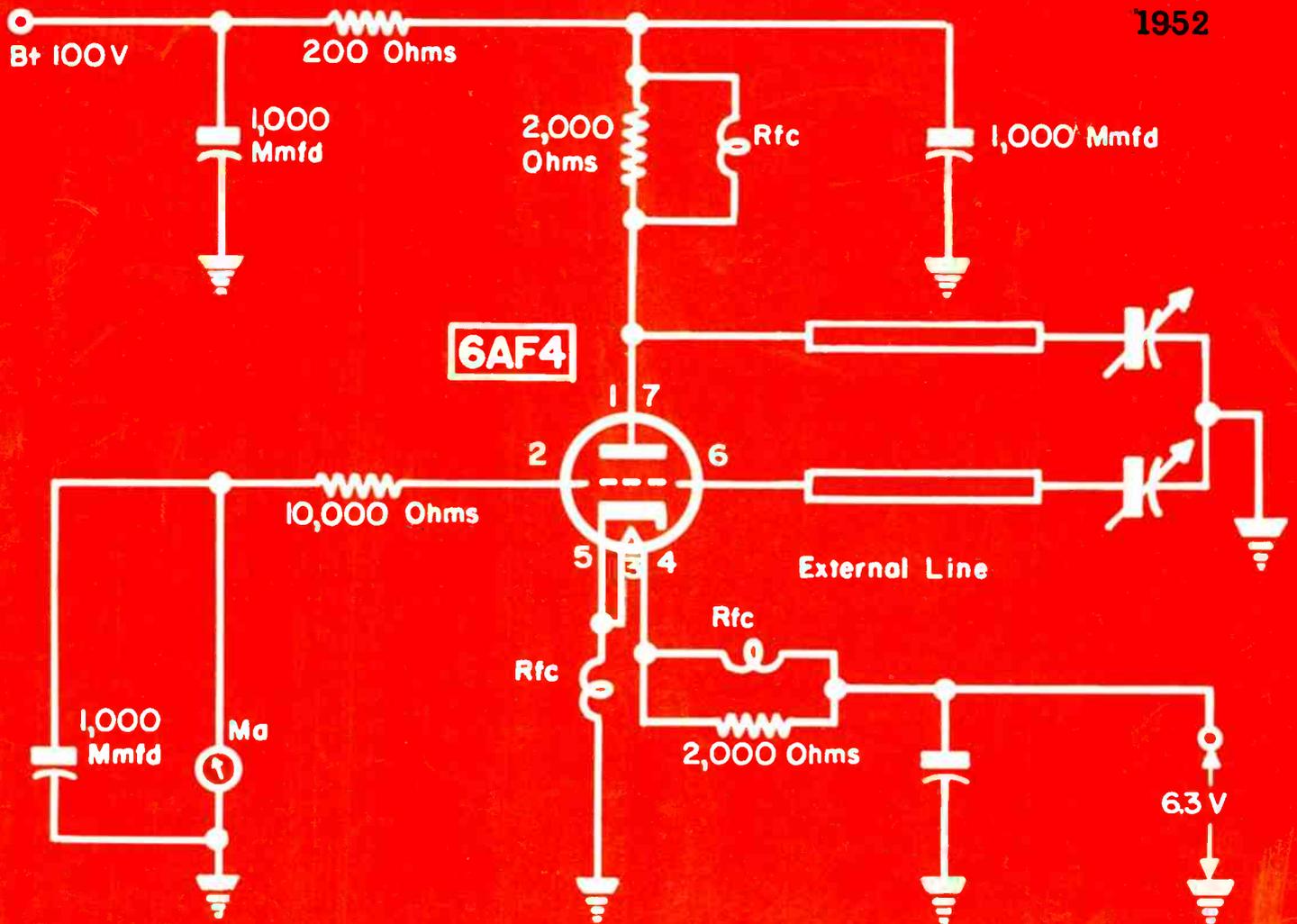


# SERVICE

MAY  
1952



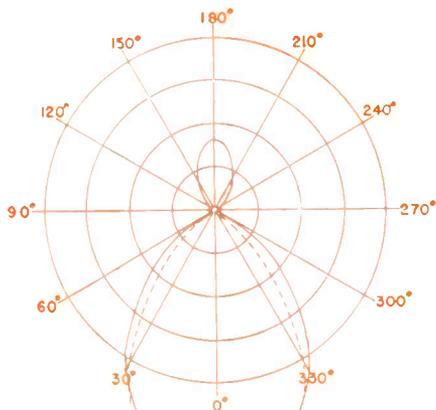
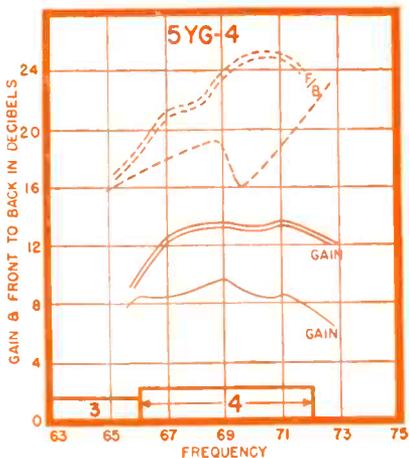
Ultrahigh continuously-tuned oscillator with miniature oscillator triode  
[See page 2]

Assured Balanced  
Performance On  
Both Audio and  
Video Signals



When You Buy A  
**RADIART YAGI**  
TV ANTENNA

You **KNOW** it covers the entire  
**6 Megacycle Band** width in the  
specific channel for which it  
was designed



The perfect answer to the need for maximum signal pickup in "fringe" areas. Each YAGI is cut for a specific channel and may be used singly or doubly stacked. Nothing skimpy or shortcut in their manufacture either — each RADIART YAGI covers the full band width of its channel.

**CHECK THESE FEATURES:**

- Pre-assembled Fold-out Design for FAST Installations
- Over 8 lb. Forward Gain
- Excellent Front-to-Back Ratio
- Narrow Beam Width That Develops High Signal-to-Noise Ratio
- Low Standing Wave Ratio
- Sturdy Construction For Lasting and Dependable Performance.



YAGI response curves for all channels available from your RADIART distributor . . . or write direct to us . . . Specify Form F885.



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

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Man, what a year for TV—and TV service profits! The richest menu of regular attractions ever offered to viewers... PLUS the party conventions, the campaign, the elections and inauguration! When viewers need replacement picture tubes, they'll want them fast—and good.

So remember that Rauland alone

offers these replacement profit advantages:

- The *most complete* line of replacement picture tubes... a far better supplement for your regular tube line than a second line of receiver tubes.
- The faster, *surer* installation adjustment made possible by the patented Indicator Ton Trap.

• The dependable, uniform *extra* quality that so many smart service men depend on for assured customer satisfaction.

Remember, Rauland research has developed more "firsts" in picture tube progress since the war than any other maker. And this leadership pays off... in your customers' satisfaction.

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*Perfection Through Research*

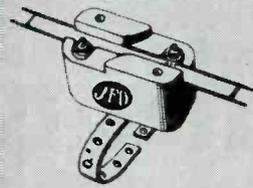
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world's largest manufacturer of TV antennas and accessories

**AT'02** for regular twin lead (universal mounting) **2.25** list

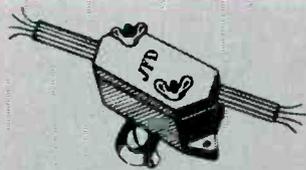


**AT103** for oval jumbo and tubular twin lead (universal mounting) **2.25** list

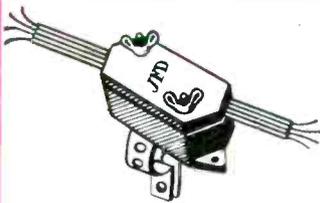
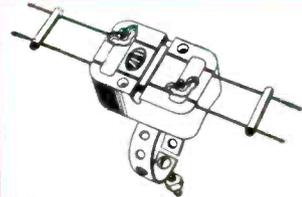


**AT104** 4-wire, 8-contact for rotator lead-in (wall mounting) **1.50** list

**AT104-T** same as above except with clamp **1.75** list



**AT107** for open-line installation (with 4-ft. ductile aluminum ground wire and strap for universal mounting) **3.50** list



**AT104S** 4-wire, 8-contact for rotator lead-in (with strap for pipe mounting) **1.75** list

lightning

means business!

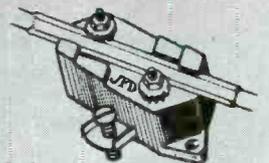
*it pays to be safe with a JFD underwriters' approved lightning arrester*

**millions sold!** because they've proved their value both as a vital home safety device and as a valuable profit item.

Write for Form No. 84R.

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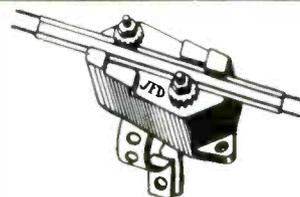


**JFD Mfg. Co.**

Brooklyn 4, N.Y.

phone: HENSONHURST 6-9200

**AT105S** for regular & oval jumbo twin lead (with strap for pipe mounting) **1.50** list





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Editor

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Assistant Editor

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Including Radio Merchandising and Television Merchandising

Application of the Marker Generator in Visual Alignment. By R. G. Middleton	34
Association News	60
Audio Installation and Service (Horn-Loaded Speaker Design . . . Tape Players). By Kenneth Stewart	49
Auto Radio Realignment. By Jack Darr	24
Business Aids (Capitalizing on the Audio Market)	62
New VHF-UHF TV Markets for the Service Man (Complete Allocation Tables)	36
Practical Tracking Adjustments for FM Chassis. By James C. Drake	33
Ser-Cuits (Ultrahigh Converters, Tuners and Receivers). By M. W. Percy	40
Service . . . The National Scene	21
Servicing Helps. By M. A. Marwell	57
Simplified Video-Sound Distribution System. By Mort Zimmerman	29
Social Security and the Self-Employed Service Man (Report on the New Tax Regulation)	32
Ten Years Ago	61
Tube News (Horizontal-Deflection Interference-Effect Cures). By L. M. Allen	54
UHF Continuously-Tuned Oscillator Circuitry (Cover). By Wyn Martin	26
Views and News. By Lewis Winner	19

**AUDIO INSTALLATION AND SERVICE**

Disc Recording	53
Horn-Loaded Loudspeaker Design	49
Tape-Disc-Phono-PA System	52

**CIRCUITS**

Auto-Radio Dummy Antenna Circuit	25
Auto-Radio Scope Alignment Circuitry	24
Crystal Diode Probe	35
DuMont Noise-Immunity Network	57
FM Discriminator	33
FM Ratio-Detector	29
Kingston Products UHF Tuned-Line Tuner	42
Musictape Tape-Disc Recorder/PA System	50
Motorola 401-A Auto-Radio Chassis	24
Philco Vertical Sweep Changes to Curb Vertical Foldover	58
RCA 6AF4 UHF Oscillator (Cover)	26
Sylvania Chassis 1-387-1 Modification to Improve Picture Quality	58
TV Monitor Unit Horizontal-Vertical Circuitry	29
TV Monitor Unit Sync Circuit	29
VHF-UHF Tuner	40
Williamson Amplifier Preamp	52

**COVER**

6AF4 UHF Oscillator (RCA)	26
---------------------------	----

**SERVICING HELPS**

AFC Troubleshooting	57
Cleaning Clock-Radio Dial Faces	57
Eliminating Residual Hum	58
Minimizing Vertical Foldover	58
Noise-Immunity Circuit Checks	57
Removing Harmonic Interference	58
Restoring Interlace	58
Soldering Hints	58
Troubleshooting the Horizontal and Vertical Sweep	59

**Index to Advertisers**

	88
--	----

**Manufacturers**

Jots and Flashes	88
News	84
New Parts . . . Tools . . . Instruments	81
Rep Talk	62
TV Parts . . . Antennas . . . Accessories	72



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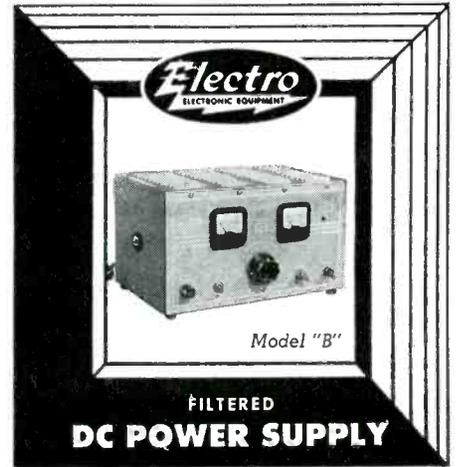
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\*Names on request.

**Low Cost Model "B" POWER SUPPLY**  
6 Volts DC, 1 to 12.5 Amps. Net \$37.50

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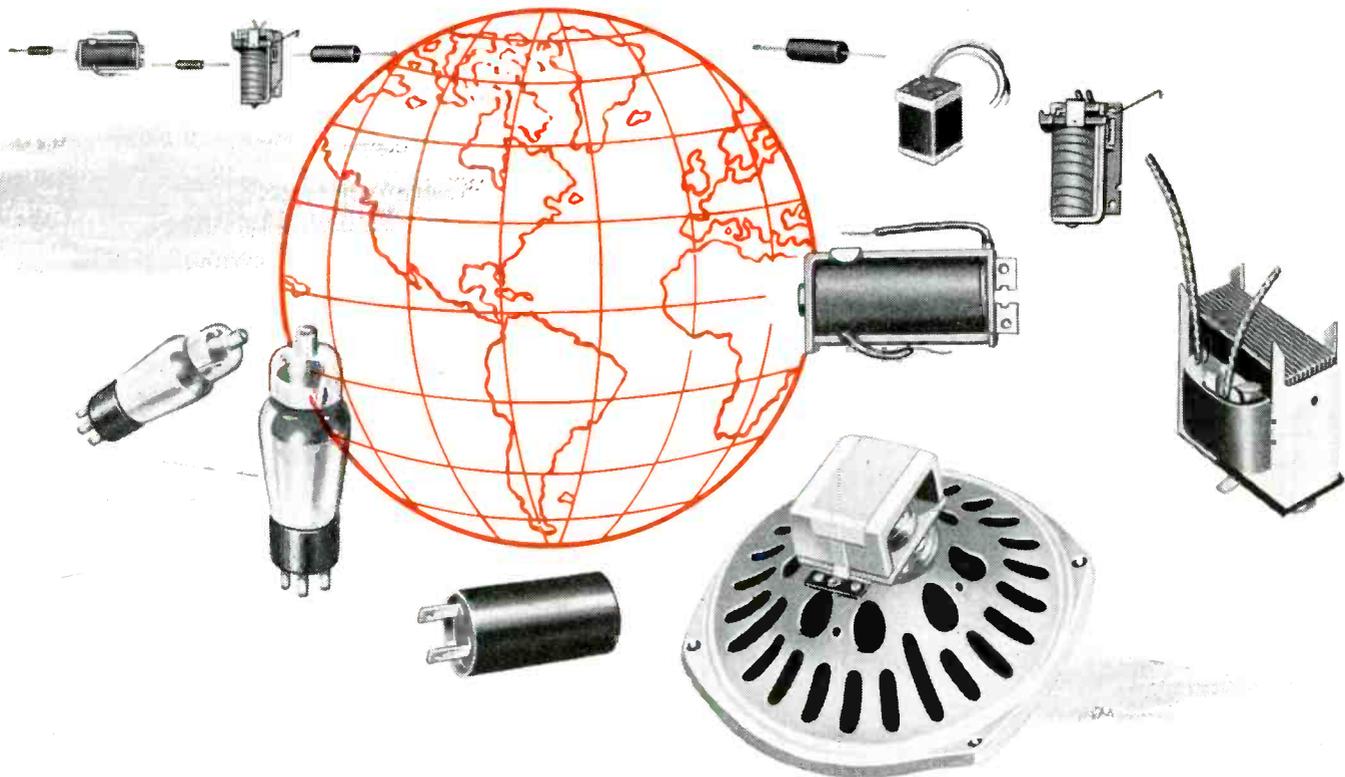


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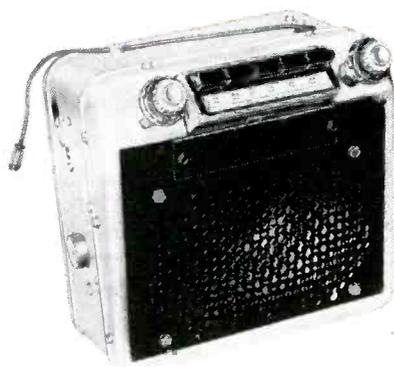
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Have a Look at some of the

# World's Finest Radio Parts!



Ordinary radio parts? Not at all! You see, these automobile radio parts—like thousands of others bearing the Delco Radio name—are of uniform high quality.

More than half of all radio-equipped cars are equipped with Delco Radios—*seven million* in all. Think of the volume-building opportunity for you!

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2. Made in the world's largest factory devoted exclusively to automobile radios.
3. Designed by one of the largest and most forward-looking engineering groups devoted exclusively to automotive radio.

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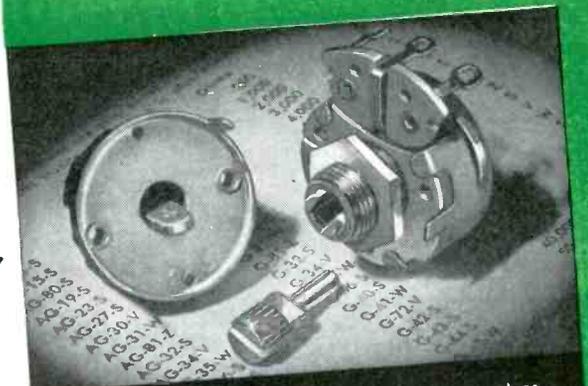
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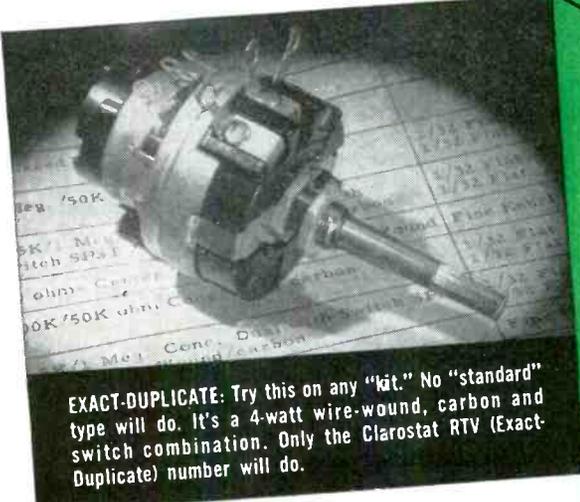
## DELCO RADIO

DIVISION OF GENERAL MOTORS CORPORATION  
KOKOMO, INDIANA

Where **Clarostat Standard** replacements are feasible **OK**; but where critical requirements must be matched-insist on



**STANDARD:** Simple snap-together Clarostat replacement — Series AG 15/16" control with Series SWB Ad-A-Switch and Series FKS-1/4 fine knurled slotted Pick-A-Shaft.



**EXACT-DUPLICATE:** Try this on any "kit." No "standard" type will do. It's a 4-watt wire-wound, carbon and switch combination. Only the Clarostat RTV (Exact-Duplicate) number will do.

# CLAROSTAT

## Exact Duplicate

### Controls

Clarostat *Standard* controls are handiest among standard replacements. First, there's the choice of either 1 1/8" or 15/16" sizes. Then there's the choice of AD-A-SWITCHES, instantly attachable to the given control. Third, there's the choice of ten PICK-A-SHAFTS, any one instantly attachable to the given control. Definitely, minimum stock takes care of maximum replacement needs. But . . .

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Your Clarostat distributor stocks both **STANDARD** and **RTV** replacements for your convenience. And Clarostat provides the outstanding servicing data.



The Clarostat TV Control replacement Manual (and supplements) tells you what control to use. Ask your distributor for it!



Clarostat latest catalog No. 51 lists the greatest choice yet of controls and resistors. Ask your distributor for your copy.

## Controls and

CLAROSTAT MFG. CO., INC., DOVER, NEW HAMPSHIRE  
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 New York 7, N. Y., U. S. A.



## Resistors

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 Canadian Marconi Co., Ltd.,  
 Toronto, Ont.

# HICKOK

## ACCURATE TELEVISION

# VHF-UHF

## ALIGNMENT



### Model 610-A

First choice TV Alignment generator • Accurate, complete IF Marker coverage with expanded scale. • Absolute linearity • FM sweep frequency • Complete IF and RF frequency coverage • Temperature compensated • Low amplitude modulation • High stable output • Sweep phasing control • Useful Harmonic outputs to over 900 mc for UHF. More in use than all others combined. Complete with leads.



### Model 680

HICKOK Model 680 television RF Marker crystal controlled calibrator. Provides crystal controlled front-end markers to .05% accuracy. 53-89 MC and 173-217 MC on fundamentals—Harmonic output on VHF and UHF. HICKOK quality, moderately priced. Designed as the ideal companion to the HICKOK 610-A for accurate VHF-UHF alignment.

The 680 will check the frequency of TV local oscillators, as well as calibrate any signal generator to a .05% accuracy by means of an exclusive HICKOK magic-eye zero-beat indicator. Provides choice of 3 crystals from front panel (2.5 MC crystal supplied).

### How Will You Service The New VHF-UHF Television Receivers?

HICKOK has the answer—Three fine instruments of versatile design to work together as a set and still provide the specific features necessary for their individual use in accurate servicing of other TV equipment.

Thousands of you Service Technicians already have the famous HICKOK Model 610-A TV Alignment Generator. The high 610-A output is usable to view over-all response curve of UHF television receivers—to 900 mc on harmonics. You will be glad to hear that for a small cost you can add the new HICKOK Model 680 Crystal Calibrator to your bench to provide RF Markers of crystal accuracy in servicing VHF-UHF television receivers.

To complete the service set, in the absence of a good Oscillograph, the HICKOK new Model 670 Oscillograph provides the extra sensitivity and range necessary to properly view the wave forms and response curves in the accurate alignment of these new VHF-UHF television receivers.

HICKOK advanced engineering has always pioneered with the most practical solution to all Service Technician's problems. Be sure to see these 3 quality instruments demonstrated at your Jobber's, or write today for complete information.

### Model 670

Stable, accurate, 5 inch Oscillograph—Perfect companion to the 610-A and 680 combination • High sensitivity—to 10 MV per inch to accurately show TV response curve • DC amplifiers for perfect square wave response on both high and low frequency • Astigmatic focus control provides sharper trace • Push-pull Amplifiers, polarity reversing switches, Z-axis modulation, demodulator circuit, negative and positive synchronizing, phasing control and provision for direct connection to both horizontal and vertical plates of CR tube are a few of the plus features that make the HICKOK 670 Today's Biggest 'Scope Value.

For VHF-UHF Servicing, these 3 instruments give you the finest combination available today. Write for technical bulletins 670, 680, 610A—today!



THE HICKOK ELECTRICAL INSTRUMENT COMPANY

10521 Dupont Avenue

Cleveland 8, Ohio

# You're top-man on our Totem Pole



You...  
the Local Radio Dealer  
and Serviceman

## ...here's why:

You're in the *Radio Business*. So are we.

You're interested in promoting the sale and use of *radio products*. So are we.

*If You prosper, so do we!*

That's why we are so anxious to *give you help* when you stock, sell and promote the *RCA Battery Line*.

That's why we continue to channel our principal battery distribution to *You, the radio dealer-serviceman*, thereby assuring *You* the repeat business for *RCA RADIO BATTERIES*.

That's why we advertise *You, The Radio Service-Dealer*, on national network radio and TV programs . . . and tell millions of listeners that *You are best qualified to sell and install RCA RADIO BATTERIES*.

We also help *You advertise for repeat sales on the RCA Battery carton itself!* Millions of volume-type *RCA Batteries* carry a printed message directing the user to *return to You* for replacements. Below this message is a space where you can stamp *your own name and address* with a personalized stamp which you may obtain from your *RCA Battery Distributor*.

We will continue to provide speedy, dependable service, backed by the *only* nation-wide warehousing and distribution organization geared to the needs of the radio trade.

With all this to back you, your best move is to stock, sell and promote the *RCA Battery Line*.

**Remember:** You're a *Radio Man*.  
We're a *Radio Company*.  
*If You prosper, so do we!*

That's why you're tops on our totem pole. And that's why you'll do better . . . *make more money* . . . with the *RCA Battery Line*.

So call your *RCA Battery Distributor*. Let's get started selling *RCA Batteries* together . . . *right now*.



**RADIO CORPORATION of AMERICA**

**RADIO BATTERIES**

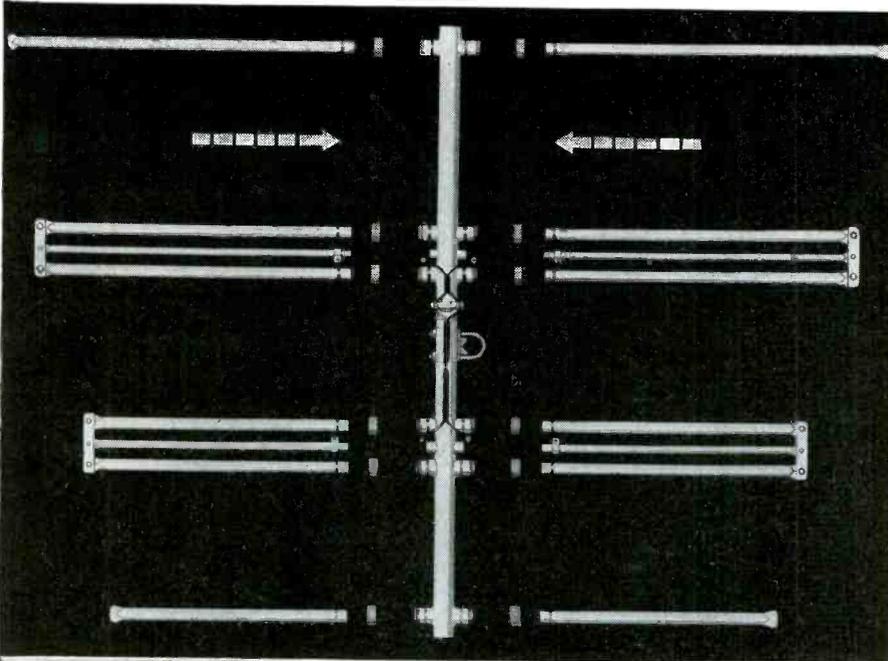
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*Announcing-*

# the New **TRIO 'MINIT-UP'**

**STRONGEST TV ANTENNA EVER DESIGNED...**

## **PLUS-ONE MAN/MINUTE ASSEMBLY!**



This — is it!

The new TRIO MINIT-UP . . . a revolutionary TV antenna that combines "minute quick" assembly with strength never before attained in *any* TV antenna!

Strong statements, to be sure — but absolutely true. Take a good look at the illustrations . . . see how simple, how fool proof, how "minute quick" assembly is! Note well, also, the many superior construction details that make the new TRIO "MINIT-UP" a veritable tower of strength!

*Feature upon feature makes this new TRIO MINIT-UP the biggest good news in TV antennas yet!*

This "exploded" view graphically illustrates the extreme simplicity of MINIT-UP's assembly. Note the color code bands that show instantly where each element is attached. Note the serrated connectors that provide a firm grip with hand or glove — in any weather. Here, indeed, is the last word in TV antennas. Featuring easy assembly, rugged strength — it's the New TRIO "MINIT-UP"!

Model 445MU High Gain MINIT-UP for channels 4 and 5  
Model 479MU High Gain MINIT-UP for channels 7 and 9

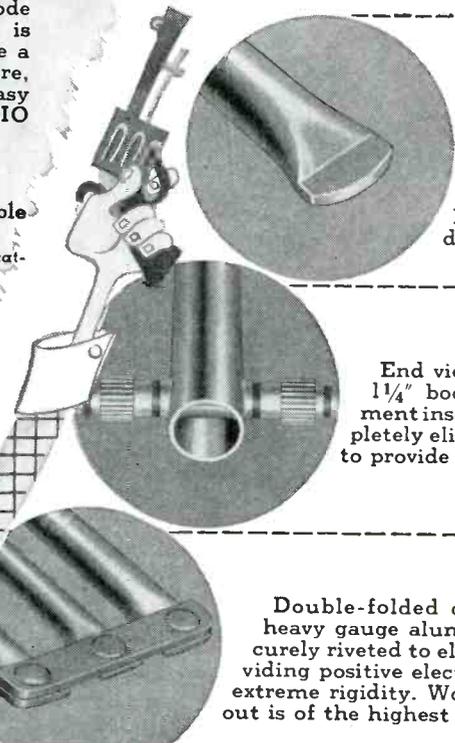
(TRIO's conventional single channel yagis also available with "MINIT-UP" construction)

Patent pending — no licensing arrangements granted for duplicating principle of this antenna.

### **MINIT-UP STOPS ANTENNA "CALL BACKS"!**

TRIO TV Antennas have long been recognized as "leaders in performance"! Now — with new design features and "minute quick" assembly — TRIO is, easily, the "leader in construction"!

Dealers and Installers will find TRIO's MINIT-UP the most profitable TV antenna they can install. MINIT-UP goes up fast — and stays up! Every detail of design and construction is employed to make MINIT-UP the most rugged TV antenna on the market today!



Yagi elements of .035" thick seamless aluminum, are full 5/8" in diameter. Ends are crimped for greater strength and to cut down vibration. Prevents entrance of dirt and moisture.

End view of the heavy gauge 1 1/4" boom showing how element inserts are swaged to completely eliminate vibrations and to provide tremendous strength.

Double-folded dipole sections have heavy gauge aluminum brace bars securely riveted to element ends thus providing positive electrical connection and extreme rigidity. Workmanship throughout is of the highest order.

ONE MAN



# **TRIO** *Manufacturing Company*

GRIGGSVILLE, ILLINOIS



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Will Tell Stancor What's Wanted at your Service Bench**

The members of the Serviceman Advisory Board have been chosen from the best men in their locality. They have an average of 4½ years experience in TV servicing (except those in non-TV areas) and over 17 years of practical experience in electronics. Most of them are officers or active participants in local servicing organizations.

**They know their business—and they know the serviceman's problems.**

These men have been retained to help Stancor do a better job for you. They will work for you by

advising Stancor on your replacement transformer problems. As we produce new components and publish new literature, the Serviceman Advisory Board represents YOU in our planning.

When new Stancor transformers are offered, they incorporate the practical suggestions of men like yourself, who are actively engaged in the servicing and maintenance of TV and radio equipment.

Here is another reason for you to "Specify Stancor" for the best in transformers.



**STANDARD TRANSFORMER CORPORATION**

3588 ELSTON AVENUE

CHICAGO 18, ILLINOIS

Adds every UHF Channel... to any TV receiver...



# Mallory UHF Converter

THAT'S RIGHT! The Mallory UHF converter adds *all* UHF channels to *any* TV set... in *any* UHF broadcast area. And installation involves only the connection of power lines and antenna leads; no internal adjustments of the receiver are necessary.

Here are the Mallory features that will help you make the most of the new UHF market...

- Reception of *all* UHF channels
- No sacrifice of VHF channels
- Built-in UHF antenna
- High quality picture definition
- Fast, easy installation

The Mallory UHF converter is small, attractive—precision-built to high Mallory standards. For complete information on this versatile converter, contact your Mallory distributor today.



*Make Sure ...  
Make it Mallory*

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

# PRECISION CR-30 CATHODE RAY TUBE TESTER

## TESTS ALL TV PICTURE TUBES

(MAGNETIC AND ELECTROSTATIC)

### 'SCOPE TUBES AND INDUSTRIAL CR TYPES

for True Beam Current (Proportionate Picture Brightness)  
Tests ALL CR Tube Elements—Not Just a Limited Few



**IN FIELD OR SHOP**  
Tests CR Picture Tubes  
Without Removal from  
TV Set or Carton!

The Precision CR-30 fills an obvious gap in the test equipment facilities employed by TV service and installation technicians.

Because of the absence of a reliable cathode ray tube tester, up to 50% of so-called "rejected tubes" are found to be fully serviceable and should rightfully never have been "pulled out."

Proven product of extended development, the CR-30 has been

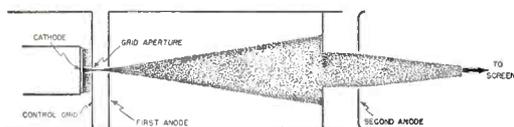
specifically engineered to answer the question, "Is It the TV Set or is it the Picture Tube?"

The Precision CR-30, a complete and self-contained Electronic Instrument, incorporates a TRUE BEAM CURRENT Test Circuit. The CR-30 checks overall electron-gun performance for proportionate picture brightness as well as additional direct testing facilities for accelerating anodes and deflection plate elements.

The Precision CR-30 should not be confused with mere adapters connecting to ordinary receiving tube testers which were never designed to meet the very specialized needs of CR tube checking. Similarly, it is not to be confused with neon-lamp units or similar devices of limited technical merit and which do not check all CR tubes or all tube elements.

### GENERAL AND TECHNICAL SPECIFICATIONS

- ★ Tests All Modern Cathode Ray Tubes:—Magnetic and Electrostatic, 'Scope Tubes and Industrial Types.
- ★ Tests All CR Tube Elements:—Not just a limited few.
- ★ Absolute Free-Point 14 Lever Element Selection System, independent of multiple base pin and floating element terminations, for Short-Check, Leakage Testing and Quality Tests. Affords maximum anti-obsolescence insurance.
- ★ True Beam Current Test Circuit checks all CR Tubes with Electron-gun in operation. It is the Electron Beam (and NOT total cathode emission) which traces the pictures or pattern on the face of the CR tube.
- ★ Voltage Regulated, Bridge Type VTVM provides the heart of the super-sensitive tube quality test circuit. Such high sensitivity is also required for positive check of very low current anodes and deflection plates.
- ★ Micro-Line Voltage Adjustment  
Meter-monitored at filament supply.
- ★ Accuracy of test circuits closely maintained by use of factory adjusted internal calibrating controls; plastic insulated, telephone type cabled wiring; highest quality, conservatively rated components.
- ★ Built in, High Speed, Roller Tube Chart.
- ★ Test Circuits Transformer Isolated from Power Line.
- ★ 4 3/8" Full Vision Meter with scale-plate especially designed for CR tube testing requirements.
- ★ Heavy Gauge Aluminum Panel etched and anodized.
- ★ PLUS many other "PRECISION" details and features.



SERIES CR-30—In hardwood, tapered portable case, with hinged removable cover. Extra-Wide Tool and Test Cable Compartment. Overall Dimensions 17 1/4 x 13 3/4 x 6 3/4". Complete with standard picture tube cable, universal CR Tube Test Cable and detailed Instruction Manual.

Shipping Weight:—22 lbs. Code: Daisy  
NET PRICE:—\$99.75

See the CR-30 on display at leading electronic equipment distributors. Order now to assure earliest possible delivery.



## PRECISION APPARATUS CO., INC.

92-27 Horace Harding Boulevard, Elmhurst 6, New York

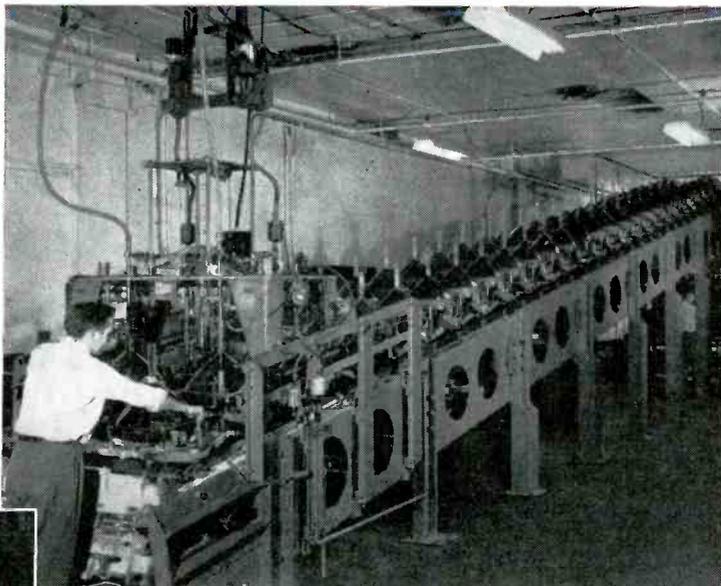
Export Division: 458 Broadway, New York, U.S.A. Cables—Morhanex  
In Canada: Atlas Radio Corp., Ltd., Toronto, Ontario

# "Let Me Tell You How It Happened..."

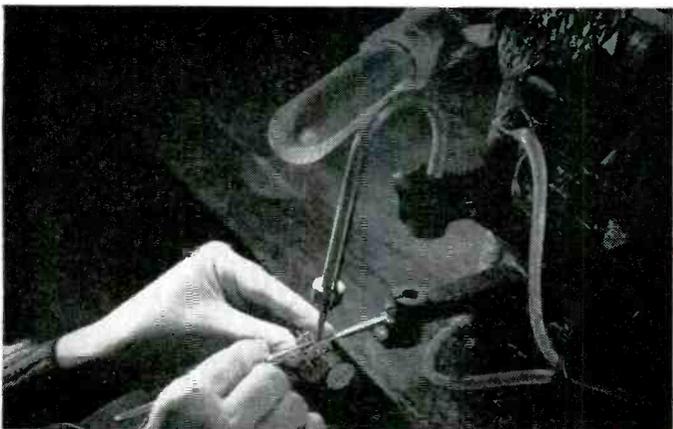


Carl Vineglass,  
Al's Radio,  
Lawrence, Mass.

"FOR YEARS I'VE BEEN BUYING TUBES... A LOT OF THEM CBS-HYTRON. But I didn't know too much about CBS-Hytron. Sure, I'd seen their ads. Read about their original rectangular tube. Their IX2A, 6BQ6GT, 12BH7, 12BY7, etc. Their handy service tools. (I just couldn't get along without my Soldering Aid.) Their Budget Plan. And so on.



"I like to know the fellows I buy from though. So last week I drove over to Salem. The CBS-Hytron gang, from President Bruce A. Coffin down, gave me a real welcome. Also the low-down on CBS-Hytron tubes, and what's behind them.



"First of all, I discovered that CBS-Hytron is big... and getting bigger fast. I saw receiving tubes rolling out of their combined Salem and Newburyport plants at 300 a minute. With their new Danvers plant, it'll be 600 a minute! And their picture tubes run at 5000 a day! You may already know that CBS-Hytron is now a division of Columbia Broadcasting System, Inc.



"CBS-Hytron has a saying, 'Tubes are known by the company they keep.' In their shipping rooms, I saw tubes being rushed out to most of the top manufacturers and jobbers I ever heard of... and lots I don't even know.

"The reason for all the popularity wasn't hard to find. I never saw such painstaking manufacturing and testing in my life. From raw materials to finished tube. Every single tube gets the works.

"And is making tubes complicated! That ingenious machinery does everything but talk. The flying fingers of the girls assembling the tubes, though, are what caught my eye. I just couldn't believe you could get that watch-like precision with that amazing speed. And talk about engineers! I saw electronic, mechanical, chemical, metallurgical, production, industrial engineers by the score.

"I've read that CBS-Hytron's picture-tube plant is the most modern in the world. I believe it. It's really something the way that push-button, automatic plant handles those big bottles. And that new Danvers receiving-tube plant is more of the same. Floor space covers approximately five acres. Main production floor is longer (500 feet) than the longest home run ever hit by Babe Ruth. That plant has everything. They tell me the whole idea was to produce at economical top speed the finest receiving tubes in the world. To my way of thinking, they succeeded.

"Believe me, I'm glad I made that trip to CBS-Hytron. They're a real on-their-toes outfit. Before I never was too fussy what standard brand of tube I bought. But now I want CBS-Hytron, and that's that! You would, too, if you'd seen what I have."

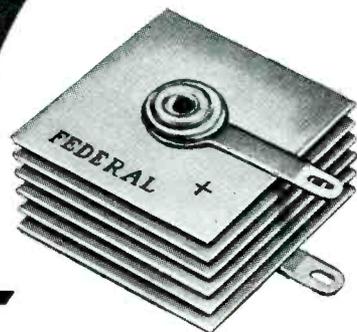
## AN OPEN INVITATION...

to all service-dealers and their distributors. You are mighty welcome to drop in at CBS-Hytron any time. How about this summer?



MAIN OFFICE: SALEM, MASSACHUSETTS

# "It pays to replace with the BEST" Federal-



## The Original Miniature Selenium Rectifier!

**IT PAYS YOUR CUSTOMERS** in finest quality and dependable, long-life performance—proved by over 30,000,000 units shipped to the field!

**IT PAYS YOU, Mr. Serviceman,** in customer satisfaction and goodwill—and a good profit on every job!

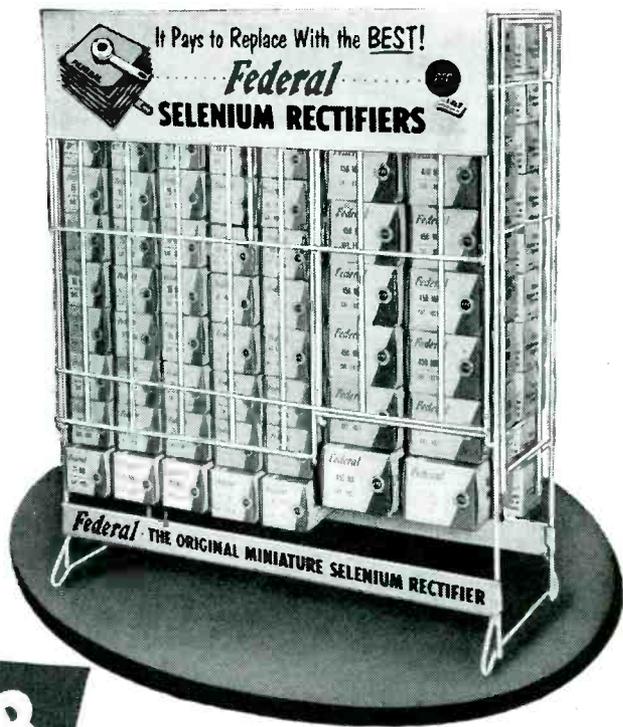
### Here Are Other Specific Reasons Why "Federal" Is Your No. 1 Choice for Servicing the Big, Growing Radio-TV Replacement Market:

- Tests by receiver manufacturers show a life expectancy of well over RTMA guarantee.
- Over 250,000 tests prove superior immunity to shelf-aging.
- Federal's synthetic barrier layer stops change during long storage.
- Quality rigidly controlled. All units fully tested before release.
- Units available either packed in the attractive Federal resale box or in bulk.
- Constant research keeps you up-to-date on rectifier progress.

