

# ELECTRONIC TECHNICIAN

Including  
**SERVICE**  
Magazine

**HORIZONTAL  
CIRCUIT  
PROBLEMS**

50¢  
April • 1960



*Here is the new Standard Coil Tuner Replacement and Repair Program that enables you to offer better service to your customers at greater profit. Now Standard Coil Products provides the tools that will enable you to cash in on the profitable tuner repair and replacement market.*

#### **TUNER REPLACEMENT LISTING IN SAMS PHOTOFAC**

Starting in January, Standard Coil tuner replacement listings will appear in all Sams TV Photofact. Tuner replacement information will be right at your finger tips. Standard Coil is the *only* manufacturer ever to provide this service.

#### **NEW TV TUNER REPLACEMENT GUIDE**

Lists original equipment TV tuners with the Standard Coil equivalent replacement for each. Also includes major mechanical replacement parts for all Standard Coil Tuners—those used in original equipment as well as the universal replacement. Eliminates all guesswork—minimizes your tuner repair and replacement problems.

#### **48 HOUR FACTORY GUARANTEED REPAIR SERVICE**

Standard Coil's special service department set-up assures factory guaranteed repairs—*on a 48 hour in-plant cycle!* All repaired tuners carry a *six month warranty* on defective workmanship and parts failure (excluding tubes). Gives you more time for additional service calls—promptly returns your customer's set to like new operating condition.

#### **DEFECTIVE TUNER TRADE-IN ALLOWANCE**

Tuners which can *not* be repaired can be traded in against a new replacement tuner which carries a *full twelve month factory guarantee*. See your Standard Coil Distributor for complete details on how trade-ins can increase your tuner sales and profits—create greater customer satisfaction.

#### **JUMP ON THE STANDARD COIL PROFIT WAGON TODAY!**

For additional details, see your authorized Standard Coil Distributor or write to:

*Standard*

**Coil Products Co., Inc.**

2085 North Hawthorne Avenue, Melrose Park, Illinois

# ELECTRONIC TECHNICIAN

Including  
**SERVICE**  
Magazine

World's Largest Electronic Trade Circulation

April, 1960

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## FRONT COVER

Defects in the horizontal afc circuit frequently take the guise of familiar fault symptoms in other TV sections. Professional service methods used to check this deceptive circuitry are described on page 32.

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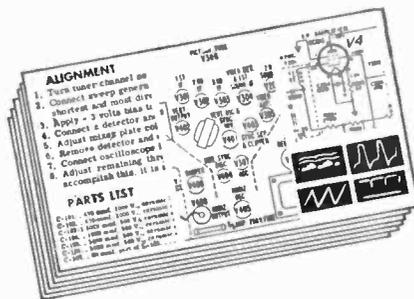
(16 pp. latest schematics—see last page)

DEWALD: FM Table Radio Model P-705

EMERSON: TV Chassis 120517E, 120518F, 120519C, 120520D, 120525E, 120526C

GENERAL ELECTRIC: TV Chassis M554  
RCA: Stereo Hi-Fi Console Models PM-17, PM-18

ZENITH: TV Chassis 18E20, 18E20Q, 18D20, 18D20Q



# "Quality line makes it easy

... says *Hubert A. Lindsey*, winner of  
 "Go Places with Mallory" contest



"That's why I knew I couldn't miss with the Mallory flight bag full of components—even if I didn't win a trip to Mexico. Of course, going to Mexico—and seeing Dixie Radio's salesman Joe Harris win a trip for introducing me to Mallory components—made the buy a doubly good one."

The Mallory line is *always* a good buy. Every item—Gems, TC's, Discaps\*, Sta-Loc® controls, FP's, Gold Label® vibrators and Mallory mercury batteries—delivers extra dependability, customer satisfaction and profit. With a deal like this, you don't even have to leave your home town to "go places with Mallory."

To go places with *your* customers, always use dependable, reputation-protecting Mallory components for radio and TV servicing and for industrial electronic maintenance, too. You're sure of getting quality products ... at sensible Mallory prices. See your Mallory distributor right away. And watch for the next big Mallory contest!

\*Trademark of Radio Materials Company  
 A Division of P. R. Mallory & Co. Inc.

Distributor  
 Division



STOP CALLBACKS WITH THESE  
 QUALITY MALLORY PRODUCTS ...



**FP ELECTROLYTICS**  
 The original 85°C cathode capacitor. Etched cathode construction—standard in FP's at no extra cost—assures hum-free performance. High ripple current ratings.



**MERCURY BATTERIES**  
 Unequaled for transistor radios... They give steady power several times longer ... stay live for years when idle. "First in space" in U.S. satellites.



**STA-LOC CONTROLS**  
 No waiting, no shopping. Your distributor can custom build, in just 30 seconds, any of over 38,000 types of single or dual controls.



**TC ELECTROLYTICS**  
 Economically priced filter capacitors with a reputation for top performance. Proved in service and backed by years of Mallory experience. Hermetically sealed.



**RMC DISCAPS**  
 Made by the world's largest producer of ceramic disc capacitors. Long the original equipment standard. In handy 3x5" file card packages. Easy to stock and use.



**GEMS**  
 5 rugged, moisture-proof Mallory "Gem" tubular capacitors in a handy dispenser that keeps stock fresh, clean, easy to find; prevents kinks in lead wires.

# to go places with Mallory™



▲  
Hubert A. Lindsey operates the Forest Heights TV Center, Statesville, N.C. His two man shop serves the Statesville area with general repair work on radio and television sets, hi-fi, auto radios and appliances.

A lifelong resident of Statesville, Mr. Lindsey received his electronics training with a local technical institute following his return from World War II service in the Marine Corps. He has been in electronic servicing for twelve years, has established a reputation for courteous, reliable service.

▲  
*Mr. and Mrs. Lindsey (at far left) "had a ball" on their recent trip to Mexico City, first prize awarded for Mr. Lindsey's entry in "Go Places with Mallory" contest . . . And it all started when he bought the Mallory flight bag from Joe Harris of Dixie Radio Supply, shown here with Mrs. Harris and the Lindseys as they took off for Mexico City.*

# Newest Soldering Gun Value on the market!

MODEL 8100B

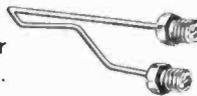
**NEW  
DESIGN**  
for 1960 from

*Weller*

...and  
it's  
only **\$644**  
LIST PRICE

## Check these advanced features:

- ✓ New Long-Life Wellertip—Utilizes copper for superior heat transfer, plus iron-plating for rigidity and long life. Copper conducts heat 5 times faster than steel, permits operation at lower temperature, prevents damage to components. Long reach for easier use in difficult places.
- ✓ 100 watts—single heat
- ✓ Tip heats instantly when trigger is pulled—no waiting
- ✓ Prefocused spotlight illuminates work, eliminates shadows
- ✓ New compact, streamlined design with rugged housing
- ✓ Perfect balance for greatest soldering accuracy
- ✓ Guaranteed for 1 year—UL approved



On sale now at your Electronic Parts Distributor

Send for Weller Gun Bulletin

**WELLER ELECTRIC CORP.** 601 Stone's Crossing Rd.  
Easton, Pa.

## Editor's Memo



This month I want to talk about sex. You might justifiably wonder what place this subject has in a technical trade publication—and that is the point of this column.

Those readers whom we have had the pleasure of meeting, know that we are not pruders. Like taxes and baseball, sex is here to stay. We have no quarrel with the appreciation of female beauty, in person on the beach and in print on a calendar, all in their proper places.

The question is whether an electronics magazine should present a picture that is more than just a pretty girl. I am referring to a photo of a sex bomb tied into a double meaning headline that is suggestive of haystacks and bedrooms.

The reason for discussing this subject is that a manufacturer recently attempted to place a series of ads in *ELECTRONIC TECHNICIAN Magazine* which featured one of the nation's foremost idols of pulchritude. Tied in with a too obvious pose, is the supposedly clever suggestive headline. We rejected the ads because we thought—and believe our readers think—that such heavy-handed sex has no place in a trade magazine.

Chances are, you may see this series of ads elsewhere. Frankly, it is doubtful whether such shenanigans in advertising convey a sense of quality and reliability to a potential customer.

I would be interested to learn what you, the reader, think of advertising which goes beyond a picture of a pretty girl to the extreme of becoming almost bawdy.

There is a story told about the *Saturday Evening Post*, which once published a serial fiction story about a secretary and her boss. At the end of the first installment, the girl was in the man's apartment having drinks one evening. The second installment opened in the man's apartment, with the couple having breakfast together. Readers blew up a storm of protest, claiming that such improprieties had no place in a family magazine. The editor answered his critical readers with a footnote that went something like this: "The *Post* is not responsible for the actions of its fiction characters between weekly installments!"

*Al Forman*

the  
**BIG SWITCH**

is to

**MINIATURIZED**  
**ELMENCO**  
 capacitors



Actual Size  
 .05  
 ±10%  
 600WV

**ELMENCO**  
**MYLAR\*-PAPER**  
**DIPPED**  
**CAPACITORS**

**RELIABILITY**

Elmenco dp Mylar\*-Paper Capacitors have achieved a reliability that meet missile and computer requirements. They are thoroughly and continually tested during production to insure outstanding performance. For example a 0.1 mfd. dp capacitor operated at full rated voltage and at 105° C will have a life expectancy of more than 7,168,000 unit hours.

**MOISTURE-PROOF**

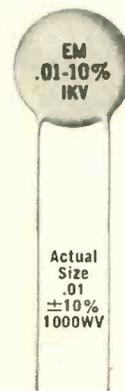
Elmenco dp Capacitors are specially processed and vacuum dipped to obtain solid impregnation and a rugged moisture-proof coat designed to withstand 4 times more humidity than the best molded capacitors used in the past.

**MINIATURIZED**

These capacitors are up to 50% smaller than other brands and can be used in printed circuit and transistor applications.

\*DuPont Reg. Trademark

Write for catalog dp 110.



Actual Size  
 .01  
 ±10%  
 1000WV

**ELMENCO**  
**CERAMIC**  
**DISC**  
**CAPACITORS**

**RELIABILITY**

The use of special ceramic materials in Elmenco Disc Ceramic capacitors impart longer life and greater stability. Higher voltage ratings greatly improve reliability by providing extra reserve for resistance to surges and temporary overloads.

**MOISTURE RESISTANT**

Elmenco Disc Ceramics are processed with a rugged phenolic coating and high temperature wax impregnation which gives them a superior moisture resistance and physical strength.

**SPACE SAVERS**

Elmenco Disc Ceramics are smaller than comparable capacitors of the same value. The miniature size is designed to offer greater service convenience with complete safety of operation.

Write for catalog CC115.

AVAILABLE AT ARCO  
 DISTRIBUTORS EVERYWHERE



**ARCO**  
 electronics inc.

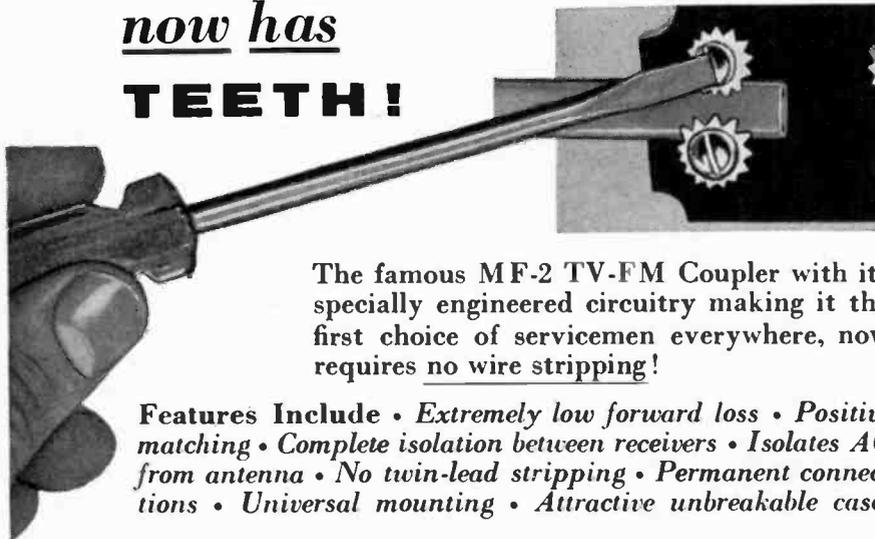
64 WHITE ST., NEW YORK 13, N. Y.  
 Branches: Dallas 19, Los Angeles 35

# JERROLD

# MF-2



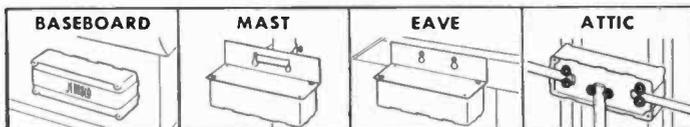
the  
**2 Set Coupler with GUTS...**  
now has  
**TEETH!**



The famous MF-2 TV-FM Coupler with its specially engineered circuitry making it the first choice of servicemen everywhere, now requires no wire stripping!

Features Include • *Extremely low forward loss* • *Positive matching* • *Complete isolation between receivers* • *Isolates AC from antenna* • *No twin-lead stripping* • *Permanent connections* • *Universal mounting* • *Attractive unbreakable case.*

**Mounts anywhere**



Two additional models available—the M-2 (recommended for UHF). The MF-4 (for 3 or 4 TV-FM sets fed from single antenna).

# JERROLD

Order from your Jerrold distributor or write  
**ELECTRONICS CORPORATION, Distributor Sales Division**  
Dept. IDS-19 The Jerrold Building, Philadelphia 32, Pa.

Jerrold Electronics (Canada) Ltd., Toronto

Export Representative: CBS International, N. Y. 22, N. Y.

## LETTERS

### To the Editor

#### "Do Newspapermen Take Payola?"

Editor, ELECTRONIC TECHNICIAN:

You should receive the Congressional Medal for the February article, "Do Newspapermen Take Payola?" It is certainly a very poor example of fairness by the *World-Telegram and Sun*. They should be investigated for their refusal to print the truth. They are a typical example of a bully, trying to prey on honest persons. They cannot take their own medicine. TV technicians are not only hard-working and honest (99-44/100% of them), but are underpaid as well. I think that all TV technicians should demand a clarification from this paper. This paper should be made to print stories testifying to some of the brave deeds performed by TV technicians, such as risking their lives to save people during a fire or flood.

BRIAN CHIN

Electron Radio-TV Service  
New York City

... We wish to commend you sincerely for your attempted rebuttal, and agree wholeheartedly that the series of articles entitled "The Great Service Slump" was a very unfair attack on America's service personnel. All of us within the industry know full well that by far the greatest majority of our TV and radio technicians are honest, hard-working and dependable. Your stand on this matter should receive widespread support from all of us in the electronics industry. It is important and could have far reaching effects.

JAMES F. SMITH  
Sales Manager  
Distributor Sales Div.

Clarostat Mfg. Co., Inc.  
Dover, N. H.

#### Printed Circuit Problems

Editor, ELECTRONIC TECHNICIAN:

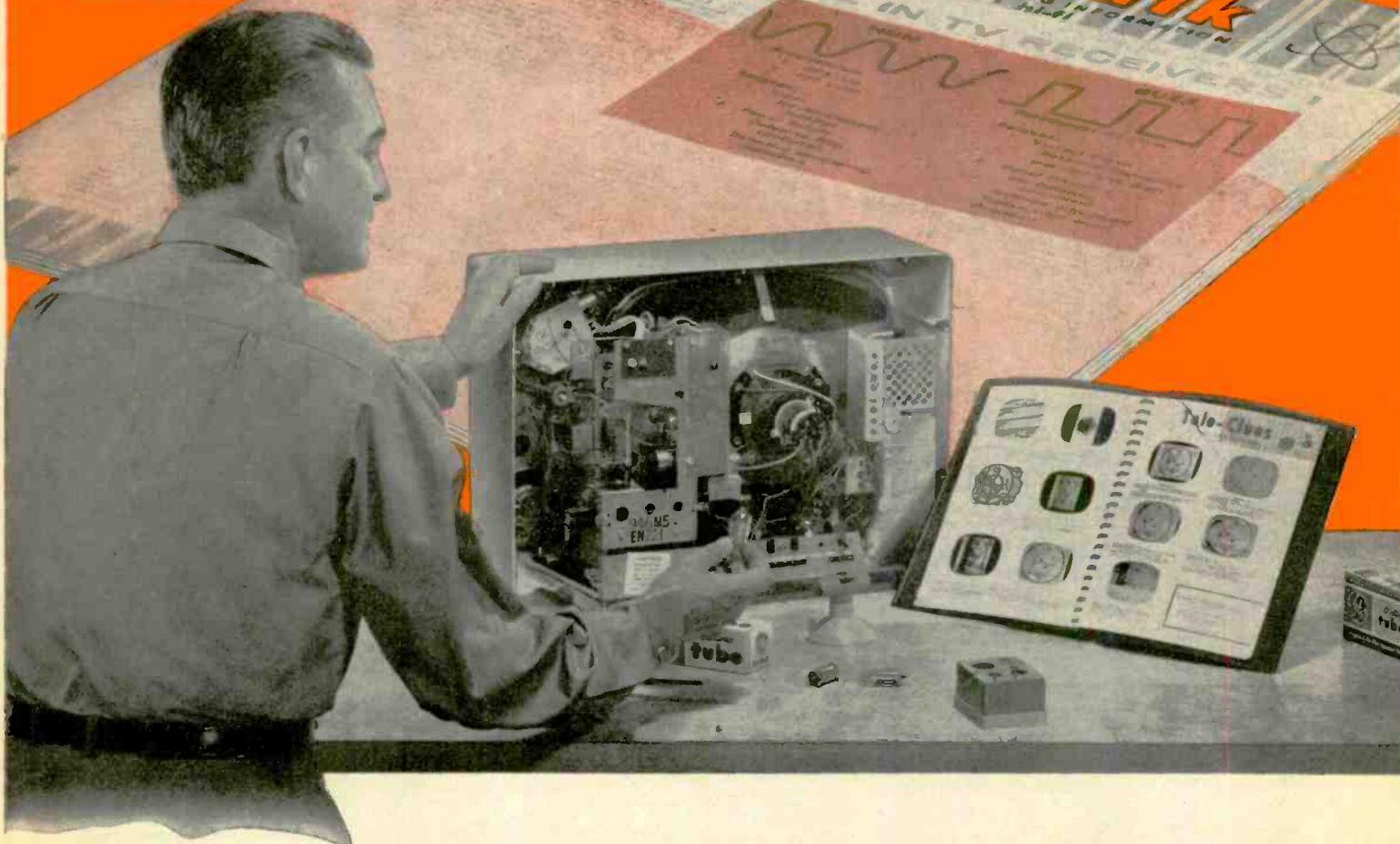
Regarding reader Unterweiser's comments on printed circuits in your January letters column, I must agree with him completely. We just completed repairing a Model 950T2 Arvin radio, which had three breaks in the circuit. It is my opinion that the board on which the circuit is printed flexed when the tubes were pulled and replaced. This caused the board to break, but if it had been thicker, this possibility would be reduced. Some portable TV printed circuits can cause no end of grief along the same lines.

C. B. MATHIS

Cal's Radio & TV  
Post Falls, Idaho

(Continued on page 9)

**FREE** TO  
**TECHNICIANS!**



## Makes every working hour PAY OFF in PROFITS!

General Electric's Techni-Talk Magazine sums up for you the job experience of expert TV technicians. It shows you fast, sure ways to eliminate television performance faults—explains work-saving shortcuts that will increase your net income. New circuits are described well ahead of time, so you can be ready to service late-model television sets from the start.

125,000 readers employ Techni-Talk as a working tool. Are you a subscriber? Remember, this

10-page guide to profitable TV servicing comes to you *free*. See your G-E tube distributor to receive Techni-Talk regularly, or fill out, clip, and mail the convenient coupon below! *Distributor Sales, Electronic Components Division, General Electric Company, Owensboro, Kentucky.*

*Progress Is Our Most Important Product*

**GENERAL**  **ELECTRIC**

311-303

Distributor Sales, Electronic Components Division  
General Electric Company, Owensboro, Kentucky

Please send Techni-Talk regularly, free of charge, to:

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

My occupation is (please check only one):

- |  |  |                                    |
|--|--|------------------------------------|
| <input type="checkbox"/> TV-Radio Service Technician (full-time).  | <input type="checkbox"/> TV-Radio Service Dealer.      | <input type="checkbox"/> Engineer. |
| <input type="checkbox"/> TV-Radio Service Technician (part-time).  | <input type="checkbox"/> Laboratory Technician.        | <input type="checkbox"/> Student.  |
| <input type="checkbox"/> Industrial Electronic Service Technician. | <input type="checkbox"/> Other (please explain): _____ |                                    |



## "We rely on the Yellow Pages to build our service business,"

says G. J. Ayoub, Serv. Mgr., S.O.S. TV and Appliance Co., El Paso, Tex.

