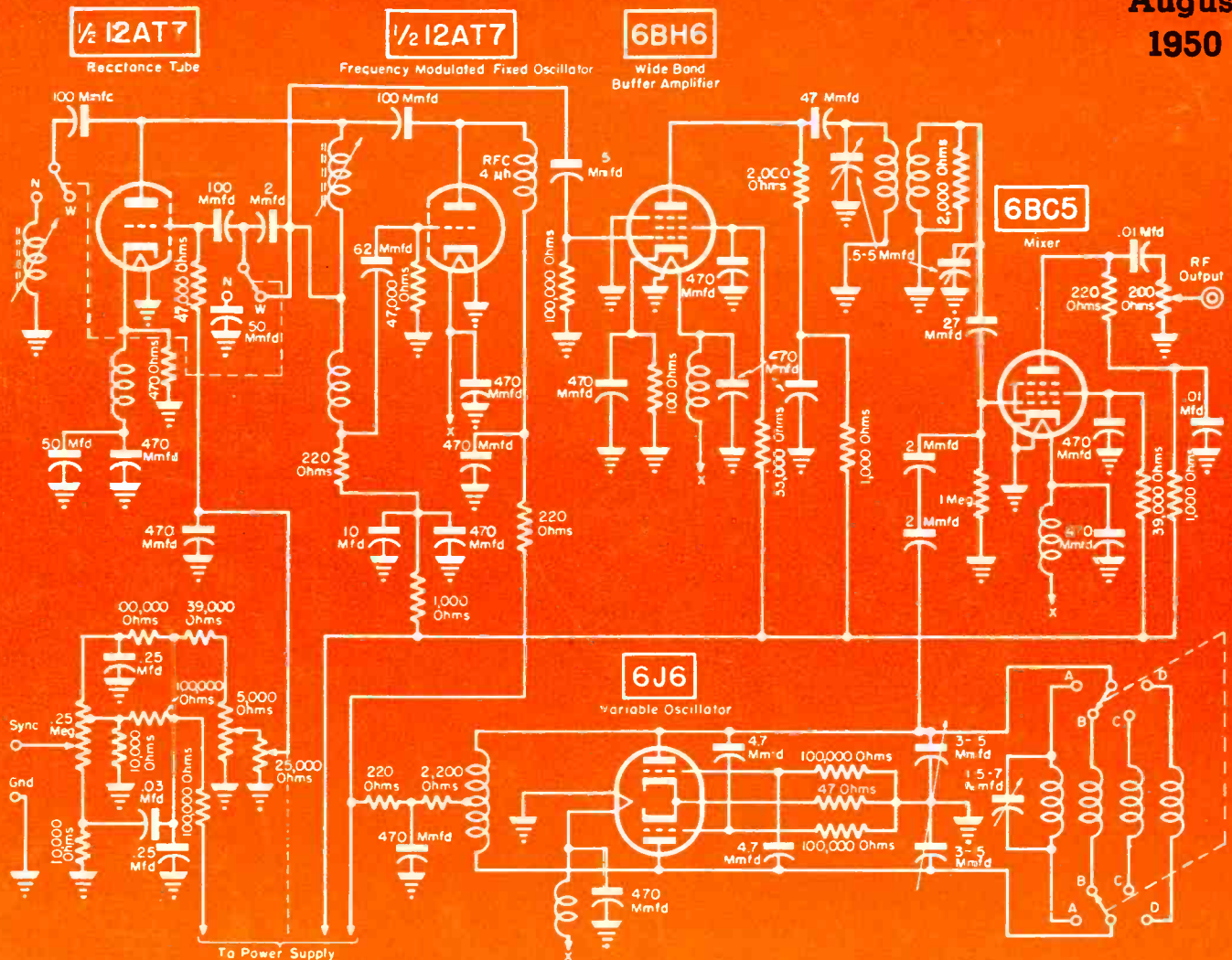


SERVICE

August
1950



Circuit of a TV-FM sweep signal generator, which features a beat-frequency oscillator, in which the fixed oscillator is frequency modulated at 60 cycles by the reactance-tube circuit.

[See page 2]

10 reasons why C-D type UP electrolytics are superior

For TV and auto radio
applications; and wherever extremes
of heat and cold are encountered

See your Classified Phone Book for nearest jobber.

Catalog No. 200B

on request.

CORNELL-DUBILIER
ELECTRIC CORPORATION,
Dept. 580 South
Plainfield, New Jersey.

Other plants in New
Bedford, Brookline
and Worcester, Mass.;
Providence, R. I.;
Indianapolis, Ind.,
and subsidiary,
The Radiart Corp.,
Cleveland, Ohio.



A special formation process which results in low leakage; permits operating temperatures as high as 85° C.



Special separator — exclusive with C-D electrolytics — prevents breakdowns under the worst field conditions.



Special construction results in lowest intercoupling between sections.



Special winding results in good RF impedance.



Etched cathode construction (Type UPE) where high ripple currents require it for permanence of capacity.



Rubber diaphragm type of construction results in a positively operated vent.



Spot welded anode risers to lugs.



Spot welded cathode tabs to mounting rings.



Saddle lug permitting easy wiring of the lugs.

For better servicing results insist on superior
C-D Electrolytics—Best by Field Test!



CONSISTENTLY DEPENDABLE

CORNELL-DUBILIER

CAPACITORS • VIBRATORS • ANTENNAS • CONVERTERS



**"MEET
MY
ACE
SALESMAN!"**



THE G-E monogram on the tubes I stock and install—that's Reason No. 1 why I'm doing more business than ever before!" Plenty of radio-TV servicemen are saying this. It pays to handle a winner; public preference for General Electric puts real money in servicemen's pockets, will profit *you* and accent your reputation for first-class repair-work and quality tubes and parts. . . . Reason No. 2 why you'll do more business, is General Electric tube promotion aids! Help to you from G-E headquarters never stops. Stunning new signs and displays; advertising items that crackle and spark; a host of useful serviceman's aids; a continuous flow of up-to-date TV repair tips in Techni-Talk Magazine—these become dollars-and-cents sales figures. Ask your distributor *today* for the full G-E-tube success story!
Electronics Dept., General Electric Company, Schenectady 5, N. Y.

**ONE SOURCE FOR ALL
YOUR TUBE REQUIREMENTS**

—metal and glass tubes; miniatures; TV picture tubes in a wide range of sizes and types; also germanium diodes and selenium rectifiers. General Electric's line is complete! G.E.'s list of types includes newest tube designs for new radio-TV receivers! . . . Stock G-E 100-per cent, to simplify ordering—benefit from unit deliveries—profit from General Electric tube quality and popularity!

You can put your confidence in—

GENERAL  ELECTRIC

181-JA6



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Including *Radio Merchandising and Television Merchandising.*
Registered U. S. Patent Office

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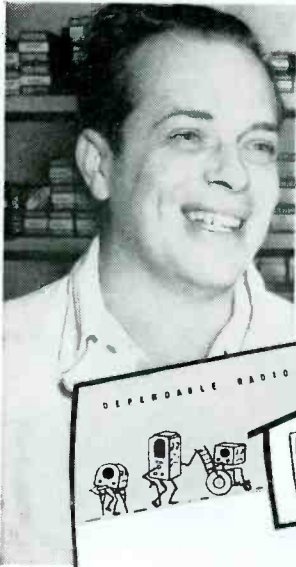
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**"We doubled our
store space...
increased our staff"**

DEPENDABLE RADIO SERVICE BY CAREFULLY TRAINED EXPERTS

BETTER RADIO INC.
136 W. Park Avenue
ELMHURST, ILLINOIS
Elmhurst 3228

April 28, 1950

Sylvania Electric Products Inc.
Advertising Department
Emporium, Pa.

Gentlemen:

During January, February and March, I sent 12,000 postal cards to each occupant of three suburban towns, Elmhurst, Villa Park, Lombard and countryside. I had a local letter service handle addressing and mailing at a cost of only 1/3¢ per card.

Business began to pour in soon after the first mailing. In January, it was up 33%, February 35% and March up 45% compared to service business in similar months in 1949. Yes, service business increased an average of 38% the first three months of this year, over last.

Due to the increased business we've had as a result of your campaign mailings, we have doubled our store space, increased our service staff from two to six bench positions, and added an outside staff for antenna installations.

Just thought you would like to know! Thanks for your help in the rapid growth of "Better Radio".

Cordially,
Howard J. Hitzeman
Howard J. Hitzeman
President
BETTER RADIO INC.

Read this remarkable record!

**Now let this SYLVANIA DEALER
CAMPAIGN boost your business!**

The above letter is actual proof of how Sylvania's Service Dealer Campaigns step up sales.

Now the new fall campaign is ready for you. It's tied in with the advertising your customers will be seeing in the Saturday Evening Post, Life, Look, Collier's and Radio and Television Best. It's sure-fire, powerful and complete . . . from colorful window and counter displays to bright, business-pulling postal cards . . . even radio spot announcements and ad mats.

All yours ALL FREE . . . you pay only the postage (1¢ for each card). So don't delay, mail the coupon TODAY!

"Ran out of..."
"I was watching an international beauty contest when suddenly..."

Call Us for expert radio and TV service at reasonable prices...

Let us repair your old radio...
Let us repair your old television...

We use and recommend SYLVANIA RADIO AND TELEVISION TUBES

DISPLAYS

"I was watching an international beauty contest when suddenly..."

You'll like our expert radio service and fair prices

WE USE AND RECOMMEND SYLVANIA RADIO AND TELEVISION TUBES

WINDOW STREAMERS

HOW DOES YOUR RADIO SOUND?

Can you get more action in your radio than you get today...
...with a Sylvania radio?

DEALER'S IMPRINT

POSTAL CARDS

Spot Radio Announcements

FOR SYLVANIA RADIO SERVICE DEALERS

RADIO SPOTS

Let Us get your radio or television set in top shape for Christmas

Put your radio or television set in top shape for Christmas

For the BEST in Radio and Television Service
Call us...
DEALER'S IMPRINT

AD MATS

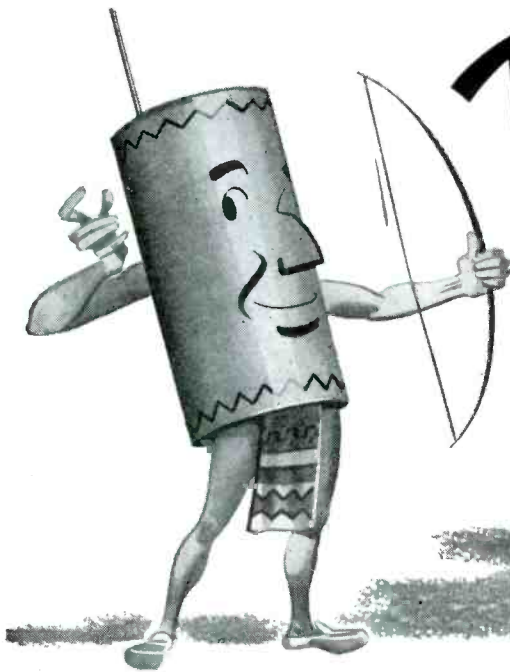
RADIO TUBES; TELEVISION PICTURE TUBES; ELECTRONIC PRODUCTS; ELECTRONIC TEST EQUIPMENT; FLUORESCENT LAMPS, FIXTURES, SIGN TUBING, WIRING DEVICES; LIGHT BULBS; PHOTOLAMPS; TELEVISION SETS

**SYLVANIA
ELECTRIC**

Sylvania Electric Products Inc.
Dept. R-1708A, Emporium, Pa.

Send full details about Sylvania's Fall Advertising Campaign for Radio-TV Service Dealers.

Name _____
Company _____
Street _____
City _____ Zone _____ State _____



BULLSEYE!

*the Sangamo Chieftain
scores with Repairmen
everywhere!*



Types MT, MTD and MTH electrolytic capacitors, the Sangamo Chieftains, are ideal replacement electrolytics. Tiny, but durable, they fit anywhere! Their small physical size makes them a "natural" for application in tight spots beneath a chassis, and the bare tinned-copper wire leads make them easy to mount.

Sangamo Chieftains are manufactured under carefully controlled conditions to protect against

source contamination and assure corrosion-free elements. Types MT, MTD and MTH have heavy insulating sleeves that are wax impregnated—not dipped. Polarity is clearly indicated. Positive electrodes are formed of rugged, etched foil aluminum plate to insure longer life, greater dependability, and better electrical characteristics. See your Jobber—if he can't supply you—write us direct.

BIG CHIEF SANGAMO SAYS:
LITTLE CHIEFTAINS YOUR GOOD FRIENDS!
MAKE REPAIR WORK EASY... FIT IN
TIGHT SPOTS... LAST LONG TIME.



Tomahawk



Warrior



Apache



Mohican

Your own trial-use will convince you that new standards of dependability and longevity have been built into Sangamo Electrolytics. Full information is given in Sangamo Capacitor Catalog No. 800, which is yours for the asking, and without obligation.

Micas, Papers, Electrolytics, Buttons, Molded Tubulars



Chieftain
Type MT
Dry Electrolytic

SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

In Canada: Sangamo Electric Company Limited, Leaside, Ont.



SC50-4

Announcing

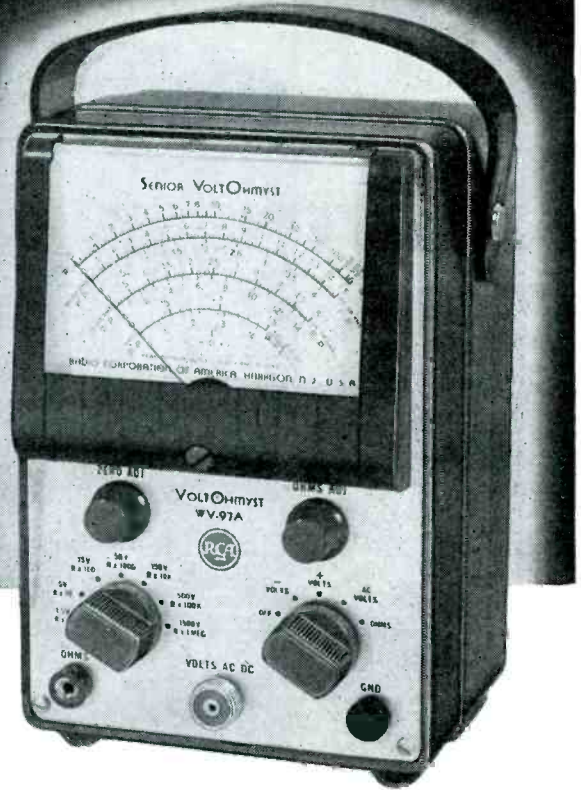
RCA WV-97A

Senior VoltOhmyst* reading peak-to-peak voltages

ONLY \$62⁵⁰

Suggested
User Price

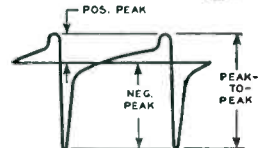
Includes direct probe and cable,
dc probe, ohms lead, and ground lead



TEN WAYS BETTER!

1. Directly measures complex waves from 0.2 volt to 1400 volts, peak-to-peak.
2. Has an over-all accuracy for dc measurements of $\pm 3\%$ of full scale.
3. Measures dc voltages from 0.02 volt to 1500 volts.
4. Measures rms values of sine-wave voltages from 0.1 volt to 1200 volts.
5. Has 7 non-skip ranges for both resistance and voltage.
6. All full-scale voltage points increase in a uniform "3-to-1" ratio.
7. Frequency response flat from 30 cps to approximately 3 Mc
8. Negative-feedback circuit provides better over-all stability.
9. Fully enclosed metal case shields sensitive electronic-bridge from rf fields.
10. More convenient to use because of smaller size and new slip-on probes.

The WV-97A measures peak-to-peak voltages directly. Hence, it quickly provides information essential for servicing TV receivers with their pulse-type waveforms.



The WV-97A has a range of usefulness extending beyond that of any other instrument in the field. Its quality, dependability, and accuracy make it a true laboratory instrument; it is exactly what is needed for television in the design laboratory, factory, and service shop.

The new Senior VoltOhmyst measures dc voltages in high-impedance circuits, even with ac present. It reads the rms values of sine waves and the peak-to-peak values of complex waves or recurrent pulses, even in the presence of dc. Its electronic ohmmeter has a range of ten billion to one.

Like all RCA VoltOhmysts, it features high input resistance, electronic protection from meter burn-out, zero-center scale for discriminator alignment, molded-plastic meter case, a 1-megohm isolating resistor in the dc probe, and sturdy metal case for good rf shielding.

An outstanding feature is its usefulness as a television signal tracer . . . made possible by its high input resistance, wide frequency range, and direct reading of peak-to-peak voltages.

For complete information on the new RCA WV-97A Senior VoltOhmyst, see your RCA Test Equipment Distributor, or write RCA, Commercial Engineering, Section H56X, Harrison, New Jersey.

*Reg. U. S. Pat. Off.

SPECIFICATIONS

DC Voltmeter:	
Seven continuous ranges	0 to 1.5, 5, 15, 50, 150, 500, 1500 volts
Input resistance (including 1 megohm in dc probe):	
All ranges	11 megohms
Sensitivity for the 1.5-volt range	7.3 megohms-per-volt
Over-all Accuracy	$\pm 3\%$ of full scale
AC Voltmeter—Fourteen continuous ranges:	
Peak-to-peak ranges	0 to 4, 14, 40, 140, 400, 1400, 4000 volts
Maximum peak-to-peak input voltage	1400, 4000 volts
RMS ranges (for sine waves)	0 to 1.5, 5, 15, 50, 150, 500, 1500 volts
Maximum rms input voltage	1200 volts
Input Resistance and Capacitance with WG-218 Direct Probe and Cable:	
1.5, 5, 15, 50, 150-volt ranges	0.83 megohm shunted by 85 μ A.F.
500-volt range	1.3 megohms shunted by 85 μ A.F.
1500-volt range	1.5 megohms shunted by 85 μ A.F.
Frequency Response with WG-218 Direct Probe and Cable:	
1.5, 5, 15, 50, 150, 500-volt ranges flat from 30 cps to 3 Mc for voltage source having 100-ohm impedance	
Overall Accuracy:	
1.5, 15, 50, 150, 500, 1500-volt ranges	$\pm 5\%$ of full scale
5-volt range	+0%-10% of full scale
Ohmmeter:	
Seven continuous ranges	0.2 ohm to 1000 megohms
Center scale values	10, 100, 1000, 10,000 ohms; 0.1, 1, 10 megohms
Dimensions: 7$\frac{3}{4}$" high; 5$\frac{1}{4}$" wide, 3$\frac{3}{4}$" deep	
Available Accessories:	
WG-264 Crystal Diode Probe. Extends range to 250 Mc (\$7.75 suggested user price)	
WG-289 High-Voltage Probe and WG-206 Resistor to extend range to 50,000 volts. (\$9.95 suggested user price)	

Available from your RCA Test Equipment Distributor



RADIO CORPORATION of AMERICA

TEST EQUIPMENT

HARRISON, N. J.



TV Sweep Generator with MIRROR-SCALE MARKER

MODEL 3434
for quick checks in all stages

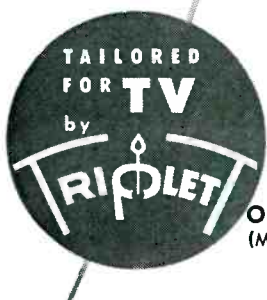
Large Marker dial has a mirror scale for easier reading and reset accuracy. Straight line frequency tuning condensers provide linear scale markings. No "SKIPS" in frequency—continuously variable Sweep width control. Triplet-engineered shielding—all critical circuits enclosed. Copper plated steel construction. All these features (see Tech. Data) combined with the two built-in markers for simultaneous use set Model 3434 apart as one of the fundamental contributions to the rapid, accurate and profitable Servicing of Television.

TECH DATA

Frequency Coverage:

- SWEEP CENTER FREQUENCY
 - Range 1— 0-60 MC
 - Range 2— 60-120 MC
 - Range 3—120-240 MC
- SWEEP WIDTH:
 - 0-12 MC (Continuously Variable)
- MARKER FREQUENCY
 - 19.5 to 40 MC (fundamental), 39 MC to 240 MC (harmonic)
- CRYSTAL FREQUENCIES
 - To 20 MC on Fundamentals. Harmonics up to 216 MC. (Crystals Not Furnished)
- MODULATION
 - 400 Cycle on both Crystal and Marker Frequencies
- AUDIO:
 - 400 cycles

The steel case is finished in black suede baked enamel, size 15 11/32" x 11 1/32" x 8 1/4". Leather handle. Panel is black, white and red etched on aluminum. Copper plated feet for grounding.



ONLY \$149.50 AT YOUR DISTRIBUTOR
(MODEL 3435 WITHOUT BUILT-IN MARKER, \$99.50 NET)

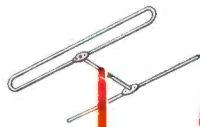
FOR THE MAN WHO TAKES PRIDE IN HIS WORK

Triplet

TRIPLET ELECTRICAL INSTRUMENT COMPANY • BLUFFTON, OHIO, U.S.A.

TV-RADIO SERVICEMEN

**Here are 2 Big Ways Federal Helps
You Make More Profits . . . and Keep Them!**

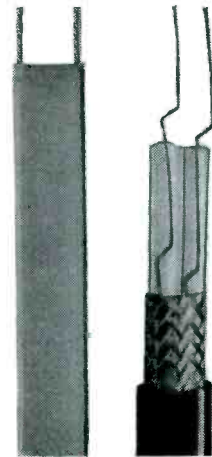


1 Lead-in installations and replacements that save "FREE" Service Calls

—IN HIGH AND LOW NOISE LEVEL AREAS

Federal is America's leading manufacturer of solid dielectric coaxial cables!

Federal's K-1046 and K-111—300-ohm lead-in cables—are your answers to the problem of keeping service calls down and TV installation profits UP. K-1046, for low noise level conditions, is insulated with amazingly durable "silver" polyethylene . . . providing 30% more service life . . . plus numerous inherent features. K-111 is tops in noisy areas . . . minimizing noise, snow and ghosts due to transmission line pick-up. Pictures are clearer, brighter, steadier . . . *all the time!*

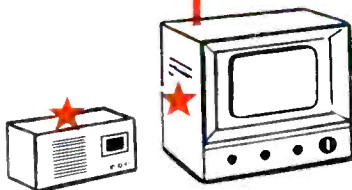


K-1046

K-111

2 FEDERAL SELENIUM RECTIFIERS★ for Replacement in TV and Radio sets

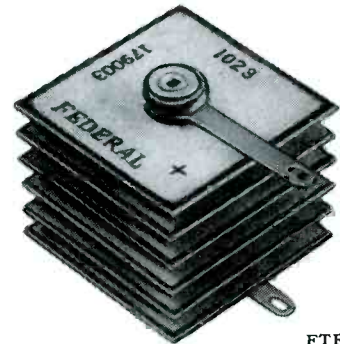
OVER 10,000,000 FEDERAL SELENIUM RECTIFIERS NOW IN SETS OF LEADING MAKERS



Every year, more and more millions of Federal selenium rectifiers are being installed in AC-DC, portable, table and console radios and TV receivers!

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 rectifier. Federal has the industry's *most complete line!*



FTR-1023

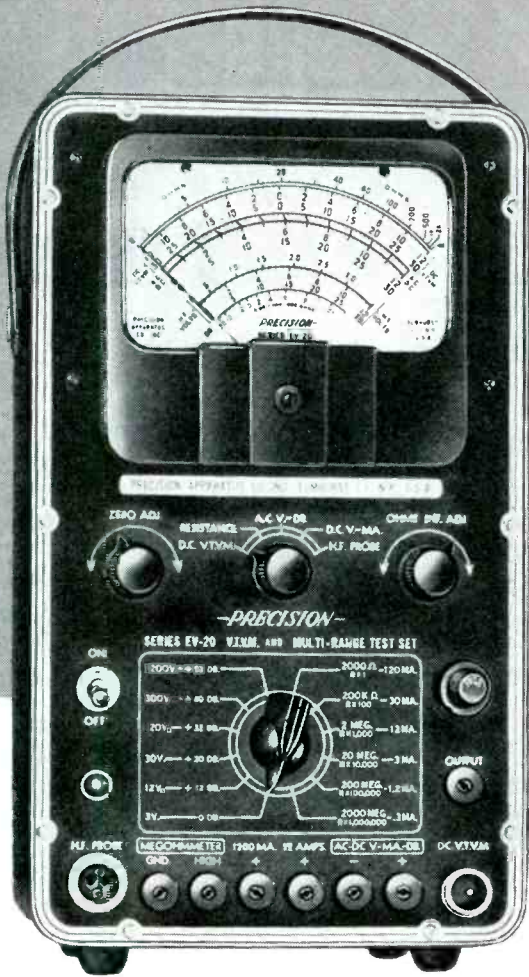
Check your stock now—and call your distributor for Federal TV lead-in cables and Federal miniature selenium rectifiers. *It pays to install the best!*



Federal Telephone and Radio Corporation



SELENIUM and INTELIN DIVISION, 100 Kingsland Road, Clifton, New Jersey
In Canada: Federal Electric Manufacturing Company, Ltd., Montreal, P. Q.
Export Distributors: International Standard Electric Corp., 67 Broad St., N.Y.



A Compact, Versatile, Portable
Circuit-Testing Laboratory for
TV — FM — AM
The New
PRECISION
SERIES EV-20
VTVM and Multi-Range Test Set

Net Selling Price... **\$64⁷⁵**

A Modern, Portable VTVM—Megohmmeter.
TRUE ZERO-CENTER on ALL VTVM ranges
PLUS Direct Reading High Frequency Scales
ALSO, complete, standard 1000 ohms per volt functions
48 RANGES TO
1200 Volts*, 2000 Megohms, 12 Amperes, +63DB

* D.C.—VTVM ranges to 12,000 and 30,000 Volts when
used with Series TV Super-High Voltage Test Probe.

Range Specifications

- ★ SIX ALL-ZERO CENTER VTVM RANGES: —13½ Megs. Constant Input Resistance. ±3, ±12, ±30, ±120, ±300, ±1200 volts. Direct Reading to ±12 KV and ±30 KV with Series TV Super-High Voltage Test Probe
- ★ SIX SELF-CONTAINED OHMMETER-MEGOHM-METER RANGES: 0-2000 - 200,000 ohms.
0-2-20-200-2000 Megohms.
- ★ FOUR DIRECT READING HIGH FREQUENCY VTVM RANGES: 0-3-12-30-120 volts. (When used with RF-10A High Frequency Vacuum Tube Probe, Net Price \$14.40. No crystal rectifiers employed.)
- ★ SIX AC-DC AND OUTPUT VOLTAGE RANGES at 1000 ohms/volt. 0-3-12-30-120-300-1200 volts.
- ★ EIGHT D.C. CURRENT RANGES: 0-300 microamps. 0-1.2-3-12-30-120-1200 milliamps. 0-12 Amperes.
- ★ SIX DECIBEL RANGES from —20 to +63DB. Calibrated for 600 ohm, 1 mw., zero DB reference level.

IMPORTANT FEATURES

- ★ VOLTAGE REGULATED—BRIDGE CIRCUIT.
- ★ DIRECT READING, ALL ZERO-CENTER VTVM —indicates BOTH Polarity and Magnitude without switching or test lead reversal.
- ★ MASTER RANGE AND FUNCTION SELECTORS eliminate frequent and inefficient shifting of test leads.
- ★ SHIELDED CONNECTORS for both D.C.—VTVM and RF—VTVM. Permits simultaneous and non-interfering connection of both Circuit Isolating Test Probe and optional H.F. Vacuum Tube Probe Series RF—10A.
- ★ HIGH FREQ. VOLTAGE SCALES—Direct Reading.
- ★ DUAL-BALANCED ELECTRONIC BRIDGE OHMMETER—MEG OHM METER uses two 1.5 volt flashlight cells easily replaced at rear of cabinet.
- ★ 1000 OHMS/VOLT MULTI-RANGE FUNCTIONS permit simple AC-DC voltage, DB and current measurements free of power line requirement.
- ★ 4½" RECTANGULAR METER—200 microamperes, ±2%. Double-Sapphired, D'Arsonval construction.
- ★ 1% Film type, Metallized and Wire-Wound resistors for all shunts and multipliers.
- ★ Heavy gauge, round-cornered, louvred steel case with plastic handle. Etched, anodized, aluminum panel.

NET SELLING PRICE \$64⁷⁵

Complete with coaxial Circuit Isolating Test Probe, Shielded Ohmmeter Test Cable, Standard #227 Super-Flex Test Leads, Ohmmeter battery and full operating instructions.

Case dimensions—10½" x 6¼" x 5"
Shipping Weight: 11 pounds. CODE:—Party



Also ask to see the "Precision" Series EV-10, DeLuxe VTVM—Megohmmeter with extra-large 7" meter. 59 self-contained ranges to 6000 volts and 70 DB.

Series EV-10, affords to the discriminating instrument purchaser, and equipment-conscious service-laboratory, the ultimate in visibility and performance.

EV-10-P
(Closed portable)—\$92.70
EV-10-MCP (Illustrated)
(Open Lab. Type)—\$89.95.

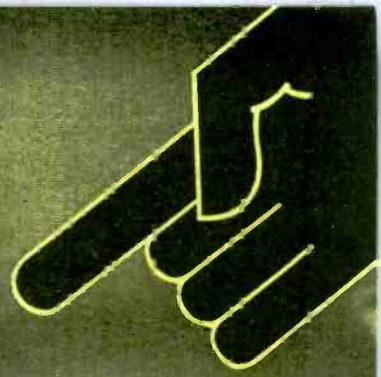
See complete EV-10 specifications on page 4 of latest Precision catalog, available at leading radio equipment distributors or write directly to factory for full details.

PRECISION APPARATUS CO., INC.

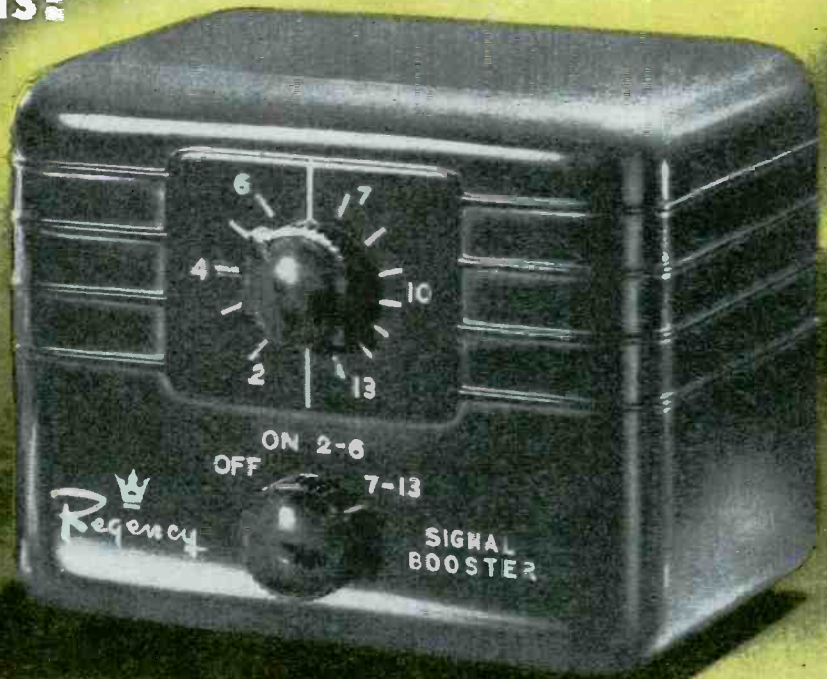
92-27 Horace Harding Boulevard, Elmhurst 14, New York
Export Division: 458 Broadway, New York, U. S. A. • Cables — Morehane
In Canada: Atlas Radio Corp. Ltd., Ontario, Toronto, Canada

NO WONDER *Regency*

**TV IS THE LARGEST SELLING
SIGNAL BOOSTER!**



... it wins all
performance tests!
... is also
lowest priced!




THE DB 400
\$29.95
LIST

REGENCY FEATURES:

- Single-knob tuning control.
- Off-on switch controls the TV set.
- Easy installation. TV set plugs into the booster—booster plugs into wall outlet!
- The use of Contra-Wound Bifilar Coils with push-pull triode design gives a balanced circuit.
- Electrical symmetry makes possible balanced-bridge neutralization which insures stability and eliminates self-oscillations.
- No external impedance matching devices required.



REGENCY FEATURES:

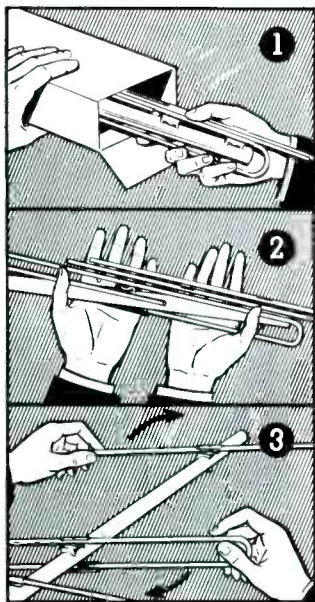
- A handsome plastic cabinet design in mahogany or blonde; created to please the most discriminating interior decorator.
- Wide bandwidth assures equal enjoyment of both video and audio on all 12 channels.
- Underwriters'  Approved.


Regency
Division, I.D.E.A., INC.

55 N. New Jersey St., Indianapolis 4, Indiana

SIMPLE!!!

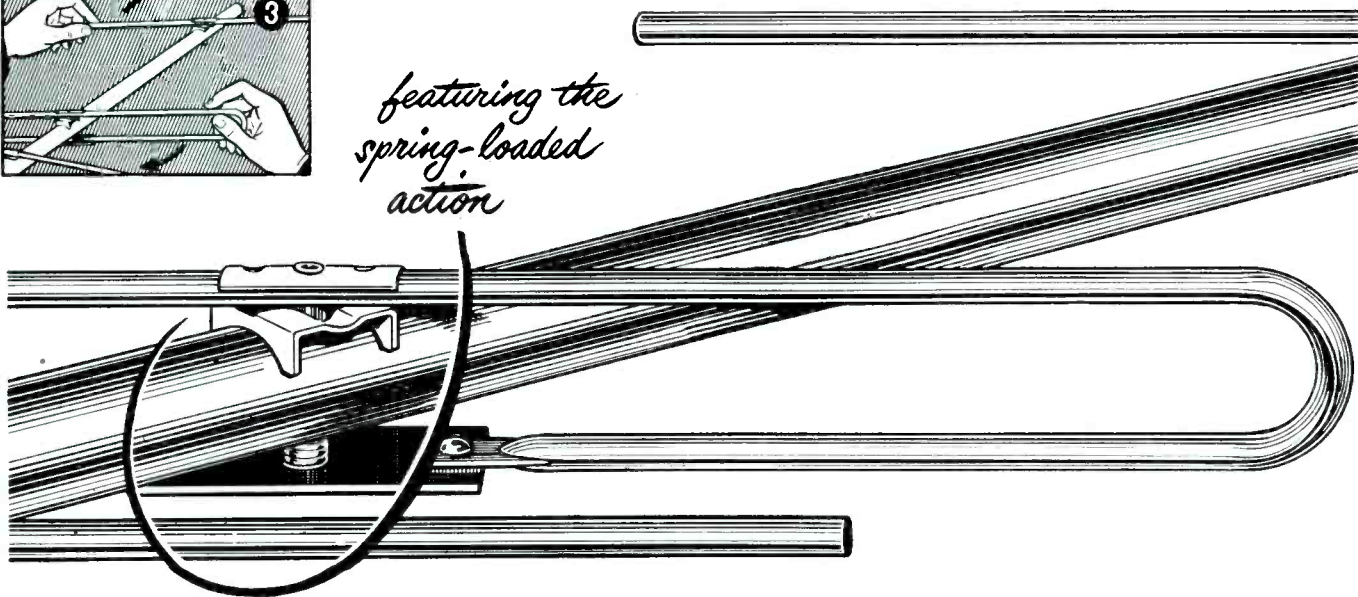
takes 1 second
to set up!