**SAVE TIME—SERVE YOURSELF**

from *Federal's* NEW

**RECTIFIER DISPENSER**



**LOOK FOR IT  
ON YOUR  
DISTRIBUTOR'S  
COUNTER!**

*America's Oldest and Largest Manufacturer of Selenium Rectifiers*

## *Federal Telephone and Radio Corporation*



SELENIUM-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.

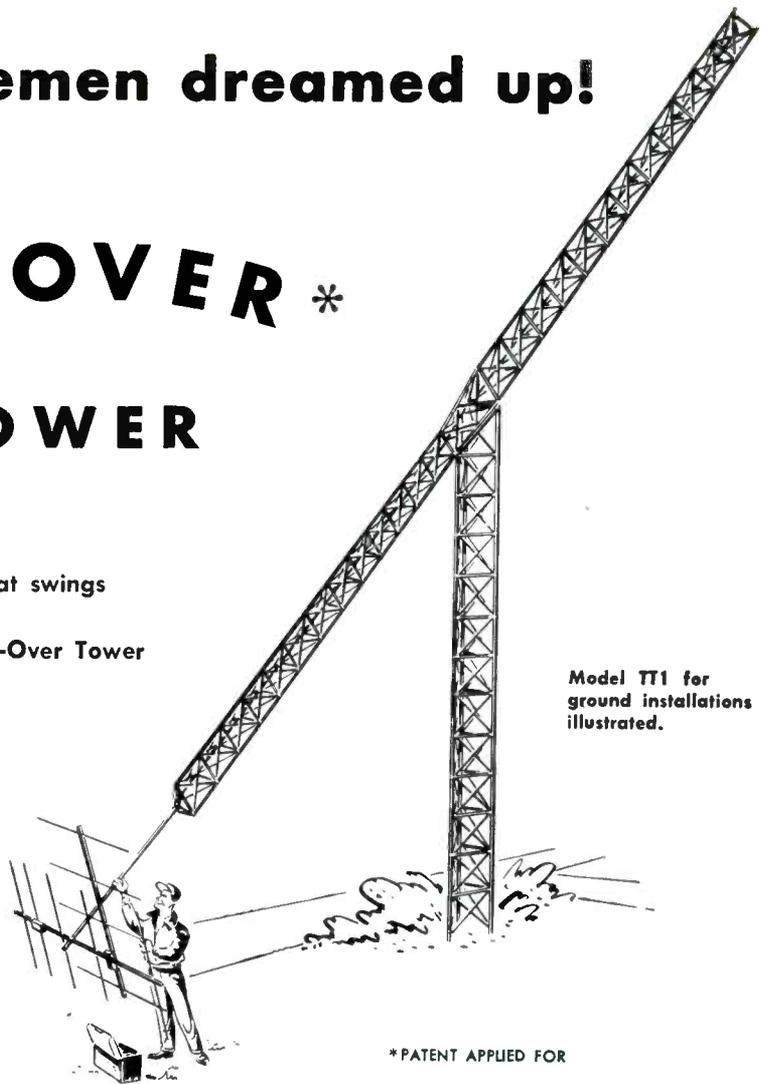


# the tower servicemen dreamed up!

## the TEL-A-RAY

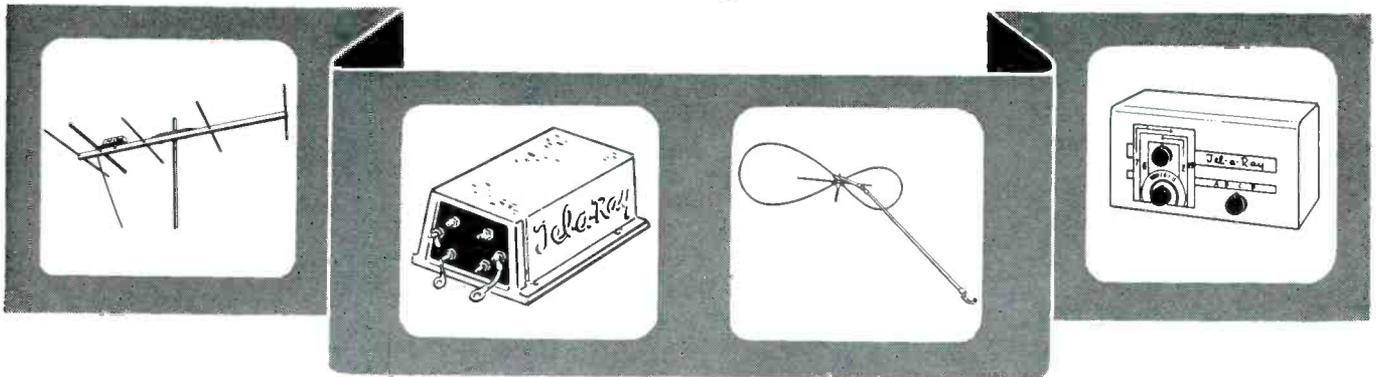
# SWING-OVER \* TOWER

A serviceman's dream — an antenna tower that swings over to the ground for servicing — now being produced by Tel-a-Ray! The Swing-Over Tower makes all other types obsolete because it is the easiest tower for servicing ever made. Built from steel angles with welded construction, the Swing-Over Tower is guaranteed to withstand wind and weather. Yet one man can lower the tower top to the ground, or raise it, in just three minutes. Competitively priced and guaranteed, the Swing-Over Tower will be your biggest item in 1952.



Model TT1 for ground installations illustrated.

\*PATENT APPLIED FOR



These Tel-a-Ray products are bringing more and better reception to television viewers every day . . . and bigger profits to their dealers: Left: The Model T antenna pulls in good reception up to 200 miles away! Cannot rust or corrode. Perfect for all fringe area reception. Left center: To complement the Model T antenna, the only antenna-mounted, low-cost preamplifier on the market, the model TB. High signal gain, low noise ratio make it outstanding.

Right center: The low-priced Butterfly antenna . . . receives 13 channels and FM radio in primary areas . . . completely guaranteed . . . swivel-mount permits erection anywhere! Right: The new Switching Booster (Model PTB1) — for areas where more than one channel can be received with separate antennas. Switches channels and antennas with one knob. Four antenna inputs. Furnishes high gain from antenna and voltage for four preamplifiers. A necessity in the fringes.

**WRITE TODAY FOR COMPLETE INFORMATION**

## Tel-a-Ray

**ENTERPRISES, INCORPORATED**  
BOX 3325  
HENDERSON, KENTUCKY

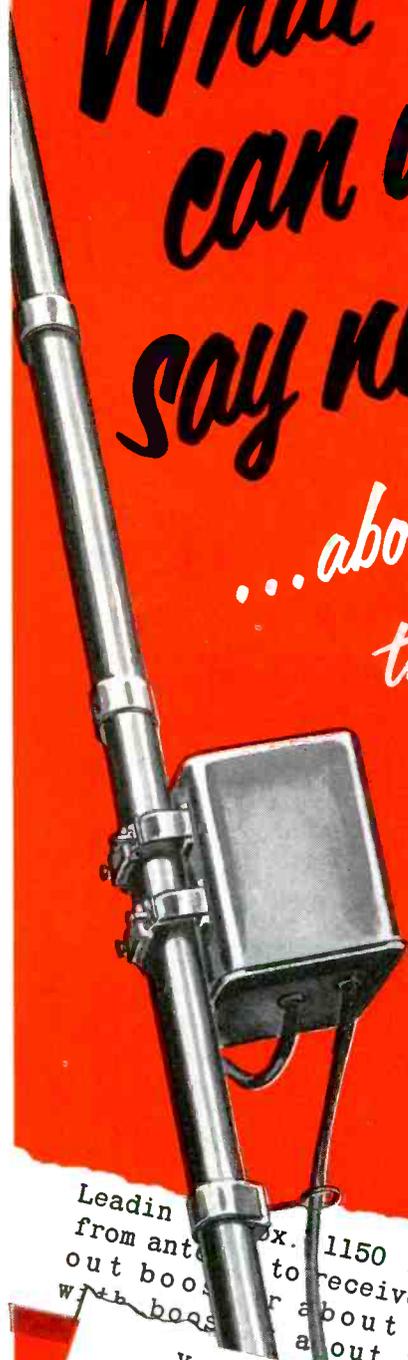


TRADE MARK

# What can we say now?

...about the

# TACO antenna supercharger



TECHNICAL APPLIANCE CORP., SHERBURNE, NEW YORK

We are trying to determine under what conditions these amplifiers are used in the field. Kindly check the following questions:

1. Is it used on a new or old installation?  
 New  Old  Taco  Other
2. Approximate length of down lead from antenna to receiver.  Under 50 ft.  Over 50 ft.
3. Was a definite improvement experienced?  
 Yes  No.

Comments: This Booster has been the greatest "Miracle" to TV reception both with your own and other antenna systems resulting in good reception in some of the most stubborn places.

By means of reply cards enclosed with Taco Superchargers we asked servicemen in all parts of the country for their comments on the performance of the unit. Frankly, we expected some good constructive comments. The enthusiastic reports exceeded our best advertising copy . . .

Try a Taco Antenna Supercharger on that next installation. This is the signal amplifier that improves reception with any type receiver—whether cascode-type or other.

Lead in from antenna 1150 feet long out booster to receiver. Without booster about 25 mv., with booster about 300 mv.

Definite improvement, with no distortion in picture as has been possible with other boosters. Satisfying antenna booster we have.

Approx. 100% improvement! New Taco 5-element stacked plus same old receiver.

Your booster has given the best reception of a number that have been tried. This location is very tough as we have a great deal of noise and low power.

No reading obtained with field strength meter without booster, although weak snowy picture was obtained. With booster, reading of approximately 100.

We are working with WMBR-TV, Jacksonville, Fla., 150 miles away. This is the best set up we have yet!

Best we've tried yet in this area!

NEW MODEL: Cat. No. 1628-(4 1/2) receives and amplifies both Channel 4 and 5. Ask your Taco distributor for Engineering Bulletin No. 70.

TECHNICAL APPLIANCE CORPORATION SHERBURNE, N. Y.

# Jensen NEEDLES

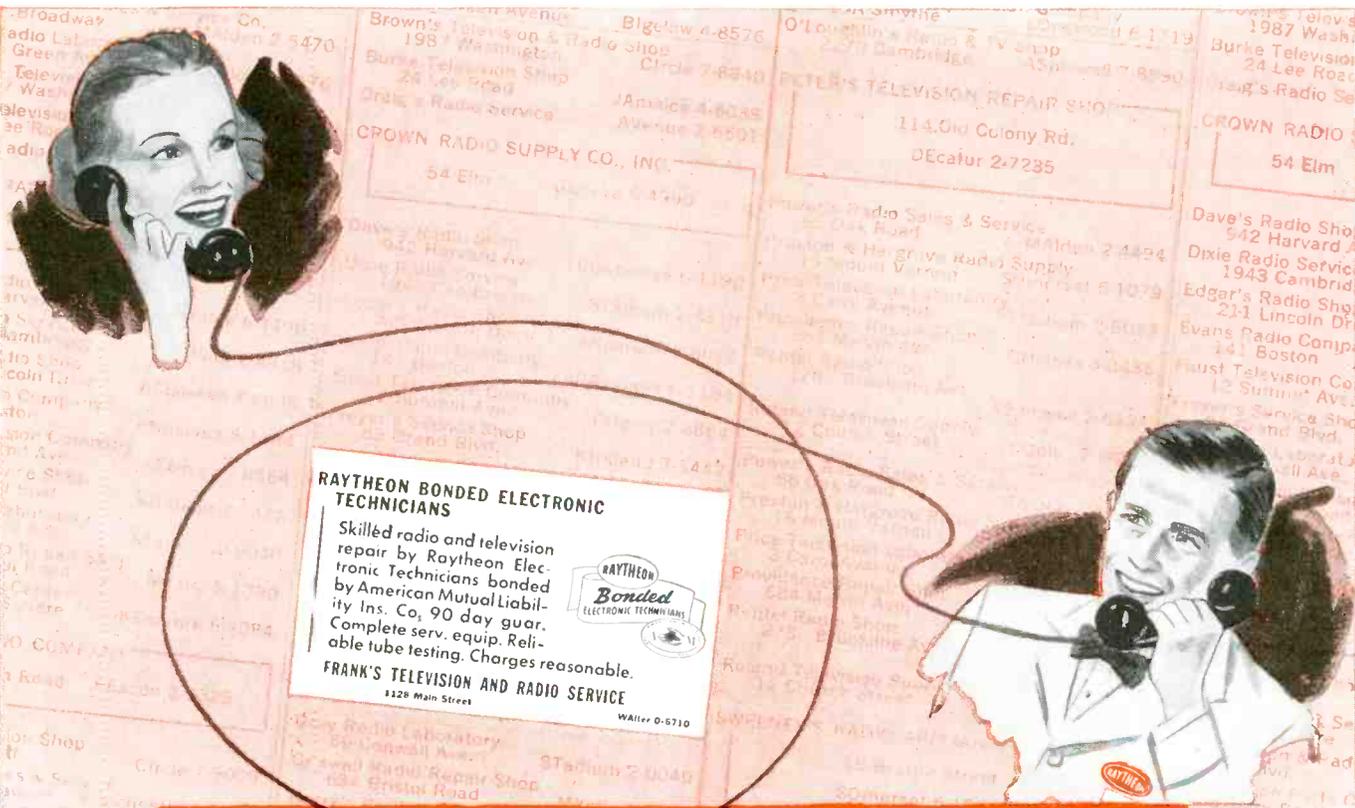
# A WELCOME TO OUR READING DISTRIBUTORS AT THE 1952 PARTS SHOW!

- ALABAMA**  
Allen and Jemison Auto Service Co.  
James W. Clary Co., Inc.  
Emrich Radio Supply  
Farbes Distributing Co., Inc.  
Hond Supply Company  
McGowan Lyons Hardware & Supply Co.  
Nelson Radio & Supply Co.  
Radio Distributing & Supply Co.  
Radio Maintenance Company  
Radio Parts & Equipment Co.  
Reid Distributing Co.
- ARIZONA**  
Dala's Brothers  
Radio Specialties Appliance Corp.  
Standard Radio Parts  
Western Radio and Engineering Co.
- ARKANSAS**  
Blytheville Radio Supply  
Martin Wholesale Radio Supply  
Southern Radio Supply  
David White Radio Supply Co.  
Wise Radio Supply
- CALIFORNIA**  
E. B. Abbott Company  
Acorn Radio Supply  
Cass Altschuler Company  
Jack C. Arbusick  
Associated Radio Distributors  
W. D. Brill Company  
Brown Company, C. C.  
Channel Radio Supply Co.  
Dealers Wholesale Supply  
Fred S. Dean Company  
DeJarnatt, B.  
Daw Radio Supply Company  
Dunlap Wholesale Radio Company  
Eber Bros.  
Electric Supply Co.  
Electronic Supply Corp.  
Empire Electronic Distributors, Inc.  
Figueroa Radio Supply, Inc.  
Hollywood Radio Supply, Inc.  
Inland Electronic Supply  
Kemp Company, Inc.  
Kierulff & Company  
Kierulff Sound Corp.  
Kinney & Faust  
Elwyn W. Lev  
Los Angeles Radio Supply Corp.  
Leo J. Meyberg Company  
Millers Radio & Television Supply  
Pacific Radio Exchange, Inc.  
Pacific Electronic & Radio Supply, Inc.  
Pacific Wholesale, Inc.  
Peninsula Television and Radio Supply  
G. M. Popkey Co., Inc.  
Frank Quement, Inc.  
Radio & Television Equipment Co.  
Radio Parts Co.  
Radio Products Sales, Inc.  
Radio Specialties Company  
Sacramento Electronic Supply Co.  
San Francisco Radio & Supply  
Santa Rosa Electronics Co.  
Shanks & Wright  
Smith & Crawford  
Television Radio Supply Co.  
Valley Radio Supply  
W. M. Van Deren  
Wenger Co., E. C.  
Western Radio and Television Supply Co.  
Wholesale Radio and Electric Supply Co.  
Yale Radio Electric Supply Co.  
Zock Radio Supply Co.
- COLORADO**  
The Electric Accessories Co.  
Fistell's Radio & Electric Supply Co.  
Inter-State Radio and Supply Co.  
Murray Radio Company  
Pueblo Radio & Television Supply Co.  
Radio & Electronic Supply Co.  
L. B. Walker Radio Company
- CONNECTICUT**  
Amrad Co.  
Band Radio Supply Co.  
Hairy & Young of New London, Inc.  
Henry of Bridgeport, Inc.  
Henry of Hartford, Inc.  
Henry of New Haven, Inc.  
Henry of Stamford, Inc.  
Henry of Waterbury, Inc.  
L. Mosen Radio & Electronics Co.  
Regent Electronics  
L. N. Waldhaus
- DELAWARE**  
Alma Radio Co.  
Radio Electric Service Company  
Wilmington Electric Specialties Co., Inc.
- DISTRICT OF COLUMBIA**  
Customcraft Radio & Television Co., Inc.  
Delair Radio Engineering Co.  
Electronic Wholesalers, Inc.  
Emerson Radio of Washington  
Kenyon Radio Supplies  
Rucker Radio Wholesalers  
Silberne Radio & Electric Co.  
Southern Wholesalers, Inc.  
Sun Radio
- FLORIDA**  
Cooper Radio Company  
East Coast Radio & Television Co.  
Electronic Supply Co.  
Goddard Distributors, Inc.  
Grice Radio & Electronic  
Hammond-Adams, Inc.  
Herman Radio Service Company  
Kinkade Radio Supply  
Radio Accessories Company  
Thompson Appliance  
Thurston Distributors, Inc.  
Waldner Radio & Appliance Co.  
Welch Radio Supply
- GEORGIA**  
Atlantia Phonograph Co.  
Herdman Thomas Electronics  
Prestwood Electronics Co.  
Radio Sales and Service Co.  
Southeastern Radio Parts Co.
- ILLINOIS**  
Schwendiman's  
Allied Radio Corp.  
Harold Bruce  
Chaucery's, Inc.  
Clayton Radio Parts  
Cooper Supply Company  
Electronic Parts Company  
H. & H. Electronic Supply, Inc.  
Herbarger Radio Supply  
Howard Electronics Inc.  
Illinois Appliance Co.  
Klaus Radio & Electric Co.  
Lampley Radio Co.  
Lafren Distributing Co.  
Lukko Sales Corp.  
Nelson Electronics  
Mid-West Associated  
Midwest Electronics  
Art Nagel Inc.  
Nation Wide Radio  
Newark Electric Co.  
Pioneer Radio Supply Corp.  
Radio Doctors  
Radio Doctors Supply House  
Radio Parts Company  
Radio Parts Outlet, Inc.  
Radio Television Supply Corporation  
Remington Distributors  
Star Electronic Distributors, Inc.  
Tri-City Radio Supply  
Wabash Electronics  
Walker-Jimison, Inc.  
Warren Radio Company  
Wexler & Co., David  
York Radio & Television Corp.
- INDIANA**  
Archer & Evinger  
Broadwin Television & Radio, Inc.  
Colfax Co., Inc.  
Commercial Radio & Radio Company  
Cosmopolitan Radio Company  
Fox Electronics Co.  
George's Electronic Supplies  
Graham Electronic Supply, Inc.  
Holmes Radio Supply Co., Inc.  
Hooper Radio Supply Co.  
Hub Distributor  
Lafayette Radio Supply, Inc.  
Lakeland Radio Supply  
Moakler Electronic Supplies  
Mobile Radio Supply Co.  
Ohio Valley Sound Service  
Pemberton Laboratories  
Radio Distributing Co.  
Radio Supply of Muncie  
Springfield Radio, Inc.  
Radfield Co., Inc.  
Terre Haute Radio  
Radio Products Company  
H. A. Williams Co.
- IOWA**  
Boe Distributing Company  
Brown Radio Supply Co.  
Duke's Radio Company  
Farnsworth Radio & Television  
Friday-Lynch Radio Co.  
Ray-Mac Supply Co.  
Tri-City Radio Supply Co.  
World Radio Laboratories, Inc.
- KANSAS**  
Acme Radio Supply  
Excel Distributors  
Interstate Electronic Supply Corp.  
Radio Supply Company  
Western Distributors
- KENTUCKY**  
P. I. Burks & Co.  
Crescent Radio Supply  
Ewald Distributing Company  
Lexington Electronic Supply Co.  
Peerless Electronic Equipment Co.  
Radio Equipment Co.  
Universal Radio Supply Co.
- LOUISIANA**  
Bell Radio Supply Company  
Central Radio Supply Co.  
Crescent Radio Supply Co.  
The Electronics Company, Inc.  
Electronic Supply Co., Inc.  
Electronic Supply Corp.  
Louisiana Radio & Television Dist. Inc.  
Pelican Radio Supply, Inc.  
Radio Electronic Supply  
Radio Parts, Inc.  
Wholesale Radio Equipment
- MAINE**  
Maine Electronic Supply
- MARYLAND**  
Henry O. Berman Co., Inc.  
Gimbel Brothers, Inc.  
Lytron Distributing Company  
Radio Electric Service Company  
A. R. Spartan Company  
Standard Electronics Supply Co.  
Wholesale Radio Parts Co., Inc.  
The Jas. M. Zamoiski Co.  
Zimmerman Wholesalers
- MASSACHUSETTS**  
Cushing, T. F.  
David B. Dean & Company  
DeMambra Radio Supply Company  
Des Roberts Electric Supply Co.  
Durrell Distributors  
The Eastern Company  
Gerber Radio Supply Co., Inc.  
Hairy & Young of Lawrence, Inc.  
Hairy & Young of Springfield, Inc.  
The Louis M. Herman Co.  
Mayer Co., A. W.  
Melrose Sales Company  
Radio Electronic Sales Co.  
Radio Shock Corporation  
Radio Wire Television Inc.  
E. A. Ross & Company  
Springfield Sound Co.  
Ware Radio Supply Co.  
Willett Radio Supply Co., Inc.
- MICHIGAN**  
Bursma Radio  
M. N. Duffy & Co.  
Electronic Supply Corporation  
Erickson's Electronic Wholesale  
Feltan Radio Co.  
Ferguson Radio Supply Co.  
Filpatrick Electric Supply Co.  
Fullan Radio Supply Co.  
General Electric Supply Corp.  
Hi-Park Distributors  
Kindle Distributing Company  
K. L. A. Laboratories  
Lifsey Distributing Co.  
Main TV Supply Company  
Northwest Radio of Michigan  
Offenauer Company  
Purchase Radio and Camera Shop  
Radio Electronic Supply Company  
Ralph M. Rolston Co.  
Radio Parts Company  
Radio Parts, Inc.  
Radio Sales Company  
Radio Supply & Eng. Co., Inc.  
Reno Radio Co.  
Samborn Music Company  
Shand Radio Specialties  
Spirals Distributors, Inc.  
Wedemeyer Electronic Supply Co.  
West Side Radio Supply  
Wholesale Radio Company
- MINNESOTA**  
Bauman Company  
Lev Bonn Company  
Hall Electric Co.  
Northwest Radio Company  
G. M. Popkey Co.  
Stark Radio Supply Co.
- MISSISSIPPI**  
Griffin Radio Supply  
Southern Distributors, Inc.  
Swan Distributing Co., Inc.
- MISSOURI**  
Tom Brown Radio Company  
Burnstein-Applebee Company  
Elinger Radio & Supply Co.  
Four-State Radio and Supply Co.  
Henshaw Radio Supply  
Holander & Company, Inc.  
Interstate Supply Co.  
McGee Radio & Electric Co.  
Radiolab  
Radonics  
St. Louis Music Supply Co.  
Suedekum Electronic Supply Co.  
Toler Radio Supply  
Van Sickle Radio Company
- MONTANA**  
Electronic Supply Company  
Northwest Distributors  
Smith Supply Co.
- NEBRASKA**  
J. B. Distributing Company  
Jacobim Radio Supply, Inc.  
Leuk Radio Supply, Inc.  
Omaha Appliance Co.  
Radio Equipment Company
- NEVADA**  
Osborne & Dermody, Inc.
- NEW HAMPSHIRE**  
American Radio Corp.  
Evans Radio  
Radio Service Laboratory
- NEW JERSEY**  
Allen & Hurley  
Alma Radio Company  
Bennett Radio Supply  
Economy Electronics  
Electronic Markets, Inc.  
Electronic Sound Corporation  
Emerson New Jersey, Inc.  
General Radio Supply  
International Distributing Co.  
Joe's Radio Shop  
Kearns, Inc.  
Aaron Lippman and Company  
Monmouth Radio Supply Company  
Nidisco City Radio, Inc.  
Nidisco Jersey City, Inc.  
Nidisco Passaic, Inc.  
Nidisco Trenton, Inc.  
Radio Electric Service Company  
Radio Wire Television, Inc.  
Union Television Parts Co.  
United Tire Stores Co.  
William Radio Supply Co.  
Williams, Carl B.
- NEW MEXICO**  
A. I. Communications Supply  
L. B. Walker Radio Co., Inc.
- NEW YORK**  
Adronack Radio Supply  
B & D Distributing Co.  
C. R. Barker  
Barth Frimber, Inc.  
Beacon Electronics, Inc.  
W. E. Berndt  
Bonafide Radio & Electronics Co.  
Cardinal Electronics Company  
Chief Electronics  
Consolidated Radio Sales Corp.  
Davis Radio Distributing Co.  
Dares Radio Service  
Dymac, Inc.  
Electric City Radio Supply  
Electronic Laboratories & Supply Co.  
Electronic Wholesalers  
Emerson New York, Inc.  
Federal Sales & Supply Corp.  
Federated Purchaser, Inc.  
Fischer Distributing Co., Inc.  
Genesee Radio & Supply Corp.  
Green Tele-Radio Distributors, Inc.  
Greylock Electronics Supply Co.
- NEW YORK Continued**  
Harrison Co., Fred C.  
Harrison Radio Corp.  
Heins and Bolei  
Island Radio Distributors  
Johnson Radio and Electronic Equipment  
Leonard Radio, Inc.  
Major Electronics  
Maxline Radio & Electronic Equipment Co.  
Morris Distributing Co.  
National Radio Distributors  
National Radio Parts  
New York Bond Instrument Co.  
O. & W. Radio Company  
Radio Electric Products, Inc.  
Radio Equipment Corporation  
Radio Wire Television, Inc.  
Ray Distributing Company  
Roberts & O'Brien  
Rochester Radio Supply Co.  
Schwartz & San, M.  
Slate and Company  
Stallion of Ithaca  
Standard Electronics Distributing Co., Inc.  
Standard Parts Corporation  
Strong Television Corp.  
Sylvan-Wellington Co.  
Taylor Co., E. B.  
Trojan Radio Company, Inc.  
United Radio & Electric Co.  
Westchester Electronic Supply Company  
Wice Radio Dist.
- NEW YORK Continued**  
Dolton Mege Radio Supply Company  
Dixie Radio Supply Company, Inc.  
Dugan's Radio Supply Company  
Johannesen Electric Co., Inc.  
Leonard Electronics Supply Co.  
Long's Distributing Company  
Meridian Electronic  
Radiotronic Distributors, Inc.  
Shaw Distributing Company  
Southeastern Radio Supply Co.  
Wamock Electric Supply Co.
- NORTH CAROLINA**  
Bristol Distributing Co.  
Dakota Electric Supply Co.  
Radio Equipment Company
- NORTH DAKOTA**  
Appliance Wholesalers, Inc.  
Armstrong's Electronic Center  
Broadway Radio Supply Co.  
Burroughs Radio, Inc.  
Chambers Electronic Supply Co.  
Cleveland Electronic Supply Co.  
D. & R. Radio Supply  
Eberle's Radio Supply  
E. L. Co.  
Gothamer, Inc.  
Hausfeld Radio Supply  
Harringer Distributing Co.  
Halub & Hogg  
Hughes Peters, Inc.  
Hutch & Son  
Lima Radio Parts Co.  
Main TV Supply Company  
Marietta Radio & Electrical Supply Co.  
Morrison's Radio Supply Co.  
Olson Radio Warehouse  
Pioneer Radio Supply Corporation  
Progress Radio Supply Co., The  
Radio & Electronic Parts Corporation  
Radio and Television Parts Co.  
Radio Parts Co.  
Radio Specialties  
Radio, TV & Refrigeration Supply, Inc.  
Electronic Supply Co.  
The Sommer Electric Co.  
Strepco, Inc.  
Stotts-Friedman Co.  
Thompson Radio Supplies  
United Radio  
Warren Radio Company  
Whitehead Radio Company  
Winteradio, Inc.
- OHIO**  
Appliance Wholesalers, Inc.  
Armstrong's Electronic Center  
Broadway Radio Supply Co.  
Burroughs Radio, Inc.  
Chambers Electronic Supply Co.  
Cleveland Electronic Supply Co.  
D. & R. Radio Supply  
Eberle's Radio Supply  
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Hughes Peters, Inc.  
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Morrison's Radio Supply Co.  
Olson Radio Warehouse  
Pioneer Radio Supply Corporation  
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The Sommer Electric Co.  
Strepco, Inc.  
Stotts-Friedman Co.  
Thompson Radio Supplies  
United Radio  
Warren Radio Company  
Whitehead Radio Company  
Winteradio, Inc.
- OKLAHOMA**  
Electronic Supply Co.  
Miller-Jackson Company  
Radio Supply, Inc.
- OREGON**  
Central Distributors  
Harper-McGee, Inc.  
R. F. Supply Co.
- PENNSYLVANIA**  
A. C. Radio Supply Co.  
Air-Tone Sound & Recording Co.  
Alma Radio Company  
Allied Electric Appliance Parts, Inc.  
Alvo Recording Company  
Geo. D. Barbey Co.  
Barnett Bros. Radio Co.  
Barron Radio Supply  
Buss Radio Electric Supply  
Cambria Equipment Company  
Came Radio Co.  
D. & H. Distributing Co., Inc.  
Danby Radio Company  
Duncombe Co., J. V.  
Federated Purchaser, Inc.  
Friend's  
General Radio and Electronic Co.  
General Radio & Refrigeration Co.  
Hollenback's Radio Supply  
Jordan Electronic Co.  
Kratz Brothers  
Kretz Radio Co.  
Marshall Co., The John  
Motorola-Philadelphia Company  
Mayer Electronics Supply Co., Inc.  
Penn. Electronic Parts Company  
Pursell, Fred P.  
Radio Distributing Co.  
Radio Electric Service of Pa., Inc.  
Radio Parts Company  
Radio Service Co.  
Reliable Motor Parts Co.  
Screnton Radio and Tel. Supply Co.  
South Hills Electronics Supply Co.  
Warren Radio  
Wile, Eugene G.  
Williamsport Radio Supply  
York Radio & Refrigeration Parts  
Zimmerman Wholesalers, Inc.
- RHODE ISLAND**  
City Hall Hdwe. Co.  
Dandreta & Company, Wm.  
W. H. Edwards Co.
- SOUTH CAROLINA**  
Carolina Radio Supply Co.  
Dixie Radio Supply Co., Inc.  
Florence Radio Supply  
Gilliam Radio Company  
Krell Radio & Appliance Company  
Southeastern Radio Parts Co.
- SOUTH DAKOTA**  
Burghardt Radio Supply  
Newkirk Radio Supply  
Warren Radio Supply
- TENNESSEE**  
Bluff City Distributing Co.  
Brad Electric Co.  
Chemistry Radio and Electric Company  
Clark Radio Supply  
Electra Distributing Co.  
Lavender Radio Supply  
Radio Electric Supply Company  
Randolph & Cole  
Roden Electrical Supply Company  
W. & W. Distributing Company
- TEXAS**  
Amateur Radio Supply Co.  
A. R. Beyer & Company  
Clark & Gase Radio Supply  
Denison Radio Supply  
Dobbs of Dallas  
Electronic Equipment & Engineering Co.  
Fort Worth Radio Supply Company  
Guarantee Radio Supply  
Quarter Distributing Company  
H. & L. Radio Supply Co.  
The Hargis Company  
Jones & Hutson Radio Supply  
L. & M. Sales Company  
Lavender Radio Supply Co., Inc.  
Mission Radio, Inc.  
Modern Radio Supply, Inc.  
Montague Radio Distributing Co.  
Omeyer Radio Supply  
Olson Radio Supply  
Pan American Electronic Co.  
Radio and Television Parts Co.  
Radio Parts Company  
R. & R. Supply Co., Inc.  
Rio Radio Supply Co.  
Southern Radio Supply  
South Texas Radio Supply, Inc.  
Southwest Radio Products Co.  
Sun Radio Lab.  
Bill Sutton's Wholesale Electronics  
Winstanley and Company  
West Texas Radio Supply  
Wholesale Electronic Supply  
Wicks-DaVilbiss Company  
Wilkinson Brothers
- UTAH**  
Ballard & Carter Company  
Herson Radio Co.  
O'Laughlin Radio Supply  
Radio Supply Co.
- VERMONT**  
Vermont Appliance Co.
- VIRGINIA**  
Bristol Radio Supply Corporation  
Eastern Electric Company  
General Supply Company  
J. J. Appliances  
D. R. Johnston Company  
Leonard Electronic Supply Co.  
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Mattson's, Inc.  
Radio Supply Co.  
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Virginia Radio Supply Co.  
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Alaska Radio Supply, Inc.  
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Kar Radio & Electric Company  
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Pringle Radio-Wholesale Company  
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builds your business

A receiver fails and an upset customer scans the telephone directory. A sea of unfamiliar names — ah — here's a radio and television service dealer whose guarantee is cash-protected by a Bond. Result: another customer for a *Raytheon Bonded Electronic Technician*.

The Raytheon Bonded Dealer Decal on windows and doors; the Raytheon Creed Display; the Raytheon Bonded Dealer Certificate exert a similar influence on passers-by — wary customers choose you instead of the guy next door.

These are all part and parcel of Raytheon's *Bonded Electronic Technician Program* which costs you nothing yet gives you a mighty important advantage over your competitors.

Better ask your Raytheon Tube Distributor to show you how little it costs to use this exclusive business builder.



RIGHT...FOR SOUND AND SIGHT



**RAYTHEON MANUFACTURING COMPANY**

Receiving Tube Division  
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*Excellence in Electronics*

RECEIVING AND PICTURE TUBES • RELIABLE SUBMINIATURE AND MINIATURE TUBES • GERMANIUM DIODES AND TRANSISTORS • RADIAC TUBES • MICROWAVE TUBES

RADIO • TELEVISION • ELECTRONIC  
**SERVICE**

### Flagrant Huckstering

WHEN, some months ago, it was disclosed that the TV station freeze would really be lifted, and in addition, the operation of thousands of stations would be approved, there appeared a rash of advertising spouting the *immediate* ultrahigh pickup possibilities of new sets in rural, and particularly metropolitan areas, which according to the advertisers would have scores of new stations telecasting *within a matter of weeks*. Predicated on nothing more than a suggested allocation plan, which it was generally known would be altered in many, many ways when the final draft appeared, the advertisements created roaring confusion, curbed sales, and riled the Service Man who had to explain just what was happening. It was their job to report that while it was true we would have more stations on the high and the low bands, many months would pass before grants would be issued and additional telecasting would begin. Fortunately, the boys performed a noble service, providing sensible interpretations and assuaging most people.

When the final allocations did come, with its bright prospects, it was hoped that manufacturers would grasp the opportunity to report on the full potentialities of the new service in a discreet, forthright manner, so that there would be no repetition of the earlier disturbing episode. Some did follow this pattern. In fact, one midwestern chassis maker ran full-page ads in the leading newspapers of the country offering a series of answers to questions about the new TV stations. He pointed out that it will be some time before new stations are on the air, and that *eventually* we'll have all-channel receiving equipment, which might take the form of complete receivers or combination receivers and converters.

Some set and accessory makers, however, have decided that it was time to bounce those racy claims around and blandly discount the disastrous results of the earlier, sad incident. They have begun to hammer away at the virtues of their gear, following the same moldy pattern which has always caused trouble. Again they are telling Mr. and Mrs. Consumer that their converters and

receivers have builtin antennas which eliminate the need for outside antennas, and anyone can install the converter . . . "in a few minutes without any specialized knowledge." They say that their tuners are . . . "so simple to install that anyone can do it with a screwdriver . . . by simply hooking up the interconnection wire to the antenna terminals of the set." They emphasize that it is . . . "unnecessary to call a Service Man" . . . in installing their simplified unit. The builtin antenna of one of these tuners is a rectangular loop mounted at the rear of the chassis, which is uncovered. Completely ignored are the facts that an external special antenna will undoubtedly be required in most cases, that special leadins may be necessary, and orientation will be required, too. The possibility, too, that the open-wire antenna will be affected by steel laths, objects in a room, or even rain, cutting off reception, is just dismissed. So, once more, the Service Man will be obliged to pitch in and explain the characteristics of the ultrahigh frequencies and why antenna systems and special installations will be required, notwithstanding the miracle claims of the manufacturers.

Misleading accessory advertising has also been rampant recently, causing turmoil everywhere. In one series of ads, describing a wavetrapp designed to stop TV interference in metropolitan areas, it was said that the device would eliminate wavy lines, streaks, zags, distortion, picture rolls, flutters and other screen imperfections that . . . "could not be eliminated by a repairman no matter how good he is." In testing the trap, it was found that it certainly did not act as a cure-all. In fact, one Service Man found that it accomplished nothing. Exaggerated advertising of this type at the expense of the Service Man, he said, should be halted immediately.

Service Men received another jolt recently when it was announced that the heretofore scarce transistors were now available to everyone, and it wouldn't be long before the 22-30-tube TV chassis would be replaced by a compliment of transistors reducing the size of the large chassis to that of a cigar box. The advent of transistors, it was noted, hastened the day when TV and radio servicing

would just be a thing of the past.

One does not deny that the transistors represent one of the most outstanding developments of the day, and that eventually they will become a key factor in all types of electronic equipment. They are small, they require no cathode power or warmup time, they are highly efficient and have a long life. They are rugged and stable. *But*, their uses are limited today by many factors. They can only be used at relatively low frequencies, usually below one megacycle. They are affected by temperature, and presently can only be used at temperatures only slightly above normal ambients. In addition, according to Washington, generous quantities are still not available.

It'll be a long, long time before the chassis of Mr. and Mrs. Consumer will have transistors. In fact, it'll be a long, long time before the transistors will appear in anything but highly classified military gear, and particularly complex computing and laboratory instruments.

This is truly an age of striking progress, and certainly everyone is very thankful that they are able to reap the rich benefits offered by the parade of brilliant contributions. Why anyone should believe that it is necessary to resort to thumping displays of blatant claims and ignore the golden results that can be achieved through sound and ethical merchandising, is a deep mystery. Countless members of industry have demonstrated that it is not difficult to win friends and make sales without flamboyant essays.

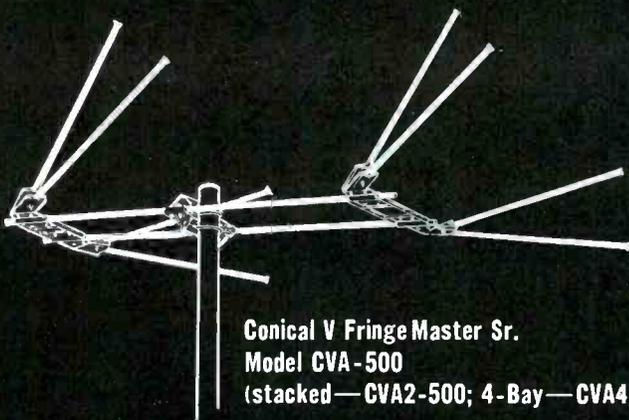
The consumer, and particularly the Service Man, will be very happy indeed when the era of flagrant huckstering vanishes completely.

### Next Month . . . Audio

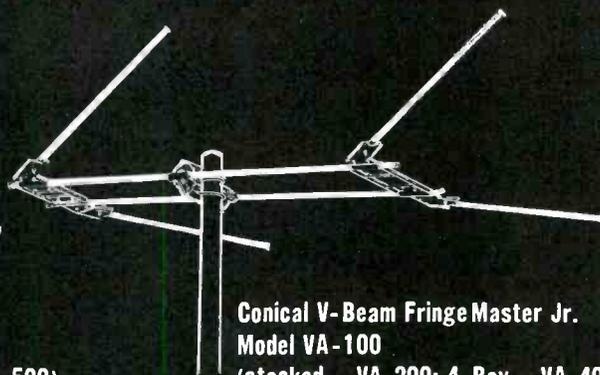
FOLLOWING our annual custom, the June issue of *SERVICE* will be devoted to *Audio* on all fronts: ultra-fidelity systems; cartridge and needle characteristics; 3-speed changer design; high-power *ac/dc* amplifiers; magnetic recording installation and servicing; wide-range speaker cabinetry; audio tube features; public-address installations, etc. Every article will contain practical, streamlined, useful data. Don't miss this all-important *Audio* issue.—L.W.

**They're  
here**

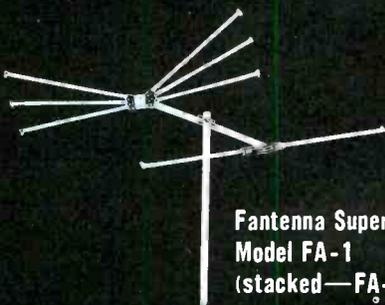
# THE LATEST RMS ANTENNAS



**Conical V Fringe Master Sr.  
Model CVA-500**  
(stacked—CVA2-500; 4-Bay—CVA4-500)



**Conical V-Beam Fringe Master Jr.  
Model VA-100**  
(stacked—VA-200; 4-Bay—VA-400)



**Fantenna Super-Fan Array  
Model FA-1**  
(stacked—FA-2; 4-Bay—FA-4)

## FRINGEMASTER ANTENNAS

CVA-500 features high gain on all bands with extra long dipoles for low band compensation.

VA-100 is ideal for urban and semi-fringe reception.

### OTHER FEATURES

- Double U-bolt mast attachment
- $\frac{3}{8}$ " aluminum dipoles; pinched ends
- $\frac{1}{2}$ " aluminum Q-matching section
- quick-rig

## FANTENNA SUPER-FAN

Provides high gain coupled with excellent broad band characteristics.

### OTHER FEATURES

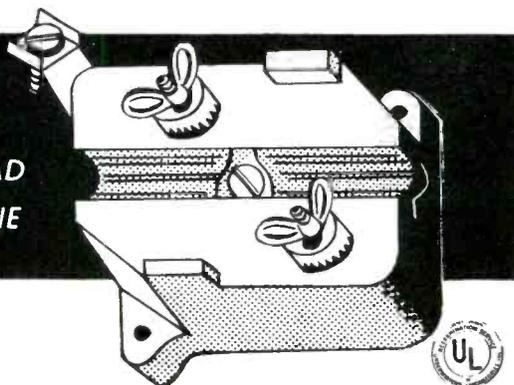
- $\frac{3}{8}$ " drawn aluminum elements with pinched ends.
- dowel-reinforced cross-arm at the U-bolt.
- Crossarm of 1" drawn aluminum with capped ends to prevent whistle.
- Quick-rig.