"We're so convinced the Yellow Pages is the most effective means of advertising our Service Department, it's the *only* way we promote this phase of our business. And the reason for this is that the Yellow Pages makes our name easy to find any time of day. After all, nobody knows when a TV set is going to break down.

"We use other forms of advertising to sell new appliances, radio and TV sets *and* to tell people we service what we sell. But anybody who hasn't heard of us, and happens to look in the Yellow Pages for service will see our service ad and then be able to locate us."

Do you want more people to be aware of *your* services? Your message under appropriate Yellow Pages headings will do the job! Call the Yellow Pages man at the Bell telephone business office. He'll gladly help prepare an effective Yellow Pages advertising program for *you!*

EL PASO PEOPLE IN DISTRESS  
CALL S.O.S. TV for service. This  
display ad (reduced) under *TV-  
Repairing* brings in the business.

Find Us Fast  
In The  
Yellow Pages

Display this sales-building emblem wherever your prospects can see it.  
The Yellow Pages representative will gladly supply as many as you need.

(Continued from page 6)

### Licensing Gives Status

Editor, ELECTRONIC TECHNICIAN:

As a recent subscriber, I noticed the February letter to the editor written under the heading "more about licensing." Some of its conclusions are incorrect and indeed based upon faulty premises. I dare not conclude that the reputable established serviceman would regard legitimate licensing as a burden to the operation of his business. It would put him into a professional status in his community. Let us not forget that a license is not protection for the holder, it is protection for the general public against those who deal in a shady operation. It does establish the rules under which the game is played. It does eliminate those whose training is not sufficient. It does establish standards for an industry which has none. Why must we as servicemen hide our heads in the sand? When we say that there are no shysters in our field, it might pay us to visit the B.B.B. in our city and see the hundreds of complaints every year that come in. The complaints have been so numerous in New York State, the Attorney General has been prompted to ask the legislature to pass a law governing the activities of TV servicemen. I have a copy of that law. It is not unreasonable. It would do our industry more credit to recognize our shortcomings and cooperate with authorities to eliminate such dishonest TV servicemen. Older groups than ours have seen the advisability of licensing, why not ours? A license is definitely not a monopoly, it is a guarantee to our customers.

DOUGLAS W. COOK  
Douglas Electric & Heating Co.  
Kenmore, N.Y.

### The Big Fellow

Editor, ELECTRONIC TECHNICIAN:

The big fellow with a large shop who opposes licensing, should remember that he started out small. If he is losing out to the small fellow, he should examine his business techniques. When we are too busy making money, we take things for granted. Our greed is money, money, money.

C. L. ROTH  
Fullerton, California

### Technician Longevity

Editor, ELECTRONIC TECHNICIAN:

As executor of the estate of William D. Warren, deceased, I am writing to you. Mr. Warren died at the ripe old age of 94. He was operating his radio repair shop to the day before his death, active in both mind and body. His repair shop is filled with replacement parts and testers which I am having difficulty in selling.

RUDOLPH JOHNSON,  
Attorney at Law

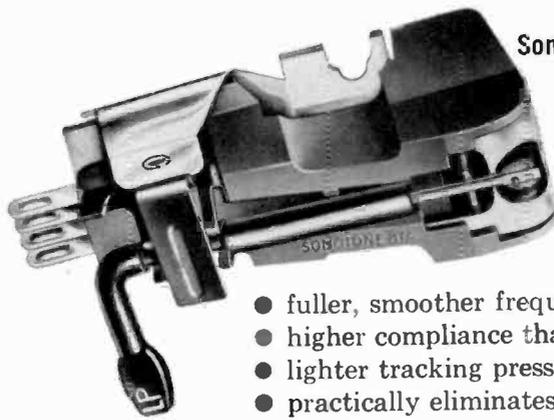
Box 353  
Boulder, Colorado

(Continued on page 10)

# Now...from Sonotone—

# 4 Big Improvements

in the quality stereo cartridge



Sonotone 8TA cartridge replaces 8T as industry standard

The new Sonotone 8TA cartridge gives greater than ever stereo performance... has 4 big extras:

- fuller, smoother frequency response
- higher compliance than ever before
- lighter tracking pressure
- practically eliminates dust pile-up

ONLY  
**\$1450\***

Sonotone 10T unitized stereo at lowest price ever

New 10T cartridge sells at record low price of \$6.45.\* And it covers the complete high fidelity range. 10T's unitized construction makes it easiest to install, easiest to replace. Low price means more sales—more profits.



### SPECIFICATIONS

	8TA	10T
Frequency Response	Smooth 20 to 20,000 cycles. Flat to 15,000 with gradual rolloff beyond.	Flat from 20 to 15,000 cycles ± 2.5 db.
Channel Isolation	25 decibels	18 decibels
Compliance	3.0 x 10 <sup>-6</sup> cm/dyne	1.5 x 10 <sup>-6</sup> cm/dyne
Tracking Pressure	3-5 grams in professional arms 4-6 grams in changers	5-7 grams
Output Voltage	0.3 volt	0.5 volt
Cartridge Weight	7.5 grams	2.8 grams
Recommended Load	1-5 megohms	1-5 megohms
Stylus	Dual jewel tips, sapphire or diamond.	Dual jewel tips, sapphire or diamond.

\*including mounting brackets

Sonotone makes only 6 basic ceramic cartridge models... yet has sold over 9 million units... used in over 662 different phonograph models. For finest performance, replace worn needles with genuine Sonotone needles.

# Sonotone

CORP.

Electronic Applications Division, Dept. C9-40  
ELMSFORD, NEW YORK



Leading makers of fine ceramic cartridges, speakers, tape heads, microphones, electronic tubes.  
In Canada, contact Atlas Radio Corp., Ltd., Toronto



## A NEW *miniature* TWO-WAY COMMUNICATIONS SYSTEM

Now, the TELEPATH provides you with wireless communications where small size and light weight are essential!

These short range systems use a completely transistorized transmitter-receiver unit, powered by economical self-contained batteries, and weigh less than one pound. TELEPATH systems are available for operation in either 27 mc. or 50 mc. bands. No license is required for the 27 mc. TELEPATH . . . it can be used immediately!

TELEPATH systems are a part of your wearing apparel, assuring you of more freedom and convenience of use than the old style "walkie-talkies." TELEPATH systems may be used to provide complete communication networks, either indoors or out. They also may be used directly with your present communications system, to extend its usefulness.

TELEPATH systems are unsurpassed for intelligible communications in high noise or poor visibility conditions where direct vocal or visual contact is impossible.

*distributor inquiries invited* Contact SEISCOR today and find out how the TELEPATH can help you!



SEISCOR, BOX 1590, Tulsa, Okla.

Please send complete information.

NAME \_\_\_\_\_  
COMPANY \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_

### HELMET MODEL

Hard-hat with built-in radio, antenna, earphones and microphone.

### BELT-CLIP MODEL



Radio unit; headset with antenna, earphones and microphone; shirt-clip controls.

### OTHER MODELS



Air Force-Type for jet-engine noise.



A complete pocket-size 2-way radio.

Special Models on Request

### FEATURES:

- Crystal Controlled Transmitter
- Crystal Controlled Superheterodyne Receiver
- Meets All Applicable FCC Requirements
- Long Battery Life

(Continued from page 9)

### Daffinitions

Editor, ELECTRONIC TECHNICIAN:

Having been a constant subscriber to ELECTRONIC TECHNICIAN since 1953, I thought that something of this nature (humorous I hope) might be of interest to your readers. To the best of my knowledge and belief, they are entirely original. Use them in any way you see fit, with my compliments.

Twisted pair: Dr. Jekyll and Mr. Hyde.

Phase Rectifier: Plastic surgeon.

Anti Hunt Device: Game Warden.

Henry: Inarticulate comic strip character.

Plate Load Resistor: Dieter.

Maxwell: Jack Benny's mode of travel.

Book Condenser: Reader's Digest.

Pentode: Frog that associates with pigs.

Yoke: Scandinavian pun.

Standing Wave Effect: Tired feet.

Cavity Resonator: Dentist.

Coupling Device: Marriage license.

Heptode: Sophisticated frog.

Class A Operation: Specialist.

Class C Operation: Interne.

Sweep Analyzer: Broom inspector.

Ohm: Cockney haven of refuge.

First Detector: Sherlock Holmes.

Dielectric: Get the hot seat.

Resonance: Where you live.

Image Frequency Response: Birth rate.

Decoupler: Divorce lawyer.

Attenuator: One cannibal to another when the missionary's wife disappeared.

Extraordinary Wave: 42-24-36.

Inverse Feedback: Mal de Mer.

Plate Impedance: Yogi Berra.

Inductive Reactance: Draftee's attitude toward draft board.

Series Resonance: Yankee Stadium, generally.

Lobe Switching: Ear to ear.

Square Wave: One not hip to the jive.

Multivibrator: Elvis Presley.

Phase Shifter: Ingo Johansson.

Delayed Sweep: Lackadaisical janitor.

Pulse Counter: Nurse.

Trigger Action: Gunsmoke.

Plate Detector: Umpire.

JOSEPH A. MULLER

Portsmouth, Virginia

### Plug-In Antennas

Editor, ELECTRONIC TECHNICIAN:

We wish to request permission to print in our local newspaper your excellent January 1960 "Editor's Memo," referring to socket antennas. This memo should be in every newspaper and magazine in the country. Of course, maybe the public doesn't mind being taken. Incidentally, we are in a fringe area and people still buy these antennas.

RAY C. BOSTON

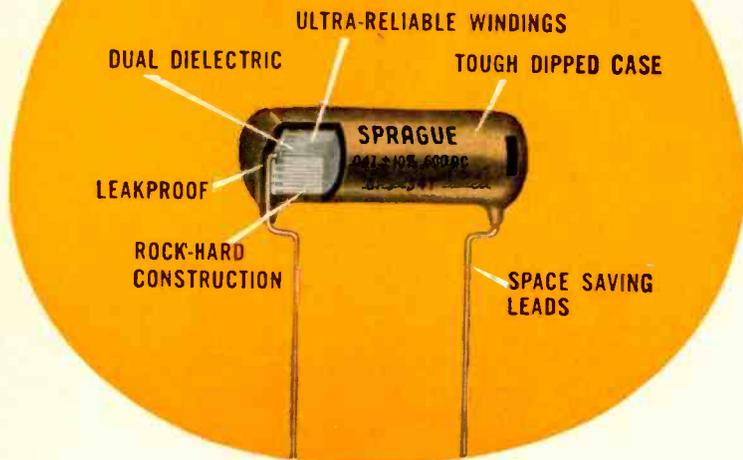
Valley TV & Radio Service  
McCall, Idaho

(Continued on page 14)

# NEW

# ORANGE-DROP®

## DIPPED DIFILM® CAPACITORS FOR EXACT ORIGINAL REPLACEMENT



THIS NEW . . . MINIATURE . . . DIFILM  
CAPACITOR OUTPERFORMS ALL  
OTHER DIPPED TUBULAR CAPACITORS!

SPRAGUE DIFILM *does it again!* First to give you at regular prices the finest molded tubular capacitor made—the DIFILM BLACK BEAUTY . . . and now the newest DIFILM capacitor—the ORANGE-DROP dipped capacitor.

◆ SPRAGUE ORANGE-DROP CAPACITORS are especially made for easy installation in tight spots . . . where only an exact replacement will fit. They are the exact same dipped capacitors used by leading manufacturers in many TV sets.

### WHY ORANGE-DROPS BEAT HEAT AND HUMIDITY

Sprague Orange-Drop Mylar-Paper Dipped Capacitors combine the proven long life of paper capacitors with the effective moisture resistance of film capacitors. Their duplex dielectric of kraft paper and polyester film is impregnated with HCX®, Sprague's exclusive hydrocarbon material which saturates the paper and fills voids and pinholes in the film before the HCX polymerizes. The result is a solid, rock-hard capacitor section which is then double-dipped in bright orange epoxy resin for moisture protection. Leads are neatly crimped for easy installation on printed wiring boards.

◆ SPRAGUE ORANGE-DROP CAPACITORS are a natural teammate for the molded DIFILM Black Beauty®. Black Beauties, born out of engineering to tough missile standards, are still far and away the best replacement capacitors—better than any other molded or dipped . . . paper, film, or film-paper combination . . . capacitor made for entertainment electronics.

◆ Where a dipped capacitor is called for, no other dipped unit can match the ORANGE-DROP. Your distributor is stocked with all popular ratings in 200, 400, 600, and 1000 volts in handy Sprague Klear-Paks. Order some today.

\*Du Pont Trademark

don't be vague—insist on

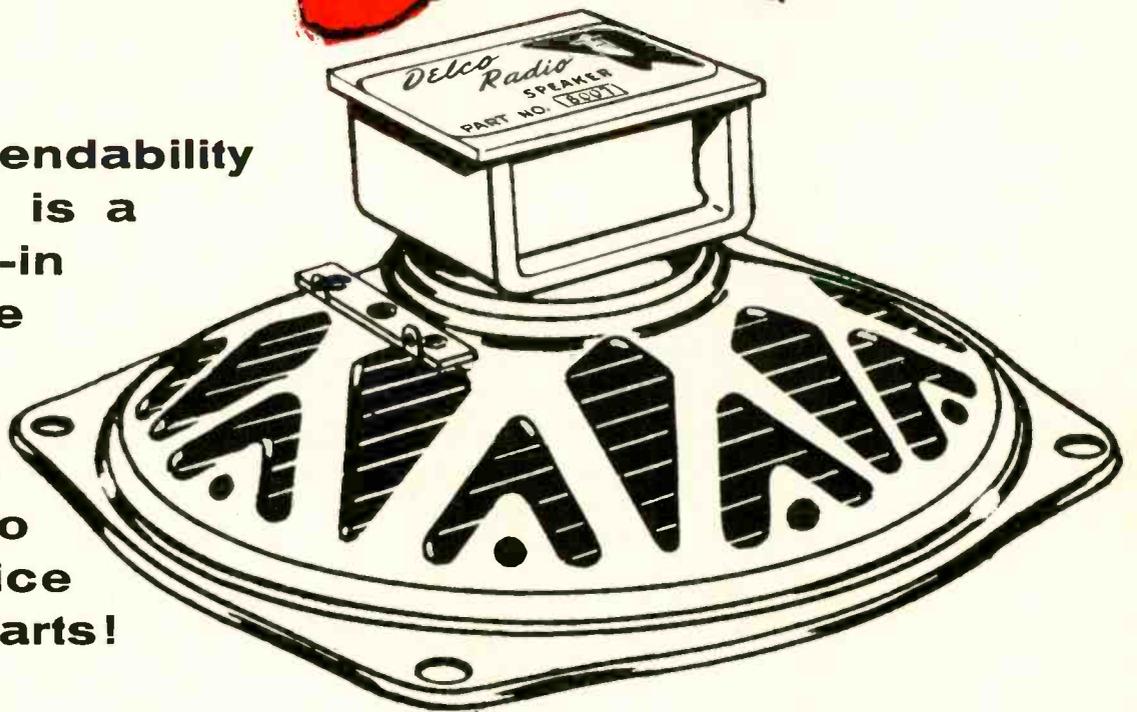
# SPRAGUE®

the mark of reliability

ANOTHER TESTED RELIABLE PRODUCT BY THE WORLD'S  
LARGEST CAPACITOR MANUFACTURER



**Dependability  
is a  
built-in  
feature  
of  
all  
Delco  
Radio  
Service  
Parts!**



Take speakers, for instance. Delco electronic speakers are built rugged for long life and resistance to extreme weather conditions. You can rely on them for exceptional power handling and rich distortion-free tone.

Delco's popular 8-inch "Hi-Fi" speaker, No. 8007, provides the most power and tonal range for the money. Designed for replacement use and high fidelity audio systems, it's a good, fast seller with price and quality appeal.

For speakers, transistors, transformers and other fine parts for Delco and other radios, see your Delco Electronic Parts Distributor. He carries the complete line. Other extras you get with Delco are • Wide selection of special application parts • Complete technical training program • Effective warranties • Dealer identification signs.

Stock with Delco Electronic Parts—more dependability and reliability for your customers, more profit for you.

**DELCO**  
DEPENDABILITY  
**RADIO**  
RELIABILITY

Division of General Motors • Kokomo, Indiana

Available everywhere through  
Electronic Distributors  
associated with



# in the sets you **SELL...**

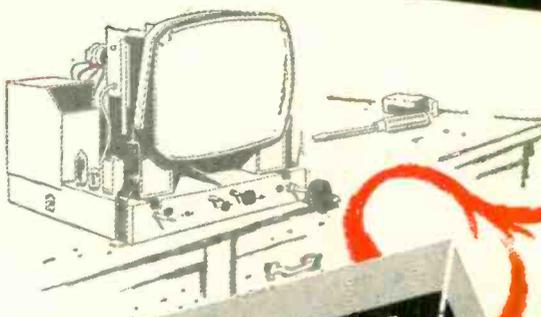


Are you satisfied with your mark-ups on transistor radios? Channel Master dealers work on large margins, even on price leaders. Are you selling the brand that does the big volume? Channel Master radio sales are in the top "Big 3". Are you building customer confidence? Channel Master's spectacular Free Replacement Warranty does just that—and it's the fastest sales-closer you've ever seen.

# in the sets you **SERVICE...**

... today's fastest-growing favorite in replacement tubes comes in the red, white, and blue Channel Master carton. Each premium-quality tube meets Channel Master's new, higher standards for uniformity, long-life, and performance. Dealers are gladly breaking old habits and making Channel Master their new "first choice" in replacement tubes. That's why Channel Master tube sales are doubling every month, an unprecedented record of growth and acceptance.

Call your distributor today for full details.



# **CHANNEL MASTER** **QUALITY** **GIVES YOU THE EDGE!**

**CHANNEL MASTER** works wonders in Sight and Sound

W ELLENVILLE, N. Y.

# AMPHENOL TV PRODUCTS

## help you serve your market better!

### ANTENNAS

Complete line of VHF, UHF, VHF/UHF and FM antennas. Famous Inline (re-issue U.S. Pat. 23,273) is considered by impartial authorities as the finest broadband VHF antenna ever built.

### ACCESSORIES

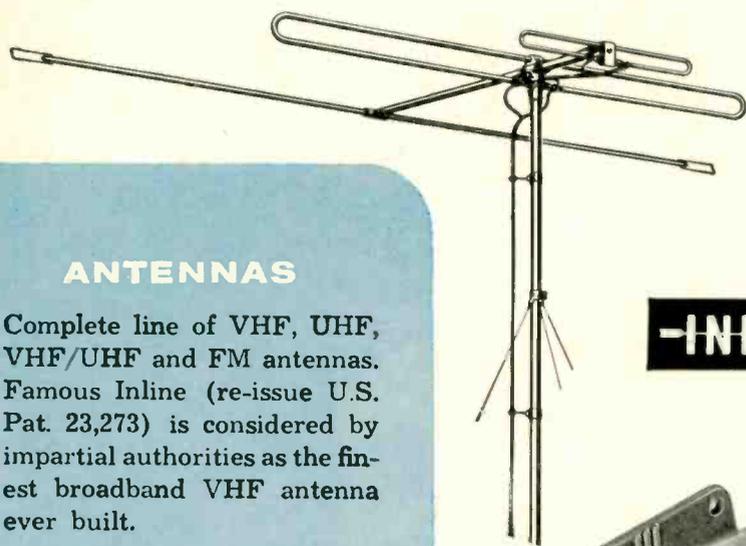
Antenna or set couplers, arrestors, other important products—all carefully engineered to highest quality standards.