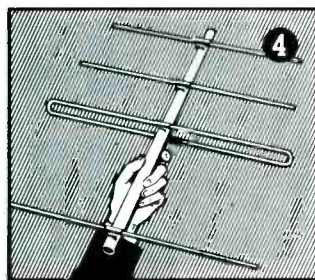
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**NOTHING TO TIGHTEN...
NOTHING TO LOOSEN!**

*featuring the
spring-loaded
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ANTENNA ASSEMBLES IN 1 SECOND!



- Costs dollars less than any other antenna to install.
- Can be carried to mast in folded-up condition and opened with one hand in 1 second.
- Guaranteed permanence when installed – no screws or nuts to lose or loosen.
- The combination of Click-Rig construction and the TACO name means electrical and mechanical perfection as it has for the past 17 years.
- **ASK YOUR JOBBER FOR THE BRAND-NEW 1950 TACO CATALOGS**

TV-FM-AM
ANTENNA SYSTEMS
TECHNICAL APPLIANCE CORPORATION,
SHERBURNE, N. Y.

TACO

IN CANADA:
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Your Pass to TELEVISION AND RADIO SERVICE Prosperity

Identification as a RAYTHEON *Bonded* ELECTRONIC TECHNICIAN means money in the bank for you! It means better business and more of it for you because set owners know they can trust Service Dealers displaying the Raytheon Bonded Certificate, backed by a guarantee bond of the hundred million dollar American Mutual Liability Insurance Co.

This valuable Raytheon Bonded Service Guarantee is yours *at no cost*, if you qualify. We foot the bill because the Bond is *Raytheon's Investment in Your Future!*

Ask your Raytheon Distributor to show you how you can profit from becoming a RAYTHEON Bonded Electronic Technician.



ASK YOUR RAYTHEON DISTRIBUTOR ABOUT THIS WONDERFUL NEW ILLUMINATED TEST PATTERN CLOCK!

It's a beauty. Big, 15" face . . . Telechron motored . . . red metal sweep second hand . . . lamp illuminated dial . . . a constant reminder to your customers of your expert Radio and Television Service and of the high quality of

**RAYTHEON RADIO AND
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Right...for Sound and Sight



Excellence in Electronics

RAYTHEON MANUFACTURING COMPANY

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RADIO AND TELEVISION RECEIVING TUBES, CATHODE RAY TUBES, SPECIAL PURPOSE TUBES, SUBMINIATURE TUBES, MICROWAVE TUBES
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It's EASY to install "Payroll Savings"

... and 20,000 companies' experience proves it pays!

If you've put off installing the Payroll Savings Plan in your company because you feel it would be "a lot of work," then this advertisement is certainly for you! Because it's really very simple to give your employees the advantages of investing in U. S. Savings Bonds the easy, automatic "Payroll" way.

HERE'S ALL YOU NEED TO DO

Appoint one of your top executives as Savings Bond Officer. Tell him to get in touch with your State Director, Savings Bonds Division, U. S. Treasury Department. Here's what happens . . .

The State Director will provide application cards for your employees to sign—plus as much promotional material and personal help as necessary to get the Plan rolling in your company.

Those employees who want Savings Bonds indicate on the applications: how much to save from their pay; what denomination of Bonds they want; and the inscription information to appear on the Bonds.

Your payroll department arranges to withhold the specified amounts, arranges to get the Bonds, and delivers them to the employees with their pay.

The Bonds may be obtained from almost any local bank or from the Federal Reserve Bank or may be issued by the company itself upon proper certification by the Federal Reserve Bank or Branch in the company's District.

THAT'S ALL THERE IS TO IT!

In case you're skeptical as to how many of your employees would like to have Payroll Savings, canvass your plant—and be prepared for a surprise. (Remember that pay-check withholdings for Bonds are *not* a "deduction"—the employee takes home his Bonds with his pay.) One leading manufacturer, who had professed little faith in the Plan, found his eyes opened when he asked the people in his plant whether they would like to obtain Bonds in this way. Within only six months after he installed the

Plan, half his employees signed up. A prominent aircraft manufacturer, whose company had used the Plan for some time, was not aware of its potentialities until his personal sponsorship increased participation by 500% among his company's employees.

THE BENEFITS ARE BIG— FOR EVERYONE

The individual employees gain security—they know that the Bonds they hold will return \$4 for every \$3 at maturity. The company gains from

the resultant increased stability and efficiency of its workers. The whole nation gains because Bond sales help stabilize our economy by spreading the national debt and by creating a huge backlog of purchasing power to boost business in the years ahead.

Is it *good policy* to deprive your company of Payroll Savings—even one more pay day? Better at least have a talk with your U. S. Savings Bonds State Director, get the answers to your questions, and *know for sure*.

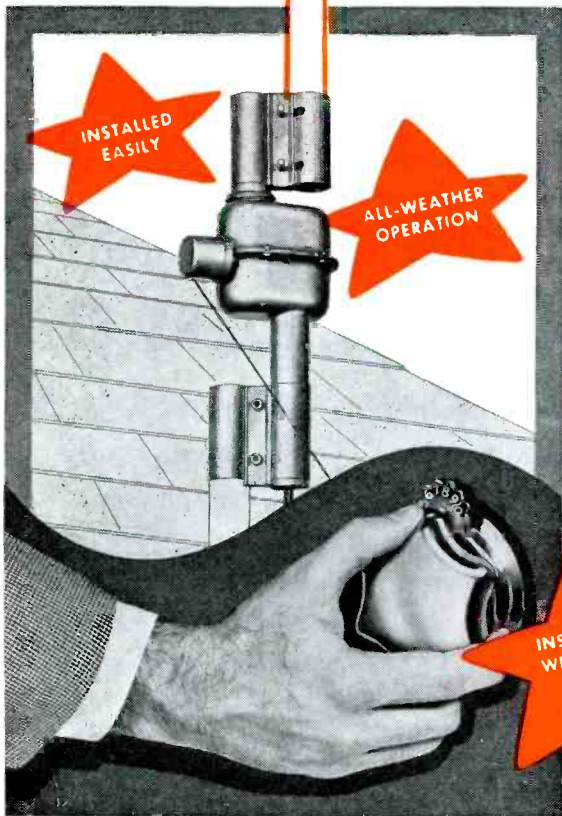
The Treasury Department acknowledges with appreciation the publication of this message by



SERVICE

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

TELE-TURNER... AMAZINGLY LOW PRICED ... BRINGS QUICK SALES



Manufactured by
JOSEPH SHAW CO., Toledo, Ohio

New TELE-TURNER T.V. Rotor is priced to sell...

Tele-Turner sells for \$16.45 complete with directional indicator, inside manual control and all necessary hardware. Cash in on the profit-making Tele-Turner.

- GUARANTEED TO OUTPERFORM MOTOR ROTORS
- FOOLPROOF MECHANICAL OPERATION
- PIN POINT RECEPTION—WITHIN 1 DEGREE
- ONE YEAR GUARANTEE

\$16⁴⁵ RETAIL PRICE
(Plus Cable)

IMMEDIATE DELIVERY

... learn more about profit-making TELE-TURNER... mail coupon today!

Please send me full information on how I may cash in on the profit making Tele-Turner.

Name _____
Company _____
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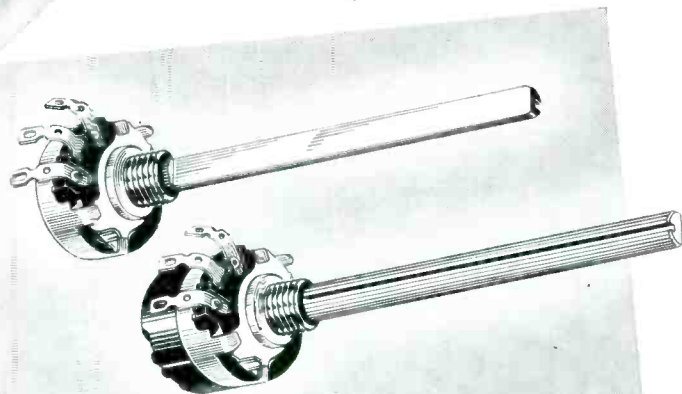
3471 West 140th St. • Cleveland, Ohio

HERE'S YOUR REPLACEMENT

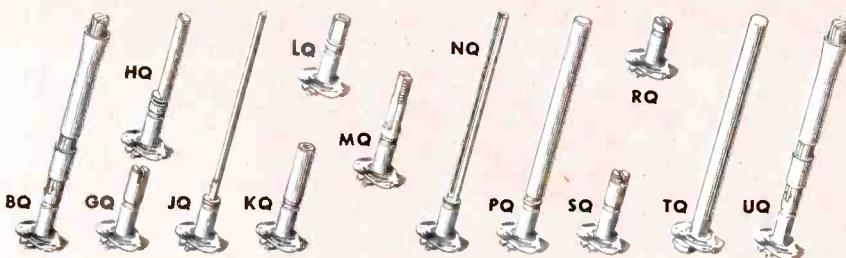
No Other Control Gives You All These

59 IRC CONTROLS WITH AMAZING ADAPTABILITY MEET ALL YOUR NEEDS WITH LESS STOCK

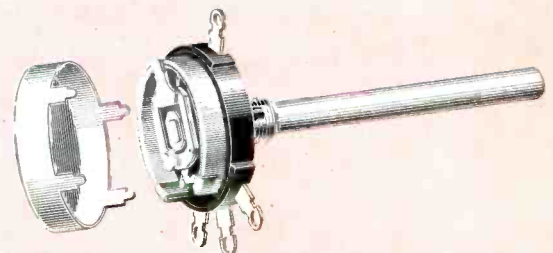
Compare the amazing adaptability of your IRC Q Control with any other. You'll agree no other control so closely meets all your servicing needs . . . no other gives you so much for your money! Feel its cushioned turn, examine its lustrous finish, study its practical design—ask your Distributor for IRC Q Controls, and you know you're buying the very best.



KNOB MASTER FIXED SHAFT
Standard fixed shaft fits most knobs without alteration or inserts. Flatted, knurled and grooved. 3" length meets TV requirements. Ample cross-section prevents bending.



INTERCHANGEABLE FIXED SHAFTS
Easy replacement of standard shaft with any of 13 special fixed shafts is made possible by exclusive IRC Resilient Retainer Ring. This revolutionary feature provides widest replacement control coverage.



WIRE WOUND CONTROLS
Dependable 2 watt controls available with center tap for TV centering. Specific TV values now available with Knob Master Shaft to accommodate both knurled and flatted knobs.

No. 1 CONTROL


Modern Servicing Features!

- ★ Fits both flatted and knurled knobs
- ★ Separate switches
- ★ Modern small size
- ★ Fixed shaft convenience with complete shaft interchangeability
- ★ 23 tapped types
- ★ Shorter bushing
- ★ Sparkling appearance
- ★ 1/2 watt rating



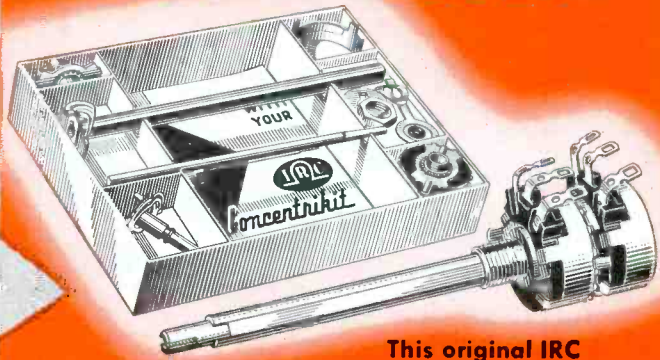
**INTERNATIONAL
RESISTANCE COMPANY**

401 N. BROAD STREET, PHILADELPHIA 8, PA.

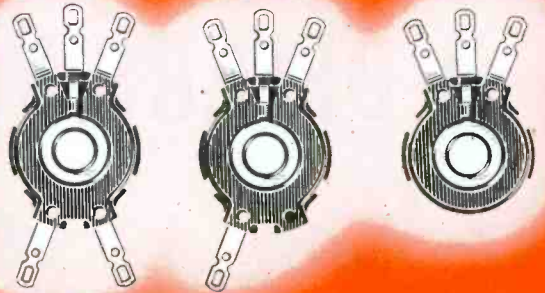
Wherever the Circuit Says 

In Canada: International Resistance Co., Ltd., Toronto, Licensee

Concentrikit

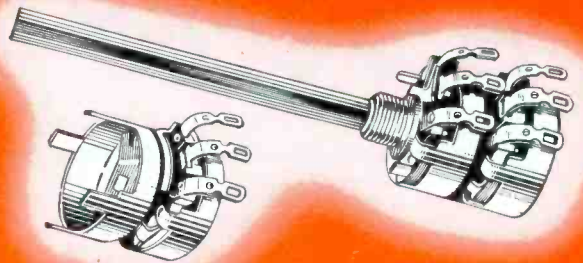


This original IRC feature provides a ready solution to your special control requirements. With this kit of parts you assemble practically any concentric dual control quickly and easily. In a matter of minutes you can prove the advantages of this practical IRC feature.



INTERCHANGEABLE BASE-ELEMENTS

Principally intended for use with Concentrikit, this IRC innovation gives you limitless opportunities for adapting controls to specific requirements. Each unit includes molded base, element, terminals and collector ring—no loose parts. Available in 33 resistance values and a variety of taps.



Multisections

For standard duals, IRC Multisections are added to Q Controls like switches. 17 values provide over 11,000,000 variations of dual, triple and quadruple controls; accommodate switches, too!

INTERNATIONAL RESISTANCE COMPANY
421 N. Broad Street, Phila. 8, Pa.

Please send me additional IRC Q Control information checked below:

- Free Catalog Bulletin DC1A
- Enclosed find 25c in stamps or coin for comprehensive Concentric Dual Replacement Manual

Name _____

Company _____

Address _____



NOW GENERAL ELECTRIC
OFFERS YOU A SHARE OF A

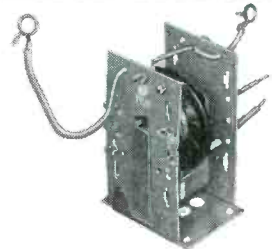
\$30,000,000
REPLACEMENT MARKET



EM-PM FOCUS COIL—These units combine the effects of Alnico 6 permanent magnet and an electromagnet to provide uniform focus with a minimum of circuit power.



NEW DEFLECTION YOKE—Sweeps 70° with only 20 watts of power from a 260-volt supply. Ferrite core units available for high efficiency applications.



HORIZONTAL SWEEP TRANSFORMER—When used with high efficiency yokes, these ferrite core transformers provide 70° deflection at 13 kv.

You can put your confidence in—

GENERAL  **ELECTRIC..**

ESTIMATES peg the TV market at ten million sets in use by the end of 1950...*that's your opportunity!*

Twenty major TV receiver manufacturers are building General Electric components into their sets. Millions of these parts are in use today, in receivers everywhere...*that's your market!*

G.E.'s complete line of high quality components is now available—for the first time—to distributors, dealers and servicemen...*that's your cue for action!*

Build your business future by establishing a reputation for careful, skilled TV service work. Satisfy your customers by replacing with components that are standard in the best receivers the industry makes, backed by a name you can depend on...General Electric.

HERE'S WHAT YOU NEED!

As television grows, be sure you grow with it. Get your share of a skyrocketing business by selling the dependable components shown here. Send for the new G-E Television Parts Catalog just off the press—just mail the coupon at right and the catalog is yours—free!

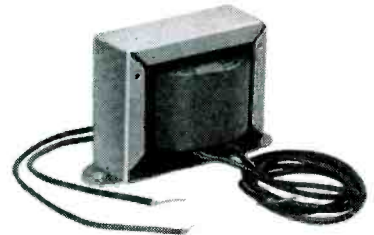
WIDTH & LINEARITY CONTROLS—

Provide convenient control of picture and linearity by screwdriver adjustment.

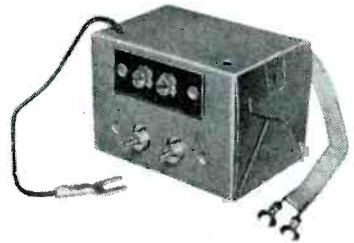


ION TRAP MAGNET—

Available in two sizes, 35 and 42 gauss.



VERTICAL SWEEP TRANSFORMER—For use in magnetic deflection circuits from 50°-70°. Designed to match vertical output tube to deflection yoke.

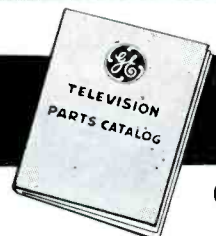


FM WAVE TRAP—Reduces or eliminates interference caused by FM broadcasting stations operating in 88 to 108 mc channels.



IF WAVE TRAP—Designed to reduce or eliminate interference on TV receivers caused by signals at IF frequencies of 41-47 mc.

**ARE YOU READY?
MAIL THIS COUPON TODAY!**



General Electric Company, Section 380,
Electronics Park, Syracuse, N. Y.

I want my share of the new TV replacement market. Send me complete catalog of TV components and facts on service sales.

NAME _____

ADDRESS _____

CITY _____

STATE _____



Sell an

ANCHOR BOOSTER

for fast profits

and complete customer satisfaction...



ON EVERY FRINGE INSTALLATION

Why High Towers,



Hazardous Installations



for your men as well as your customers? WHY spend so

many hours



on one installation when you CAN

make 3 or 4 calls



and more profits



per

installation in one afternoon?

You, the Service Dealers, are recognized as experts in your community. Your advice is often asked and usually followed. Your men are the *one group* in the electronics field who actually get into the home... right at the point of sale. It stands to reason then that an installation of one of the many fine simple-to-install antennas, plus an ANCHOR Single or Two-Stage Booster would make a faster and more profitable installation for YOU as well as a completely satisfied customer. REMEMBER, returned calls due to dis-satisfaction are costly.

The New ANCHOR BOOSTERS Are Available. Order from your jobber Now.



ANCHOR'S NEW SINGLE-STAGE BOOSTER, ARC-101-75, especially recommended for low signal areas in or near cities where there may be any number of interference problems. Assures consistently good reception up to 75 miles.

BE SURE YOU KNOW ALL THESE FACTS

Only ANCHOR can provide your customers with ALL of the most Ultra-Modern advantages for consistent, top-notch, long-range TV reception. Here's why!

- ANCHOR has the highest gain of any TWO-STAGE BOOSTER.
- ANCHOR has the highest Signal to Noise Ratio.
- ANCHOR is the only non-regenerative unit available. The unit that is not returned.
- ANCHOR'S Single Knob Construction is so convenient for Booster is turned on and can be switched and tuned all on the same knob.
- ANCHOR'S New and Revolutionary method of construction of the RF Stage (Pat. Pend.) is the only real engineering advance in Boosters in recent years.
- ANCHOR'S TWO-STAGE BOOSTER is modernly styled with streamlined plastic escutcheon, soft mahogany leatherette finish.
- IMPORTANT ANCHOR'S TWO-STAGE BOOSTER is often the answer to installation difficulties well within the normal TV areas where their New Single Stage Model fails to give complete satisfaction.

ANCHOR'S NEW TWO-STAGE BOOSTER, AFC-101-100, increases original TV signal strength more than 5 times and assures consistently good reception over 100 miles.

ANCHOR RADIO CORP.

ANCHOR ENGINEERING ALWAYS A YEAR AHEAD
2215 SOUTH ST. LOUIS AVENUE CHICAGO 23, ILLINOIS



RADIO · TELEVISION · ELECTRONIC
SERVICE

A Sparkling Forecast for TV Service

TV'S SERVICING POSSIBILITIES, acclaimed widely everywhere, particularly since the chassis began pouring out of the plants, received its greatest tribute recently during a Philco service meeting talk by John Pell, who predicted that next year there'll probably be a need for over 40,000 full-time Service Men.

Estimating a production of 5,000,000 sets for the year and an estimated 2.5 calls per year, Pell declared that at least 12,500,000 service calls should be required. Assuming a Service Man repairs the bulk of the chassis in the shop and makes five calls per day, 1250 calls can be made in 250 working days of the year. On this basis, therefore, commented Pell, the 5,000,000 new models would require 10,000 men for minimum service requirements. Since there are 5,000,000 sets already in operation, by the end of this year the television service industry should require a minimum of 20,000 Service Men full time. And in '51, as set production increases, Pell indicated that the manpower needs could easily rise to 40,000.

The Manpower Report

To support his views, Pell submitted a detailed report on the number of full time Service Men that are required now, and will be needed in '50 and '51. At present, for instance, the small city of Albuquerque in New Mexico has about 6 Service Men. By the end of the year it is estimated that about 3 more men will be added, and in '51 there should be about 12 Service Men in this area. Substantial jumps in manpower requirements before the end of the year and for '51 were disclosed in the report covering most of the TV cities in the nation. In Atlanta it was estimated that the current group of Service Men totaling 75 will be doubled in '51 and in Baltimore a similar situation would hold with the number of 232 jumping to 464. In other cities the same conditions were cited, with Boston's 736 men doubling to 1,472; Cincinnati's 240 Service Men rising to 480; Cleveland's 446 becoming 892; Chicago's 892 men jumping to 1,784; Detroit's

462 increasing to 924; Hartford's 121 doubling to 240; Los Angeles' 988 mounting to 1,976; Miami's 50 men doubling to 100; Milwaukee's 220 operators increasing to 440; Newark's (N. J.) 1,000 men becoming 2,000; New York City's 2,600 Service Men increasing to 5,200; Oklahoma City's 55 doubling to 110; Philadelphia's 982 increasing to 1,964; Providence's group of 113 growing to 226; Rochester's 79 rising to 158; San Diego's group of 74 growing to 148; San Francisco's 110 increasing to 220; Syracuse's (N. Y.) 87 operators jumping to 174; St. Louis' 256 Service Men doubling to 512; Washington's (D. C.) 256 Service Men increasing to 512 and Youngstown's (Ohio) group of 20 taking a jump to 80 men, or a fourfold increase.

Service and Defense Plans

Although the foregoing statistics were predicated on normal production, a condition which will be altered substantially as the defense program swings into action, the needs for servicing will not diminish, but rather increase. The millions of chassis in the homes, which it may not be possible to replace completely as time goes on, will require careful servicing. The need for this attention will certainly mount as the days go by. And the boys will really have to roll up their sleeves and drive hard.

Quality of TV Service

Pell's timely talk also covered another vital phase of the industry . . . *the quality of television service* . . . which he pointed out can greatly influence the growth of the video art. Said Pell: "Good service will increase sales; poor service will discourage prospective owners. At the present time there is the distinct possibility that sales of new television receivers during the last half of '50 will exceed the capacity of the television service industry. Sales will, no doubt, grind to halt if the service industry falls too far behind."

A third factor was also reviewed by Pell . . . *the business ability of the*

Service Man. He said that here is a factor that cannot be ignored, if the Service Man is to succeed in a business which is . . . "as competitive, as seasonal and downright complicated as television service. . . . You may not believe this, but becoming a businessman is just as easy as becoming a television Service Man, and, incidentally, much more profitable. The man who has the ability to make a good television Service Man, has the ability to make at least a fair businessman." Training and avid reading were also cited as the keys to success by Pell, who declared that . . . "Regular reading of journals such as . . . SERVICE . . . is very desirable."

Commenting on the problem of training, Pell pointed out that all training must be as complete and basic as possible. It is highly important to learn *all* about new chassis, new antennas and the variety of other new developments appearing on the new receiver, accessory and test instrument fronts.

There is quite a job to be done in TV and there is plenty of opportunity for every Service Man to do that job!

Sound Still Vital

SOUND REPRODUCTION, which with the advent of TV appeared to wander away in the background, has become quite an item again . . . in fact nearly as important as the picture. In a survey conducted for John Meck, it was learned that there was only 10% rating difference, between the video and sound characteristics which influenced the purchase of a set. Specifically, 1,258 cited the sharpness of picture as the important guide to the purchase of a set and 1,158 commented on the quality of sound reproduction as the influencing factor in the purchase of a receiver.

Commenting on the survey, John S. Meck said: "The findings seem to indicate clearly that the public regards television as a sound and sight medium, rather than primarily a visual medium only."

Sound appears to have come back into power again.—L. W.

TVI... Causes and Remedies

Report on Current Status of Nine Sources of Interference (Second Harmonic of FM Stations; FM Receiver Radiation on Channels 5 and 6; Local Oscillators of TV Sets; FM Stations, Due to Lack of Image Rejection in TV Chassis; Hams; Prewar Diathermy Equipment; Electromedical and Industrial Apparatus; Ignition Systems; and TV Receiver Sweep and Video Circuit Radiation) and New Methods Which Have Been Evolved to Eliminate the Problems.

by **IRA KAMEN**

TV Antenna Consultant

INTERFERENCE, one of industries' stubborn problems since the days of the three-tube, with the advent of TV, became quite an extremely acute headache, requiring the attention of not only the receiver makers, but telecasters, and government agencies.

In 1948, in a review¹ of this situation, it was revealed that there were nine types of interference involved. Since then, some conditions have been improved and others have grown worse. In an extensive survey² of reception in the New York and Connecticut areas, it was found that four of the trouble-makers had become

highly aggravated, while the remainder were being remedied rapidly. The negative results were found in those categories involving FM receiver radiation, absence of FM image rejection, local oscillators, and sweep and video circuit radiation, while positive results were found in instances involving interference from the FM

¹Kamen, Ira, *TV Interference, Causes and Remedies*, SERVICE; October, 1948. ²Field studies since 1947.

second harmonic, hams, prewar diathermy equipment, electromedical apparatus, and pulse-type devices.

Specifically, the study revealed the data shown in the table below.

Fortunately, the situation is not hopeless as it appeared to be in '48 or even '49. For today, a variety of effective solutions have become available. As the table discloses the second harmonic transmission problem has been cured at the station and at the receiving sites through the use of inline type of antennas which can be adjusted for directional pickup of the TV stations and thus discriminate

Interference Type	Status Since '48	Reason for Change
(1) Second harmonic of FM stations.	<i>Improving</i>	Use of second harmonic suppression methods at FM transmitters.
(2) FM receiver reradiation on channels 5 and 6.	<i>Aggravated</i>	Demand for low-priced FM receivers, prompting the use of inexpensive front-ends with less isolation between the local oscillator and the antenna terminals of the FM receiver.
(3) Local oscillators of TV receivers.	<i>Aggravated</i>	Low priced TV receiver designs, using inadequate front ends employing 21-mc <i>ifs</i> . Some progress is being made here, with manufacturers shifting to the 32.8 and 42.1 mc <i>if</i> .
(4) FM stations, due to lack of image rejection in TV Receivers.	<i>Aggravated</i>	Low priced receiver designs, with low-image rejection.
(5) Radio amateurs.	<i>Improving</i>	Use of required filters and modifications in rigs to preclude TVI radiation.
(6) Prewar diathermy equipment transmission.	<i>Improving</i>	Retirement by doctors of some of the prewar diathermy equipment and the development of efficient high-pass filters, which has helped this situation.
(7) Electromedical and industrial apparatus transmission: induction and dielectric heating, and professional diathermy operating in the 26.96 to 27.28-mc band.	<i>Improving</i>	Development of low-priced filter units for easy installation and shifting of the TV receiver <i>if</i> frequencies.
(8) Pulse-type device transmission: ignition systems, motors, neon signs, etc.	<i>Improving</i>	Filters included by many manufacturers of these man-made interference devices.
(9) TV receiver sweep and video circuit radiation; background noise and beeps.	<i>Aggravated</i>	Drive to reduce manufacturing costs, which has led to a minimization of sweep and video circuit shielding and resultant increased radiation.

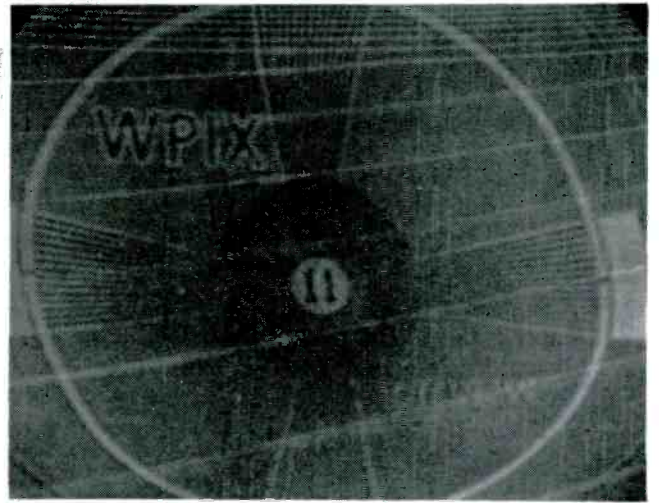


Fig. 2. Patterns with *rf* interference. Image at left was caused by weak interference from *rf*, while pattern at left resulted from strong *rf*-signal interference, providing a picture which has a negative-looking appearance. (Courtesy, Sylvania.*)

against FM signals (second harmonic) coming from another direction. In Fig. 5 this problem and a receiving antenna solution are illustrated. The adaptation of a high-gain inline antenna raises the direct TV signal pickup, with respect to the signals received from the FM station, and therefore tends to swamp this type of interference. The use of shielded-transmission line, either of the coax or shielded-balanced line type must be used here to preclude transmission-line pickup of the undesirable FM signals.

The FM receiver reradiation problem, which is dominant on channels 5 and 6, can now be cured with the installation of a preselector or booster between the antenna terminals of the offending FM receiver and the transmission line. This setup usually prevents local oscillator radiation from entering the antenna circuit.

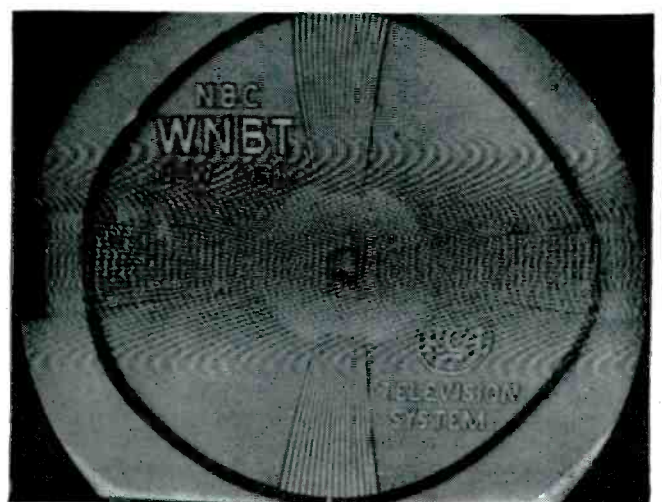
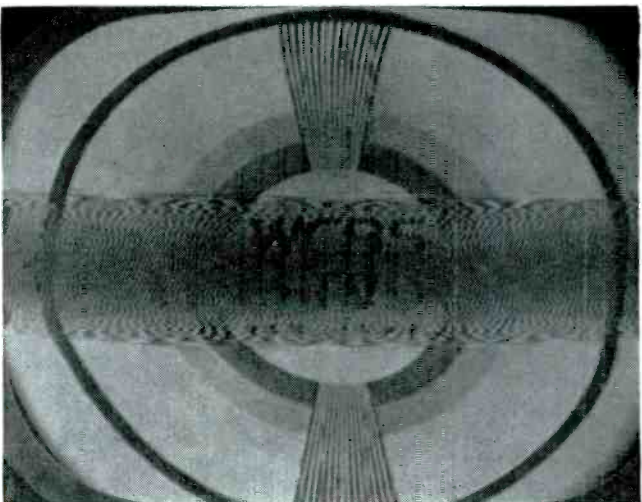
The local TV receiver oscillator

Fig. 1. A typical FM interference pattern. (Courtesy DuMont)



*From paper on *Television Interference* by Herbert B. Michaelson, which appeared in the October, 1949, issue of the *Sylvania News*. Photos by John Schinke.

Fig. 3. Strong diathermy interference picture patterns. (View at left courtesy Sylvania*, and view at right, courtesy DuMont).



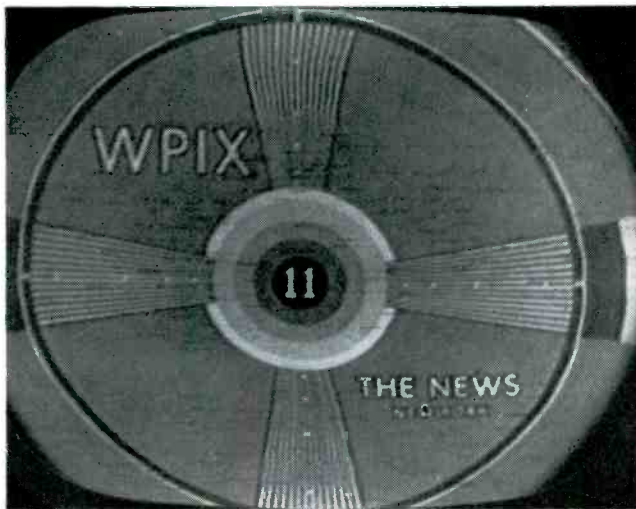


Fig. 4. Typical interference pattern caused by ignition noise of medium strength. (Courtesy, Sylvania*).

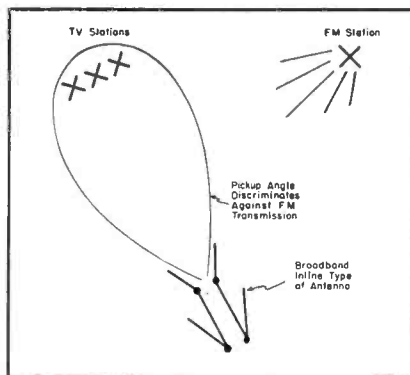


Fig. 5 (above). How a directional antenna can be placed so as to discriminate against second harmonic transmission from an FM station.

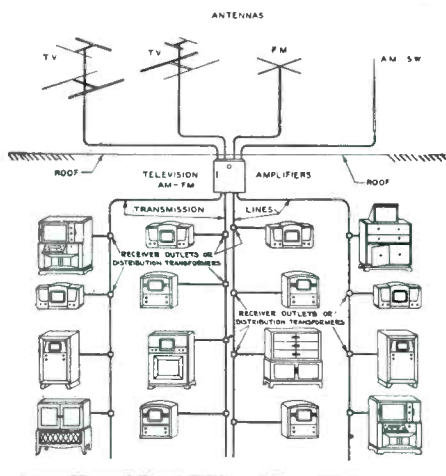


Fig. 7. A typical master antenna-system installation arrangement.