## ... and the latest in LIGHTNING ARRESTOR protection

Lighting arrestors are the tremendous trifles that can jeopardize an installation. Play it safe . . . use them. Play it safe . . . choose them with care. Play it safer . . . choose RMS LA-3, uniformly manufactured, quality - control - checked, performance-tested lighting arrestors.

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**FOR TWIN LEAD**  
**AND OPEN LINE**



NEW YORK 59, N. Y.



# SERVICE... *The National Scene*

INTERFERENCE PROBLEMS LOOM AS HAMS MOVE INTO 21-MC BAND--Service Men in many areas are scheduled to face one of the most hectic servicing periods since TV roared onto the scene a few years ago, realigning and installing high-pass filters in receivers using 21-21.45-mc ifs, for amateurs have now been authorized to pound brass in that region; the band was actually officially assigned and approved in the summer of '48 at the conclusion of the International Allocation Conference in Atlantic City. Currently, dot-and-dash transmission will only be allowed; this interference might take the form of sudden or extreme variations in image brightness, or even picture washout. In the not-to-distant future, phone transmission will be permitted, and this might cause bar streaks across the picture. . . . Commenting on the possible solutions that Service Men will have to employ, several manufacturers have indicated that the high-pass 300-ohm balanced-type of filter, installed at the input of the receiver, will serve as an excellent curb. One manufacturer has warned that the filter will have to be placed . . . "hard up against the set's input terminals and securely grounded." Realignment will also eliminate the dot-dash or phone disturbances, with shifting of the if sound carrier to 21.6 or 21.9 mc suggested as an adequate procedure. Where staggered-tuned strips were used and the frequencies were carefully selected to minimize the possibility of if oscillation during alignment, frequency shifting may be tricky. It has also been suggested that the if stages be shielded, and that the use of coax or single-sided transmission line be avoided where the interference problem exists. It was noted that the areas beyond the primary TV zone, or in fringe locations, will be most susceptible to interference. Of course, locales where hams are active will also be acute problem zones. . . . Although many manufacturers have raised the frequencies of their if strip, and are using the recommended 41-mc band, there are still several large chassis producers who have not adopted the high-if plan, and are using the antiquated 21-mc arrangement. At this writing, there have been no announcements from these manufacturers indicating an immediate change to the higher if, although it is believed that they undoubtedly will make the shift in their new models. . . . Service Men have a grave responsibility in this war against picture and sound interference. To lend a hand in the campaign, SERVICE will publish a series of comprehensive analyses describing exactly how to realign chassis, install high-pass filters, and shields ifs. The first installment will appear in July. Watch for it!

FREEZE LIFT VIEWED AS BOON TO TV ACCESSORY SALES--There's an extremely lively antenna-accessory era ahead for Service Men, thanks to the release of the new allocations, according to a prexy of a pioneer antenna maker. In his opinion, during the next few years there'll be quite a market for antennas, preamps, rotators, lightning arresters, towers, masts, roof and base mounts, transmission lines, insulators and allied antenna hardware. . . . The freeze lift will introduce new markets for single-channel antennas, it was said, since many of the new stations will probably be in areas not currently being serviced by any other transmitters. As additional telecasters appear in areas presently being served by a single station, there should be a substantial demand for rotators, multi-channel antennas, and possibly double or triple single-channel installations. . . . It was also revealed that recent tests have shown that the life of an average antenna is about 3½ years, and that accordingly, an extremely large replacement market should appear as the hundreds and hundreds of new stations begin operating. . . . Other new business prospects described were converter, tuning strip or new tuner sales, and of course, the installation and servicing of these new items to provide all-channel coverage.

# SERVICE... *The National Scene*

DIATHERMY-INTERFERENCE SHIELDING RULE TO BE MODIFIED--The shielded-room requirement, included in the original regulation curbing interference from diathermy equipment, is expected to be modified to permit the use of sufficient shielding, instead of a completely shielded room to reduce the strength of radiation. It will still be necessary to employ a rectified and filtered-plate power supply and power-line filters. The change was made because it was found that the cost of completely shielded rooms (approximately \$3,000 and up) would be prohibitive to the average physician. . . . According to the FCC records, there are over 200,000 pieces of heat-therapy gear in use which will probably require shielding and the installation of filters, if they are to be interference free.

TV TRAINING PROGRAM CALLED KEY TO PROFITABLE RECOGNITION--Acceptance as a professional, with corresponding equitable compensation, can only be assured if Service Men are extremely well trained, and a continuing supply of trained men are available, according to the chairman of the TV committee of the electrical association on the Pacific coast. A well-trained Service Man, in his opinion, can always win public confidence, command respect, and a just return for service rendered.

SEVERE PENALTIES INCLUDED IN L.A. TV SERVICE ORDINANCE--The Los Angeles, California, ordinance regulating the servicing of television receivers, now has a set of new, sharp teeth, because of a new clause introduced by the board of supervisors. Hereafter, licenses will be revoked if any Service Man is found guilty of charging for parts not installed, or issuing false statements relating to the parts used or service provided. The same revocation penalty will also obtain if Service Men alter or mutilate serial numbers on the chassis.

CAPITELLI ELECTED ESFETA PREXY--At the annual meeting of the Empire State Federation of Electronic Technicians Associations, held in the Hotel Arlington, Binghamton, N. Y., O. Capitelli of ARTSNY was elected prexy. Other new officers elected for '52 were: Herbert Snyder, Binghamton, vice president; Dave Violet, RTG, Rochester, secretary; Charles Kohl, UETA, Kingston, treasurer; and John Hague, ERTA, Endicott, sergeant-at-arms. New directors of ESFETA are: Hal Hazard, Binghamton; Sidney Gent, Endicott; Thomas Thorne, Hudson Valley, Poughkeepsie; Ray Trumpait, Kingston; Jack Wheaton, TRTG, Long Island; Max Liebowitz, ARTSNY; and Andy Wentworth, RTG, Rochester.

PORTABLES TO USE ALKALINE CELL BATTERIES--A new dry-cell type B battery, which uses an alkaline electrolyte, that is claimed to increase playing time about ten times, will soon appear in portable models. Originally alkaline cells were of wet design, had to be held upright and were not portable. The new units are said to be over 20 per cent smaller than standard dry types.

APPLAUSE FOR SERVICE--It is gratifying indeed to report the continued receipt of many complimentary letters during the past few weeks. According to Paul G. Clauser . . . "SERVICE is the most beneficial of all the magazines printed for the independent Service Man." . . . R. W. Graham declared that . . . "I take six other radio magazines regularly, but I think more of SERVICE than the rest. Keep up the good work." . . . H. P. VanDerLinden told ye editor that . . . "Your articles on tape and wire recorders have more than repaid me for the price of my subscription." . . . Louis A. Joczik offered his . . . "Sincere compliments for a technical service that is tops, particularly those articles on TV alignment." Thanks, gentlemen, for these grand bouquets.--L. W.



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"IMPS" are molded in rugged thermo-setting plastic!



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Write now for complete literature—and your free sample!

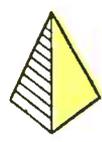
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# Auto

## Simplified Basic Procedures Using Signal Generators, VTVMs and 'Scopes.

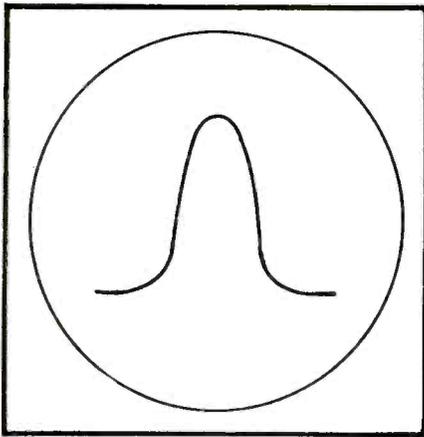


Fig. 1. Single-trace curve on 'scope.

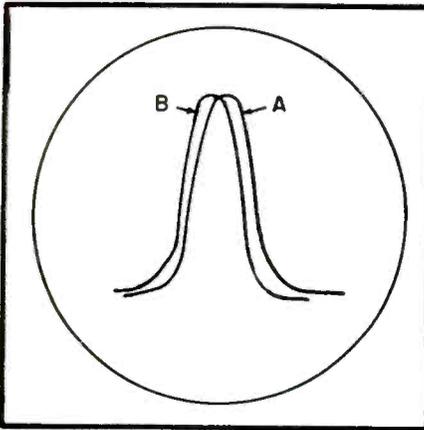


Fig. 2. Double-trace curve. Traces which should overlap as much as possible, were drawn separately for clarity.

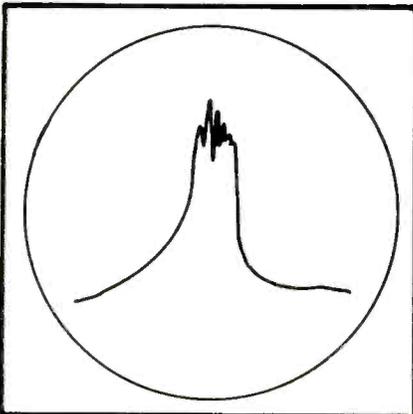


Fig. 3. Trace illustrating regeneration or oscillation.

IN ALIGNING AUTO chassis, there are two factors which must always be remembered; the sets are usually more sensitive and selective, and accordingly require extremely careful alignment attention. Signal generators and allied alignment equipment, such as 'scope, signal tracer and a *vttm*, must be very stable and accurate.

Signal generators should be capable of supplying both AM and FM signals for alignment with a 'scope. An assortment of especially-designed *tuning* tools can also be very helpful for adjusting the variety of screws that will be found on variable iron cores; screws with slotted ends, screws with flattened ends or slugs. Those fiber tuning tools will come in highly handy for these screw adjustments.

A basic set of adjusting tools can be made in the shop. The old fiber rods can be modified so that they can be used to turn volume and tuning (dial) controls. A slot, about  $\frac{1}{2}$ " deep, can be cut in one rod, while another can be filed to a tongue, about  $\frac{1}{2}$ " long and  $\frac{1}{8}$ " thick. They should then be cut to

the same length, and a knob placed on the other end, to make them easier to handle. With these rods installed, it will not be necessary to use the control head, which would only dangle and interfere with alignment.

To perform a satisfactory alignment job, it is necessary to place an accurate indicator in the output. This can be an *ac* voltmeter of suitable range, connected across the voice coil, or with a blocking capacitor across the power tube plate to ground. A *dc-vttm* can be connected across the *avc* bus to read the developed *avc* voltage. The readings on this instrument will increase with an increase in signal. A signal tracer tuned to the *if* and connected to the diode plates of the second detector will also be found handy, since it provides readings of not only the amplitude of the actual signal, but also the frequency. This unit may be used to

Fig. 4. Schematics illustrating 'scope connections. In (a) appears connections which must be made when the volume control is used as a diode load resistor. The (b) circuit shows connections required when separate diode load resistor is used.

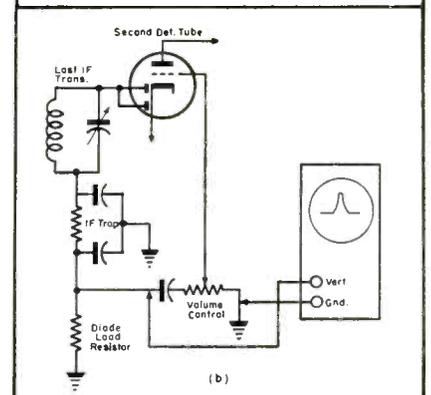
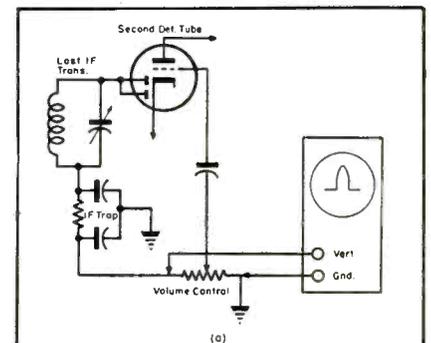
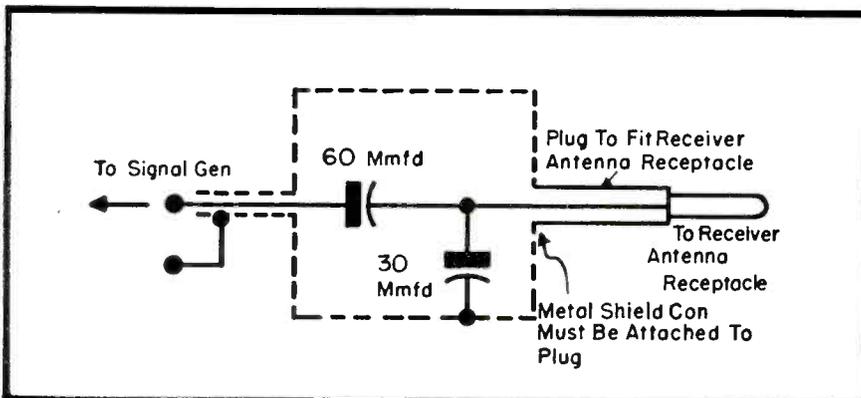


Fig. 5. Dummy antenna setup suggested by Motorola for their auto radio set.



# Radio Realignment

by JACK DARR

Ouachita Radio Service

advantage in determining unknown *if* frequencies.

Auto-radios use only a few *ifs*; 450, 370 and 260 kc represent most of the *ifs* employed. The chassis used in many of the old Chevrolet or Pontiac cars using 6F7-6A7-6B7, etc., have a 260-kc *if*. Some of these just won't tune up with a probe on the diode plates. To check these chassis it will be necessary to use an output meter on the audio plate or voice coil.

A scope will be found invaluable for alignment work, providing accurate selectivity-curve information which will improve set peaking. Before aligning, it is imperative that all servicing has been completed and tubes have been checked. If a defect appears during alignment, an immediate repair

should be made and alignment steps repeated. This approach will take more time, but you'll be more than repaid by the resulting higher quality of work.

The set and signal generator should be warmed up thoroughly before alignment; at least ten minutes should be allowed for warmup. This must be done so that all tubes, parts, etc., will have reached their normal operating temperatures, and will not drift during or after alignment. While the set and generator are warming up, all the required tools, circuits and alignment data should be rounded up and readied for use and reference.

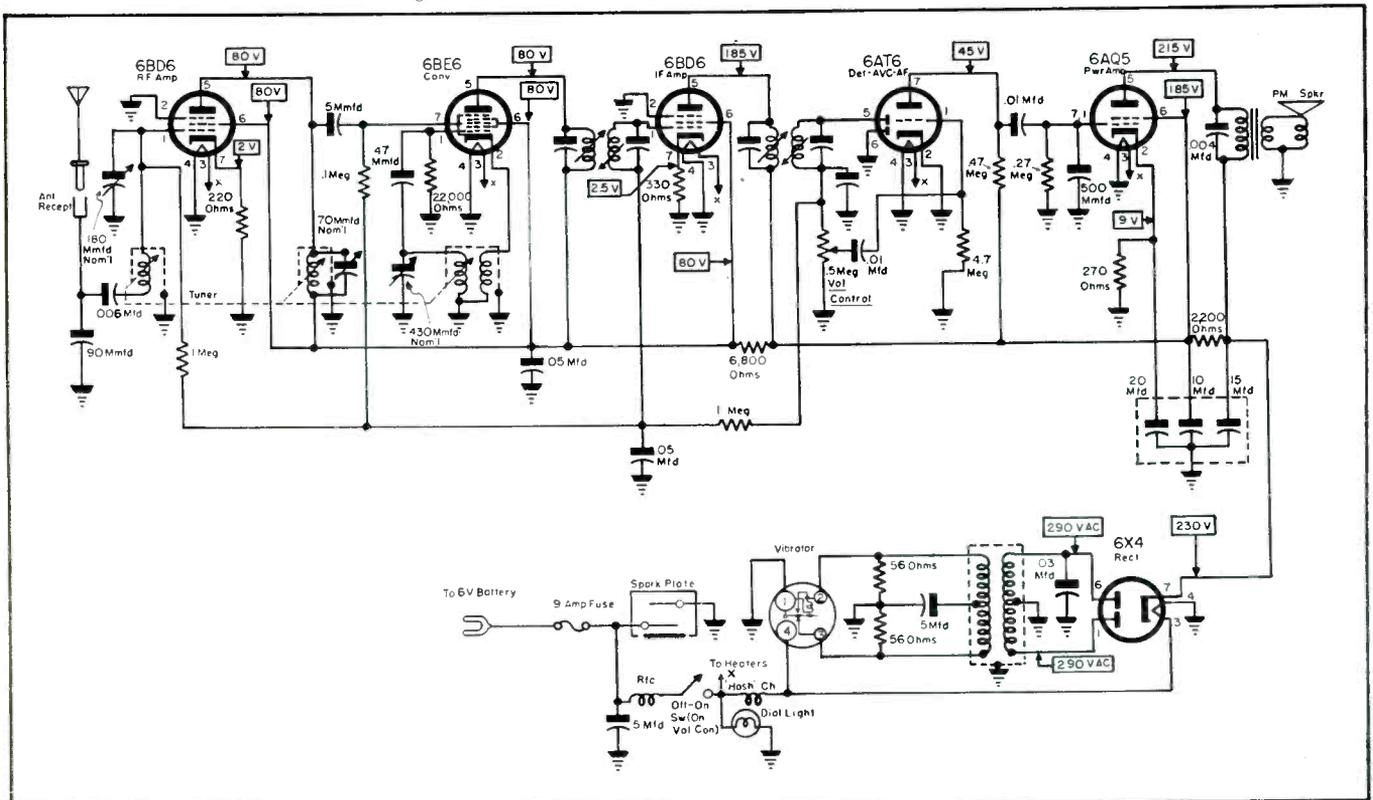
After the set and signal generator have warmed up the indicating instrument should be set up and the signal

generator connected to the mixer grid, through a capacitor of about .01-.05 mfd value. This must be done to avoid shorting out the *avc* voltages on the grid. If the *ifs* are too badly out of alignment, you may have to move on to the *if* amplifier grid, and tune the last stage first. Then you can move back to the mixer grid and tune the first stage. The tuning of the last stage should be rechecked and then the first stage can be checked. Sometimes, it will be necessary to repeat this several times, until no more gain can be had.

To tune up *rf*, oscillator and antenna stages, the signal generator should be connected to the antenna socket of the

(Continued on page 64)

Fig. 6. Circuit of late model auto radio chassis; Motorola 401A.



# UHF Continuously-Tuned OSCILLATOR Circuitry

by WYN MARTIN

(See Front Cover)

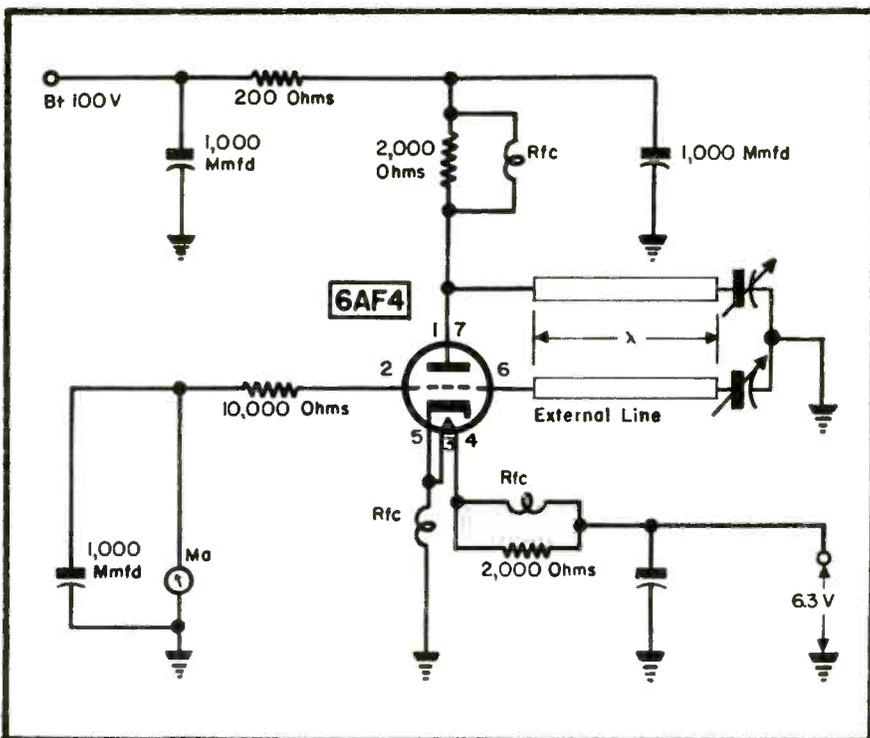


Fig. 1. Circuit of a continuously-tuned oscillator (shown on the cover) using a 6AF4. Values of the external line are noted in the graph in Fig. 2.

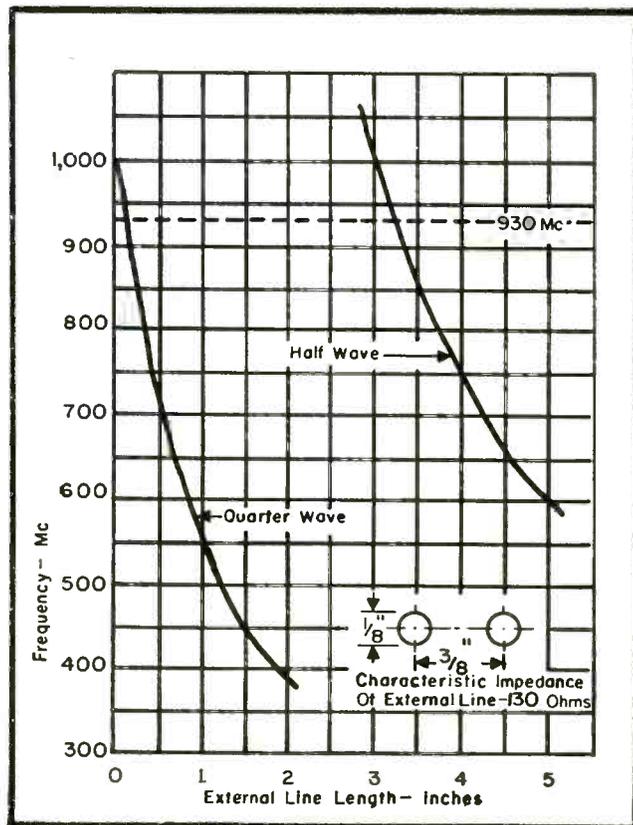
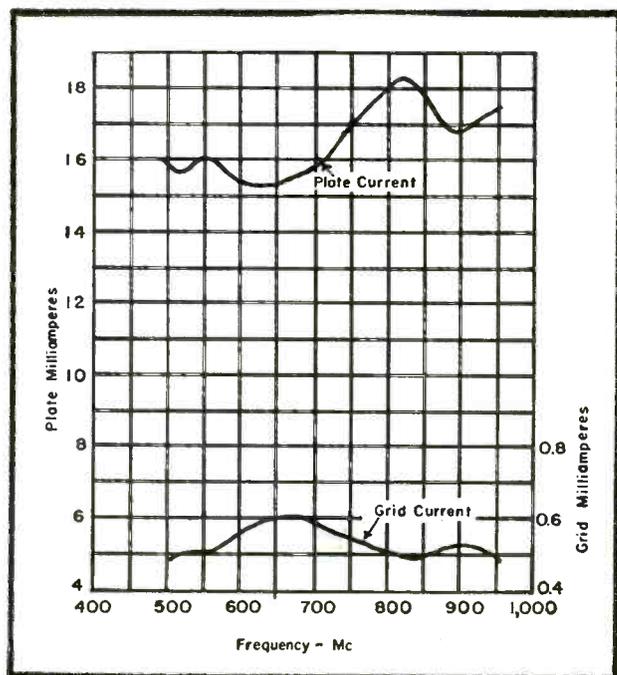
ON THE ULTRAHIGHS, it is necessary to use tubes which have good frequency stability, low interelectrode capacitances, low lead inductance, and low *rf*-lead resistance. In the local oscillator circuit it is particularly important to employ tubes with these characteristics. Accordingly special tubes have been developed for that purpose.† One such type is the 6AF4\* whose design features include silver-plated base pins to minimize losses due to skin effect, short internal leads to reduce lead inductance and lead resistance and a short mount structure utilizing small parts to provide low interelectrode capacitances. In addition, the tube has double base-pin connections for both plate and grid. These double connections are positioned to facilitate operation of the tube with either series or parallel-

(Continued on page 67)

†See uhf report, SER-CUTS, this issue; p. 40. \*RCA.

Fig. 2 (right below). Operational characteristics of the 6AF4, which illustrates the length of the line required in the plate-grid circuit. Capacitor values are determined by length of line used.

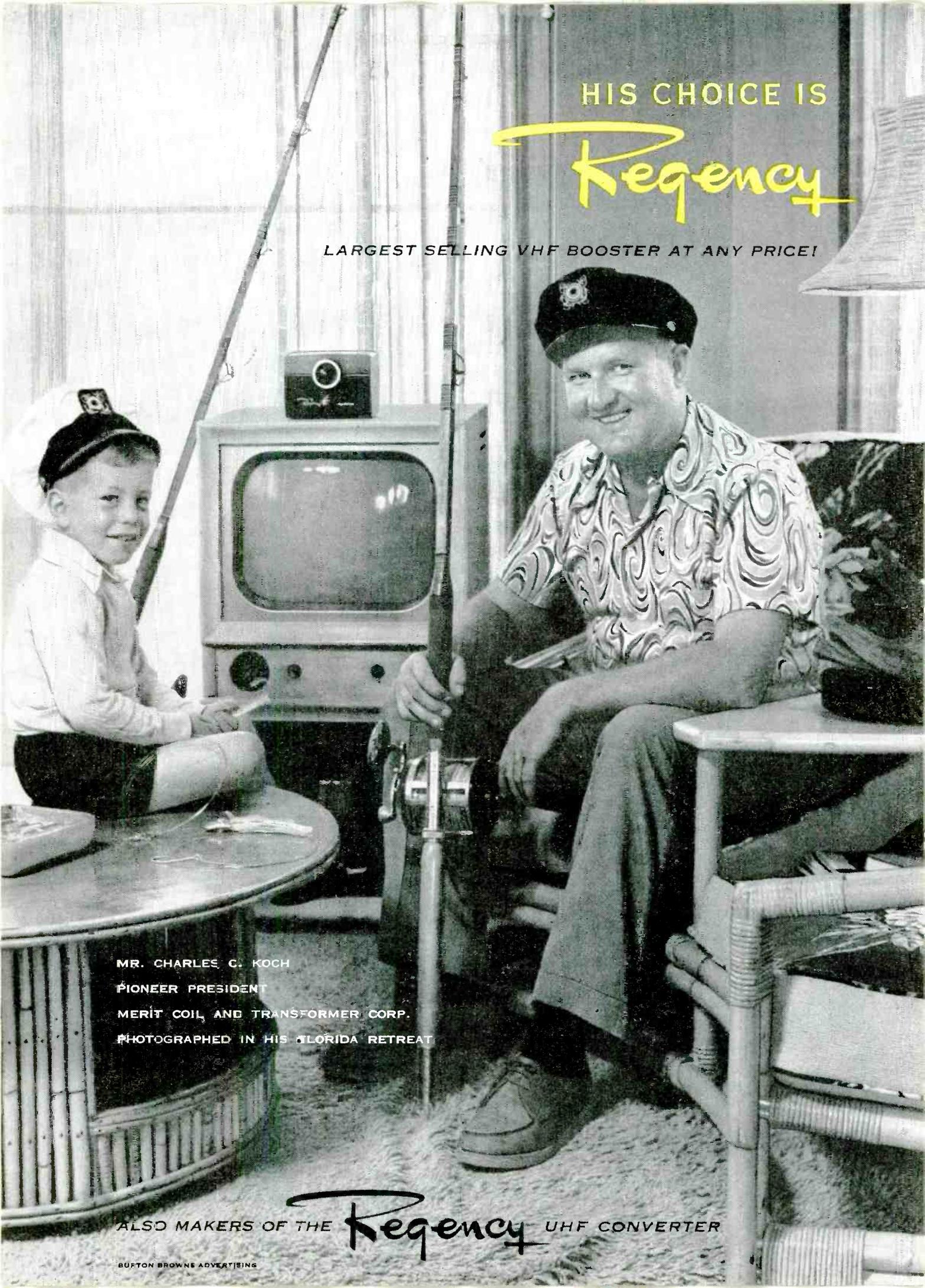
Fig. 3. Plate and grid current characteristics of the 6AF4, where the  $E_r = 6.3$  and plate volts = 100.



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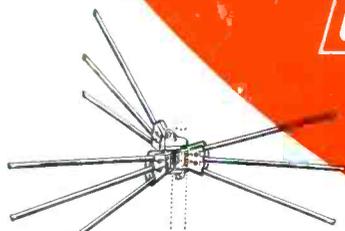
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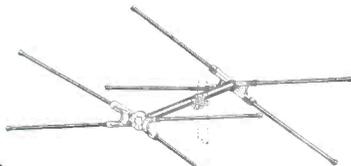
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*Slave Units, Involving Use of Sweep-Sound Chassis and Centralized Receiver Pickup, Found to Permit Streamlined Distribution of Video-Sound.*

# Simplified VIDEO-SOUND DISTRIBUTION System

by **MORT ZIMMERMAN**

Supervision of Engineering  
Television Engineering Services Co.

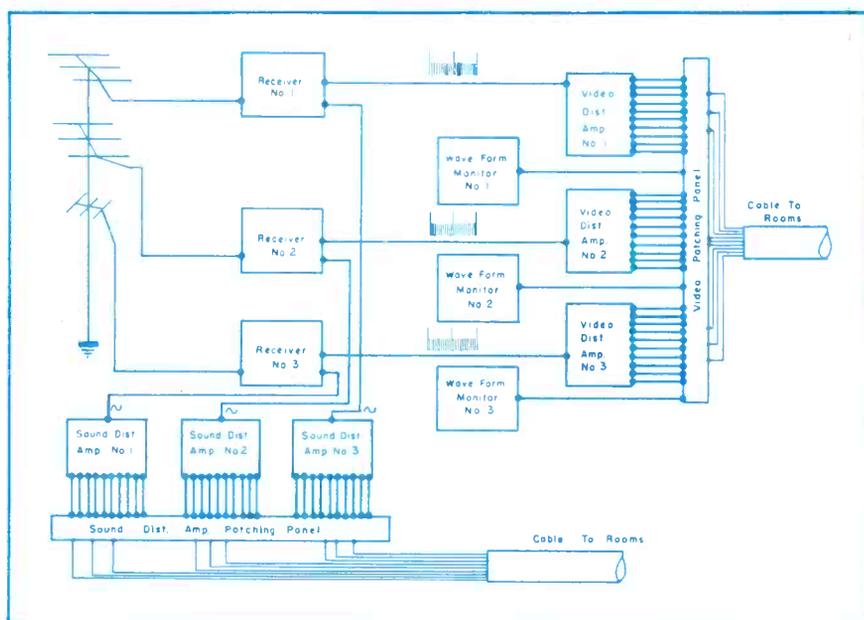
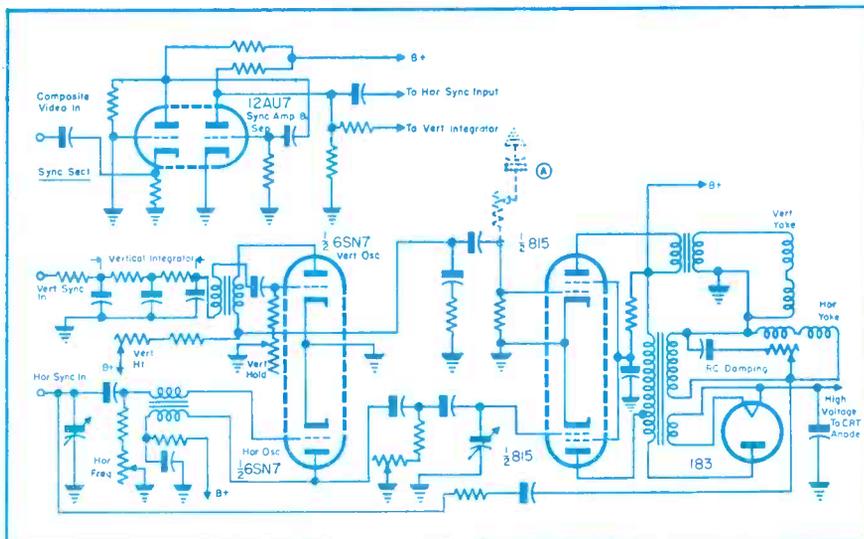


Fig. 1. System designed to replace use of separate receivers with separate antennas.

Fig. 2. Schematic of horizontal-vertical (below) and sync sections (above) of monitoring unit. The rc network shown in dashed lines has been found to provide better vertical linearity.



DISTRIBUTION SYSTEMS, developed for either centralized antenna pickup in hotels, tourist courts, hospitals and other multiple unit buildings or apartments, for closed-circuits operation, have become an increasingly important factor on the TV scene. And with the striking expansion forecast for the future, furthering interest in TV throughout the land, the single-feed technique may become an even more vital item.

Several approaches to master-antenna distribution have been evolved. Some have featured master receivers and multiple slave units. Recently, a novel approach to the slave-feed idea was developed featuring video monitor units or TV chassis using the sweep and sound sections only.

Tested during extensive experiments, the technique has been found to offer many advantages.

To explain its operation, let us assume that the system is to be installed in a 20-room hotel and three-station service must be provided.

A single antenna tower can be placed on top the hotel with three major elements resonant at the three channels to be received. Three separate matched lead-in wires must be brought to three separate receivers located in a *control room*.

At this point, the variations in the system are introduced. The video output and the video detector is split in each receiver so that it is fed to the video amplifiers and to three separate cathode followers, producing three low-impedance separate video outputs.

These outputs are then fed into three separate video distribution amplifiers, similar or identical to those used in TV broadcasting, often known as stabilizing amplifiers, without the use of inserted sync.

For our purpose, each video distribution amplifier employs one input for

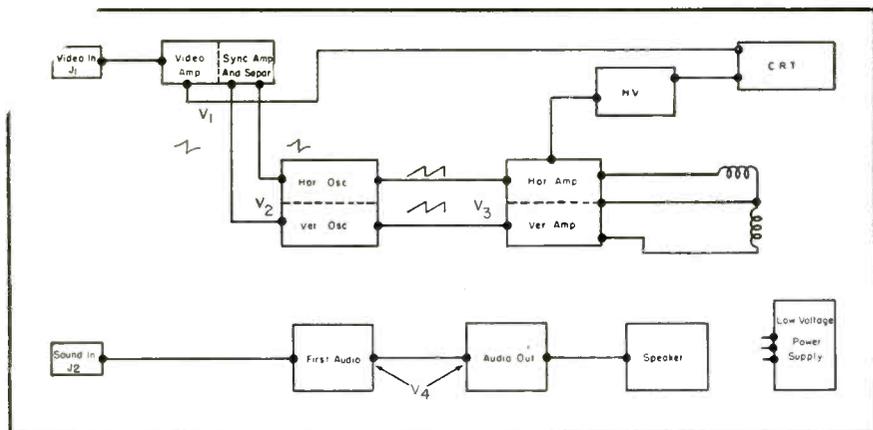


Fig. 3. Block diagram of monitor unit.

20 outputs. At this point, there are two choices for final distribution of signal. First, we can choose to terminate our outputs in a video patch panel and run a single low-impedance shielded cable to each of the 20 rooms from this patch panel, and have an operator on duty in the control room to accomplish video patching upon request by telephone for a given station. Second, we may choose to run three video cables to each room and terminate these at a coax switch to be used by the viewer for station selection.

For large hotels with many rooms, the former system will prove more economical.

Once the video signal has reached the viewing room, it is fed into a simple 4-tube/2-selenium rectifier, video monitor unit.

The composite video signal is fed into a jack, amplified and then fed to two sections, the grid of the picture tube, and vertical and horizontal sync amplifier.

The other portion of the video-amp tube serves both as the sync amplifier and separator. The signal is then fed to a tube used both as a vertical and horizontal oscillator in a blocking setup, with the output sawtooth waves fed respectively to a dual pentode operating both as a horizontal and vertical sweep amplifier.

By necessity, the cathode of the horizontal sweep amp, common to both sections of the tube, operates at ground potential and the internally connected screen grids are bypassed sufficiently to present an *ac* ground to both horizontal and vertical pulses.

Audio signals are fed to a jack, which feeds a dual triode cascaded for sufficient audio amplification to drive a five-inch alnico *pm* speaker.

Thus, in the control room of the hotel, the operator on duty monitors three separate pictures and respective accompanying sound, in accordance with telephone requests for channels from viewers throughout the hotel. A constant check can be kept on all receiving monitor units in the hotel and a maintenance-operation log can be kept.

In the event additional transmitters are placed in operation in the area, this type of system requires merely the addition of one receiver and a distribution amplifier for each channel to be added.

It is possible to eliminate the operator, through an alternate system. However, in this instance it becomes necessary to use a separate video cable and

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sound cable for each channel connected to each room. Thus, in a twenty-room hotel, for three-channel pickup, sixty video and sixty sound cables would be necessary. And unless provision were made for additional runs of cable, new channels could not easily be added; in the operator system only one video and sound cable and channel addition are required.

Sound distribution can be simplified in the operator method by taking advantage of the intercarrier principle in the monitor room itself.

This would eliminate the use of a separate sound cable. It had been noted that the initial signal received is split at the detector in the receiver before distribution. Therefore, the composite video signal can be transmitted through the distribution amplifier to the room monitoring unit and nowhere along its path is the 4.5-mc component disturbed. Thus, at the monitor unit, a 4.5-mc discriminator coil can be inserted along with a detector to produce pure audio for amplification.

#### Monitor Receiving Unit

The monitor receiving unit in the hotel room would only have two controls; an on-off volume control and contrast control. Sync and brightness controls would not be necessary since the control room can keep the *dc* level of the signal constant and maintain the sync-to-video ratio standard at 25% to 75%. This can be checked through the use of a waveform monitor in the control room.

The foregoing system, representing an engineering approach, has been found practical, but can be criticized because of economic competitive issues. Although the receivers in the control room could be purchased commercially, the monitor units in the rooms would have to be manufactured, since no manufacturer markets such an item in the price range competitive to receivers.

However, management actually can save money through the proposed approach.

It is only necessary to compare the cost of 100 complete receivers versus 100 monitor units. There are many manufacturers who build sectionalized television chassis, with the sweep and sound chassis separate or mechanically connected by fasteners to the front end and *if* chassis.

The current Westinghouse chassis are an interesting example. It is thus only necessary to negotiate for the purchase of 100 sweep-sound chassis, which would undoubtedly cost less than the complete receiver. Current mass production assembly line methods

(Continued on page 68)



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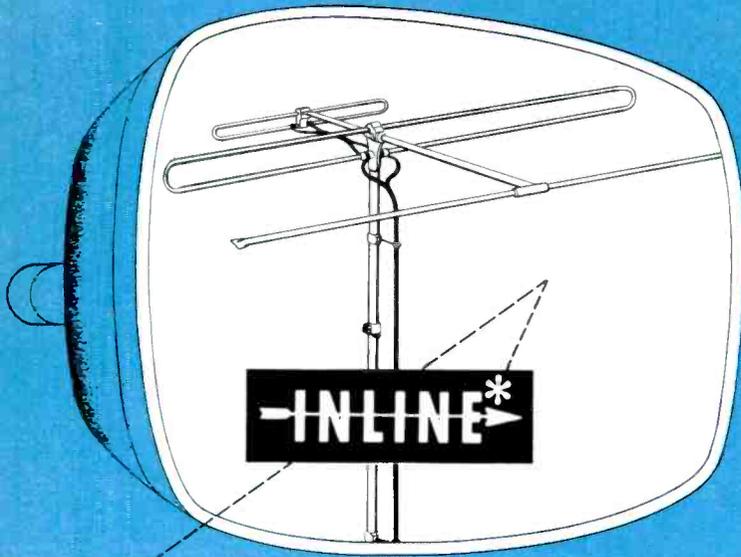
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# Social Security and the Self-Employed Service Man

## A Report on the New Tax Regulation\*

SERVICE MEN, who work for themselves, have experienced their initial reporting of 1951 self-employment income for *social security* purposes.

Unlike other workers covered by the *social security* law, the Service Man who works for himself does not have his earnings reported by someone else. He does not share the tax obligation with an employer, or have his report submitted for him. The self-employed individual or partner will be required to report his own earnings and pay his own tax for *social security* purposes. This was done when the '51 income tax was filed on March 15.

Income from self-employment, subject to certain exceptions, means net earnings derived from a trade or business covered by *social security*. The Service Man who works for himself reported and paid the tax of 2¼% on all such earnings over \$400 and up to \$3,600 starting for '51. These net earnings may be from full or part-time self-employment. If, in addition, he has wage earnings from a job covered by *social security*, he reports only that part of his self-employment net earnings which, added to his wages, total \$3,600 for that year. If his wages are as much as \$3,600 he will not need to report his self-employment earnings. All reports must be filed with the local Collector of Internal Revenue.

All types of self-employment in a trade or business are covered by this new law. The few occupations that do not count toward *social security* protection are farm owners or operators, physicians, dentists, osteopaths, chiropractors, naturopaths, veterinarians, public accountants, funeral directors, architects, professional engineers who work for themselves, and a few others.

Self-employed individuals made a last minute rush for their necessary *social security* number. Where the number was included on Schedule C, or an application for a number submitted, the number will be assigned, and the income properly credited. In those cases where no number was obtained and omitted from the report, each individual will be requested to complete the necessary application for the assignment of a number.

*Social security* means a foundation of old-age and survivors insurance protection for the individual and his family. Retirement benefits will range from a minimum of \$20-\$80 a month. A man and wife retired at 65 could receive \$120 a month. Surv-

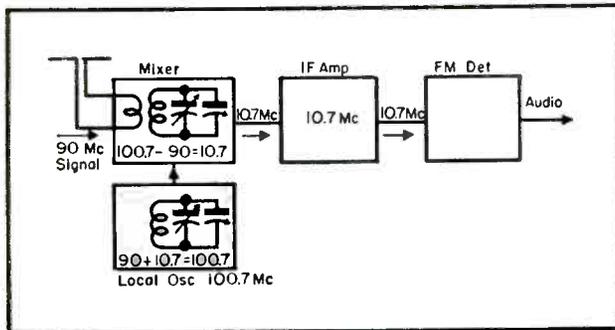
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\* Martin. Wyn, *The Serviceman and His Income Tax*, SERVICE, January, 1952.