### TWIN LEAD

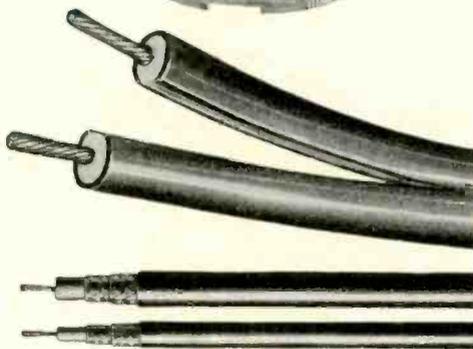
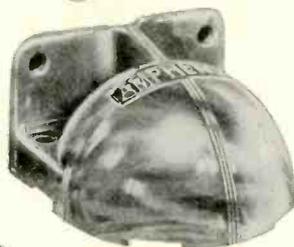
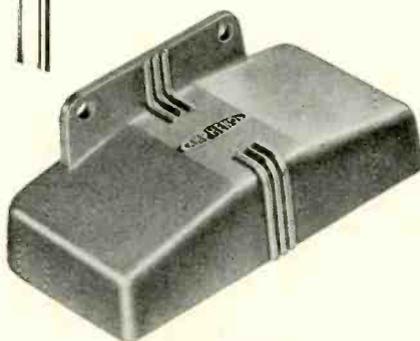
Both receiving and transmitting types are made by AMPHENOL, including the "hottest" twin lead on the market—AMPHENOL MARINE CORE, super low-loss Polyfoam.

### COAXIAL CABLES

AMPHENOL's Cable-bility is famous: More types of RG-/U (Polyethylene and Teflon), more experienced engineering, most modern production facilities.



**—INLINE\***



stock the finest—stock

**AMPHENOL!**

**AMPHENOL**

**DISTRIBUTOR DIVISION**  
BROADVIEW, ILLINOIS

Amphenol-Borg Electronics Corporation

(Continued from page 10)

### Loose Cords

Editor, ELECTRONIC TECHNICIAN:

Your January article on pages 38-39 showed "a day in the shop." Those boys sure do a sloppy job on delivery. See the last photo. Did the customer get a cheater cord or was it hung up on the dolly?

ADDIE LEE DOMANGUE  
Houma, Louisiana

• Since the back of the set was on, it must have been a regular line cord, not the technician's cheater. They should have folded up the cord properly instead of letting it drag. It just goes to show . . . no matter how good you are, there is always room for improvement.—Ed.

### Shop Hint In Production

Editor, ELECTRONIC TECHNICIAN:

I was greatly pleased when your Board of Editors decided to include Item #5, namely wire connectors, in the Shop Hint Contest (Feb. 1960). They have been on the market for several years and presently are being handled by Chemical Electronic Engineering of Matawan, N.J. Perhaps your entrant from Missouri never did see our particular connectors, but from his description as to how he winds them, it must truly be a bothersome task. Our Sure-N-Easy connectors retails at \$1.00 for 300 and the serviceman is saved the task of winding and cutting.

ROY L. RICHARDSON  
Hollywood, Fla.

• Contest winners will be announced next month.—Ed.

### Poor Products

Editor, ELECTRONIC TECHNICIAN:

I have been in the electronic servicing business for over 30 years and I find your magazine very helpful in my business. I would like to put in one "gripe" and this is directed to the manufacturers: MAKE BETTER PRODUCTS. The manufacture of electronic merchandise has reached a new low in quality and workmanship. The repairman can only make a product as good as it was when the customer purchased it and no better. Most merchandise made today will hardly stay together until it is sold. The customer is told that the products they are about to purchase are the best made; and this is true. But the customer is not told that the merchandise could be made better if the manufacturers wanted to make it better. The service technician is in between the customer and the maker of the product. I suggest a move to force the manufacturer to build better products, even if the cost is greater. It seems that each manufacturer is trying to build his stuff a little cheaper and sell it for a little less money. Yours for a greater magazine.

H. RAY BOYER

Boyer Electric Co.  
Eldorado, Texas

# The Sounding Board

## World's Toughest Audience Tests, Approves, Selects E-V ULTRA- Compact Units



Recently, in New York, Boston, and Los Angeles nearly 300 sound room personnel of top high fidelity dealers were given the opportunity to spend an afternoon listening to and rating the "sound" produced by three of Electro-Voice's new ultra-compact speaker systems (Regal, Esquire, Leyton) and six other currently popular competitive ultra-compact systems. All nine systems were placed behind an opaque curtain and each listener's selector switch was coded but unmarked so he had no way of knowing which system he was hearing. The result of the listening test was that more than 80% ranked Electro-Voice Esquire and Regal units either first or second. And Electro-Voice's economical Leyton was ranked third by over 50% of the participants—thus outscoring systems at double its price.

Now, we don't think this proves a single thing except that there is a heavy percentage of knowledgeable people in New York, Boston, and Los Angeles who could recognize the clarity and purity of sound that we build into any Electro-Voice speaker system. We long ago discovered that it is impossible to build a speaker that sounds exactly the same to every listener, so we have always strived to create instruments that let our customers listen to the music rather than the speaker.

### New Convertible Drivers Bring Public Address Performance to Hi-Fi Levels

The basic characteristics needed to satisfy any critical sound job—wide range, low distortion, and high efficiency—are all combined in E-V's new group of drivers. But there has been one great plus added to the unmatched performance of these units. *The same driver can be used on reentrant horns and in compound horns.* This means that a single driver will fit the famous E-V Compound Diffraction Horn as well as conventional reflector horns. This unusual versatility is accomplished without compromising the performance quality of either horn type.

Engineered with careful attention to detail, these drivers feature such exclusives as: ceramic magnets; edge-wise wound voice coils; and dual concentric

centering. They are easier to install with their push-type polarized connectors and permit easy diaphragm replacement in the field.

If you are planning a P.A. system don't fail to consider these rugged, weatherproof drivers that have eliminated "peaked" response to provide the tonal balance needed for good musical reproduction and the rising frequency

- |   |   |  |
|---|---|--|
| <p>• DC30A</p>  <p>30 Watts<br/>150-10,000 cps<br/>\$27.50 List</p>                                    | <p>• DC30T</p>  <p>30 Watts<br/>With 70.7 V.<br/>Transformer<br/>150-10,000 cps<br/>\$37.00 List</p> | <p>• DC40</p>  <p>40 Watts<br/>140-11,000 cps<br/>\$36.00 List</p>                                     |
| <p>• DC40T</p>  <p>40 Watts<br/>With 70.7 V.<br/>Transformer<br/>140-11,000 cps<br/>\$46.50 List</p> | <p>• DC50</p>  <p>50 Watts<br/>140-11,000 cps<br/>\$47.00 List</p>                                 | <p>• DC50T</p>  <p>50 Watts<br/>With 70.7 V.<br/>Transformer<br/>140-11,000 cps<br/>\$57.50 List</p> |

response necessary for clear, crisp voice projection. Available as listed below as well as with 45-ohm voice coils for high-powered inter-com:

### What Does E-V's Magneramic 31 Do That Your Magnetic Cartridge Can't Do?

The stereo cartridge has rightly been termed the "gateway" to your sound system. If the response characteristics of the cartridge lacks fidelity of reproduction, the system performance will not possess the essential brilliance of the recorded sound. Similarly, if the cartridge fails to provide adequate electrical input to the amplifier, much of the recorded definition and authority may be attenuated. The factor of cartridge output influences not only the system gain—but the quality and definition of the sound as well.

In distinct contrast to magnetic type cartridges, the revolutionary, new E-V Magneramic 31 produces an output of 8 millivolts—over 60% higher than most magnetics. Thus, it is possible to play your system at noticeably lower amplifier gain and speaker pad settings. This bonus output is often the difference

between marginal and outstanding performance, particularly when employing low-efficiency speaker systems. Lower amplifier gain settings also reduce the likelihood of introduction of tube thermals and transformer hum into the system. You hear only what is recorded—clean and true-to-life—without the introduction of stray parasites from the amplifier.



### First Users of New Model 644 Mike Rave About Performance

The all-new Model 644 Sound Spot Microphone introduced by Electro-Voice early this year has already started to prove itself in its initial installations. Here are just a few of the comments received from sound installers and audio specialists throughout the country:

"Move anywhere on the stage and be heard easily throughout the auditorium"...

"Better pick-up of a band across a football stadium than any parabolic microphone ever tried"...

"By using the 644's we turn up the system to more than needed sound without feedback—but with old microphones we could just barely crack the control open"...

"The anticipated feedback in this installation from any normal application would be tremendous. The 644 was installed and all preliminary tests were amazing"...

The microphone that all these men are talking about utilizes a slotted tube on the front that can actually discriminate between sounds arriving from random directions and reduce pick-up from sides and rear by 20 db or more. This new design concept enables the 644 to offer as much as four times greater working distance than the best cardioids; greatly reduced feedback; retention of "on-mike" presence despite extended working distance; excellent performance out-doors because of elimination of wind noise. Despite the outstanding performance characteristics built into the 644, it is still priced low enough (\$110.00 list) to fit most budgets.

### Did You Know?



Depending on the weight of the tone arm, a needle exerts as much as 30,000 to 50,000 pounds per square inch pressure on the record groove. So, it's easy to see why even a slight imperfection in the tip could ruin records in a hurry. Don't take chances with your valuable collection. Always select Electro-Voice Power-Point Needles. The only replacement needle line sold by a manufacturer of high-fidelity equipment.

Want more information on any of the items mentioned in the Sounding Board? Simply check the appropriate boxes below and mail the coupon to Dept. 40T, Electro-Voice, Inc. Buchanan, Michigan.

- |                          |       |                          |       |
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**Electro-Voice®**  
BUCHANAN, MICHIGAN

## News of the Industry

**HICKOK ELECTRICAL INSTRUMENT** has named **JERRY M. RHOADS**, Production Supt. and **JOHN KUSHAN**, Production Control Mgr.

**JFD ELECTRONIC CORP.** has formed a new western div. to be located at 3711 Van Nuys Blvd., Van Nuys, Calif., and headed by **WILLIAM BELLENKES**.

**CLEVITE Transistor Products Div.** has appointed **ALLEN S. NELSON** as Mgr. of distributor sales.

**BLONDER-TONGUE** announces the appointment of **HARRY A. GILBERT** to the newly created position of Vice Pres., to coordinate activities of all line and staff departments.

**CORNELL-DUBILIER** reports the appointment of **JOHN H. FEDER, JR.**, as Dist. Mgr. to direct sales activities in Eastern Pa., Dela., Wash., D. C., Md. and Va.

**RADIO MATERIALS CO.**, Div. of **P. R. MALLORY & CO.** has broken ground for a new 45,000 sq. ft. production and research facility in Chicago's new Brynwood Industrial District. The plant is expected to be completed by October 1960.

**TEXTRON ELECTRONICS** announces that the Board of Governors of the American Stock Exchange has approved application for listing **TEXTRON Common Stock**, and trading on the Exchange has begun. The new ticker symbol for the stock is: **TEI**.

**WELLER ELECTRIC CORP.** has made the following two additions to its sales force: **ANDREW PAPPALARDO** will service accounts in O., Western Pa., Western N. Y. State, and W. Va.; and **RUSSELL WINKELMANN**, will service accounts in Mich., Ind., and Western O.

**ELDON MFG. CO.** has broken ground for a new 210,000 sq. ft. manufacturing plant to merge facilities and resources with **UNGAR ELECTRIC TOOLS**, the electronics div. of **ELDON**. The new plant will consolidate operations now conducted in seven separate plants, and will accommodate some 2,000 employees.

**ELECTRONIC PUBLISHING CO.** has announced new electronic parts and high fidelity catalogs published for the following firms: **DOW RADIO, INC.**, **FT. ORANGE RADIO DISTRIBUTING CO.**, **REED RADIO & SUPPLY CO.**, **ROCHESTER RADIO SUPPLY CO.**, and **SYRACUSE RADIO SUPPLY CO., INC.** Copies may be obtained by writing the above named companies.

**INTERNATIONAL RECTIFIER** has filed a registration statement with the Securities & Exchange Comm. seeking registration of 120,000 shares of common stock, \$1.00 par value, to be offered for public sale through an underwriting group headed by **BLYTH & CO., INC.** Of the shares being offered, 60,000 shares are being offered by the company and 60,000 by a selling stockholder.

**GENERAL ELECTRIC Semiconductor Products Dept.** has appointed **HAROLD C. POTTER** Mgr. of Sales. The Receiving Tube Dept. announced the appointment of **LOUIS M. ROBB** to the newly created position of Mgr. of Market Development. The dept. has also announced a new national advertising and sales promotion campaign to back up service dealer sales of GE's "BLACK-DAYLITE" television picture tubes, beginning with a series of commercials on Dave Garroway's "Today" show.

(Continued on page 18)

## Solve Rough Sweep Output Problems

IN MINUTES

INSTEAD OF HOURS!



## NEW **B&K** DYNA-SWEEP CIRCUIT ANALYZER

1. Provides composite synchronizing signals (negative or positive) to inject directly in each sync stage.
2. Provides plate drive signal to check complete vertical output circuit, including V.O. transformer.
3. Provides vertical yoke test signal to determine if vertical yoke windings are defective.
4. Provides horizontal plate driving signal to directly drive TV horizontal output transformer circuit.
5. Provides B+ boost indicator.
6. Provides unique high-voltage indicator.
7. Provides sensitive tests for each of the horizontal output components, including H.O. transformer and yoke. Immediately reveals their true condition, good or bad.

Quickly solves tough output servicing problems that have always plagued the TV serviceman. Provides horizontal and vertical sync and driving pulses that make it easy to check out every stage in the sync and sweep sections of a television receiver. Tracks down troubles in the horizontal and vertical output circuit, including defective output transformer and yoke. Checks for shorted turns, leakage, opens, short circuits, and continuity. Gives unique high-voltage indication. Eliminates trial and error replacements. Saves many hours of service work! Pays for itself over and over again.

Model 1070 Dyna-Sweep. Net, \$74<sup>95</sup>

**MODEL A107 DYNA-SWEEP CIRCUIT ANALYZER**  
for use with B&K Model 1075 Television Analyst

Functions like the Model 1070 above, but is designed as a companion unit for use only with B&K Model 1075 Television Analyst for driving source. Makes your Television Analyst more useful and valuable than ever. Net, \$54.95



See your B&K Distributor or Write for Bulletin ST24T

**B & K MANUFACTURING CO.**  
1801 W. BELLE PLAINE AVE • CHICAGO 13, ILL.

Canada: Atlas Radio Corp., 50 Wingold, Toronto 10, Ont. • Export: Empire Exporters, 277 Broadway, New York 7, U.S.A.

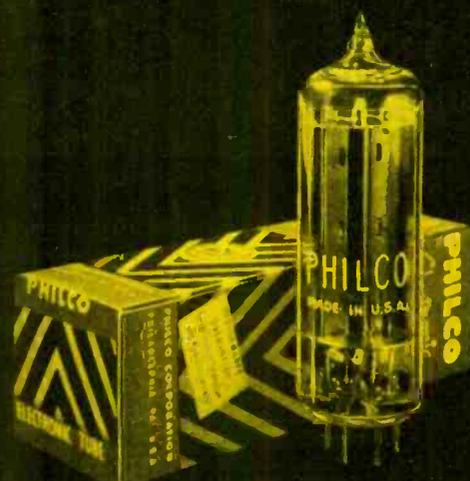
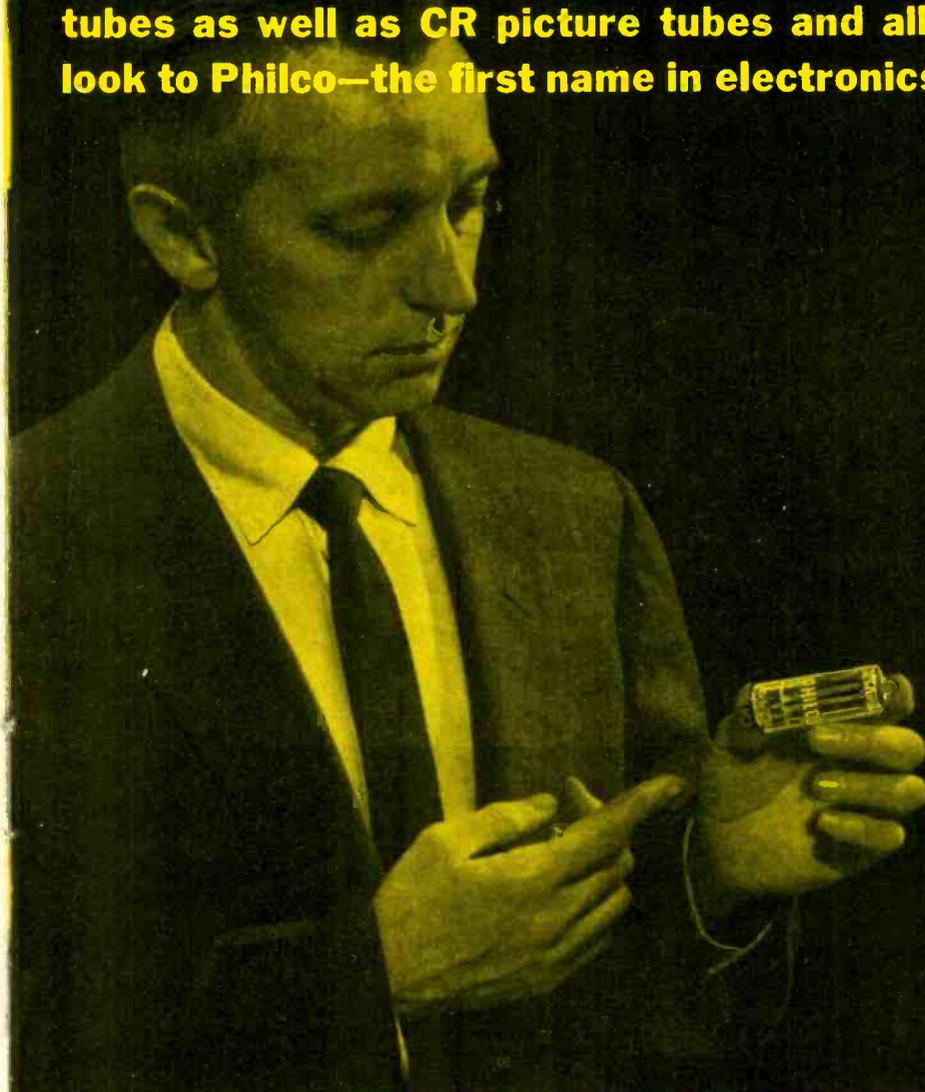


# PHILCO<sup>®</sup> THE FIRST NAME IN ELECTRONICS

# QUALITY

...THE LAST WORD IN

Because the Philco name is symbolic of quality, long-life Philco tubes are the **FIRST CHOICE** of quality-wise technicians. It will pay you to use them for all replacements—TV, radio and hi-fi. Their proven reliability protects your profits. In addition, the prestige of the Philco name builds customer good will. For top performance in receiving tubes as well as CR picture tubes and all other replacement parts, look to Philco—the first name in electronics...the last word in quality!



**SEE YOUR PHILCO DISTRIBUTOR TODAY!**  
**Get the facts about the Spring "Free-for-All",**  
**Easter Gifts! Mother's Day Gifts! Service Aids!**

## PHILCO ACCESSORY DIVISION

WORLD-WIDE DISTRIBUTION

Service Parts • Power-Packed Batteries • Universal Components • Long-Life Tubes • Heavy-Duty Rotors • Star Bright 20/20 Picture Tubes • Long Distance Antennas • Appliance Parts • Laundry Parts • Universal Parts and Accessories



PHILCO CORPORATION ACCESSORY DIVISION  
 ATTN: Carl Areschoug  
 P. O. Box 3635  
 Philadelphia 25, Pa.

If you service television and radio receivers and would like to receive the Philco Giant Banner Sales Mallers, attach this coupon to your Company letterhead and forward to above address.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

# SYLVANIA

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## SEMICONDUCTOR

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### DEVICES

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... for high quality, low prices!