Fig. 8. Application of a booster** ahead of a TV receiver to prevent rf radiation from reaching the antenna.

Fig. 9a. Broadband directional TV antenna featuring gain and pattern characteristics that discriminate against FM pickup. (Courtesy Amphenol)



**Super-Sonic.
***DeciMeter.

problem which was considered as unsolvable at one time has been successfully overcome by the use of master antenna systems which isolate TV receivers from each other by as much as 50 db, and still deliver as much as 3,000 microvolts for each receiver connected to the system. For private homes the solution appears in the application of a well-designed booster, installed between the antenna terminals of the TV receiver and the antenna transmission line. The practical considerations are, of course, complicated for it is necessary to convince the person who owns the offending TV receiver that a booster should be installed to solve his neighbor's reception problem. Experience has shown that it is wiser to show the person, who must have the booster, that such an installation will actually improve his own reception. It can always be demonstrated that a booster will provide more TV signal. In addition, the booster is added insurance against pickup of diathermy, short-wave and other if types of interference.

For the TVI problem, caused by signals from FM stations, due to a lack of image rejection in the TV receiver, three solutions have been found.

In one, it will be necessary to install an inline antenna, of the type shown in Fig. 9a, which has been designed (Continued on page 55)

Fig. 6. A 72-300 ohm matching transformer with high-pass filter action. This transformer, a perfect match at TV frequencies, seriously mismatches and attenuates diathermy and short-wave interference signals in the if band. (Courtesy Brack)

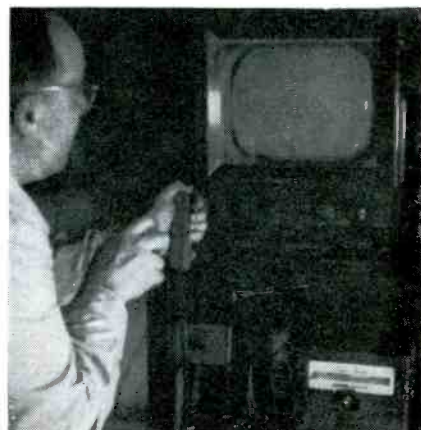


Fig. 9b. Tuning and adjusting an FM absorption type wavetrapp*** to eliminate FM interference.



Fig. 9c. Installation of an absorption-type wavetrapp on a baseboard.

Fig. 9d. Quarter-wave tunable wavetrapp for FM application. (Courtesy Don Good)

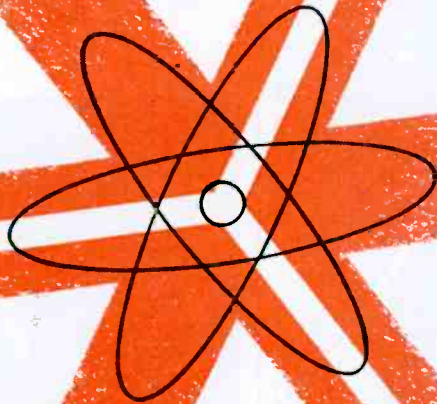


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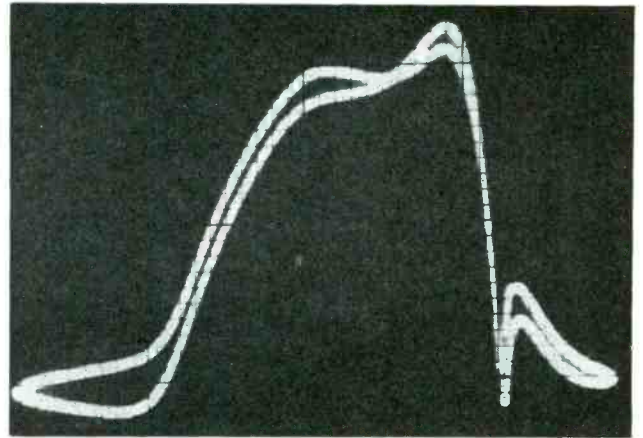


Fig. 2. 'Scope pattern of a television *if* response curve showing the distortion introduced by low-frequency phase shift in a 'scope. Note: In this and the 'scope** patterns shown in Figs. 4, 5 and 7 (p. 30), increasing frequency is from right to left.

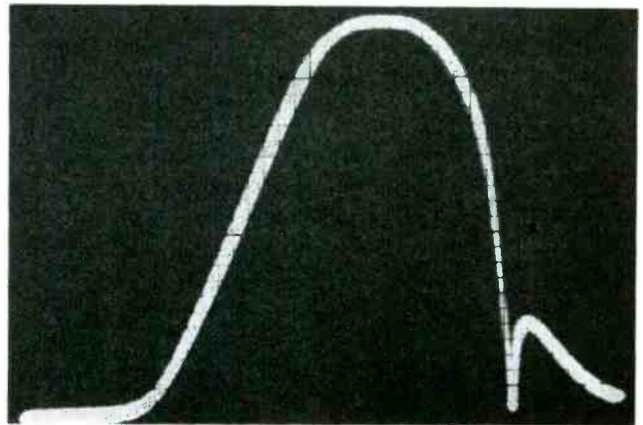
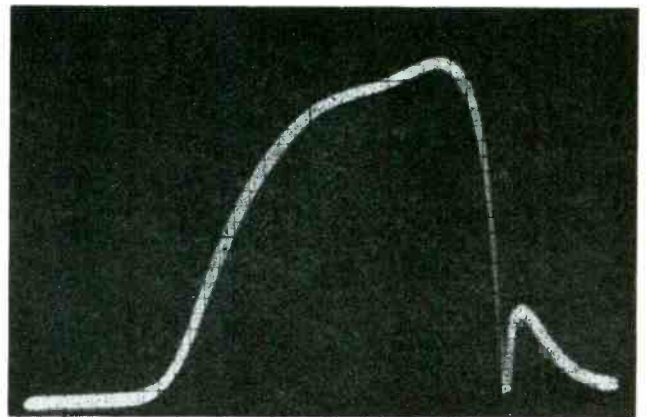


Fig. 4. 'Scope pattern showing how overloading a video *if* amplifier can produce a false picture of the response curve.

Fig. 5. 'Scope pattern which reveals that a typical response curve can be obtained when the sweep generator output level and phasing controls are properly adjusted.



Limitations and Uses of SWEEP GENERATORS*

WITH OVER four million television sets now in use and with the expected sales this year to double that figure, it is evident that the servicing of these sets will become a major enterprise. To compete in this business it is imperative that every Service Man be equipped with a TV-FM sweep generator.

Advantages of Generator

In the early days of radio the only means for obtaining the response curve of an amplifier was the point-by-point method. However, the advent of the sweep generator paved the way to the present-day visual alignment method. With visual alignment it is possible to look at the overall picture on a 'scope and whenever alignment changes are made on an *if* amplifier, for instance, the effects can be seen immediately. The pass-band can be checked very quickly for center frequency and bandwidth by the use of a marker pip.

Sweep Generator Requirements

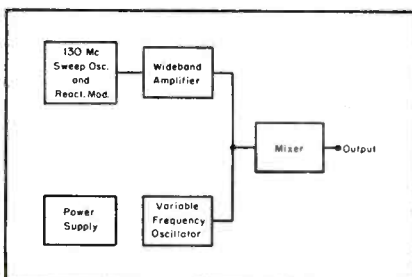
The equipment required for the visual alignment method must include a sweep generator with a substantial *whf* frequency coverage. It has been found that models* with a coverage from 2 to 120 mc in the first three bands and from 140 to 230 mc in the

*Sylvania model 500 employed as reference instrument in this paper.

**'Scope patterns viewed on Sylvania model 132 'scope.

Fig. 3. Diagram illustrating the connections and equipment necessary for aligning a video *if* amplifier, using the visual alignment method.

Fig. 1. Block diagram of the heterodyne sweep generator.



Critical Analysis of Generator's Capabilities Reveals . . . Circuitry Requirements and their Relation to Application Possibilities, Procedures Found Most Effective in Operation as TV or FM Alignment Tool, and Features Necessary in Allied Equipment, Such as 'Scope, to Assure Best Results.

by **MARCEL J. AUCREMANNE**

Physics Laboratories
Sylvania Electric Products, Inc.

fourth band, provide very effective results.

For TV work, a broad sweep width is necessary. In the instrument employed in this analysis, a TV sweep of 15 mc maximum was provided. For aligning FM receivers and narrow-band amplifiers, a sweepwidth of 600 kc was available. In both instances the sweepwidth was variable on both the wide- and narrow-sweep position. Output of the generator was at fundamental frequencies, there being no

harmonics within the range of the generator.

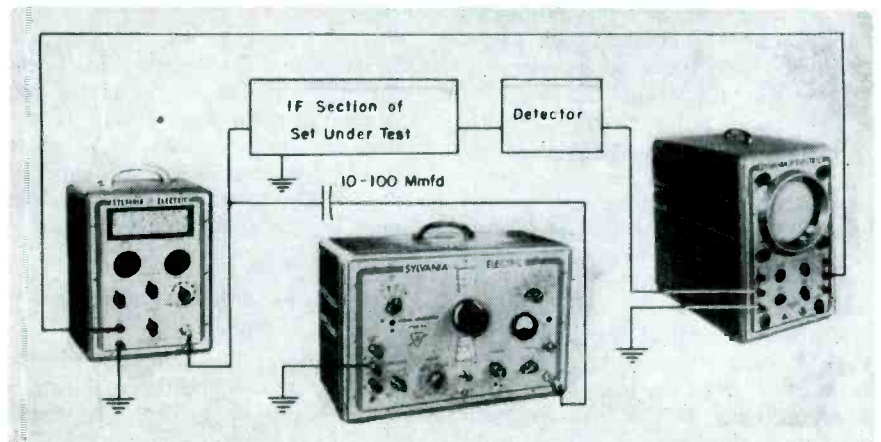
Theory of Operation of Sweep Generators

The sweep generator used in our study contained two oscillators beating together in a mixer stage. One oscillator, operating at a fixed center frequency, was frequency-swept by means of a reactance modulator tube, and the other was tunable over several frequency ranges to produce the desired beat output ranges.

In such a generator the operating frequencies of the two oscillators are chosen so that the desired output is the difference frequency beat. Whenever a heterodyne system is used, the sum and difference frequencies are always produced in the output of the mixer. Therefore, if the difference

On The Cover

Circuit diagram of generator* discussed in this paper. It consists of a beat-frequency oscillator in which the fixed oscillator is frequency modulated at 60 cycles by the reactance tube circuit. The deviation from the center frequency, or the sweep bandwidth, is controllable from zero to 600 kc in the narrow bandwidth range and up to 15 mc in the wide bandwidth range.



frequencies are to be used, then the sum frequencies must be such that they are outside of the useful generator range. Since the highest frequency in the present television band is 216 mc, all of the sum frequencies must be above this. The swept oscillator which has a fixed center frequency is made to operate in the unused region between 115 and 150 mc. A center frequency of 130 mc was chosen in this model since it allows adequate room on either side for sweeping the oscillator. The lowest frequency at which the variable oscillator operates is 132 mc. This produces the difference frequency of 2 mc and the sum frequency of 232 mc. These two frequencies are so far apart that it is impossible for the sum frequency to cause any spurious response in a circuit being tested at the difference frequency of 2 mc.

Referring to the block diagram (Fig. 1) it will be noted that the swept oscillator is followed by a wideband amplifier. The purpose of this amplifier is to raise the swept oscillator output level and to prevent interaction between the two oscillators, especially near zero beat. It is very important in a heterodyne system that the two oscillators do not exhibit a *pulling* effect; that is, one oscillator affecting the frequency of the second one. This wideband amplifier then acts as a buffer stage between the swept oscillator and the mixer, and makes the sweep generator more stable.

Mixing is accomplished by feeding the oscillator outputs to the first grid of a pentode mixer tube. The desired beat output is obtained from a potentiometer attenuator connected across a low-impedance load in the mixer plate circuit. The output level of a mixer is determined primarily by the weaker of the two incoming voltages. In this generator, the variable oscillator output varies somewhat over the four ranges while the swept oscillator output is constant and is the weaker of the two. Therefore, it follows that the generator output is quite constant over all four ranges. The output of the generator is one-tenth of a volt, which has been found to be adequate for any TV or FM application.

Precautions on Use of Equipment

Since the visual alignment method depends greatly on the pattern shown on the 'scope, it is very important that this instrument have a good low-frequency response or, more specifically, that the vertical amplifier of the 'scope be able to pass the sweep frequency of the sweep generator without distortion. If the low-frequency response of the 'scope is not adequate

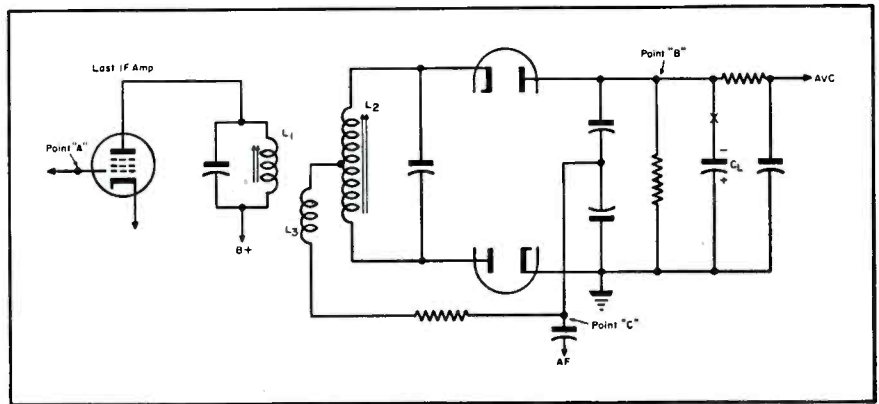


Fig. 6. Schematic of a radio detector.

an incorrect pattern will appear. In Fig. 2 appears the distortion introduced by low-frequency phase shift in a 'scope. It will be noted that the response curve is tilted and there is no position of the phasing control that will produce one solid pattern. Therefore, to avoid incorrect patterns, it is recommended that a 'scope designed especially for TV servicing be used or that the 'scope being used have the proper low-frequency response.

In using the visual alignment method, the 'scope controls should be adjusted first. The coarse frequency control should be turned to the off position since the synchronizing and sweep voltage comes from the sweep generator. The vertical amplifier gain should be maximum since it is a preferred practice to keep the output level of the sweep generator as low as possible. Setting of the horizontal amplifier gain is arbitrary. However, it should be adjusted so that the pattern covers about half the width of the *crt* screen. The baseline on either side of the response curve should be clearly visible. It is also a recommended practice, when using a marker pip, that the size of the pip be kept as small as possible, but yet be visible. A strong marker pip will badly distort the response curve pattern and the results of alignment may be in error.

Another precaution necessary at television and FM frequencies is that all of the equipment must have a good common ground connection. If possible, all equipment should be placed on a large metal sheet of copper or brass. This practice will eliminate many errors in alignment work.

Television Alignment Procedure

For proper alignment of a video *if* amplifier, the connections shown in Fig. 3 must be made. The output cable of the sweep generator should be

connected to the grid circuit of the last stage. If *dc* is present on the grid, a mica blocking capacitor must be placed in series with the *high* end of the output cable. The horizontal amplifier of the 'scope derives a synchronizing and sweep voltage from the sweep generator terminal marked *sync*. Output of the video *if* amplifier should be taken from the detector stage and fed to the vertical amplifier of the 'scope.

The sweep generator is first set to the proper frequency as supplied by the receiver manufacturer. Next, the sweep control is set to *W* or wide sweep and the sweepwidth control is adjusted for about 10 mc. The generator output control should be set so that the pattern is visible. It is very important not to overload the video amplifier being tested since this will produce a false picture of the actual response curve, as shown in Fig. 4. When the video amplifier is overloaded, it will be noticed that alignment adjustments will not affect the top of the response curve. Therefore, to find the proper working level, the vertical amplifier gain of the 'scope must be first increased to maximum, then the output of the sweep generator increased until the height of the pattern on the 'scope is about one-third the height of the 'scope screen. With the pattern of proper size, the phasing control should then be adjusted to give a single response curve.

Adjustment of the stage can then be made according to the receiver manufacturer's instructions, until the curve is of the proper shape. A marker pip is necessary for the alignment of each stage. When the last stage has been properly adjusted, the output cable of the sweep generator is then moved to the grid circuit of the preceding stage. The connections to the 'scope remain unchanged. Each stage is then properly adjusted to provide the best response curve. When

(Continued on page 30)

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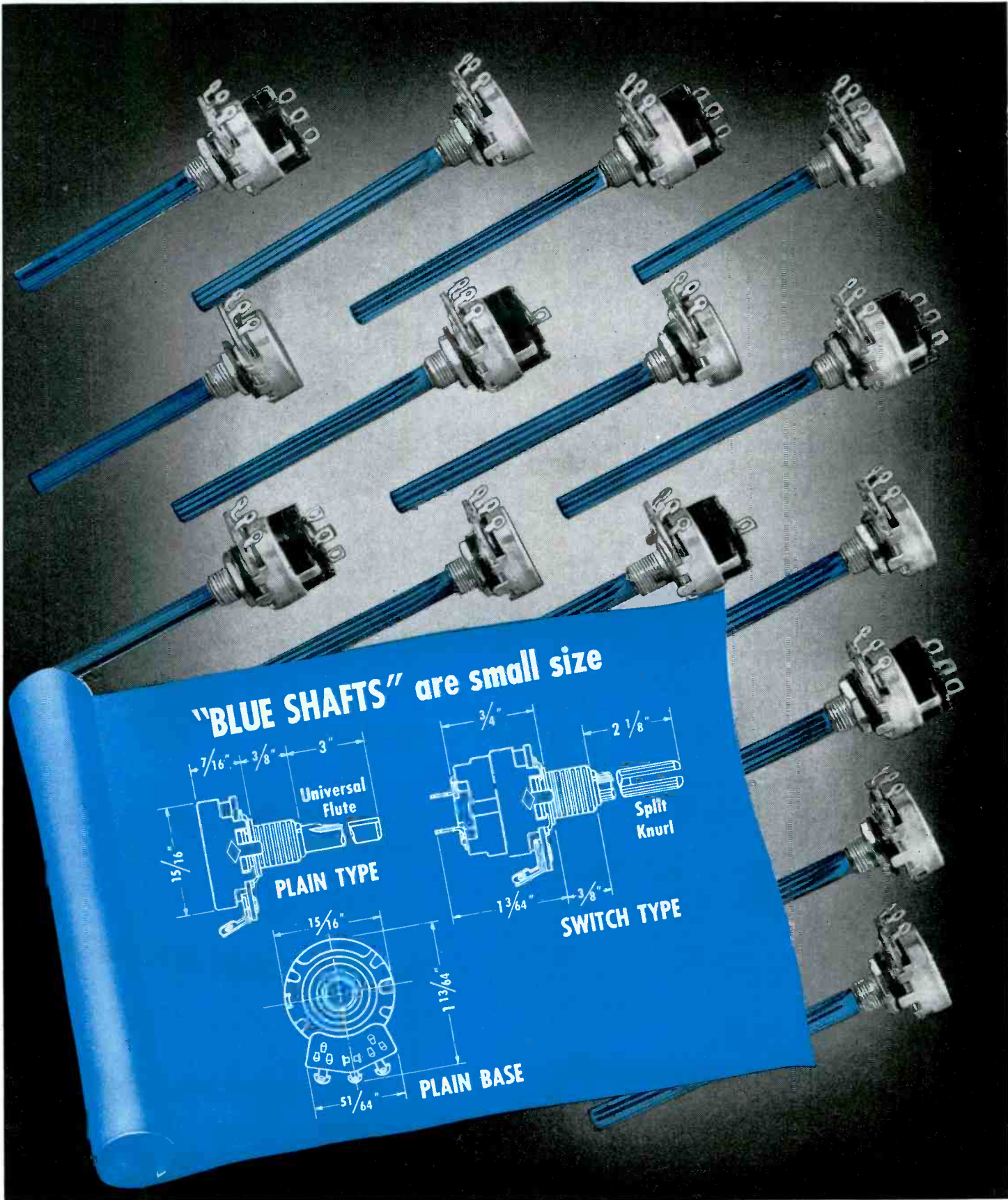
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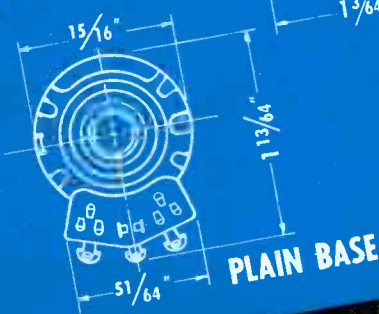
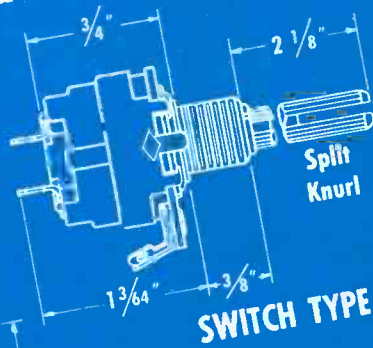
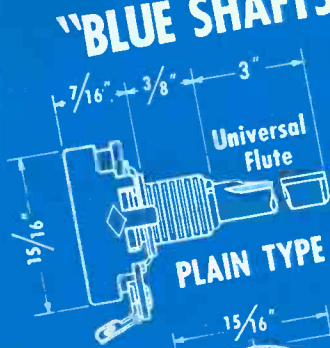
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Sweep Generators

(Continued from page 26)

the video amplifier is completely aligned, the overall response curve might look like that shown in Fig. 5. This curve shows, that in this particular amplifier, there is a slight amount of peaking at the high frequency end.

FM Alignment Procedure

Only two general FM alignment examples will be cited since receiver manufacturers normally outline in detail the procedure to be followed for proper alignment of a particular receiver.

To observe the *if* response of an FM receiver, the circuitry of a detector system, such as the ratio-detector method shown in Fig. 6, should be studied carefully. With this type of circuit in mind, the output cable of the sweep generator must be connected between the grid of the last *if* amplifier tube, point *A*, and ground. The 'scope must be connected between point *B* and ground. When a ratio detector is used the limiting action must be disabled temporarily. This is done by disconnecting the large limiting capacitor C_L at the point marked *X*. Any other limiter in the *if* circuit must also be disabled.

The center frequency of the sweep generator should be set to the proper *if* of the FM receiver under test and the sweepwidth control set for 300 kc. With the signal input level set for a reasonable size of picture on the 'scope screen, the last *if* coil must be adjusted for maximum height of the response curve. Slight readjustment of the coil may be necessary to obtain a curve of the proper size.

When final adjustment of the last *if* stage has been completed, the sweep generator output cable must then be moved one stage toward the mixer. Each stage is then adjusted to give the best response curve. The output level of the sweep generator should be reduced after each stage has been aligned so that the original size of the curve can be seen on the 'scope screen.

In order to align the ratio detector, the limiting capacitor must be reconnected. The output cable of the sweep generator is connected to the grid of the last *if* stage, as indicated in Fig. 6, point *A*; 'scope connections are made between point *C* and ground. The horizontal sweep for the 'scope is taken from the *sync* binding post on the sweep generator. A sweep width of about 300 kc with the proper phasing control adjustments made will produce an *S-shaped* response curve pro-

(Continued on page 31)

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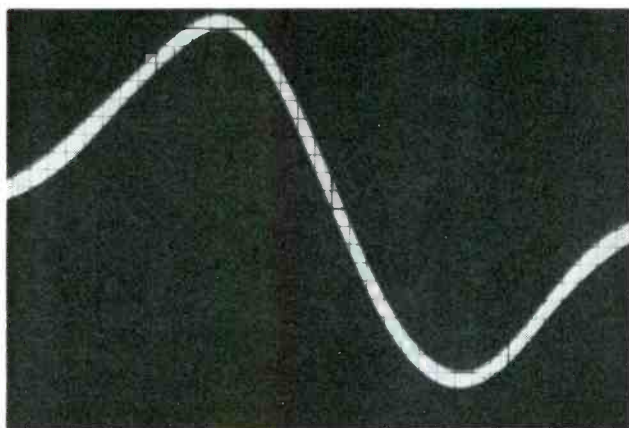


Fig. 7. 'Scope pattern showing the *S-shaped* response curve of a ratio detector, when it is properly aligned.

Sweep Generators

(Continued from page 30)

vided the ratio detector is not too far out of alignment.

The primary coil L_1 must be adjusted for maximum height of the curve and the secondary coil L_2 adjusted for centerbalance. When the ratio detector has been properly aligned, a response curve similar to Fig. 7 will be obtained.

Credits

The writer wishes to acknowledge the assistance of his colleagues at the Physics Laboratories of Sylvania, especially Carmine Masucci and Lawrence Ankersen.

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Above: Truck recently converted by Electro-Crafts Television, Kansas City, Mo., into a combination repair shop-on-wheels, delivery truck and advertising medium. Sets are delivered in truck, and antennas are installed with the aid of a telescopic dipole that extends through the roof. Antenna can be turned and raised to heights up to 40 feet. Below: Test equipment in truck which permits repairing of television and radio sets at customers' doors. A public address system advertises the company's facilities while the truck is on the road. Auxiliary generator provides 110-volt ac for soldering iron and test equipment. (Courtesy Dodge Division, Chrysler Corp.)



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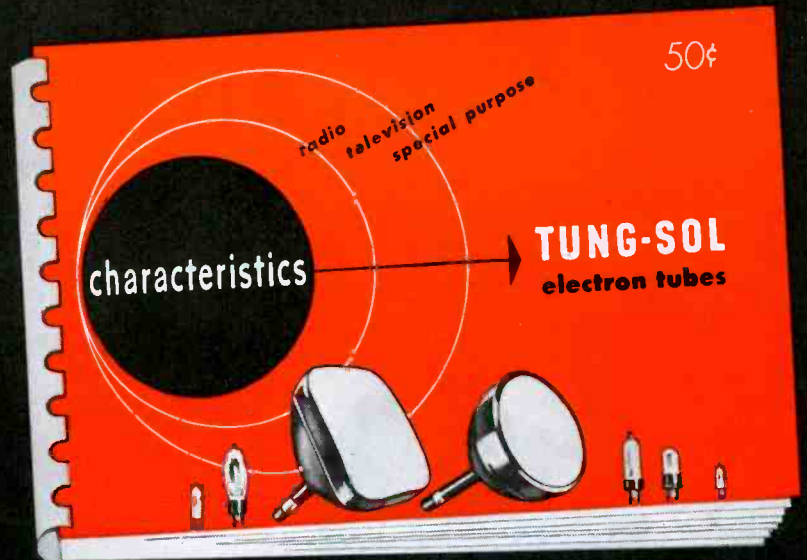


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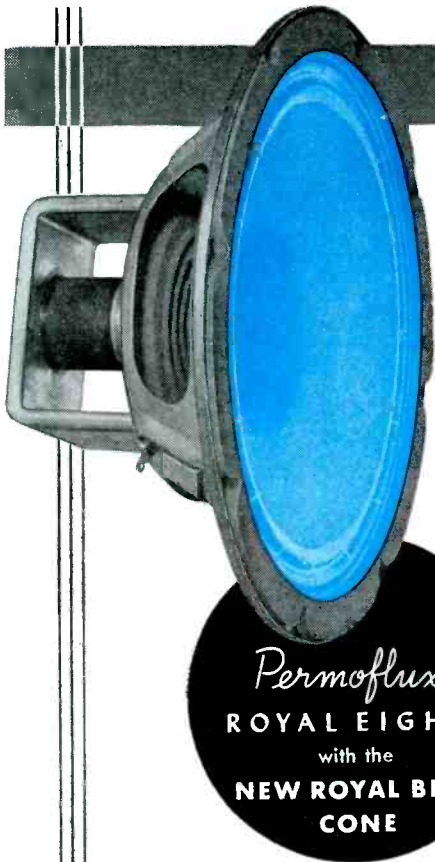


Philco executives at the banquet of the recent Philco Service Convention, left to right: Leslie J. Woods, vice president-director engineering and research; James M. Skinner, Jr., general manager of sales, refrigeration division; Henry T. Paiste, Jr., vice president-service and quality; and William Balderston, president of Philco Corp.

C-D VIBRATOR CATALOG

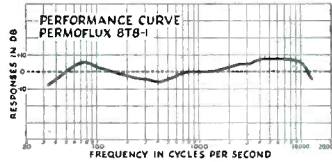
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Leon Avenue, Atlanta, Georgia, has become a Workshop Associate rep in the states of North and South Carolina, Georgia, Alabama, Mississippi, and Tennessee. . . . *Gerald Wilson*, 403 Second St., Jackson, Michigan, will represent Workshop in western Pennsylvania, Ohio, Kentucky, Indiana, and Michigan. . . . *Harold A. Kittleson*, Los Angeles, has become Tech lab sales and engineering rep for California, Arizona, Nevada and New Mexico. . . . *Grady M. Duckett* is now a rep for RMS covering the Southeast. . . . *J. J. McBride Sales Co.*, Chicago, Ill., have been named by RMS to cover Illinois, Iowa, and Wisconsin. . . . *A. W. Arnold*, 1321 Rosedale Ave. Chicago, 40, Ill., is now N. U.'s rep covering the Chicago territory. Arnold, was previously associated with Tung-Sol Lamp Works. . . . *Ross Merchant*, 4829 Woodward Avenue, Detroit 1, Michigan, has been named chairman of the Reps nominating committee for '50-'51. . . . *Arthur E. Akeroyd* is now located on the twenty-third floor of the John Hancock Building, Boston 16. . . . *Milton J. Shapp* has resigned from the M. J. Shapp Co., representing eleven plants, to devote full time as president of the Jerrold Electronics Corp. The M. J. Shapp Co. will continue as national sales rep for Jerrold Electronics Corp. and Tomore Electric Corp. *Harry Estersohn* and *Ken Randall*, former associates of Shapp, have been retained by most of the factories Shapp represented. Estersohn will represent Meissner, Racon Electric, Dalco, Herman Hosmer Scott and the jobber division of Switchcraft, Inc. Randall takes over representation of the Barry Corp., Condenser Products, Electric Motor Corp. and Cyclohm Motor Corp. (both divisions of Howard Industries), Thordarson Electric, Workshop Associates, and the industrial division of Switchcraft, Inc. . . . *Southern Sellers*, 3507 Tchoupitoulas Street, New Orleans, La., has been appointed Circle-X rep for the states of La., Miss., and Mobile, Ala. *Gerald G. Ryan Co.*, 549 Washington Blvd., Chicago 6, Ill., has been appointed by Circle-X to cover Ill. and Wis. and Lake and Porter Counties in Ind. . . . *Herb Richardson*, 2210 Forshay Tower, Minneapolis 2, Minn., has been appointed Alliance rep in the Minnesota territory on motors and Tenna-Rotors. . . . *Ron Merritt* has been named field sales agent for the instrument division of Allen B. Du Mont Laboratories, in the Northwestern territory comprising the states of Washington, Oregon, Montana, and the northern section of Idaho. Merritt is located at 217 Ninth Ave., N., Seattle 9, Wash. . . . *Charles Schlagel* is now eastern field rep for Snyder Manufacturing
 (Continued on page 59)

Rep Talk

LE ROY SCHENCK is now located at 31 Clinton St., Newark 2, N. J. . . . *Karl D. Engle*, 1525 East 53 St., Chicago, has been elected to senior membership in the *Chicagoland Chapter of The Representatives*. . . . *Eugene L. Berman*, 1355 Market Street, San Francisco 3, Calif., is now a senior member of the *California Chapter of The Reps*. . . . *The Mississippi Valley Chapter of The Representatives* has elected *Theodore B. Lowell*, P. O. Box 21, Normandy, Missouri, to senior membership for 1950. . . .

The *Southwestern Chapter of The Representatives* elected *J. Earl Smith*, 505 N. Ervay St., Dallas, president for 1950. *Jack Yount*, 1423 Pleasant Grove Dr., Dallas, will serve as vice president, and *Hal F. Corry*, 3522 Gillon Ave., Dallas was reelected to the post of secretary-treasurer. . . . *The Wolverine Chapter of The Representatives* has elected *Gerald Wisson*, 403 Second Avenue, Jackson Michigan, to full, senior membership for 1950. . . . *The Henry W. Burwell Company*, 1133 Ponce de



Charles Schlagel

Custom-Built Cabinet Finishing Techniques

Procedures Found Effective in Finishing Cabinets Designed to House Receiver and Amplifiers, and Phono Gear.

by **HERBERT G. EIDSON, Jr.**

Chief Engineer, WIS and WIS-FM; Technical Director, WIST

IN CABINET WORK, one of the most important factors is finishing. It is a painstaking process, requiring very careful planning and follow-through.

As cited last month, our plan provided for the application of finishing head nails first, followed by filling in with wood putty, after which all the surfaces were sandpapered. The next step was the all-important overall filler operation, involving the use of a can of wood filler and turpentine.

The wood filter must be stirred well and turpentine added to obtain a consistency of thick cream. Using a very

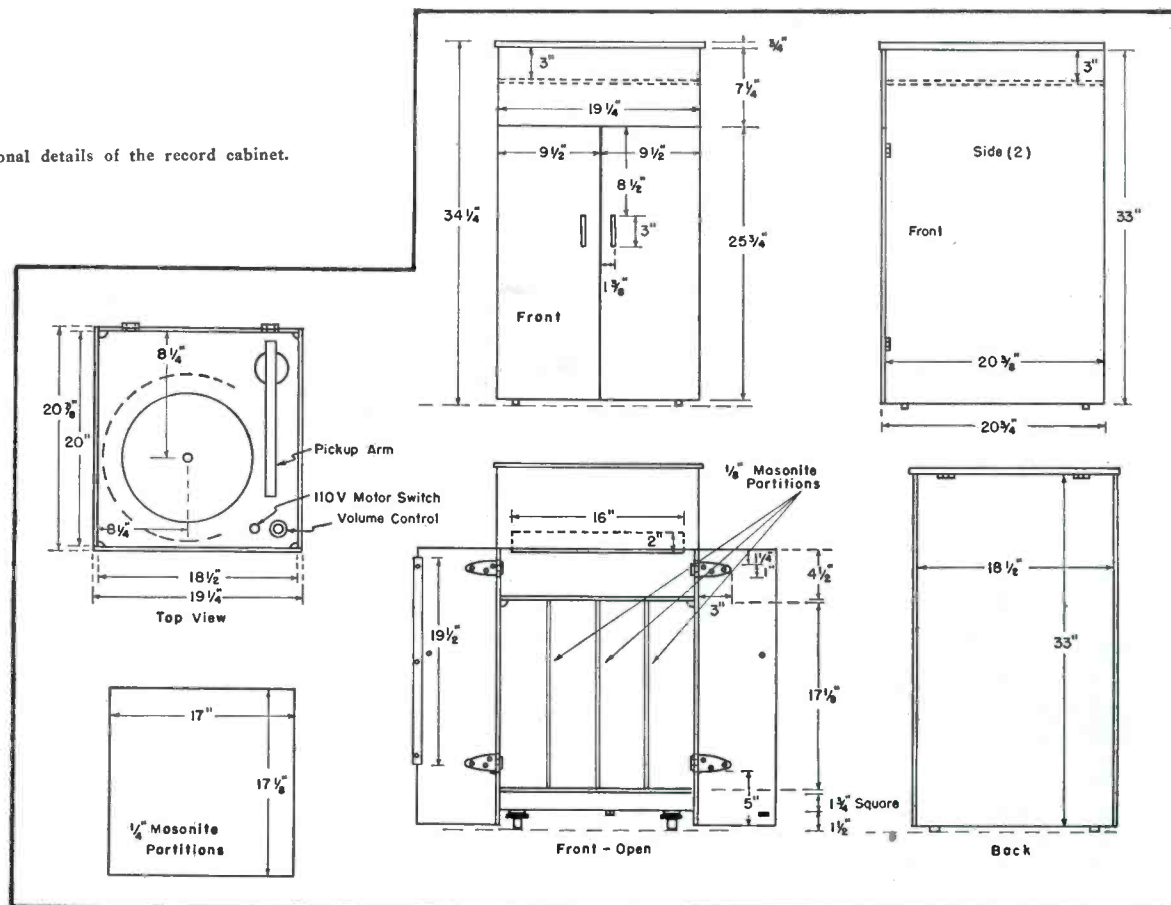
small round brush, one drop was allowed to fall on each spot that had been filled with wood putty. Then wiping at once, with a clean cloth, followed. Next the filler was brushed on all exposed edges of the cabinets, using a small flat brush, being careful not to allow any filler to run over on the face of the cabinet sections. Twenty-four hours were allowed for complete drying, after carefully wiping all edges thus treated.