# Practical Tracking Adjustments for FM Chassis

by JAMES C. DRAKE

Instructor, Valparaiso Technical Institute



**Two Simple Methods That Can be Used to Insure Proper Tracking of FM Receivers... Involving Use of Calibrated Grid-Dip Oscillator, and a Tuning Wand and Voltmeter.**

PROPER TRACKING adjustment of preselector and local oscillator circuits in FM and other *vhf* receivers is often a problem even when alignment data are available. Alignment is difficult because of the spurious responses of all superhet receivers and the use of signal generators which use harmonics for their *hf* ranges. However, it has been found that a calibrated grid dip oscillator can be used to make correct tracking adjustments, even on sets badly misaligned.

## Basic Theory of the Superhet

In superhet receivers all stations or frequencies that are to be received are converted to a new lower frequency, called the *if*, at which it is amplified substantially before being demodulated or detected. This conversion is accomplished by heterodyning or beating a local oscillator with the incoming

desired signal and using the difference frequency as the *if*. This improves the gain per stage and increases the selectivity compared with straight tuned *rf* amplification, but is not without its complications.

In Fig. 1 appears a block diagram of a simple FM set, in which there are only two tuned circuits that vary with the tuning dial and control. One is the local oscillator, and the other is the antenna or preselector tuned circuit which is necessary to reduce spurious responses. Each is tuned to a different frequency.

Let us now assume that the *if* amplifier is in proper alignment. Tracking of the two tuned circuits indicated in Fig. 1 can be accomplished in the following way. With the set turned off, the tuning dial should be set to 90 mc. At this point, the tuned circuits should be resonant to the frequencies indicated in the block diagram. The grid

dip oscillator should be brought close to the coil of the preselector tuned circuit, and tuned through a range of frequencies close to 90 mc, until a definite dip is obtained in the grid current. This indicates that you have tuned the oscillator to the resonant frequency of the circuit. From the dial of the grid dip oscillator, suppose for example, that the reading is 95 mc. This means that the preselector tuned circuit is tuned too high in frequency. To correct this, the coil turns should be squeezed together slightly and the frequency remeasured, repeating this until the preselector is adjusted to 90 mc.

Now, for the local oscillator adjustment. To receive a frequency of 90 mc, the local oscillator must operate at 90 mc plus or minus the *if* value. Usually, the oscillator operates on the high side of the signal frequency. The

(Continued on page 68)

Figs. 2 (below) and 3 (right). Voltmeter connections required in ratio-detector and discriminator circuits in FM sets when ironslug wands are used for peaking.

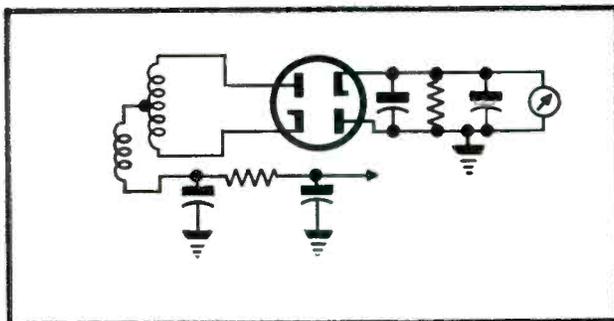
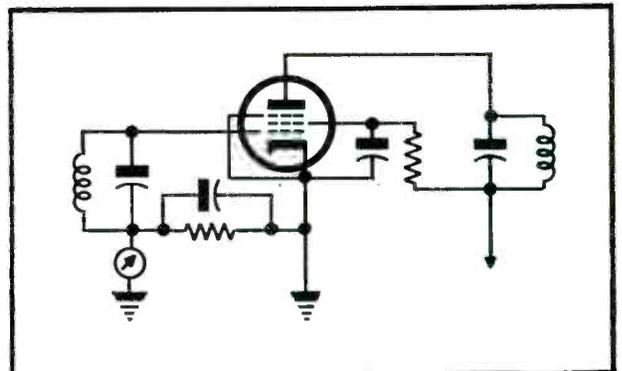


Fig. 1 (above). Block diagram of simple FM receiver, illustrating method used to secure *if*.



# Application of the

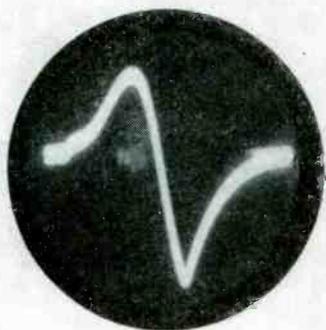


Fig. 1. An S curve, with the retrace blanked by means of phased 60-cycle blanking voltage applied to beam-blanking post of 'scope. The end baseline distortion, caused by the stabilizing capacitor, is of no practical concern, since the linear (operating) portion of the S curve is unaffected.

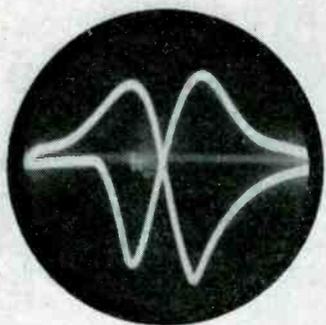
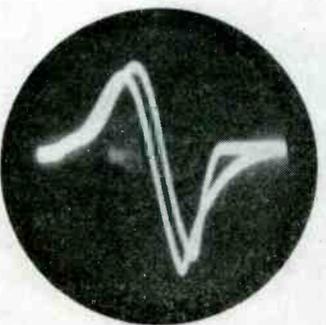


Fig. 2. A crossover S curve trace obtained by utilization of 120-cycle sawtooth sweep in the 'scope; phasable 60-cycle sync voltage applied to the *ext-sync* post of the 'scope to lock pattern. The beat marker is invisible through the ratio detector.

Fig. 2A. S curve obtained by sweeping the ratio detector of an intercarrier receiver. The 60-cycle sine-wave sweep is used in the 'scope. Retrace plainly visible in this instance. The 4.5-mc marker is invisible due to the inherent AM rejection of the ratio detector. The reactive loops at the ends of the S curve appear because the stabilizing capacitor was not disconnected from the ratio-detector circuit.



WHEN RATIO DETECTORS are to be sweep-aligned, either by means of an S curve as shown in Fig. 1, or by means of a crossover pattern as shown in Fig. 2, difficulty may be experienced in obtaining a visible 4.5-mc marker, because of high degree of AM rejection inherent in many ratio-detector circuits. It is sometimes found that the marker can be made visible by opening the stabilizing capacitor, but in other cases this expedient fails.

For this reason, it is very useful to have available a suitable test method for marking a ratio-detector curve in a straightforward manner. Such a method involves the temporary disconnection of the intercarrier receiver from the alignment instruments, substituting the crystal probe shown in Fig. 3, in place of the receiver. Since the probe has no AM rejection, the operator will find that the 4.5-mc marker then appears clearly along the 'scope trace, as illustrated in Fig. 4, p. 70.

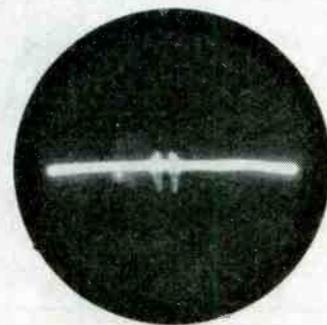
It is necessary to make a note of the exact *position* along the trace at which the marker appears. Then the intercarrier receiver should be reconnected to the instruments, observing where the marker position, previously noted, falls with respect to the S curve. The 4.5-mc marker position will remain at exactly the same distance along the trace, as long as the *horizontal controls* of the 'scope are not touched. Alignment adjustments, or vertical-gain variations, will not affect the distance along the horizontal axis of the screen, at which the 4.5-mc point is located.

Certain sources of confusion can arise during procedures of this kind, due to visible retrace, crossover pattern markers, and in some cases spurious markers can appear. The steps which should be taken to avoid confusion are:

- (1) When working with a single S curve, the display is usually obtained by utilizing 60-cycle sweep; when the scope is swept by a 60-

cycle sine-wave voltage, the retrace is plainly visible and must be properly controlled. In Fig. 2A appears a typical display of trace and retrace, with the *phasing control* of the 'scope (or sweep generator) improperly adjusted. The phasing control must be adjusted to superimpose the two curves. Then, if the 'scope has retrace blanking facilities, the retrace can be blanked out, although blanking is not essential. When the phasing control is not properly set, the result of utilizing the crystal probe is to develop two 4.5-mc markers along the 'scope base line, as shown in Fig. 2B. It is then, of course, a question as to which marker should be centered on the 'scope screen. However, if the trace and retrace are properly phased, these two markers will superimpose over each other.

- (2) A somewhat similar situation is frequently encountered when using a crossover pattern, but there is a basic difference in that 120-cycle sweep is being used. When the crystal probe is substituted for the receiver, and two markers are seen along the base line (which will usually be the case), the *center frequency of the sweep generator* must be properly adjusted to make the two markers superimpose over each other. The superimposed markers are then brought to center screen by suitable adjustment of the horizontal centering control of the 'scope. Finally, when the receiver is again connected into the test circuit, the ratio detector is adjusted to make the *crossover point* fall exactly in the center of the 'scope screen, which then indicates that this



\*Illustrations, presented in this paper, reprinted from copyrighted manuals, appear through the courtesy of Precision Apparatus Co.

Fig. 2B. Sweep display which appears when the crystal probe is substituted for the ratio-detector of the TV receiver. A pair of 4.5-mc markers are seen due to *improper phasing* of the *horizontal sweep*.

# MARKER GENERATOR In

## Visual-Alignment

by R. G. MIDDLETON

Senior Engineer  
Precision Apparatus Co., Inc.

### Techniques Evolved to Facilitate Alignment and Marking of Ratio Detectors.

crossover point takes place at exactly 4.5 mc. as it should.

- (3) Spurious markers along the base line usually indicate that other *rf* generators in the shop are coupling into the test circuit. Sometimes a transmitter in the vicinity of the shop causes similar interference. If necessary, the alignment setup should be moved into a screened room.

#### Marking of Over-All Response Curve

An *overall* response curve is the receiver response between the antenna terminals and the second-detector output. This curve shows the combined characteristics of the front end and the *if* amplifier. When we think of marking the *overall* response curve, we usually think of injecting a *cw* marker signal at the antenna terminals. In practice, this may not be the most economical, nor most convenient procedure.

A marker signal can be injected at *if*. This is possible, because we are inspecting the *overall* response curve, and it evidently makes no difference whether the marker is injected at station frequency and subsequently beat down to *if* through the mixer and oscillator, or, whether the marker signal is picked up at *if* frequency half-way along the line. The advantage of marking at *if* is that the investment in a high-frequency marker generator is made unnecessary, except for setting up the local oscillator; this can be handled in most cases by means of an expedient.

To inject the *if* marker into the *if* amplifier, it is highly advisable to use a floating tube shield over the mixer tube. In many cases, Service Men

complain that the markers are too small, and cannot be seen in the traps. If a floating tube shield is used, extremely large markers will be obtained. These will be plainly visible in traps, especially after the sweep width has been reduced and the gain of the 'scope is increased to maximum.

It will be recognized that an *if* marker will not serve to adjust the local oscillator in the front end, because variation of the local-oscillator frequency serves merely to move the overall response curve left or right along the base line of the 'scope, carrying the *if* marker along with the curve in a fixed position. Therefore, some source of a high-frequency marker will be required to adjust the local oscillator. However, this marker does not necessarily have to be obtained from a high-frequency marker generator. If a station signal is available on the channel under consideration, it is possible to *mix the station signal with the sweep signal to obtain a marker at the picture-carrier frequency and at the sound-carrier frequency*, as shown in Fig. 5; p. 71.

The signal must usually be attenuated from the antenna, before it is satisfactory for marking purposes, and hence series resistors should be used

in the antenna lead for his purpose. The resistors may have a value from 5,000 to 100,000 ohms, as determined by experiment for the particular signal level which prevails.

Satisfactory markers will not be obtained unless an isolating resistor is used in series with the hot lead to the 'scope as shown in Fig. 7, p. 71. This marker sharpening-resistor should have a value of approximately 50,000 to 75,000 ohms. It is essential, however, that the value of the resistor correlate with the capacitance of the shielded input cable to the 'scope, so that sufficient, but not excessive filtering action occurs. If excessive filtering is used, the time delay which is introduced will cause *marker displacement* on the response curve, as shown in Fig. 6, p. 71. This is an important point, inasmuch as test equipment is often wrongly blamed for this situation.

#### Modulation of Marker

It is frequently desirable to modulate the marker to distinguish between a true marker and a spurious marker. The true marker can be distinguished in the following manner: Modulation is applied to the marker, and the dial  
(Continued on page 70)

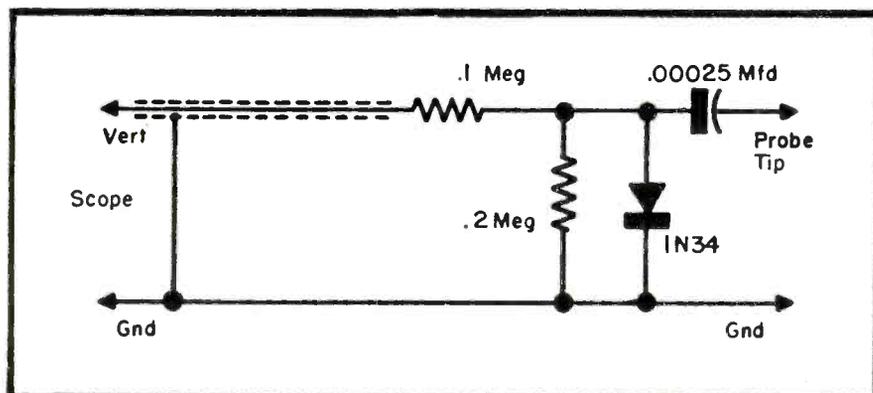
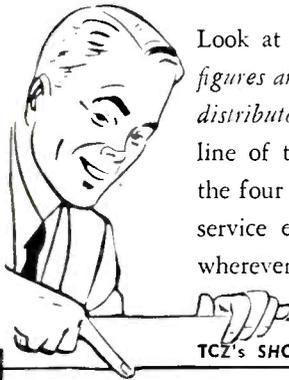


Fig. 3. A typical crystal diode probe.





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CRL Part No.	Cap. mmf.	Tolerance	Net Price	Cap. mmf.	Tolerance	Net Price	Cap. mmf.	Tolerance	Net Price	Voltage 500 VDCW			Cap. mmf.	Tolerance	Net Price
										Cap. mmf.	Tolerance	Net Price			
TCZ-.5	0.5	± .25 mmf	.45	*			†			†			†		
TCZ-.68	0.68	± .25 mmf	.45	*			†			.75	± .1 mmf	.45	†		
TCZ-1.0	1.0	± .25 mmf	.45	*			†			†			†		
TCZ-1.5	1.5	± .25 mmf	.45	1.0	± 1 mmf	.30	†			1.5	± .5 mmf	.30	1.5	‡	.30
TCZ-2.2	2.2	± .25 mmf	.45	*			†			†			†		
TCZ-3.3	3.3	± .25 mmf	.45	3.0	± 1 mmf	.30	†			3.0	± 1 mmf	.30	3.0	‡	.30
TCZ-4.7	4.7	± .5 mmf	.36	3.3	± 1 mmf	.30	†			3.3	± .5 mmf	.30	3.3	‡	.30
TCZ-6.8	6.8	± .5 mmf	.36	4.7	± 1 mmf	.30	†			4.7	± .5 mmf	.30	4.7	‡	.30
TCZ-10	10	± .5 mmf	.36	5.0	± 1 mmf	.30	†			5.0	± 1 mmf	.30	5.0	‡	.30
TCZ-12	12	± .5 mmf	.36	6.8	± 1 mmf	.30	†			6.8	± .68 mmf	.30	6.8	‡	.30
TCZ-15	15	± .5 mmf	.36	8.2	± 1 mmf	.30	10	‡	.30	10	± 1 mmf	.30	8.2	‡	.30
TCZ-18	18	± .5 mmf	.36	10	± 1 mmf	.30	†			†			†		
TCZ-20	20	± .5 mmf	.36	*			†			15	‡	.30	†		
TCZ-22.0	22	± 2½%	.30	*			†			†			†		
TCZ-24	24	± 2½%	.30	20	± 10%	.30	†			†			†		
TCZ-27	27	± 2½%	.30	25	± 10%	.30	†			20	± 10%	.30	20	‡	.30
TCZ-30	30	± 2½%	.30	*			†			†			†		
TCZ-33	33	± 2½%	.30	*			†			†			†		
TCZ-36	36	± 2½%	.30	33	± 10%	.30	33	‡	.30	33	± 10%	.30	33	‡	.30
TCZ-39	39	± 2½%	.30	*			†			†			†		
TCZ-43	43	± 2½%	.30	*			†			†			†		
TCZ-47	47	± 2½%	.30	*			†			†			†		
TCZ-51	51	± 2½%	.30	47	± 10%	.33	†	‡	.33	†			†		
TCZ-56	56	± 2½%	.30	*			†			50	± 10%	.33	50	‡	.33
TCZ-62	62	± 2½%	.30	*			†			†			†		
TCZ-68	68	± 2½%	.30	*			†			†			†		
TCZ-75	75	± 2½%	.30	68	± 10%	.33	†	‡	.33	†			†		
TCZ-82	82	± 2½%	.30	*			†			75	± 10%	.33	75	‡	.33
TCZ-91	91	± 2½%	.30	*			†			†			†		
TCZ-100	100	± 2½%	.30	50	± 10%	.33	100	‡	.33	†			†		
TCZ-110	110	± 5%	.30	*			†			†			†		
TCZ-120	120	± 5%	.30	*			†			†			†		
TCZ-130	130	± 5%	.30	*			†			†			†		
TCZ-150	150	± 5%	.30	150	± 10%	.36	150	‡	.36	150	± 15 mmf	.36	150	‡	.36
TCZ-160	160	± 5%	.30	*			†			†			†		
TCZ-180	180	± 5%	.30	175	± 10%	.36	†			†			†		
TCZ-200	200	± 5%	.30	*			†			175	± 17.5 mmf	.36	175	‡	.36
TCZ-220	220	± 5%	.30	*			†			†			†		
TCZ-240	240	± 5%	.30	*			†			†			†		
TCZ-270	270	± 5%	.30	*			†			†			†		
TCZ-300	300	± 5%	.30	*			†			†			†		

\*\*Name on request.

\*Not cataloged item — available on special order.

†Not cataloged

‡Tolerance not listed in literature

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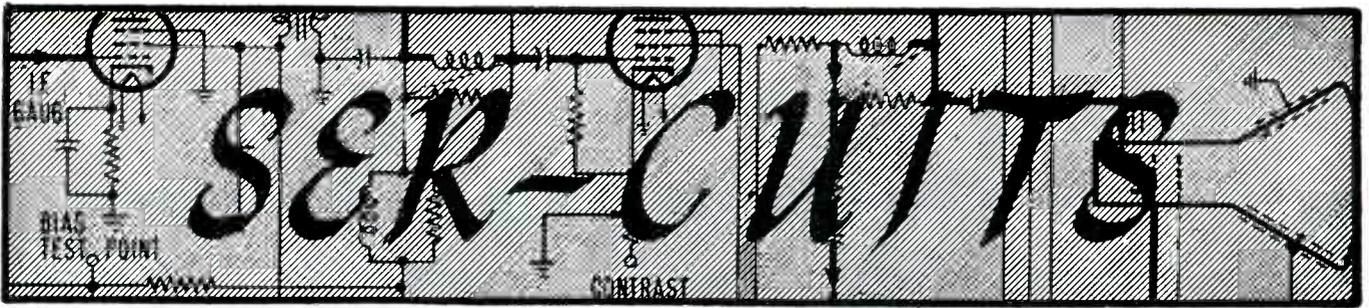
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CRL				COMPETITOR A** (tubular)			COMPETITOR B** (disc)			COMPETITOR C** (tubular)			COMPETITOR D**		
CRL Cat. No.	Cap. mmf.	Tolerance	Net Price	Cap. mmf.	Tolerance	Net Price	Cap. mmf.	Tolerance	Net Price	Cap. mmf.	Tolerance	Net Price	Cap. mmf.	Tolerance	Net Price
TCN- 3	3	± .5 mmf	.36	*			†			†			†		
TCN- 5	5	± .5 mmf	.36	5	± 10% or ± 1 mmf	.30	†			5	± 10% or ± 1 mmf	.30	5	‡	.30
TCN- 10	10	± .5 mmf	.36	10	± 10% or ± 1 mmf	.30	10	‡	.30	10	± 10% or ± 1 mmf	.30	10	‡	.30
TCN- 12	12	± .5 mmf	.36	*			†			†			†		
TCN- 15	15	± .5 mmf	.36	*			15	‡	.30	†			†		
TCN- 18	18	± .5 mmf	.36	*			†			†			†		
TCN- 20	20	± .5 mmf	.36	*			†			†			†		
TCN- 22	22	± 2½%	.30	*			22	‡	.30	†			†		
TCN- 24	24	± 2½%	.30	*			25	‡	.30	†			†		
TCN- 27	27	± 2½%	.30	*			†			†			†		
TCN- 30	30	± 2½%	.30	*			†			†			†		
TCN- 33	33	± 2½%	.30	*			33	‡	.30	†			†		
TCN- 36	36	± 2½%	.30	*			†			†			†		
TCN- 39	39	± 2½%	.30	*			†			†			†		
TCN- 43	43	± 2½%	.30	*			†			†			†		
TCN- 47	47	± 2½%	.30	47	± 10%	.30	47	‡	.30	47	± 10%	.30	47	‡	.30
TCN- 51	51	± 2½%	.30	*			†			†			†		
TCN- 56	56	± 2½%	.30	*			†			†			†		
TCN- 62	62	± 2½%	.30	*			†			†			†		
TCN- 68	68	± 2½%	.30	*			68	‡	.30	†			†		
TCN- 75	75	± 2½%	.30	75	± 10%	.30	†			75	± 10%	.30	75	‡	.30
TCN- 82	82	± 2½%	.30	*			†			†			†		
TCN- 91	91	± 2½%	.30	*			†			†			†		
TCN-100	100	± 2½%	.30	100	± 10%	.30	100	‡	.30	100	± 10%	.30	100	‡	.30
TCN-110	110	± 5%	.30	†			†			†			†		
TCN-120	120	± 5%	.30	†			†			†			†		
TCN-130	130	± 5%	.30	†			†			†			†		
TCN-150	150	± 5%	.30	†			150	‡	.30	†			†		
TCN-160	160	± 5%	.30	†			†			†			†		
TCN-180	180	± 5%	.30	†			†			†			†		
TCN-200	200	± 5%	.30	†			200	‡	.30	†			†		
TCN-220	220	± 5%	.30	†			220	‡	.30	†			†		
TCN-240	240	± 5%	.30	†			†			†			†		
TCN-270	270	± 5%	.30	†			†			†			†		
TCN-300	300	± 5%	.30	†			†			†			†		
TCN-330	330	± 5%	.30	†			330	‡	.30	†			†		
TCN-360	360	± 5%	.30	†			†			†			†		
TCN-390	390	± 5%	.30	†			†			†			†		
TCN-430	430	± 5%	.30	†			†			†			†		
TCN-470	470	± 5%	.30	†			†			†			†		
TCN-510	510	± 5%	.30	†			†			†			†		
TCN-560	560	± 5%	.30	†			†			†			†		
TCN-620	620	± 5%	.30	†			†			†			†		
TCN-680	680	± 5%	.30	†			†			†			†		
TCN-750	750	± 5%	.30	†			†			†			†		

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by M. W. PERCY

## Design and Application Features of ULTRAHIGH Converters and Tuners Described During UHF Symposium at IRE National Convention.

THE ULTRAHIGHS, now no longer an airy dreamland, but rather an extremely practical and official home for telecasters, has begun to receive priority attention in numerous labs of receiver, tube, transmitter and accessory manufacturers. And the results have been intriguing, with an assortment of tuners, converters, antennas, tubes and crystals, and amplifiers appearing on the scene.

The tuner-converter front has been particularly active, with a host of solutions posed. Some have indicated that the answer to reliable *uhf* lies in the turret tuner. Others have announced that it's the tuned transmission line which can provide the best performance, and still others have favored the variable inductance idea.

At the recent IRE national convention in New York City, the first detailed appraisal of the foregoing techniques was offered during symposia

sponsored by the professional group on broadcast receivers.

### Turret Tuners

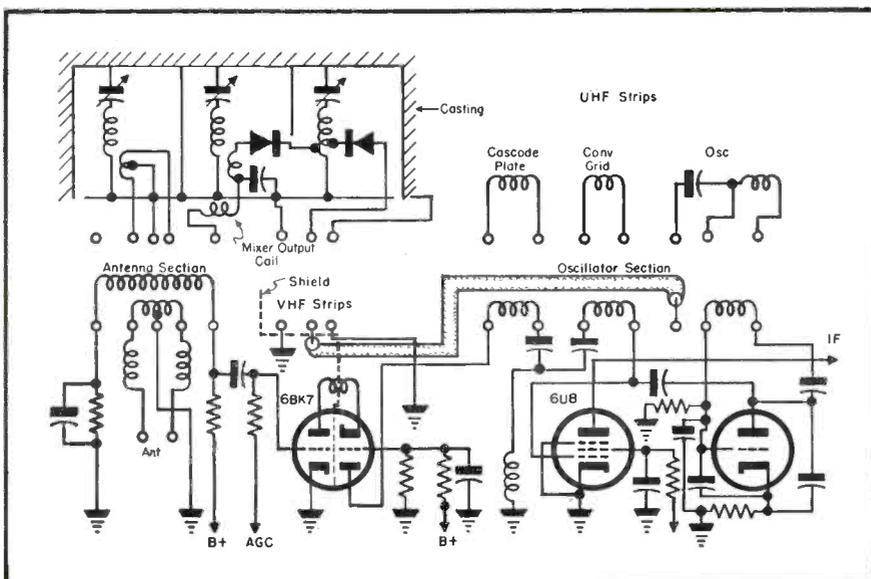
Supporting the turret-tuner method, John Bell of Zenith declared that experience has shown that there has been a public preference for the snap type of tuning which permits the user to go from channel to channel in a single operation. This, it was said, has been provided by the turret type of tuner in which channel strips on a turret are moved past the indexing point. The strips are replaceable and can be made interchangeable in a given type of turret.

The tuner providing *vhf-uhf* coverage was described as featuring two-section design, a solid partition extending over the entire cross section of the tuner housing. The shield, together with proper placement of parts and circuits, was claimed to permit more than

adequate isolation of the oscillator from the antenna.

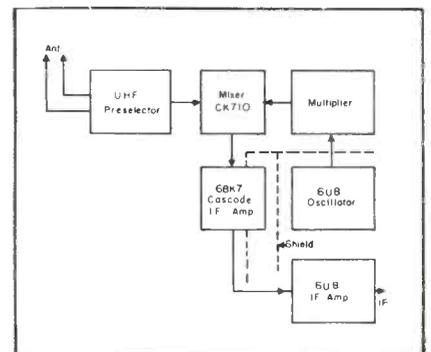
Analyzing the basic elements of the tuner, Bell said that a 6BK7 double triode is used in a cascode *rf* amplifier, a single-tuned circuit on the first grid of the cascode providing some preselection between the antenna and *rf* amplifier. A double tuned circuit is used between the output of the cascode and the converter grid of a 6U8, a new triode pentode. It was noted that a pentode converter is preferred, because a triode would have to be accurately neutralized when used as an amplifier on *uhf*.

To cover the entire *uhf* band, the *vhf* oscillator must tune between 172 and 234 mc. Thus, it was said, the third harmonic of the oscillator is used on the low *uhf* frequencies and the fourth harmonic is used on the high *uhf* frequencies. The desired harmonic output of a multiplier crystal is used to



(Left)  
Simplified circuitry of *vhf-uhf* tuner, described by Zenith Radio engineers.

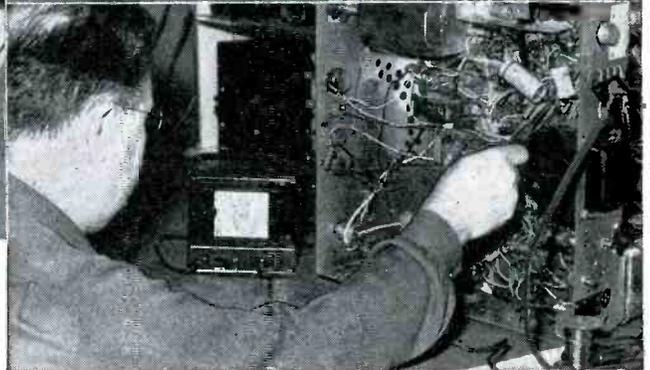
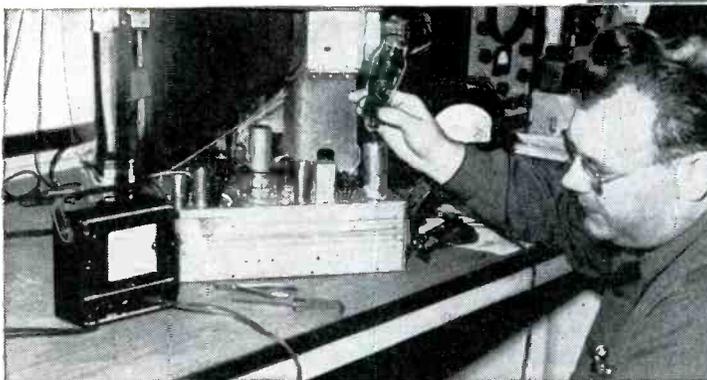
(Below)  
Block diagram of receiving system with *uhf* strips in place, analyzed by Zenith experts.



**Bill Clemens says—**

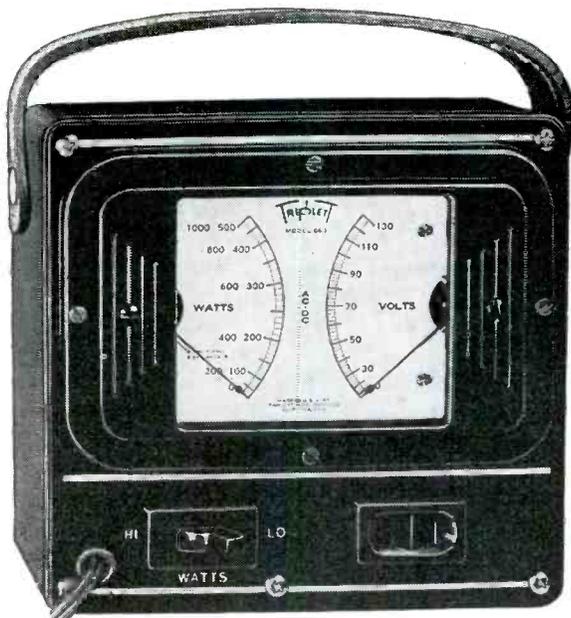
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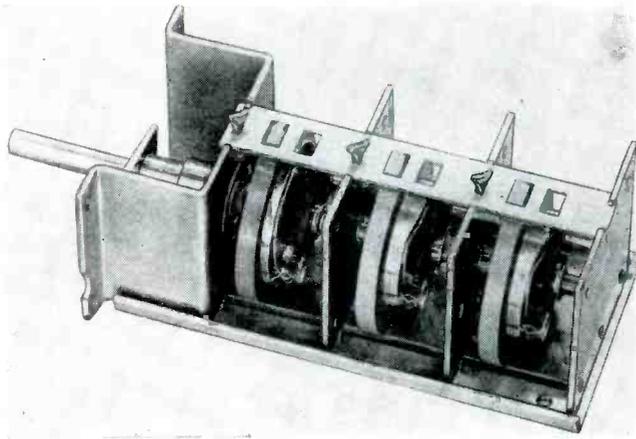
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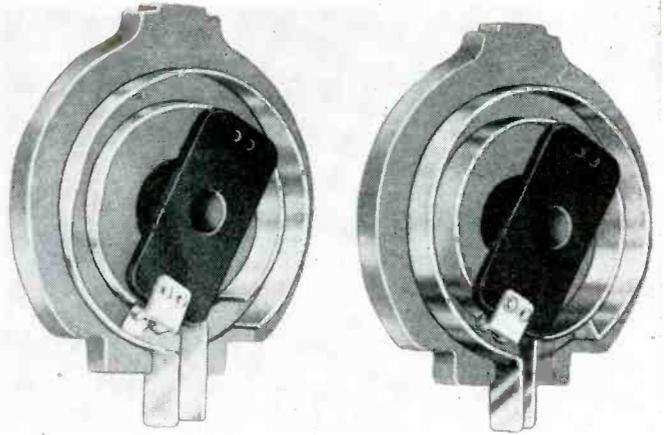
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Three-section *uhf* variable-inductance tuning system tuner reviewed by Melvin of Mallory. (See page 47 for tuner analysis.)



Structure of oscillator tuning and mixer-tuning elements in Mallory unit.

excite a germanium mixer crystal, which is preceded by two preselector tuned circuits. The design thus provides three *uhf* tuned circuits and two germanium crystal diodes mounted in a die-cast housing, designed to replace electrically and mechanically the antenna section of the *vhf* channel strip.

Reviewing the objective of the 6BK7 cascode, Bell declared that it was selected to obtain the lowest possible noise figure on all channels consistent with cost and reasonable simplicity. The cascode interstage is series tuned near channel 13 by means of a series coil connected between the first plate and second cathode. Accordingly, he pointed out, the two triodes are thus connected directly in series and, therefore, have identical plate currents. The

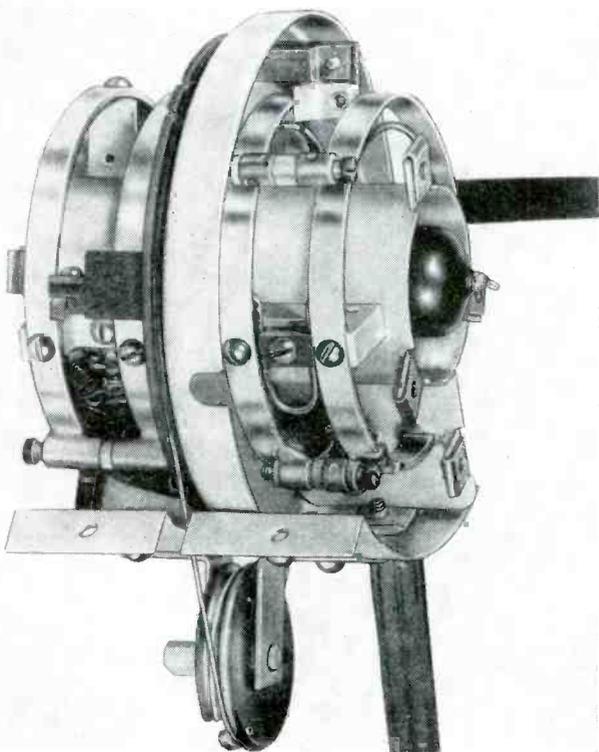
grid of the second triode is held at a fixed potential by means of a voltage divider between B+ and ground, giving a relatively rapid cutoff in the first triode, which is controlled by the *agc* voltage. So that the gain of the cascode may not be reduced before the signal is completely free of noise, Bell said, a delayed action is provided in the application of *agc* to the 6BK7. This is accomplished by providing some cathode bias on the *if* amplifier and allowing the *agc* voltage to go positive by this amount. When the *agc* voltage is positive, it was shown, a 2.2-megohm grid leak on the 6BK7 holds its grid near zero; actually slightly negative due to contact potential. When the *agc* voltage passes through

‡Rexolite.

zero the signal level was described as high enough so that the noise figure of the *rf* amplifier is no longer important and the 6BK7 is then cut off rapidly by a further increase of *agc* voltage in the negative direction.

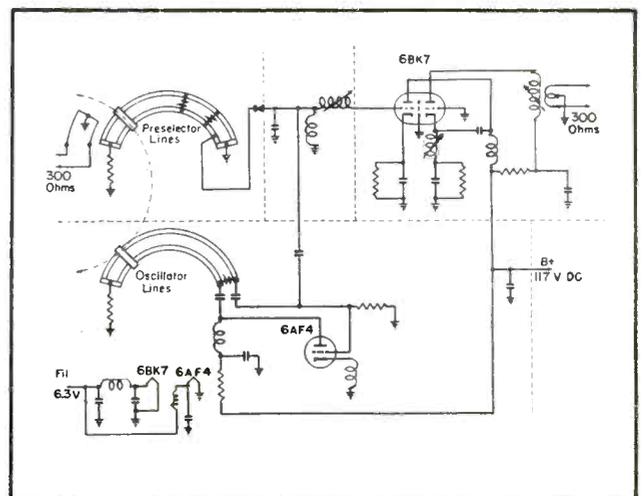
Describing the *uhf* tuned circuits, Bell said that they are mounted in a cylindrical hole .205" in diameter and 1/2" deep. The coils themselves are .4" long and 1/8" in diameter. Tuning capacity is provided by the proximity of the top end of the coil to a No. 1-72 machine screw which enters the coil through a No. 1422 mounting bushing‡. No other connection was said to be necessary to the top end of the coil. It was noted that substantial tuning ranges can be achieved with

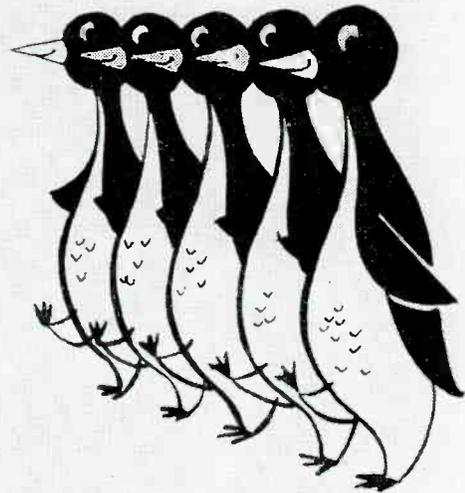
(Continued on page 44)



(Left)  
Top view of Kingston Products tuner, with shields removed. Shown are the preselector lines and the slider with their respective trimmers in place. Back of the line is the antenna coupling loop. Also shown is a portion of the cascode *if* amplifier tube.

(Below)  
Schematic of tuned-line tuner analyzed by Rieth of Kingston Products.





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### Ser-Cuits

(Continued from page 42)

very small capacities by this method because the minimum capacity of the circuit is not increased by connections to a variable capacitor and the parts of the capacitor, etc. The minimum capacity of the circuit was said to be approximately  $\frac{1}{4}$  mmfd; thus the *uhf* range can be covered with three different coils. There are three different housings to cover the *uhf* band; the first covers from 470 to 602 mc, a

second from 608 to 734 mc, and a third from 740 to 890 mc.

The mixer output circuit was described as a simple pi network in which the *rf* bypass capacitor is the input capacity, and the grid-cathode capacity, or the input capacity, of the 6BK7 is the output capacitor. This simple network was said to provide very nearly optimum coupling between the crystal and the grid of the 6BK7 for best noise figure. The bandwidth of the input circuit is determined entirely by the damping provided by the mixer crystal. In this way, it was

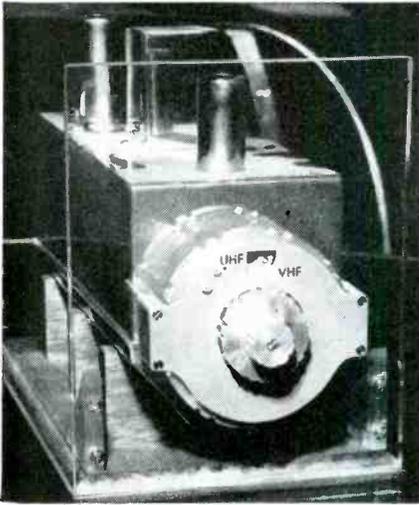
noted, the mismatch between the crystal and the first grid is nearly complete, with the result that there is realized most of the 3-db improvement in noise figure which is available if the *if* amplifier absorbs no power from the crystal.

Reviewing the operation of the *uhf* channel strip, Bell said that the cascade plate and the converter grid are tuned to *if* and the coupling between them is adjusted for proper bandwidth to give full response at both the sound and picture carriers. Capacitor coupling between the oscillator coil and an extra turret contact (No. 11) feeds excitation through a coax cable to the multiplier crystal in the antenna section. This contact in the antenna section is shielded as completely as possible by two grounding strips on either side of the contact and by the arrangement of the shield which permits a minimum amount of the contact to be exposed to the antenna compartment; thus, it was noted electrostatic capacity coupling is reduced between this contact and the antenna coils. The antenna coils are arranged with the ground contact between the antenna primary and the *rf* grid contact. Thus, the two antenna contacts are adjacent to each other, reducing the loop area of the antenna leads which can couple magnetically to the oscillator through the multiplier contact which carries oscillator current to the multiplier crystal. This was said to be important when the *uhf* channel strips are in place, serving to reduce oscillator radiation. This arrangement also permits additional isolation of the antenna contacts from the *rf* grid reducing direct *if* pickup on *uhf*.

Detailing the performance of the system on *uhf*, Bell noted that the noise figures on channels 24 and 47 (535 and 670 mc) were 14, and 17 on channel 72 (820 mc). Image rejection on channels 24 and 47 was said to be 50, and 45 on channel 72. The *if* rejection on channels 24 and 47 was noted as being 60 and 59, and 58 on channel 72. Relative gains for channels 24, 47 and 72 were said to be .81, .72 and .65.

### 82-Channel Turret Tuner

In another dissertation on turret tuners, Aldo Scandurra of Kollsman Instrument $\ddagger$  reported that there had been developed a combination veryhigh—ultrahigh tuner, in which channel selection was accomplished through a scheme of dual conversion, the *uhf* band being divided into eight parts. The *uhf* channels are converted to *vlf* and the *vlf* section of the tuner is used as variable first *if*. This approach was said to provide a decimal system of



The 82-channel turret tuner described by Scandurra of Standard Coil.

counting for tuning of the *uhf* channels. Resonant circuits for the arrangement were noted as being obtained through the use of lumped parameters; tuning of the *uhf* oscillator and *uhf* mixer is accomplished by switching these lumped parameters across fundamental circuits.

#### Band Circuitry

For each of the bands, Scandurra said, the tuner consists of a *uhf* pre-selector, a *uhf* mixer and oscillator, and a first *if* system of the cascode type. The *rf* switch serves to separate the antenna feeds. In the *uhf* position, the antenna is fed to preselectors and the output of the *uhf* mixer excites the *vlf* first *if*. In the *vlf* position, it was noted, the antenna terminal is connected to the input of the *vlf* tuner; in this position, the *uhf* section of the tuner is inactive.

In this arrangement, when a particular tens digit is selected, actually there is selected one of eight *uhf* bands with its associated preselector and oscillator setting. When a units digit is selected one of the variable intermediate frequencies is chosen. Due to the numbering of the *vlf* stations, the dial presentations are arranged so that the *uhf* numbers appear in the upper portion of the window, and *vlf* numbers in the lower portion.