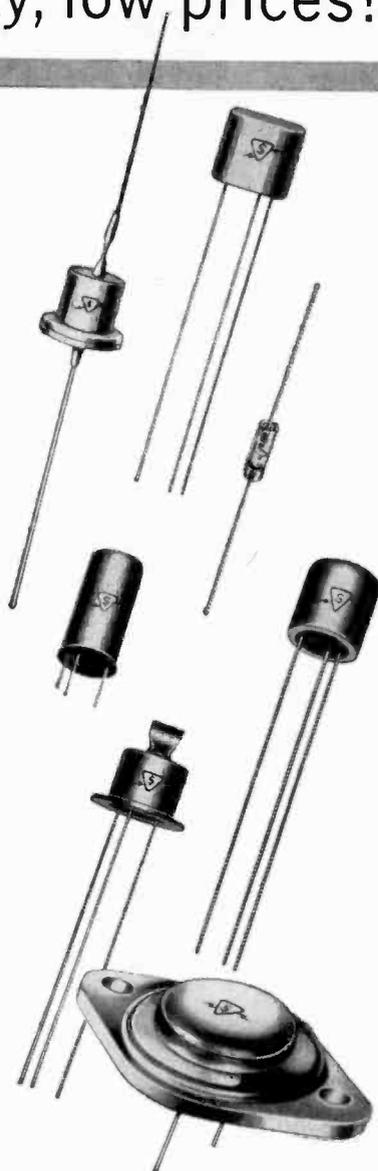
- Silicon Rectifiers
- Power Transistors
- Diodes • Transistors

Follow the leaders... the profit leaders in the electronic servicing field! When you have to replace a silicon rectifier or a power transistor, or any diode or transistor, you will find it in the Sylvania line. That's the way to save time, keep costs down and profits up.

For immediate delivery see  
your **SYLVANIA**  
**SEMICONDUCTOR**  
**DISTRIBUTOR**

NEW service-dealer's "SEMICONDUCTOR COMPLEMENT MANUAL" - only 50¢. Now at your Sylvania Distributor's. A time-saving guide to semiconductor replacements. Gives set manufacturers' parts numbers with corresponding transistor-type numbers for cross-reference. Gives U. S. equivalents of foreign transistor types. Get your copy from your local Sylvania Distributor, or from Sylvania, 1100 Main Street, Buffalo 9, N. Y.

Check your stock and fill in with quality-assured Sylvania semiconductors. Sylvania Semiconductor Division, Woburn, Mass.



# SYLVANIA

Subsidiary of **GENERAL TELEPHONE & ELECTRONICS** 

(Continued from page 16)

**ZENITH SALES CORP.** has initiated an "in school" training program in modern merchandising methods.

**PENTRON ELECTRONICS** filed a registration statement with the Securities & Exchange Comm. seeking registration of 250,000 shares of common stock to be offered to the public at \$3 per share. **STANLEY HELLER & CO.**, N. Y., is the underwriter.

**RCA Electron Tube Div.** reports the appointment of **GEORGE D. HAN-CHETT** as Coordinator, Technical Planning. **RCA SERVICE CO.** has expanded its Gov't. Services activities with the opening of two new regional offices in Rome, N. Y., and Los Angeles; **B. R. HARRIGAN**, Mgr., Field Engineering Marketing Programs; and **E. R. WAGNER**, Mgr., Facility & Support Marketing Programs.

**TELEX, INC.** announced acquisition of all assets and business of **BALLASTRAN CORP.**, Ft. Wayne, Ind., to be known as the Ballastran Div. of Telex. **ORDEAN KILTIE**, Ballastran Pres., will become a Vice Pres. & Dir. of **TELEX** and Gen. Mgr. of the new div. **WILLIAM WEIR**, Secy.-Treas. of the Ft. Wayne company, will be Asst. Secy. of **TELEX**. A 25% interest in **ELECTRO-LOGIC CORP.** has also been announced.

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## Reps & Distributors

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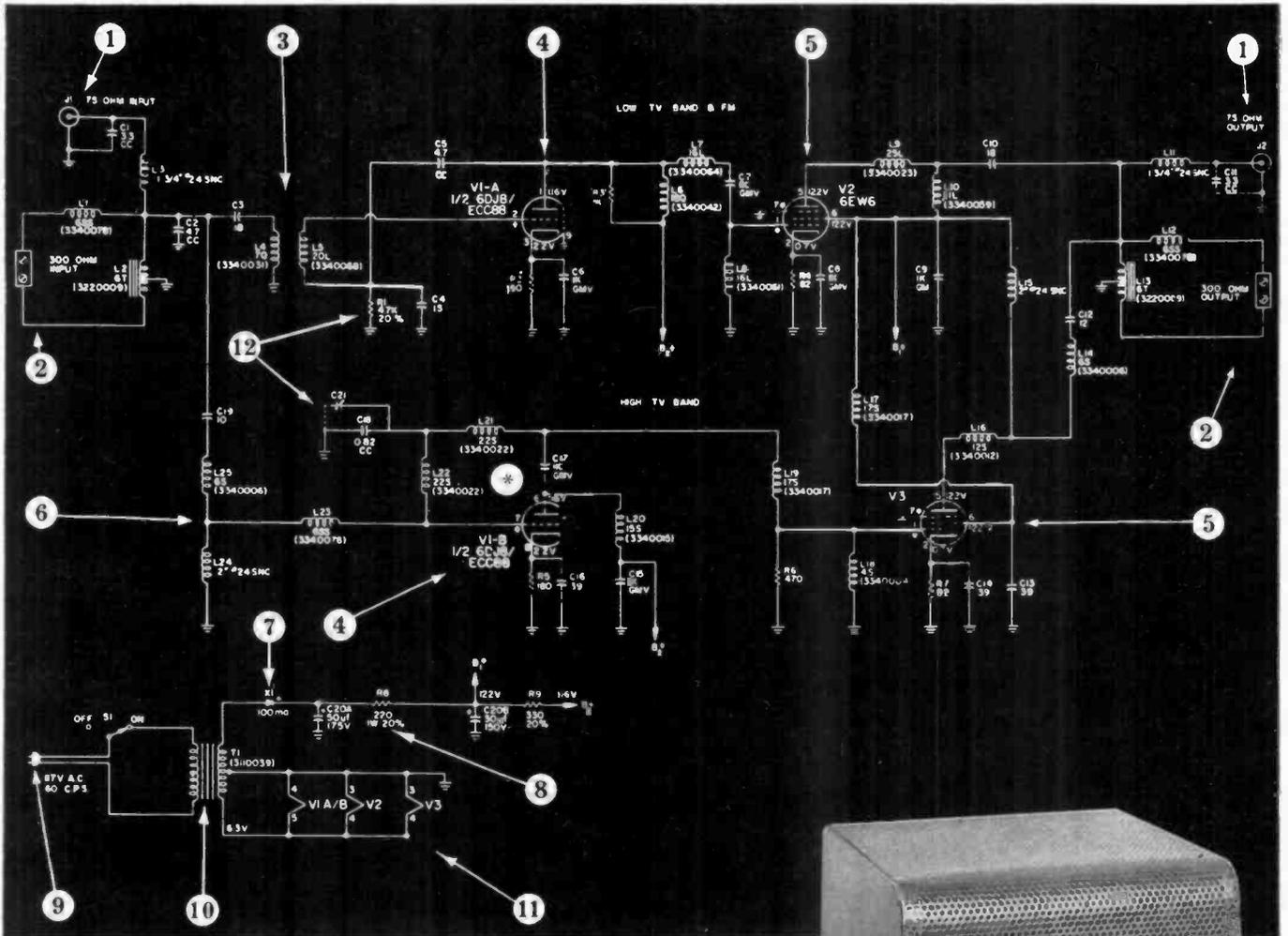
**SAM R. EISENBERG & ASSOC.** has added **MEL HULKOWER** and **ROY BELTIER** to the staff. Territory covered by the firm now includes metropolitan and upstate N. Y. and N. J.

**KIERULFF ELECTRONICS** has announced formation of **CAPKIT, INTERNATIONAL, INC.**, as an affiliate of Kierulff enterprises, with **K. KAWACHI** as Mgr. The new company will provide U. S. representation to Japanese manufacturers of electronic units and electrical parts and equipment and act as a purchasing organization.

**BE-ESCO SALES CORP.** is the new name of **BLAIR SALES CO.**, with **NAT FURMAN** as Pres. and **JOCK BRITTAIN** as Executive Vice Pres. The following two new men have been added to the present staff: **SAM LEVITT** and **GENE REICH**. **BE-ESCO** will maintain the present facilities at 45 So. Broadway, Yonkers, N. Y., and cover the same territory.

(Continued on page 20)

# the secret's in the circuit!



new...

## BLONDER-TONGUE all-channel tv-fm amplifier model HAB only \$6950 List



- ① Solderless radiation-proof 75 ohm coaxial fittings
  - ② Exclusive B-T 300 ohm "NO STRIP" terminals. Patents pending.
  - ③ Low-pass coupling - 54 to 108 mc.
  - ④ Premium frame-grid circuitry for minimum noise and maximum gain - 23 db (15 times.)
  - ⑤ Operated at less than 50% of maximum plate dissipation for maximum tube life.
  - ⑥ High-pass signal takeoff - 174 to 216 mc.
  - ⑦ Solid state rectifier for longer life.
  - ⑧ Dual filtering network for stable, hum-free operation.
  - ⑨ Low cost operation, draws only 0.24 amps.
  - ⑩ Power transformer isolates unit completely from power line.
  - ⑪ Parallel heaters for simplified servicing.
  - ⑫ Separate high and low bands of amplification consistent with maximum gain and wide band response.
- \*U. S. Patent 2,761,023—triode neutralization circuit

Available at parts distributors, for further information write Dept. ET-4



## BLONDER-TONGUE LABORATORIES INC.

9 Alling Street, Newark 2, N. J. • Phone: Market 2-8151

In Canada: Tequipment Mfg. Co. Ltd., London, Ont. Export: Morhan Export Corp., New York 13, N. Y.

hi-fi components • UHF converters • master TV systems • industrial TV cameras • FM-AM radios

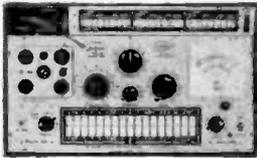
## "SERVICE-ENGINEERED"



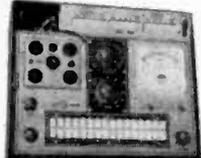
### TEST EQUIPMENT helps you make more profit

All Jackson test equipment is "Service-Engineered" for service work. It is designed to give you the accuracy you need, combined with speedy, profitable operation. That's why smart servicemen are switching to Jackson. Your distributor will be glad to demonstrate Jackson equipment to you to prove the point.

#### DYNAMIC® TUBE TESTING



Model 658—Finest service tube tester made. Makes more tests, more accurately and faster.



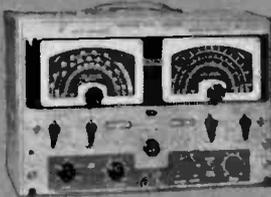
Model 648R—Combines sequence switching with time-proved Jackson Dynamic testing technique.



Model 598—Low cost Dynamic circuit with convenient Lever Switching. Many features.

#### Power Chart Available for Any of These Tube Testers

#### ALIGNMENT



Model TVG-2—Combination Sweep-Marker Generator for TV or FM servicing.



Model CRO-2—Finest service 'scope made. Wide band and high sensitivity. Flat to 4.5 MC.

#### TEST AND MEASURING



Model 590—Accurate 7" VTVM. Fast warm-up. Measures AC and DC Volts and Ohms.



Model 591—Wide Range Capacitance Checker. Checks capacity from 10 uf to 1000 uf.



Model 655—Wide Range Audio Oscillator. Sine wave output 20 cycles to 200,000 cycles.

See your distributor or write: **THE JACKSON ELECTRICAL INSTRUMENT COMPANY**  
124 McDonough Street, Dayton 2, Ohio  
In Canada: The Canadian Marconi Co.



(Continued from page 18)

**CONTINENTAL-WIRT** has appointed **ART CERF & CO.** as manufacturer's rep for the middle Atlantic states.

**TECHNICAL APPLIANCE CORP.** announced the appointment of **W. A. HENDRICKSON CO.** as sales reps for the New England states.

**LEL, INC.** reports the appointment of the following reps: **J. E. HACHTEN CO.**, Calif. & Ariz.; **DAGE CORP.**, all foreign countries excluding Canada and Alaska.

**PETERSON-RUDNICK ASSOC.**, new rep firm, has been formed by **A. J. (PETE) PETERSON** and **DAVID RUDNICK**. Offices of the new company are located at 484 Clifton Ave., Newark, N. J., and 70 Prospect Park West, Brooklyn 15, N. Y.

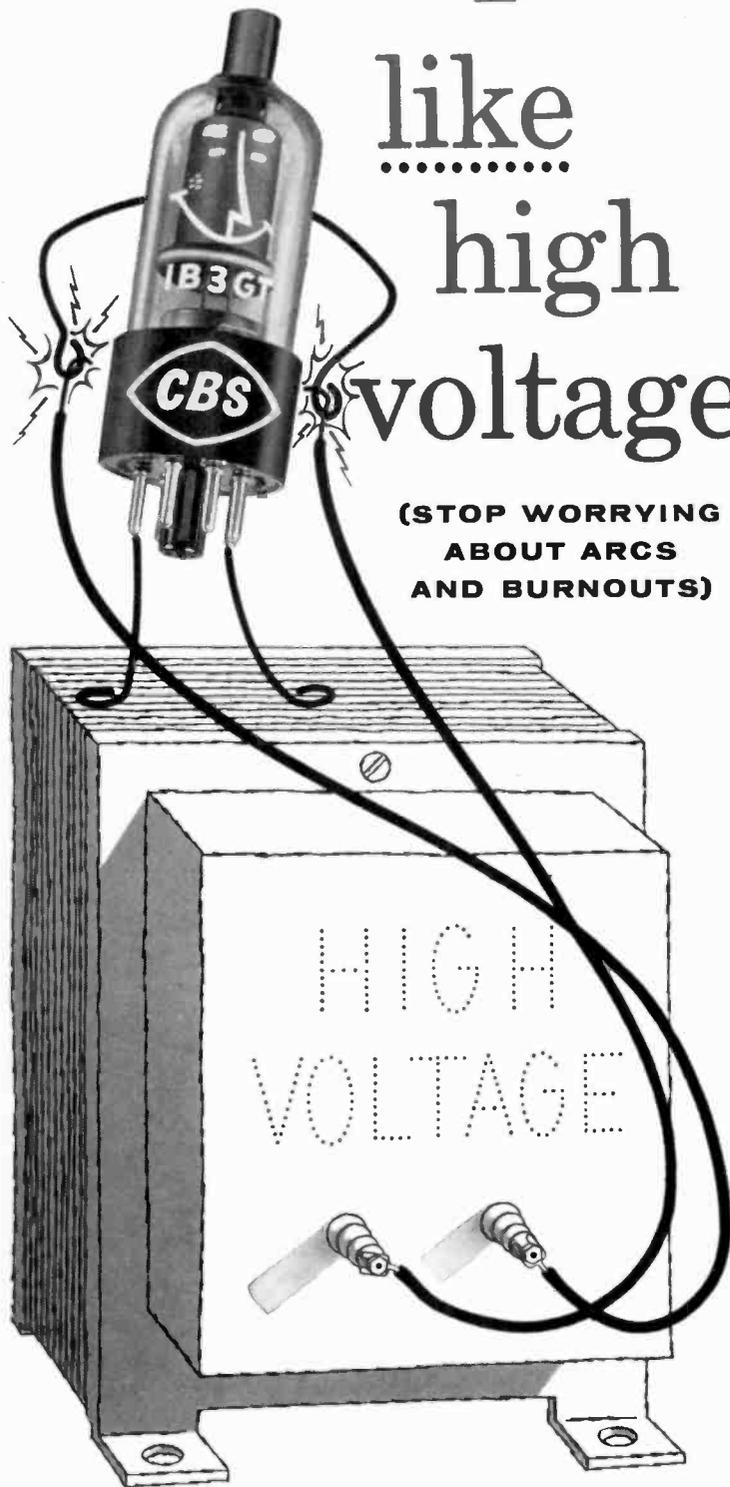
**SONY CORP.**, Tokyo, has established the **SONY CORP. OF AMERICA**, 514 Broadway, N. Y. C., to distribute products formerly handled in the U. S. by **DELMONICO INTERNATIONAL DIV.** The new company is headed by **AKIO MORITA**, Executive Vice Pres. of the parent organization.

**UNITED SCIENTIFIC LABS.** reports the appointment of the following three reps for the DeWald line: **SAMUEL B. COHEN**, Pa., Md., Dela., Wash., D. C., Northern Va., and Southern N. J.; **DIXIE ELECTRONIC ASSOC.**, Miss., Ala., Ga., N. & S. C., Tenn. and Southern Va.; and **NORWESTERN SALES CO.**, Ore., Wash., and Alaska.

**ERA** has elected the following new officers: **WALLY SHULAN**, Jersey City, N. J., Pres.; **CHARLES N. HOEMIG**, Fort Wayne, Ind., Chairman of the Bd.; **PHILIP ANDRESS**, Philadelphia, Pa., Eastern Dist. Vice Pres.; **CLARK R. GIBB**, Minneapolis, Minn., Central Dist. Vice Pres.; **ROBERT BONIFACE**, North Hollywood, Calif., Western Dist. Vice Pres.; **NORMAN KATHRINUS**, St. Louis, Mo., Secy.; and **HARRY HALINTON**, Chicago, was re-elected Treas. These seven officers, together with Executive Dir., **WILLIAM C. WEBER, JR.**, constitute the Executive Comm. of the association. **ERA "Excellence in Sales Management"** Awards were presented for Instrument, Audio, Distributor and Industrial Components to the following: **W. NOEL ELDRED**, Vice-Pres., Marketing, **HEWLETT-PACKARD CO.**; **EARL U. SALA, JR.**, Gen. Sales Mgr. of **BELL SOUND DIV.**, **THOMPSON-RAMOWOOLDRIDGE, INC.**; **NORMAN A. TRIPPLETT**, Gen. Sales Mgr., **TRIPPLETT ELECTRICAL INSTRUMENT CO.**; and **LOWELL L. WILKES, JR.**, Gen. Sales Mgr., **CAMBRIDGE THERMIONIC CORP.**

# I like ..... high voltage

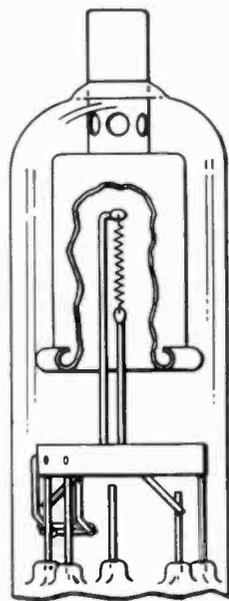
**(STOP WORRYING  
ABOUT ARCS  
AND BURNOUTS)**



"I'm clean as a whistle inside . . . no loose particles make me get grouchy and sputter. My filament coating stays put. My filament and anode keep a respectful and arcproof distance. You can depend upon me to take high voltage and like it."

Yes, the whole family of CBS high-voltage rectifiers offers you *total reliability* . . . proved in performance by leading TV and radio set manufacturers. Profit from the *total reliability* of CBS tubes. Use them yourself.

Ruggedness and dependability are built into every CBS high-voltage rectifier four ways: The Bantet stem gives solid four-point suspension. A simplified two-weld support cuts filament weld problems in half. A stretched filament coil (possible only with expensive cathoretic coating) is sagproof and flakeproof. Positioning of anode with respect to filament is permanent.



**TOTAL RELIABILITY**  
... proved in performance



**CBS ELECTRONICS**

Denvers, Massachusetts

A Division of Columbia Broadcasting System, Inc.

Receiving, industrial and picture tubes • transistors and diodes • audio components • and phonographs



GLASER-STEERS appoints Ed Claffey as merchandise manager of consumer products.

SHURE names Dr. Harvey Fletcher, acoustic pioneer, as consultant.

CHICAGO HIGH FIDELITY SHOW will be held Sept. 23-25 at the Palmer House.

AMPEREX publishes the 'Audio Designers Handbook,' a 33-page booklet which covers amplifier circuits, tube table and design data for engineers and audiophiles. Copies are available from the company for \$1.50 each.

MASCO names W. Walter Jablon President, succeeding Mrs. Miryam Simpson, who becomes Board Chairman.

JENSEN MFG. appoints Wyborny Sales Co., Dallas, as rep for their complete speaker line in Texas, Oklahoma, Louisiana and Arkansas.

AUDAX adds 3-1/2 inch cone-type tweeter to speaker line. Response is 3,000 to 18,000 cps. Power handling capacity is 25 watts. Retail for \$9.95.

PROGRESS MFG. introduces the Sound-Guard "Convertible" radio intercoms for installation in older homes without cutting holes in walls.