The cabinets were now ready for staining. Using a two-inch *new* brush, stain was applied evenly with

the grain, being careful to rebrush when the stain ran. If this were not done, then the run would be visible when it dried. If a light finish is desired, then wipe with clean, hard, cotton cloth immediately after brushing. This insures that there will be no running of stain. If a medium finish is wanted, then brush carefully but do not wipe. If a medium dark is your desire, then allow the first coat to dry for twelve hours and apply the

(Continued on page 56)

Constructional details of the record cabinet.



Coupling Two TV Sets

Fig. 1. Installing a two-set coupler for a 300-ohm line.

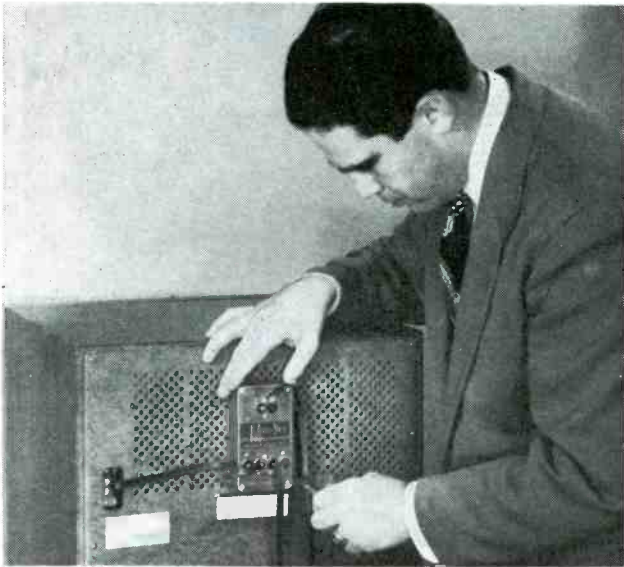
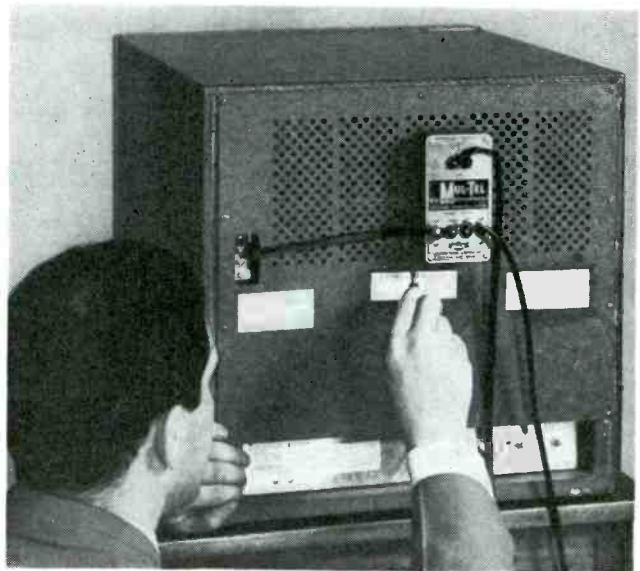


Fig. 2. Installation of a coupler for a 300-ohm and a 75-ohm line receiver.



WHEN YEARS AGO, the possibility of an extra receiver for the average home was suggested, there were many, very many, who doubted the practicality of such a program. It was not long, though, before extra sets, to the tune of two and three and more, began to become quite commonplace. It appears now as if TV has fallen heir to the same cycle of events, with skepticism first, as to the use of more than one set, and then complete acceptance of the idea.

With the development of the smaller chassis at popular prices, the two or more sets in the home has become quite a popular theme. All-out effec-

Fig. 3. The two-set coupler which isolates two TV or FM receivers from each other.



tiveness of the plan, however, has been curtailed because of three problems:

(1) Undesirability of two antennas and transmission lines on the house.

(2) The fact that two sets connected to the same antenna will load each other and mar the reception.

(3) Matching difficulties; matching two receivers to one antenna, by means of resistor networks,* to achieve the necessary isolation, introduces heavy losses.

In an effort to solve these problems, a decoupling device, of the type shown above and at left, was evolved.

With this device, it has been found that the input, which can be adjusted to match a 75-ohm coaxial cable, or a 300-ohm line, provides a matched termination from 50 to 225 mc. In addition, the input discriminates against all interfering signals (diathermy and short-wave) in the *if* bands, since it presents a serious mismatch to the transmission line at the TV frequencies.

The unit also provides separation of the output signal into two equally balanced signals, which are completely independent of each other.

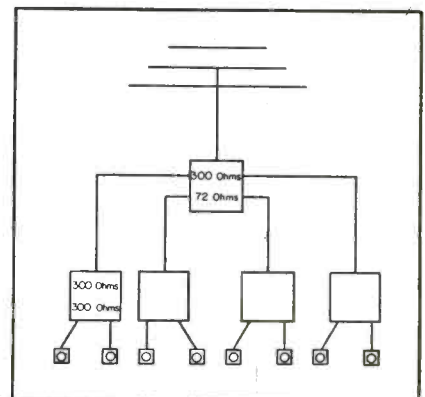
Isolation is also afforded by the device. Transmission lines, connected to either of the two outputs, are so

isolated that a shorted or open connection on one receiver will not affect the operation of the other receiver. And it is possible to use the coupling medium for either two 300-ohm receivers, two 75-ohm receivers, or a combination of both.

Dummy loads are not necessary in the event that either receiver must be removed from the circuit temporarily, as the output network of the device automatically loads itself in the event of an open or short circuit.

In installing the unit with one set requiring a 75-ohm coaxial cable input and the other a 300 ohm input, as illustrated in Fig. 2, the 75-ohm contact is established by circuiting the

Fig. 4. An 8-receiver setup, using four two-set couplers from a 4:1 distribution device.



*Kamen, Ira, and Winner, Lewis, *TV-FM Antenna Installation*, Chapter X.

To One Antenna

Single Antenna System Can Now Be Used to Feed a Pair of 75 or 300-Ohm Receivers, Link Being Provided Through a Coupler. Unit Has Input Which Discriminates Against Diathermy and SW Type of Interference in IF Bands.

by **JEROME BERGER**

Manager, Devices Division
Brach Manufacturing Corp.

coaxial center conductor to one of the 300-ohm jacks and the shield to a ground screw on the unit.

It has been found that the *two-set coupler* can also be used for the operation of a TV and FM receiver. To those who are familiar with FM receiver installations, it is well known that improved reception is available if an external signal is received, even if it is via a TV antenna.

The couplers can also be used to extend the application of a non-amplified

master antenna system, as illustrated in Fig. 4, where four units have been linked. The *two-set coupler* technique can also be employed with all types of master antenna systems outlets to provide two 75 or 300 ohm outputs in the apartment of a multiple dwelling.

In Figure 6 appears a view of a hookup of the *two-set coupler* with the 4:1 distribution device shown in Fig. 4, which has a 75-ohm output. It will be noted that when the input to the

two-set coupler is 75 ohms, it is necessary to provide a jumper across the input jacks for connection to the center conductor of the coaxial cable. The input cable shield is connected to the ground screw provided between the input jacks.

For best isolation, in making *two-set coupler* installations, the 300-ohm line between the *coupler* and the receivers connected to the *coupler* should be run apart, to prevent coupling and interaction.

Fig. 5. An FM receiver operating from a two-set coupler with a 300-ohm line to the TV set.

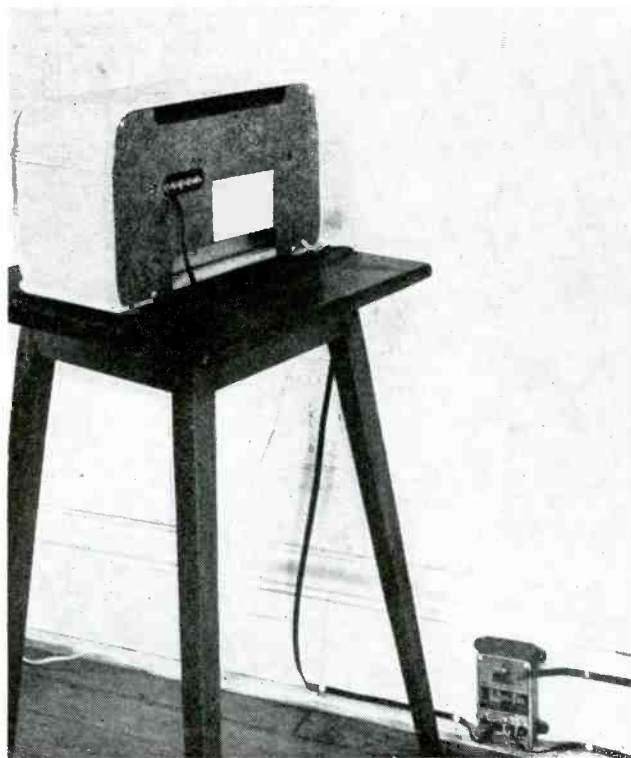
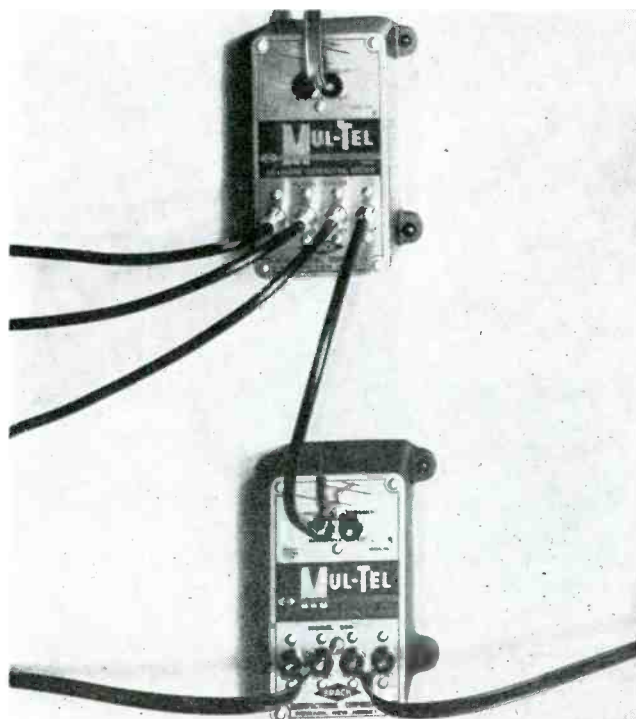


Fig. 6. Views of coupler being used in conjunction with a four-set distribution device, see Fig. 4.



PHONO *installation and service*

Cycling Methods Used in Zenith Multiple-Speed Changers . . . Coax Speaker Designs . . . Cardioid Crystal Microphone Characteristics . . . Features of Recently-Announced Three-Speed Phonos and Hi-Power Amplifiers.

by **KENNETH STEWART**

IN MULTIPLE-SPEED phono systems, cycling is particularly important, serving as a vital link to the variable-rpm operation.

In the changers used in the Zenith chassis (models S14028, S14029, S14030, S14031 and S14036) the motor shaft contacts a drive wheel assembly and causes it to rotate by friction contact with its rubber surface. A drive wheel assembly drives an idler wheel. The underside of the turntable is in contact with the idler wheel and is driven in this manner. Speed of the turntable is controlled by changing the position of the idler wheel on the drive wheel. When the idler wheel is moved to the center of the drive wheel it will rotate more slowly than when moved to the outer edge of this drive wheel. In this manner the turntable can be driven at any speed from 10 to 85 rpm. Minor adjustments for proper tonal pitch can be made by moving a speed change lever back and forth to compensate

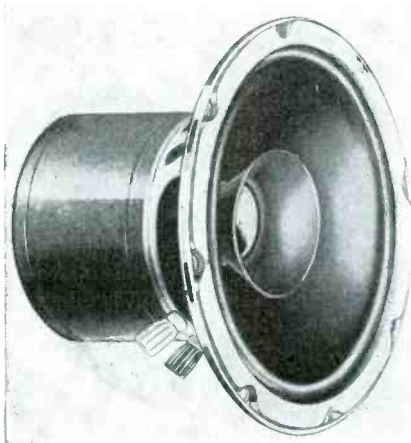
for turntable speed which may vary due to line voltage changes. When a reject button is depressed it energizes a solenoid which then attracts a trip pawl assembly. This also occurs when the forward movement of the tone arm causes a friction lever and weight assembly to contact a copper bronze contact on the trip switch assembly. When the gear segment is released a gear pawl spring causes the gear segment to engage a rotating pinion gear under the turntable thus causing the clutch assembly to rotate.

As the clutch assembly rotates, the tone arm lift lever swings in such a manner that it contacts a tone arm lift pin and raises the tone arm. Simultaneously, a tone arm link and stud assembly slides towards, and contacts one finger of the tone arm lever assembly forcing the tone arm towards the outer edge of the turntable, and

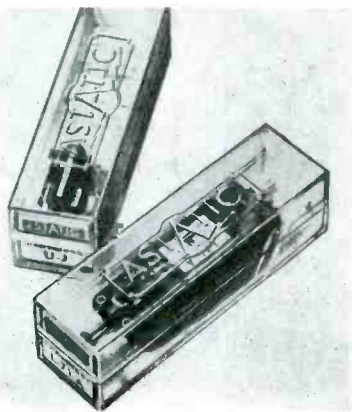
then on its return swing contacts the other finger of the tone arm lever assembly, swinging the tone arm back over the records. The position to which it swings the tone arm over the records is determined by the position of a record size discriminator. There are three steps on this record-size discriminator which determines the set-down position for 7", 10" and 12" records. The tone arm lift lever then returns and releases a brake lever assembly which keeps the tone arm from moving erratically during cycle. Simultaneously, an ejector lever and link assembly rotates and this in turn causes a spindle shaft to rotate and an ejector cam to push the record off the spindle shelf. Operation of the tone arm set-down adjustment can be observed by raising the tone arm so

(Continued on page 58)

Electro-Voice Radax loudspeaker.



Recently designed phono pickup cartridge transparent plastic boxes. New containers have been found to facilitate cartridge identification and stock recording. Rigid structure, also featured in boxes, found to minimize possibilities of box tearing or gapping, affording a safer and cleaner housing. (Courtesy Astatic)



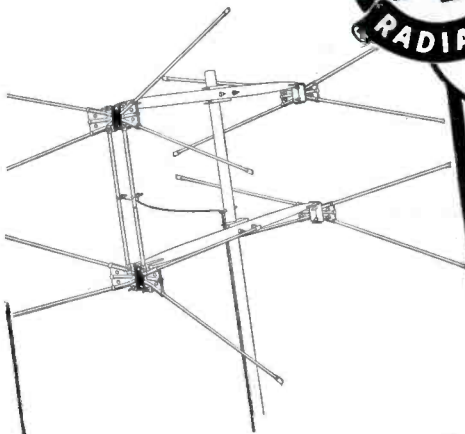
Portable 3-speed phono featuring featherweight pickup arm finished in gold, employing an all-purpose, all-speed permanent needle; 2-tube amplifier; separate tone and volume controls; Alnico V speaker; and 3-speed motor with selector switch. (Model 104; Duosonic)



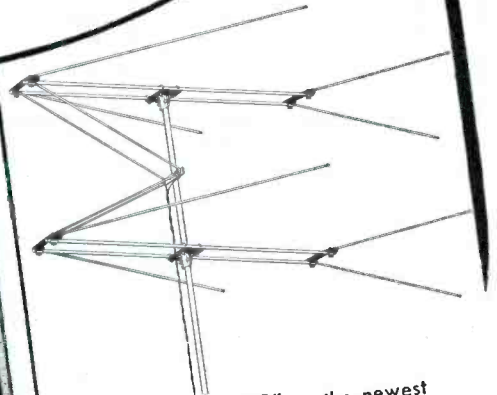
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Available in the following models:

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- **TR-2**... Compass Control Rotator with illuminated "Perfect Pattern" dial (uses 8 wire Cable) **\$44.95**



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Servicing PA Systems

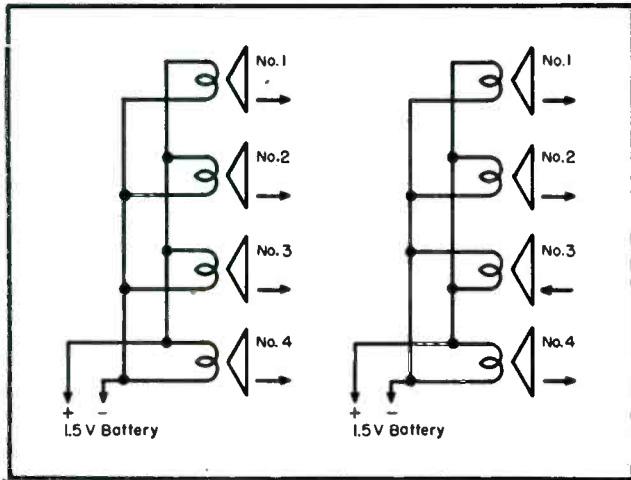


Fig. 1. Speaker matching test system.

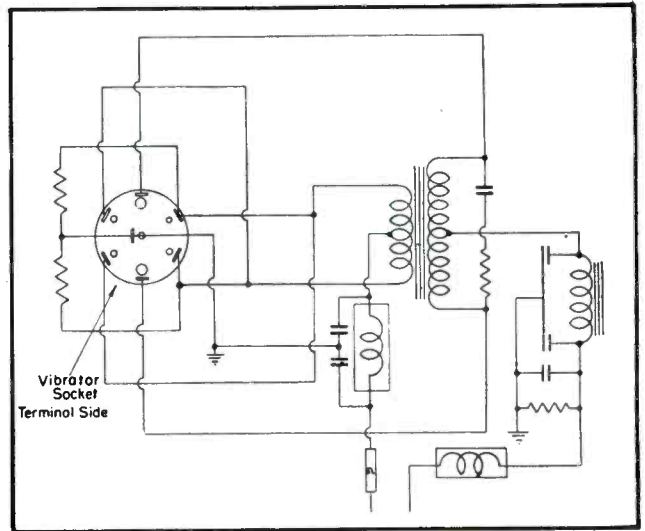


Fig. 3 (right). Synchronous vibrator power supply; Mallory VP-540.

MATCHING, around which revolves to a substantial degree, sound-system effectiveness, must be studied carefully in the servicing probe, with specific attention to the output transformer. The determination of the load impedance is quite important, and can become quite involved when multiple speakers are connected in series-parallel or when the load values or voice coil resistance are not known.

For all practical purposes, the voice coil impedance is equal to 1.3 times its *dc* resistance. If the primary impedance of the output transformer is not known, an approximation may be obtained as follows: the voice

coil should be disconnected and 1 or 1.5 volts *ac* applied across the secondary winding of the transformer. (This voltage can be obtained from an old filament transformer having a 1.5-volt winding.) The voltage obtained across the primary should then be divided by the applied voltage to arrive at the turns ratio. The result is squared and then multiplied by the voice coil impedance to secure the reflected primary impedance:

$$\left(\frac{E_{pri}}{E_{sec}}\right)^2 \times Z_{vc} = Z_{refl}$$

For example, suppose we measured the *dc* resistance of a voice coil and

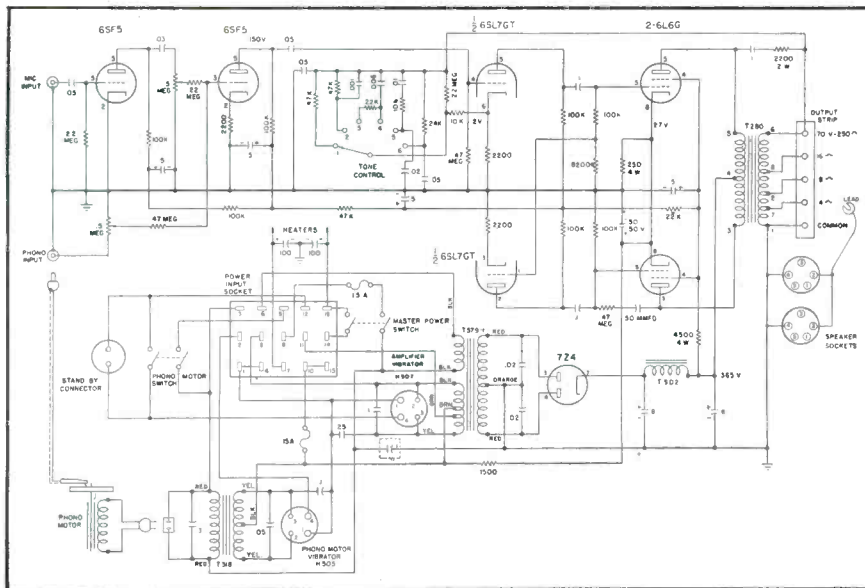
found it to be 4.6 ohms. This, multiplied by 1.3 (the resistance-impedance ratio) would reveal the voice coil impedance as approximately 6 ohms. Applying the 1.5 volts *ac* to the secondary winding, suppose the *ac* voltage across the primary was 115. By using the foregoing formula, we can change

$$\left(\frac{E_{pri}}{E_{sec}}\right)^2 \text{ to read } \left(\frac{115}{1.5}\right)^2 \text{ or}$$

$(76.6)^2 = 5867.5$. Multiplying this number by the voice coil impedance (6 ohms), we arrive at the result, or 35,205 ohms reflected primary impedance. This is the actual plate-to-plate impedance when the secondary is terminated in a 6-ohm voice coil. It will change considerably if any other value of voice coil winding is used. By using the foregoing equation and employing different voice coil terminations, it will be possible to obtain almost any number of primary impedances to match different tube combinations. For example, in the transformer measured, the primary impedance will change from 35,205 to 47,000 ohms if a speaker having an 8-ohm voice coil is substituted, or to 23,500 ohms with a 4-ohm voice coil. For all practical purposes, the voltage ratio between primary and secondary windings is equal to the turns ratio. Thus, the transformer just measured would have a turns ratio of approximately 77:1.

In *pa* systems using more than one speaker, each speaker unit must be properly phased with respect to the other; all speaker cones must move in and out together (Fig. 1). Otherwise,

Fig. 2. Bogen H625 twenty-watt amplifier, which operates on 6 v *dc* or 117 v *ac*. Included in system is *dc*-operated phono motor. Total power drawn on 6-volt storage battery is 14 amps.



dead-spots and sound-wave interference will result and the overall efficiency of the system will be impaired. Voice-coil phasing can be checked by connecting a 1.5-volt flashlight battery across the voice coil of one speaker, polarizing it so that the cone moves outward when the battery voltage is applied. This test should be made with each speaker in succession, making absolutely sure that the same battery polarity (positive or negative) has been applied to the same corresponding voice coil terminal in each speaker. For these tests, the hum-bucking coil, if one is used, should be shorted out. If the cone of any of the speakers moves inward when battery voltage is applied, the voice coil leads should be reversed. For future reference, the voice coil terminals should be marked as being positive or negative. For parallel connections, all positive terminals should be tied together. In series connections, proper phasing can be obtained by connecting the positive lead of one speaker to the negative lead of the next, etc.

In electrodynamic speakers, it is important that the field coils also be polarized or phased. The terminal or lead being more positive in voltage may be determined by voltage measurement from each side of the coil to ground. This lead should be marked and should be in the same position with relation to the voice coil, in all speakers.

Speaker rattles at a particular frequency, caused by loose voice coil windings, cracked cone surfaces, vibrating voice coil leads, loose mounting bolts, etc., can be found by applying an audio signal to the amplifier and varying the frequency until the

Matching Methods of Detecting Trouble in Power Supplies Using Synchronous and Non-Synchronous Vibrators . . . How to Replace Vibrators Searching and Curing Such Troubles as Hum, Noise, Hash, Interference, etc Determining Sizes of Power Cables Used Between Power Supply and Storage Battery in Car Setups.

by **JOHN B. LEDBETTER**

Engineer, WKRC-TV

rattle appears. Vibration and resonant spots in baffles, cabinets, and room surfaces may also be located by this method.

Since the Service Man is often required to repair and maintain battery-operated *pa* systems, he should be familiar with problems peculiar to this type of equipment.

The amplifier, itself, is susceptible to the same troubles and circuit failures as the *ac* amplifiers previously discussed and may be treated or serviced in the same manner. It is in the power supply and in the various methods of amplifier installation that unusual problems will be found.

The type of power supply used depends on the power required to operate the amplifier system and the current limits of the low-voltage *dc* source. Some of the more common forms of power supplies are: vibrator packs, *dc* to *ac* converters, dynamotors, and battery-operated or gasoline-

driven *ac* generators. Since each type has its own drawbacks and advantages, the final choice of a particular unit depends on individual operating requirements and available power facilities.

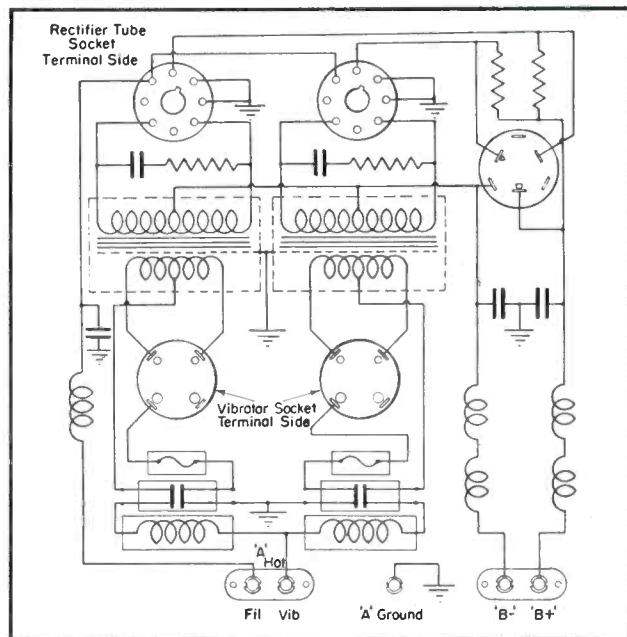
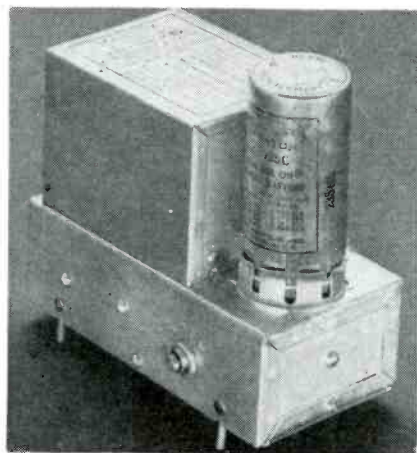
For *pa* systems with outputs up to and including 20 watts, the vibrator supply is recommended and generally used; Fig. 2. Some of the more outstanding advantages of vibrator packs over other types of supplies are: high operating efficiency with comparatively low battery drain; ease of installation and removal for servicing; lightweight; compact construction; low initial cost; low upkeep, and dependable, relatively trouble-free operation.

Vibrator supplies, available in various types and sizes and with outputs up to 60 watts at 300 or 400 volts *dc*, may be had with *dc* inputs of 6, 12, and 32 volts and 110 volts *ac* if desired.

A 20-watt mobile *pa* system similar

Fig. 4 (right). Non-synchronous power supply; Mallory VP-555.

Fig. 3a. Synchronous supply; Mallory VP-551.



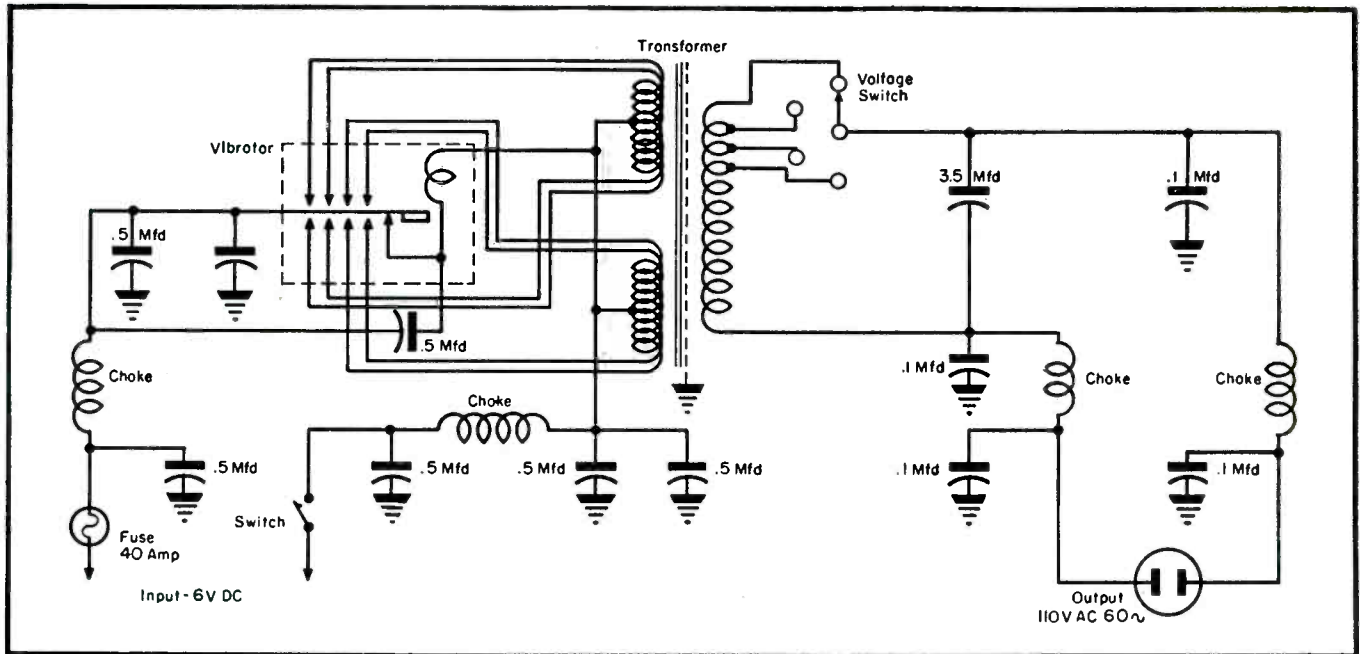


Fig. 5. A 6 v dc to 117 v ac converter, rated at 100 watts continuous output, 125 watts intermittent; Radiart 6R10 ViPower.

to that illustrated in Fig. 2 will provide a reasonably high output, especially if it is equipped with one or more exponential horn speakers. The vibrator supply (drawn about 11 amperes) often may be operated directly from the regular automobile battery. If the system is used extensively while the vehicle is not in motion, the vibrator power supply should be provided with a separate storage battery, or the regular automobile generator replaced with a heavy-duty unit capable of supplying enough current for both the automobile and *pa* system. If a separate battery is used, the generator output current must be capable of charging both batteries. A trickle charger should also be connected across the *pa* battery when the automobile is stored or left idle for long lengths of time.

Incidentally, quite a few speakers used in mobile systems are of the dynamic type. A worthwhile reduction in battery drain can often be realized by replacing these units with *pm* speakers, and installing a 12 to 15-henry, 100 to 200-ohm choke in place of the speaker field.

Vibrators

The two basic types of vibrators in general use are synchronous (self-rectifying, Fig. 3) and non-synchronous (Fig. 4). The non-synchronous type is available as either half-wave or full-wave, but since the latter requires less filter capacity and generates much less *rf* interference or *hash*, it is generally preferred by manufacturers and sound men.

The synchronous type does not

require a rectifier tube, but it is higher in cost and more likely to require adjustment. In the non-synchronous full-wave vibrator packs, two types of rectifier tubes, the 6X5 and 0Z4, are generally used. The cold-cathode 0Z4 may be used where the lowest possible battery drain is desired. For these tubes, however, the minimum or resting load current must be at least 75 ma. If the amplifier does not draw this much current under *no load* conditions, it is better to use high-vacuum tubes such as the 6W5 or 6X5. In most cases the 6X5 tube will give longer life and less trouble than the 0Z4.

Either type of vibrator supply may be employed as long as the negative return of the *pa* amplifier is grounded. If, however, the ground return is in series with resistors, chokes, or the speaker field to obtain bias voltages, a non-synchronous or tube rectifier pack *must* be used.

Among the troubles most common in vibrator power supplies are: no output voltage; low or varying output voltage; vibrator interference; intermittent operation; hum; and noise. Whenever possible, a faulty power supply should be checked with its own battery. In this way, much time can be saved in the event the trouble is in the battery itself.

Battery failures are generally due to excessive discharge rate; loss of electrolyte; low water level; one or more shorted cells; or (externally) to a short or excessive load in the power supply circuit.