#### Method of Tuning

Reviewing oscillator systems studied for the system, the Kollman specialist pointed out that an 800-mc oscillator consisted of two coils in parallel connected across the tube socket, in this particular case, pins 1 and 2, and 6 and

(Continued on page 46)

‡Subsidiary of Standard Coil Products Co., Inc.

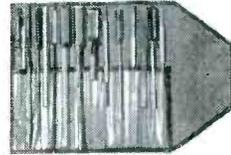
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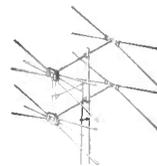


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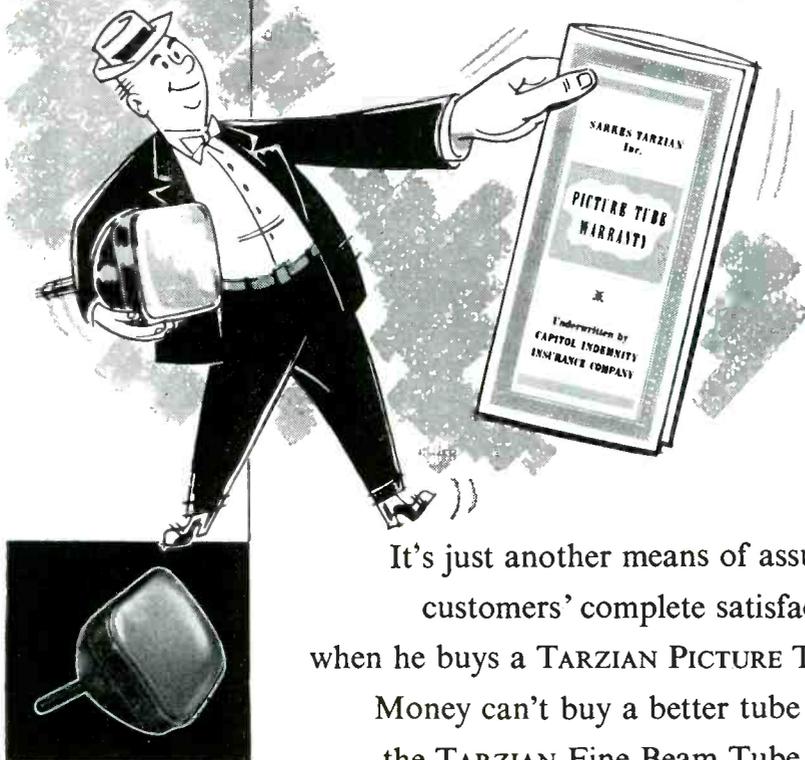
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### Ser-Cuits

(Continued from page 45)

7. The *dc* isolation between the grid and plate was effected through a small gimmick wound around the end of each coil. This provided a small capacitance connecting the tube to the circuit. Filament chokes used had about 20 turns of No. 28 SSE closely wound on a 3/8" form. Based on these simple experiments, the work was carried on to extend the use of lumped parameters.

An oscillator was built, using a sub-miniature type tube which operated in the neighborhood of 1250 mc. The inductances consisted of two coils in parallel, with two turns of No. 24 wire wound on a 3/16" form, connected to the tube element through a gimmick capacitance of approximately 1 mmfd. The method of incremental tuning by paralleling lumped inductance and capacitance was found to be ideal for a turret tuner. The *Qs* of the circuits were found to be high, of the order of 100 or greater. If the fixed coil is stabilized for possible temperature va-

riations, the deviation in switching from one channel to another can be held to a minimum.

#### Design of Oscillator

In evolving an oscillator design, the choice of a tube loomed as a key factor, it was noted. The choice was said to be complicated not by the lack of a suitable tube, but by the variety available. With lumped circuits, at least six different types of triodes were embodied in oscillator circuits. All were found to perform satisfactorily. Most of the work was conducted with the 2367A<sup>a</sup> and 1165E<sup>b</sup> tubes. In the course of experimentation, oscillators were assembled using other tube types such as the 6BK7, 6BZ7, 5703, 6K4, 6J6, etc.; all have been found to operate rather well in the *uhf* range.

In experimenting with the oscillator, it was established that the resonance in the filament cathode circuit could be troublesome. Continuous tuned oscillators were assembled which required no change in the cathode circuit. However, those oscillators were found to be critical in adjustment. The use of a switched *uhf* oscillator served to reduce this effect, enabling the optimizing of the plate current through the frequency range. The maximum plate current in the final oscillator on any of the channels was on the average less than 20 ma for 80 *v* anode voltage on a number of tubes which were available.

Tests showed that once the fundamental circuit was established at the center of the range, the other oscillator frequencies could be obtained rather easily by adjustment of the increments. The possible variation with the trimmer was found to be approximately  $\pm 7$  mc.

#### Design of Preselector

The present tuner was described as using double-tuned circuits with coils as increments for all of the eighty bands. A broadened response was achieved by proper positioning of the antenna output and the mixer input, with no resistive loading used. This setup was said to result in an optimum transfer of power with the only dissipation existing in the radiation losses and the loss within the coils and capacitors associated with the circuit. The noise factors which were measured in the lab indicated that the loss in the preselector varied from 1 to 2 db.

In the present model, a capacitance of the order of 3/4 mmfd is included as a variable capacitor to adjust the

<sup>a</sup> RCA. <sup>b</sup> Sylvania.

circuit in the 870 to 890-mc range, in addition to the incremental inductance from the turret. This was said to set the fixed circuit, and no other adjustments need be made for the remaining seven bands. The fundamental circuit operates in the neighborhood of 400 mc when incremental inductances are used. Scandurra noted that this lower frequency of operation of the fixed circuit was chosen to obtain incremental inductances which were small in size. For this purpose, a circuit operating at 400 mc or below was found to be better than a fixed circuit operating at higher frequency, since the size of the incremental inductances for the various channels has been kept reasonably small. It was noted that one could use a circuit operating in the neighborhood of 600 mc and use capacitances and inductances for achieving the required responses. However, the use of capacitors has been found to be limited to the bandwidth requirements, while inductances have resulted in a more efficient transfer of energy.

#### Variable Inductance Tuners

In a paper covering the possibilities of variable inductance systems for *uhf* tuners, H. F. Melvin of Mallory disclosed that two types of tuners have been designed for this service. One has been a so-called dual-line tuner.

The tuner was said to be a compact assembly of variable inductance available in one, two, three, or four sections in the same case.

In this unit, dual inductor elements, arranged in a non-inductive, concentric path, provide an inductance range in 270° of rotation (less than a single turn).

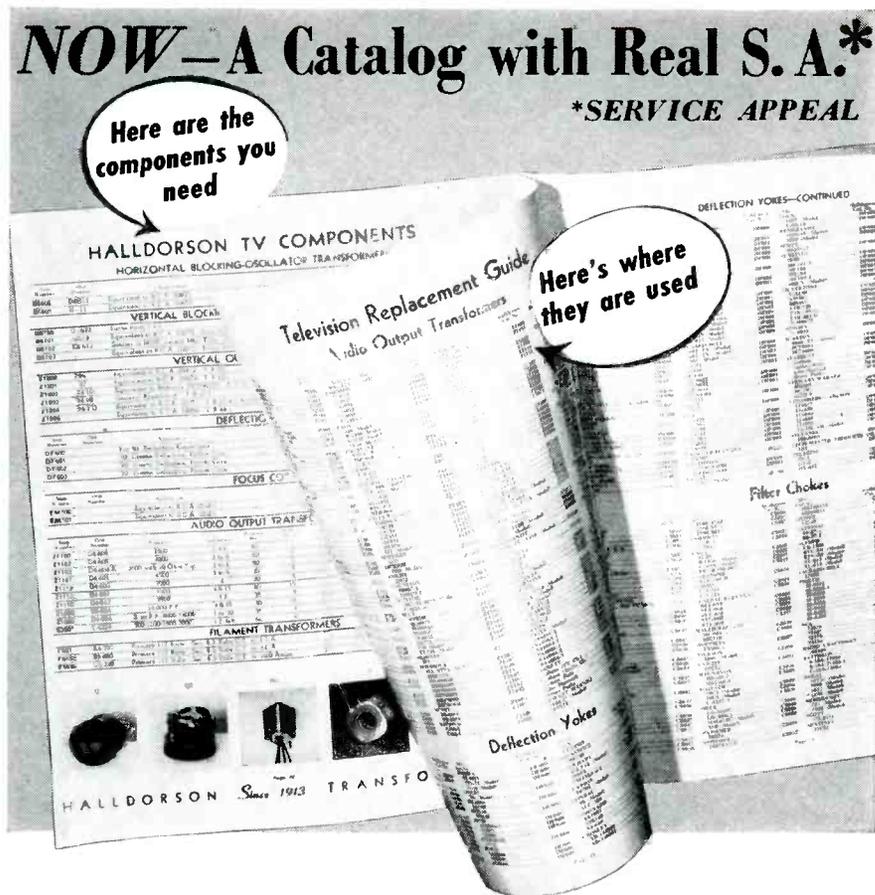
Preselector tuning elements are shaped differently from each other and from the oscillator tuning elements (available for various *if* frequencies, at roughly, 40, 80, and 130 mc) to provide good tracking when used in converters and front-ends. The maximum deviation in resetability from one production element to another was said to be less  $\pm 0.8^\circ$  at 130° rotation (approximately  $\pm 2$  mc at 660 mc), where the maximum error occurs. The *rf* range of the preselector was described as being approximately 1.98 (460 to 910 mc) in 270° of rotation.

In a review of the antenna section it was said that two small arcs of silver ribbon (approximately 70° long) were imbedded on the back side of a coupling element. These are concentric with the tuning element, and in a position to provide approximately balanced

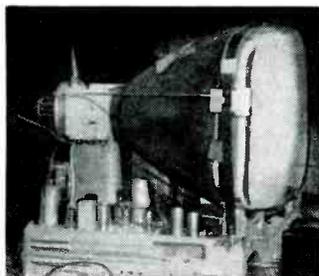
(Continued on page 80)

# NOW—A Catalog with Real S.A.\*

\*SERVICE APPEAL



## Halldorson's New Catalog and TV Replacement Guide



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Power Transformers  
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Horizontal Blocking—  
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Vertical Blocking—  
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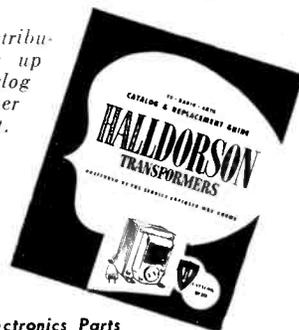
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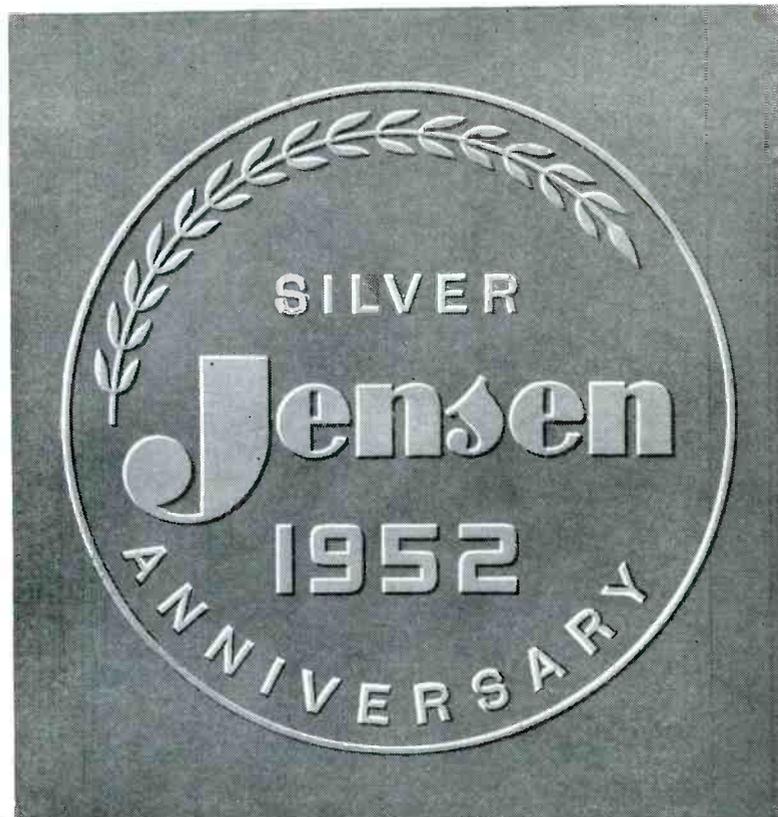
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# AUDIO installation and service

## Phono-Tape-Wire-PA-Amplifiers-Speakers

by KENNETH STEWART

**Horn-Loaded Loudspeaker Design . . . Tape-Disc-Phono-PA-System . . .  
Continuous Tape Players . . . Direct-Drive Amplifiers . . . 45 RPM Spindles.**

IN AUDIO REPRODUCTION networks there are normally six links in the transmitting-to-listening chain: microphone, phonodisc cutter or magnetic head, pickup or playback unit, phono or wire-tape recorder, amplifier and speaker. The latter items, or amplifier and speaker, have been described as the strongest and weakest links in the system. The weak position of the speaker has been attributed to the fact that no other component is required to transform energy from one form to another with so many variables to satisfy. In an ideal speaker system, the energy transformation should be accomplished with a smooth response over a maximum range of about ten octaves and with a high degree of efficiency. Directional effects should be controlled, and in addition, the speaker should be able to handle the output

stage power with a minimum of non-linear and transient distortion.\*

In efforts to meet this complex requirement many have evolved unique and extremely effective approaches, some revolving about speaker design, while others have developed special enclosures.

Reviewing the problem during a meeting of the IRE professional group on audio at the NEC conference†, D. J. Plach and P. B. Williams\*\* reported that there are two kinds of radiation means employed to produce sound from a speaker. In one the moving system is coupled to the air by the transformer-like action of a loading horn. However, they said, the more

common method is to couple the cone directly to the air, in the so-called direct radiator, or cone-type unit, which is commonly used today.

At low frequencies it was pointed out, speakers are no better than the enclosures used with them. It has been found that a properly tuned bass-reflex enclosure can deliver more low-frequency output at lower distortion, than an open-backed or closed-box type cabinet. Over about one octave, movement of the cone was said to be less, while the port radiates most of the power. It was noted that a reduced cone movement lowers distortion generated by non-linearities in the moving system and magnetic field; in-

A 45 spindle that fits V-M Tri-O-Matic 950 and 920 series record changers. Spindle slips over the standard spindle.



Three-speed record player which features a slip-on 45-rpm spindle. Larger slip-on spindle fits over a permanent 78/33 1/3-rpm spindle and converts the player into a 45-rpm instrument. Record player plays up to 14 45-rpm records at one loading; plays up to ten 12-inch or twelve 10-inch standard or long-playing discs at one loading; plays up to ten intermixed sizes of 78-rpm, or the same number of 33 1/3-rpm records of intermixed sizes; provides two separate pick-up points in a single tone arm, one for playing 78-rpm discs and another for the 45-rpm and 33 1/3-rpm records. (RCA: 2JS1 record player attachment, complete with phonojack cable, which can play through any radio or television set; 2ES3 self-contained all-speed phono which houses its own speaker and amplifying system; 2ES38 self-contained portable all-speed phonograph housed in a leatherette carrying case with handle; 2US7 table model radio-phono combining all-speed changer with a standard band 7-tube radio with 3 watts of push-pull output.)



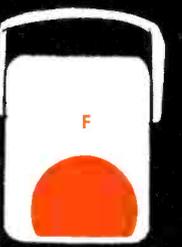
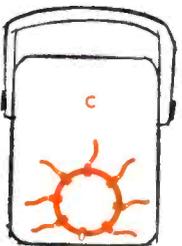
\*From comments made by Vincent Salmon, Stanford Research Institute, in a PGA-IRE newsletter.

†Seventh annual affair held in Chicago.

\*\*Jensen.

A 500-ohm direct drive amplifier which is said to eliminate the need for an output transformer. Hum and noise are claimed to be 90 db below full output; frequency response,  $\pm 1/4$  db 20-70,000 cps; distortion less than half of one per cent at 20 watts output. Matching loudspeakers and speaker systems with 500-ohm  $vc$  impedance must be used with the amplifier. Utilizes four 2A3s in parallel in output directly connected to 500-ohm voice coil through an 80-mfd bypass. (Tru-Sonic 500 D; Stephens Mfg. Corp., 8538 Warner Drive, Culver City, Calif.)





# THE SIMPSON MODEL 260 VOLT-OHM-MILLIAMMETER OUTSELLS ALL OTHERS COMBINED BECAUSE

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- E easy battery replacement
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- all components—including case and panels—are specially designed and completely tooled for maximum utility...not merely assembled from stock parts

## ranges

20,000 Ohms per Volt DC,  
1,000 Ohms per Volt AC  
Volts, AC and DC: 2.5, 10, 50,  
250, 1000, 5000  
Output: 2.5, 10, 50, 250, 1000  
Milliamperes, DC: 10, 100, 500  
Microamperes, DC: 100  
Amperes, DC: 10  
Decibels (5 ranges):  
-12 to +55 DB  
Ohms: 0-2000 (12 ohms  
center), 0-200,000 (1200 ohms  
center), 0-20 megohms  
(120,000 ohms center)

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Model 260 \$38.95; With Roll  
Top \$46.90. Complete with  
test leads and operator's  
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Transcription player combined with *pa* system, which has a 12-inch detachable loudspeaker with 10-foot extension cord and plays all records and transcriptions from 7" to 17½". Has a 5-tube amplifier, twist crystal cartridge fitted with 2 permanent needles, a 3-speed motor for 33 1/3, 45, and 78 rpm, variable volume and tone control, and mixer that permits simultaneous use of record and microphone. (Model AM 53-PA; Audio-Master Corp., 341 Madison Ave., N. Y. 17.)

builtin speaker or through an external speaker.

Utilizing two 6SJ7s, a 6J5 and 7C5, recorder is said to provide a frequency response of from 50 to 7,000, and a power output of 5 watts. Speed of the tape is 3¾" per second, with provisions for one hour of recording on double track tape. Disc rpm is 78. Speaker is 5" x 7" oval, 3.2 ohms impedance. Instrument employs an automatic erase, fast forward and rewind speeds for editing, etc. An external 12-inch Alnico speaker may be employed with the unit for use as a *pa* system for either voice or music.

#### Disc Recording

To record onto a disc with this unit, a cutting needle should be inserted into the crystal cartridge so that the screw tightens up onto the flat side

(Continued on page 79)

In an effort to teach record owners the fundamentals of good record care, Electrovox Co., Inc., has announced that it is making available a microscope, capable of enlarging needle tips 200 times for customer inspection, set up on a display stand. Display and microscope are available through Walco distributors.



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# TUBE News

by L. M. ALLEN

## Minimizing Ripple and Interference Effects in Horizontal-Deflection Circuits

IN TV CHASSIS two types of picture disturbance are encountered quite often; *ripple* which appears as alternate dark and light vertical bands in the raster, and *spook interference*, which appears as a narrow black vertical band very near the left margin of the raster. Although ripple has been called *ringing*, the term *ringing* actually describes only one of several possible causes of ripple. Both of these troubles originate in the horizontal-deflection circuits.

The specific cause of ripple can normally be determined from the appearance of the raster and a few simple tests. In locating the specific cause it is necessary to determine first

whether the ripple is caused by modulation of the picture-tube beam current or by modulation of the scanning current. Modulation of the beam current results from coupling between the deflection circuits and the video-amplifier or picture-grid circuits. Because such coupling does not affect scanning, no change in horizontal linearity is associated with ripple due to beam modulation. Observation of the circle of a test pattern or, preferably, of a straight diagonal line in a picture will usually indicate if any linearity disturbance is present. The placement of two capacitors, .5 mfd or larger, at the socket of the picture tube, one between grid 1 and cathode,

and the other between grid 2 and cathode, should eliminate any ripple due to modulation of the beam current.

### Common Cause of Ripple

One common cause of ripple is improper neutralization of the horizontal-deflecting coils. Improper neutralization results in modulation of the scanning current and, consequently, variations in horizontal linearity. Distinguishing characteristics of this kind of ripple are: wavy raster lines in the vicinity of the ripple; ripple, most intense at the extreme left of the raster; ripple not uniform in appearance from top to bottom of the raster. . . . It is usually barely perceptible at a point

\*Based on copyrighted notes prepared by the Tube Department of RCA.



(Left)

A fact and a prediction: According to G. E., a recently completed survey shows that more than 950,000,000 receiving tubes are now in operation in home and car chassis and TV sets, and the billionth tube, similar perhaps to the model illustrated at left, will undoubtedly go into operation within the next few weeks.

(Right)

Projection-type picture tube employing electrostatic focus and magnetic deflection; RCA 7WP4. Has a 7-inch face and metal backed white fluorescent screen, and can provide a 15x20 picture at a projection throw of about 80 feet. Operates with an *ultor* voltage of 75,000 volts; *ultor* in a picture tube is the electrode or electrode in combination with one or more additional electrodes connected within the tube to it, to which is applied the highest *dc* voltage for accelerating the electrons in the beam prior to its deflection. In this tube, grid 1, which has the *ultor* function and collector, are connected together within the tube.



near the center (vertically) of the raster; marked changes in beam focus, apparent in the vicinity of the ripple; appearance of the ripple which may be changed by adjustment of the ion-trap magnet or other device which alters the position of the beam inside the neck of the picture tube.

Although some of these symptoms could be caused by omission or a marked change in value of the damping resistor across each vertical-deflecting coil, these resistors are rarely omitted and their value is not critical. The usual cause of these symptoms is improper neutralization of the horizontal-deflecting coils. Neutralization can be accomplished with specific values of series resistance and capacitance across the horizontal-deflecting coil, which is at the highest *ac* potential above ground. For satisfactory neutralization, the value of resistance is not critical. The major advantage of using the resistor is that the adjustment becomes less critical and, therefore, in practice a capacitor of fixed value can be employed. However, even when the resistor is used, the capacitor tolerances should not exceed five per cent.

Although the values of resistance and capacitance in the yoke-neutralizing network may be correct, almost all yokes produce a series of two or three very narrow bright vertical lines at the extreme left of the raster. Although this disturbance exhibits all of the symptoms enumerated, it is not eliminated by conventional methods of yoke neutralization. Fortunately, this type of disturbance, which is difficult to eliminate, is usually in the blanked portion of the raster and off the screen. The cause of this remaining ripple is apparently imperfect coupling between the windings of the individual deflecting coils. Because it is impracticable to make electrical connection to the portions of individual coils requiring neutralization in production type yokes, circuit designers can do very little to eliminate this ripple.

Another common cause of ripple, also evidenced by modulation of scanning current, is *ringing* in the horizontal-output transformer. Ringing can be described as a damped oscillation which occurs in resonant circuits formed by leakage inductance and distributed capacitance in the transformer. Such ringing may modulate the scanning current and cause raster ripple. This ripple, however, is different from that due to improper neutralization of the horizontal-deflecting coils, in that it is uniform in intensity from top to bottom of the raster.

It has been found that ripple, due to ringing in the horizontal-output  
(Continued on page 56)

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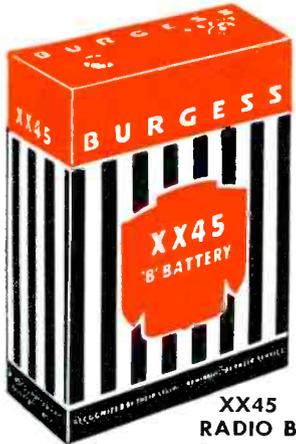
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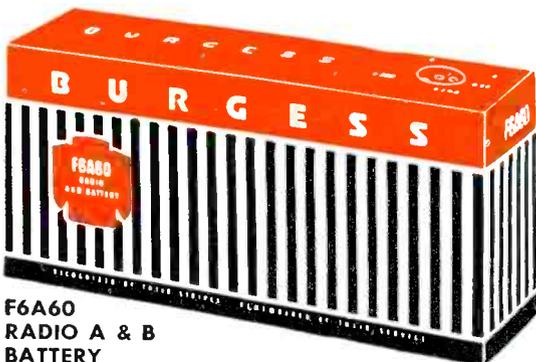
Burgess advertising is a real sales help all along the line. Folks really remember those distinctive two-color ads in leading national magazines... you'll see it reflected on your profit sheet all through the year.

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Burgess is the *oldest* line for radio dealers and servicemen. Burgess was first to see the great future of portable radios... that's why it's the major radio battery line today.



2R  
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F6A60  
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## 6 Best Promotional Program:

You'll like the aggressive way Burgess promotes sales for you in '52! For instance, the 1952 portable radio promotion... (the Burgess Portable Battery Prize Carnival)... is the soundest, most complete sales promotional program ever organized.

Order Your Stock from Your  
Burgess Distributor Today!

## Tube News

(Continued from page 55)

transformer, generally results from inherent design characteristics of the transformer. It may also be caused or intensified by the particular circuit in which the transformer is used. For example, the use of a width control having too low an inductance value can increase ripple intensity. A change of yoke inductance often affects ripple, even though the transformer taps may be altered to reflect the same impedance to the horizontal-output tube. The addition of capacitance across a portion of the transformer winding can also change the intensity or frequency of the ringing and, therefore, affect the ripple. Insertion of an external capacitor across each portion of the transformer winding, in turn, is often a useful means of locating the portion which causes the ripple. Alteration of circuit capacitance or inductance to make an appreciable change in retrace time can change the appearance of the ripple. Although alteration of any of these values of inductance and capacitance may be useful in localizing ringing in the output transformer, it is usually advisable to obtain the transformer manufacturer's recommendations for minimizing ringing.

### Identification of Ripple Due to Several Causes

Ripple may be due to several causes all present at the same time. In such a case, none of the suggested procedures applied individually will eliminate all the ripple. It is advisable, therefore, to investigate the causes in order:

- (1) Two bypass capacitors, .5-mfd or larger, should be placed at the socket of the picture tube, one between grid 1 and cathode, and the other between grid 2 and cathode. The bypass capacitors will eliminate all beam modulation, not only ripple caused by coupling between the deflection circuits and video circuits, but also all picture information. The blank raster can then be used for critical observation of ripple due to other causes in further tests.
- (2) A variable capacitor should be substituted for the fixed yoke-neutralizing capacitor. Commercially available transmitting-type air capacitors having a range up to 75 or 100 mmfd and adequate spacing to prevent arc-overs are suitable, provided a well-insulated knob is placed on the shaft to permit safe handling. The capacitor

(Continued on page 79)

**BURGESS BATTERIES**  
BURGESS BATTERY COMPANY FREEPORT, ILLINOIS

**Cleaning Clock Radio Faces ... Removing Corrosion on Plate Caps of 6BQ6 and 6CD6 Tubes ... Eliminating High Residual Hum in Table Chassis ... Overcoming 4.5-Mc Harmonic Interference ... Checking Noise Immunity Networks ... Troubleshooting Faults Common to Horizontal Sweep and Vertical Sweep Sections ... Practical Soldering Hints.**

# Servicing Helps

by **M. A. MARWELL**

To PREVENT RAPID changes in the *dc* error voltage when noise or vertical-sync pulses enter the discriminator circuit, noise-immunity networks are used. Checks must be made to determine whether or not the network is coupling the error voltage to the grid of the reactance tube. This can be done by connecting a *vtrm* between the grid of the reactance tube and ground, and varying the horizontal-oscillator frequency control. As the oscillator frequency is varied above and below 15,750 cps, the control-grid voltage should vary from approximately +1 to approximately -4 volts. If the error voltage is not correct, it will be necessary to check the components in the noise-immunity network.

The network should also be checked to determine whether or not it is properly filtering the error voltage. This may be accomplished by connecting a 'scope between the grid of the reactance tube and ground. If the circuit is at fault, horizontal tearing in the picture will result.

When it has been determined that the noise-immunity network is functioning properly, the reactance tube stage should be checked.

## Reactance Tube Stage

The usual voltage and resistance measurements are all that are required to locate a fault in the reactance-tube circuit, with the exception of an open screen bypass capacitor. This fault will cause a slight horizontal jitter in the picture, and may be checked by

connecting the vertical input of a 'scope between the screen of the reactance tube and ground. If a sine-wave signal is observed on the screen, the bypass capacitor is probably open.

## AFC Troubleshooting Procedure

To isolate *afc* circuit faults, the following procedures should be employed:

1. All tubes in the *afc* circuit should be checked by substitution. When substituting tubes, the frequency and phasing controls should be readjusted.
2. A *vtrm* should be connected between the reactance-tube control grid and ground, and the variation in grid voltage should be checked as the horizontal-frequency control is rotated.
3. If the grid voltage does not vary from approximately +1 to -4 volts,

the sync-discriminator and horizontal-oscillator stages should be checked.

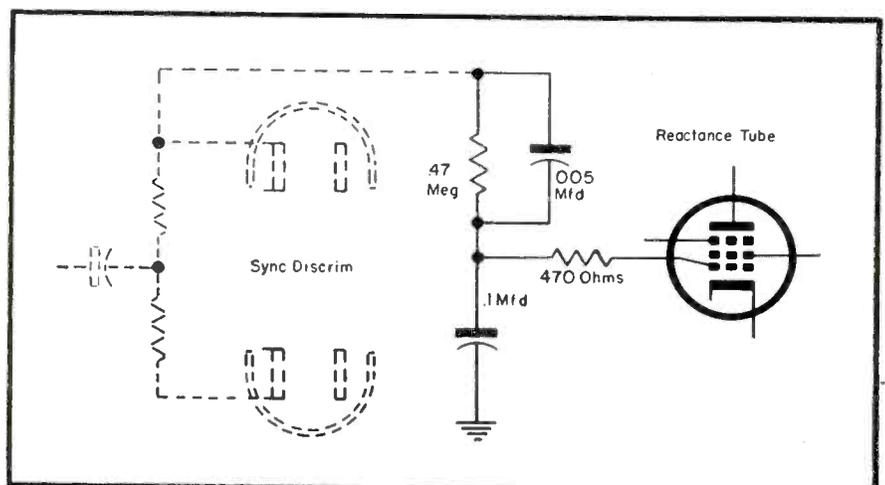
4. The waveform at the control grid of the reactance tube should be checked with a 'scope.

5. If the noise-immunity network is functioning properly, the voltages on the reactance tube should be measured, and a check should be made for an open screen-grid bypass capacitor<sup>‡</sup>.

## Sylvania Service Notes

*Cleaning of Faces on Clock Radios:* To clean the faces on Sylvania clock radios, it is recommended that the face be wiped with a soft cloth moistened in a solution of a good household detergent and water. This should be followed with a clear water washing and then dried with another piece of dry soft cloth.

Fig. 1. Partial schematic showing noise-immunity network components (solid lines) in DuMont chassis.



<sup>‡</sup>Based on copyrighted notes appearing in the DuMont Service News.



Master antenna isolation box, molded of phenolic plastic, which contains a resistor network for a minimum 30-db isolation between receivers. Feed-through feature allows soldering of coax cable in box so that signals are fed through to the next distribution point. Resistance pad isolates receiver from line. (Tacomex feed-through isolation boxes, molded of Bakelite phenolic plastic by Union Insulating Co.)

**Plate Cap Corrosion in 6BQ6 or C6D6s:** Corrosion inside of the plate caps of 6BQ6 or 6CD6 tubes has been found to result in poor contact, causing low *h<sub>v</sub>*. To insure proper contact, a thorough cleaning adding up to a bright surface is suggested.

**High Residual Hum in Table Radios . . . Chassis 1-601-1 and 1-602-1:** Correction of this type of hum in Sylvania models may be obtained by removing the .022-mfd capacitor, *C<sub>16</sub>*, from its *B*-return point and reconnecting it across the primary of the output transformer.

**4.5-mc Harmonic Interference:** In Sylvania model 22M-2 (1-387-1 chassis), 4.5-mc harmonic interference may be reduced by redressing the speaker leads so that they are as far away from the antenna leads as possible. The antenna should also be kept away from the speaker frame.

**Arcing and Corona at Anode Button:** Dirt accumulation around the anode button may lead to the belief that the picture tube is defective. This is particularly true on sets using a rubber anode cap. The rubber anode cap should be removed and discarded, and the insulated area around the button cleaned with scouring powder and water and then polished dry. This procedure should in no way affect the operation of the set and is said to eliminate the possibility of needless picture-tube replacement.

### Double Firing\*

Double firing of the horizontal oscillator is usually caused by maladjustment of the stabilizer core in the horizontal-oscillator transformer. It may also be caused by a change in value of the capacitor in parallel with the stabilizer winding of the horizon-

tal-oscillator transformer. Double firing, also referred to as *squeezing* or *gunboating* can be corrected by adjusting the horizontal oscillator. If the trouble can not be cleared by adjusting the transformer, the capacitor in parallel with the stabilizer winding should be replaced.

### Vertical Foldover\*

Vertical foldover in the vertical sweep section of some Philco models has been found to be caused by the inability of the vertical output tube to pass the entire vertical sawtooth. In early production of the dual-chassis models, this problem was corrected by increasing the voltage applied to the plate of the vertical output tube.

### Lack of Interlace\*

When two succeeding fields of the TV picture do not have their lines perfectly interlaced, the vertical definition of the picture is reduced. This defect is often referred to as pairing. When the lines of the two fields pair up, that is fall on top of each other or close to each other rather than being evenly spaced, the trouble can be traced to a defective component in the grid circuit of the vertical oscillator. The pairing of lines can also be caused by undesired coupling between the horizontal and the vertical sweep section. This coupling allows some of the horizontal sweep signal to affect the operation of the vertical oscillator. Improperly positioned damper-tube leads or hori-

\*From Philco Service TV home-study handbook.

Fig. 2. Circuit changes in vertical sweep circuit of Philco chassis developed to stop vertical foldover. Parts added are indicated by *A*.

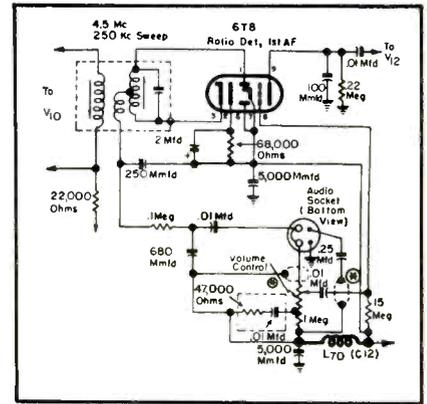
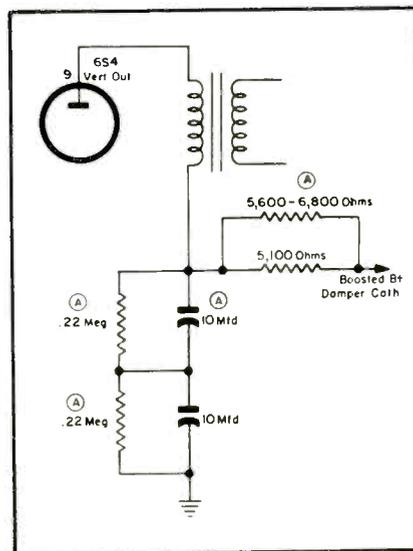


Fig. 3. To improve picture quality in Sylvania chassis 1-387-1, when the receiver is used with a builtin antenna in locations where the signal input is weak, two components must be incorporated into the circuit: An *rf* choke (*L70*) as shown above, and a .05-mfd capacitor between 6T8 filament (pin 5) and ground.

zontal-output leads are usually the cause of undesired coupling between the two sweep circuits.

### Practical Hints on Soldering\*\*

All work to be soldered should be cleaned. When metals are exposed to air for even a short length of time their surfaces become coated with oxides (such as rust) or other foreign materials. These represent an obstacle to good soldering; perfect joints can be made only if the two surfaces are chemically clean.

Methods of cleaning the surface preparatory to soldering may be either mechanical or chemical. Mechanical methods include the use of abrasive wheels, filing, scratching or shaving. Chemical methods involve the dipping into, or the application of fluxes. In preparing the soldering iron for use, the iron should be heated and then filed while it is hot. One should file, with a light, even stroke so that the surface is flat and not rounded. The bit should be cleaned with a flux and covered with a light coat of solder. This is called tinning and is accomplished by touching the iron to the solder, the excess solder being wiped or shaken off. If you use a flux-cored solder, the cleaning and tinning should be done at the same time.

The surface of the iron should be kept clean at all times so that it will tin readily and hold a maximum amount of solder. It should be kept flat so that maximum contact may be made. Oxides and corrosive products should be removed at regular intervals by filing or scraping.

The part to be soldered should be

\*\*From a booklet published by the Federated Metals Division of the American Smelting and Refining Co.

heated by placing the hot iron on it. A little solder should be fed between the iron and surface, and the solder worked in with a rubbing rotary motion. Additional solder should then be added and firm rubbing should be continued to assure perfect pre-tinning.

#### Soldering Tips

Soldering work can be ruined when solder is melted on the bit and then allowed to drip onto the work. A weak joint usually results. . . . Always apply heat to the work itself until it is hot enough to melt the solder. Then touch solder to the work. . . . Surplus solder wastes money, conceals a poor fit, hides spots which are not in contact with solder (which can cause many hours of wasted troubleshooting), and actually weakens the joint. The strongest joint is .003" to .0005" thick . . . not much thicker than the paper this is printed on. With such thin spacing between properly heated elements, the solder is drawn by capillary action and fills the gap so that there is a complete strong metal-to-solder-to-metal union.

#### Westinghouse TV Chassis Modifications

*Model H-328C7, V-2136-4 Chassis:* In earlier Westinghouse models of this series, excessive *hf* oscillator voltage injection will tend to reduce the sensitivity at the high-frequency end of the AM band. This effect can be eliminated by adding a 680-ohm 1/2-watt resistor between the tap on the AM oscillator coil and chassis ground. . . . The dropping resistor for the pin-6 grid of the 12BE6 should be changed to 2200 ohms to lower the power dissipation in the tube. . . . A .005-mfd capacitor should be added in parallel with the ratio-detector electrolytic capacitor. This will serve as an *rf* bypass and eliminate oscillation that may otherwise appear on the FM band.

*Models H-331P4U and H-333P4U, V-2104U Chassis:* To improve the operation of the *hf* oscillator at low-line voltage, the dropping resistor for the pin-3 grid of the 1R5 should be changed to 22,000 ohms, and the grid-return resistor for the 1R5 and 3V4 should be changed to 150,000 ohms. . . . An improved line-battery switch is used in later production. In chassis containing the improved switch, the 82-ohm resistor in series with the positive lead of the B battery should not be used, and the battery should be connected directly to the switch. . . . To prevent B-battery leakage when the line plug is inserted for battery operation and the *on-off* switch is in *off* position, the connecting points for the

(Continued on page 69)

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The Challenger, in bakelite, Model LA-2 \$1.00 list

TWO ALL-PURPOSE MODELS:

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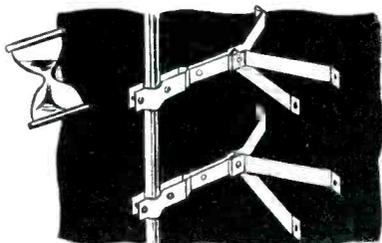
# Radion

See us at the MAY SHOW . . . suite 616A-617A at the Conrad Hilton

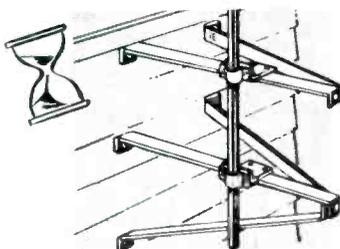
# Time is a THIEF



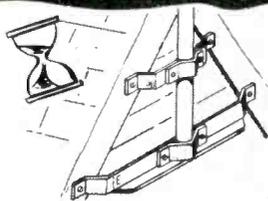
Service calls can mean profit loss! You don't have to commit profit suicide. Guarantee your profit! Eliminate costly service calls with trouble-free iE installations. Cut installation time too, with iE Quick "N" Easy Antenna Mounts.



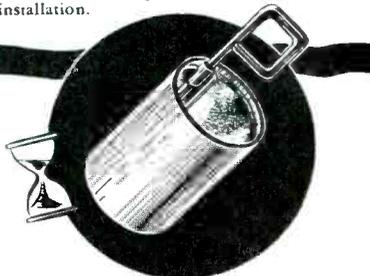
No. 102 DELUXE WALL MOUNT. Comes to you completely assembled—all rivet construction. Snap-on mast mount for masts up to 2 3/4" Wall clearances—18" and 24".



No. 145 ADJUSTABLE WALL MOUNT for difficult overhang installations. Clears obstacles up to 20 inches from wall. Quick "N" Easy assembly and installation.



No. 147 EAVES MOUNT. Adjustable! Allows for complete adjustment of mast alignment on uneven installations. Complete with clamps and hardware. See your distributor or write . . .



HOTTEST! HOT TUBE PULLER OUT! Only vibrator tube puller on market that works and will not crush the can. Just slip iE tube puller over radio or TV tube, lock, and pull out. 3 sizes in a set.



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Manufacturers of Industrial Electronics

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## ASSOCIATIONS



THE FIRST newsletter of the Television Service Association in the tri-state area has been published, Penny Martin, executive secretary of the association, planned the issue, in which appeared news of the activities of the association and the industry, too.

According to the newsletter, Robert Laneve of Pittsburgh Radio, Sound

and Television Lab, was elected the first president of the association. Serving with him for '52 will be: Milton J. Reich, Allegheny Television, Inc., vice president; Thomas Ulrich, Penn Television, secretary, and L. C. Reed, Moree Television Service, treasurer.

Standing committees appointed included: Finance, Reed and Pete

Stampo; membership, Reich and Ulrich; publicity, Penny Martin; laws and regulations, James Hershberg and Ed Ross; trade and labor relations, Paul Eisler and George Moreau; member cooperation, Morton Fredler and Robert Roetter.

Hershberg and Ross will select a lawyer to charter the association and investigate the advisability of retaining a legal firm to represent the TSA.

The first Wednesday of each month was designated as the regular meeting date of the TSA.

### RTTG, FLORIDA

At a recent meeting of the Radio and Television Technicians Guild of Florida, Dade County Chapter, E. A. Williams explained the method by which a vital community function which hitherto had not been utilized to its full extent, can be made to benefit the radio service operator.

Association members expressed their thanks to the Honorable Chelsie J. Senerchia, Mayor of Miami, for his timely talk on the past and future growth of Miami and the resultant possibilities this growth holds for Service Men.

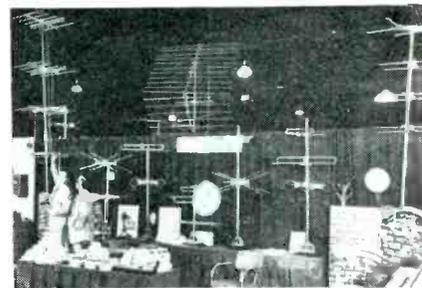
Sam Kessler and Mrs. Kessler were applauded for their grand job of arrangement at the installation dinner.