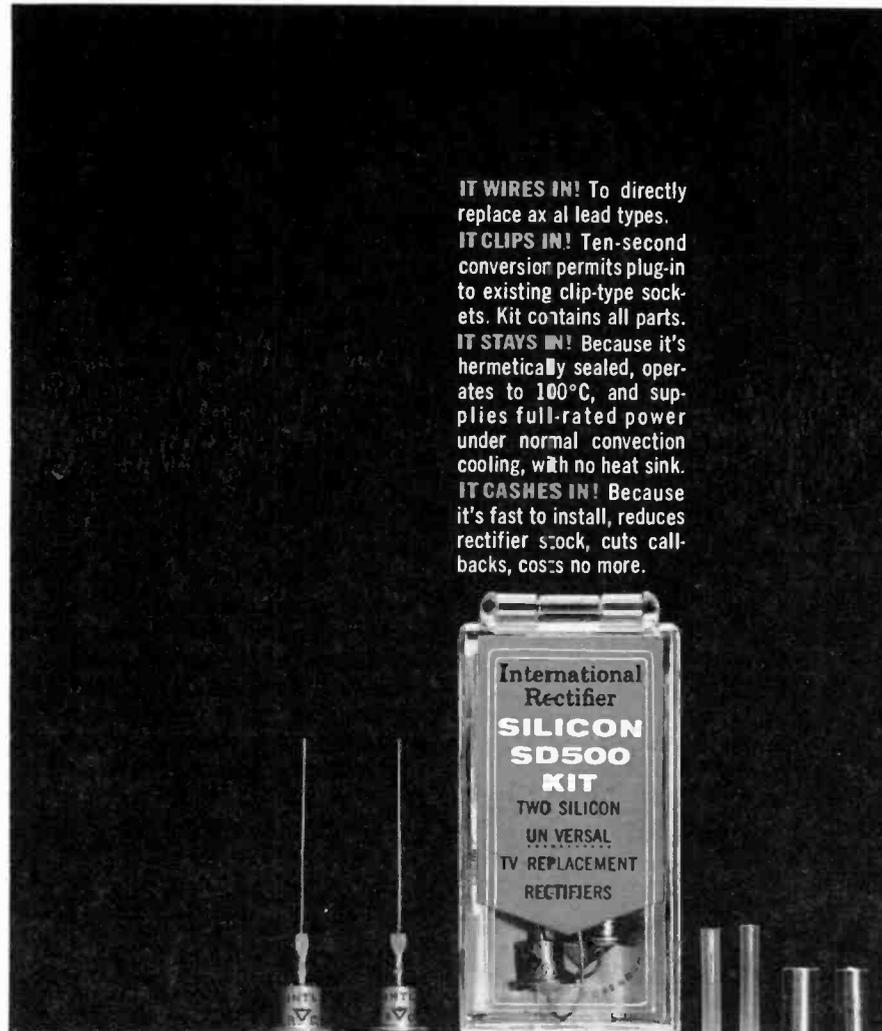
OLSON RADIO offers stereo control unit, Model VC-223. Contains master volume control stereo-reverse-mono selector, input and output pin jacks. Retail for \$3.00.

MINNESOTA MINING announces Scotch brand no. 311 magnetic tape backing featuring a sturdy new backing material called Tenzar. Particularly suited for business and audio-visual use, 1200' on a 7" reel lists for \$3.75.

V-M introduces new 307 portable stereo component system with changer listing @ \$129.95; similar model 207 with manual player is \$119.95. Also, Model 915 stereo console @ \$379.95 includes tuner with afc.

ROBINS INDUSTRIES announces new display deals for tape heads, tape and record care accessories. Free materials include cabinet and literature; 16 heads list @ \$309, 25 heads @ \$521, and 54 heads @ \$1079. Three new sales reps named are: Wayne Beitel Co., Detroit, Mich.; Fred Wamble Sales Co., Montgomery, Ala.; Bernard A. Cahn Co., San Francisco, Calif.

(Continued on page 25)



**IT WIRES IN!** To directly replace axial lead types.

**IT CLIPS IN!** Ten-second conversion permits plug-in to existing clip-type sockets. Kit contains all parts.

**IT STAYS IN!** Because it's hermetically sealed, operates to 100°C, and supplies full-rated power under normal convection cooling, with no heat sink.

**IT CASHES IN!** Because it's fast to install, reduces rectifier stock, cuts call-backs, costs no more.

**INTERNATIONAL RECTIFIER**

**SD-500 KIT** — The silicon radio-TV rectifier kit that replaces a drawerful!

**INTERNATIONAL RECTIFIER CORPORATION**

Distributor Sales Division: El Segundo, Calif.

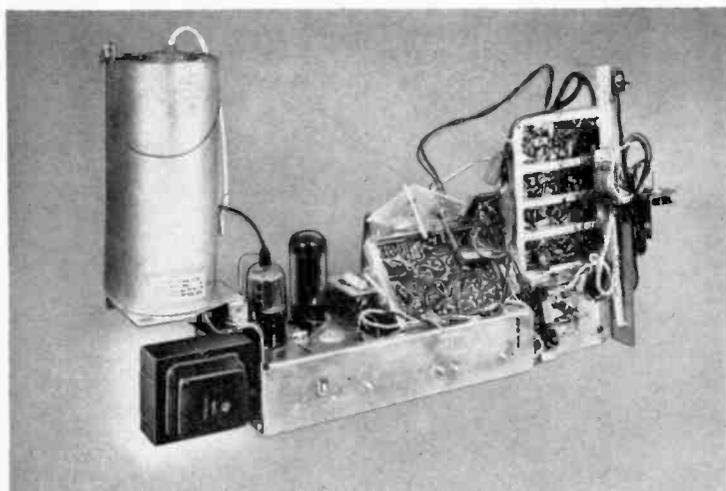
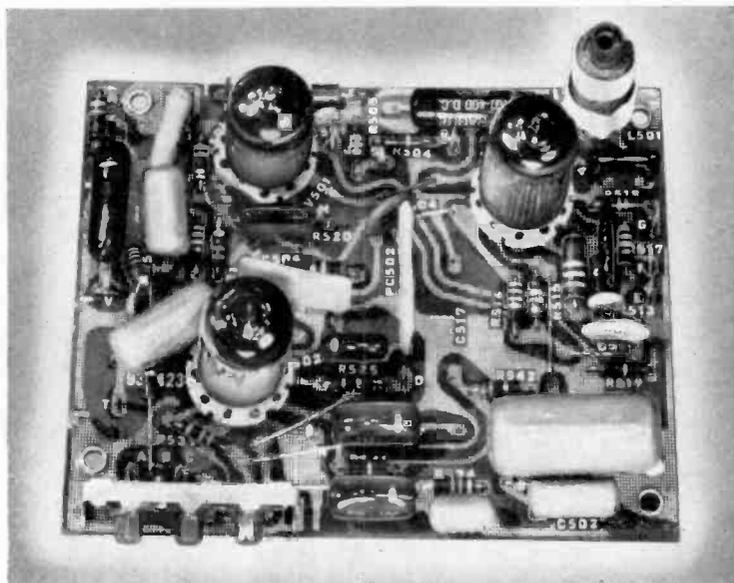
In Stock at Better Dealers Everywhere



Now setting new industry standards  
for performance and reliability—

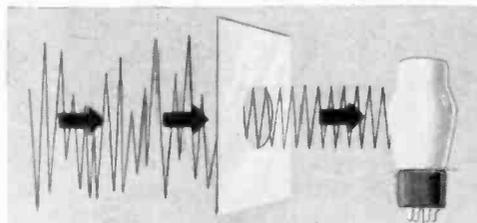
# Every new RCA VICTOR TV set has all these quality features:

**Security Sealed Circuitry!** Copper, permanently bonded to a non-conductive panel, forms the wiring pattern for Security Sealed Circuitry. All tubes and components are mounted on the serviceman's side of the panel . . . easy to reach, easy to locate with RCA Victor's "road-map" technique. All components have printed identification right on the board! RCA Security Sealed Circuitry seals in quality, seals out trouble . . . so reliable they are specified for vital government projects . . . proved in many millions of RCA Victor TV sets.



Every RCA Victor black-and-white TV has a Transformer-Powered Chassis. Chassis design makes servicing fast and uncomplicated. RCA Silverama

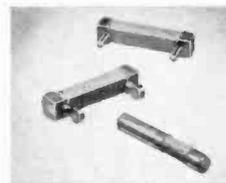
aluminized picture tube gives greater sharpness and sparkle. These RCA Victor TV sets offer truly new high standards of performance.



**New Tube Guard** protects against tube-killing power blast when set is turned on, the main cause of TV failure. Every tube, including picture tube, warms up gradually and safely—lasts longer.



**New high voltages** (20,000 volts in many models) step up picture brightness and contrast. **Clarity Control** reduces "snow" and "ghost" effects.



**New Chemical Fuse** gives complete protection, yet doesn't blow from non-dangerous momentary overloads that open ordinary fuses.



THE MOST TRUSTED NAME IN TELEVISION

These and a dozen other reliability features are built into every 1960 RCA Victor TV set. No wonder RCA Victor is setting the pace for reliability and performance in the television industry, assuring you that every RCA Victor TV set is built to satisfy customers every time!

# READY TO SERVE YOU!

# OVER 1500

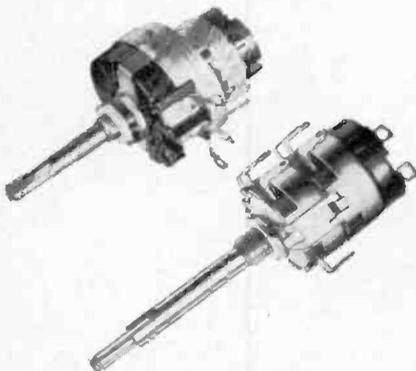
## CLAROSTAT DISTRIBUTORS

with

# CLAROSTAT "Right Replacements"

### RTV CONTROLS

Completely factory-made and assembled — ready for use right from the carton — eliminates all fuss, bother and cussing because they fit right and work right just as you get them.



### GREENOHM RESISTORS

King of them all — for price and dependability. Available in all popular values. Ideal for replacement purposes especially where overloading burns out less rugged resistors.



### PICK-A-SHAFT CONTROLS

Pick the one you need — wire-wound or carbon — from the many popular values available. Then choose your shaft — snap it in. Need a switch? Ad-a-Switch attaches to control in seconds — no sweat, no bother ...



WRITE FOR COMPLETE CATALOG, OR ASK YOUR DISTRIBUTOR

## CLAROSTAT MFG. CO., INC.

DOVER, NEW HAMPSHIRE

In Canada: CANADIAN MARCONI CO., LTD., Toronto 17, Ont.

(Continued from page 22)

ELECTRO-VOICE introduces the 715 SR ceramic mike for communications service. Output is -55 db. Frequency response is 60-7,000 cps.

ALLIED RADIO introduces Knight Model KN-4060 stereo tape recorder @ \$229.95. Unit records and plays 2 and 4 track stereo tapes at any of three speeds--1-7/8, 3-3/4, 7-1/2 ips. Response at 7-1/2 is 50-15,000 cps, wow and flutter 0.25%, s/n -45 db. Also Knight KN-135 stereo FM/AM tuner @ \$79.50. Sensitivity is 4  $\mu$ v for 20 db quieting.

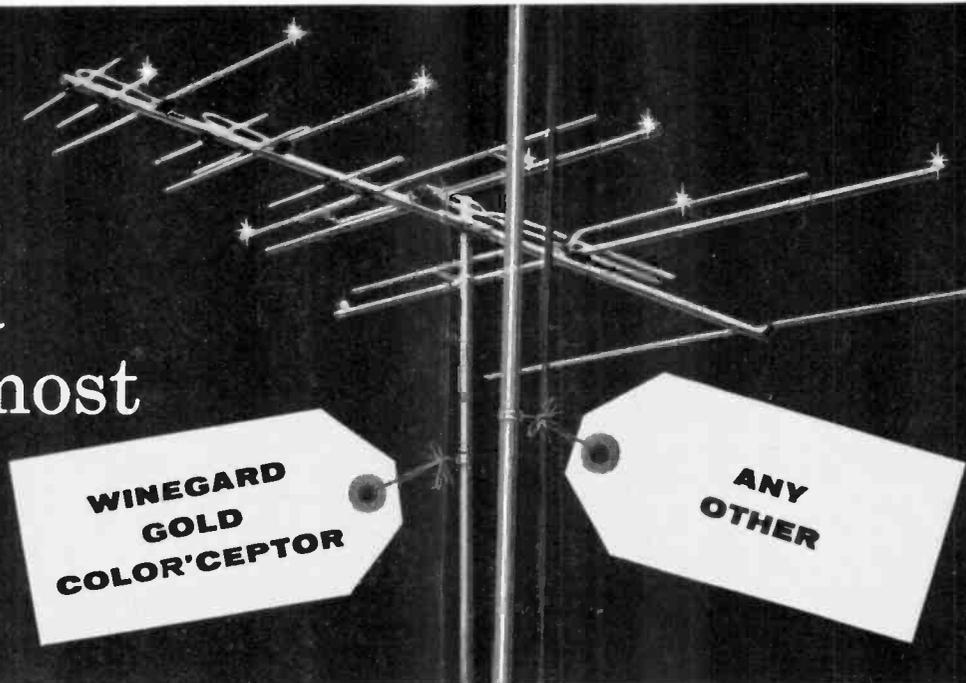
LAFAYETTE introduces dual-speed portable tape recorder, Model RK-400, priced at \$54.50. Frequency response @ 7-1/2 ips is 60 to 8,500 cps.

ELECTRONIC INDUSTRIES ASSOCIATION recommends packaged phono power rating standard. Called "music power output," manufacturers adopting this standard spec would not list distortion figures in advertising. Power rating is for momentary output, not continuous, and is reported as 10 to 20% higher than continuous rating.

KIRSCH MUSIC announces plans to include tape-care accessories in its audio accessories line and to market the line through record wholesalers.

AUDIOTEX introduces impedance matching "L" pads for remote control of speakers without loss of quality. Controls are rated 10 watts continuous power and include "Off" position. \$10.50. Also publishes its 16-page 1960 catalog listing more than 150 audio accessories. Photo and list price of each item are presented.

## Which TV Antenna can do the most for you?



Remember when everybody lit cigarettes with matches that sold for a penny a box? Then along came a lighter at 500 times the cost of matches. Lighters, today, sell by the millions . . . making bigger profits for dealers than matches ever did!

You get the idea. People do have the money . . . and when they have a choice, they invariably buy the best . . . even if it costs more. The widespread acceptance of our patented Color'Ceptor proves that people also want the best antenna. Dealers who offer it to them are the ones who make the most money. In fact, Color'Ceptor has gained such tremendous popularity that eleven imitations are now masquerading as substitutes!

Now Know This and Make More Money Color'Ceptor outsells others for many reasons: PERFORMANCE—uniform high gain over all channels, sharp directivity, no suck-outs, no gain roll-off on end channels, no spurious side lobes, uniform high front-to-back ratio on all channels. A HIGH QUALITY OF CONSTRUCTION not found in any other antenna—rides out winds up to 100 mph, yet weighs less, installs quicker and easier. Elements lay flat and neat. Has exclusive non-crush mast clamp and Winegard's 7-cycle bright gold anodizing that doesn't turn green . . . defies salt spray, fuel acids, corrosion. Three models to meet most needs. Has the

most attractive package, best dealer sales aids, by far the strongest national consumer advertising. Has what dealers and their customers both want. So good you could build a retail business on Color'Ceptor alone—and that's been done!

Any dealer who can sell imitations and other "second-best" antennas will do far better selling the Color'Ceptor. WHY SELL PENNY MATCHES? Get OUT all that's IN this business. Feature Color'Ceptor! Speak to your Winegard distributor or mail the coupon now.



**Winegard**  
ANTENNA SYSTEMS

WINEGARD CO. 3019-4 Scotten, Burlington, Ia.

Send me full Color'Ceptor details.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_

State \_\_\_\_\_

# TARZIAN

## Silicon Rectifiers do more than replace these 40 tube types



5AU4	5AW4	5AZ4	5T4
5U4	5V4	5Y4	5W4
5Y3	5Z4	6X4	6063
6202	80	82	83
83V	5Z3	0Z4	5X4
6AX5	6X5	5AU4	5931
6087	6106	5R4	6AU4
6AX4	6BL4	6U4	6W4
12AX4	17AX4	25W4	816
836	3B28	866	866A

Some common vacuum rectifier types that Tarzian silicon rectifiers replace,

### THEY ALSO PROVIDE:

1. Higher current ratings
2. Inherently rugged construction
3. Instant operation; no warmup
4. Greater electrical stability
5. Improved voltage regulation

Tarzian tube replacement silicon rectifiers combine the advantages of solid state rectification and direct interchangeability with over 95% of all popular rectifier tube types. Although the silicon units are generally smaller than the tubes they replace, their dc current ratings are substantially higher, as much as three times as great in some ratings.

If you have a rectifier application requiring high efficiency, long life, rugged construction, or wide temperature range, Tarzian tube replacement silicon rectifiers may solve your problem. They are available in nine standard models. Special designs and modifications can be worked out on request.

For specifications and prices of tube replacement silicon rectifiers, contact your Sarkes Tarzian sales representative or distributor, or write to Section 4615B, Sarkes Tarzian, Inc., Semiconductor Division, Bloomington, Indiana.



**SARKES TARZIAN, INC.**

SEMICONDUCTOR DIVISION  
BLOOMINGTON, INDIANA

In Canada: 700 Weston Rd., Toronto 9, Ontario  
Export: Ad Auriema, Inc., New York City

## Catalogs & Bulletins

**BATTERY & CHARGER:** The new miniature "Pony" rechargeable battery and plug-in charger are covered in a 2-color circular. The battery is directly interchangeable with miniature 9v batteries used in transistor radios. B&K Mfg. Co., 1801 W. Belle Plaine Ave., Chicago 13, Ill. (ELECTRONIC TECHNICIAN B4-1)

**COMMUNICATION SYSTEM:** Brochure E-13 describes a new integrated hospital communication system. The equipment consists of a nurses' central station, an administrative internal communication system and a private paging system; and can be integrated into a central source master system or installed separately in combination with any part of an existing system. Dictograph Products, 95-25 149th St., Jamaica 35, N. Y. (ELECTRONIC TECHNICIAN B4-2)

**SEMICONDUCTORS:** Rectifier News, Winter Edition, RW-1259 contains a 4-page article entitled "Properties of Semiconductor Devices Affecting Voltage Division." Voltage distribution and various methods to achieve equality are discussed. International Rectifier Corp., 1521 E. Grand Ave., El Segundo, Calif. (ELECTRONIC TECHNICIAN B4-4)

**PRINTED CIRCUIT BOARD HOLDER:** "Little Joe" No. 160, which holds any board up to 8½" wide, is covered in a new catalog sheet. Macdonald & Co., 1324 Ethel St., Glendale 7, Calif. (ELECTRONIC TECHNICIAN B4-5)

**INSULATORS:** A full-color sheet gives information on the new color range available in flexible insulators. White, yellow, green and blue have been added to the familiar red and black. Mueller Electric Co., 1583 E. 31 St., Cleveland 14, Ohio. (ELECTRONIC TECHNICIAN B4-6)

**DIODES:** A 2-color catalog sheet covers the firm's latest development in damper-diode design: the 6DA4A, intended for use in the majority of TV receivers using a single-ended octal-based damper diode. Tung-Sol Electric, Inc., 1 Summer Ave., Newark 4, N. J. (ELECTRONIC TECHNICIAN B4-7)

**DEPTH FINDER:** Model 5100 self-contained, battery-powered marine depth finder, covered in bulletin T-280, is a new compact unit with modern marine styling. Included in its features is the exclusive "dial doubler" to provide two full dial scales. Electro-Voice, Inc., Marine Div., Buchanan, Mich. (ELECTRONIC TECHNICIAN B4-3)

# Free



## STORAGE RACK KEEPS ALL YOUR RESISTORS FOR EASY USE!

### HERE'S WHAT YOU GET!

Take your choice of these special stocking deals . . . a balanced assortment in each wattage.