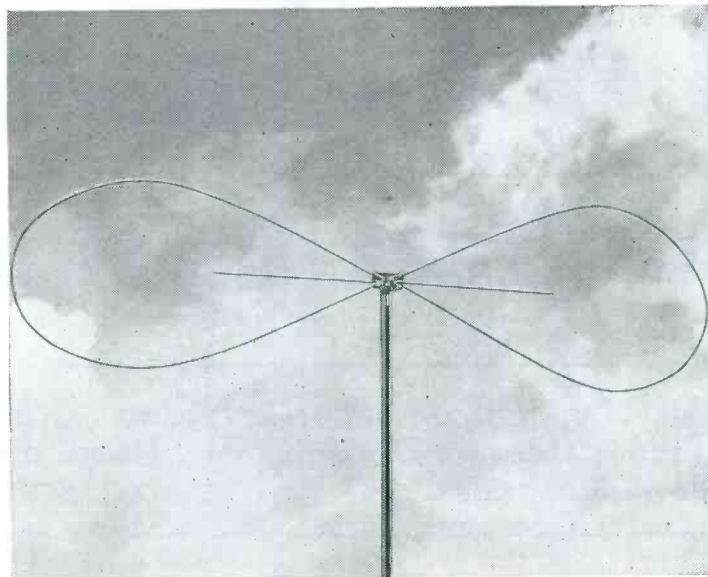
If the power supply is inoperative, the fuse should first be examined. A

blown fuse may indicate stuck vibrator points, shorted filters, a leaky or shorted rectifier tube, shorted windings in the power transformer, or an overload in the *B* circuit of the amplifier unit. A blown fuse may, of course, indicate nothing more than a fuse of insufficient rating or a defective insulating sleeve in the fuse container. The possibility of shorts in any part of the primary *A* circuit should be checked before the power supply is turned on. The fuse container and *A* leads should also be checked for poorly soldered joints or corroded connections.

After the primary circuit has been thoroughly examined, the supply should be turned on. Lack of output voltage may be due to an inoperative vibrator, one or more shorted filters, or a defective rectifier tube. If the vibrator does not operate, its points may be stuck or the lead wires broken. Its condition may be determined by removing the case and examining the reed and contact points. An overheated reed, or points which have become pitted or which show definite signs of arcing, are due to an overload or short in the high-voltage secondary or in the *B* positive circuit. The filters should be checked for capacity and leakage. The buffer capacitors should in all cases be checked or replaced before installing a new vibrator. Oil-filled units of the correct capacity and having a working voltage of at least 1600 volts *dc* should be used.

Pitted or worn vibrator points should not be filed or adjusted. Once the relatively thin tungsten facings

(Continued on page 64)



**THE ANSWER
TO INSTALLATION
PROBLEMS**

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and it sells for **\$2⁹⁵** Suggested List

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There is nothing to assemble with the Butterfly. Just take it out of the box and mount it to the mast — for fine television.

The Butterfly will save you time and money — not only in installations — but by eliminating call-backs. Constructed from Dural, with stainless steel fittings, the Butterfly withstands winds up to 75 mph, is unaffected by any weather conditions, and cannot corrode.

This is a quality antenna — even though the price is low. It receives all 12 TV channels and FM radio, eliminates ghost images, and brings in a strong, sharp signal. It is designed for high signal areas, only.

The Econ-a-Ray Butterfly comes individually wrapped, 12 to a carton. Order yours today from your distributor.

TEL-A-RAY manufactures a complete line of TV and FM antennas including the Model T Reception Master which brings television to homes 200 miles away from the nearest station. All are guaranteed against weather and wind damage. We will be glad to send you our catalog.

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Auto Radio

Tools and Test Equipment

Instruments Required for Shop and Outdoor Servicing . . . How to Set Up Audio Tests . . . Installing Extension Facilities . . . Hand and Power-Tool Requirements . . . Meter Applications.

by JACK DARR

Quachita Radio Service

THE AUDIO TEST section of the auto test bench is quite important, serving as a check on many problems in receiver installation and operation. Especially useful for this work are the special plugs for the speakers which can be made up out of some of the old plugs around the shop. Late model Ford chassis, for instance, used a small three-prong plug. A plug for this model can be built by cutting off one of the pins from a small four-prong battery-pack plug. The type used on the small Philco portables made a few years ago, was found excellent for this purpose. Motorola, for several years has connected their speakers, battery lead, etc., to a row of large jacks, on the top of the case. A banana pin will fit these. Thus, at least one pair with

bananas should be available. Identifications can be stamped on the set case. Older model GM and United Motors sets used a special three and four-prong plug for the speakers. Replacements will be hard to find. If you can't find a duplicate, clip leads will serve very well. Several years ago Wells-Gardner built some chassis for Western Auto with three-prong speaker plugs, which resembled the old RMA 45-volt B-battery plug. There is a male plug on the set end, and this clip can be used for testing. Some sets use a two-prong plug which is identical with the RMA 1.4-volt A-battery plug.

Test Instruments

An auto-radio Service Shop should have the following instruments: vac-

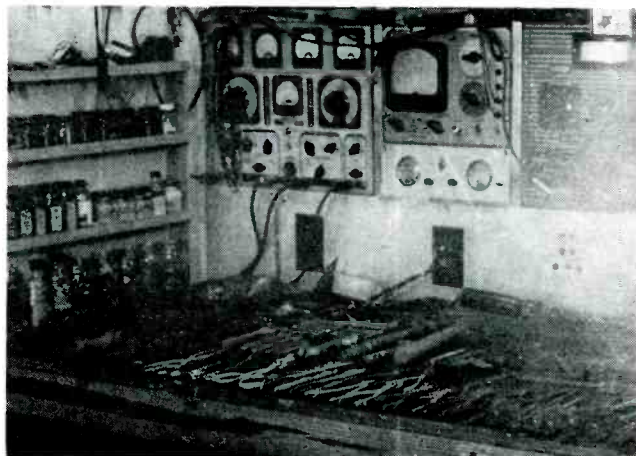
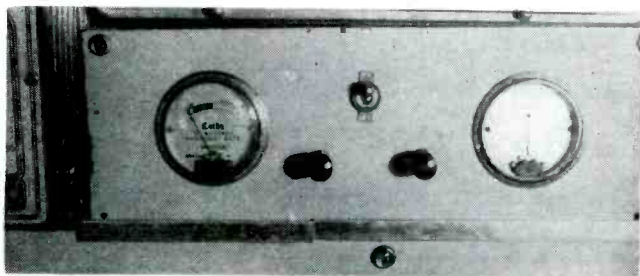
uum-tube voltmeter, preferably one which will read *ac*, *dc* voltage and resistance, all electronically; accurate FM-AM signal generator, which can supply both AM signals for calibration and a suitably-swept signal for FM alignment with a 'scope; capacitor tester, preferably of the bridge type, which will read both capacity and leakage, with a power-factor test for electrolytics, and a breakdown-voltage test for coupling and buffers; a 'scope, from 2" on up, which will be useful for alignment work and invaluable for testing vibrator power-supplies; and a portable volt-ohmmeter, preferably a 20,000 ohms-per-volt type. Signal tracers have also been found very

(Continued on page 60)

Right:

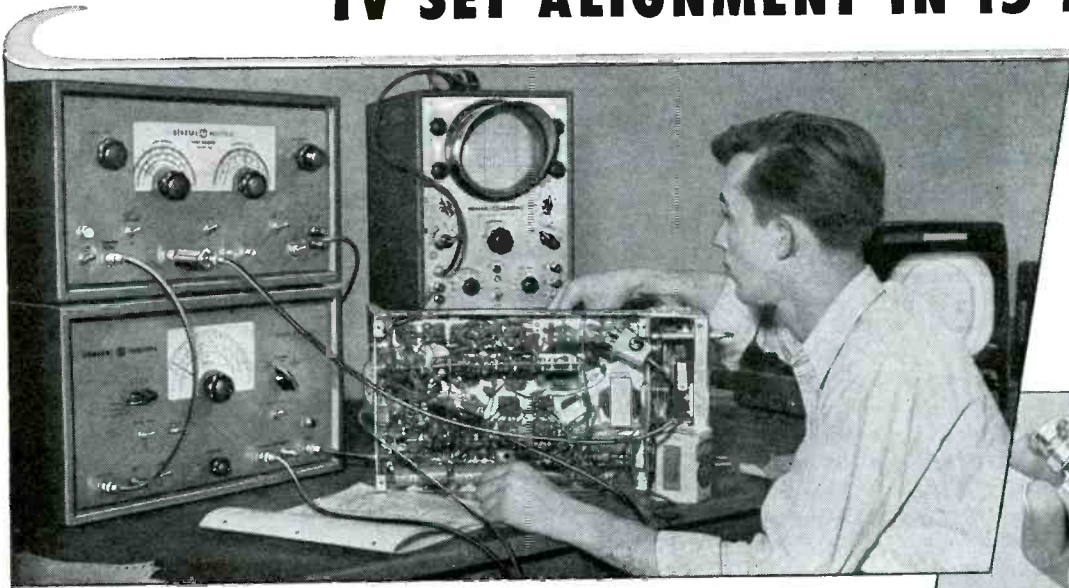
Variety of tools required for auto radio service work.

Battery charge rate ammeter (left) and ammeter for indicating drain of set under test. Charger switch is in center. Binding posts below are used as connecting leads.

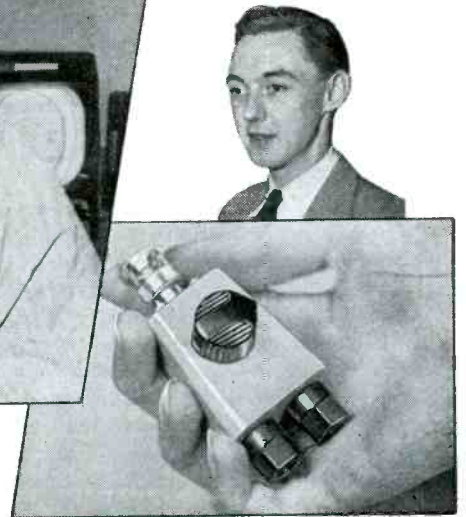


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SER-CUITS

Analysis of the Common IF Amplifier, Incremental Version of Tapered Line Tuner, Horizontal Linearity System, Gated AGC Amplifier, and Vertical Retrace Suppression Method Used in New Philco Chassis.

WITH THE ADVENT of the annual mid-summer new-model season, industry has witnessed the display of many streamlined TV chassis with a variety of circuitry innovations, involving simplified tuners, improved linearity systems, high-gain *agc*, and provision for round as well as rectangular types, the latter being featured in most models.

An interesting example of this trend appeared in the Philco sets, which were shown at a special Service meeting in Philadelphia, several weeks ago. These models use a new thin-necked 12½" round tube, standard

52° deflection round tubes, and a complete line of rectangular types of 14", 17" and 20" sizes with 65° and 70° deflection, as well as the 16" 70° round type.

Among the significant developments in these new receivers are a common *if* amplifier and an incremental version of the tapered line tuner.

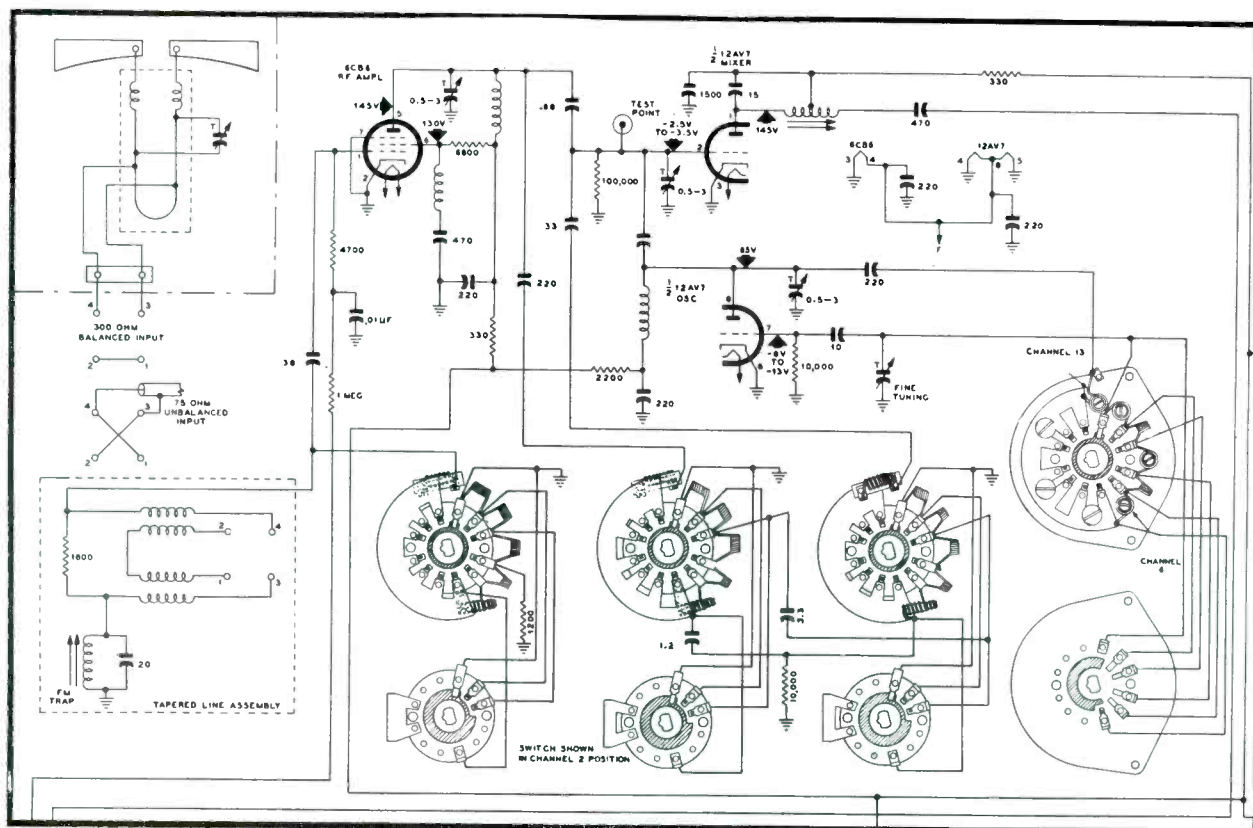
The *if* amplifier has greater attenuation outside the desired pass band to provide an improvement in the rejection of adjacent channel signals. Also included is a modified adjacent picture trap to produce an improvement in tuning characteristics. With the

trap tapped and moved to 21.85 *mc* there is a slight rise in response from approximately 23.6 to 22 *mc*. Thus the sound can remain strong, as the picture carrier is placed higher on the common *if* response by use of a fine tuning control. This improvement was found to correct the so-called split-tuning effect, where it was not possible to get best picture and sound together on a weak signal.

The Tuner

The tuner in the 1443 chassis is an incremental version of the tapered

Fig. 1. Philco tuner system (No. 76-5747) featuring an incremental version of the tapered line tuner.



line tuner. Tuned circuits of the various stages are each made up of inductances which are added in series in tuning from the highest channel down to the lowest channel. A 12AV7 dual triode serves as the mixer oscillator. The *rf* amplifier is a 6CB6, an improved 6BC5 with separate cathode and suppressor grid connections which provides reduced feedback and thus less regeneration. The special values of the grid resistor and *agc* bypass capacitor were selected to provide better impulse noise performance resulting in a reduction of *white noise* on the picture tube by preventing blocking of the *rf* grid.

In addition, two 5AX4GTs have been included in place of the three 5Y3GTs used in earlier models as the low voltage rectifiers. Also used is a single 6CD6G in place of the two parallel 6BQ6GTs as a horizontal sweep output tube.

The type 33 *rf* chassis and type C1 power chassis as used in the 1601, 1602, and 1634 models differ only slightly from the 1443 series. The *rf* chassis has a 7C5 in place of the 6V6GT and the power chassis has a voltage doubler using two 1X2s in place of a single 1B3GT. There are two 5U4Gs in place of the 5AX4GTs.

Of interest in the 1601 series is the horizontal linearity circuit which provides a greater range of linearity adjustment by allowing some of the ripple of the sweep pulse from the 6W4GT to be fed back to the output transformer. Varying the slug of the linearity control varies the phase and amplitude of the ripple current so that a wide range of control is available. Feedback from the yoke to the grid of the 6CD6 is used to improve retrace characteristics and thus improve width and high voltage.

In a model identified as 1443P there is an RT-4 AM tuner only, for operation on an external power supply. Provides a pentagrid mixer oscillator, one *if* amplifier, diode-triode detector—audio amplifier. The audio amplifier is used as a phono preamp only. It is not used for radio.

In the common *if*, featured in the 1836 model, automatic compensation of response is obtained.

Automatic adjustment of the response of the picture *if* carrier of 26.6 *mc* is obtained in the second *if* stage by connecting a 12-mmfd capacitor between the grid and unby-passed cathode and by applying *agc* voltage to the grid.

The circuit constitutes a variable capacitive reactance which increases with decreasing *agc* bias so that the 25.5-*mc* circuit in the plate of the first *if* is tuned higher in frequency as the *agc* voltage decreases. Thus, the re-

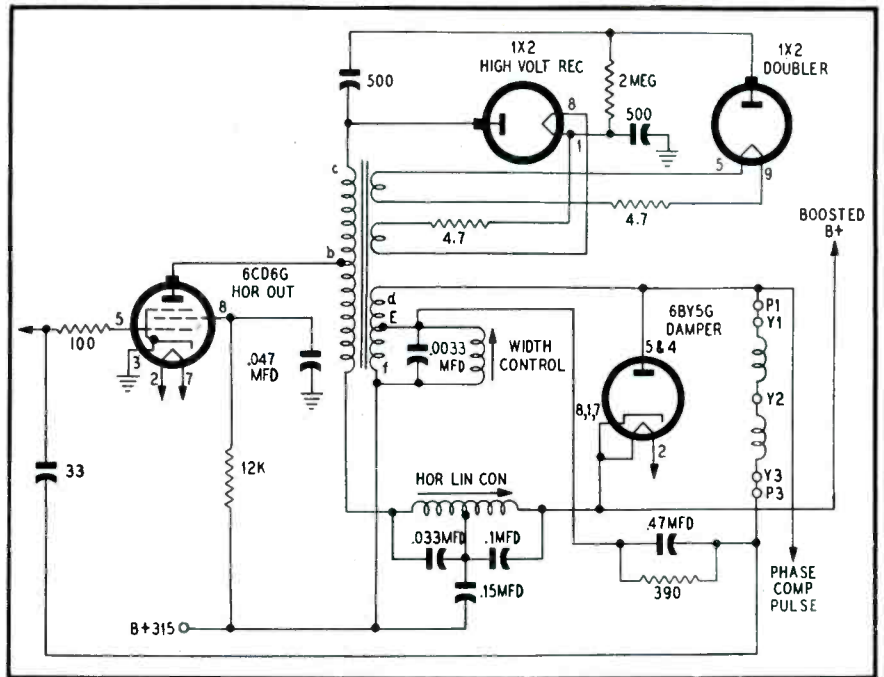


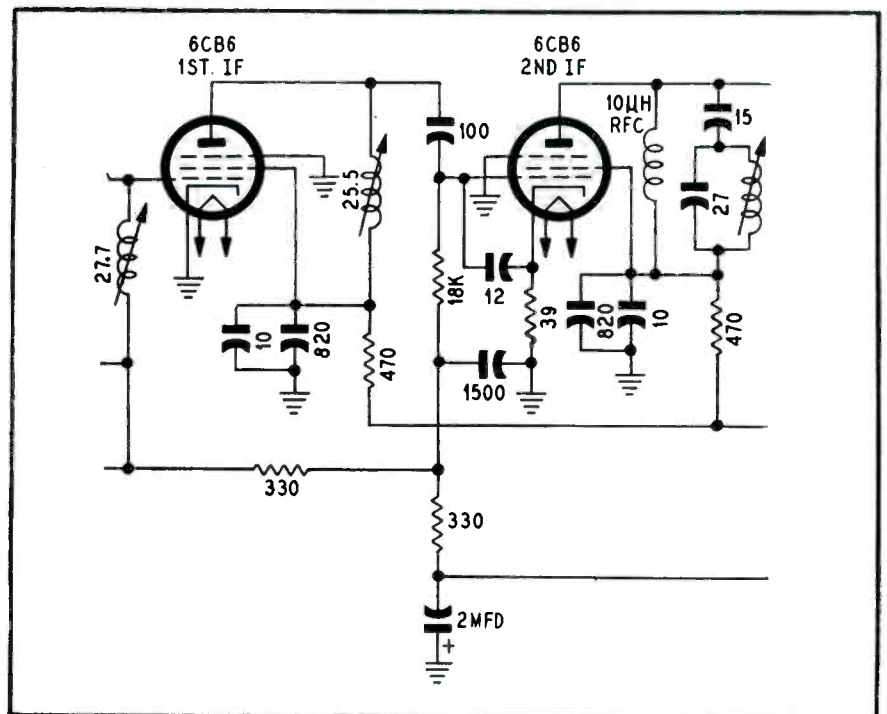
Fig. 2. Horizontal linearity circuit of the Philco 51-T1601.

sponse is increased at the picture carrier frequency for improved contrast and good sync performance on weak signals. The reactance effect of the second *if* stage cathode-to-grid capacitor can be explained as the opposite polarity of the *Miller effect*, in which capacitive feedback between the grid and plate produces a variable capacitive reactance at the grid. In other words, the voltage developed across the cathode resistance will be opposite

in phase to the voltage across the 12-mmfd capacitor between grid and cathode.

This follows from the fact that the plate resistance of a pentode is so high, that for all practical purposes the plate (and cathode) current is in phase with the grid voltage for practical values of reactance in the circuit. Since the impedance in the cathode is a resistor, the voltage across it will be in *time phase*, but opposite in polarity to the

Fig. 3. First and second stages in the common *if* chain, where automatic compensation of response is obtained. This system is featured in the Philco 51-T1836.



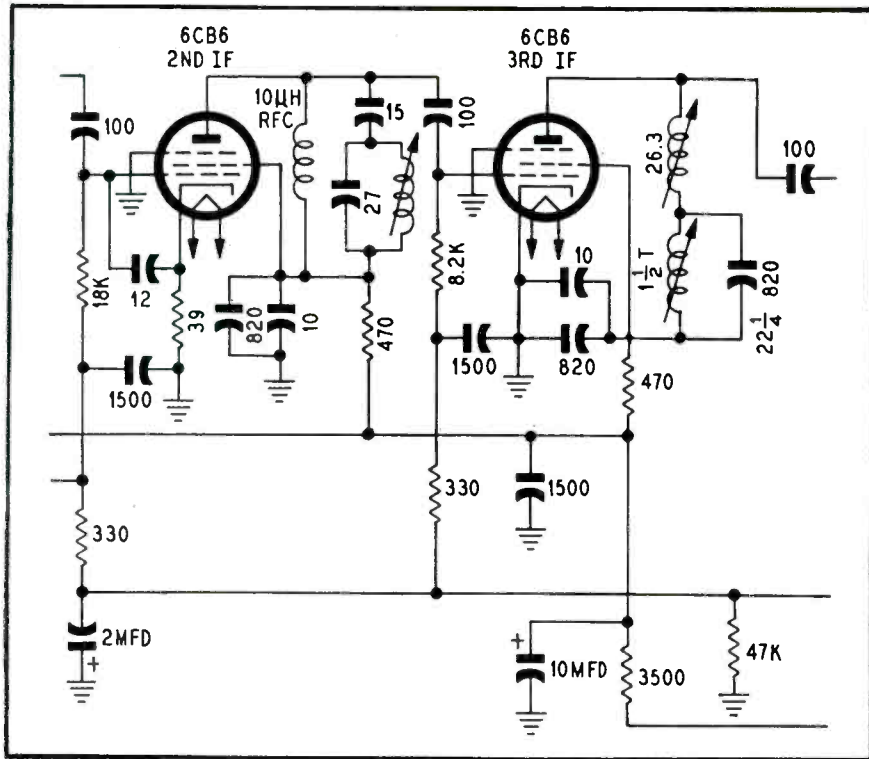


Fig. 4. Second and third *if* stages in the Philco 51-T1836.

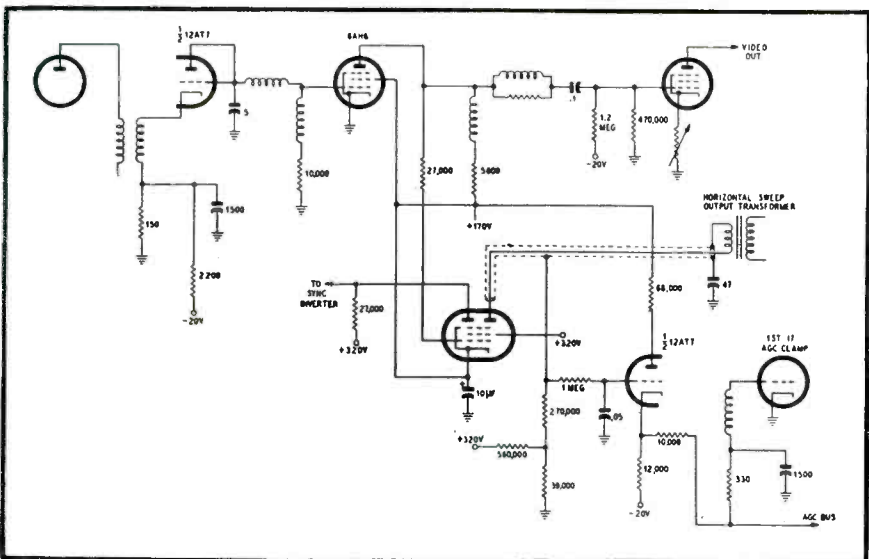
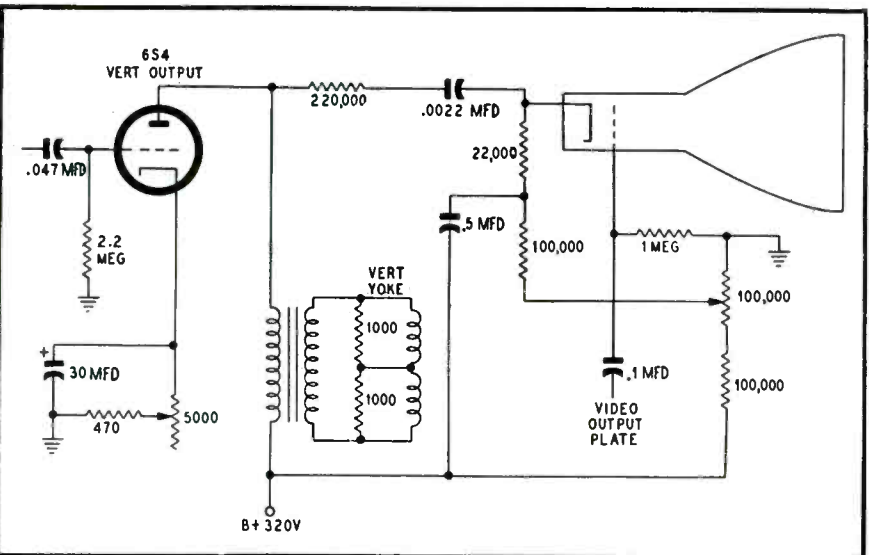


Fig. 5. Gated *agc* amplifier of the Philco 51-T1836.



voltage across the 12 mmfd unit, so far as the grid is concerned. Therefore the voltage across the cathode resistor will oppose the voltage across the capacitor or it will make the capacitor look smaller. As *agc* voltage is reduced the voltage across the resistor will increase making the capacitor look still smaller.

The control of response by this circuit will vary the response at 26.6 *mc* from approximately 35% at high signal levels to approximately 80% at low signal levels. As a result, it has been found that contrast and sync levels remain optimum.

To maintain sound sensitivity, automatic control of response at 22.1 *mc* is provided by leaving the resistor out of the cathode of the third *if* stage. Thus, it acts as a small variable capacitive reactance due to voltage feedback from the cathode which has some inductance in internal leads. The reactance variation tunes the 23 *mc* trap in the plate of the second *if* lower in frequency with decreasing *agc* voltage, thus increasing the response at 22.1 *mc* to provide more sound sensitivity. The cathode of the first *if* stage is grounded also, to move the 27.7 *mc* circuit on the grid lower in frequency to contribute toward increasing the response at picture carrier for low *agc* voltage.

The 23 *mc* trap in the second *if* plate and the 22.25 *mc* trap in the third *if* plate have been carefully proportioned in combination with a series capacity in the first case and a low *L/C* ratio in the second, so that their combined effect produces a rising sound shelf at 22.1 *mc*. The series capacity makes the 23 *mc* trap broad at the low frequency side and the low *L/C* ratio makes the 22.25 trap dip on the high-frequency side.

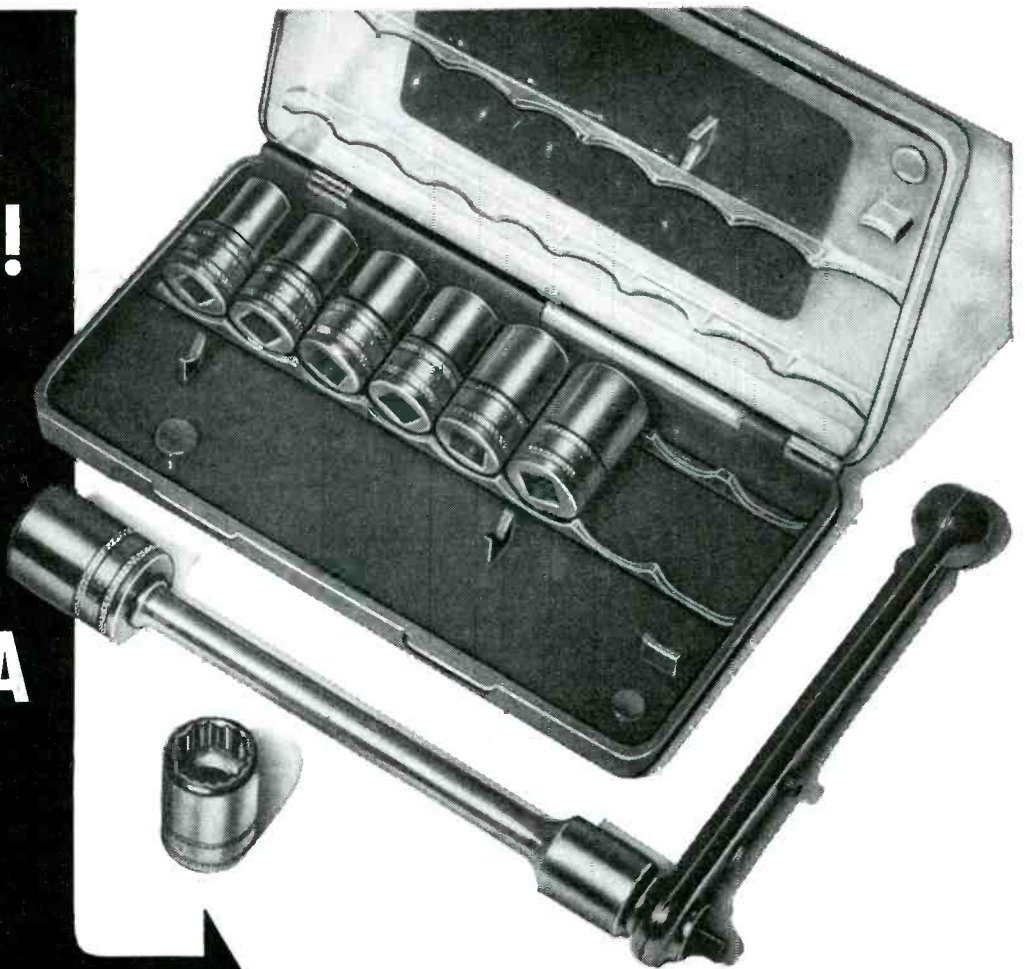
Effective sync and *agc* performance are obtained in a new circuit which combines the functions of a gated *agc* amplifier and *dc*-coupled, fixed bias sync separator in a single, special tube. The grid and cathode of the special dual-plate pentode are connected across the first video plate load with the grid connected to the video amplifier plate, through a decoupling resistor, and the cathode to *B+*. Under these conditions the special pentode will be cutoff except during sync tips due to the voltage drop across the

(Continued on page 62)

Fig. 6 (left). Circuit which provides vertical retrace suppression in the Philco models.

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Servicing Helps

by M. A. MARWELL

RCA T100, T120, TC124, TC125, TC127, TA128, TA129

Deflection Changes: In the 10" and 12" television receivers recently produced two different types of deflection yokes were used; the older type which had an iron wire wrap core, and the new type yoke with a powdered iron core. The two yokes can be identified by the housings, the older iron wire wrap yoke having a cardboard outer housing, while the new powdered iron yoke has a moulded bakelite housing.

The two yokes are not directly interchangeable, for while the iron wire wrap yoke will work in the circuit designed for powdered iron core yoke, the powdered iron yoke can not be employed in the circuit designed for the iron wire yoke unless suitable circuit modifications are made.

Early T100 and T120 receivers with straight deflection systems employed a 1-megohm resistor for R_{181} , when the iron wire wrap yoke was used. Later some were built using a 150,000-ohm resistor, which gave more width and high voltage with the wire wrap yoke. When the powdered iron yoke is employed, the 1-megohm resistor, R_{181} , must not be less than 470,000 ohms (which affords greatest width) nor

higher than 1 megohm (which provides the best linearity). A 470,000-ohm has been found to be an ideal compromise and is being used in production.

In receivers employing the *electronic magnifier* deflection circuit, R_{181} was 470,000 for the iron wire wrap yokes. This value has been changed to 220,000 as a compromise value for both types of yokes.

Vertical Non-Linearity: T120 receivers employing the powdered iron core yokes require another modification to prevent poor vertical linearity; has appeared as cramping at the bottom of the picture. The non-linearity was corrected by raising the vertical oscillator plate voltage by changes in the *B* boost filter as shown in Fig. 1. This change was also found to prevent the formation of an extremely bright spot on the screen immediately after the set is turned off. If C_{140B} develops excessive leakage it will cause the picture to be cramped at the bottom.

RCA Chassis

EM-PM Focus Coil Troubles: In some chassis, it has been found that it's difficult to reach focus with the focus control. The trouble has been found due to:

- (1) Incorrect placement of the coil on the picture-tube neck.
- (2) Too much *pm*.
- (3) Too little *pm*.
- (4) Polarity of the *em* winding reversed in color code or hookup.

In the normal placement of the coil the front plane of the coil is approximately $\frac{1}{4}$ " behind the back cover of the yoke. Moving the coil back on the picture tube will, in effect, be the same as reducing the total flux of the coil. Some cases of too much *pm* can be thus corrected. In a few such cases, the correct focus was obtained at the sacrifice of loading spring tension. It is suggested that washers be used to bush up the springs if they are too loose when the correct focus is obtained. Under no circumstances should the *em* portion of the coil be reversed to compensate for too much *pm*. Doing this will eventually run the *pm* down to zero and make the coil useless along with producing a service call every week or so.

It may appear that an *aiding* flux might gradually increase the *pm* flux. Such is not the case because the *pm* material is magnetized to a greater density than the *em* portion.