Roger Haines, newly elected vice president of National Electronic Technicians and Service Dealers Association, spent a brief vacation in Miami, and offered his congratulations to the RTTG for their work.

### CORRECTION

IN THE CIRCUIT DIAGRAM of the tape-disc recording amplifier presented within the cover article in the March issue of SERVICE, no connection should have appeared between pins 1 and 2 of the recording head.

### JFD BOOTH AT MONTREAL EXHIBITION



The JFD booth at the recent Montreal Exhibition. Featured were TV television antennas and accessories. Lectures by JFD's chief antenna development engineer, Leonard Mazel, were held twice a day during the show's run.

**TEN YEARS AGO**

MANUFACTURERS received word that civilian radio-set production would cease on June 7th. . . . Designs included in the last receivers coming off the line indicated many interesting trends. *Crosley* introduced a 5-tube phono combination, which used a transformer for boosting the plate-supply voltage, but employed a string of series filaments operating directly from the line as in *ac/dc* receivers. . . . *Wilcox Gay* released a record player equipped for 78 and 33 speeds, using an equalizer to maintain uniform response at the two speeds. The equipment also featured an additional filter created by grounding a .003-mfd bypass capacitor, which connected to load resistors in the 6Q7 plate. At high frequencies, the load was thus considerably reduced from 270,000 to 20,000 ohms, providing a boost in the lows. . . . The annual Parts Trade Show was cancelled because of the industry's war program. . . . *George D. Barbey* planned a distributors meeting coincident with the RMA convention at the Stevens Hotel. . . . The Sales Managers club, Western group, appointed a victory-program committee for the industry show, consisting of *J. J. Kahn* of Stancor as chairman, and *W. W. Kuehl* of Drake Electric Works, Inc., *Ed Singer* of Alliance Manufacturing Co., and *Jerome Prince* of Carron Manufacturing Co. . . . A 7-tube portable, announced by *Zenith*, featured the use of a 11E3 triode as a separate oscillator, and a 11N5 as a tuned rf stage. Pushbutton tuning was provided for all-wave reception.

**LIGHTNING-ARRESTER  
MERCHANTISER**



A 2-piece lightning-arrester merchandiser introduced by the Cornell-Dubilier Electric Corp., South Plainfield, N. J. One unit, a wall-dispenser merchandiser features twelve individually-cartoned arresters. Second unit consists of an open fold-back top carton displaying 24 individually-cartoned arresters for counter or self-service use. Standup cover is punched to receive a sample arrester exposed for examination. Entire merchandiser is reproduced in yellow and blue.

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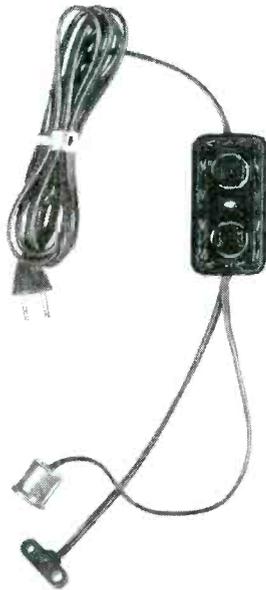


Visit Booth #309 and Display Room #557, May Parts Show, Chicago

SERVICE, MAY, 1952 • 61

Columbia

# All-Purpose TELEVISION Service Cord



The one cord to service most television receivers. No more separate cords for each call. This one sturdily constructed compact unit includes all necessary connectors. A real timesaver for every serviceman.

- Handy two-way convenience outlet for soldering iron, portable light, etc.
- Television connector for all Zenith sets.
- Standard TV connector of unbreakable plastic for all other television sets.

Have you seen our New "TV Service Light" and "TV Picture Tube Extension Cable"?

Available through Jobbers only... order today! Write for our new plant-facility brochure.

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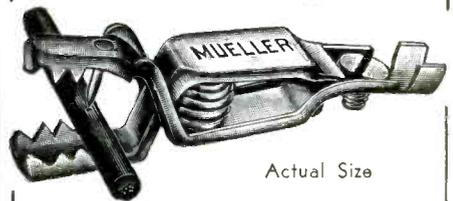
## Rep Talk

F. A. DAUGHERTY Co., Bedford, Ohio (Ohio); *Morris F. Taylor Co.*, Silver Springs, Md. (West Virginia and Pennsylvania); and *Southern Sales Co.*, Fort Wayne, Ind. (Kentucky and Indiana), have been appointed reps for the General Cement Manufacturing Co. . . . *Wood and Anderson Co.*, 3001 Delmar Blvd., St. Louis, Mo., has been appointed rep for Cornish Wire Co., Inc., in Missouri, Kansas and southern Illinois. . . . *G. G. Wilson Co.*, Houston, Texas (Oklahoma, Arkansas, Louisiana and Texas); *Bill Bartleson*, Minneapolis, Minn. (North and South Dakota, Minnesota and northwestern Wisconsin); and *Harris Pound*, Montreal, Canada (Canada except province of British Columbia), have been named reps for United Technical Laboratories. . . . *Dan Bittan*, reporting on the NEDA-Atlantic City Fall conference during a recent meeting of the chapter in N. Y. City, advised that there will be no show, display or exhibits; participating manufacturers will have booths to interview the visiting jobbers. Those at the meeting included *James Pickett*, chapter prexy; *Harry Finkelsstein*, vice prexy; *Jules Bressler*, second vice prexy and *Wally Schulan*, secretary-treasurer. . . . The roster-directory for the N. Y. chapter is now available from *John Kopple*, 60 E. 42nd St., New York City, or *Wally Schulan*, 136 Liberty St., New York City. Directory has been printed in three sections: Section one, member reps listed alphabetically; section two, manufacturers represented shown alphabetically; and section three, products. . . . *Harry Ester-son and Co.*, have moved to 7135 Germantown Ave., Philadelphia 19, Pa. New phone number is WIssahickon 7-1816. . . . *Al Middleman*, 55 W. 42nd St., New York, N. Y., has been named national sales rep for Beam Radionics Corp., Chicago. . . . *Harry Bittan and Co.*, have been appointed rep for Crest Laboratories, Inc., Far Rockaway, L. I., in metropolitan New York. . . . *L. F. Waelterman*, 8543 McKenzie Rd., St. Louis, Mo. (Missouri, Nebraska, Kansas); *Joe Clancy*, Wilder Rd., Angola, Ind. (Ohio, Indiana, Kentucky); and *J. J. McBride Sales Co.*, Merchandise Mart, Chicago, Ill. (Illinois, Iowa, Wisconsin), have been appointed reps for Ram Electronics. . . . *Ronald C. Stimpson* has joined the staff of *Henry Lavin Associates*, P.O. Box 196, Meriden, Conn. He was formerly with Graybar Electric. . . . *George E. Harris* of George E. Harris & Company, Wichita, Kans., has been appointed rep for the Halldorson Transformer Co. Harris and his associate, *John B. Pilkington*, will call on distributors in Kansas, Missouri, Nebraska, and Iowa. . . . *Cliff Landis Sales Co.*, 8-11 Roosevelt Ave., Jackson Heights, New York, has been named rep for the cathode-ray tube division of Allen B. Du Mont Laboratories, Inc., in the New York Metropolitan area.



Ronald C. Stimpson

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Yes sir! PeeWee in your kit means saved time—extra profits. A full 35 watts, with 3/16" tip, the Drake PeeWee gets right into those tight corners—has baffle plates to keep handle cool. Order from your distributor now.

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# Business Aids . . .

[In response to many requests, arrangements have been made to feature every month in SERVICE a column devoted to a discussion of Business Aids for the Service Shop, based on queries submitted by readers of SERVICE. Topics to be reviewed will include advertising, bookkeeping, customer relationship, filing systems, displays, direct mail, etc. These columns are being conducted by a veteran Service Man with over a quarter of a century experience in the field, who is currently operator of a large Service Shop, and is also extremely active in association affairs. If you have a business-aid problem, send it to ye editor, and every effort will be made to publish a solution in an early edition of SERVICE.]

Dear Don Kay:

During a repair call in a home, what possibilities exist for extra sales, especially insofar as audio is concerned.—A. H. B.

Dear A. H. B.:

There are many audio extras that can be sold during a service call.

It is profitable for a shop to carry a complete selection of replacement needles for all makes of phonos. A service kit of popular and higher-priced needles and special replacements should be carried by a Service Man when making a call. A check of the customer's needle should always be made during the call as a special extra service. For 78-rpm changers or phonos, you will find that it is not difficult to sell needles. Where the owner is a connoisseur of fine music and desires quality, the higher-priced needles and cartridges offer excellent sales possibilities.

The cartridge-replacement business, an item long over-looked by the Service Man, is a very profitable extra. Cartridges that have been in players or changers two years or more usually lose some of their frequency response characteristics and high amplitude, too, during that time. The cost involved in carrying a replacement stock of cartridges is not as great today as it was several years ago. Many manufacturers now make complete replacement kits that will cover up to 90 per cent of your daily needs. In addition, there is the reluctance-type pickup that can be sold to the music lovers. A preamp, required in this case, would be another extra.

You will find the needle and cartridge-replacement business in the dual and triple-speed changers, more frequent than in the 78-rpm changer. The customer's neglect to change the position of the needle with the change of speed will tend to damage or wear the needle in some way. Many of the dual needles are so inserted that it becomes necessary to replace the entire unit. This extra sale and extra service time will pay big dividends if you take time out to check the needle and the cartridge when making a service call in the home.

Many owners of record changers have forgotten about the condition of their player or changer due to lack of use:

(Continued on page 64)

# LOOK—NO NOISE!

Boosts the signal . . .  
not local lead-in noise!

Gives higher signal-to-  
overall-noise ratio!

Exclusive broadband  
circuit gives uniformly  
high all-channel gain!

Eliminates  
effect of  
external  
interference

**AUTOMATIC SELF-TUNING**  
**Tenna-Top**  
**TV BOOSTER**

SINGLE TWIN-LEAD LINE\*  
CARRIES POWER UP—  
AND SIGNAL DOWN

## Pictures are Sharper, Brighter! Sound is Clearer!

You can see and hear the difference when you hook up the TENNA-TOP. Because it is mounted at the antenna ahead of the lead-in...it amplifies only the wanted TV signals, not any local noise interference produced by automobile ignition systems, neon signs, diathermy, or other external noise picked up by the lead-in. You have the further advantage of E-V low-noise circuit. All this guarantees the best possible results with any TV set anywhere...even in toughest fringe areas or in all noisy locations. The TENNA-TOP is completely automatic. Turns "On" or "Off" with the TV receiver switch. It is easy to install, highly stable, trouble-free.

Model 3010 Tenna-Top Booster. List Price . . . \$38.00



### Tune-o-Matic TV BOOSTER

Famous E-V broadband booster—proved in thousands of installations! Uniform high gain—low noise circuit. Automatic self-tuning for all channels. Easily concealed.

Model 3000, 4-stage, List \$57.50  
Model 3002, 2-stage, List \$39.50

## Electro-Voice

TV BOOSTERS • MICROPHONES • HI-FI SPEAKERS • PHONO-PICKUPS

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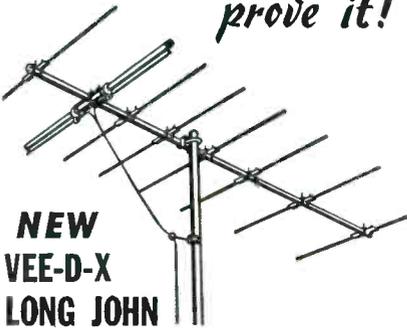
\*Patent Pending

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## AMERICA'S NO. 1 SINGLE CHANNEL PERFORMER

PERFORMANCE IN  
FRINGE AREAS + SALES  
+ USER SATISFACTION

*prove it!*



**NEW  
VEE-D-X  
LONG JOHN  
8 ELEMENT YAGI**

**41% MORE GAIN THAN THE  
BEST 5 ELEMENT YAGI  
AND EQUAL GAIN TO A DOUBLE-  
STACKED 5 ELEMENT YAGI ARRAY**

**IMPORTANT!** You can get an additional 50% gain by stacking Long John with a specially engineered phasing harness. Can also be four-stacked.

### FEATURES

- Faster, easier to install than stacked arrays
- Better roof-top appearance
- Higher front-to-back ratio eliminates co-channel interference
- Full 6 megacycle band width
- Rugged pre-assembled construction

**Costs Less** than a double-stacked 5 element Yagi array

Channels 7 to 13	\$12.50 list
Channel 2 or 3	\$29.85 list
Channel 4 or 5	\$26.15 list
Channel 6	\$23.65 list

All prices less mast

Long John Was Originated and  
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# VEE-D-X

**NOTE: Beware of Chinese Copies**

**THE LaPOINTE-PLASCOMOLD CORP.**  
Windsor Locks, Conn.

## Business Aids

(Continued from page 63)

many of them have not been used because of the need for some minor adjustment. By checking each changer and player, you will find extra dollars.

To replace the average type of cartridges and needles, there is no need for any special tools. A small pocket mirror, a two or three-inch screw-driver and a flashlight should serve your needs.

Another extra, to a single-speed changer owner, might be a new and modern three-speed changer. This involves but little work to replace, as you can buy a wooden base board to fit the new changer.

Sincerely,  
DON KAY

## Auto Radio

(Continued from page 25)

set, through a dummy antenna which is usually specified by the manufacturer. If such a load is not specified, you should install one, consisting of a 100-mmfd capacitor shunted by a 400-ohm carbon resistor.

To calibrate the dial at the *hf* end the tuning capacitors should be opened all the way. This procedure also applies to permeability tuners; the cores should be pulled all the way out of their coils. If the dial scale reads 16, align to 16.20 kc; if it's 17, align to 17.20. The receiver should be set for maximum output by adjusting the oscillator trimmer and then tuning the signal generator to around 1400 kc. The chassis can now be tuned to the signal-generator signal and *rf* and antenna trimmers adjusted for maximum. To adjust the low end, the signal generator should be set to 600 kc, and the signal tuned by adjusting the padder in the oscillator, and then the dial can be tuned for maximum reading. These operations should be continued until no further increase can be had; this is known as *rocking*, and is employed on all padder adjustments. If the calibration is not quite accurate, after this adjustment, at the low end of the dial, there is no need to be alarmed; car radios aren't noted for their exact calibration, and the extra gain is more important than a precise dial reading.

Most of the antenna trimmers are adjusted at around 1400 kc. You needn't take too much time with them while on the bench, as they will have to be retuned after installation, anyhow. It is only necessary to get them to a rough peak and let 'em go. Some sets, especially the older ones, used antenna series capacitors which were adjusted at 600 kc. This value should appear in the alignment instructions. If it doesn't, you should check the schematic; if the capacitor is in par-

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**Multicore**

World's Finest 3-Core Solder  
in one-pound "Handi-feed" cartons!  
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**THE RADIART CORPORATION**  
Cleveland 2, Ohio

**RADIO MERCHANTISE SALES, INC.**  
New York 59, N. Y.

**WALTER L. SCHOTT COMPANY**  
Los Angeles 18, California

**SNYDER MANUFACTURING CO.**  
Philadelphia 40, Penna.

**T-V PRODUCTS CO.**  
Brooklyn 5, N. Y.

**WARD PRODUCTS CORP.**  
Division of The Gabriel Co.  
Cleveland, Ohio

**THE WORKSHOP ASSOCIATES**  
Division of The Gabriel Co.  
Needham Heights 94, Mass.

allel, it's probably a trimmer and adjusted at 1400 kc. If it is in series with the antenna coil, it's a padder, and adjusted at 600 kc. After reinstallation in the car, a final adjustment should be made. This should be done by connecting the output lead of the signal generator to the external antenna, tuning the set to 1400 or 600 kc, whichever is necessary. This signal can be tuned in on the set and adjustments then made.

### Alignment with 'Scope

'Scope alignment differs from conventional procedure. Required is an FM-AM signal generator, with facilities for providing a signal at a frequency, which can be alternately swept from about 15 kc above to 15 kc below the resonant frequency of the stage under alignment. These values will vary from instrument to instrument. As the FM signal starts above the resonant frequency, there will be no response. As it reaches resonance, the stage will give its maximum response: then as it goes below, the stage will return to zero response. The output of this stage, if applied to the vertical plates of a 'scope, will cause deflection of the spot on the screen. If the sweep rate of the signal generator is in synchronism with the sweep rate of the 'scope, there will appear a pattern on the screen, like that shown in Fig. 1. Most signal generators use 60-cycle modulation for FM alignment work. If the 'scope uses a 60-cycle sawtooth sweep, the picture will have a single trace. If the 'scope uses 120 cycle sweep, there will be a double trace. These traces will move back and forth across the screen as the tuning of the signal generator is changed. Usually, the signal generator should be tuned so that the peak of the trace falls near the center of the screen.

To produce a suitable-size figure on the screen, it will be necessary to adjust the gain control of the vertical amplifier and the attenuator of the signal generator. Sweep controls of the 'scope should be adjusted until the figure remains stationary. As little input as possible should be used to avoid overloading and distortion of the pattern.

The 'scope's vertical amplifier must be connected to the output of the last *if* stage, usually the diode-load resistor. The connection should be directly across the resistor if possible. If not, you should get as near to it as you can. It is important to avoid connecting the 'scope so that signals have small coupling capacitors in series with them. This may cause phase-shift and pattern

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**TV "DO-ALL" GENERATOR**  
OVERALL ACCURACY BETTER THAN 1/2 OF 1%  
SINGLE BAND ACCURACY TO 1/10 OF 1%

**\$69<sup>50</sup>**  
NET

One compact, accurate, efficient instrument—which gives the performance of several combined instruments—each of which is higher priced and all of which are needed for properly servicing Television and FM receivers.

The only single, easily portable instrument that provides for alignment of: Front Ends, IF's, Horizontal Linearity, Vertical Linearity, Picture Size, Picture Position, Focus Coil, Ion Trap.

**Range:** 9 Megacycles to 220 Megacycles with skips ALL FUNDAMENTALS—Bands 9-11 Megacycles 21-47 Megacycles; 54 to 220 Megacycles.

**Pattern Generator:** Modulation can be either Horizontal Bar—Vertical Bar or Cross Hatch.

**Tuning:** Dial continuously calibrated through 340°, giving extremely long calibration scale; enables easy reading and tuning. Each TV channel is marked specially, on the dial.

**Audio Output:** Both 540 Cycles and 220.5 KC are available.

**Attenuation:** Complete variation through 200 ohm control.

Extreme stability—unusually fine circuit design—rugged mechanical construction.

Never such an investment at such a low price! Stock this new item now—a concerted advertising program on this item will bring you greater sales.

See it at the Chicago Parts Show—Booth #409. Write for Catalog S-6.

**RADIO CITY PRODUCTS CO., INC.**  
152 WEST 25th ST.—NEW YORK 1, N. Y.

distortion. In a large number of sets, the volume control itself is the load resistor, and connections may be made across it. In others, a separate load resistor is used, and the signal fed to the volume control through capacitors.

Before attempting alignment with the 'scope, the signal generator should be set to the correct *if* on AM, and the trimmers roughly aligned for peak. When the FM signal is connected, the peak response will then be in the proper place. Now, with the response curve on the screen, the trimmers should be adjusted to provide a pattern with the maximum amplitude and the

greatest degree of coincidence. In other words, the curves should be made to overlap as much as possible. The curves obtained, when using the double-trace method, should overlap at the top and sides, and be as nearly together at the bottom as possible.

If the pattern rises to its maximum height when adjusting trimmer, then suddenly breaks up into *fuzz* at the top, or *tears out*, you have some oscillation, somewhere in the *if*. This must be cured before proceeding with the alignment. First, the input signal should be

(Continued on page 66)

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## Auto Radio

(Continued from page 65)

reduced to see if the distortion is due to overloading. If not, tubes and by-passes should be checked. In a very few cases, the presence of the 'scope leads will cause oscillation, especially if they happen to cross from their connection point back over the first or second stages. To check for this condition, the leads should be moved back and forth. If this cures the trouble, the leads should be dressed until oscillation stops. Improper lead dress elsewhere in the set can also cause oscillation. A gassy tube, a missing shield, or a plate lead too close to a grid lead can cause this, too.

At this point, if you happen to have a tube in the *if* that you're not quite sure about, a bit of tube testing is certainly in order. For instance, if the *if* amplifier tube tested in the question-mark sector, and you could show the customer how much difference a new one would make, the height and shape of the curve on the screen with the old tube could be displayed and then the characteristics with a new tube could be shown. It might be necessary to recheck the trimmer associated with that particular tube for maximum efficiency, but you'll be able to tell very definitely whether that particular tube should be replaced.

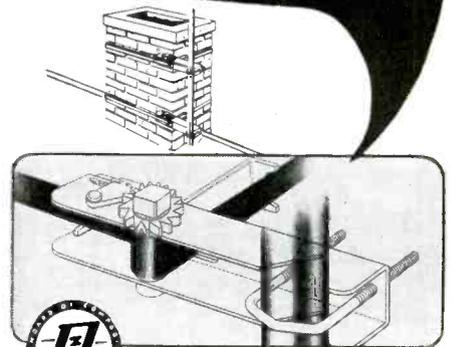
### Selectivity Measurement

The selectivity of any set can be measured with the 'scope pattern. For instance, if your signal generator has a 30-kc sweep, and your 'scope screen is calibrated (a plastic overlay with linear graph lines), you can adjust the width of the trace until the ends of the base line coincide with the plus and minus kc marks on the plastic overlay. The height should be adjusted to some convenient amplitude, and the width of the trace measured at the base of the curve, also  $\frac{2}{3}$  of the way down from the top. If this width,  $\frac{2}{3}$  down, is less than 10 kc, your set is selective enough for all practical purposes. The height of the image relative to the length of the base line is not important; it is the ratio of the base width to the width at another given point, usually  $\frac{2}{3}$  down from the top.

The 'scope can also be used to shape up *rf* or antenna circuit response. The 'scope should be left connected to the diode load resistor, and the signal generator lead moved to the antenna socket. You can use the dummy antenna previously described. The signal generator gain should be adjusted until the pattern is the right size, and tuned to about a 1400-kc signal, swept the same as previously. Now, the *rf* and

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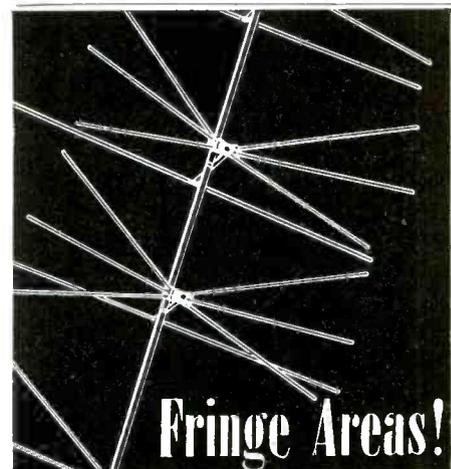


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antenna trimmers should be adjusted. To adjust oscillator padders and antenna series capacitors, the signal generator should be set to around 600 kc, also swept. This will make adjustment of padders easy, as the proper direction of adjusting may be seen from the screen. It will cut the number of moves necessary from about ten or twelve to two or three.

A certain amount of practice is necessary to get the most out of the 'scope, but once you get used to it, you'll find it possible to do much better and faster work.

## UHF Oscillator

(Continued from page 26)

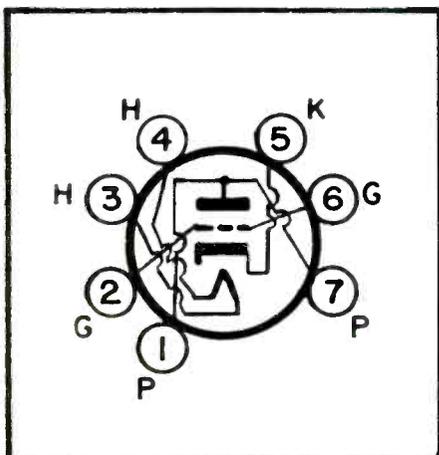


Fig. 4. Socket sections (bottom view) of the 6AF4.

resonant lines, and to provide a greater flexibility in circuit connections.

A continuously tuned oscillator designed for this tube appears on the cover and in Fig. 1.

The base pins of the 6AF4 fit miniature 7-contact sockets, which should be of the mica-filled, rubber, or ceramic type. The tube can be held in any position, but the tube must be held secure. Otherwise, the generated frequency may change by as much as 10 mc. Use of a conventional miniature tube shield and external clamping arrangement are also recommended.

### Frequency Deviations

It has been found that frequency deviations occurring after the operating temperature of the tube has been stabilized are often the result of changes in the applied voltages or changes in the circuit elements. A variation in the plate voltage can affect the transconductance and the electron transit time, while a variation in the heater voltage can affect the input capacitance and may affect the space charge within the tube. Therefore, receivers designed for stable operation



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SYNKOTE .100 web twin-lead — cat. #PP1376

must use a well-regulated plate and heater-supply for the oscillator tube.

Stability of the external circuit elements can best be achieved, it is said, through the use of materials which are relatively independent of temperature variation, vibration, and change during life. In addition to the use of the proper type of socket as recommended, it is important that the resonant circuit utilize materials having a low-temperature coefficient.\*\*

\*\*Based on copyrighted application notes prepared by the RCA tube department.

### UNIVERSITY CATALOG

A 28-page catalog, *Technilog*, featuring both technical and product information, has been published by University Loudspeakers, Inc., 80 S. Kensico Ave., White Plains, N. Y.

Technical index includes selecting the proper loudspeaker system, methods of connecting speakers to the amplifier, impedance matching, constant voltage distribution systems, impedance matching transformers, effects of mismatch upon power transfer, controlling loudspeaker volume, overload protection of loudspeakers, phasing loudspeakers, reverberation and baffling a cone speaker.

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## Distribution System

(Continued from page 31)

permit such processing this at no loss to the manufacturer.

Once it can be established that these monitors cost less than complete receivers, the only other cost left for consideration is the master antenna system with its usually involved *rf* distribution, compared to the simple and straightforward system of distribution amplifiers with a streamlined distribution of non-*rf* video.

Just as audio distribution in the fields of *pa* systems, talkback systems, recorders, etc., was merely an outgrowth of standard broadcasting systems, it seems as if video distribution is heading in this same direction.

## Social Security

(Continued from page 32)

Survivor benefits in addition to a lump-sum are provided for the widow at age 65, to the widow with minor children in her care, children under age 18, dependent husband, and dependent parents. Family benefits in death cases will range from a minimum of \$40 to a maximum of \$150 a month.

Where an individual is or will be 65 years of age and plans to retire, it will be to his advantage to visit his nearest *social-security* office to discuss his case. Survivor's benefits payable to eligible members of the family should be familiar information to all. A free explanatory booklet is available upon request to any *social-security* office.

## FM Tracking

(Continued from page 33)

standard *if* is 10.7 mc. In this case, the oscillator frequency should be 90 + 10.7 or 100.7 mc. The actual resonant frequency of the local oscillator tuned circuit should be measured with the grid dip oscillator in the same manner as the preselector was measured. Any changes should be made in the coil necessary to make it resonant to 100.7 mc. Some receivers may have an iron-cored slug or a flat non-magnetic disc for adjusting the resonant frequency of the circuit. This adjustment is for the low end of the band only.

All adjustments made thus far covered tracking at the lower end of the dial. Now the high end of the tuning range, or 104 mc, must be considered. If the receiver dial is set to 104 mc the preselector should be resonant to 104 mc and the local oscillator to 104 mc + 10.7 or 114.7 mc. The resonant frequencies of each circuit should be checked again as was previously.

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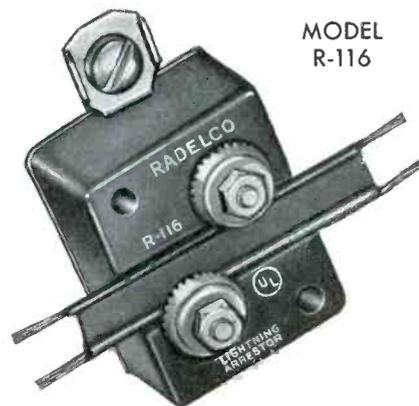
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However, if a correction of resonant frequency of either circuit is required, this must be done by means of the trimmers across each unit, *not* by squeezing the coils or by otherwise adjusting the inductance.

Following this adjustment of trimmers at the high end of the tuning range, it would be wise to recheck the resonant frequency of the circuits once again at the low end; that is at about 90 mc. This would be particularly necessary if considerable trimmer adjustment was required.

The set should be ready now to receive signals and can be connected to an antenna, turned on and operated.

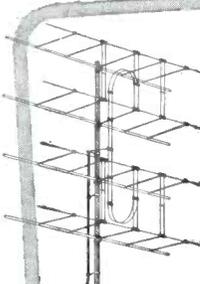
An alternate method that can be used to peak a set that is all right otherwise and will get some stations, requires the use of a so-called tuning wand. A powdered iron slug and a brass slug, each on the end of a piece of good insulation is used. Here is how it may be done. In the case of an FM receiver, a high impedance voltmeter (20,000 ohms-per-voit or better) should be placed across the ratio-detector load resistor; Fig. 2, p. 33. If the chassis employs a discriminator, the meter should be connected from the high side of the limiter grid resistor to ground; Fig. 3, p. 33. The set should be turned on and a station tuned in on the low end of the dial. Suppose we get a station at 93 mc on the receiver dial, and the actual operating frequency is known to be approximately 92 mc. The receiver dial should be set to 92 mc and this station tuned in again by variation of the inductance of the local oscillator, using the meter as a tuning indicator, and adjusting for maximum voltage.

Preselector tuning is next. First, let's assume that it is correct. The iron slug should be inserted slowly into the coil of the tuned circuit. This will detune it in the low-frequency direction. The voltage on the meter will fall off. Insertion of the brass slug into the coil will detune it in the high-frequency direction. Again the meter will fall off.

If the meter falls off with one slug and goes up some with the other, it is obvious that the circuit is not quite resonant to the incoming signal. As an example, if the brass slug causes some slight increase in voltage while the iron slug causes a decrease in voltage, the circuit should be tuned slightly higher in frequency by spreading the coil turns.

This procedure must be repeated again for the high end of the band, say at 104 mc. This time, however, corrections should be made with the trimmers only.

Either of these methods have been found to produce fine results.



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**Service Helps**

(Continued from page 59)

negative lead from the A battery and the negative lead from the B battery should be interchanged. The negative lead from the B battery now connects to the point where the A battery negative lead previously connected, and vice versa.

*Model H-354C7, V-2180-2 Chassis:* To meet UL requirements, a .05-mfd capacitor should be added in series with the line that runs from the antenna loading coil to the antenna terminal board. . . . To reduce motorboating on strong AM signals, the resistor

( $R_{20}$ ) connected between terminal 3 of the second FM *if* transformer and the *arc* line should be changed to 10,000 ohms. . . . To reduce hum modulation on strong signals,  $C_{36}$  in the grid circuit of the 6BJ6 FM *rf* amplifier should be changed to .005 mfd. Capacitor  $C_{38}$ , connected between the grid of the 12AT7 mixer stage and the selector switch, should be changed to .005 mfd.  $C_{10}$ , connected from terminal 3 of the second FM *if* transformer to the selector switch should be changed to 800 mmfd, and a 350-microhenry reactor ( $L_6$ ) should be added between the terminal board side of the antenna loading coil and the chassis.

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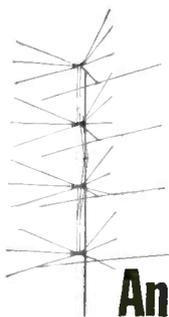
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**Visual Alignment**

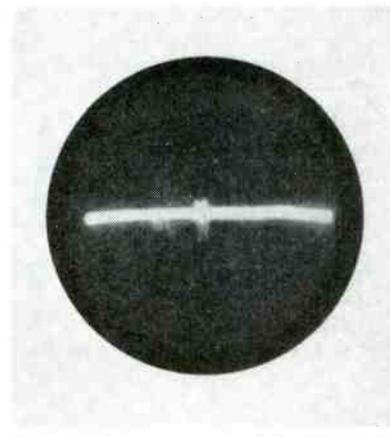
(Continued from page 35)

of the marker generator is rotated to run one marker up the curve and the other marker down to the base line. If the true marker is near the top of the curve, the baseline of the pattern will *wiggle*, as indicated in Fig. 8. If the spurious marker is near the top of the curve, the base line will not *wiggle*.

Spurious markers are generated by harmonics of the *if* amplifier beating with the harmonics from the marker generator, or in some cases by beating of sweep harmonics with marker harmonics. Spurious markers are also caused by other oscillators in the vicinity of the test setup, either in the receiver under alignment or in another receiver. The local oscillator tube should always be removed from the receiver under alignment, and all *rf* sources near the bench should be *killed*.

Since spurious markers can originate from harmonics of the *if*, and from harmonics of the sweep and marker generator, it will appear that not *every* spurious marker can be detected by the modulated-marker technique. The modulation test is, however, of value in the infrequent case in which it is necessary to contend with a spurious marker.

Fig. 4. Trace which appears when the phasing control of the 'scope is properly adjusted to make markers coincide on trace and retrace.



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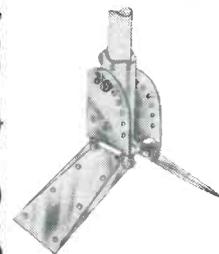
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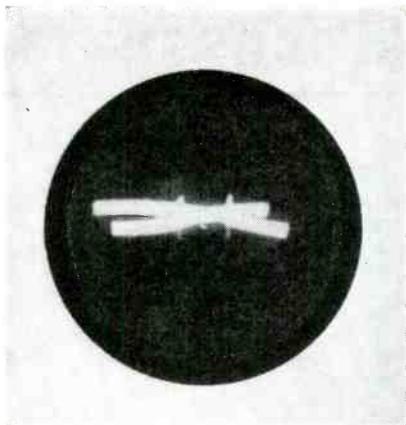


Fig. 4A. Trace will appear when the crystal probe is substituted for the ratio detector. Two markers appear because the center frequency of the sweep generator is not set exactly to 4.5 mc. Trace and retrace do not lie exactly in a horizontal line due to the stray 60-cycle hum pickup.

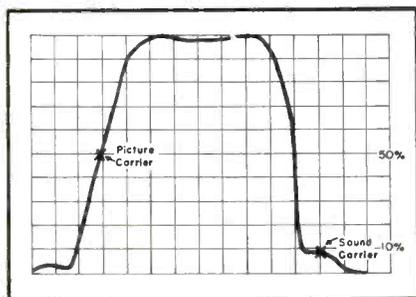


Fig. 5. Intercarrier if response curve illustrating sound shelf.

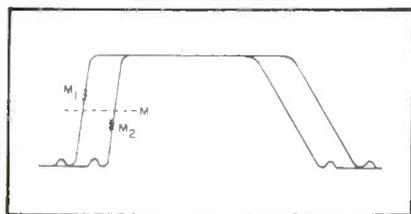


Fig. 6. Marker displacement caused by incorrect test conditions. Markers, normally appearing at level  $M$ , appear at  $M_1$  and  $M_2$  when the input capacity of the scope is excessively high.

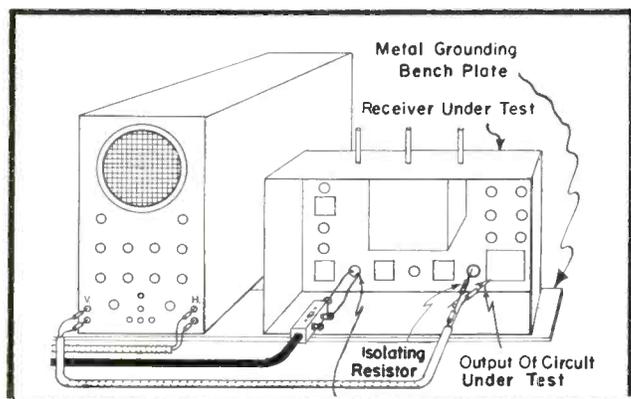


Fig. 7. Setup illustrating how isolation resistor is installed in series with hot lead to the scope to insure satisfactory markers. At left is input of circuit under test.

Fig. 8. When the true marker is near the top of the curve, the base line of the pattern will wiggle. If the spurious marker is near the top of the curve, the base line will not wiggle.

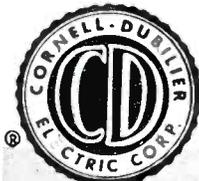
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**UNIT REACTIVATES  
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Small Electronic Device Tests  
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 Year or More of Use

By T. R. KENNEDY Jr.

A small electronic device that can be applied to home television receivers to test and reactivate the picture tube without removing the tube from the set, resulting in renewed brightness and longer useful life, has been placed on the market for the first time by a New York manufacturer.

In some cases, it was said, the picture tube may be made almost as good as new and given as much as a year's useful life before replacement is necessary.

The instrument is small and compact. It weighs three pounds, is as large as the average lunch box, costs little and is simple to operate. Picture tubes, some of them new and never in a receiver, have shown remarkable improvement in a few minutes of reactivation here in the last few days.

Although the principle of its operation is not new—cathode-ray tube manufacturers have used it for years in the initial making of picture tubes—its incorporation

The almost immediate urgent need for such an instrument, which also soon may be produced in kit form for home assembly, is apparent. Eight to ten million TV picture tubes, Transvision engineering estimates, have now been in use for three to four years or more, and "probably are in need of test and reactivation to renew their brightness." Unfortunately, loss of brightness can be detected only seldom by the old tubes with out comparing the old tubes with new ones in lately produced sets.

Furthermore, picture tubes in their original cartons in stores may have lost some of their brightness, which has been described as a "kind of aging process" to which all large cathode-ray tubes and similar devices are subject. Such tubes, in the current area most in use today, cost from \$25 to \$65.

New picture tubes can be tested and reactivated without removing them from their cartons, and tubes in TV sets without removing the tubes from the receivers. It is accomplished by attaching a standard picture-tube socket to the tube-tube socket of the receiver, turning a switch on the instrument, and noting the glow of a small neon bulb as a dial on the tester is watched. The condition of the tube is indicated directly on a dial of the tester, which is plugged into an AC home electric socket. The receiver, meanwhile, is not turned on.

In some cases the test and reactivation is accomplished in less than a minute.



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 performs 2 vital functions:

- Tests Picture Tubes
- Renews Brightness of Dim Picture Tubes

**It's a TESTER:**

Without removing picture tube from set, you apply this precise instrument to:—

- Measure Cathode emission
- Locate shorts between elements
- Locate high resistance shorts or leakage as high as 3 megohms

**It's a REACTIVATOR**

for dim CR Picture Tubes

Revives dim TV Picture Tubes, without removal of tubes from sets. Reactivation works on many tubes with low light output, if there's no mechanical break in tube. 110 V—60 cycles. Weighs only 3 lbs. One or two applications pays for instrument.

**SATISFACTION GUARANTEED** or money refunded if you return the instrument in 10 days in good condition. **\$19<sup>95</sup> NET**

—RUSH THIS COUPON—  
 TRANSVISION, INC.  
 DEPT. S5 NEW ROCHELLE, N. Y.  
 Send me \_\_\_ CR Tube Tester-Reactivator(s).  
 Enclosed find \$\_\_\_ deposit. Balance C.O.D.  
 Enclosed find \$\_\_\_ in full. Send prepaid.  
 Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_

**TV Parts . . . Accessories**

**ASTATIC TV BOOSTER**

A TV booster, *Scanafar*, model CT-1 that features a balanced cascaded-type circuit with a neutralized 6J6 tube driving a 6BQ7, has been developed by the Astatic Corp., Conneaut, Ohio. Both tubes are used over the entire TV frequency range.

Bandwidth is claimed to be over 7 mc on all channels. Two control knobs operate the booster; one an *on-off* switch and low or high-band selector, and the other a fine-tuning control.



**SPRAGUE UNIVERSAL HV  
 TV CAPACITORS**

A 500-mmfd, 20,000-volt molded-case ceramic capacitor, type 20DK-T5, has been announced by The Sprague Products Company, 61 Marshall St., North Adams, Mass.

Capacitor is equipped with female-threaded brass inserts on both faces of the plastic case and is furnished with a complete set of thread-in terminals which fit the insert, enabling a Service Man to select any two he needs to fit the particular receiver upon which he is working. Ceramic unit has a moisture-resistant, non-flammable case of thermosetting plastic. Molded guard rings surround the terminals and are claimed to lengthen the creepage path and protect against troubles from conducting dust particles which may collect on capacitors after installation in TV sets.

**G-C HV CORONA DOPE**

A corona dope *Red-X*, developed to meet high-voltage requirements of TV sets, has been announced by the General Cement Manufacturing Co., 919 Taylor Ave., Rockford, Ill.

Dope can be applied to all solder connections and any sharp edges, such as tube caps, in service work. It is said to be quick drying. Packaged in a 2-ounce bottle.



**IRC TV CONTROLS**

Factory assembled exact-duplicate concentric-dual controls, individually packaged in cartons, marked with manufacturers' part numbers as well as with IRC stock numbers, and a universal line which assembles these concentric duals, have been announced by the International Resistance Co., 401 North Broad St., Philadelphia 8, Pa.

Control line also includes new *concentripaks* with a special selection of universal parts for specific makes of TV dual controls, a *concentrikit* assortment in a all-metal four-drawer cabinet, and form *S012* TV *concentric* dual replacements listed by trade name and part number showing IRC exact duplicate controls and *concentrikit* equivalent.

Catalog *DC1C* covers complete line.

Cat. No. 624  
**MOSLEY ROOF-THRU**  
 List Price—\$5.84

We're looking forward to meeting you at the May show. We cordially invite you to visit us in Space 119.

## MOSLEY ROOF-THRU

The Leak-Proof Roof Entrance for TV and FM Transmission Line and Rotator Control Cable

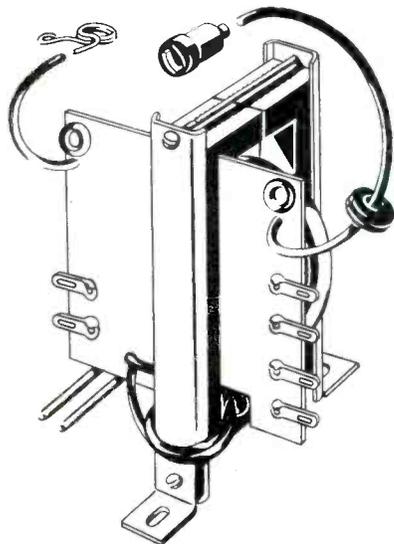
- Permits shorter lead-in with less loss of signal energy—less interference pick-up!
- Prolongs life of transmission line by keeping it out of weather!
- Eliminates unsightly wires on outside of house!
- Easy to install on new or old buildings!
- Copper flashing and plastic bushing unaffected by weather—provides perfect seal against weather leaks!

