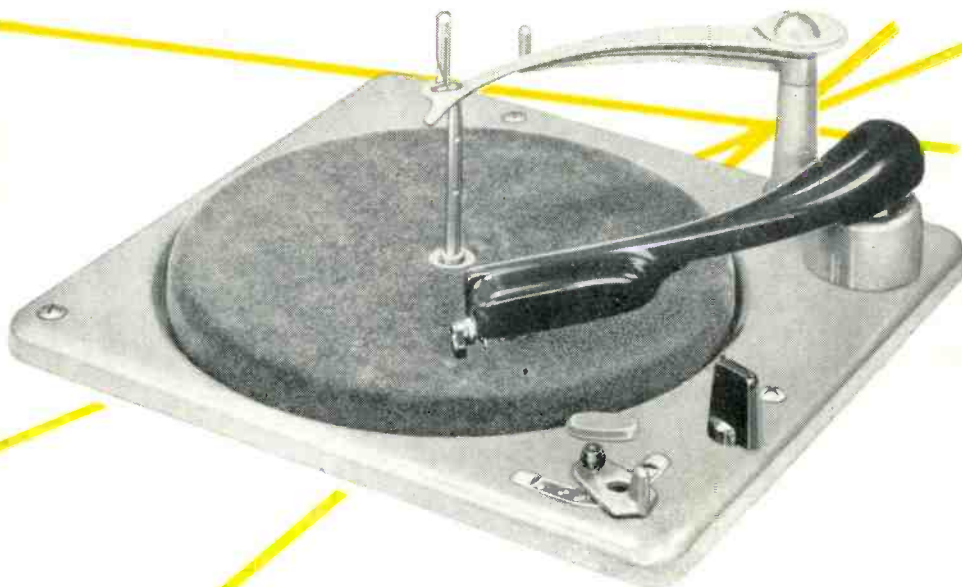
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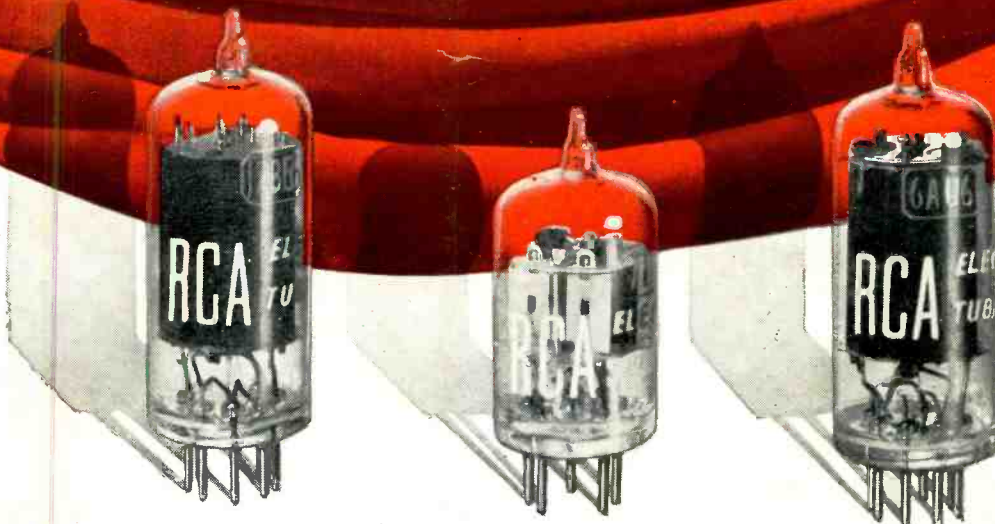


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