Polarity may be checked by the following method:

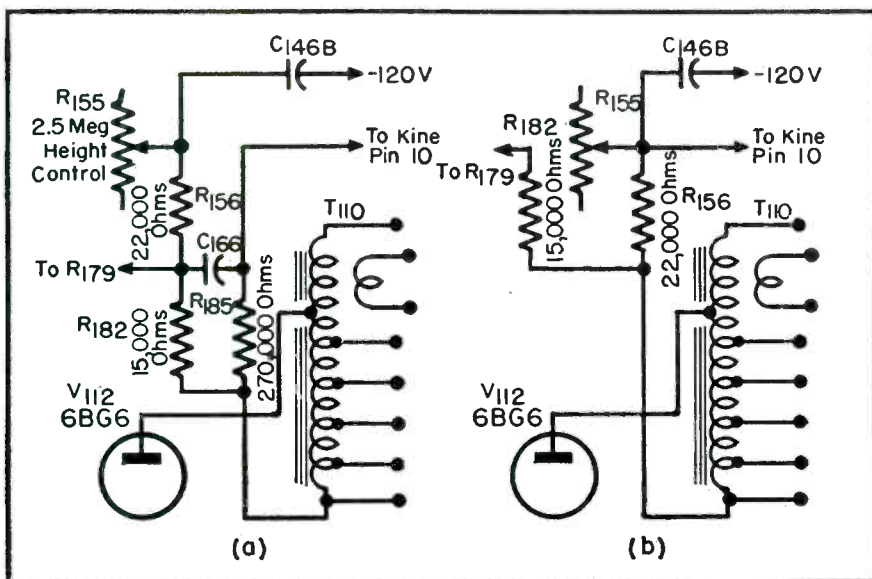
- (1) As good a focus as possible should be secured with the coil up against the yoke. The voltage across the *em* winding should be noted.
- (2) The coil should then be moved as far to the rear as possible and the focus control turned so that *condition 2* approximates *condition 1* in appearance. The voltage across the *em* winding should be noted, and the voltage across the *em* winding should be higher in *condition 2* than in *condition 1*.

The effects of magnetism are minimized as the coil is moved to the rear, so that more magnetism must be supplied.

If the *condition 2* reading is lower, or if no satisfactory comparison can be obtained by adjustment, then the *em* winding is reversed and should be re-connected in the proper way.

A tag should be attached to the set to indicate a change if the color code

Fig. 1. Modified *B* filter connections in RCA T120 chassis to correct for non-linearity. Circuit in (a) is for the iron-wire wrap type yoke, and the circuit in (b) is for the powdered iron yoke.



RCA TV Chassis Service Hints: Deflection Yoke Circuit Changes... Preventing Poor Vertical Linearity... Eliminating EM-PM Focus Coil Troubles... High-Pass Filter Cutoff Remedies... Minimizing AM Broadcasting Interference. G.E. Hi-Channel Interference Traps. Admiral TV Receiver Service Help Suggestions: Eliminating Adjacent Sound Interference... Removing Picture Window and Control Escutcheon Static Charge... Polishing Mars and Fine Scratches on Plastic Escutcheons. Correcting FM Drift in Stromberg-Carlson Chassis.

is incorrect so that some future Service Man knows what has been done.

If position and polarity have been checked and it is discovered that there is too little *pm*, the entire coil must be replaced. The 6BG6 supply should not be reconnected to add to the focus current because it overloads the coil and the shunt potentiometer.

On some sets it will be found that by shorting the 10-ohm resistor, enough control will be obtained. This should not be done since the focus potentiometer would be overloaded if the arm is set near the short circuit end. Moving the coil toward the rear will solve a problem of this type and still permit good focus with the 10-ohm resistor in the circuit.

RCA KRK-5/7 RF Units

High-Pass Filter Cutoff Remedy: In some units the addition of a 1.5-

mmfd capacitor, Fig. 2, in parallel with C_{22} , has been found necessary since that capacitor was reported running on the low-capacity side of its tolerance and causing the high-pass filter to cut off at too high a frequency, thus placing a tilt in the channel 2 *rf* response.

Broadcast Interference: In some instances, where a TV receiver is in operation on a weak signal, but near a strong AM station, interference has been experienced. It has been found possible to cure this by inserting a 100-mmfd capacitor between the high side of T_{115} and T_{116} , as illustrated in Fig. 3.

GE 810, 811, 814, 820, 830, 835 and 840

Hi-Channel Interference Trap: The addition of a 1.5-15 mmfd trimmer to the head-end unit has been found to minimize high channel-interference,

such as channel 8 being received on channel 5 and channel 10 on channel 6; Fig. 4 (p. 50). The trimmer is connected between the low side of L_3 and to ground. The rotor side of the trimmer should be connected to ground at the ground lance to which R_1 and C_1 are soldered.

The channel selector switch S_1 is open on low-channel reception, connecting the added trimmer in series with L_3 . This makes a series resonant circuit of these components, which when properly adjusted will effectively reduce the subject interference. On high-channel reception, the trimmer is switched in parallel with C_2 (1,500 mmfd), making the trap circuit inoperative so that it has no effect on the normal high channel operation.

With the receiver tuned to the low channel and the interfering high channel station operating, two minimum points of interference will be observed when turning the trimmer from the maximum capacity position. The first minimum indicates that the trap is tuned to attenuate the high channel fundamental and the second minimum indicates tuning to the second harmonic of the local oscillator. The best point of adjustment for the least interference is the second minimum point or when the trap is tuned to the second harmonic of the local oscillator.

The first minimum results in an attenuation of 45 db, while the second minimum gives approximately 83 db attenuation. Thus it is very important to tune for the minimum interference at the lowest capacity setting of the trimmer.

Admiral 20A1, 20B1, 21A1

Eliminating Adjacent Sound Channel Interference: In areas where any two adjacent channels may be received, the sound transmission from the lower

Fig. 2. Addition of 1.5-mmfd capacitor in RCA *rf* unit high-pass input filter.

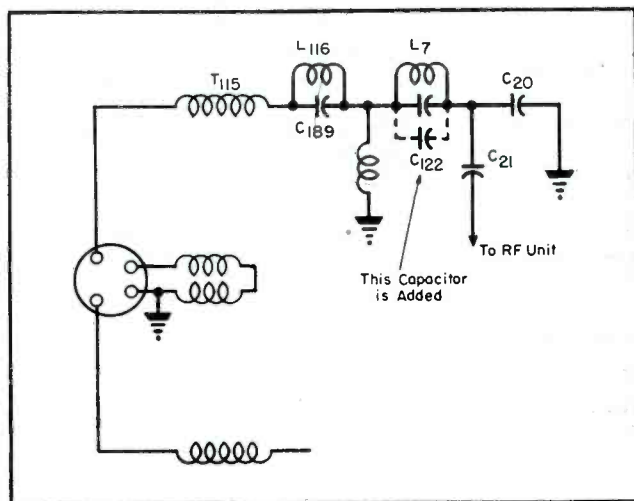


Fig. 3. RCA *rf* unit modified through insertion of 100-mmfd capacitor to minimize broadcast interference.

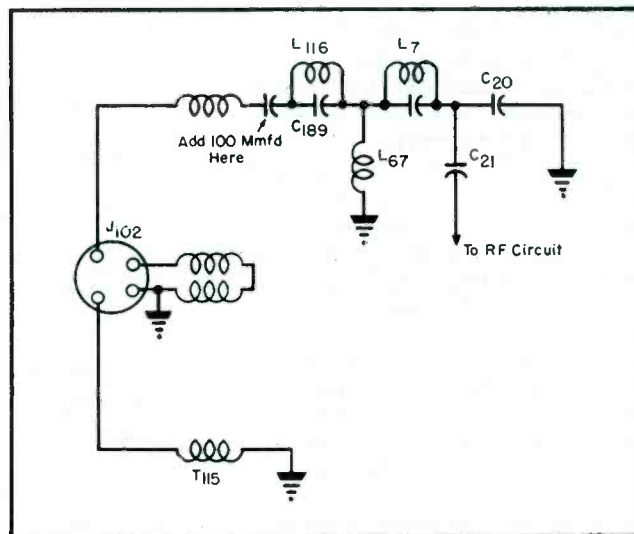


Fig. 4 (below) Hi-channel interference trap circuit for G.E. TV chassis.

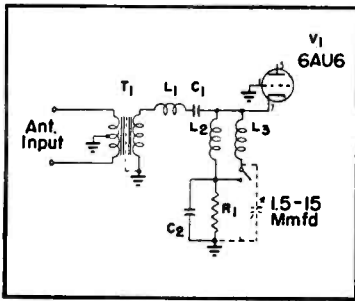
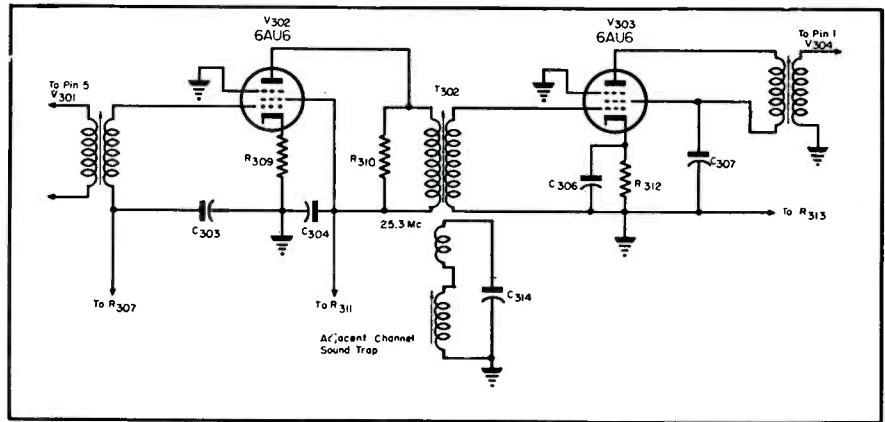


Fig. 5 (right). Adjacent channel sound-trap circuitry developed for Admiral chassis.



channel may cause interference on the picture of the higher channel.

This type of interference may be reduced to a minimum or eliminated by means of an adjacent channel trap fitted to the second video *if* amplifier.¹

The trap can be constructed by modifying another sound trap (L_{309} , part number 72 A 88-1) and installing as indicated in Fig. 5:

(1) Two turns should be removed from the coil at the end farthest from the slug screw and the coil resoldered to the lug on the form. The capacitor should not be removed.

(2) The white and the bare tinned leads should then be clipped from the coil.

(3) Then the cover should be removed from the video *if* strip and the video *ift* located.

(4) A short length (approximately 3") of insulated 24 or 26 gauge wire should then be obtained and approximately $1\frac{1}{2}$ turns wound in a clockwise direction on the *ift*. These turns should be positioned on the small diameter portion of the *ift* at the end farthest from the slug screw, with one end of the wire looped under itself, to hold the coil in position in a manner similar to the coupling coil of T_{301} .

(5) One end of the $1\frac{1}{2}$ turn coil should then be connected to the ground connection of the *ift*.

(6) In a large number of these chassis, an unused $\frac{1}{4}$ " hole will be found between the 6AU6s, but if the hole has not been punched, one should be drilled and the new trap inserted.

(7) The black lead from the new trap should then be connected to the ground lug of the *ift* and the loose end of the $1\frac{1}{2}$ turn coupling coil connected to the other lug on the new trap.

(8) The video *if* stages should now be realigned. Due to the slope of the video *if* curve, it will be difficult to align the new trap to 27.25 mc with a signal generator, so the slug must be adjusted for minimum interference on the picture. However, care must

be used when making this adjustment since it is possible to affect the video *if* bandpass if the adjustment is incorrectly made.

(9) A sweep generator and 'scope should be used to check the video *if* bandpass after adjustment to be sure the trap has not affected the *if* bandpass.

Admiral Chassis

Eliminating Picture Window and Control Escutcheon Static Charge:

It has been found that a charge will sometimes build up on the picture windows and control panel escutcheons on models with 16" and 19" metal picture tubes.

This charge may be eliminated by grounding the picture window to chassis ground. The charge on the control escutcheon, since it is built up through leakage from the picture window, will also be eliminated. A convenient way of doing this is by using an escutcheon ground cable assembly^{2, 3} with picture windows 23D61/23E62, or picture windows 23D61-1/23E62-1. This ground cable assembly consists of a spring clip, shielded braid and a solder lug.

The spring is fastened by the mounting screw on the lower right corner (facing rear of cabinet) of the 23D61 or 23E62 picture window using the screw hole nearest the end. A 6 x $\frac{3}{8}$ round-head wood screw should be used to fasten the spring to the cabinet.

The lug end of the cable assembly may be fastened to any convenient spot on the chassis, such as one of the mounting screws for the high voltage shield.

All present production 16" and 19" sets incorporate these ground spring assemblies.

Stromberg-Carlson 1121-1135

FM Drift: When FM drift is encountered on these models, the following corrective steps can be taken:

On the variable tuning capacitor,

¹Admiral T_{309}

short lengths of wire braid should be connected from the shaft wiping contacts to the *rf* tube shelf. Also at the four points, where the tie-bar of the variable capacitor is connected to the *rf* tube shelf, heavy wire braid should be used and soldered with a heavy duty soldering iron.

At the converter end of the *rf* tube shelf, where it is mounted to the chassis mounting bracket, solder should be sweated on along the butting junction.

The FM trimmers on the *rf* shelf may be loose, permitting heat, vibration, etc., to cause them to change slightly. If they can be turned easily, the lock-nut should be unsoldered and run down a fourth or half turn, as necessary to get a smooth but secure hold on trimmer screw. It can then be resoldered. Particular attention should be paid to the oscillator section.

Contact of the metal spacers to the tie rods between wafer sections at the oscillator end of the range switch should be checked. If they are floating or only grounding intermittently, they should be crimped down tightly against the tie rods and the tie bolts tightened.

Alignment of FM *if* and discriminator should be checked for proper bandwidth. The iron core slugs should also be checked for a snug fit, so that they will hold alignment. A *Vistac* compound that acts as a non-hardening filler can be used. Particular emphasis should be given to the iron core on the discriminator transformer secondary where a slight movement gives the same effect as oscillator drift.

Polishing Mars and Fine Scratches on Plastic Escutcheons*

Scratches that are deep must be sanded out with #400 or finer sandpaper; #400 wet or dry-type paper has been used with good results. Plenty of water must be used with the sandpaper. After the scratch is re-

(Continued on page 63)

²Admiral A3229. ³Admiral A3232.



A Masterpiece

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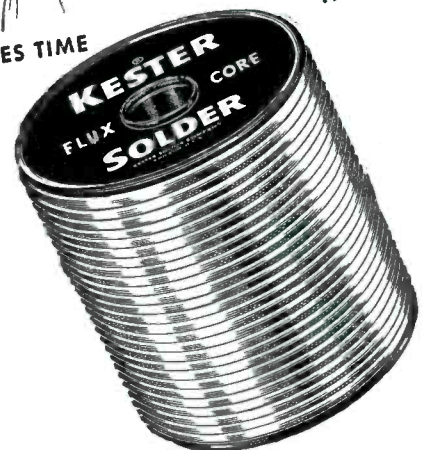


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by IRA KAMEN

Manager, TV Dept.
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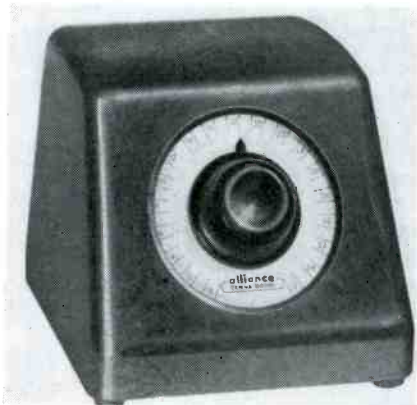
ADDRESS

CITY AND STATE

New TV Parts . . . Accessories

ALLIANCE TV ANTENNA ROTATOR

A *Tenna-Rotor*, model HIR, which features a pointer-type automatic control case, has been announced by the Alliance Manufacturing Company, Alliance, Ohio. Model incorporates a 4-conductor cable. Case has an indicator dial which may be optionally marked for new channels. Also has a *moving mystic light* along the dial which shows the antenna position while rotating. The pointer indicates the final antenna direction at all times.



* * *

PERFECTION BEAMAJUSTER

A control for centering television pictures, the BeamaJuster, has been developed by the Perfection Electric Company, 829 South State St., Chicago 5, Ill.

The unit, consisting of a pair of rotating aluminum plates, one of which holds a permanent magnet, is installed by snapping on the back cover of the TV tube yoke. Fits any standard yoke and is suitable for any size tube.

The picture is centered by rotating the outer plate. Fine adjustments are made by moving the outer plate up or down or to either side.

When used in place of electrical centering devices, the BeamaJuster is said to eliminate horizontal control, vertical control, and 1,000-mfd and 250-mfd capacitors.



* * *

TELREX UNIVERSAL CONICALS

A *universal series of conical-V-beams*, featuring 3-slot element clamps in both driven and reflector *butterflies*, has been announced by Telrex, Inc., Asbury Park, N. J.

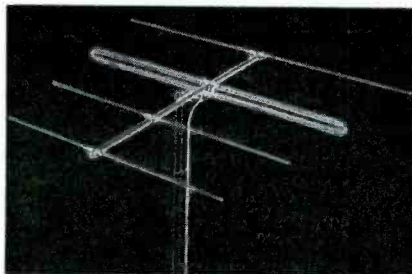
Series will be available as model U2X-TV (single bay), and model U4X-TV (two bay stacked array).

WARD ANTENNAS

An all-channel TV antenna, the *Flying Arrow* has been announced by the Ward Products Corp., Cleveland, Ohio. One model, TV-72, is said to combine high gain in the high band with effective performance on the low band, and pinpoint directivity. Constructed of $\frac{3}{8}$ " aluminum tubing. Another model, TVS-75, is a stacked array consisting of two single-bay *Flying Arrows*.

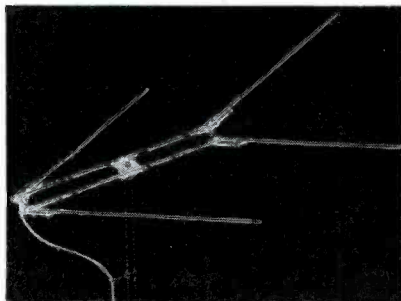
Also available from Ward is a *yagi*, based on the interlinking folded dipole principle. Features a built-in impedance transformer. Narrow beam width is said to permit maximum energy pickup, and pinpoint directivity with a high front-to-back ratio. Unit employs Jones and Laughlin *Perma-Tube* crossarms for horizontal torsional strength. Mast brackets take up to $1\frac{3}{8}$ " mast.

Stacking kits for stacking either high band or low band arrays can be supplied.



Above: Ward Yagi

Below: Ward Flying Arrow antennas



* * *

CROWN CONTROL ROTATOR

A rotator with an electric eye which flashes the position of the antenna has been announced by Crown Controls Co., Inc., 124 S. Washington St., New Bremen, Ohio. In operation, two flashes indicate east position, three flashes for south, four flashes for west, and continuously for north, which is the end of rotation. Intermediate points are indicated by one flash.



GOODLINE AIRLEAD

A twin-lead line in which 80% of the dielectric web between the wires has been removed is now available from Don Good, Inc., 1014 Fair Oaks Ave., South Pasadena, Calif. Lead, known as Goodline Airlead, is said to allow for the effective utilization of air for insulation affording low loss. The manufacturer also states that the standard close spacing of the wires and standard nominal 300-ohm impedance eliminates the losses through re-radiation due to poor balance to ground.

Lead is also claimed to eliminate excessive wet weather losses.

Lead can be used with standard insulators, and can be pulled taut without danger of bringing wires close together.

Composed of weather resistant polyethylene and nominal dimensions are $.375" \times .083"$. Specifications call for use of two 7 x 28 conductors. Packaged on reels in standard continuous lengths of 55', 100', 250', 500', and 1,000'.

Patent application for Goodline Airlead has been filed.



* * *

ELECTRO-VOICE SELF-TUNING BOOSTER

A 4-stage self-tuning TV booster, model 3000 Tune-O-Matic, has been developed by Electro-Voice, Inc., Buchanan, Michigan.

Booster, which can be turned *on or off* automatically by TV receiver switch, is said to require no separate tuning or adjustment after installation.

Regulation of gain is said to be made by tuning the receiver contrast control.

Unit is said to afford isolation of the receiver local oscillator and eliminates re-radiation.

Uses four 6J6 tubes. Power consumption, 20 watts. Input and output, 150-300-ohm twin lead.



* * *

TRANSVISION CONVERSION CABINETS

Conversion cabinets available with uncut front panel and proper mask for converting 10" or 12 $\frac{1}{2}$ " TV set to a 16" or 19" TV set, or for making combination-consoles with 3-speed phonos, have been announced by Transvision, Inc., New Rochelle, N. Y.

ASSOCIATIONS



ESFETA

AT A MEETING OF delegates of the Empire State Federation of Electronic Technicians Associations, Inc., held at Bayville, Long Island, the group were hosts to representatives of manufacturers and others who participated in the recent educational lecture series, coordinated by ESFETA.

A highlight of the occasion was the awarding of certificates to those who supplied speakers for the statewide series. Included on the award list were the publishers of this journal and TELEVISION ENGINEERING, who provided illustrated lectures on TV antennas for the meetings held in Binghamton, Rochester, Poughkeepsie and New York City. The certificate, officially presented by ESFETA, declared that . . . "The Empire State Federation of Electronic Technicians Associations awards this expression of appreciation to the *Bryan Davis Publishing Co., Inc.*, for its outstanding participation and contribution to the ESFETA TV Course, 1949-1950."

Among the guest speakers at this special meeting was Richard Devaney of PRSMA, Philadelphia.

During a business session of the conference, a resolution covering price practices was adopted. The resolution declared in part that . . . "The policy of jobbers . . . to sell to retail customers at wholesale prices is objectionable. . . . This practice deprives technicians of their contact with a potential customer and consequently a loss of their



Max Liebowitz (left), president of the Empire State Federation of Electronic Technicians, presenting Hal Bersche, renewal sales manager of the RCA Tube Department, with a Certificate of Appreciation for RCA Tube Department's participation in the ESFETA service course. The series featured lectures by John R. Meagher and A. J. Petrask.

TEN YEARS AGO

From the Association News Page of SERVICE, August-September, 1940

THE SEVENTH ANNUAL RADIO Industry Picnic, sponsored by the Cleveland chapter of RSA, was held at Wiegands Lake. . . . The Westchester chapter of the RSA held their annual clambake at Port Chester, New York. The committee responsible for this event consisted of Robert Jones, chairman, and Phil Brigante, Ed Donaldson, Joe Hanasik and Arthur Hinkelbein. . . . A three-day technical-sales convention of the Spokane Radio Co. was held. Among those in attendance were Earl Dietrich, Chicago general sales manager of Raytheon, and R. C. James, Jr., and Don Burcham, area reps.

legitimate income. . . . The member organizations of ESFETA, representing some 3,000 radio and TV technicians of New York State, recommend to the members of NEDA that this practice be eliminated for the betterment of relations of all groups of the radio and TV industry."

ARTSNY

IN AN EFFORT to determine the degree of cooperation extended by members of the Associated Radio-TV Servicemen of New York, Inc., during a ARTSNY WOR-TV plan which suggested alignment and orientation of TV sets for WOR-TV, a survey card was mailed out to all members asking: "How many sets have you aligned for WOR-TV since—. . . . How many new antennas have you oriented for WOR-TV. . . . How many old antenna installations were oriented for WOR-TV. . . . How do you find reception of WOR-TV in your neighborhood (Poor—Fair—Good—). . . . Do you observe any of the following interference (RF, Local Oscillator, Ghosts, Amateur)."

In an address delivered before an audience of over 1,000 during the ARTSNY recent meeting protesting a municipal licensing bill, corresponding secretary Noel Payne declared that. . . . "Licensing has never cured any problem." It was his view that

licensing only succeeds in creating other problems. . . . "which are sometimes worse than those it seeks to cure."

Outlining the problems which appear to have prompted the presentation of the bill, Payne declared that . . . "It is our opinion that the major fault of this whole situation has been due to the service contract and we feel, as I am sure a large percentage of you do, that the day of the service contract is drawing to a close, and other than the first year contract by the manufacturer to protect his brand name and fulfill his obligation to the public, all TV service in the future should be done on a per call (time and material) basis."

Declaring that the radio and television Service Man has been a victim of false exposes, Payne told the boys that . . . "You now have an organization to be your voice, to fight for your right to earn your living in the profession of your choice, to fight for your freedom of opportunity . . . and to enable you to start a business of your own, a one man shop if that is all you can afford to start with and to grow, free from government restrictions in the true meaning of free enterprise."

EICO AWARD



Calvin Silverman, representing the Huntington High School Radio Amateur Club, with the first prize won in the radio group division competition held in conjunction with the recent Long Island Science Congress, the prize being an Eico, model 511-K, volt-ohm-milliammeter kit, donated by Harry R. Ashley (right), president of the Electronic Instrument Co., Inc., Brooklyn, N. Y., manufacturers of the Eico line of test equipment kits and instruments. The club was awarded the first prize for their singular achievement in the able construction and operation of a modern 300-watt all-band amateur transmitter.

TVI

(Continued from page 22)

to discriminate against FM signal pickup in the 88-108 mc band. In the second approach, a tunable absorption wavetrap can be used, as illustrated in Figs. 9b and c. When more than one FM station has to be eliminated two of these traps may be installed and each tuned to a separate FM station. Each trap consists of a parallel-resonant circuit, which is tuned by means of a trimmer adjustment on a capacitor. The 300-ohm line is run through the filter, in such a way that the tuned circuit absorbs or traps out the interfering signals without loading the transmission line at the TV frequencies. Since this filter does not have to be soldered into position at any fixed point, it is possible to take advantage of a standing-wave condition of the interfering frequency, by sliding the trap along the transmission line for the most effective position. The usual installation position for this trap is on the back of the TV receiver or on the baseboard, where the leadin also appears. In most signal areas the installation position of the trap is not critical.

In tests made in New York City, with this filter, where the interference was strong, it was found necessary to use more than one filter, installed in series about a quarter-wavelength apart and close to the TV receiver input. In some extreme cases, where the transmission line picks up an excessive amount of FM interference, it may be necessary to change the downlead to coax cable and install a 75 to 300-ohm matching transformer at the antenna terminals, with the trap installed on the 300-ohm side of the matching transformer as close to the front end as possible.

Under many conditions it is possible to install a piece of 300-ohm line, approximately 30" long, as a tuning stub across the antenna terminals to attenuate the interfering FM signals. The usual technique for adjusting this tuning stub involves cutting of 1/2" pieces from the 30" stub until the interfering signal disappears. A practical consideration, in making this stub adjustment, is to adjust the stub with the TV receiver in the installed position. Often, surrounding metal objects influence the tuning of the stub, making it difficult to make an optimum adjustment when the set is pushed away from the installed position for comfort of adjustment. A high Q quarter-wave wavetrap which simplifies this adjustment, is illustrated in Fig. 9d.

[To Be Continued]

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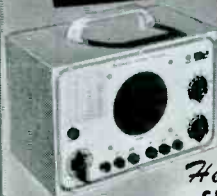
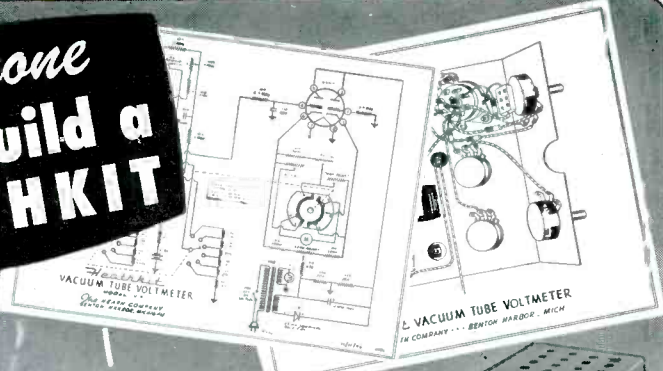
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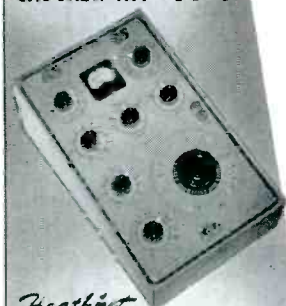
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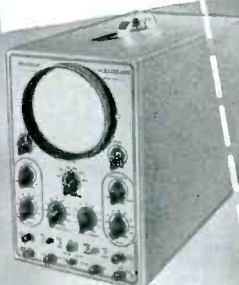


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Custom Cabinets

(Continued from page 33)

second in the same manner. Do not wipe. After each application of stain, go over lightly with fine steel wool, then over again with moist cotton cloth.

The Final Step

In the final step, two coats of clear varnish are brushed on, being sure that the brush is completely clean. It is necessary to brush with the grain, and if running occurs, rebrush at once. After each coat, light sanding should follow with fine sandpaper, then with moist cloth. Plenty of time must be allowed for each coat to become hard and dry. One final coat of satin varnish can then be applied

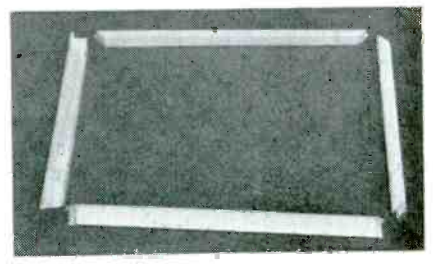
- 1 33 1/8" x 40" 3/8" plywood (front)
- 1 19 11/16" x 33 3/8" 3/8" plywood (back)
- 1 14 3/8" x 38 3/4" 3/8" plywood (bottom)
- 2 15" x 33 1/2" 3/8" plywood (sides)
- 1 14 3/8" x 31 1/2" 3/8" plywood (vertical partition)
- 1 18 1/2" x 18 7/8" 3/8" plywood (radio shelf)
- 1 8" x 18 7/8" 3/8" plywood (preamp shelf)
- 1 11 3/4" x 18 7/8" 3/8" plywood (main amplifier shelf)
- 1 15 7/8" x 40 1/2" 3/4" plywood (top)
- 1 17 1/4" x 18 3/4" 1/4" plywood (recessed front)

Receiver cabinet wood sections

- 2 9 1/2" x 25 3/4" 3/8" plywood (doors)
- 1 7 1/4" x 19 1/2" 3/8" plywood (upper front)
- 2 20 3/8" x 33" 3/8" plywood (sides)
- 1 18 1/2" x 33" 3/8" plywood (back)
- 1 18 1/2" x 20" 3/8" plywood (bottom)
- 1 17" x 18 1/2" 3/8" plywood (shelf)
- 1 18 1/2" x 20" 3/8" plywood (motor board)
- 1 19 3/4" x 21" 3/4" plywood (top)
- 1 3 1/4" x 19 1/2" 1/4" plywood (door stop)
- 1 2" x 16" 1/4" plywood (door stop)

Record cabinet wood sections

Back-band molding for one of the two openings on the console front. Note the mitered ends.



and with a *new* brush. The cabinet should then be dried in a dry, dust-free room.

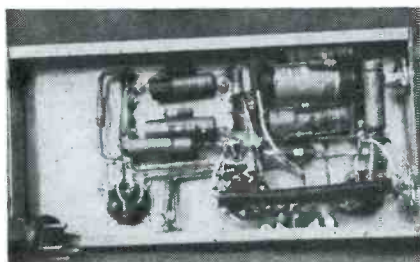
- 1 Pint of *Golden-Oak* stain*
- 1 Pint of clear varnish*
- ½ Pint of *Satin-Finish* varnish*
- 1 Pint of turpentine*
- 1 Small can of wood putty*
- ½ Pint can of paste wood filler, transparent*
- 2 2" paint brushes
- 1 Box fine steel wool
- 6 Sheets No. 1 flint paper
- 6 Sheets No. 180-C carborundum water-proof paper.

*Sherwin-Williams.

Material for receiver and record cabinets

- 3 ½" masonite partitions, 17" x 17½"
 - 18 1¾" square wood stripping
 - 5' Quarter 'round wood stripping
 - 1 Door catch
 - 2 Door grips; made from soft pine (3" x ¾" x ¾")
 - 4 Two-inch casters
 - 6 ¾" off-set hinges; two small, flat-end type
 - 1 Metal elbow support for top
 - 20' Single conductor shielded wire
 - 1 12" turntable with motor and 3-ampere toggle switch
 - 1 Pickup arm with G.E. head; .0025 tip.
 - 1 2,000-ohm potentiometer; volume control
 - 10' Back-band mold; for front trim
 - 4 3/16" brass welding rods; 15½" long
 - 1 Gold-black speaker grill cloth; 14" x 18"
 - 4 Two-inch casters
 - 1 Celotex sheet, 17½x17½, for speaker baffle
 - 5' Wood stripping; 1" square
- Kimsul sound proofing; enough to cover inside of speaker enclosure.

Miscellaneous material



Bottom view of preamp equalizer. Five-prong plug at left connects to amplifier power supply.

View of 14-watt amplifier designed for custom-built installation.



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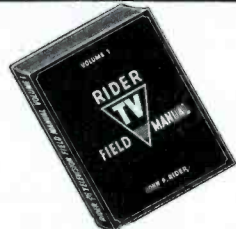
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Phono

(Continued from page 36)

the adjustment mechanism can be viewed.

Coaxial Loudspeakers

A coaxial 2-way high-fidelity loudspeaker¹ using a single magnetic structure and voice coil has been developed. Provided is a high-frequency cone or propagator (*whizzer*) coupled *solidly* and a bass cone *compliantly* to a *single* voice coil. Lower frequencies are produced by the bass diaphragm. Upper octaves are radiated solely from the high-frequency propagator, because the low-frequency cone is completely decoupled from the voice coil at these frequencies by a mechanical crossover.

Speakers are available in 8", 12" and 15" models.

Cardioid Crystal Mikes

Recently announced too, for the sound man is a unidirectional cardioid crystal type² employing a special sintered metal to cancel out 15 db front to back. This feature is said to make the microphone dead to sound from rear.

Frequency range is said to be from 50 to 10,000 cps. A response selector switch is provided for voice or general voice and music work.

A high-impedance microphone, the unit is said to have an output level of -54 db. Crystal element has a special metalseal protection against moisture or dryness.

Portable 3-Speed Phono

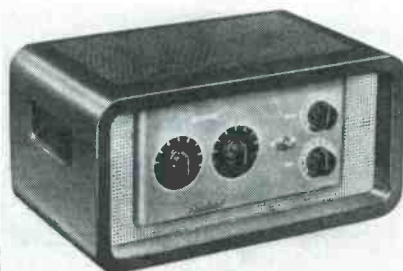
A portable three-speed phonograph³ featuring an amplifier and a 4"x6" speaker, is now available. It has a

¹Radax; *Electro-Voice, Inc.*, Buchanan, Michigan.

²Synabar, model DR-10; *Astatic Corp.*

³Model 130 Fonograf; *Webster-Chicago.*

Rauland-Borg amplifier



NEW BUSINESS BUILDER FOR SERVICE MEN —



**ELIMINATES 80%
OF FEEDLINE LOSSES**

SERVICEMEN WHO KNOW THE NEW GOODLINE AIRLEAD like it—use it regularly—insist upon its use—because it builds customer business. . . . Remember, one user tells another that GOODLINE AIRLEAD eliminates "SNOW"—gives, clear, concise non-interference pictures. GOODLINE AIRLEAD eliminates excessive losses found in ordinary feed lines used in T-V and amateur installations. With the new GOODLINE AIRLEAD 80% of the loss producing dielectric web is removed permitting the maximum practical transfer of the signal from the television antenna to the television receiver. Also, standard close spacing of wires and standard nominal 300 Ohm impedance eliminates losses through re-radiation due to poor balance to ground so prevalent in wide-spaced lines. . . . Loss of signal during rainy weather has been a constant source of trouble to both amateur and T-V set users. GOODLINE AIRLEAD EFFECTIVELY ELIMINATES WET WEATHER LOSSES.