Available from Your Radio Parts Jobber  
**MOSLEY ELECTRONICS**  
 2125 Lackland Road, Overland, Missouri

**STANCOR FLYBACK-TRANSFORMER  
REPLACEMENTS FOR ADMIRAL  
CHASSIS**

Horizontal-deflection and high-voltage flyback transformers for replacement in Admiral chassis, have been announced by the Standard Transformer Corp., 3580 Elston Ave., Chicago 18, Ill.

Available are A-8133, a replacement for Admiral 79C30-1 and 79C30-3, and A-8134, a replacement for Admiral part 79C30-4. Replacements provide an approximate anode *kv* of 12.5-15, a maximum scan of 70°, and use ferrite *E* as a core material.



**B-T TX MIXER AMPLIFIER**

A TV mixer-amplifier, *MA4-1*, that is said, in effect, to be a complete self-contained master-antenna system for *vhf* and *uhf* reception, has been announced by Blonder-Tongue Laboratories, Inc., 38 N. Second Ave., Mt. Vernon, N. Y.

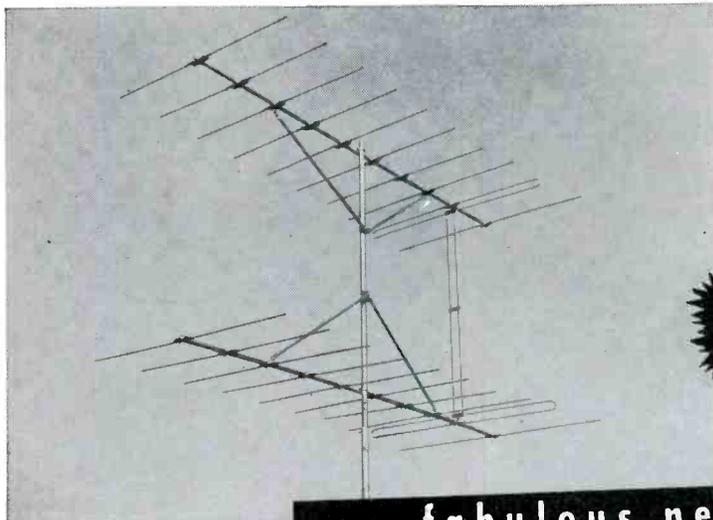
Chassis of the mixer-amplifier contains power supply, signal-mixing circuit, output terminal and broadband input. It is also provided with four socket receptacles to accommodate from one-to-four plugin strip assemblies for specific channels. Channel strips, model CS-1, feature plug-in single-channel amplifiers that are said to have a gain of 17 db, fixed tuned for individual channels, and employ a 6AB4 and 6CB6. UHF converters, model UC-1, are plug-in units for lowering *uhf* signals to existing TV frequencies.

One complete mixer-amplifier unit is said to handle signals from five different antennas.

Below: Complete Blonder-Tongue mixer amplifier.



*the* **BIG 10** *is terrific!*



**12**  
DB single

**14½**  
DB stacked

**CHANNEL  
MASTER'S**

fabulous new  
**10 Element Yagi**

**COMPARE these 10 Terrific Features!**

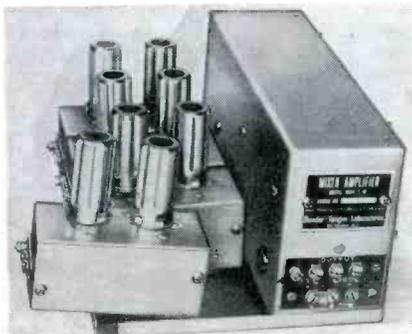
- 1 10 Elements — more signal, less noise, less rear pickup.
- 2 Highest gain of any Yagi ever developed.
- 3 Over 30% more gain than any 8 element Yagi.
- 4 This antenna can be stacked, with 78% additional gain over single bay.
- 5 Includes the famous Z-Match system.
- 6 **You don't pay for stacking bars.**
- 7 Excellent 300 ohm match in all installations.
- 8 "Boom Braced" to prevent crossboom "bounce" which causes picture flicker.\*
- 9 Two piece "Swej-Lok" crossboom for simplified stocking, handling, and installation.\*
- 10 Completely pre-assembled.

\*Low Band only

LIST PRICES		
ch. 7—13	ch. 2 or 3	31.94
<b>\$1388</b>	ch. 4 or 5	28.47
	ch. 6	25.69

**CHANNEL MASTER CORP.** MEMBER  
 ELLENVILLE, N. Y.

Below: Plug-in single-channel amplifiers.



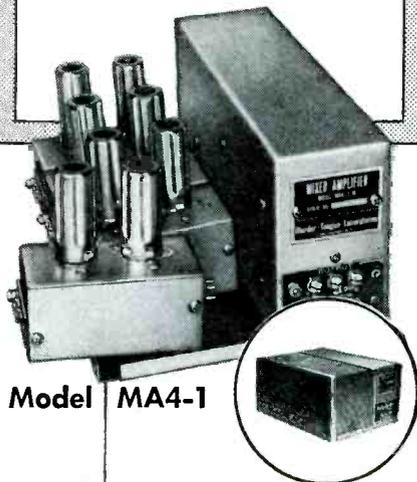
**BERNARD L. CAHN NOW EASTERN  
S-M CLUB CHAIRMAN**

Bernard L. Cahn, general sales manager of the Insuline Corp. of America, Long Island City, N. Y., has been elected '52 chairman of the Sales Managers Club, eastern division.

Other officers chosen for the year were: Jerome Kirschbaum, Precision Apparatus Co., Inc., Elmhurst, N. Y., vice-chairman; Walter Jablon, Espey Manufacturing Co., New York, N. Y., secretary; and Vincent Ulrich, National Union Radio Corp., Orange, N. J., delegate to the industry's show corporation board.

**"PACKAGED ENGINEERING"  
at Its Best!  
For the TV Technician**

**The B-T  
MIXER-AMPLIFIER  
SYSTEM**



**Model MA4-1**

**For All VHF and UHF  
Multi-Antenna Problems**

Designed for the Service Technician to enable him to plan and make any installation . . . whether a single receiver or a complete 2000-set Master Antenna System . . . at lower cost, and without outside engineering.

The B-T MA4-1 is a wide-band, all-channel TV signal mixer for feeding 5 antennas to 1 TV receiver or distribution system. One input is broad-band for signals requiring no pre-amplification, and the remaining 4 accommodate separate plug-in strip assemblies. All terminals have 75 and 300 ohm connections. Several units may be ganged to serve any number of antennas.

**B-T PLUG-IN STRIPS**

Channel Strip CS-1 is a 2-tube (6AB4-6CB6), single channel, highly selective amplifier with a gain of at least 17 db., one strip for each TV channel.

The UHF Converter, UC-1 is designed for lowering UHF signals to existing TV frequencies, permitting UHF reception on present TV receivers.

*Eliminates all need for rotators, separate boosters, converters, and other costly projects.*

*Once connected the MA4-1 performs without further attention . . . no switching . . . no adjustments.*

**LIST PRICES:**

Model MA4-1 (less plug-in strips) **\$52.50**  
Channel Strip CS-1 (specify channel) **19.50**  
UHF Converters UC-1 . . . . . to be announced  
Standard RTMA Warranties Apply.



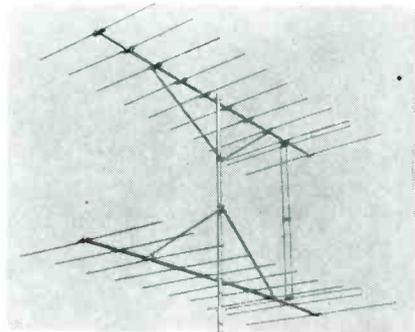
For the Complete 'Packaged Engineering' story, ask about B-T Signal Amplifiers and B-T Distribution Amplifiers at your local Distributor, or write to Service Department, E

**BLONDER-TONGUE LABS. inc.**  
Mount Vernon 7, New York

**CHANNEL MASTER YAGI**

A 10-element yagi, the *Big 10*, that is said to provide over 12-db gain on the single bay, has been introduced by the Channel Master Corp., Napanoch Rd., Ellenville, N. Y.

Antenna incorporates a Z-match system, and can be stacked to produce over 14½ db. Elements are spaced on cross-arm, one full wavelength on the low band and 1.4 wavelengths on the high band. To prevent crossboom bounce, which may cause picture flicker, antenna is boom braced. Crossboom, on the low band, is a swaged, two-piece unit.



\* \* \*

**RYTEL PICTURE TUBE REACTIVATOR**

A picture-tube reactivator, which is said to restore most low-emission TV tubes up to 80% of their original brilliance has been announced by Rytel Electronics Manufacturing Co., 11138 Hawthorne Blvd., Inglewood, Calif.

Reactivator is claimed to speed up rate of barium deposit by increasing the cathode temperature and current. Instrument limits cathode current and ages the tube so that the higher cathode temperature does not result in the boiling off of the barium surface.



\* \* \*

**UNIVERSAL ROOF MOUNTS**

Roof mounts, RM-1-2-4, that are said to mount on flat, sloping and peaked roofs, have been announced by Universal Metal Products Co., 125 Ontario St., Toledo, Ohio. Mounts are available to accommodate antennas from 1½" to 2" od.

Also available is an antenna guy-wire tightener, GL-2, that features a welded 2-inch lag screw, that is claimed to eliminate the use of turnbuckles, eye screws and cable clamps.

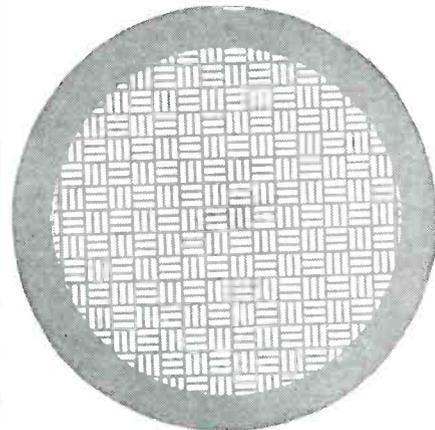
**YOU SHOULD OWN A  
MICRO CIRCLE CUTTER**

A well built tool for those odd size holes. Cuts through ½ inch of steel. Has **MICROMATIC SIZE ADJUSTOR**. Comes complete with tool steel cutting bit for extra long service.

*Specify round (7/16") or square shank.*

See your local distributor or write us. **PRECISE MEASUREMENTS CO.**  
\$5.00 942 Kings Highway, Bklyn 23, N.Y.

**An Essential Grille  
for Engineers**



**Model 12-A Grille**

**A Flush Mounting Grille for a 12" speaker.**

The Grille proper comes with either a beautiful chrome plated finish or prime coated for painting. The border to which the grille is fastened is always prime coated.

**List Price \$12.50**

*Write for literature on our  
Speakers, Baffles and Grilles*

**WRIGHT, Inc.**

2233 University Ave., St. Paul 4, Minn.



• BUILDERS OF QUALITY RADIO INDUCTANCES SINCE 1924

**NOW AVAILABLE**

**TO THE SERVICEMAN  
AND EXPERIMENTER  
THE FAMOUS**

**K-TRAN\***

• THE FINEST  
MINIATURE  
I. F. TRANSFORMER  
EVER  
MANUFACTURED!

• ONLY 2½" HIGH  
BY ¾" SQUARE

• SHELL CORE PERMEABILITY TUNED STABLE SILVER MICA FIXED CONDENSERS — NOT MICA COMPRESSION TUNED.

CAT. NO.	ITEM	NET PRICE
12-H1	262 KC INPUT I.F. TRANS.	\$1.50
12-H2	262 KC OUTPUT I.F. TRANS.	1.50
12-H6	262 KC OUTPUT I.F. TRANS WITH DIODE FILTER CAPACITORS	1.59
12-C1	455 KC INPUT I.F. TRANS.	1.32
12-C2	455 KC OUTPUT I.F. TRANS.	1.32
12-C6	455 KC OUTPUT I.F. TRANS WITH DIODE FILTER CAPACITORS	1.41
1463	10.7 MC INPUT OR INTERSTAGE F-M TRANS.	1.65
1464	10.7 MC F-M DISCRIMINATOR	1.98
1465	10.7 MC F-M RATIO DETECTOR	1.98

The "K-TRAN" is distributed nationally to the jobber only by J. W. Miller Company.  
\*Manufactured under "K-TRANS" Patent Numbers 2435630 and 2429468 of Automatic Manufacturing Corp.

**J. W. MILLER COMPANY**  
5917 S. MAIN ST. LOS ANGELES, CALIF.

**CREST PICTURE-TUBE REACTIVATOR**

A plugin type, picture-tube rejuvenator, that is said to permanently renew brightness of previously unusable weak tubes, has been announced by Crest Laboratories, Inc., Whitehall Building, Far Rockaway, N. Y.



\* \* \*

**VEE-D-X BROADBAND ANTENNA WITH PRINTED CIRCUIT**

A broadband TV antenna, *Q-Tee*, featuring the use of a printed circuit incorporated in the matching system that is claimed to prevent detuning effect between the high and low channels, while providing a driven element of low *Q*, has been announced by The LaPointe Plascomold Corp., Windsor Locks, Conn.

Driven elements consists of a series of 7-matched dipoles that provide a 300-ohm match on both high and low channels. With the addition of a high-channel director and a low-channel reflector, antenna is said to have desirable front-to-back ratio and gain characteristics of parasitic-type antennas, such as yagi. Antenna is claimed to have a flat response across the *vhf* spectrum with a standing wave ratio of 1.15 or better. May be double stacked for the near-fringe and 4-stacked for the fringe areas.

\* \* \*

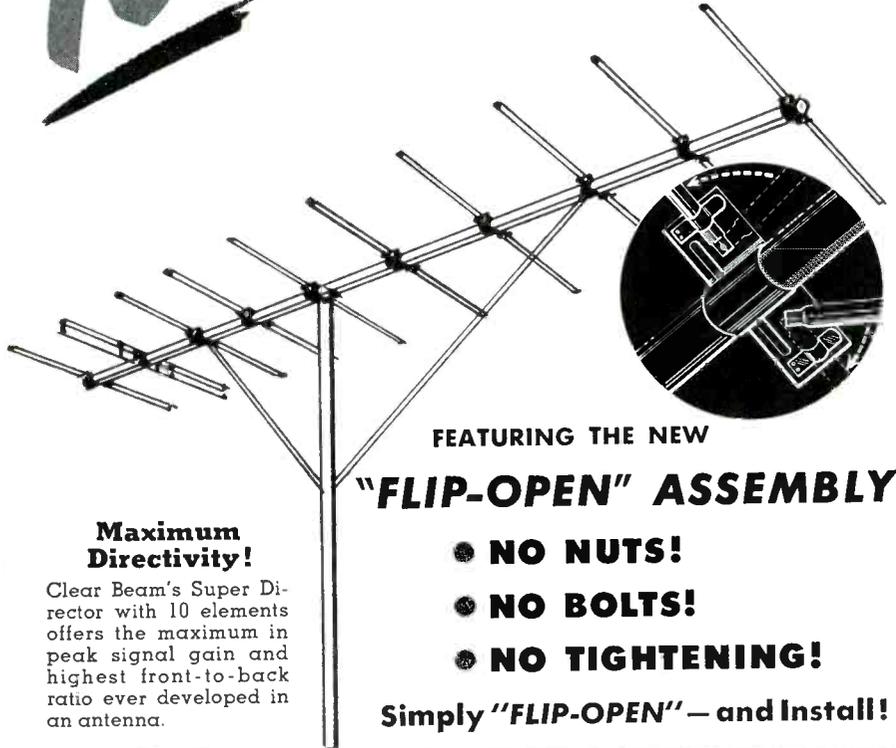
**RMS INDOOR ANTENNA**

A 3-section telescopic indoor antenna, T-3, has been introduced by RMS, Inc. Elements of corrosion-proof alloyed aluminum, have phosphor springs and are said to assure positive contact throughout each element.



NOT 5  
NOT 8  
But -  
**10 ELEMENTS!**

IN THIS  
**SUPER DIRECTOR YAGI by Clear Beam**



**Maximum Directivity!**

Clear Beam's Super Director with 10 elements offers the maximum in peak signal gain and highest front-to-back ratio ever developed in an antenna.

FEATURING THE NEW

**"FLIP-OPEN" ASSEMBLY**

- NO NUTS!
- NO BOLTS!
- NO TIGHTENING!

Simply "FLIP-OPEN" — and Install!



**Clear Beam**

TV ANTENNAS AND ACCESSORIES

*The largest and most complete antenna line manufactured under one roof*

100 PROSPECT AVENUE • • • BURBANK, CALIFORNIA  
ROCKWELL 9-2141 CHARLESTON 0-4886

ENGINEERED ANTENNAS FOR ANY PROBLEM - ANYWHERE

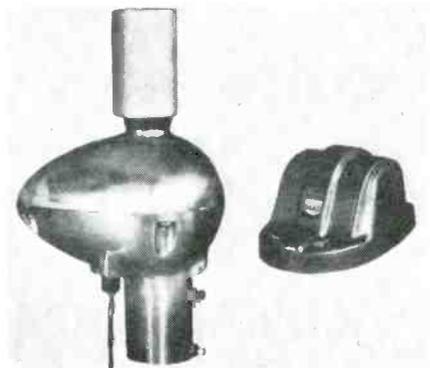
**BRACH STACKED BOW-TIE V ANTENNA AND ROTATOR**

A stacked *Bow-Tie V* antenna, which it is said requires no reflectors and directors, has been introduced by the Brach Manufacturing Corp., 200 Central Ave., Newark, N. J.

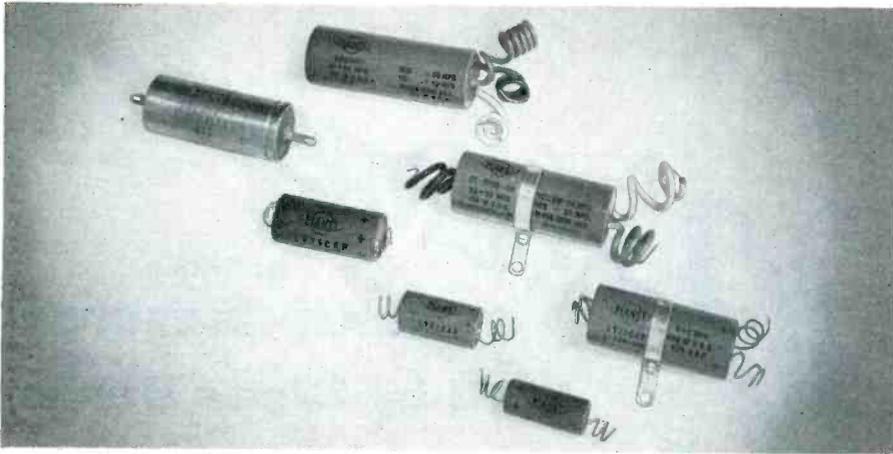
Uses a closed-end which is said to increase gain, minimize side lobe pickup, and eliminate vibration of elements.

An antenna rotator, 470, housed in an aluminum alloy casting that is said to reduce wind resistance and preclude ice formations, has also been introduced by Brach.

Rotator incorporates a weatherproof, moisture-sealed drive unit capable of clockwise and counter clockwise 365° rotation, using a three-wire rotator lead.



Above: Brach rotator.



## Planet Capacitors "Engineered for Quality"

1 year service guarantee

Custom engineered to your specifications or supplied from stock, Planet capacitors meet the highest standards of the industry. Every capacitor is tested mechanically and electrically throughout its manufacture.

This rigid system of quality control makes our unconditional one-year guarantee possible. But making Planet capacitors right from the start means reasonable prices too!

### PLANET MANUFACTURING CORPORATION

225 BELLEVILLE AVENUE  
BLOOMFIELD, N. J.



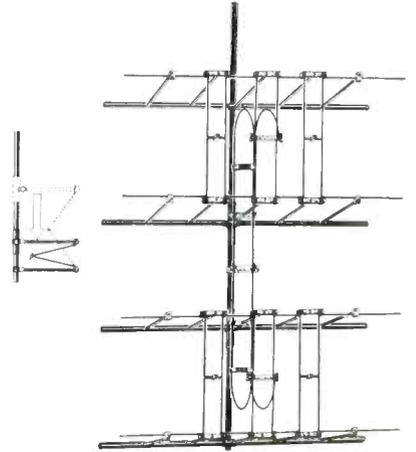
WRITE for Catalog 206-B, listing specifications on stock items.

### SKYLINE COLINEAR ANTENNA

A foldable colinear antenna, *Skyline*, of the double-bay type, is now available from Skyline Manufacturing Co., 1458N2 East 17th St., Cleveland 14, Ohio.

All-aluminum antenna features elements and phasing bars that have been combined into one integral part.\* Dynakon reinforced plastic insulators are used.

\*Patent No. 2,586,276.

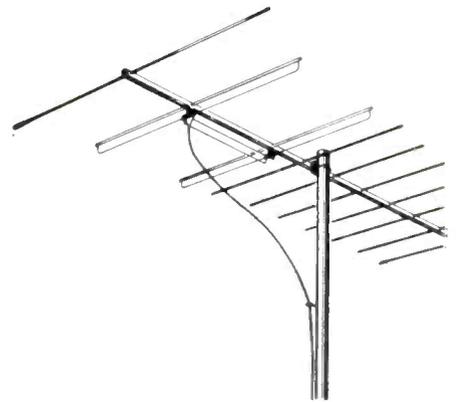


\* \* \*

### TELREX FISHBONE ANTENNA

An array, the *Fishbone* (model WB-1) has been developed by Telerec, Incorporated, Asbury Park, N. J.

Array is said to feature ten working elements. Model is recommended for suburban and outlying fringe-area single-channel reception.



\* \* \*

AUTHORIZED DISTRIBUTOR DISC



Orange and blue disc, denoting authorized distributorship for J. S. C. wire products, released by Jersey Specialty Company, Little Falls, N. J.

## See the NEPCO

line of

TV ANTENNAS  
MOUNTING ACCESSORIES  
TV WIRE

at the

**RADIO and TV PARTS SHOW**

**CHICAGO - MAY 19-22**

ROOMS 625-625A • CONRAD HILTON HOTEL

Otherwise write for information

**NATIONAL ELECTRIC PRODUCTS CORP.**

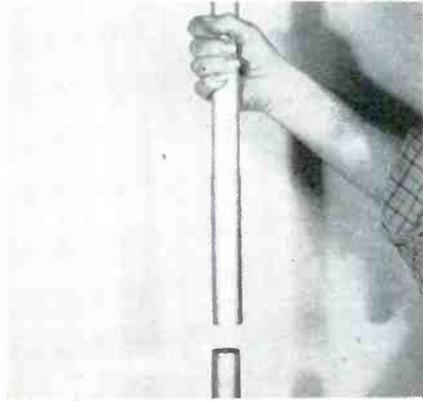
1386 CHAMBER OF COMMERCE BLDG., PITTSBURGH 30, PA.

### JFD ANTENNA MASTS

Two types of antenna masts are now available from JFD Manufacturing Co., New York.

One, type M110, produced by Republic Steel and called the JFD *Dura-Mast*, is a seamless steel unit. It is electro-galvanized with the same process as EMT conduit. Has 6" fitted joints to provide an inter-lock grip.

The second, M108, a Jones & Laughlin mast, made of Permatube, is a seamless piece, too. Mast has 3" fitted joints. Its corrosion-resistant coating is Vinsynite. Both masts are available in 10' lengths.



JFD M108 mast

\* \* \*

### WORKSHOP SOLDERLESS CABLE CONNECTORS

Four universal connectors for RG-59/U, RG-11/U and RG-8/U coax, have been announced by The Workshop Associates, 135 Crescent Rd., Needham Heights 94, Mass.

Cable connector, *W-50*, a silver-plated male connector, provides an impedance of 72 ohms, and may be used with frequencies up to 250 mc. Chassis receptacle, *W-60*, a silver-plated female connector for both chassis and panel mounting, has a soldering terminal protruding from the rear. Cable junction, *W-80*, a silver-plated double-ended female connector, mates at either end with *W-50*. Cable adapter, *W-100*, a silver plated, male and female, is used for converting from RG-59/U to RG-11/U or RG-8/U, and is said to require no soldering.

\* \* \*

### INDOOR TV ANTENNA PACKAGE



Package designed to be a self-service merchandising kit, styled for the Snyder indoor *Directronic* TV antenna system, an all-channel affair. Full 360° orientation is said to be obtained without the use of motors or remote control, combinations being accomplished by use of a beam selector switch mounted on or near the television set. Antenna has been designed for concealed installation in attics or closets, or may be sealed to the ceiling of a room, flexible tape elements being used instead of rigid elements.



General Industries' Model TR 3-Speed Phonomotor

## Compactness . . .

another reason why leading manufacturers prefer General Industries' 3-Speed Phonomotors

Because of their clean compact design, General Industries' *Smooth Power* Phonomotors are ideally suited for *any* phonograph application—portable record player, table-model combination or full-size console.

Write *today* for complete information about these trouble-free, performance-proved phonomotors, including specifications, design features and dimensions.



**THE GENERAL INDUSTRIES CO.**  
Department MF • Elyria, Ohio

### ERIE HV FILTER

A high-voltage filter, 413, that has threaded sockets into which various types of terminals may be screwed to match the terminal combinations, found in man-



ufacturer's sets, has been introduced by the Erie Resistor Corp., Erie, Pa.

Rated at 20 kv or lower, capacitor, known as *Ceramicon*, is insulated in a low loss thermosetting plastic which provides a moisture seal. Ring convolutions are molded into the surface to provide a check against surface leakage.

\* \* \*

### E-M TUBE TESTER

A tube tester, model 205, designed to give test readings for all tubes, including noval and sub-miniatures, from .75 to 117 filament volts through the standard emission method of testing, has been announced by Electronic Measurements Corp., 280 Lafayette St., New York.

Instrument, using four-position lever-type switches and individual sockets for each tube base type, is available in either stationary or portable oak cases.

## UHF-VHF TV Markets

(Continued from page 37)

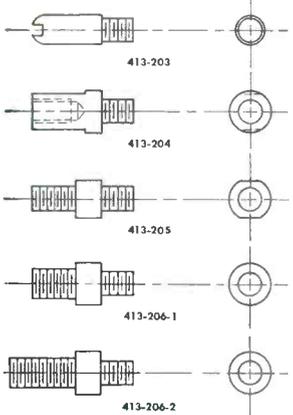


**solves a basic problem  
for the service man**

**the ERIE  
413 "UNIVERSAL"  
HV FILTER  
CERAMICON for TV**

• You stock one body type of Ceramicon. An assortment of terminals such as illustrated at the left enables you to replace any one of a multitude of terminal combinations as found in receivers of different manufacturers. With a fraction of the inventory otherwise required you are able to service practically any receiver on the market rated at 20 KV or lower . . . quickly and profitably.

Booth 318, Electronic Parts Show  
Display Room 536A, Conrad Hilton Hotel, Chicago



WASHINGTON	
Aberdeen	58
Anacortes	34
Bellingham	12, 18, 24
Bremerton	44, 50
Centralia	17
Ellensburg	49, *65
Ephrata	43
Everett	22, 28
Grand Coulee	37
Hoquiam	52
Kelso	39
Kennewick (also see Kennewick-Richland-Pasco)	25
Kennewick-Richland-Pasco	*41
Longview	33
Olympia	60
Omak-Okanogan	*35
Okanogan (see Omak)	
Pasco (also see Kennewick-Richland-Pasco)	19
Port Angeles	16
Pullman	*10, 24
Richland (also see Kennewick-Richland-Pasco)	31
Seattle	4, 5, 7, *9, 20, 26
Spokane	2, 4, 6, *7
Tacoma	11, 13, *56, 62
Walla Walla	5, 8, *22
Wenatchee	*45, 55
Yakima	23, 29, *47

WEST VIRGINIA	
Beckley	6, 21
Bluefield	41
Charleston	8, *43, 49
Clarksburg	12, 22
Elkins	40
Fairmont	35
Hinton	31
Huntington	3, 13, *53
Logan	23
Martinsburg	58
Morgantown	*24
Parkersburg	15
Welch	25
Weston	32
Wheeling (also see Wheeling-Steubenville, Ohio)	*57
Wheeling-Steubenville, Ohio	7, 9, 51
Williamson	17

WISCONSIN	
Adams	*58
Appleton	42
Ashland	15
Beaver Dam	37
Beloit	57
Chilton	*24
Eau Claire	13, *19, 25
Fond du Lac	54
Green Bay	2, 6
Janesville	63
Kenosha	61
La Crosse	8, *32, 38
Madison	3, *21, 27, 33
Manitowoc	65
Marinette	11, 32, *38
Milwaukee	4, *10, 12, 19, 25, 31
Oshkosh	48
Park Falls	*18
Portage	17
Fr�aire du Chien	34
Racine	49, 55
Rhinelander	22
Rice Lake	21
Richland Center	15, *66
Sheboygan	59
Shell Lake	*30
Sparta	50
Stevens Point	20, 26
Sturgeon Bay	44
Superior (see Duluth, Minn.)	
Wausau	7, 16, *46
Wisconsin Rapids	14



**ERIE RESISTOR CORP., ERIE, PA.**  
LONDON, ENGLAND . . . TORONTO, CANADA  
Cliffside, N. J. • Philadelphia, Pa. • Buffalo, N. Y. • Chicago, Ill.  
Detroit, Mich. • Cincinnati, Ohio • Los Angeles, Calif.

# KNOCK OUT

## TV INTERFERENCE

with **4** GRAYBURNE Dual Tunable INTERFERENCE FILTERS

A model for every type of interference

Research shows 16,000,000 set-owners want to get rid of some form of annoying interference. Here's a new market loaded with high profits—yours just for the asking on every service call! Grayburne gives you 4 new Filters to throw the right kayo punch at each of the 4 major sources of interference!

**Precision-Engineered:** Network of 2 iron-core precision-wound coils and condensers tunable over specific interference band.

**Dual Tunable Feature:** By tuning both sides of the line, each model achieves maximum interference rejection and maintains line balance.

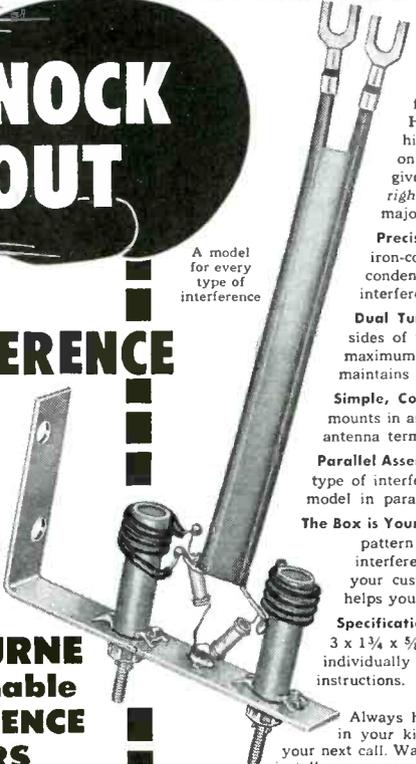
**Simple, Concealed Installation:** Bracket mounts in any convenient position near antenna terminals.

**Parallel Assembly:** To knock out more than one type of interference, just assemble each model in parallel.

**The Box is Your Salesman:** Photo of interference pattern on package shows which type of interference each model removes. Helps your customer recognize his interference—helps you make the sale!

**Specifications:** Plated L-shaped bracket. 3 x 1 3/4 x 3/8". Matching 300-ohm lead. Each individually boxed with complete instructions. \$2.75 list, each model.

Always have a set of 4 Grayburne Filters in your kit. Show them to your customer on your next call. Watch how quickly he tells you to install one or more in his set. Make every call a plus profit call with Grayburne Filters. Write now for complete catalog and name of your distributor.



**GRAYBURNE**  
Grayburne means Quality Electronic Components

**GRAYBURNE CORPORATION, 103 Lafayette St., New York 13, N. Y.**

WYOMING

Buffalo	29
Casper	2,6
Cheyenne	3,5
Cody	24
Douglas	14
Evanston	14
Gillette	31
Green River	16
Greybull	40
Lander	17
Laramie	*8,18
Lovell	36
Lusk	19
Newcastle	28
Powell	30
Rawlins	11
Riverton	10
Rock Springs	13
Sheridan	9,12
Thermopolis	15
Torrington	27
Wheatland	24
Worland	34

**Audio**

(Continued from page 53)

of the needle shank. Then a blank disc can be placed on the turntable. The phono arm should be moved so that the point of the cutting needle is approximately 1/4" from the edge of the record. The turntable should be at full speed before cutting is to be made, and then the arm should be lowered so that it begins to cut into the record. The volume should be adjusted so that the recorder indicator flashes brightly on the loudest passages. As the recording progresses, a fine hair-like material will begin to appear where the disc is being cut; this will have a tendency to go towards the center. It is suggested that too much of this material should not be allowed to collect, and should be drawn off as it goes toward the center. After recording, the rear of the arm should be lifted from the disc and sharply pushed down into a normal horizontal position. The cutting needle should be removed and a regular needle inserted in its place. After pushing down the *use speaker* and *play disc* knob, the recording may be heard.

When recording from tape to disc, the tape should be set going as if it were going to be played back. Buttons *play tape* and *record disc* should be depressed, and then recorded as mentioned previously.

To use this instrument as a phono, a playback needle should be inserted into the pickup arm, and the *phono play disc* and *use speaker* knobs set in the proper position, adjusting tone and volume to proper levels. When an external speaker is to be used, the wires from the speaker should be attached to a plug, and the plug inserted into a jack, placed at the rear of the case.

A new, improved, foldable colinear antenna  
the **SKYLINE**

Amazing fringe area reception  
Pre-assembled  
Quick rigtime  
Patent No. 2,586,276  
Other Pat's Pending

SKYLINE MFG. CO. 1458A2 E. 17th St. Cleveland 14, Ohio

**Tube News**

(Continued from page 56)

should be adjusted for best neutralization, the most sensitive indication of which is the straightness of the raster lines.

- (3) Any ripple remaining will usually be due to ringing in the horizontal-output transformer and may now be investigated without confusion due to the presence of ripple from other causes. One advantage of this sequence of tests is that it helps to indicate whether the ringing in the transformer,

which is usually the most difficult to eliminate, would be tolerable if the other sources of ripple were eliminated.

[To Be Continued]

\* \* \*

**RMS FORUM SPONSORED BY FT. ORANGE RADIO**

A forum conducted by Radio Merchandise Sales, Inc., 1165 Southern Blvd., New York 59, N. Y., was held in Albany, N. Y., under the sponsorship of the Ft. Orange Radio Supply Co.

Forum provided Service Men with data on the use of high-gain TV antennas and open-transmission line, multi-element yagis and a TV analyzer.

## Ser-Cuits

(Continued from page 47)

capacitive coupling to opposite ends of the variable inductance.

Analyzing a converter that has also been developed for *uhf* coverage, Melvin said that the converter is divided into two major portions. The first is an *rf* assembly which is the tuner and its associated circuitry. Three sections are used, allowing an oscillator tuned circuit with a 6AF4 triode, a mixer tuned circuit with a 1N72, and a pre-selector. A double ended capacitive coupling system feeds the preselector circuit. The oscillator was described as essentially a Colpitts circuit, with coupling from the oscillator through a .68-mmfd capacitor to the mixer. An output, from the mixer, of approximately 82 mc is fed to the *if* input. The trimmers in the *rf* and mixer were noted as being set on 460 mc at 270° clockwise rotation; the tuner is set 0° in a counter-clockwise direction and end inductance strips adjusted. The oscillator runs at approximately 82 mc below desired *rf* frequency.

In a review of performance it was said that although a gain figure of *I* has been listed, the gains have run to 3. On the basis of noise measurements made with the noise diode system, it was noted, noise figures of below 22 db have been obtained. Spurious responses in all cases were said to be down in excess of 34 db. It was indicated that measurements at various frequencies showed that rejection was from 50 to 60 db; image rejection at 890 mc was noted as 34 db, the worst point.

Describing studies on a combination *vhf-uhf* unit under way, Melvin said that printed circuits, following the required complex configurations, have been tried. This printing consisted of a die stamped, pressed powder pattern with the basic metal coined into a homogeneous mass. In this instance, with the use of silver powder, conductivity better than half that of strip silver of the same cross sectional area was said to be obtained. In addition, it was noted, a smoothness of surface area was possible, allowing noise-free operation with sliding contacts.

During the tuner studies, several types of tubes were tried. Preliminary design was made around the 2018\* version of the 6AF4. This differs from some 6AF4s in that the cathode lead inductance is at a minimum. Another tube that has been found to offer promise is the 1553D\*\*. The recently announced 2103\* was noted as offering great promise. All of these tubes were said to be operable as mixers.

[To Be Continued]

\*G.E. \*\*Sylvania.

See the  
Whole line  
In CHICAGO!

BOOTH 101  
ROOM 635A

# PHOENIX

Speed-Tennas . . . Mounts  
. . . Accessories

**PHOENIX ELECTRONICS, INC.**  
LAWRENCE, MASSACHUSETTS

*Build YOUR OWN* **Heathkit TEST EQUIPMENT**

Heathkits are completely engineered instruments supplied unassembled. Every kit goes together smoothly and easily. All drilling, punching, and painting has already been done for you.

It's easy and fun to build a Heathkit. All parts are furnished and are of highest quality for years of trouble-free, dependable operation.

Save money by constructing your own. All expensive wiring and assembly costs are completely eliminated.

Detailed construction manual shows clearly where each wire and part goes and tells exactly how to build the kit. Write for free catalog.

- Heathkit AUDIO GEN. KIT . . . \$34<sup>50</sup>
- Heathkit TELEVISION GENERATOR KIT \$39<sup>50</sup>
- Heathkit CONDENSER CHECKER KIT \$19<sup>50</sup>
- Heathkit HANDITESTER KIT . . . \$13.50
- Heathkit TUBE CHECKER KIT \$29<sup>50</sup>
- Heathkit SIGNAL TRACER KIT \$19<sup>50</sup>
- Heathkit IMPEDANCE BRIDGE KIT \$69<sup>50</sup>
- Heathkit BATTERY ELIMINATOR KIT \$24<sup>50</sup>
- Heathkit R.F. SIGNAL GEN. KIT \$19<sup>50</sup>
- Heathkit PUSH-PULL . . . 5" OSCILLOSCOPE KIT \$43<sup>50</sup>
- Heathkit ELECTRONIC SWITCH KIT \$19<sup>50</sup>
- Heathkit VACUUM TUBE VOLTMETER KIT \$24<sup>50</sup>

**HEATH COMPANY**  
BENTON HARBOR 11, MICHIGAN

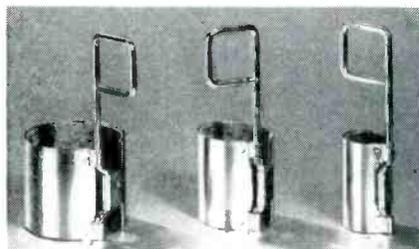
EXPORT AGENT  
ROCKE INTERNATIONAL CORP.  
13 E. 40th St.  
NEW YORK CITY (16)

# Tools . . . Instruments Parts . . .

## IE-TUBE PULLER

A tube puller, available in three sizes to a set, has been produced by IE Manufacturing, 325 N. Hoyne Ave., Chicago 12, Ill. Puller operates by slipping over the tube, closing, and then pulling up.

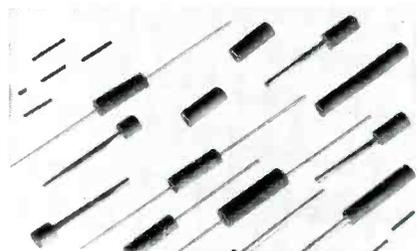
Features are a body formed of spring steel and lined with cork to prevent damage to tubes, all welded construction, and an eccentric lever, zinc plated to prevent corrosion.



\* \* \*

## GRAYBURNE FERRITE-CORE KIT

An experimenter's ferrite-core kit, type FCK, consisting of 27 various-sized cores for experimentation in *ij*, *rf* coils, solenoids, linearity, width and other variable controls, and electromechanical applications, has been announced by the Grayburne Corp., 103 Lafayette Street, New York 13, N. Y.



\* \* \*

## ASTRON RF FILTERS

Filters, that can be used for noise attenuation from 14 kc to 1000 mc have been announced by the Astron Corp., 255 Grant Ave., East Newark, N. J.

Units feature metallized paper-capacitor sections, specially wound inductance, high impedance and low voltage drop.



## GOOD NEWS FOR YOUR HI-FI FANS!

# V-M tri-o-matic® 956-GE RECORD CHANGER

Here is quality unsurpassed by any Record Changer on the market today — yet priced to fit the budget of every Hi-Fi enthusiast!

The new V-M 956GE features a hum-free, four-pole motor that maintains constant speed . . . muting switch for silence during change cycle . . . a GE Variable Reluctance Cartridge



for true fidelity in sound reproduction . . . and new Luxury Styling!

PLUS — all standard V-M tri-o-matic features, including automatic shut-off, after last record plays, and automatic Tone Arm Setdown for all size records, without adjustment.

Comes complete with 6-foot AC cord and 4-foot sound cord. Mounted on heavy metal pan. Plays through any radio set or separate amplifying system. Also available without pan (Model 951GE) for use in combinations.

Get Full Details Today, from Your V-M Distributor!



# V-M CORPORATION

BENTON HARBOR, MICHIGAN

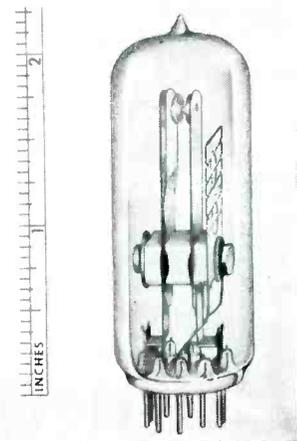


## AMPERITE MINIATURE DELAY RELAYS

Hermetically-sealed delay relays in T6½ bulb-base 9-pin miniature style are now available from Amperite Co., Inc., 561 Broadway, New York 12, N. Y.

Tubes can be supplied for all standard heater voltages, such as 6.3 to 26 and 115 v. Delays available from 2 to 90 seconds. Wattage consumed by the heater is approximately 2 watts. Contact rating is 115 v at 2 a ac, non-inductive. Ambient compensated for temperatures from -50 to +70° C

Right: Amperite delay relay.



# Choice of the Leaders!

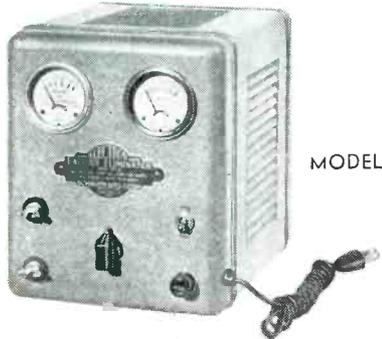
## ELECTROX

### D.C. POWER SUPPLIES!

Leading companies—General Motors • Sears Roebuck • Goodrich • Lincoln-Mercury • Western Auto Supply • Firestone • many others—have standardized on ElectroX D.C. Power Supplies for demonstrating and testing auto radios and other low voltage D.C. equipment. And servicemen everywhere have followed their lead—for the ElectroX is today's outstanding D.C. Power Supply . . . in performance and dollar-for-dollar value!