No. 3994-1— $\frac{1}{2}$  Watt—6 per box—30 boxes

No. 3994-2—One-half of above

No. 3994-3—1 Watt—4 per box—30 boxes

No. 3994-4—One-half of above

No. 3994-5—2 Watt—3 per box—30 boxes

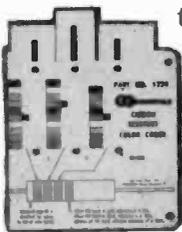
No. 3994-6—One-half of above

No. 3994-7— $\frac{1}{2}$ , 1 and 2 Watts—10 boxes of each value

Get any one of these **7** deals on famous

# GC STACKPOLE FIXED COMPOSITION RESISTORS

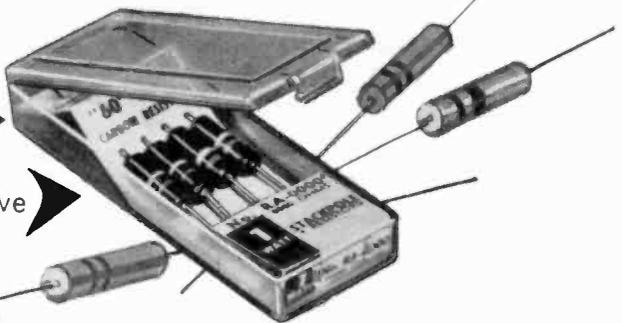
For a limited time only, you can stock up on the resistors you need at a real saving . . . get a handy metal storage rack free. Choose any one of these GC special assortments of top quality resistors in the exclusive-with-GC color-coded plastic boxes. Take advantage of this special sale now . . . see it at your GC jobber.



**FREE COLOR-CODER** included with each deal.

✓ Scientifically packaged to prevent bent soldering leads

✓ Boxes color-coded to make identification positive



**SEE YOUR JOBBER!** He now has these special resistor deals . . . or can get them for you.



# GC Electronics Co.

Resistor and Knob Division of

Division of Tectron Electronics, Inc.

Western Plant: Los Angeles 18, California • Main Plant: **ROCKFORD, ILLINOIS, U.S.A.**

# NOW

## Make Money on Printed Circuit Repairs

... it's easier than you think with the new

### Ungar®

## DE-SOLDERING TIPLETS®

You pocket more profit on printed circuit repair jobs with these exclusive interchangeable Ungar De-Soldering Tiplets. Specially shaped to remove 9 out of 10 components! No more improvising with make-shift tools!

Repairs are easier, safer and 70% faster because each triplet is designed to apply just the right amount of heat simultaneously to all soldered contacts without heat radiation damage. No more de-lamination problems! No more ruined printed boards!

Tiplets shown at left are available individually... List Price 75¢ each, or...



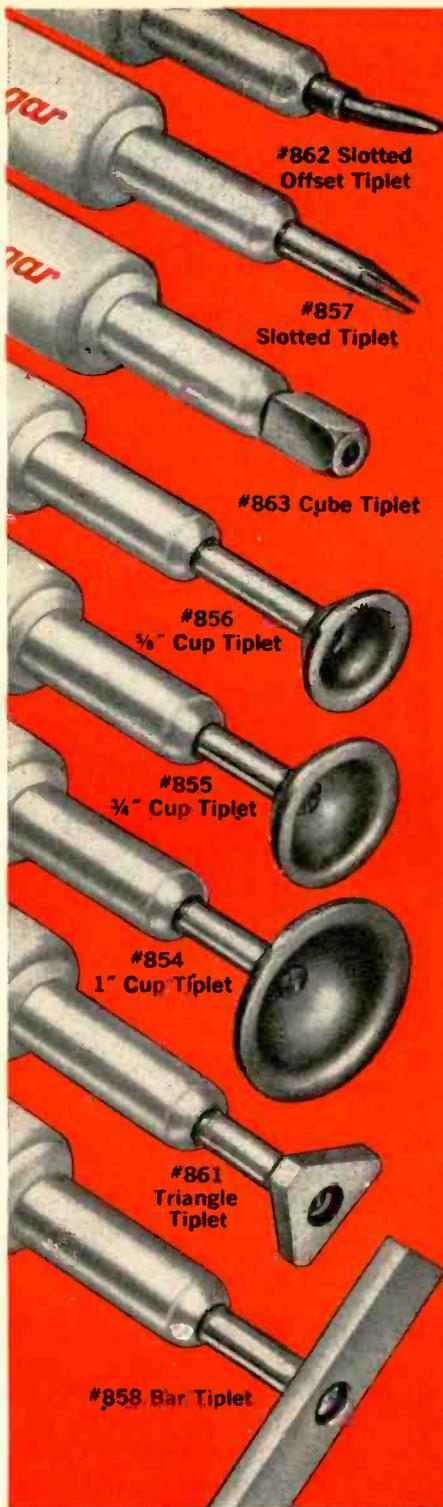
### Special Introductory Kit

Lifetime Metal Case contains #776 Handle, Super Hi-Heat Unit, #857 Slotted Tippet, 3 cup Tiplets and #858 Bar Tippet. . . . . List \$7.95

Order from your  
Electronic Parts Distributor now!

## Ungar Electric Tools, Inc.

4101 Redwood Ave., Los Angeles 66, Calif.



#862 Slotted Offset Tippet

#857 Slotted Tippet

#863 Cube Tippet

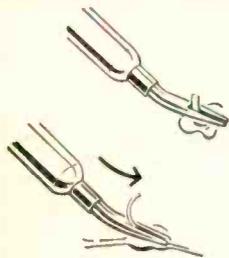
#856 3/8" Cup Tippet

#855 3/4" Cup Tippet

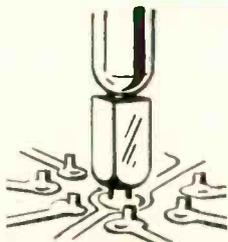
#854 1" Cup Tippet

#861 Triangle Tippet

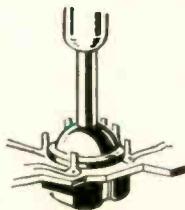
#858 Bar Tippet



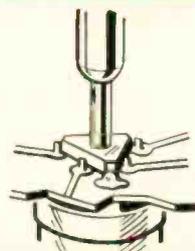
Offset Slotted Tippet straightens leads, tube tabs and small wires bent close to board.



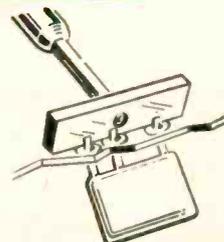
Cube Tippet removes center pins of tube sockets and harness leads.



Cup Shaped De-Soldering Tippet removes solder from circular multi-lug components in one operation.



Triangle Tippet melts solder on leads of electrolytic capacitors simultaneously.



Bar Tippet simultaneously melts solder on all multiple straight line network components.

# ELECTRONIC TECHNICIAN

Including  
**SERVICE**  
Magazine

## *Abusing Citizens Band*

It seems there will always be people who take advantage of a good thing. A serious case in point is the improper utilization of Citizens Band frequencies.

For some time it was evident that the nation could benefit from a "people's communications service" which would allow truckers, boat enthusiasts, businessmen, construction crews and people from all walks of life to use radio communications without having to undergo rigid examinations. The Federal Communications Commission established just such a service—Citizens Band—which was intended to provide low power, short distance communications of a practical nature. It was not intended to duplicate the amateur service which allows hams to experiment and socialize on the airways.

It has become evident that too many people with Citizens Band transmitters are using their equipment for fun and DX-fishing for long distance contacts, contrary to law. Apparently, some overly zealous manufacturers and electronic hobby magazines have been guilty of encouraging such activities.

### **New Rules**

The FCC has now adopted new rules to outlaw amateur-type of communications on Citizens Band, particularly for Class D stations which operate in the 27 mc band.

Some of the commission's own statements may shed further light on this: "Although the rules do not specifically define the types of messages to be transmitted, in each case the licensees are restricted to those communications considered essential to the conduct of that portion of their activities which forms the basis of their eligibility in the particular service.

"In line with this policy, the citizens radio service was created to provide a means of transmitting the substantive and useful messages related to either the business activities or personal convenience of private citizens who may not be eligible in any other radio service except the amateur radio service. Since the provisions of the rules governing the other radio services had not been misinterpreted, it was believed unnecessary to define in great detail the type of use which might be made of citizens radio stations.

"While it was contemplated that there would be unlimited possibilities for use," the Commission emphasized, "there was no intention to create a service paralleling the amateur radio service nor was it intended that citizens radio stations be used as a hobby in itself, for technical radio experiments or for general 'contacts' of a random nature."

### **Citizens Band Not For Hamming**

The FCC said it "regrets" that anyone has been "misled by magazine articles or the advertisements of certain equipment manufacturers into purchasing radio equipment solely to conduct amateur-type communications in the citizens radio service."

It has been reported that more than 80,000 Citizens Band units have been sold in less than a year and a half. A number of these have been sold and installed by electronic service dealers, and many more will continue to be sold in this manner.

It behooves all people professionally engaged in marketing Citizens Band equipment—manufacturers, distributors, technicians, and publications—to promote the wonderful potential of this service, while cautioning consumers that its purpose is for communications and not for hobby fun.

# Tuning In the

**AGREEMENT** has been reached among manufacturers, trade and press groups, to recommend the voluntary assignment of specific channels for marine use in the Class D Citizens Band. The resolution calls for the voluntary assignment of Channel 13 (27.115 mc) for pleasure boating, including all non-commercial marine applications; Channel 9 (27.065 mc) for commercial marine use. It was emphasized at the meeting that these suggested frequencies are not to be considered as a replacement for the international calling and distress frequency of 2182 kc.

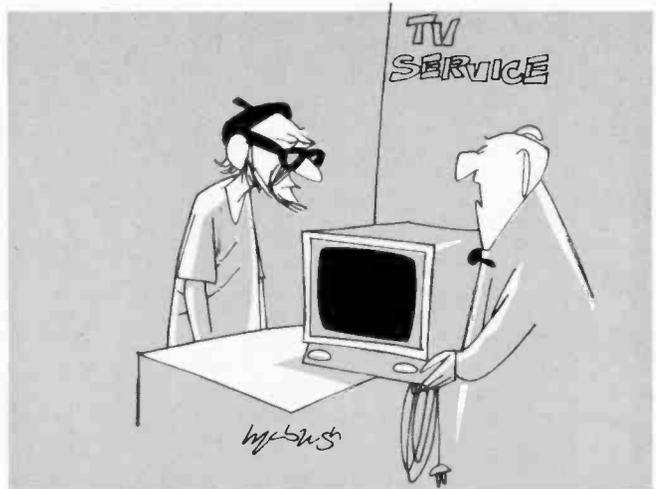
**ETOBICOKE**, a Toronto suburb, has become the site of a pay-TV installation setup for International Telemeter Corp., a Paramount subsidiary. For a basic fee of \$5.00, 1,000 charter subscribers have had a coin control box connected into their antenna line. The operation transmits three channels by cable to subscribers. New movies or special events are shown on two of the channels while the third channel simultaneously has public service fare. Dropping coins in the box converts the cable signal up to one of the unused VHF channels.

**NATIONAL CREDIT OFFICE** reports a study of 600 hi-fi retailers showed that 75% made a profit in 1959, while 18% broke even and 7% were in the red. 301 firms increased sales, 88.4% operating profitably 10.3% at break-even, and 1.3% losing. 201 firms had a sales decline with 67.2% in the black, 22.4% even, and 10.4% losing money. Of 98 firms reporting volume unchanged, 50% were profitable; 33% even, and 17% operating at a loss.

## STORE IMPROVEMENT PROGRAM



Store Improvement Program sponsored by RCA Electron Tube Division is designed to help the independent TV service dealer make his place of business a better selling tool. More than 35 business and service aids are available for windows, counter and floor areas. Shown here is a set being serviced on the 2 X 4' shop bench offered in the program by the company's distributors.

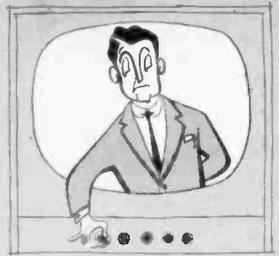


"You'll be glad to hear your horizontal was 'way out.'"

**NATIONAL STEREOPHONIC RADIO COMMITTEE** will conclude its technical studies of various proposed systems of stereo, FM, AM, and TV transmissions as a result of the refusal of the Federal Communications Commission to establish a TASO-type organization to carry on the activity. EIA had requested the FCC on October 15th to take over the technical work of the NSRC and establish a Government-chaired (anti-trust proof) organization such as the Television Allocations Study Organization so that the work could be completed. RCA and the Columbia Broadcasting System had declined to serve on the NSRC for legal reasons. They had indicated a willingness to join a TASO-type organization under FCC supervision. The FCC is expected to propose rules for stereo FM broadcasting in the near future.

**ANNUAL REPLACEMENT PLAN** for educational TV sets is being offered school authorities by General Electric. Labeling "open circuit broadcasting" the most practical approach to supplying the growing needs of educational television, GE proposes to supply schools with standard receivers at minimum cost, and avail the school of the opportunity to up-date receivers each 12 to 18 months on a replacement basis. Indicative of the market potential of ETV is the projected figure of 52.5 million student population in 1965 and the forecast shortage of teachers in that year of a quarter million. Based on the claimed optimum of 20 pupils to each TV set, GE estimates the potential ETV set market in 1965 will reach 2,750,000. A special financing plan permits use of 100 ETV receivers for a cost less than \$1.00 per set per week.

# Picture .....



**EPSILON ERIDANI, 70 OPHIUCHI, and five other stars similar to our own sun are within a radius of 15 light years from us. Radio telescopes are being developed to listen to these stars and their earth-like planets to find out if any intelligent radio signals are being emitted. A key undertaking designed to record radio noise from the stars—and look for any signs of artificial signals—is Project Ozma at the National Radio Astronomy Observatory. A 600 foot diameter telescope dish antenna is being constructed. It will be able to transmit pulse signals a distance of about 8.6 light years, which is twice the distance to the nearest star. A 1,000 foot dish planned for Puerto Rico would permit communication with any of 10,000 stars within a radius of 100 light years. Thus may we find out if there is any life even remotely similar to ours on other planets.**

**RECEIVING TUBE SALES** will surpass 400 million units during 1960, reports RCA. In 1959, the electron tube industry sold 430 million units, equal to nearly \$370 million at factory selling prices. This represented a 35 million unit increase over the previous year, and a continued high level is expected for 1960. Sales of black-and-white TV picture tubes rose substantially in 1959, increasing from 12 million units in 1958 to more than 13 million units last year, notes RCA. One of the key factors in this upward trend was the growing popularity of black-and-white portable TV sets, which accounted for nearly 40% of all models.

## CALENDAR OF COMING EVENTS

- Apr. 18-19: Conference on Automatic Techniques, Sheraton Cleveland Hotel, Cleveland, Ohio.
- Apr. 20-22: S.W. IRE Regional Conference & Electronics Show, Shamrock-Hilton Hotel, Houston, Tex.
- Apr. 29- May 1: Producers of Associated Components For Electronics, Annual Meeting, Nevele Hotel & Country Club, Ellen-ville, N.Y.
- May 2-4: National Aeronautical Electronics Conference, Baltimore and Miami Hotels, Dayton, Ohio.
- May 2-5: URSI-IRE Spring Meeting, Sheraton Park Hotel and National Bureau of Standards, Washington, D.C.
- May 3-5: Institute of Radio Engineers, American Institute of Electrical Engineers and Association for Computing Machinery; Western Joint Computer Conference, Jack Tar Hotel, San Francisco, Calif.
- May 9-12: Instrument Society of America, Instrument-Automation Conference and Exhibit, Brooks Hall, San Francisco, Calif.
- May 10-12: Electronic Components Symposium, Hotel Washington, Washington, D.C.
- May 16-18: Electronic Parts Distributors Show, Conrad Hilton Hotel, Chicago, Ill.
- May 23-25: National Telemetering Conference, Miramar Hotel, Santa Monica, Calif.
- May 23-26: Design Engineering Show, American Society of Mechanical Engineers, New York Coliseum, New York, N.Y.
- May 24-26: IRE-ISA Joint Technical Exhibit, Olympic Hotel and National Guard Armory, Seattle, Wash.

*"BELLBOY" personal signaling service will be provided by AT&T in 14 major cities in 1960. A person away from his telephone hears a tone signal (sent from the telephone exchange) in a pocket radio receiver. This alerts him to call his home or office to get a message.*

## RANDOM NOISE

KIMBLE  
GLASS  
ANNOUNCES  
18" CRT  
BULB FOR 122°  
YOKE  
DEFLECTION

### CRT ALBUM



10" 12" ROUND



PROJECTION



16" 17" 19" METAL



14" TO 27" RECT.



23" RECT.



18" RECT.

FAIRCHILD CAMERA CORP  
DEVELOPS 4 1/2 LB. 8MM  
HOME MOVIE CAMERA  
THAT RECORDS SOUND.  
HAS TRANSISTORIZED AMP.



LEN ROTTER

# Sophisticated Approach To AFC TV Problems

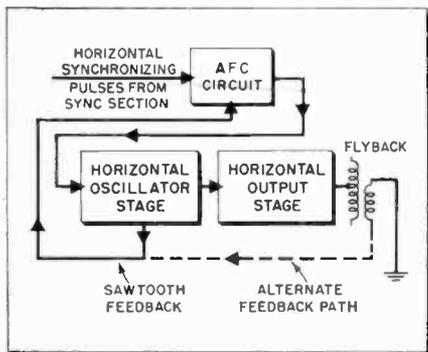
## Horizontal AFC Defects Display Trouble Symptoms

STUART HOBERMAN

• Automatic horizontal frequency control circuits are designed to maintain stable horizontal oscillator frequencies in TV receivers. The afc detector, discriminator or comparator, responds to phase changes and compares difference in phase between incoming sync signals and the horizontal sweep signal which is supplied to the detector through a feedback network. The horizontal sync pulse received from the transmitting station is the "Standard" by which feed-back signals are compared. This is a closed-loop system, analogous to agc and avc circuits. A functional diagram of the afc circuit and its relation to the horizontal oscillator and sweep circuit is illustrated in Fig. 1.

In practice, an afc circuit develops either a negative or positive d-c voltage when the horizontal oscillator frequency varies. These d-c voltages are in turn applied as a correction bias to the horizontal oscillator grid for automatically in-

Fig. 1—Functional diagram of horizontal afc and its relation to the oscillator and sweep output stage.



*Don't let the horizontal afc circuit fool you. It's an insidious little beast, at times.*

*Trouble symptoms normally related to other parts of the circuit can make a "tough dog" out of a simple defect. Typical symptoms exhibited by afc defects are: horizontal pulling, loss of sync, loss of raster and Christmas tree effect.*

*Your best weapons to combat such misleading symptoms are proper isolation methods with VTVM and scope.*

creasing or decreasing the oscillator frequency. In fact, to maintain the frequency constant. The method employed by various circuits may vary slightly but net results are similar.

When the received sync signals and the feed-back waveform are in phase, and equal in frequency, the afc correction voltage remains at zero.

### Afc Circuits

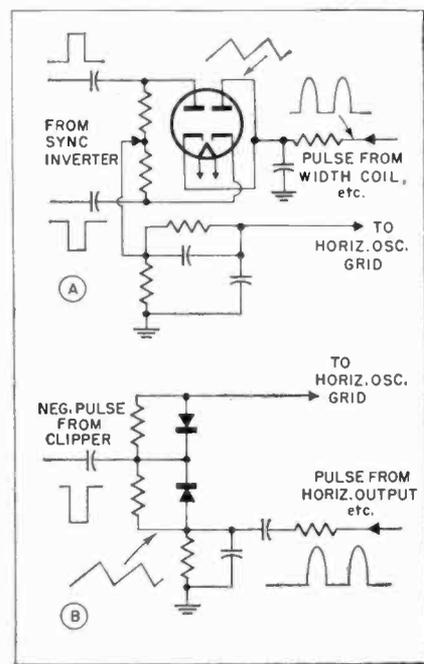
There are many possible circuit arrangements. Disregarding minor variations and the now little used sinewave-oscillator-reactance tube and the inverted triode circuits, two basic afc's are commonly used. These are: *balanced diode* and *pulse width* phase detectors. There are a number of possible circuit arrangements with each type.

The two horizontal oscillators generally employed with modern afc circuits are the modified cathode-coupled *multivibrator* and the *blocking oscillator*. A "modified" multivibrator is one which has a

parallel-resonant tank circuit added to obtain a measure of frequency control and to provide a degree of stability through "fly-wheel" effect. This resonant circuit is variously referred to by different manufacturers as horizontal frequency control, ringing coil, horizontal lock, horizontal stabilizer, etc. Afc circuits also have various trade pseudonyms such as synchro-guide, miracle picture lock, etc., but they all serve a similar purpose.