INSTALLATION IS SIMPLE AND QUICK. Just install GOODLINE AIRLEAD in the usual manner. Standard insulators can be used—no special insulators required. Wire can be pulled taut without bringing wires close together—thus no loss of effectiveness for which it is designed. . . . No special transformers or "experimenting" required. . . . GOODLINE AIRLEAD is lower in cost than other lead-lines purposed to accomplish the same results. SPECIFICATIONS: Weather resistant polyethylene with nominal dimensions of .375" x .083". Use 2 only 7 x 28 conductors. . . . PACKAGED FOR EASY HANDLING AND INSTALLATION: On practical reels in standard lengths: 55'—100'—250'—500'—1,000'. ASK YOUR JOBBER OR WRITE US FOR SAMPLES, LITERATURE, PRICES, JOBBER'S NAME.

*Patent Pending *Trade Mark

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DON GOOD, INC., also manufactures TELETRAPS (F-M, and Diathermy and Amateur Interference Traps) and TELEPASS (High Pass Interference Filters)

Astatic unidirectional cardioid crystal mike



heavy-flock turntable and a balanced tone arm for tracking of the records. A single needle is adapted to all speeds and types of records. The case is bur-gundy simulated leather.

16-Watt Amplifier

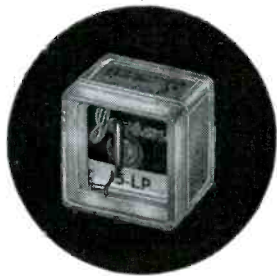
For phono and general *pa* work, a manufacturer has developed an amplifier⁴ rated at 16 watts at 5% or less harmonic distortion (measured at 100, 400 and 5000 cycles) with a 20-watt peak output. The model provides two microphone inputs (either convertible for use with a low-impedance mike by means of a plug-in transformer); one phono input; electronic mixing and fading on all three inputs; and tone control.

Frequency Response

Frequency response is said to be ± 1 db, 40 to 20,000 cps. Output impedances are 4, 8, 16, 250, 333 (70 volts), 500 ohms. Gain characteristics have been announced as: mike, 130 db (2 meg); 117 db (100,000 ohms); 117 db (150 ohms); phono, 85 db ($\frac{1}{2}$ meg). Voltage required for rated output: high impedance input, .0015; low impedance, .0001; phono, .1 volt.

⁴Green Gem model 1916; *Rauland-Borg Corp.*

Portable tape recorder which records for immediate playback. Through direct connections to radio, phono, or microphone, this equipment records on plastic or paper tape, using 5" or 7" reels. Half of the double-track tape can be recorded or erased at a time. A 5" reel lasts for 30 minutes; a 7" reel for one hour. Unit automatically erases as it records. Interlock switch is said to prevent accidental erasing when the tape is being rewound. Amplifier is said to have a frequency response of 70 to 8,000 cycles, ± 3 db. Output is 3.5 watts. Jacks available for direct connections to any amplifier or *pa* system. There is also an output of 3.2 ohms and high impedance for headphone monitoring. Internal speaker is a 6" *pm* type and automatically disconnects when a remote speaker is plugged in. (Model RT-65; *Bell Sound Systems*).



Jensen Needles come to you individually packed in a dust-proof container.



JENSEN — THE OLDEST NAME IN SOUND ENGINEERING

Rep Talk

(Continued from page 32)

Co. He will cover the entire eastern territory for Snyder, in both the TV and automotive trade. . . . *Edwin K. Lassberg*, 5004 Ross Avenue, Dallas, Texas, has been elected to senior membership in the *Southwestern Chapter of The Representatives*. Lassberg is with *The Texport Co.*, representing *Audak*, *Browning Labs*, *Electro Products*, *JFD*, *Pentron* and *Ward Leonard*. . . . *A Rocky Mountain Chapter of The Representatives* has been formed, and *Gordon G. Moss*, Box 428, Greeley, Colorado, has been elected as the first president. *Franklin Y. Gates*, 200 South Main St., Salt Lake City, Utah, will serve as chapter vice president. *Arthur J. Nelson*, 1639 Blake St., Denver, was elected as secretary-treasurer. Three new senior mem-

bers of the chapter are: *Ronald G. Bowen*, 852 Broadway, Denver 3; *W. Cliff McCloud*, 5522 E. Colfax St., Denver 7; and *William H. Connors*, 1590 Eudora St., Denver 7. . . . *John J. Kopple*, 60 E. 42nd St., New York City, is now chairman of the '50-'51 national membership committee of the *Reps*. . . . Other members of the committee are: *William T. McGary*, secretary-treasurer of the *Mississippi Valley Chapter*; *George W. Davis*, publicity chairman of the *Los Angeles Chapter*; *David M. Lee*, first president of the *Pacific Northwest Chapter*; and *Art Nelson*, of the *Rocky Mountain Chapter*. . . . *The Los Angeles Chapter of The Reps* will handle registration of reps at the 6th annual *Pacific Electronic Exhibit* at Long Beach, Cal., municipal auditorium Sept. 13-15. *Norman Neely* is the *Reps'* rep on the *WCEMA* committee for general exhibits, with *Don C. Wallace* on the registration committee for reps.

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It's easy and profitable to recommend a new Jensen Needle when making a service call. What's more, it's still easier to order any needle required from your jobber by number. He can supply you from stock at once. A new needle assures a satisfied customer.

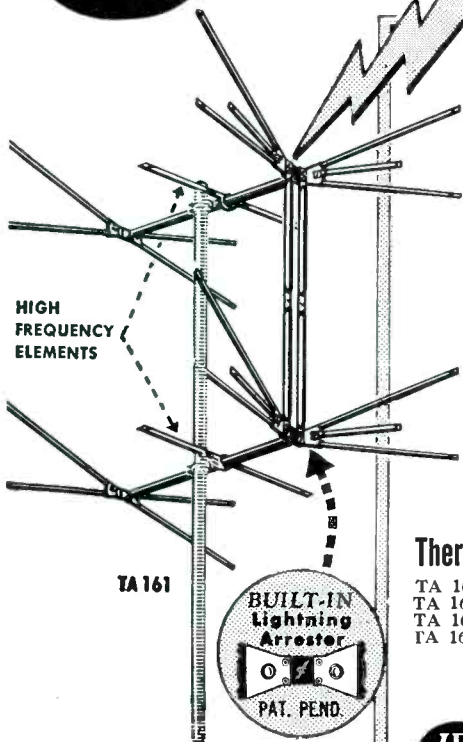
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JFD MANUFACTURING CO., Inc.
6113 16th Avenue, Brooklyn 4, N. Y.
First in Television Antennas & Accessories

Write for FREE JFD Bulletins

Auto Radio

(Continued from page 42)

handy for alignment and hunting for intermittents.

Hand and Power Tools

Hand tools are very important. The availability of the correct tool at just the right time can save many a minute. It's also wise to avoid substitution for the proper tool. If you haven't the correct tool, buy it! Misuse of tools, such as the replacement of a small screwdriver for a larger one, only results in ruined tools, loss of temper and income.

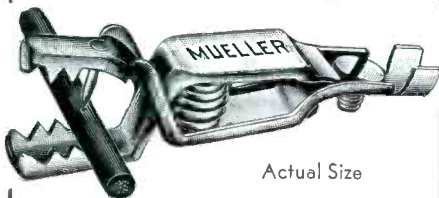
Tools should always be kept neat, clean and sharp. A properly sharpened screw driver will be found to save many a scratched paint job and skinned knuckle.

Hand tools should be in a drawer, each type separated from the others; screwdrivers in one compartment, pliers in another, wrenches, bits, etc., each in their own place. Then, when you reach for one, you'll get what you want.

Screwdrivers are particularly important in the shop. Two types are required, one for the car and one for the sets. Needed for car work are one long, heavy, standard; one short, heavy *stubby* standard; a small one for set-screws; and a medium-sized one for general work. Required, too, are a large and a small or medium Phillips or Reed and Prince (cross-point) screwdriver, and, for GM cars mostly, a large and a small *clutch* screwdriver. An *offset* or right-angle standard and Phillips screwdriver have been found to be very useful at times. We've also found that one set of three Phillips right-angles can double as ratchet screwdrivers.

For the chassis, screwdrivers will be required, for, in the main, small 1/4" hex-head self-tapping screws. However, there are lots of kick-pads, dummy plates, etc., that must be removed to get at receiver gear. These will be found to be very seldom fastened with conventional screws, and thus the

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Solid bronze, non-corroding. Wire centers itself in notched jaw. Teeth on sides of jaw allow use for many other applications.

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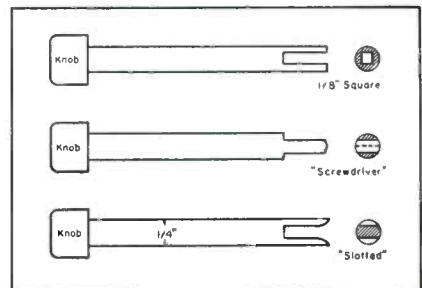
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HOLLYWOOD 38, CALIFORNIA

Fig. 1. Tuning tools which can be made up from fibre neutralizing units.



special-types of drivers will be required.

Pliers and wrenches are also important. Needed are one large, one medium and one small pair of *slip-joint* pliers, preferably of the *right-angle* or hawk-bill type. Diagonal cutters, large and small, and standard and small long-nose cutters are also essential. At least three *Crescent* adjustable end-wrenches of the 4", 6" and 10" type, and a full set of good *nut-drivers*, of the 6" and the *stubby* types will come in very handy, too. A good stout half-inch hollow shaft nut-driver will be found to work as fast as a ratchet-wrench for tightening lots of the very long mounting bolts, such as are used on Motorola chassis. A $\frac{1}{4}$ " stubby is a must item for prying lids off sets while still in the car. A $\frac{3}{8}$ " stubby will be found to be an ideal tool when making connections to switch terminals, etc., since most of these use $\frac{3}{8}$ " hex nuts. The short handle of the *stubby* permits access to many places behind a crowded instrument panel. If the area in trouble is too tiny for even a stubby, a $\frac{1}{4}$ " box-end wrench will be found to be the answer to your headache. Wrenches may sometimes be purchased in sets, designed for working on ignition systems. A couple of open-end wrenches in the same sizes aren't too bad an idea, either.

Drills, hole cutters, etc., represent another important tool group. For instance, a small electric drill, with a set of bits up to $\frac{1}{4}$ ", about three *rotary files* and a *hole-cutter*¹ are essential in auto-radio work. A short center-punch and a light hammer will serve to locate holes. The hole-cutter comes in very handy for cutting the large holes, up to 13/16", used to mount different types of car antennas. This tool will do a much better job than a drill of the same size, and with the added advantage that it may be used in a $\frac{1}{4}$ " drill, instead of the large $\frac{1}{2}$ " drill that would be required to turn that size bit. The rotary files may be used to clean up mounting holes, or even to make them, after drilling a pilot hole, $\frac{1}{4}$ ". They are also invaluable for cleaning off paint, insulating compound, etc., from the inside of the car-body to furnish a good ground for antennas.

If the servicing operations are at the curb in front of your shop, or in the shop proper, a good stout extension cord is an essential. This should be at least 50' long, with a heavy duty plug on one end and a standard junction-box on the other end, fitted with a dual receptacle. The wire should be fastened securely with the strain-relief

¹Similar to the Bruno Tool Co. 101.

The little lamp that high notes can't hurt



IN old-style radio dial lamps, certain high notes caused vibration that often tore filaments apart. And the lamp had to be replaced.

To minimize this cause of lamp failure, General Electric Lamp engineers redesigned the filament supports—made them longer and moved the bead closer to the coil. This new

design greatly reduced the effects of vibration. And as a result, G-E radio dial lamps aren't damaged by high notes, give long, dependable service.

For full information on G-E miniature lamps, call your nearby G-E Lamp office or write to the General Electric Company, Division 166-S8, Nela Park, Cleveland 12, Ohio.

1. Dependable, trouble-free performance.
2. High level of maintained light output.
3. Low current consumption.
4. Long life.
5. Profitable to handle.
6. Greater dealer acceptance.



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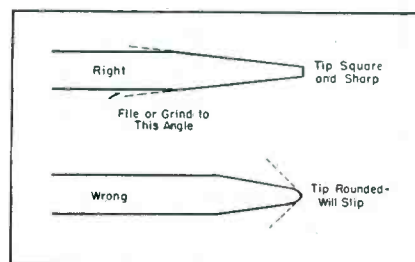
clamp provided inside the box. This move is necessary since the cord will be involved in quite a bit of pulling and hauling around during its life.

A short trouble light, with a wire guard over about a 40-watt lamp, will be found useful, when working on dark days, or up under a dashboard. The guard should have a small metal shade on one side; otherwise, the light will invariably shine right in your eyes.

There's one item, which although a piece of test equipment, will be found usually in the tool box. That is the small ammeter which is used to measure the current drain of a set

without taking it out of the car. It's possible to make up one of these in
(Continued on page 62)

Fig. 2. Techniques which should be used to sharpen screwdrivers.



Patent Pending



new! LOW COST DC SOURCE ELECTRO "BJ" JUNIOR

SUPPLIES 1 to 12.5 AMPS. 6 VOLTS CONTINUOUS DUTY
3 to 9 Volts at Other Ratings

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New Model "BJ" Junior Filtered Power Supply utilizes same exclusive application of selenium rectifiers used in the famous Model "B." This application, using conduction cooling, doubles the rectifier power rating, dissipates over 3 times the heat and provides lower cost per ampere output over other types. Supplies ample power, with a peak instantaneous current rating of 25 amperes (from standard 50/60 cycle 115 volt source). Heavy duty components withstand high over-loads. AC ripple less than 0.4 volts at 6 volts DC 8 amperes.

Unmatched Double Value—Lowest Price—Recognized Top Quality

EXCLUSIVE FEATURES

Voltmeter 0-10 volts 5% accuracy.
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8 Heavy-duty power tap adjustments.
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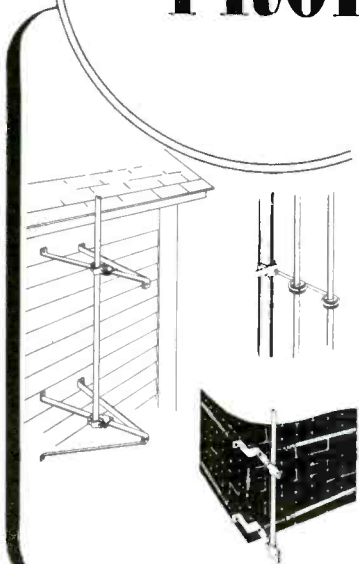
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A modern plant with modern equipment — a skilled staff, trained in modern production methods — and the desire to make you a *Permanent Customer*; — these Phoenix features mean simply this as far as you are concerned: that you get One Hundred Cents worth of value for every dollar you invest in the PHOENIX Hardware Line. There is a Phoenix accessory to cope with every mounting problem. Phoenix hardware is engineered to hold *permanently*, too; and it's easy to install. Buy PHOENIX for strength, PHOENIX for rapid rigging, PHOENIX for quality, PHOENIX for the right price.



Write for folder V containing complete line of television accessories.

AT LEADING JOBBERS



LAWRENCE, MASS.

Auto Radio

(Continued from page 61)

the shop. One of the war-surplus 15-ma movements can be used. A home-made shunt can be built using about No. 16 or 18 copper wire, enameled. The wire is wound around a nail or screwdriver, and its ends connected across the meter terminals. Then check by hooking up in series with your good meter. Take a small drain through this combination, with a resistor, or a car-set. Note the reading of the meter, and add or subtract from the shunt, until both meters read the same. Then clean up the shunt, tie with string and varnish with glyptal or coil-dope. A small box should be made to hold the meter, and a *dpdt* switch installed on the face, below the meter. Two leads should be brought out of the box, each around 20" long, and with either a fuse-holder or clips on the ends. To check the current drain, the set's fuse should be removed and the meter leads hooked up to the fuse holders. In testing, turn the set on. If the meter goes off-scale, reverse the switch.

One of the least expensive tools in your car radio kit is a small whisk-broom. This is used to brush off the car floorboards and save your shirt, tools and temper!

Ser-Cuits

(Continued from page 46)

video plate load. One of the dual plates in the special tube is keyed or gated with a pulse from the sweep transformer so that it will pass current and therefore develop *agc* voltage during the intervals when sync is present, since the voltage across the video load will then be less negative than cutoff bias. The second plate is returned to *B+* through a 27,000-ohm resistor. Sync is taken from this second plate direct to the sync inverter tube.

The operation of this circuit depends upon high gain in the *agc* amplifier circuit. High gain is provided by using a 6AH6 tube in the first video amplifier since the video amplifier is also part of the *agc* amplifier. Any change in level at the detector will be reflected in a change at the first video plate which in turn controls the gated *agc* tube. The gain is high enough to keep the voltage at the second detector constant at a level of approximately one volt. At this level the first video amplifier will clip any noise exceeding the level of the sync tips, thus preventing large pulses of

noise from passing on into the sync amplifier to upset its operation. The constant level at the detector makes it feasible to operate the sync separator section of the special pentode with fixed bias. There is sufficient gain in the *rf* and *if* amplifiers to provide the required one volt of video at the second detector for any signal above the low noise level of the system. A voltage divider in the grid sets the bias on the first video amplifier so it will cutoff just above sync tips.

A cathode follower is used to couple the *dc* control voltage of the *agc* amplifier to the *if* and *rf* grids and thus provides a low impedance grid return for all these grids to minimize *white noise* due to impulse noise blocking the grids. A delay voltage is provided by a voltage divider in the grid of the cathode follower, so that *agc* voltage is not developed until a useful signal is present. The use of the delay voltage requires the use of an *agc* clamp diode to keep the *agc* voltage from going positive. Clamping is provided by connecting the output of the cathode follower through a 10,000-ohm resistor to the grid of the first *if* amplifier grid through the 330-ohm *agc* decoupling resistor and *if* coil.

Suppression of the vertical retrace is provided in the Philco 1836 models, in a circuit which features connection of a positive pulse to the cathode of the picture tube during the retrace interval. An unbypassed 27,000-ohm resistor in the picture tube cathode is connected to the vertical sweep output plate through a 220,000-ohm resistor and .0022 capacitor in series to turn the beam off during retrace. The small capacitor differentiates the plate pulse just enough to pass only a sharp positive spike.

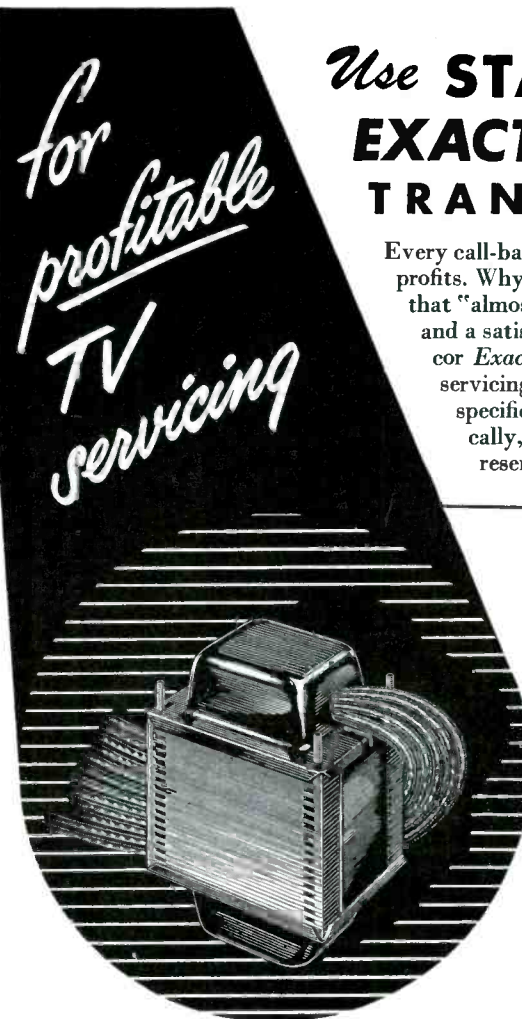
The 1836 chassis employs two pentode amplifier stages in the 4.5 mc sound *if* to obtain high sound sensitivity with substantial rejection of AM and noise.

Servicing Helps

(Continued from page 50)

moved, the plastic must be polished. There are many polishing compounds that may be used, either by hand or with a buffing wheel. Three household items have been found satisfactory for this purpose. Simoniz Kleener, Johnson's Carnu, and Wright's Silver Cream.

Absorbent cotton makes an excellent



JUST PUBLISHED—Ask your Stancor Distributor or write for your free copy of the New **STANCOR TV CATALOG and REPLACEMENT GUIDE**. Also available is the New **STANCOR CATALOG OF TRANSFORMERS** for radio, sound and other electronic applications.



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Every call-back you make means lost time and profits. Why take a chance with transformers that "almost fit?" You're sure of a good job and a satisfied customer when you use Stancor *Exact Duplicate* transformers for TV servicing. These units meet the exact specifications, electrically and physically, of the original components. Representative types are listed below.

Vertical Blocking - Oscillator Transformer. *Stancor Part Number A-8121.* Exact duplicate of *RCA type 208T2.* For generation of 60 cps required to drive grids of vertical discharge tubes.

Plate and Filament Transformer. *Stancor Part Number P-8156.* Exact duplicate of *RCA type 201T6* used in model 630TS receiver.

Deflection Yoke. *Stancor Part Number DY-1.* Exact duplicate of *RCA type 201D1.* For use with direct viewing kinescopes such as 7DP4 and 10BP4.

Focus Coil. *Stancor Part Number FC-10.* Exact Duplicate of *RCA type 202D1.* For use with magnetically focused kinescopes such as *RCA type 10BP4.*

Horizontal Deflection Output and HV Transformer. *Stancor Part Number A-8117.* Exact duplicate of *RCA type 211T1.* For use with direct viewing kinescopes, such as types 7DP4 and 10BP4.

For complete specifications and prices of these and other Stancor TV replacement components, see your Stancor distributor or write for Television Catalog 337.

applicator. A very soft cotton rag may also be used with care.

Step-by-Step Procedure for Removing Scratches*

(1) Scratch can be removed by sanding with wet #400 (wet or dry) type sandpaper, using free, easy, circular motion and finishing with light feathering strokes. Plenty of water must be used.

(2) Sanded area should be cleaned thoroughly by swabbing with wet cotton, and dry, using another piece of cotton.

(3) Polishing agent should be applied generously, and rubbed in with

rapid vigorous, circular strokes. It may take several minutes of this rubbing to produce satisfactory results.

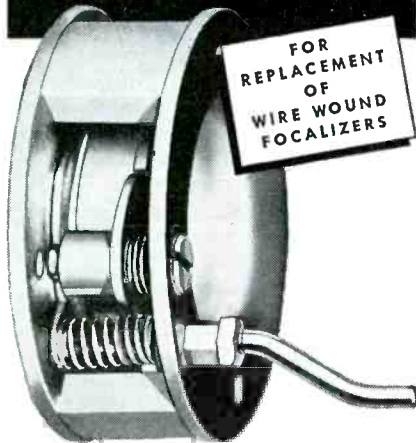
(4) All traces of the polishing agent should be removed by swabbing with damp cotton. Inspect results carefully.

(5) Dry completely, and buff entire plastic part with clean, dry cotton.

The foregoing methods have been used to remove scratches from plastic radio and television escutcheons, picture tube windows, refrigerator freezer locker doors, breaker frames and other similar plastic parts.

*Based on service notes prepared by Admiral.

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- UNAFFECTED BY TEMPERATURE AND VOLTAGE FLUCTUATIONS!

Simple to install—
NO WIRING NEEDED!

Now, you can replace wire-wound focus coils on television sets you are repairing or rebuilding for larger tubes with the improved Quam Alnico V Permanent Magnet Focalizer* unit that is being used as original equipment in many leading sets.

Easy to install, the Quam Focalizer* unit provides a sharper image that is unaffected by voltage and temperature fluctuations.

A slight turn of the adjusting screw brings the tube in focus—the centering handle centers the image on the screen. It is designed for tubes with anode voltages up to 12 K.V.

Aluminum supporting bracket is furnished with kit.

**ASK YOUR JOBBER ABOUT
THE QUAM FOCALIZER* KIT
LIST PRICE . . . \$4.75**

*Trade Mark
QUAM-NICHOLS CO.
526 E. 33rd Place Chicago 16, Ill.
Makers of Quam Adjust-A-Cone Speakers

PA Servicing

(Continued from page 40)

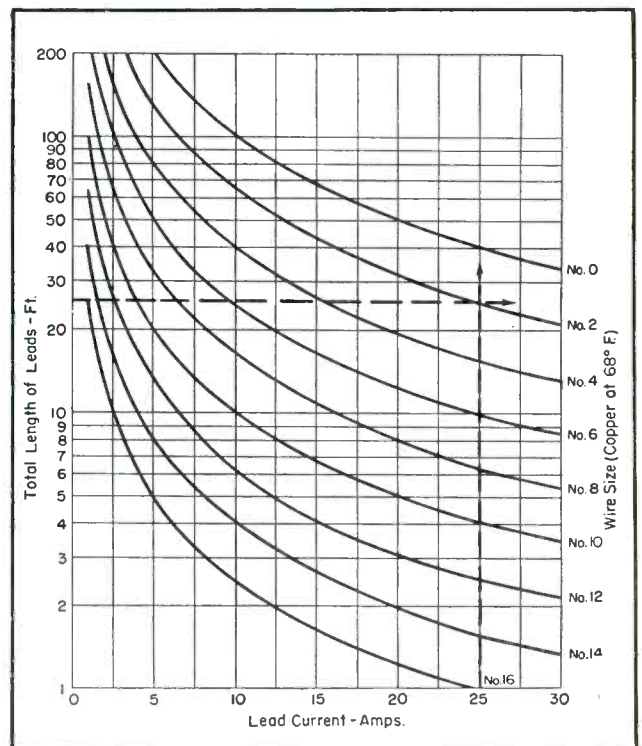


Fig. 6. Wire size table which can be used to determine length and type of cable to use between power supply and car battery.

(Courtesy Mallory).

have been worn through or the vibrator reed has lost its temper, the vibrator has reached the end of its useful life and should be discarded. There are times, however, when emergency repairs must be made to keep the equipment operating until a replacement can be obtained.

It is necessary to be certain that replacement vibrators have sufficient current ratings for the required job. Many *pa* systems require heavy-duty units, and a standard automobile vibrator used as a replacement can give trouble shortly.

Both sides of the power transformer secondary should be checked for balance. A partially-shortened section will cause unbalance and a tremendous overload on the vibrator points. In

most cases a short of this nature will also result in overheating of the transformer. In case of intermittent operation, the fuse, *A* leads, and all connections should be checked for rosin joints and continuity. Vibrator leads must be checked for open or intermittent breaks. In addition, all wiring must be examined for corrosion, breaks, and cold-soldered joints. Shield loom should be checked for frayed sections or breaks.

Low *B* voltage has been found due to poor emission or leakage in the rectifier tube, particularly in gaseous types such as the 0Z4. A new tube should be substituted, even though emission on the old tube tests satisfactorily. Often the tube will be leaky or become shorted internally only under normal load. Other causes of low *B* voltage are leaky filters; intermittently-shortened buffers; a partial or high-resistance short in the amplifier unit; or a weak storage battery. The latter condition is also responsible for the inability of the vibrator to operate at all, especially if the battery voltage is 5.5 or less. The filter choke must also be checked for a partial short or grounded condition. Not to be overlooked are the rectifier and vibrator sockets. These should be examined for signs of leakage and low resistance arcing between prongs. This is quite common in localities where the humidity is high, or where the system is

WE DON'T RUN A HOSPITAL* . . .

. . . but we do have one of the most modern condenser plants in the industry today!

*It seems as though everyone who makes condensers today likes to talk about non-contamination, dust-free rooms, white coated and gloved workers, etc.

Well, we have all this too, but we have an idea that you fellows would rather hear the hard facts about the condensers you use. We would like you to know this about Illinois Condensers: (1) Every condenser that leaves our factory is *Unconditionally Guaranteed for One Full Year from Date of Purchase!* (2) We have been producing electrolytic capacitors continuously for 16 years. Literally millions of Illini-Hycap Capacitors are giving FAITHFUL SERVICE every day!



Write today for catalog—complete listings of highest quality tubular, twist prong, plug-in and screw mounted electrolytics in single or multiple units. Also tubular paper condensers, high voltage buffer and TV capacitors and auto generator condensers.



ILLINOIS CONDENSER CO.
1616 NORTH THROOP STREET • CHICAGO 22, ILL.

subjected to coal smoke, chemical or gas fumes in industrial districts.

In installing or checking power supplies of the synchronous type, caution must be used in connecting the battery terminals or in reinserting certain types of synchronous vibrators. Since a wrong connection does result in a reversed *B* polarity, the vibrator and filter capacitors may be quickly damaged if the current is left on. As soon as the unit is turned on, the output *B* polarity should be checked with a voltmeter. If the wrong polarity is observed, the supply must be turned off at once and the trouble corrected by reversing the input connections or properly reinserting the vibrator.

Hum and noise originating in the power supply are generally caused by faulty components, ineffective shielding, or poor mechanical or electrical contact. Low-frequency hum is usually caused by open or leaky filters, but may also be due to an unbalanced (partially-shortened) winding in the power transformer, improper dressing of high-tension leads, or a bad ground connection between the power supply chassis and the vibrator can or shield box. Mechanical hum may also result if the vibrator case or shield can is allowed to make physical contact with other components. Trouble of this sort may be eliminated by insulating the can mechanically from other parts with a small block of rubber or by moving it slightly away from the adjacent part.

Vibrator *hash* can be caused by a defective or worn-out vibrator, an open buffer capacitor, high-tension leads too close to the *B* or grid circuits, a defective *rf* bypass, poor mechanical or electrical shielding, or noisy, leaky rectifier tubes. Mercury vapor or gaseous types (such as the 82 or 0Z4G) are especially apt to generate *rf* interference. These tubes must be shielded; the shields and bases must be free from corrosion and held firmly in place.

Hum and interference can be located rapidly with a signal tracer. Intermittent troubles in the power supply can usually be located by jarring or shaking the unit and gently tapping tubes, capacitors, and other components with a small rubber mallet. Wiring and soldered joints should be tested for breaks and poor connections; cables and shielded leads for breaks and frayed spots.

Interference originating in the generator or ignition system of the sound car can be easily identified. The noise will rise and decline as the motor is accelerated and decelerated, and will disappear entirely when the ignition is turned off. To eliminate this trouble,

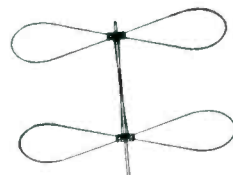
Telrex CONICAL-V-BEAMS*

memo These 3 basic facts prove TELREX SUPERIORITY!

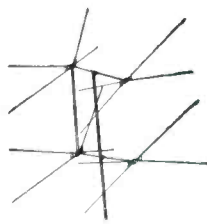
- 1 Since the advent of Telrex "Conical-V-Beams" into the field of TV reception, no antenna to date has been able to outperform them except on paper.
- 2 90% of all Television Antennas being produced today are genuine Telrex "Conical-V-Beams" or imitations thereof.
- 3 Performance counts! It takes more than extravagant claims to produce results. That's why Telrex delivers the goods when others fail.

THERE'S NO PRACTICAL SUBSTITUTE FOR SOUND DESIGN, THOROUGH ENGINEERING, QUALITY MATERIALS!

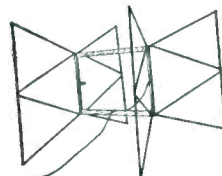
Ounce for ounce, dollar for dollar, Telrex laboratories have designed and produced more worthwhile, service-tested antennas designed for application and long service life. There's no substitute for Telrex. Install one on your next TV installation. You'll see and hear the difference!



CLOVER-V-BEAMS*



CONICAL-V-BEAMS*



ATTIC-V-BEAMS*

OUTSTANDING
... FOR DESIGN
WORKMANSHIP
PERFORMANCE
QUALITY...

TRULY AMERICA'S
STANDARD OF
COMPARISON!

Call or Write for
Complete Catalog

* REGISTERED
TRADE MARK

Telrex INC.
CONICAL-V-BEAMS* ASBURY PARK 4, N. J.

SEE THEM ALL AT THE SHOW!

Don't fail to see us at the Radio Parts Distributors Convention (NEDA SHOW) BOOTH 126, Cleveland Auditorium, Cleveland, Ohio.

Copyright 1950

Patents Pending

Be sure it's a "CONICAL-V-BEAM"
—Look for the TELREX* Trademark

AMERICA'S
STANDARD OF
COMPARISON

THE SKILL
TO DESIGN
THE FACILITIES
TO PRODUCE
THE ABILITY
TO DELIVER

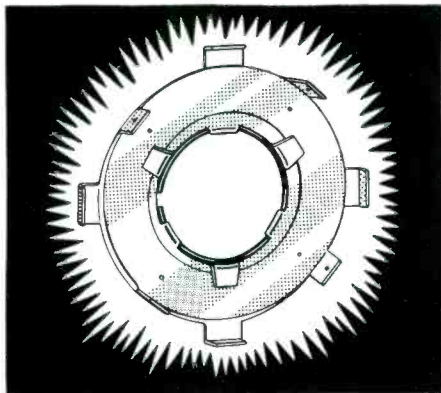
a .5 mfd. bypass normally can be mounted on the generator frame and connected to its low-tension (6-volt) circuit; another connected across the hot *A* lead at the ignition switch. It may be necessary in some cases to install similar capacitors across the dome light and oil pump to eliminate completely interference from these sources.

Dirty or worn generator brushes, worn spark plugs, and incorrectly-set distributor points may also be responsible for interference. It is rarely necessary to install spark-plug suppressors

in late-model automobiles. In stubborn cases, however, even this may become necessary.

Noise may also arise from improperly bonded fenders, hood, speedometer cable, choke and accelerator cables, and the instrument panel. This condition may be checked by bonding each unit or section temporarily to a clean spot on the automobile chassis with a heavy piece of flexible shield braid with the *pa* system in operation. The offending section should be bonded

(Continued on page 66)



Center TV Pictures in 3 Seconds with the NEW BeamaJuster



1. Snap BeamaJuster on back cover of tube yoke. (Fits any standard yoke and ANY SIZE TUBE.)
2. Rotate BeamaJuster as shown here for approximate centering of picture.
3. Make final adjustment by sliding outer plate of BeamaJuster vertically or horizontally.

Now service men can center TV pictures in 3 seconds instead of 20 to 30 minutes. The new Perfection BeamaJuster eliminates costly and complicated centering controls of the resistor type. It also replaces mechanical centering controls which tilt the focus coil to center the picture and require numerous springs, wing nuts and special brackets.

The BeamaJuster not only saves time and money but assures lasting results. No drifting of the picture once it is set by the BeamaJuster. This control does not affect spot size, focus or picture definition. Over 3,000,000 TV sets need this simpler centering control. Also perfect for conversions from 10 and 12 inch tubes to larger size tubes. Order today from your supplier.