#### NEW MODELS!

Two new ElectroX Models are now available—compact—dependable—low cost! They deliver smooth, hum-free D.C. which will operate practically any auto radio—either push-button or manually tuned. They are designed to give the utmost in reliable, dependable service.



MODEL AR-5

Delivers 6 volts D.C.—smooth, hum-free. Output voltage adjustable for any load current between 3 to 15 amperes, indicated by 0-15 ampere D.C. ammeter; 0-8 volt D.C. voltmeter. Size: 7½" wide, 9¼" deep, 8" high.



MODEL AR-4

Same size, constructed to same high standards as Model AR-5 above, except output voltage is not adjustable. Delivers 6 volts D.C. at approx. 15 amperes.

ORDER NOW FROM YOUR DISTRIBUTOR. WRITE FOR FREE COPY OF BULLETIN 1467 GIVING COMPLETE DETAILS.

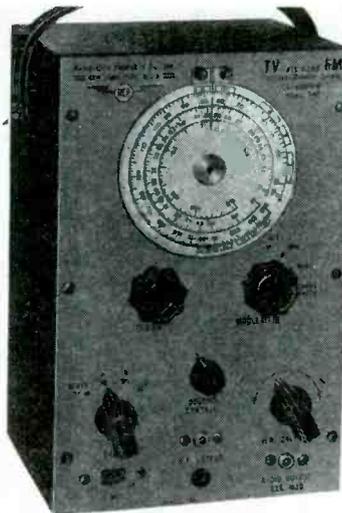
Rectifier Division  
**SCHAUER MANUFACTURING CORP.**  
4512 Alpine Ave. Cincinnati 36, Ohio

#### RCP FM-TV BAND SIGNAL GENERATOR

A portable signal generator, model 740, that covers all FM and TV channels, on fundamental frequencies, has been announced by Radio City Products Co., Inc., 152 W. 25th St., New York 1, N. Y.

Instrument features a range of 9 to 220 mc; bands 9-11 mc, 21-47 mc, 54-220 mc. Accuracy is said to be better than 1/10 of 1 per cent on 9-11 mc, and better than ½ of 1 per cent on 21-220 mc. Dial is continuously calibrated through 340°. Audio output is available at both 540 cycles and 220.5 kc. Features attenuation variation through 200-ohm control.

As a pattern generator, modulation can be either horizontal bar, vertical bar or cross hatch.

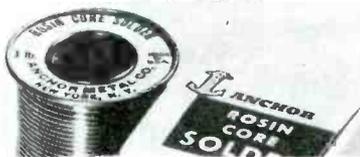


\* \* \*

#### ANCHOR ROSIN-CORE SOLDER

A rosin-core solder, that is said to have a high wetting and oxide-removing characteristic, has been developed by the Anchor Metal Co., 244 Boerum St., Brooklyn 6, N. Y.

Flux is claimed to be non-corrosive and electrically non-conductive. Solder may be used with copper, tin, zinc, brass, cadmium and nickel-plated metals. Available in all diameters, and in 1, 5, and 25-pound spools.



### Get RID of BARKHAUSEN OSCILLATION



with the

## PERFECTION B. O. ELIMINATOR



(Actual Size)

To eliminate the vertical black bars which appear in TV pictures as a result of Barkhausen Oscillation in the horizontal sweep output tube (such as the 25BQ6, 6BQ6, 6EV5, 25EV5, 6AU5 or 25AU5, etc.)—use the Perfection B. O. Eliminator.



Easy to Install

Because it brings a concentrated magnetic field near the screen grid it usually eliminates the oscillation. Just slip the B. O. Eliminator over the tube, move down, or up, or turn until the dark vertical bars disappear.

Order today from your supplier!

### PERFECTION ELECTRIC CO.

2635 South Wabash Avenue, Chicago 16, Illinois  
Makers of Perfection Speakers, Ion Traps and BeamaJuster TV Picture Centering Controls



## Low Cost Powerful P.A.!

COMPLETE • READY TO USE

Tops for powerful indoor-outdoor use; ideal for electioneering. Easy portability. Covers 4,000 persons indoors, up to 25,000 sq. ft. outdoors. Full 30 watts usable output; 2 high-imp. mike inputs, 1 phono input, each with separate volume control; tone control; fidelity ±2 db from 40-20,000 cps. Complete system includes: 30 watt amplifier and tubes, Electro-Voice "Cardax" unidirectional mike with adjustable floor stand and 20' cable; 2 General Electric 12" PM speakers, each with 30' cable; portable carrying case holds all, 16¼ x 12¼ x 25". For 110-130 v., 60 cy. A.C. Shpg. wt., 75 lbs. Complete, less only phono top.

93-372. Complete 30 Watt System. Only \$119.75  
93-340. 3-Speed Phono Top for above. Only \$16.95  
Available on Easy Terms—write for details

**FREE** See the 212-Page ALLIED Catalog for other Sound Systems, ranging from 8 to 80 watts. Write for Free copy of Radio's leading Buying Guide today.

## ALLIED RADIO

833 W. Jackson Blvd., Dept. 23-E-2, Chicago 7, Ill.



### MODEL TS-4 OPERATES UP TO 4 TV SETS FROM 1 ANTENNA



See your distributor or send for literature

**EPCO ELECTRONICS, INC.**, 140 Liberty St., New York 6, N. Y. Dept. S-5

#### ✓ Check these features

- ✓ Low Cost \$8.75 List
- ✓ No Inter-Set Coupling
- ✓ Operates in Fringe Areas
- ✓ High Efficiency Transformer Used
- ✓ Easily Installed with a Screw Driver
- ✓ No Soldering

#### Some of Our Other TV Accessories

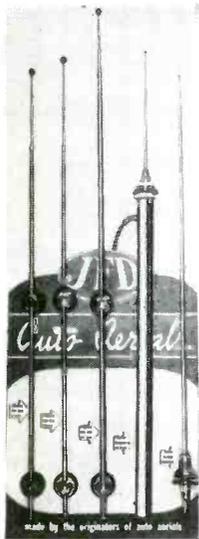
- TS-2—2 Set Coupler for Weak Signal Areas
- IGF-1—Ignition Interference Filter
- HPF-1—Hi-Pass Interference Filter
- AC-1—2 Set Coupler for Strong Signal Areas

### JFD AUTO ANTENNAS

An auto-antenna line, *Sky Streak*, featuring side cowl, top cowl and disappearing antennas, has been introduced by the JFD Manufacturing Co., Inc., 6101 16th Ave., Brooklyn 4, N. Y.

Two side-cowl antennas are available: *The Mariner*, SP66C, and *The Traveller*, 3B66C, 3-section 64-inch types. A 4-section side cowl, *The Whippet*, 4B100C, extending to 103" from a collapsed length of 31" and *The Beachcomber*, 3B4000, a 3-section top cowl which extends to 64" from 25" in collapsed position, are also available. A disappearing antenna, *The Highwayman*, 3B5000, has three sections and extends up to 66" from a closed length of 25".

All auto antennas, topped with an anti-static ball, are supplied with a connector that is said to eliminate corrosion, and 36' of *uhf* coax cable.



JFD auto-antenna display.

\* \* \*

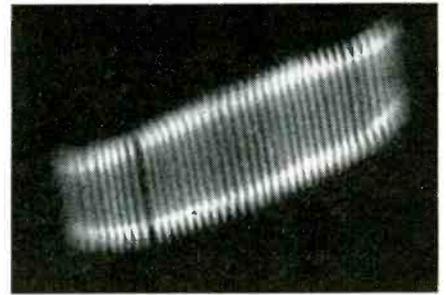
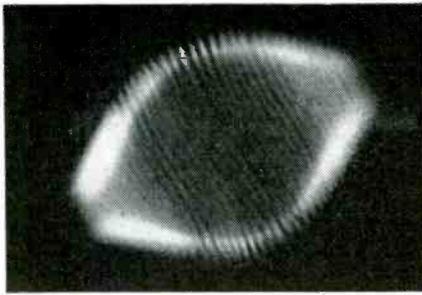
### SCALA 'SCOPE PROBES

A line of 'scope probes has been introduced by the Scala Radio Co., 2814 19th St., San Francisco 10, Calif.

One model, a signal-tracing probe, *B.Z.1*, can be used, it is said, to locate dead *if* stages, calibrate marker generator, adjust video amplifiers, check output of a sweep generator, view response of single *if* stage, trace buzz pulse in sound *if* strip, and can be used with a *vwm*. Contains demodulator of low-capacitance, and is useful to 225 mc.

Another model, a low-capacity probe, *B.Z.2*, can be used to trace video, sync or sweep waveforms through high-impedance circuits. Said to cut the effective input capacitance of a 'scope by a factor of 10 and provides an attenuation of 10 to 1.

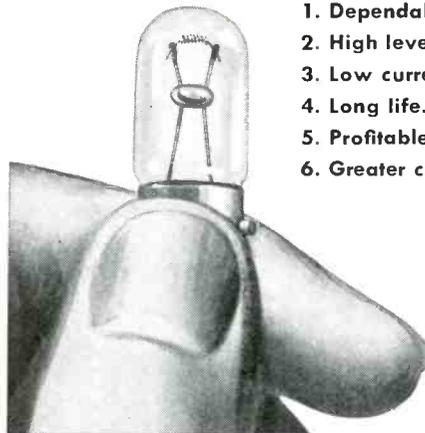
A third type, a 100:1 voltage-divider probe, *B.Z.3*, it is claimed, can be applied directly to plate of horizontal output tube or at the plate of the damper tube to check operation waveforms and measure their peak-to-peak voltages without impairing the wave shape or incurring danger to the 'scope.



## Why General Electric dial lamps stand the high notes

**T**HE high "C's" of a soprano often cause vibrations in the filaments and lead-in wires of radio dial lamps. In old-style lamps, these vital parts sometimes vibrate in different frequencies, setting up a whipping action (photo above, left) that eventually tears the filament apart.

But in G-E dial lamps, General Electric engineers have changed the filament supports so that the frequencies of the filament and lead-in wires match, thus greatly reducing the effect of the vibration (photo above, right). As a result, General Electric dial lamps give longer, more dependable service.



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 customer acceptance.

**Always replace  
with G-E dial lamps**

**GENERAL  ELECTRIC**

### MILWAUKEE RESISTOR-FUSE COMBINATION

A resistance unit, the *Fusistor*, that under normal electrical load will operate as a resistor only, but when subjected to an overload of current, will sustain the overload for a predetermined time, then melt or burn out before expiration of another given predetermined time, thus functioning as a fuse, has been developed by the Milwaukee Resistor Co., 700 W. Virginia St., Milwaukee 4, Wis.

Component can be built to carry an overload for a minimum of 20 seconds, then fuse or burn out within the next 30 seconds. Overload time-lag can be established within closely controlled minimum and maximum time limits. There is said to be no spewing of flame, or spark emission, at the moment of fusion.



Milwaukee resistor-fuse combination.

for dependable sound,  
**INDUSTRY** relies on  
**ATLAS**



DR Double-Reentrant Projectors



Paging & Talk-Back Speakers



ALNICO-V-PLUS Driver Units



Dual Speakers



FULL-GRIP, VELVET-ACTION Mike Stands



**ATLAS SOUND CORP.**

1442-39th Street, Brooklyn 18, N. Y.  
In Canada: Atlas Radio Corp., Ltd., Toronto, Ont.

**DEPENDABLE QUALITY:**

The latest electro-acoustic research and engineering—and over 20 years of manufacturing know-how—are behind every ATLAS product.

**DEPENDABLE SERVICE:**

Coast-to-coast and around the world today—in every Industrial, Marine, Railroad, Military, Educational, Civic, U.S. and Foreign Government application—under every kind of climate and noise condition—ATLAS sound equipment is famous for highest efficiency and durability. That's the proof of ATLAS performance dependability.

**DEPENDABLE DELIVERY:**

Yes, ATLAS gives our Government highest priority. And yes, we too feel the pinch of material shortages. But our customers will continue to get our usual dependable delivery—because we believe in equitable and dependable distribution to all ATLAS users.

**DEPENDABLE PROFITS:**

Completeness of line, excellence of product, dependable delivery, right prices—that's the ATLAS combination that means high, steady Industrial Sound profits for You!

JUDGE for yourself, COMPARE ATLAS at your local Jobber today. See why ATLAS is the preferred line for utmost dependability. Write NOW for FREE latest Catalog 551.

**NEWS**

**ARTHUR WELCH NAMED BENDIX ASS'T G-M**

Arthur E. Welch, formerly national merchandising manager for Raytheon, has been named assistant general manager of Bendix Radio, television and broadcast receiver division of the Bendix Aviation Corporation, Baltimore, Maryland.



Arthur E. Welch

**JENSEN CELEBRATING SILVER ANNIVERSARY**

The Silver-Anniversary theme will be featured in current and future '52 ads and promotions of the Jensen Manufacturing Co., 6601 S. Laramie, Chicago, Ill. Ads will bear a silver anniversary medalion logotype throughout the year. Theme will also be featured at the Parts Show, and at the "Audio Fair" following, where Jensen will sponsor a Silver Anniversary Sound Theatre.

**KAMEN NAMED BRACH VP**

Ira Kamen has been named vice-president of the Brach Manufacturing Corporation, Division of General Bronze Corp., Newark, N. J.

Kamen will be responsible for organizing the expanded industrial and government sales operations, and will continue to handle contract negotiations for radar antenna, servo, and other electronic activities.



Ira Kamen

**XCELITE Hand Tools**  
PREFERRED BY THE EXPERTS

**The Right Screwdriver In A Flash!**



**UNIDRIVER**

has these 5 screwdriver blades that store in its hollow handle and fit the quick-change chuck:

- PHILLIPS No. 1 Point
- PHILLIPS No. 2 Point
- Slotted 3/16" Blade
- Slotted 1/4" Blade
- Clutch type 3/16" Blade

Only \$3.50 List

**XCELITE INCORPORATED**

(Formerly Park Metalware Co., Inc.)  
Dept. V, Orchard Park, N. Y.  
ORIGINATORS—NOT IMITATORS

**For Originality LOOK TO XCELITE**

**JFD AUTO-ANTENNA DISPLAY**

A 4-color display, AD100, that will hold five auto-antennas, has been announced by the JFD Manufacturing Co., Inc., 6101 16th Ave., Brooklyn 4, N. Y.

**HARRY ADELMAN APPOINTED ARROW AD MANAGER**

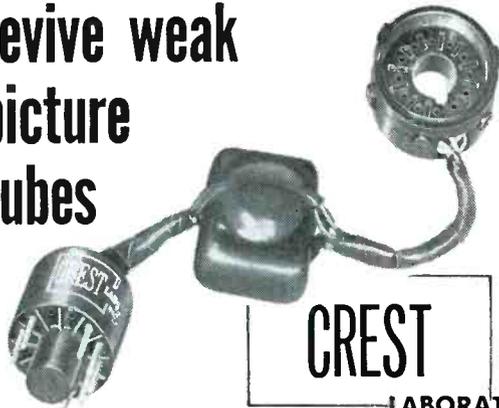
Harry Adelman has been appointed advertising and sales promotion manager of Arrow Electronics, Inc., 82 Cortland St., New York 7, N. Y.

**SPICO ANTENNA AT MACY FESTIVAL**



At the recent Macy department store TV and music festival which featured a demonstration of the Spico Super-Phantom indoor TV antenna, model TV-503. Left to right: I. Kamins, Macy's radio and TV assistant buyer; Milton Spirt, president of Spirling Products Co., producers of the Spico antenna, and Eve Edwards, demonstrator.

revive weak picture tubes



**CREST**

LABORATORIES, INC.

Whitehall Building, Far Rockaway, N. Y.

- Simple Plug-in
- Permanent Hook-up
- Applicable to all size tubes
- Save on service contracts
- Automatically operated
- Only \$3.85 dealer net

Pat. applied for

**NEPCO FORMS ELECTRONICS DIVISION**

An electronics division, with headquarters at its Ambridge (Pa.) plant, has been announced by National Electric Products Corp., Chamber of Commerce Bldg., Pittsburgh 19, Pa. The new division will consist of two departments: TV and radio, and radar.

The TV and radio department will be located at the Ambridge plant, and the radar department will be located at the Elizabeth (N. J.) plant.

The new division, at present, will devote its attention to the manufacture and distribution of Nepco-yagi antennas, TV masts, and a complete line of TV rough-in materials, as well as special types of wire intended for TV use, including twin-lead, open and ground wire.

Frank P. Yarussi, former vice president in charge of engineering of Gordon Electronics, will head TV and radio sales. R. F. Mihalick will serve as a consulting engineer specialist.



F. P. Yarussi  
\* \* \*

**INTERNATIONAL RECTIFIER NAMES CATALDO ASS'T G-M**

J. T. Cataldo has been appointed assistant general manager of International Rectifier Corp., 1521 E. Grand Ave., El Segundo, Calif.

Cataldo was formerly with the Signal Corps Engineering Laboratories, Ft. Monmouth, N. J. as a research and development engineer.



J. T. Cataldo  
\* \* \*

**SERVICE AND REPLACEMENT BUSINESS PROMOTION INAUGURATED BY RCA**

A promotion drive, designed to accelerate consumer demand for TV picture and receiving tubes, and support radio Service Men in their local business-building efforts has been announced by the RCA Tube Department, Harrison, N. J. Program embraces national radio and TV advertising, a variety of in-store and window display material, direct mail literature, a kit of six basic sales aids for use by Service Men in tie-in promotions, and a promotion-plan catalog. Included is a leaflet designed for the consumer, presenting an illustrated story on how picture-tubes are made.

Available to the consumer is an illustrated booklet, *The Magic RCA Picture Tube*. Booklet is available for direct mail, counter handout, and distribution during service calls.

For point-of-service display, the company has designed a flasher-action window display unit.



# "CONICAL-V-BEAMS"

\*REGISTERED TRADE MARK

**Now! Customized for your locality**  
**CUSTOM-DESIGNED ANTENNAS**  
*at mass production prices!*

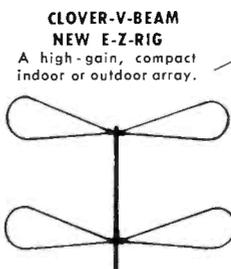


Another Telrex first in superior antenna service. Famous Conical-V-Beams custom designed for best results in your particular area. Regular list prices prevail, meaning you get better performance, more satisfied customers and your selling territory for TV receivers is increased tremendously. Installing *customized* Telrex antennas is insurance against callbacks due to antenna adjustments and you enjoy the added protection of Telrex super-durable, all weather construction. Just specify the installation area when ordering, Telrex will supply your antennas cut-to-area for the finest pictures ever!

**— for superior reception on TV, FM and UHF**



**DUBL  
CONICAL-V-BEAM**  
For outstanding all station performance. Has new HI-V-REFLECTOR.



**CLOVER-V-BEAM  
NEW E-Z-RIG**  
A high-gain, compact indoor or outdoor array.

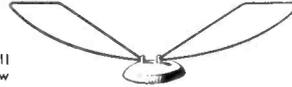


**TELREX "FISHBONE"**  
Ten **WORKING** elements. Guaranteed to outperform any Yagi.

**SEE THEM ALL AT BOOTH 7 RADIO PARTS SHOW!**



**TELREX "BAT-WING"**  
Outperforms any top-of-set antenna with no tuning or pruning.



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Standard on Monarch and Universal Series.

"CONICAL-V-BEAMS" are covered by Patent No. 23,346  
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**CONICAL-V-BEAMS**

AMERICA'S OUTSTANDING TELEVISION BEAM

**ASBURY PARK 4, N. J.**

Originators and Manufacturers of "CONICAL-V-BEAMS" —INSIST on the original!

**RIDER TELL-A-FAULT TROUBLESHOOT SERVICE**

A monthly troubleshooting service, *Tell-A-Fault*, that is said to provide practical information, has been introduced by John F. Rider Publisher, Inc., 480 Canal St., New York 13, N. Y.

Service offers data on troubleshooting (symptoms and cures) for all types of television and also radio receivers, record changers and recorders.

Detailed are pictorial symptom and cure sheets, which list TV trouble symptoms as they appear on picture tubes; also fault locations and explanations of test 'scope patterns for each type of circuit found in TV receivers; circuit guides, which are examples of the many different circuits, etc.

**TACO SCHOLARSHIP FUND**

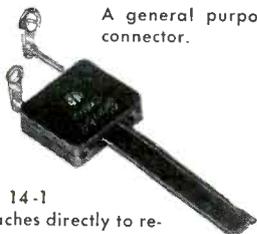
An educational scholarship, that will provide financial aid for a qualified student throughout his college education, has been set up by Technical Appliance Corporation, Sherburne, N. Y. Object of the scholarship is to further local interest among young men and women for a technical career.

Scholarship is available to a student who is a member of the graduating class of the Sherburne Central School, or a former member of that school. Recipient will receive the scholarship annually for four or five years, depending upon the length of the college course undertaken.

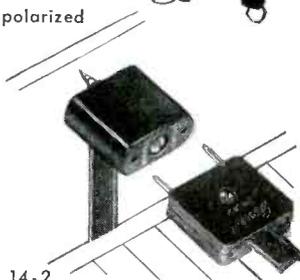
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TWIN LINE CONNECTORS GIVE  
YOU A CHOICE FOR ANY  
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PROBLEM!



No. 14-0  
A general purpose polarized  
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No. 14-1  
Attaches directly to re-  
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Eliminates cutting line  
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No. 14-2  
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tion for antenna lead-in and inside lead  
to set. Mount them in parallel to accom-  
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# Finest TV Reception

the *Hi-Lo*  
TV Spiral Indoor  
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We repair tuners for all makes of TV receivers. . . . Our large volume of work handled has given us

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**CHANNEL MASTER ANTENNA  
BOOKLET**

A 12-page booklet, *Your Guide to Channel Master Television Antennas*, describing more than 50 different types of antennas, accessories, and kits, has been announced by Channel Master Corporation, Ellenville, N. Y.

Booklet describes the specific reception problems that each antenna is designed to solve, including the latest types, such as 10-element impedance-matching yagi, the *Big 10*. Also includes data on towers, mounting accessories, and telescoping masts.

**PURINTON AND ROUS NOW  
AMPHENOL DIRECTORS**

Vice president Richard M. Purinton, administrator of engineering, and vice president William H. Rous, sales manager, have been named members of the board of directors of the American Phenolic Corp., Chicago, Ill.

**FACILITY AND MERCHANDISING  
BROCHURES RELEASED BY RADION**

Two brochures, one describing plants and equipment facilities and the other, *How To Profit With Radion*, detailing how to get the most out of indoor antenna business, are now available from The Radion Corp., 1130 W. Wisconsin Ave., Chicago 14, Ill.

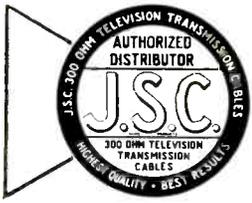
**FTR NOW PHOTOFAC  
PARTICIPANT**

The Federal Telephone & Radio Corporation, of Clifton, N. J., has become a participant in the Photofact folder services of Howard W. Sams & Co., Indianapolis, in behalf of its line of selenium rectifiers.

**WARD AUTO-ANTENNA COUNTER  
DISPLAY**

A blue-orange-black counter display, *WCD-2*, for auto antennas, has been announced by Ward Products Corp., Division of The Gabriel Company, 1523 East 45th St., Cleveland 3, Ohio.

Display mounts three antennas, and is constructed from masonite.

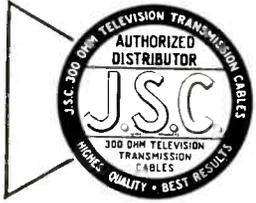


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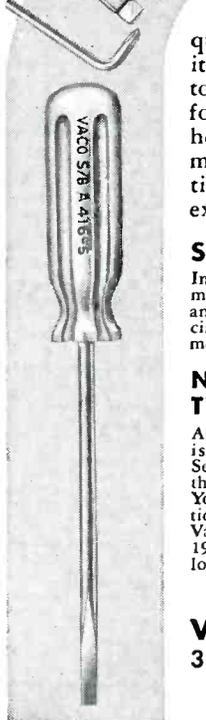
No probes made anywhere do the job of SCALA oscillograph probes so efficiently, so easily. Use with your present scope . . . low cost will be paid ten times over in a month. Check your local distributor or write factory and specify model number: **BZ-1 SIGNAL TRACING PROBE** . . . locates dead I.F. stages, marks ratio detector curve, calibrates marker generator, adjusts video amplifiers, checks output of sweep generator, views response of single I.F. stage, traces buzz pulse in sound I.F. strip. Can be used with V.T.V.M. Contains demodulator of low-capacitance, high-impedance design, useful to 225 MC.

**BZ-2 LOW CAPACITY PROBE** . . . makes it possible to trace video, sync or sweep waveforms through high-impedance circuits without causing waveform distortion due to circuit loading. Cuts the effective input capacitance of scope by a factor of 10 and gives an attenuation of 10 to 1.

**BZ-3 100:1 VOLTAGE DIVIDER PROBE** . . . is very useful in trouble-shooting horizontal sweep circuits. It may be applied directly to plate of horizontal output tube or at the plate of the damper tube to check the operation waveforms and to measure their peak to peak voltages without impairing the wave shape or incurring danger to the oscillograph.

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Also available from Vaco is a new 27-piece TV Service Kit made up at the request of TV men. You'll find a full description of this kit and other Vaco products in the new 1951 Vaco 3-color catalog. Send for it, today.



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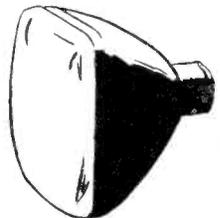
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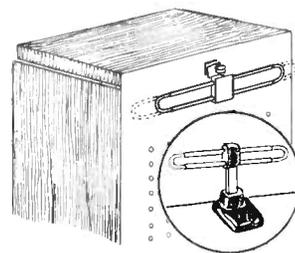


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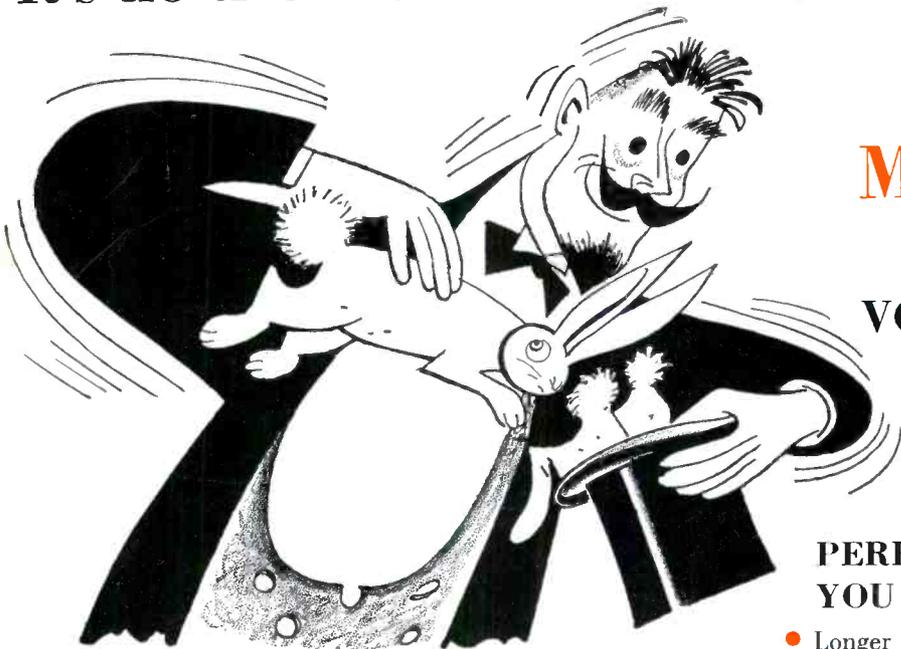
## JOTS AND FLASHES

A BRIGHT REPLACEMENT MARKET for picture tubes is in the offing for '52, according to John T. Thompson, manager of G.E. replacement tube sales, who found during a recent survey that about one out of every fifteen TV set owners, and there are 16-million at present, will probably need a new picture tube before the year is over. About 1,100,000 picture tubes worth \$44-million, and 110,000,000 receiving tubes worth \$220-million will be sold this year for TV, as well as radio replacement purposes, according to the results of this specialist's study. . . . To help their radio and TV tube dealers and distributors recover from the damage of the recent raging midwestern floods, *Sylvania* has offered to test and repackage tube stocks affected by flood waters. A headquarters engineer, it was said, will visit each distributor, if necessary, to thoroughly test and inspect dealer and

distributor tube stocks where there is any question of damage by flood waters. . . . *H. R. Letster* is now sales manager of the industrial division of Webster-Chicago Corp. . . . The Chicago branch offices and warehouse of *Allied Electric Products Inc.* and its *Sheldon Electric* division have been moved to enlarged quarters, and are now occupying a two-story structure at 2300 North Ashland Ave., Chicago. . . . A four-page list-price sheet, with actual-sized drawings of 25 fuse types and blowing characteristics, has been published by *Littlefuse, Inc.*, 1865 Miner St., Des Plaines, Ill. A companion sheet illustrates and prices various assortments and kits as well as the complete line of fuse mountings. . . . *Radio Specialties Co.*, 1956 S. Figueroa St., Los Angeles 7, Calif., celebrated their 20th anniversary recently with the opening of new facilities at the corner of 20th and Figueroa Sts., Los Angeles, Calif.

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Agency: Austin C. Lescarboura & Staff	Agency: Atherton & Currier, Inc.
<b>ALLIED RADIO CORPORATION</b> . . . . . 82	<b>P. R. MALLORY &amp; CO., INC.</b> . . . . . 11, Inside Back Cover
Agency: George Brodsky, Advertising	Agency: The Atkin-Kinnett Co.
<b>ALPRODCO, INC.</b> . . . . . 53	<b>J. MILLER CO.</b> . . . . . 74
Agency: Paul J. Steffen Co.	<b>MOSLEY ELECTRONICS</b> . . . . . 72
<b>AMERICAN PHENOLIC CORP.</b> . . . . . 32	Agency: Bartz Adv. Agency
Agency: Burton Browne, Advertising	<b>MULTICORE SALES CORP.</b> . . . . . 86
<b>AMERICAN TELEVISION &amp; RADIO CO.</b> . . . . . 88	Agency: Arthur Gassman Co.
Agency: Firestone-Goodman Adv. Agency	<b>MUELLER ELECTRIC CO.</b> . . . . . 62
<b>ANTENNA MANUFACTURERS ASSN.</b> . . . . . 54	<b>NATIONAL ELECTRIC PRODUCTS CORP.</b> . . . . . 76
Agency: The Hubbell Adv. Agency	<b>OXFORD ELECTRIC CORP.</b> . . . . . 61
<b>ASTRON CORP.</b> . . . . . 68	Agency: Sander Rodkin Adv. Agency
Agency: Satow & Associates	<b>PERFECTION ELECTRIC CO.</b> . . . . . 82
<b>ATLAS SOUND CORP.</b> . . . . . 84	Agency: Seantlin & Co.
Agency: H. W. Hauptman Co.	<b>PERMA-POWER CO.</b> . . . . . 55
<b>BENDIX RADIO</b> . . . . . 30	Agency: Sander Rodkin Adv. Agency, Ltd.
Agency: MacManus, John & Adams	<b>PHOENIX ELECTRONICS, INC.</b> . . . . . 80
<b>BLONDER-TONGUE LABS.</b> . . . . . 74	Agency: Milton Richards Adv. Co.
Agency: Sharpe-Wilkes, Inc.	<b>PLANET MFG. CORP.</b> . . . . . 76
<b>L. S. BRACH MFG. CORP.</b> . . . . . 66	Agency: Gordon A. Pihl Associates
Agency: Conti Adv. Agency, Inc.	<b>PLASTOID CORP.</b> . . . . . 67
<b>BURGESS BATTERY CO.</b> . . . . . 56	Agency: Byrde, Richard & Pound
Agency: Ruthrauff & Ryan, Inc.	<b>PRECISE MEASUREMENTS CO.</b> . . . . . 12
<b>CENTRALAB DIV. GLOBE-UNION, INC.</b> . . . . . 38, 39	Agency: Mitchell Adv. Agency
Agency: Klau-Van Pietersom-Dunlop Associates, Inc.	<b>PRECISION APPARATUS CO., INC.</b> . . . . . 12
<b>CHANNEL MASTER CORP.</b> . . . . . 73	Agency: Sharpe-Wilkes, Inc.
Agency: Duso Advertising, Inc.	<b>PYRAMID ELECTRIC CO.</b> . . . . . 23
<b>CLAROSTAT MFG. CO., INC.</b> . . . . . 5	Agency: Herbert Lindauer Studio
Agency: Austin C. Lescarboura & Staff	<b>RAD-EL-CO MFG. CO.</b> . . . . . 68
<b>CLEAR BEAM TV ANTENNAS</b> . . . . . 75	Agency: Lehman Wood
Agency: Stiller-Rouse & Associates	<b>RADIART CORP.</b> . . . . . 66, Inside Front Cover
<b>COLUMBIA WIRE &amp; SUPPLY CO.</b> . . . . . 62	Agency: Stern and Warren
Agency: Sander Rodkin Adv. Agency, Ltd.	<b>RADIO CITY PRODUCTS CO.</b> . . . . . 65
<b>CORNELL-DUBILIER ELECTRIC CORP.</b> . . . . . 44	Agency: Jaman Advertising, Inc.
Agency: Reis Advertising	<b>RADIO CORPORATION OF AMERICA</b> . . . . . 7, Back Cover
<b>CORNELL-DUBILIER RADIART</b> . . . . . 71	Agency: J. Walter Thompson Co.
Agency: Stern and Warren	<b>RADIO MERCHANDISE SALES, INC.</b> . . . . . 20
<b>CREST LABORATORIES</b> . . . . . 84	Agency: Reid Associates
Agency: Bachenhelmer-Lewis, Inc.	<b>THE RADION CORPORATION</b> . . . . . 59
<b>DELCO RADIO DIV. GENERAL MOTORS CORP.</b> . . . . . 4	Agency: Calkins & Holden, Carlock, McClinton & Smith, Inc.
Agency: Campbell-Ewald Co.	<b>RA-KAR ENTERPRISES</b> . . . . . 87
<b>DRAKE ELECTRIC WORKS, INC.</b> . . . . . 62	Agency: J. H. Kennedy, Advertising
Agency: Symons, MacKenzie & Co., Inc.	<b>THE RAULAND CORPORATION</b> . . . . . 1
<b>ALLEN B. DU MONT LABORATORIES, INC.</b> . . . . . 9	Agency: MacFarland, Aveyard & Co.
Agency: Austin C. Lescarboura & Staff	<b>RAYTHEON MFG. CO.</b> . . . . . 18
<b>ELECTRO PRODUCTS LABORATORIES, INC.</b> . . . . . 3	Agency: Walter B. Snow & Staff
Agency: Clarence M. Gotsch Associates	<b>REGENCY DIV. I.D.E.A., INC.</b> . . . . . 27
<b>ELECTRO-VOICE, INC.</b> . . . . . 63	Agency: Burton Browne, Advertising
Agency: Henry H. Teplitz, Advertising	<b>HOWARD W. SAMS &amp; CO., INC.</b> . . . . . 68
<b>EPCO ELECTRONIC, INC.</b> . . . . . 82	Agency: George Brodsky, Advertising
<b>ERIE RESISTOR CORP.</b> . . . . . 78	<b>SCHAUER MFG. CORP.</b> . . . . . 82
Agency: W. S. Hill Co.	Agency: The Keeler & Stittes Co.
<b>FAIRPRICE PRODUCTS</b> . . . . . 70	<b>SIMSON ELECTRIC CO.</b> . . . . . 50
<b>FEDERAL TELEPHONE &amp; RADIO CORP.</b> . . . . . 14	Agency: Burton Browne, Advertising
Agency: J. M. Mathes, Inc.	<b>SCALA RADIO CO.</b> . . . . . 87
<b>THE FINNEY CO.</b> . . . . . 69	Agency: Richard Meltzer Adv., Inc.
Agency: Allied Adv. Agency, Inc.	<b>SKYLINE MFG. CO.</b> . . . . . 79
<b>GENERAL CEMENT MFG. CO.</b> . . . . . 45	Agency: Packaging-Design-Advertising
Agency: Paul J. Steffen Co.	<b>SNYDER MFG. CO.</b> . . . . . 28
<b>GENERAL ELECTRIC LAMP DEPT.</b> . . . . . 83	Agency: Brooks and London
Agency: Batten, Barton, Durstine & Osborne, Inc.	<b>SOUTH RIVER METAL PRODUCTS CO., INC.</b> . . . . . 70
<b>THE GENERAL INDUSTRIES CO.</b> . . . . . 77	Agency: Art-Copy Adv. Agency
Agency: Meldrum & Tewsmith, Inc.	<b>SPRAGUE PRODUCTS CO.</b> . . . . . 31
<b>GRAYBURNE CORPORATION</b> . . . . . 78	Agency: The Harry P. Bridge Co.
Agency: H. W. Hauptman Co.	<b>STANDARD TRANSFORMER CORP.</b> . . . . . 10
<b>GRAYHILL</b> . . . . . 86	Agency: Burnet-Kuhn Adv. Co.
Agency: Merchandising Advertisers, Inc.	<b>SARKES TARZIAN, INC.</b> . . . . . 46
<b>HALLDORSON CO.</b> . . . . . 47	Agency: H. L. Ross, Advertising
Agency: Western Adv. Agency, Inc.	<b>TECHNICAL APPLIANCE CORP.</b> . . . . . 16
<b>HEATH COMPANY</b> . . . . . 80	Agency: Austin C. Lescarboura & Staff
Agency: G. Dean Arndt, Advertising	<b>TEL-A-BAY ENTERPRISES, INC.</b> . . . . . 15
<b>HICKOK ELECTRICAL INSTRUMENT CO.</b> . . . . . 6	Agency: Keller-Cressent Co.
Agency: The White Adv. Co.	<b>TELEVISION TUNER CO.</b> . . . . . 86
<b>HI-LO TV ANTENNA CORP.</b> . . . . . 86	<b>TELREX, INC.</b> . . . . . 85
Agency: Sander Rodkin Adv. Agency	Agency: George Homer Martin Associates
<b>HYTRON RADIO &amp; ELECTRONICS CO.</b> . . . . . 13	<b>TRANSMISSION, INC.</b> . . . . . 72
Agency: Bonnett, Walther & Menadier, Inc.	Agency: H. J. Gold Co.
<b>I. E. MFG. CO.</b> . . . . . 60	<b>TRIO MFG. CO.</b> . . . . . 8
Agency: Manning Enterprises, Ltd.	Agency: Bartz Adv. Agency
<b>JFD MFG. CO.</b> . . . . . 2	<b>TRIPLETT ELECTRICAL INSTRUMENT CO.</b> . . . . . 41
<b>JENSEN INDUSTRIES, INC.</b> . . . . . 17	Agency: Western Adv. Agency, Inc.
Agency: Paul J. Steffen Co.	<b>V-M CORPORATION</b> . . . . . 81
<b>JENSEN MFG. CO., INC.</b> . . . . . 48	Agency: Maynard Sales & Adv. Counsel
Agency: Burton Browne, Advertising	<b>VACO PRODUCTS CO.</b> . . . . . 87
<b>JERSEY SPECIALTY CO.</b> . . . . . 87	Agency: Keniliff-Breslich, Inc.
Agency: George Gero, Advertising	<b>WALDOM ELECTRONICS, INC.</b> . . . . . 70
<b>KESTER SOLDER CO.</b> . . . . . 43	Agency: Turner Adv. Agency
Agency: Paul J. Steffen Co.	<b>WRIGHT, INC.</b> . . . . . 74
<b>THE LA POINTE-PLASCOMOLD CORP.</b> . . . . . 64	Agency: Kay Advertising, Inc.
Agency: The F. W. Prella Co.	<b>XCELITE, INC.</b> . . . . . 84
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It's no trick to make 'em fit . . . fast!



## MALLORY MIDGETROL®

### ROUND-SHAFT VOLUME CONTROLS

#### FAST, EASY INSTALLATION

- Because of the wide and easy adaptability of Mallory Midgetrols, it's easy to stock—or get fast from your distributor—just what you need to do your job.
- Round tubular shaft designed and built for fast, easy and accurate cutting.
- Factory-tested AC switch may be attached instantly without disassembling control.
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**Make Sure!  
Make it Mallory!**

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- Longer lasting resistance elements even in extremes of temperature and humidity.
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- No pigtail connections to break, thanks to Mallory's exclusive sliding contact which gives EXTRA quiet operation.
- Minimum wobble with Mallory's exclusive 2-point shaft suspension.

So versatile are Mallory Midgetrols—both standard and dual—that they reduce by 40% the cost of inventory needed to service the 10 most popular makes of radio and TV sets.

The Mallory Midgetrol is shown with the two shaft ends packed with every control to permit easy use of split-knurl or flatted type knobs. The Mallory Midgetrol line, in addition to round shaft standard controls, includes dual concentric controls that offer fast, easy assembly in five steps *without* special tools. Front and rear sections are factory assembled and inspected. AC switch attachment is easy.

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with RCA's new  
Sales and Servicing aids

and watch  
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NEVER BEFORE has RCA made available to you such a varied and colorful assortment of Radio-TV Sales and Servicing Aids to help you build your business—the most comprehensive and useful promotions in the industry. You'll find all the basic business builders . . . from traffic-stopping illuminated "Service" signs and displays to colorful mailing pieces and souvenir gift items, to build your local reputation as "TV-Radio Service Headquarters."

In addition, RCA offers you top-flight technical publications such as the famous "Pict-O-Guides," the "Triple Pindex" with tube base diagrams, "RCA Kinescopes" . . . and the new, authoritative book on "TV Servicing" . . . to make your job easier and more profitable.

For the whole exciting story, ask your RCA Tube Distributor *today* for your free copy of the colorful brochure "In Focus for '52," that describes and illustrates 33 dynamic Sales and Servicing Aids to help you cash in on the fast-growing TV-Radio service business.



**RADIO CORPORATION of AMERICA**

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HARRISON, N. J.

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BRING OUT  
THE BEST...  
IN ANY  
SET!



ILLUMINATED FLASHING  
WINDOW DISPLAY



"TELEVISION SERVICE  
CAMPAIGN KIT"



INDOOR ILLUMINATED  
"FIREGLOW" SIGN



Get this Free Brochure Today from  
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