Two popular afc circuits employed with the multivibrator are shown in Fig. 2. The circuit at "A" can use a double diode in place of the 6AL5

Fig. 2 (A)—Phase detector with double diode tube requires two sync pulses of opposite phase and a feedback sawtooth derived from the horizontal oscillator or sweep output. (B)—Two semiconductors, effectively in parallel, use a negative horizontal sync pulse and a feedback sawtooth.



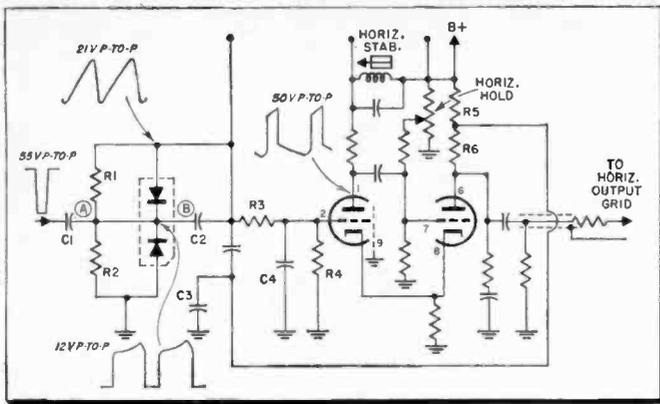


Fig. 3—Afc phase detector and cathode coupled multivibrator indicating average waveform shape and p-to-p voltage.

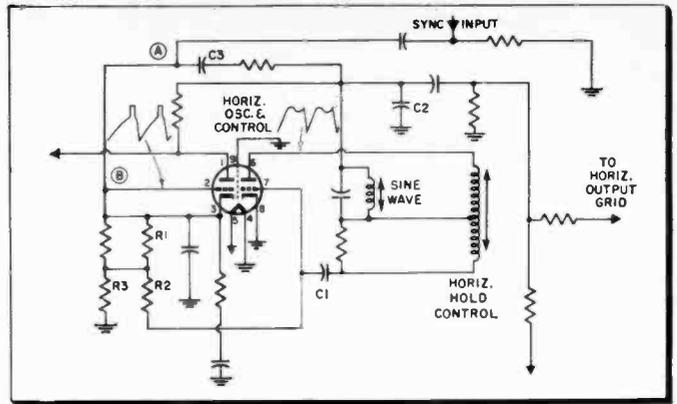


Fig. 4—Variation of a pulse width type horizontal afc circuit shown coupled to a blocking oscillator triode.

tube. The circuit at "B" can use a double plate single cathode diode tube section (e.g.,  $\frac{1}{2}$  6BW8, or 6CN7). The circuit at "A" requires two sync pulses of equal amplitude but opposite phase at the afc input. The arrangement at "B" employs a negative going horizontal sync pulse of proper amplitude at the diode cathodes. A complete modern balanced diode afc system, and horizontal multivibrator is illustrated in Fig. 3.

These circuits are found in many modern TV receivers. For example, Admiral chassis 15D1B, Hoffman 348-350 (Circuit Digest 88), GE Chassis M569 (Circuit Digest 91).

A widely used pulse width afc control circuit employing  $\frac{1}{2}$  of a double triode is shown in Fig. 4, together with the horizontal blocking oscillator which it controls. A positive going sync pulse and a sawtooth wave or modified sine-wave are applied to the afc control grid. Some older circuits combined three separate waveforms. Although this circuit has passed through a series of evolutionary processes it remains basically the same.

This circuit or variations are also used in some late TV sets. For example, RCA KCS 120E and 120F (Circuit Digest 89) and Andrea chassis VS-323 (Circuit Digest 91).

Attention is again directed to the fact that all afc circuits require a properly shaped waveform from the feed-back circuit. Essentially, rectangular voltage waveforms from the flyback, damper, yoke or horizontal output plate circuit are reformed into sawtooth waves through RC shaping networks. Modified sawtooth or sinewaves from the horizontal oscillator output are shaped and

utilized in the same manner.

### Afc Faults

There are a wide variety of symptoms indicating faults in afc circuits. Some of these are:

1. Bending or horizontal displacement
2. Tearing or "Christmas-tree" effect.
3. Complete loss or weak horizontal sync.

Another fault which should be mentioned at this point is an intermittent loss of raster, caused by a defect in the afc circuit. This is not common—but it can happen.

Any defect causing cut-off negative bias on the horizontal oscillator grid can result in loss of raster. The horizontal oscillator generally resumes operation and the raster reappears when the sync pulse is removed from the phase detector. A defective phase detector tube or diode is usually at fault. A VTVM voltage reading at the horizontal oscillator grid will generally reveal this fault and the horizontal output tube plate will probably be running red hot—until its cathode bias resistor burns up.

If the output tube is glowing, it's advisable to remove the tube from the socket while investigating the cause in prior stages. A scope may be used to monitor the waveform by connecting the vertical probe to the output tube's grid, and the ground lead to B—.

Since all of the symptoms mentioned above can originate in other TV sections apart from afc circuits, the first troubleshooting step is to isolate the fault to a particular section of the set.

Gassy tubes or slight cathode-heater leakage in tubes are a common source of bending and pulling. Any tube from the sync separator through the video output, i-f, to the r-f tube in the tuner can cause this symptom. When substituting tubes leave each tube in the set until the defective one is located or until all have been replaced.

Some technicians use a fast method to detect cathode heater leakage or shorts. In any parallel heater string where chassis ground is at zero potential, the cathode of each tube is merely shorted to chassis with a small screwdriver. If the a-c appearing in the picture is reduced, the tube is at fault. If a very low resistance leakage or a cathode heater short exists, the defective tube heater will probably blow.

The next step in the process of isolating horizontal afc faults is the proper adjustment of the ringing coil, synch phasing, hold control, etc. Agc, fringe or noise controls, drive and other associated adjustments should be properly set. On blocking oscillator circuits a scope is essential for accurately aligning waveforms from some modified sinewave phasing coils.

Many horizontal sync troubles have been traced to improper adjustment of one or more of these controls. Numerous cases of intermittent bending and pulling, present on some channels and not on others, have been traced to an improperly adjusted phasing coil in blocking oscillator circuits.

If no satisfactory results are obtained after tube substitutions and adjustments, it will be necessary to determine if the bending or pulling  
(Continued on page 74)

# Checking Tape Recorder Frequency Response

## Practical Test Set-Ups Are Needed To Determine Tape Recorder Playback And Record Performance

HERMAN BURSTEIN

• Checking out a tape recorder can be a very elementary procedure. Playing a reel of prerecorded tape will indicate whether it functions in playback; recording a few words on a fresh reel and playing this back will indicate whether it functions in the record mode as well.

This simple procedure results in limited results. It can be determined that the unit is essentially operating on both record and playback. But will a loss of treble response be detected? Doubtful. Perhaps the unit is being played through a hi-fi system, by-passing the internal amplifier of the unit, if it contains one. Is the bass response proper? And can you discover if it is through a simple lis-

tening test? Probably not; nor is listening for peaks in the response a good test method. Everyone's ears are different in hearing ability and training.

Today, many owners as well as their tape machines are too sophisticated for crude checks to get by. When audiophiles pay \$300 and up for tape recorders capable of high fidelity performance in addition to repeating baby's words, they expect excellent frequency response, low distortion, and a high signal-to-noise ratio. When the recorder fails in one or more of these respects, they expect it to be restored to its original level of performance. The service technician who desires to boost his income by getting the trade of these audiophiles must have a basic knowledge in techniques of checking tape recorder performance.

Fig. 1—Test set-up with audio oscillator and VTVM for record-playback overall response checks. A switch is used to simplify checking input and output signals.

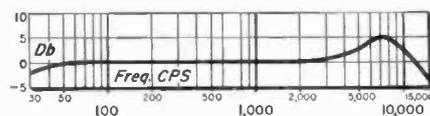
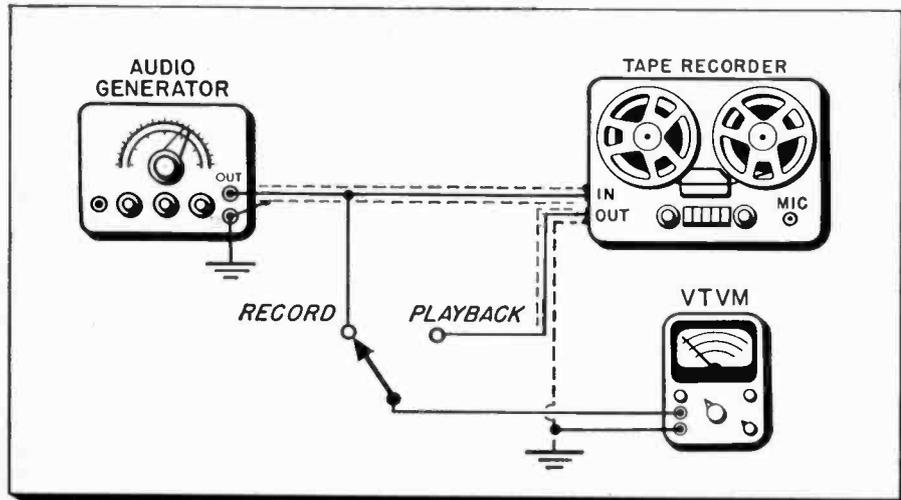


Fig. 2—Frequency response of some tape recorder amplifiers peak between 6 and 8 kc because of design characteristics.

These checks pertain to frequency response, equalization, azimuth, head height, bias current, distortion, signal-to-noise ratio, record level indication, tape speed, erasure.

The test techniques to be described apply in general to the majority of tape recorders. However, variations in design may sometime call for some modification of the basic procedure. Therefore, the technician is advised to consult the manufacturer's service manual for the specific machine he is servicing.

### Playback Response

Azimuth misalignment, incorrect bias current, and dirty heads (resulting in poor tape-to-head contact) can adversely affect treble response. It is presumed that these situations have been corrected before checking frequency response or that they will be taken care of as the result of the response test.

If the user plays prerecorded tapes, a check of playback response is important to ascertain that it is reasonably flat. It is quite possible for compensating errors in record and playback to yield flat response on a record-playback basis, disguising the fact that playback response is unsatisfactory.

A test tape is the best practical means of checking playback response. This takes into account not only the equalization of the playback amplifier but also the characteristics of the playback head and other factors, such as the cable from the head to the amplifier, which can produce treble loss if it is too long. The preferred measuring device is a VTVM connected to the output of the tape machine. An oscilloscope is, of course, also generally satisfactory as it may be read with great accuracy. A VOM, however, is undesirable because of its inferior frequency response characteristics.

If there are tone controls in the tape recorder, it is advisable to measure the output signal prior to these controls. It may also be well to measure response after the controls, at various tone control settings, to determine the position that yields flattest response.

The test tape contains voiced announcements of the various frequencies. To hear them, it is necessary to bridge an audio amplifier and speaker across the output of the tape recorder when the recorder does not have a self-contained power amplifier and speaker. If the recorder has a high impedance output, more than two or three feet of cable from the output to the external amplifier may significantly reduce treble response. Therefore, use a minimum length of low capacitance cable.

A test tape denotes a playback equalization standard that is widely accepted in the U. S. This is true for the 15 ips (rarely used for amateur equipment) and 7.5 ips speeds, where NAB (formerly NARTB) equalization is employed; bass boost commences (3 db rise) at 3,180 cps and levels off (3 db below maximum

boost) at 50 cps. The situation is less clear at 3.75 ips, because various turnover frequencies ranging from 795 cps to 1,590 cps have been used here. However, it is indicated that a turnover of 1,326 cps may become standard at 3.75 ips. If the test tape requires such equalization but the playback amplifier provides a turnover frequency of 795 cps or 1,590 cps, bass response will be about 4 db deficient in the first case and about 2 db excessive in the second.

### Record-Playback Response

If playback response conforms to a standard, then a check of record-playback response indicates whether the tape machine is recording in agreement with the standard characteristic. Figure 1 shows a setup for checking overall response, using an audio oscillator and a VTVM to check the level of both the incoming signal and of the tape machine's output. It is vital that the test signals be recorded at least 20 db below the maximum permissible recording level as indicated by the record level indicator. Otherwise one is likely to overload the tape at high frequencies due to the large amount of treble boost incorporated in the record amplifier.

Checking frequency response is quite simple when the tape machine has separate record and playback heads, permitting simultaneous recording and playback. But when the same head is used for record and playback, requiring the tape to be rewound before it can be played back, the procedure becomes laborious and it is desirable to use the minimum number of frequencies that adequately span the audio range. The following 10 frequencies

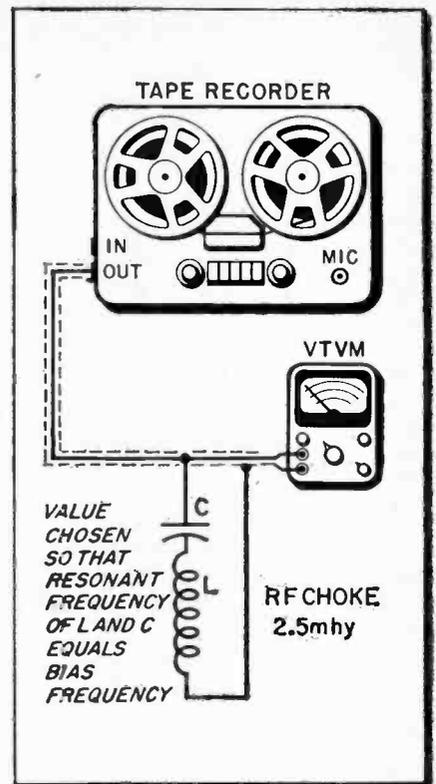


Fig. 3—A series trap is used at the tape recorder output to prevent bias oscillator r-f from feeding into the VTVM.

can measure frequency response satisfactorily: 30, 50, 100, 200, 500, 1,000, 2,000, 5,000, 10,000, and 15,000 cps. However, one is more likely to uncover significant peaks or dips by using a greater number of frequencies, particularly at the high end. Thus it is worth testing response at 6,000, 7,000, 8,000, 9,000, and 12,000 cps in addition to the previously named frequencies. As shown in Fig. 2, some tape recorders tend to peak excessively in the 6,000 to 8,000 cps region as the result of seeking to extend response out to 15,000 cps.

When checking frequency response of a tape machine that utilizes the same head for record and

Fig. 4—The set-up for checking playback equalization uses a voltage divider network to prevent overloading.

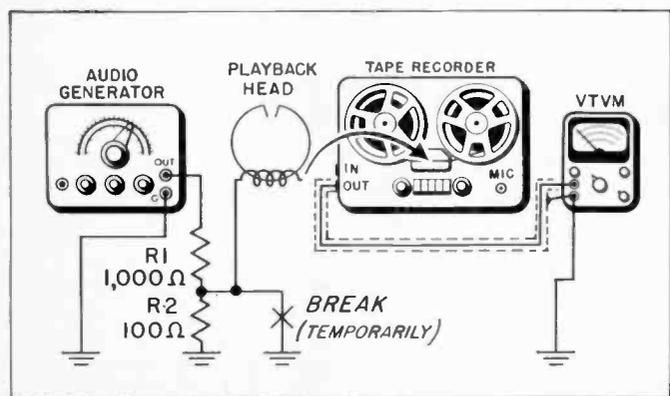
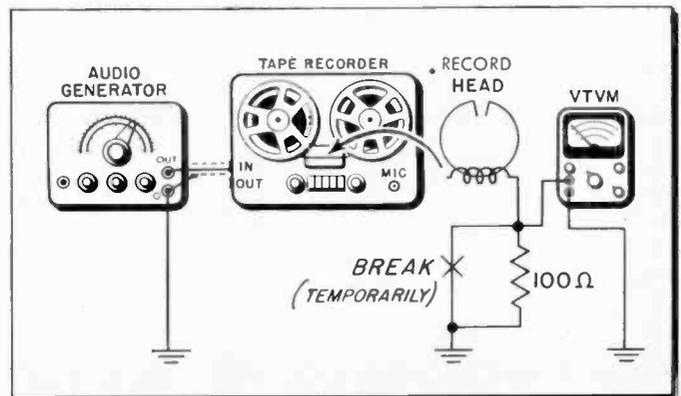


Fig. 5—Set-up for measuring record equalization. The bias oscillator tube should be removed.



playback, there is the problem of frequency identification in playback. One method is to intersperse voiced announcements by a microphone and monitor the tape playback with a speaker. A less laborious method is to write down the "schedule" of test frequencies and to "mark" several key frequencies, say 100, 1,000, and 10,000 cps. The marking can be accomplished by turning the oscillator on and off rapidly during each key frequency, causing the VTVM to fluctuate strongly in playback.

A problem is sometimes encountered when checking frequency response of a tape recorder with separate record and playback heads. If one is recording and playing back simultaneously, some bias voltage may be picked up at the output jack, so that the VTVM is reading not only audio signal, but also bias signal. To obtain an accurate measurement of frequency response it is then necessary to employ a bias trap, as shown in Fig. 3. The bias frequency usually lies between 50,000 and 100,000 cps, and as a result has radio frequency properties that cause it to appear at various places in the tape amplifier. When the record and playback amplifiers are very close together, as in a compact home machine, it is difficult to shield adequately against bias radiation. A 2.5 mhy. choke and a capacitor in the range of 1,000 to 4,000  $\mu$ f make an adequate bias trap. The value of the capacitor can be calculated, using a 2.5 mhy choke and the resonant frequency, by the usual formula:

$$C = \frac{1}{4\pi^2 f_r^2 L}$$

### Equalization

If playback response or record-playback response proves faulty, one

of the causes may be improper equalization. The technique commonly used to measure playback equalization is that of Fig. 4. The signal is inserted into the playback amplifier via the playback head in order to include treble losses due to winding capacitance of the head and other circuit capacitances. To present a very small signal to the head, comparable with that from a tape, and thus prevent overloading the head, a voltage divider made up of R-1 and R-2 is used. Adjust the gain control of the audio oscillator so that output of the playback amplifier is no more than about 1 volt. Maximum output occurs at the bass end, with decreasing output as frequency rises. Hence, a sensitive VTVM is required. It may be necessary to increase the input signal level above 500 cps in order to obtain a clear reading; this increase of course must be taken into account in tabulating response.

Figure 6 shows the NAB playback curve, commonly used at 15 and 7.5 ips; it also shows two characteristics that have been or are being used at 3.75 ips. It may well happen that measured equalization shows less treble cut, referred to 1,000 cps, than in Fig. 6. The reason will be that the remaining treble cut is produced by losses in the playback head or other circuit elements. One may also find somewhat less bass boost than shown by the curves of Fig. 6. The NAB standard permits response to be down 4 db at 50 cps. Figure 7 shows the measured playback equalization that one might typically encounter in a tape machine of good quality, operating at 7.5 ips.

Measured playback equalization that falls within  $\pm 2$  db of the NAB or other standard curve between 100 and 10,000 cps is excellent; within  $\pm 3$  db is good. At 50 cps the bass

boost should be not more than 4 db below the standard curve. At 15,000 cps, the treble cut should not exceed that of the standard curve by more than 4 db; in fact, in view of the likelihood of playback head losses, the measured treble cut probably should not exceed the standard curve.

### Measurement

To measure record equalization, the technique commonly employed is that of Fig. 5. A low value resistor, typically 100 ohms, is inserted between the ground lead of the record head and ground. As signals of constant amplitude and varying frequency are fed into the record amplifier, voltage is measured across the 100 ohm resistor.

Again, a sensitive VTVM should be used. If the instrument is not sensitive enough, it may be feasible to use a 1,000 ohm resistor instead. The important thing is that the resistor should be small compared with the impedance of the record head and other circuit elements (including the plate resistance of the tube driving the head and the "constant current" resistor between the plate of this tube and the head) at all audio frequencies.

Before measuring record equalization, remove the oscillator tube. Otherwise you will be measuring bias current instead of record equalization. Bias current is several times as great as audio current flowing through the record head.

To avoid the possibility of overloading the driving tube or the record head, keep the signal input to the record amplifier very low; at least 20 db below the amount that causes the record level indicator to indicate maximum permissible recording level. •

Fig. 6—The NAB playback equalization curves for 7.5 and 15 ips are shown. Two 3.75 ips curves that have been used are also shown.