PERFECTION ELECTRIC COMPANY
829 SOUTH STATE ST., CHICAGO 5, ILL.

Makers of Perfection
Alnico 5 Speakers
and Ion Traps



Trade Mark



UNIVERSAL ROOF MOUNT
Just What TV Installers Have
Been Looking For

- 1—All-aluminum castings with plated steel bolts.
- 2—Tested to withstand any normal load up to 1500 lbs.
- 3—Will take tubing O.D. 1/4" to 2".

Ask your jobber—or send for circular and prices.

SMITH ELECTRIC MFG. CO.
ASHLAND, OHIO

PA Servicing

(Continued from page 65)

permanently with the heaviest braid available.

Low *A* battery voltage at the input of the vibrator pack may be due to the use of a connecting wire or cable which does not have sufficient current-carrying capacity. Since a drop of only .1 volt is the maximum allowable on any length of battery cable, the cable size and resistance is very important. Voltage readings should be taken at the battery and at the power pack terminals to determine the total voltage drop in the power cable.

Determining Power Cable Size

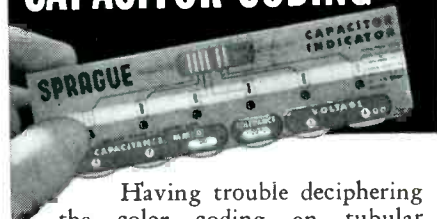
The distance between the power supply and the car battery must be weighed carefully in evaluating cable size. As an example, let us suppose a power supply is located in the trunk of a passenger-type or panel automobile and takes its power from the regular car battery located in the engine compartment or under the driver's seat. A cable length of approximately 12 feet will be found to be necessary to make the *positive* battery connection. Since depending on the automobile frame for a ground return is not recommended, another 12-foot length of wire or cable must be run from the power supply frame to the battery *negative* post. Thus, a total of 24 feet of cable is used. If the current drain of the *pa* system is 20 amperes, No. 2 flexible welding cable will be required for both connecting cables, a value obtained by referring to a wire size chart of the type shown in Fig. 6.

U. S. D. ANTENNA ROTATOR TEST



John Stern, sole owner of Radio Electric Service Company of Pennsylvania, subjecting a U. S. D. antenna rotator to a novel test which involved sitting off-center and leg kicking. Test was said to indicate that the rotator could withstand this treatment because the unit embodies a 1/4" steel shaft which rotates on a case-hardened ball bearing, which, in turn, rests on a stainless steel plate. Cast-in bronze bearings at the top and bottom of the mechanism are claimed to prevent shaft from going out of line.

QUICK, EASY WAY TO READ TUBULAR CAPACITOR CODING



Having trouble deciphering the color coding on tubular molded capacitors in new TV and Radio sets? There's no need to consult complicated wall charts or tables!

JUST FLICK THE DIALS

The Sprague Capacitor Indicator gives you the needed data in a jiffy. Just flick dials to the color bands and read capacitance, tolerance, and voltage directly.

GET YOURS TODAY!

This slick plastic service help fits your pocket. Always on hand, it saves time and avoids mistakes . . . and it's only 15c. Ask for one at your Sprague distributor's store today!

SPRAGUE

PRODUCTS COMPANY

DISTRIBUTORS' DIVISION OF THE SPRAGUE ELECTRIC COMPANY

61 MARSHALL ST., NORTH ADAMS, MASS.

IRA KAMEN BECOMES TV DEVELOPMENT-SALES HEAD AT BRACH

Ira Kamen has been named director of TV development and promotion of Brach Manufacturing Corp., 200 Central Avenue, Newark, N. J.

Prior to joining Brach, Kamen was manager of the TV department for Commercial Radio-Sound, RCA distributors in the New York, New Jersey and Connecticut areas.

Co-author of the book *TV-FM Antenna Installation*, Kamen has appeared before many service groups, lecturing on TV antennas and accessories. He is a member of the TBA engineering committee, and the IRE.



Ira Kamen
* * *

STANCOR CATALOG

A 20-page catalog of transformers and related components for radio, sound and industrial applications has been published by Standard Transformer Corporation, 3580 N. Elston Avenue, Chicago 18, Ill. Lists electrical and physical specifications of more than 400 part numbers. Also included is a complete price list and handy charts.

(Additional News on pages 70 and 71)

New Parts . . . Instruments . .

RCA SENIOR VOLTOHMYST

A *Senior VoltOhmyst*, providing direct peak-to-peak measurement of complex wave shapes up to 1,400 volts, has been announced by the test and measuring equipment section of the RCA Tube Department.

VoltOhmyst, WV-97A, contains a full-wave, high-impedance, high-frequency signal-rectifier circuit featuring wide frequency response and high voltage ratings.

In addition to peak-to-peak measurements, the instrument reads *dc* voltages, resistance values, and *rms* values of sine waves.

Direct-reading peak-to-peak scales of the VoltOhmyst permit the measurement of sync pulses, composite waveforms, and deflection voltages in TV receivers.

Voltage-measuring facilities provided include seven *dc* ranges, seven *ac rms* ranges, seven peak-to-peak ranges, and seven ohm ranges, all continuous in ratio steps of about three-to-one without skip ranges.

DC voltages of either polarity may be measured from .1 to 1,500, in the presence of *ac* voltages, under conditions of fluctuating line voltage, and in high-resistance circuits.

AC voltages of complex waves to 1,400 peak-to-peak volts may be measured at frequencies up to 3 mc, and with a minimum of circuit loading.

Resistance values from .1 ohm to 1,000 megohms may be read with the instrument.

VoltOhmyst combines a 200-microampere *dc* movement and 1% resistors with a highly degenerative circuit to afford an overall accuracy of ± 3 per cent of full scale for *dc*, and ± 5 per cent of full scale for *ac*.

Available as accessories for the instrument are a slip-on crystal probe, WG-264, which permits *rms* measurements in *rf* circuits up to 250 mc, a high-voltage probe, WG-289, and a multiplier resistor, WG-206, which extends the *dc* voltage range of the instrument to 50,000 volts, and multiplies all scales by 100.



More than enough

300 ohm Twin Line to go AROUND the WORLD

U.S.
WIRE AND
CABLE CORP.

That's mileage delivered—and it's just one of the types in continuous production to meet the ever-growing demand for U.S. Wire and Cable! *Here's why:* Only virgin polyethylene is used for insulation. This assures *minimum* signal loss between antenna and receiver. Virgin polyethylene provides 30% more service life—the wire retains its impedance value and holds its original characteristics *longer*. Every foot of U. S. Wire and Cable is held to close tolerances—and *pre-tested*. Specifications usually exceed rigid, government requirements. Yet, with all its *extra quality . . . it costs you less!*

Write for Specification Sheet.

U.S. WIRE and CABLE CORP.
27 Haynes Ave., Newark, New Jersey

All types of Twin Line and Coaxial Cables, 4-Conductor TV Cable, plus a complete line of other wires and cables.

HYTRON TUBE PULLER

A Neoprene rubber tube puller which works by suction and friction on *top* of tube, has been produced by the Hytron Radio & Electronics Corp., Salem, Mass. Said to remove even the tiny 6AK5 and 6AL5 types from shielded sockets.

To pull, tube puller is pushed onto top of 7-pin miniature. With just enough for firm grip, and without depressing, a button at top is released. Then it is only necessary to pull straight up and out. Tube is then held securely in one hand, and with other, release button is pushed quickly. Compressed air pops out tube. Or, holding down release button, tube puller can be removed by rocking it.

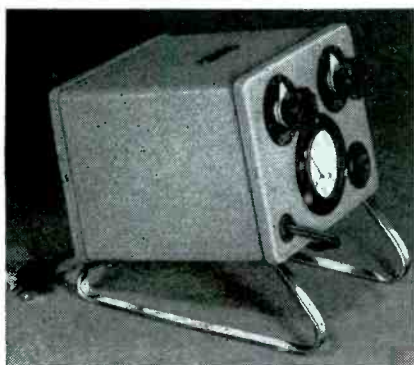
RCP SWEEP GENERATOR WITH MARKER

A TV-FM sweep generator and marker, combined in one instrument, TV-80, has been announced by Radio City Products Co., 152 West 25th St., New York City.

The sweep generator uses an electromagnet type of sweep and two oscillator circuits. Design incorporates internal blanking circuit that is said to permit retrace to be blanked out independently, regardless of the type of 'scope used.

Range 5 to 240 mc, continuously variable. Sweep width, variable 400 kc to 10 mc. Marker is a high Q absorption type; marker range, 17 to 48 kc.

It's **NEW**
...and it's **NEWS!**



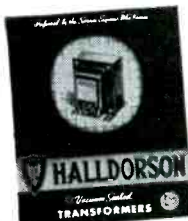
VARIVOLT MASTER Model N-202 Voltage Adjusting Isolation Transformer

A new, larger capacity transformer that provides positive control of your voltage fluctuations—better than ever, and safer because it isolates you from your work. Raises voltage or lowers it—in 1½ volt steps—high for locating weak points, low for testing under minimum conditions. Handles the smallest or largest servicing job, even up to 20" TV Combinations!

Rated capacity at 117 volt output is 500 watts. A marvel of efficiency, Varivolt Master weighs 21 lbs. yet requires less than a square foot of bench space. Steel runners permit easy movement, and slant the instrument for accurate reading. See your Jobber Today!

Write for Catalogue
Today

It's free. The Halldorson line of Vacuum Sealed Transformers is tops for quality—one of the completest in the industry. You're up-to-date with a Halldorson Catalogue. The Halldorson Company, 4500 N. Ravenswood, Chicago 40, Illinois.



Halldorson
Vacuum Sealed Transformers

ASTRON FILTERS AND CAPACITORS

A line of filters for radio-noise suppression, and a line of molded paper tubulars and electrolytics, have been announced by Astron Corp., 225 Grant Avenue, East Newark, N. J.

One model, a Metalite midget, features use of metallized paper and is said to be self-healing.

Astron is headed by Otto Paschkes, a pioneer in the capacitor industry, formerly head of Polymet and Solar. Joseph Frank is vice president, secretary and treasurer. He was also connected with Solar for many years, as were John Fisher, vice president in charge of engineering, and Irving Black, vice president in charge of production.



CENTRALAB BLUE-SHAFT CONTROLS

A line of Blue Shaft Controls, for use as replacement controls, has been developed by Centralab, Milwaukee, Wisconsin.

All controls are factory assembled. They are 15/16" in diameter, standard model B controls having 3" long shafts, universal fluted, with full length mill, and model BSK, a 2 7/8" shaft with split knurl.

Terminal surfaces are elevated, which is said to eliminate danger of shorting to cover legs.

Double wiping contacts on both resistor and center terminal ring are present with a positive contact spring.

Resistors are made of special resistance material bonded to high quality phenolic which is said to afford smooth operation, low noise level, and effective humidity characteristics.

Insulator used is said to withstand breakdown test at 1,000 volts rms. Offered in resistance ranges from 500 ohms to 10 megohms, in a variety of tapers and tapped units.



* * *

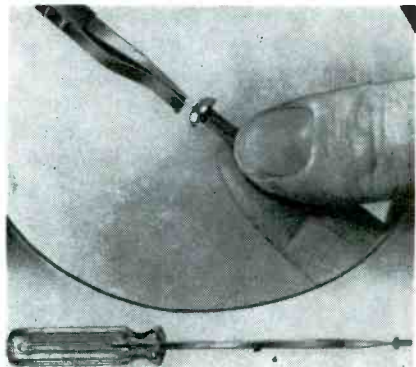
VACO KLIPXON SCREW DRIVER

A screw driver, the Klipxon, with a screw holder in the form of a spring clip which may be slid back up the shaft and out of the way when not needed, has been produced by Vaco Products Co., 317 E. Ontario St., Chicago 11, Ill.

To secure a screw to the Klipxon screw driver in the open, the clip is moved forward along the blade until the end of the clip extends beyond the bit. The clip is then inserted into the screw slot by holding the screw firmly and sliding the bit forward toward the head, exerting enough pressure to close the gap between clip and bit so as to seat the bit in the slot. Extracting a screw from a countersunk hole is negotiated in the same manner except that the screw is held in the hole instead of by the fingers.

Handle is said to be constructed of breakproof amberyl. The shank is square and is made of forged chrome vanadium.

Available in two different bit diameters and in many lengths.



NOW!

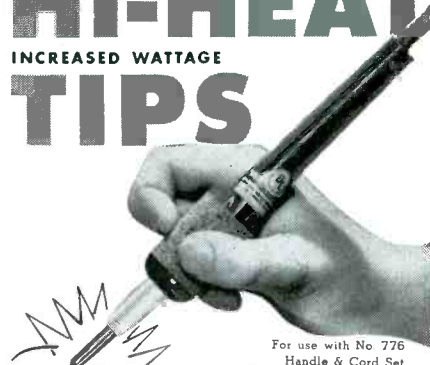
SPEED UP ALL SOLDERING WITH

UNGAR

FEATHER-LIGHT SOLDERING PENCILS WITH

HI-HEAT TIPS

INCREASED WATTAGE

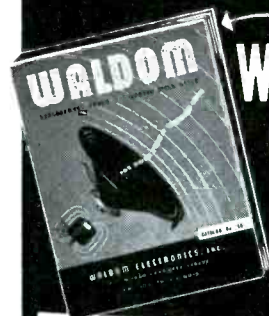


For use with No. 776 Handle & Cord Set

Stop wrestling with big irons. New HI-HEAT TIPS in your Ungar Electric Soldering Pencil produce a really versatile tool that'll perform on a par with the big, bulky 100-150 watt irons. If you can't get immediate delivery, please be patient, for production hasn't yet caught up with demand. Ask your supplier for No. 1236 Pyramid or No. 1239 Chisel. List price, \$1.25 each.

Ungar
ELECTRIC TOOL CO., Inc.
LOS ANGELES 54, CALIFORNIA

Servicemen - Dealers



WALDOM
Replacement
Cone
Manual
Catalog No. 50

Write for your FREE copy Today!

Waldom's Free New 24-Page Replacement Cone Manual lists specific replacement data for over 75 different TV, FM, and AM Sets. This handy reference speeds-up your repair time — means more profit to You! Write today for your Free Copy. Just send your name and address to Dept. 8.

For Finer Tone a Waldom Cone



- Check these features:
- Hawley diaphragms — with the patented thin, tapering edge that assures maximum speaker efficiency and true low frequency response.
 - The finest voice coils and spiders made with precision craftsmanship to exacting specifications.
 - Unconditionally Guaranteed as to construction and performance.
 - Carries the full R.M.A. Warranty.

WALDOM ELECTRONICS, INC.
911 N. Larrabee St., Chicago 10, Ill.

JACKSON CAPACITOR TESTER

A push-button controlled test instrument, model 112, for capacity and leakage tests, has been announced by Jackson Electrical Instrument Co., 18 South Patterson Boulevard, Dayton 1, Ohio. Checks all types of capacitors: electrolytic, paper, mica, etc.

Six test voltages from 20 volts to 500 volts. Dial is glass-enclosed and equipped with a scale expander pointer. Measures power factor on a direct reading scale calibrated from 0 to 60%. Ranges from .00001 to 1,000 mfd in four steps.



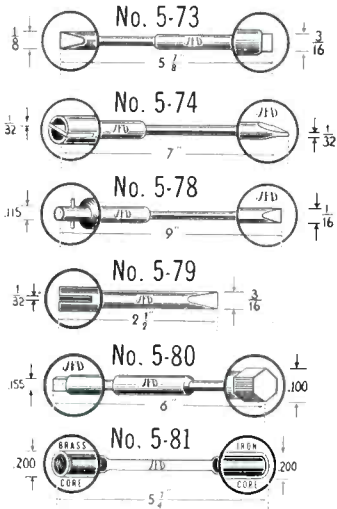
* * *

JFD NYLON TV ALIGNMENT TOOL KIT

A nylon TV alignment tool kit, No. TK60, with six tools molded of unbreakable nylon, has been announced by JFD Manufacturing Co., Inc., 6101 Sixteenth Ave., Brooklyn 4, New York.

Each of the aligning tools furnishes two different tuning tips, one on each end, for a total of 12 separate aligning ends. Tools are molded in contrasting colors to speed identification.

Servicing adjustments provided by tools are: No. 5-73, for tuners, trimmers and *if* transformers; No. 5-74, for midjet transformers; No. 5-78 for nested iron cores; No. 5-79, for close trimmer and *if* transformers; No. 5-80, for K-tran and *if* transformers, and No. 5-81, tuning rod for changing coil inductance.




* * *

MAGNETIC DRIVERS

A magnetic driver for hex head screws and nuts, which is said to have 10 times the pull of ordinary magnetic tools, has been announced by the Magna Tool Corp., Buffalo, New York.

A permanent Alnico magnet, yieldingly recessed in the nutdriver socket, holds screw or nut firmly in position for starting and driving.

Magna hex drivers are available in all standard sizes from 1/4" to 1/2".



TIME will not "OUTDATE" Your RCP Tube Testers
Only RCP has these "Obsolescence-Proof" Features!

NEW DYNOPTIMUM FREE POINT TUBE TESTER MODEL 323

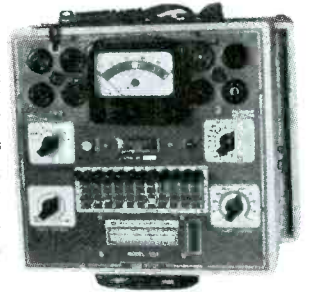
Don't buy a new tube tester that could be obsolescent over night. That's what could happen with any other tester on the market compared with the new R.C.P. Models 323, 807, and 8773.

In addition to being a free point tester, these new models have two extra switches and two extra sockets that are not used. They are kept in reserve and provide for future new tubes with extra elements. Space is also provided for new tube sockets that might appear in the future.

Included also is the new 8-prong subminiature socket for testing hearing aid ballast, pilot light tuning indicators, etc., also speedy-short leakage and filament continuity tests.

Another part of the standard equipment is the new speedy Rohindex with approximately 1000 tube listings.

- Model 323C—Counter model, metal case..... \$49.95
- Model 323P (Illustrated)—Combination portable-counter model in beautiful oak carrying case..... 52.95

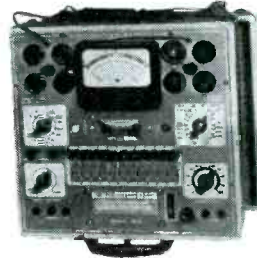


COMBINATION TUBE & SET TESTER MODEL 807

Combines model 323P, described above, with a modern multi-tester and condenser tester. Additional Ranges:

- DC Voltmeter: 0-10-50-500-1000-2500
- AC Voltmeter: 0-10-50-500-1000-2500
- DC Milliammeter: 0-10-100-1000
- DC Ammeter: 0-10
- Decibel Meter: -8 to +15, 15 to 29, 29 to 49, 32 to 55
- Ohmmeter: 0-500-5000 ohms, 0-0.1-1-10 megohms

Housed in handsome hand-rubbed carrying case with test leads, batteries, etc. Complete, ready to operate..... \$69.95



SERVISHOP MODEL 8773

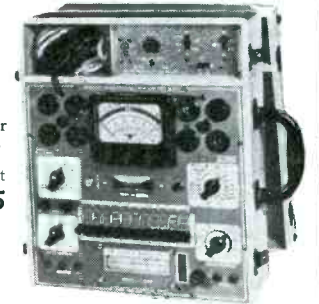
This unit is equivalent to a complete service shop.

- Tube Tester
- AM Signal Generator
- Audio Oscillator
- Condenser Tester
- FM Signal Generator
- Complete Multitester

Complete with tubes, batteries and test leads, output leads, etc., and housed in beautiful natural finish oak case..... \$94.95

SEE THESE OUTSTANDING BUYS AT YOUR JOBBER TODAY

WRITE FOR CATALOG 8S



RADIO CITY PRODUCTS CO., INC.

152 WEST 25th ST — NEW YORK 1, N. Y.



INSULINE LIGHT-BEAM AUTO ANTENNA

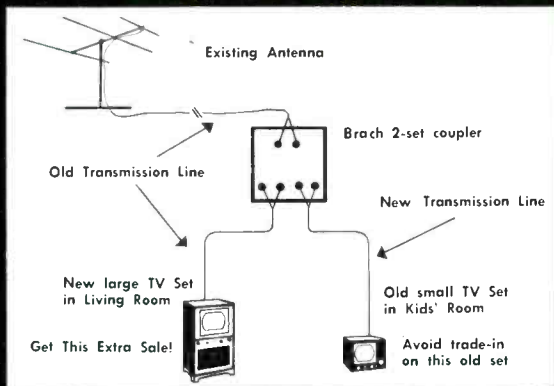
A lucite-enclosed auto radio antenna that lights up along its bottom section, *Tema-Beam*, has been announced by the Insuline Corporation of America, 3602 35th Avenue, Long Island City 1, N. Y.

Illumination is furnished by a six-volt bulb in the casting that forms the base of the antenna, under the cowl. The light is conducted upward by a two-foot length of plastic tubing, in which the fixed part of the antenna rests. An additional pull-out section gives the antenna a total length of four feet. The antenna rods are made of chrome-plated brass tubing. A universal mounting fixture and a four-foot length of shielded leadin wire are included.



Insuline light-beam antenna

TWO SETS IN EVERY HOME Made Easy with New Coupler



The Brach 2-Set Coupler

- Eliminates interference
- Matches 300 & 75 ohm lines
- Installs with hand tools
- Low in cost
- Avoids trade-in sales

See it at the
**NEDA
SHOW**
Booth No.
127

BRACH MANUFACTURING CORP. (Div. of General Bronze Corp.)
200 Central Ave. Newark 4, N. J.

Plymouth

TV-FM ANTENNA EQUIPMENT - CHIMNEY, ROOF, WALL MOUNTS - CHANNEL TRANSFER SWITCHES - STAINLESS STEEL STRAPPING - GALVANIZED STRAPPING - GUY CABLE

Write for illustrated catalogue sheets.

Plymouth Electronics Corp.

68 HIGH STREET, WORCESTER 8, MASS.

WHEN YOU CHANGE YOUR ADDRESS

Be sure to notify the Subscription Department of SERVICE at 52 Vanderbilt Avenue, New York 17, N. Y., giving the old as well as the new address, and do this at least four weeks in advance. The Post Office Department does not forward magazines unless you pay additional postage, and we cannot duplicate copies mailed to the old address. We ask your cooperation.

RTMA NAMES ERNEST KELLER CHAIRMAN OF TV BOOSTER COMMITTEE

Ernest Keller, vice president and sales manager of the Anchor Radio Corp., has been appointed chairman of the RTMA TV Booster Committee. Reviewing the activities of the committee, Keller indicated that with the aid of a good working committee under the guidance of RTMA, TV accessories such as a booster, aside from being a profitable item in itself, will play a vital part in extending TV sales to untapped markets. Service Men interested in the program are encouraged to send comments and further suggestions concerning this plan to Box B, Room 700, 37 W. Van Buren St., Chicago 5, Ill.



Ernest Keller

GENERAL CEMENT CATALOG

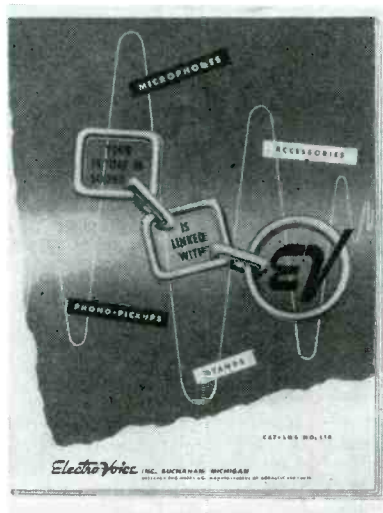
A 64-page catalog, No. 154, describing radio chemicals, radio and TV parts and service aids, alignment tools and radio hardware, has been published by the General Cement Mfg. Co., Rockford, Ill.

ELECTRO-VOICE MICROPHONE CATALOG

A microphone catalog, No. 110, has been issued by Electro-Voice, Inc., Buchanan, Michigan.

Catalog presents information and specifications on the line of Electro-Voice dynamic, crystal, velocity and carbon microphones and floor, desk and banquet stands and accessories.

Also included are details and listings of Electro-Voice *Torque-drive* crystal phono pickup cartridges for single-speed and multi-speed 33 $\frac{1}{3}$, 45 and 78 rpm record players, and the new *Econo-Cart-ridge*.



SNYDER DISPLAY BASKET

A wire display basket, to hold a complete line of catalogs and other printed information, has been created by Snyder Manufacturing Co., 22nd and Ontario Streets, Philadelphia 40, Pa.

Display is of the self-service type and can be set up on the store counter.

Can be obtained from regular Snyder distributors or by writing directly to Dick Morris, Snyder sales manager.



Snyder display basket

CLETRON SPEAKER CATALOG

A radio and TV replacement speaker catalog, 127 M, which lists a line of auto, TV and radio speakers in *pm* and *em* types has been published by Cleveland Electronics, Inc., 6620 Euclid Ave., Cleveland 3, Ohio.

Also featured are the new Cletron weatherproof speakers and TV lightning arresters.

Write Bill Allen for a copy.

ELECTRONIC TECHNICIANS

FOR

Radar, Communications, Television Receivers
NEEDED BY

RCA SERVICE COMPANY, Inc.

A Radio Corporation of America Subsidiary
For U. S. and Overseas

Requirements:

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Qualified candidates will be interviewed promptly.

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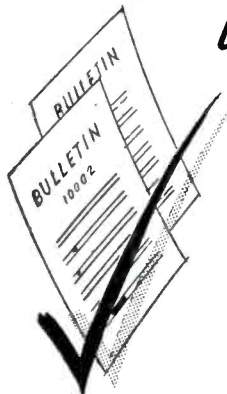
Qualified technicians seeking a connection with leading company having permanent program for installation and service of military equipment, AM, FM, TV transmitters and receivers and electronic devices, such as electron microscopes, mobile and microwave communications, theatre television, write full history to:

RCA SERVICE CO., Inc.
CAMDEN 2, NEW JERSEY

**HANDY NEW SELETRON
RECTIFIER BULLETIN READY**

FREE!

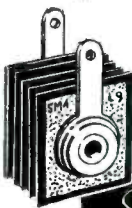
*... Makes Every Serviceman's
Life Easier!*



SELETRON RECTIFIERS

It's SELETRON's Service Bulletin No. 10002 . . . Charts SELETRON Rectifiers which may be used as replacements in Radio and Television Sets of various manufacturers . . . Lists each manufacturer's Set Number, his Rectifier Number, and SELETRON's corresponding model!

Write for your copy of this valuable time-saving bulletin today—It's free!



RR SELETRON DIVISION RR
RADIO RECEPTOR COMPANY, Inc.
Since 1922 in Radio and Electronics

Sales Department: 251 West 19th St., New York 11, N. Y.
Factory: 84 North 9th St., Brooklyn 11, N. Y.

PRECISION APPARATUS LECTURES

The lecture tour sponsored by Precision Apparatus Company, Inc., Elmhurst, N. Y., and featuring nation-wide talks to television Service Men by R. G. Middleton, senior engineer, on high-voltage power supplies and video if alignment, terminated recently with a lecture at Houston, Texas.

Precision found that the talks, which they plan to renew for the fall and winter months, stimulated interest in TV, served to provide answers to many servicing problems and proved to be generally helpful to distributors, salesmen, Service Men and, in the final analysis, the consuming public.

About 15,000 Service Men attended the meetings.



Bob Middleton, before a typical audience, during one of his Precision Apparatus talks.

RCA TRIPLE INDEX TUBE BASE DIAGRAM GUIDEBOOK REVISED

A revised edition of the *Triple Index* reference guide to tube-base diagrams has been announced by the RCA Tube Department.

Guide now covers the base diagrams for more than 600 tube types, including more than 60 picture tubes.

Triple Index is actually three complete and separate base-diagram booklets, joined in a single cover with a spiral-wire binding. To locate a tube base diagram, the Service Man can flip over the pages of one of the booklets. If a second base diagram is needed, it may be located in the second booklet, without disturbing the first diagram. A third diagram may be independently located in the same three-in-one page.

Tube types are listed in both alphabetical and numerical sequence. A four-page cross-index supplement in the back of the book lists additional types, together with a key to appropriate diagrams in the book.

Designed for work-bench use, the *Triple Index* measures 4" x 8".

Guide, 2F366R, is available from RCA distributors; price 75 cents.

JFD CATALOG

A 12-page TV antenna and accessory catalog has been announced by the JFD Manufacturing Co., Inc., 6101 Sixteenth Ave., Brooklyn 4, New York.

Catalog covers conicals, dipoles, yagis, window and indoor antennas, lightning arresters, chimney mounts, assorted hardware, TV chassis knob sets, terminal strips, test lead prods, etc.


SYLVANIA WEST COAST BUILDING OPENED

A new building, which covers 40,000 square feet, centralizes Pacific Southwest sales and service facilities, and provides warehouse space for stocks of Sylvania radio and TV tubes, lighting products and photolamps, was opened recently by Sylvania at 2936 E. 46th St., Los Angeles, Calif. A TV picture tube testing and experimental laboratory and a photographic laboratory are also included in the new structure.



Above: At new Sylvania building dedication ceremonies, left to right: Al Jarvis, radio and TV star; movie actress Meredith Leeds, who was chosen Miss Television for 1950; George Sommers, general sales manager of Sylvania's radio and television picture tube division; Robert H. Bishop, vice president, in charge of Sylvania sales, and Betty White, radio and TV actress. At the dedication ceremonies Sylvania played host to 3,800 civic and industrial leaders, distributors, dealers, engineers and celebrities of stage, screen and radio.

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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.

SPRAGUE PRODUCTS CO.
61 Marshall Street
NORTH ADAMS • MASS.

JOTS AND FLASHES

TV STREAMLINED CHASSIS with fewer parts and tubes, less connections and simplified component layouts, a year ago just an idea, has become a dominant actuality, with many receivers now coming off the line featuring these compact arrangements. Models produced by RCA, for instance, are said to have 30% less parts and 20% less connections. Here's a trend which will be a blessing to every Service Man. . . . James D. Secrest, who since 1945 has been director of public relations for RTMA, has succeeded Bond Geddes as secretary and general manager of the association. Geddes will continue to serve RTMA as a consultant. . . . Ralph Batcher has been named chief engineer of the engineering department of RTMA and manager of the RTMA Data Bureau in New York. L. C. F. Horle, chief engineer of the department for nearly 15 years, has retired. . . . Sun Radio and Electronics Co., Inc., 122-124 Duane Street, New York 7, are now exclusive distributors for Peerless transformers in the New York metropolitan area. . . . Three new auto radios, which can be installed in any make or model of car, have been announced by Philco. The models feature five miniature tubes, plus a rectifier, and include a tuned *rf* stage, a 3-gang permeability tuner and a built-in *pm* speaker. . . . A book entitled *TV Installation Techniques*, written by Samuel L. Marshall, has been published by John F. Rider Publisher, Inc., 480 Canal St., New York 13, N. Y. . . . A new distributor, Hudson Radio and Television Corp., has been formed in New York City, at 212 Fulton St. Sol Baxt and Lester Klein, formerly with Newark Electric Co., are the owners of the new company. . . . The facilities of Sound, Inc., 221 E. Cullerton St., Chicago 10, Ill., have been acquired by the Pentron Corp., 611 W. Division St., Chicago 10, Illinois. . . . Robert L. McNelis has become distributor sales rep for the radio tube division of Sylvania Electric. . . . Donald E. Smith, formerly an engineer for the electronics division of Sylvania, has been transferred to the renewal tube sales department of the Sylvania radio tube division. . . . John S. Meck recently delivered a talk on *The Impact of Television* during a Northwestern University Reviewing Stand discussion over the Mutual network. . . . A metal-core antenna system, known as the *Croloy Radio Rod*, developed by Henry L. Crowley and Co., Inc., West Orange, N. J., has become a feature of many portable and table model receivers. The antenna consists of a single layer of insulated wire winding on a .250" to .6" diameter core, 7" to 8" long. The core is said to provide signal pickup of about 2:1 at the low end of the band and nearly as high at the upper end. . . . General Electric has announced that it will start making 17" rectangular picture tubes at its Buffalo and Syracuse plants. The tube, 17BP4A, has a neutral-density faceplate and is a magnetic-focus-and-deflection type. It features an electron gun designed for use with an external, single-field ion-trap magnet for the prevention of ion-spot blemish. An external conductive coating serves as a filter capacitor when grounded. Heater voltage is 6.3 and heater current is .6 ampere $\pm 10\%$.

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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!

1ST **TRISEAL CONSTRUCTION**—Sealed *three* ways —with moisture-free Mallotrol* . . . tough outer plastic shell . . . exclusive Mallocene!

1ST **DISTORTION-FREE WINDING** — No flattened cartridges due to molding pressures . . . no failures due to "shorts"!

1ST **FASTITE LEADS**—Permanently fastened . . . sealed with Mallocene . . . unaffected by soldering-iron heat!

1ST **TRU-CENTER CARTRIDGE**—Cartridge centered every time . . . uniform insulation guaranteed at all points!

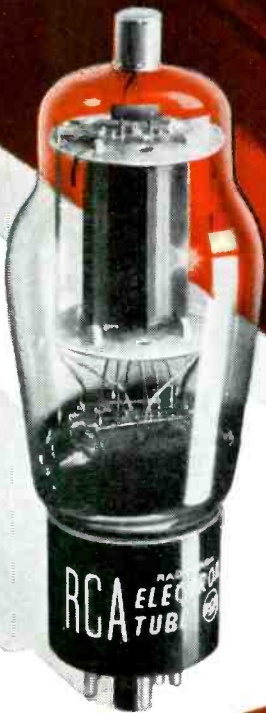
Plus these Top Features: Operates at 85°C . . . No messy outside wax coating required . . . Great mechanical strength . . . Small in size . . . Light in weight . . . High dielectric strength . . . Lead to outside foil clearly identified . . . Handsome yellow case . . . Legible part-numbers and ratings.

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SWITCHES . . . RESISTORS . . . RECTIFIERS . . .
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*Reg. U. S. Pat. Off.

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

THE QUALITY OF RCA TUBES IS UNQUESTIONED



RCA for *Deflection Tubes*
... with dependability

Each standard by which you judge a tube in service is considered in establishing the design requirements of RCA tubes. Dependable performance of deflection circuits starts with *dependable* tubes. For example.

RCA-designed driver tubes, such as the 6SN7-GT and 12AU7—as well as the RCA-6K6-GT and RCA-6AQ5 vertical-deflection tubes—are exceptionally low in microphonics. They are built for *dependable* performance.

RCA-designed horizontal deflection tubes, such as the 6BG6-G, easily withstand peak plate voltages of 5000 volts, and as readily meet peak emission demands on the cathode. They, too, are built for *dependable* performance.

For these reasons, RCA tubes offer *dependability* beyond the average. With fewer service failures and fewer costly call-backs, there is, then, an additional hidden profit in every RCA tube and kinescope you sell.

Always keep in touch with your RCA Tube Distributor



RADIO CORPORATION of AMERICA
ELECTRON TUBES

HARRISON, N. J.