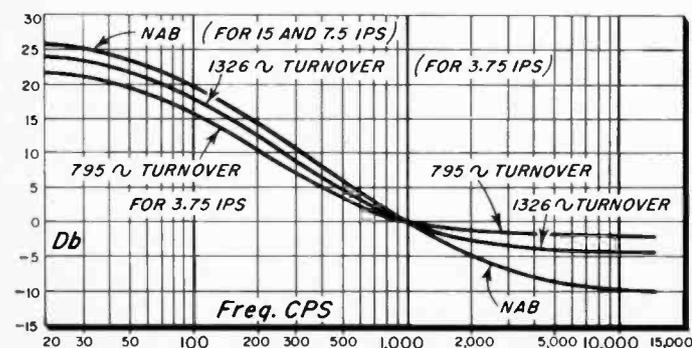
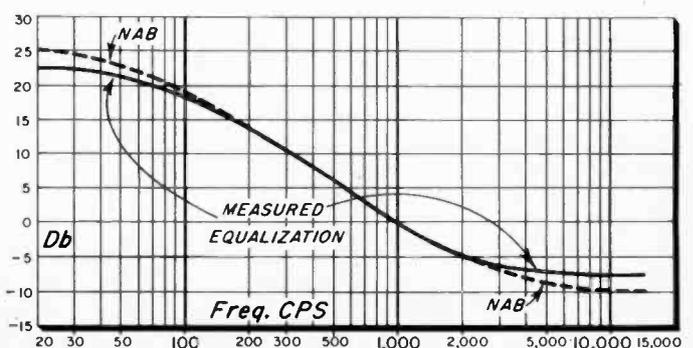
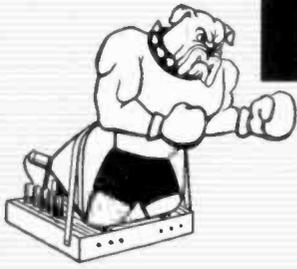


Fig. 7—Typical equalization curve derived from measurements of a reasonably good recorder at 7.5 ips, plotted against NAB standard.





# "Tough Dog"

## Corner



### Difficult Service Jobs Described by Readers

#### Tuner Trouble

When I was called to service an Admiral portable, chassis 15B2, there was only a white raster with a black horizontal band across the screen that moved vertically through the raster when the vertical hold control was adjusted. Also a high-level buzz was audible, varying with the volume control setting.

Symptoms appeared to be 60 cycle a-c modulation caused by either a defective agc system or heater-to-cathode leakage in a tube.

All tubes in the video, i-f, r-f and agc were substituted without any change. The set was brought to the shop.

Voltages were checked with a VTVM in the agc and video sections. They were correct. The layout of the i-f amplifier on the printed circuit board was in a very awkward position to service so I made cathode-heater leakage checks by momentarily shorting each cathode in the i-f amplifier to ground. No leakage was found. The symptoms remained.

A scope at the video detector output showed an unusual waveform, (Fig. 1 A), which could not be identified as a composite video signal. A normal video trace should have appeared similar to the one shown in Fig. 1 B. With a demodulator probe on the scope, recognizable video couldn't be observed at the tuner output.

By now the job was becoming a weary one because of the mechanical problems involved in getting at the tuner circuit. All of the coil assemblies, except one, were removed from the turret so that voltage and resistance checks could be made in the tuner.

Finally, when the VTVM probe was touched to the grid of the VHF oscillator, the picture returned to

normal. Examination of the wiring to pin 1 of the tube socket revealed the grid resistor, as shown in Fig. 1 C, had a cold solder joint. A touch

#### Cross Modulation

I went out to see a 24-inch RCA TV with a reported case of "sound bars." Investigation showed sound bars on some channels, but not on others. The fine tuning control had no effect on them, and the bars occurred only on loud volume. I suspected a microphonic tube being affected by speaker vibration. I removed the back and tried a new 6BZ7 r-f amp tube. Sure enough, the trouble cleared up and I departed.

Next day the customer called again and said he had the same trouble. I went out and confirmed the complaint. I tried a new rabbit ear antenna without satisfactory results. Again, I removed the back and installed a new mixer tube. The set now seemed to work perfectly.

I was called back the next day and confronted with the same complaint. After cleaning the tuner and inspecting the fine tuning control for possible sensitivity to vibration, everything appeared ok. The set was working perfectly. I replaced the back and was about to leave when I decided to have another look to avoid a call-back. Sure enough, the defect had returned.

I tried all channels. The offending "sound bars" were visible on channels 7 and 9, but not on channels 4 and 5. I removed the back again. Now reception was fine on all channels.

After inspecting the back for loose antenna connections, I re-soldered the male pins on the transmission line coming from the tuner. I then cleaned and pinched the clips that fit into the

(Continued on page 82)

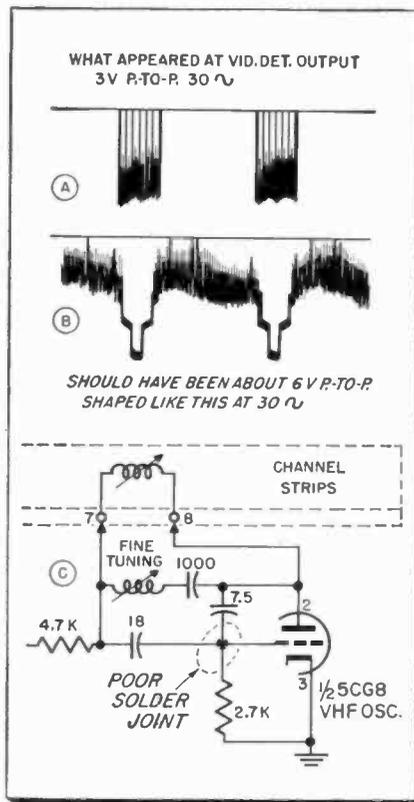


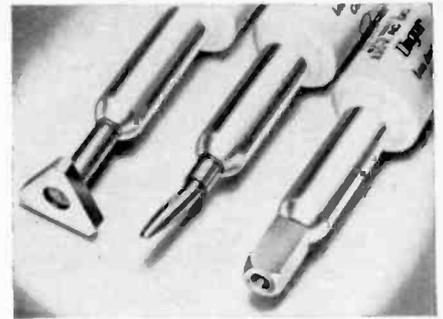
Fig. 1 (A)—Distorted waveform at the video detector output as seen on scope. (B)—Normal waveform at the same point. (C)—When a poor connection was soldered at the VHF oscillator grid, pix returned.

of the soldering gun to the joint, plus a half hour to reassemble the tuner and place the chassis back in the cabinet, restored the set to normal.—Harry S. Johnson, Aiken, S.C.

#### NEXT MONTH

Electronic Technician Magazine will announce Shop Hint/Tough Dog Contest Winners.

# Practical Desoldering Methods



## Choose The Proper Tools For Component Desoldering

GEORGE KRAVITZ

• Next to troubleshooting a radio or TV set to determine the location of a defect, soldering and desoldering probably consume the major productive service time of a technician's workday.

General soldering techniques are usually taught in technical and trade schools or assimilated by tyros in the field without too much difficulty. Desoldering, however, has only recently been disassociated from soldering techniques. It's now recognized that removing a part often takes more time than soldering in a part. This is particularly true with printed circuit boards.

You may ask, "What's so difficult about desoldering; isn't it just the reverse of soldering?" No, it isn't necessarily the reverse of soldering. The mechanical process of soldering is usually much simpler than desoldering. For example, when soldering, it is usual to place the part in position and solder individual connec-

tions. Desoldering, however, cannot always be efficiently handled by working on one connection lug at a time.

Components utilizing a number of lugs, secured to a printed circuit board, are generally difficult to remove when working on one lug at a time. An excessive amount of time and patience is generally spent trying to remove solder from individual terminals. It's much more practical to utilize triplets specifically designed to desolder some components simultaneously. In addition, other specially designed tools are useful in removing components from printed boards when triplets cannot accommodate desoldering.

### Desoldering Principles

Using the correct desoldering tool for removal of a component is a basic precept of good soldering. Another principle of printed circuit desoldering that is important to consider is the heat used in the process

of removing a part. Too much heat can damage the printed board, wiring and adjacent parts. In contrast, too little heat will make part removal a slow, tedious job. About 45 to 50 watts is generally satisfactory for removal of components.

Removable triplets for soldering irons are welcome reliefs for desoldering. Using the right tool speeds up work. Examples of using the right tool for a job are as follows:

If a lug is bent, use a slotted head triplet to straighten the lug. If a lug lies close to the printed board, use an offset slotted triplet to lift and straighten the lug. De-solder electrolytic capacitors (can type) with triangular lugs by using a triangular triplet. Use a bar triplet to de-solder parts with straight line lugs. (Integrator networks typify circuits with straight line lugs.) To de-solder tube sockets or i-f transformers, choose the cup triplet with the correct diameter. An assortment of cup triplets consisting of  $\frac{5}{8}$ ",  $\frac{3}{4}$ ", and 1" will handle most jobs. Use a cube triplet

Fig. 1—Removing center-pin tube sockets from PC boards may be accomplished by using a cube triplet.

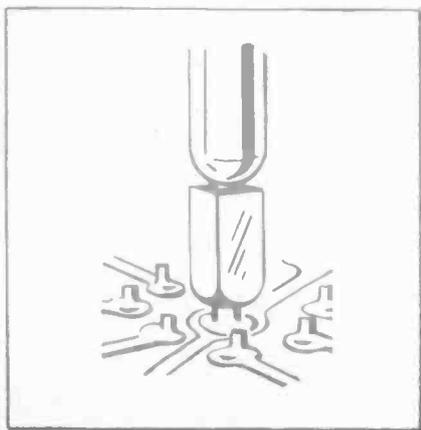


Fig. 2—Socket contacts are removed simultaneously by using a cup triplet having the correct diameter.

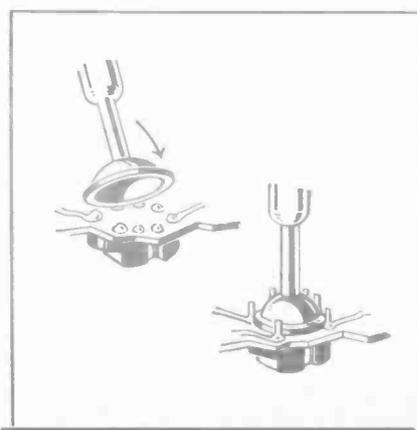
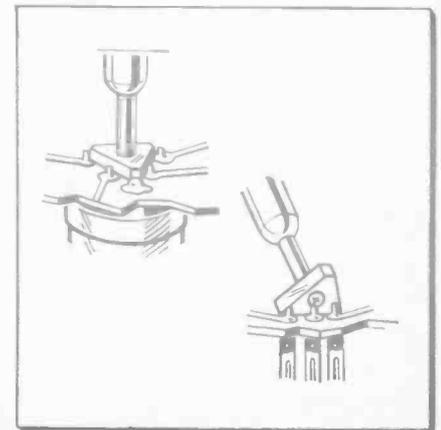


Fig. 3—When component lugs are positioned triangularly, as on some electrolytics, a triangular triplet may be used.



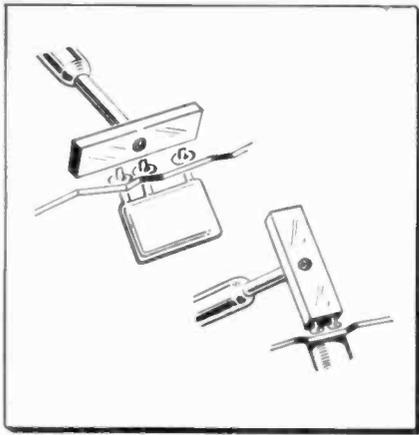


Fig. 4—A bar-type triplet may be used to remove PEC terminals from a printed board.

to remove center pins of tube sockets and harness leads.

### Techniques

The most applicable tools in the world are useless unless they are properly applied. Therefore, let's discuss techniques, commencing with desoldering tube sockets.

To de-solder tube sockets which have center pins, first use the cube triplet. Fit the cube cup over the center pin, as shown in Fig. 1, until the solder melts. Then, push to drive out the center pin. You may have to lift the center pin from the top of the board with a pair of pliers.

After this has been done, the

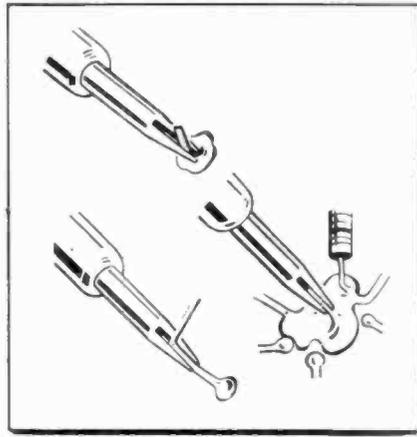


Fig. 5—Slotted heads are useful for straightening lugs and removing solder.

socket can usually be removed by selecting a cup triplet (Fig. 2) with the correct diameter and place it over the circle of tube tabs. As the solder securing the tabs melts, rotate the cup slightly as the socket is gently moved free.

Another method used to remove older sockets is to clip the socket tabs before applying a cup triplet to melt the solder. Be cautious to prevent damage to the printed circuit foil.

To de-solder parts with triangular lugs (electrolytic capacitors, for example), press a triangular triplet (Fig. 3) against the lugs so that the triplet contacts all the lugs at the same time. When solder melts, lift

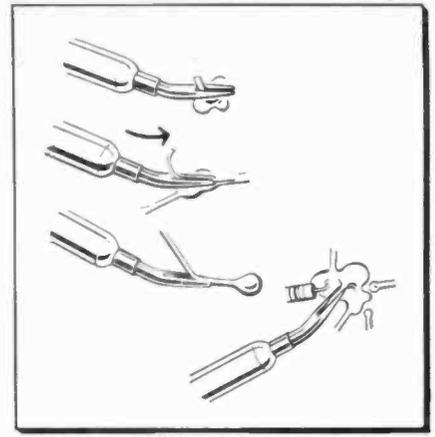


Fig. 6—An offset triplet can be a tremendous aid when desoldering lugs close to the board.

the part free. The bar triplet in Fig. 4 is used in a similar manner. Simultaneously melt all straight line lugs and pull the part away from the board.

Fig. 5 illustrates how a slotted head triplet is used to straighten bent or folded lugs. Fit the lug in the slot and straighten the lug when the solder melts. You can also use the slotted head triplet to remove excess solder by holding the printed board vertically or upside down. Point the slotted triplet upward and excess solder will flow into the slot through capillary action.

For lugs that lie close to the board, lift the lug or wire by wedging an offset triplet (Fig. 6) under the

Fig. 7—To prevent damage to a completely removed printed circuit board, a jig that does not apply too much pressure is an asset.

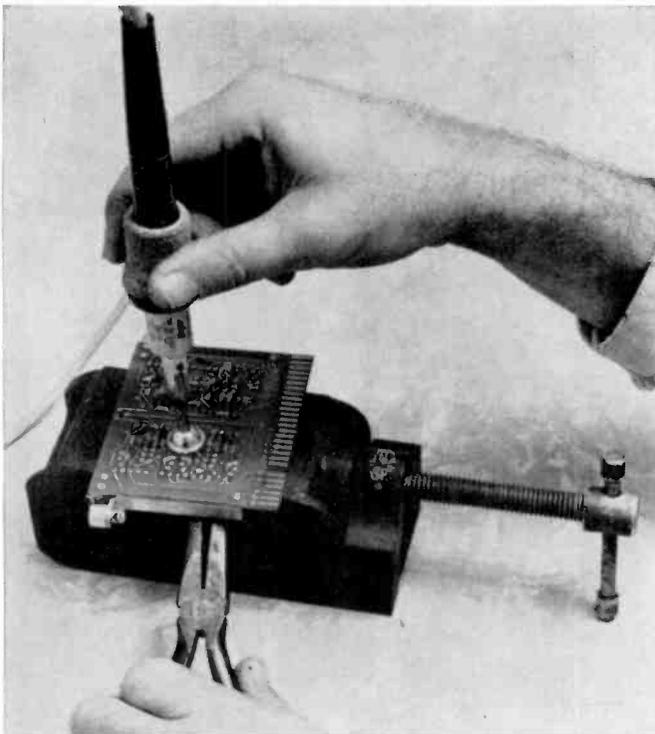
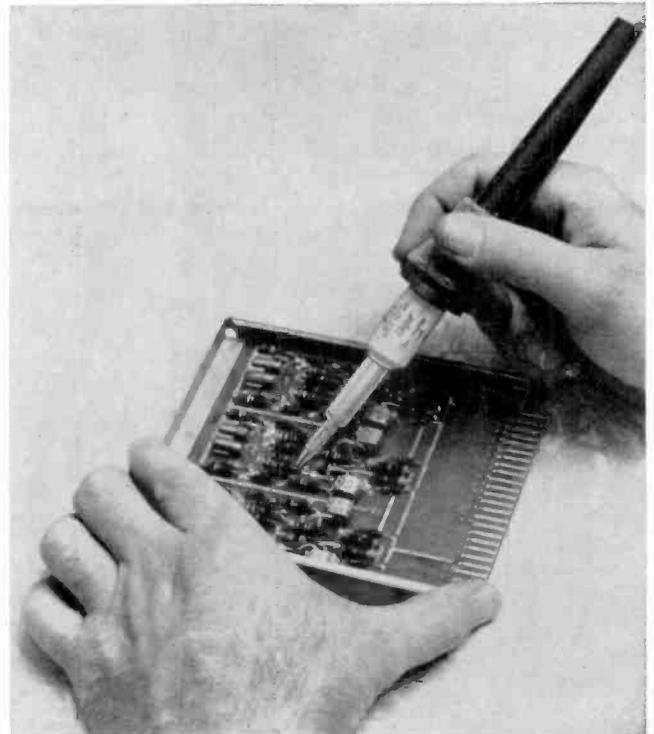


Fig. 8—The slotted head triplet can relieve the technician from manipulating pliers while desoldering a component.



lug. When solder melts, you will be able to lift the lug easily. Use a slotted head tiptlet, either straight, or offset to reinforce printed wiring. To do so, the slotted head tiptlet can be used as a pen. Fill the slot with solder and "write" the solder—put molten solder where you want it on the printed board.

Desoldering tiptlets do not render other desoldering methods obsolete. In some instances, desolder tiptlets are not made for a specific component and a solder tool should be used in conjunction with mechanical tools such as a knife, pick, pliers, etc. Take advantage of *all* tools.

Figs. 7 and 8 show desoldering tools in action.

Fig. 10 illustrates how a printed circuit board, soldered to a chassis rather than secured by screws, can be removed. A higher wattage solder tool than normally used when removing components should be used in this case.

Some components, such as small resistors and bypass or coupling capacitors, do not need desoldering. They can often be removed by crushing the part, as in Fig. 11, or clipping the leads—leaving an extended lead attached to the board for a part replacement.

Various methods are used to secure components to a printed board, depending upon the manufacturer. The service technician should be versatile and use the desolder tool that does the best job, rather than restrict himself to a limited set of tools. Having *all* the tools on hand will result in the technician being

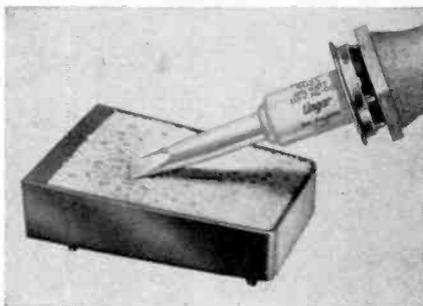


Fig. 9—An excellent solder tip cleaner is a wet, plastic sponge.

able to choose the best one.

### Maintenance

Desoldering tool maintenance is similar to soldering tool care. The skilled technician takes care of his tools to keep them in top operating condition at all times.

Don't dunk the tip in soldering paste or scrape the tip with a file each time it loses its shine. *Never* use acid as a cleaner. A quick swab is all it usually takes to clean the tip. Don't use wiping cloths that may leave charred bits of lint on the soldering tip. If the charred lint is transferred to a soldered joint, the connection will be weakened.

Steel wool is commonly used to clean soldering tips. If you use it, be sure to remove strands of steel that may stick to the iron. A wire brush may also be used as a tip cleaning tool. Both steel wool and wire brushes cause tip wear, however. A brass brush will cause less tip wear, but you run the risk of contaminating the solder with residue from the brass brush. Brass mixes with solder

to cause a brittle connection.

One of the best tip cleaners is a damp sponge pad. A commercially available one is shown in Fig. 9. The pad cleans efficiently without wearing the soldering tip.

Don't bang the soldering iron against the bench to shake off solder. Rough handling will shorten the heating element life. Higher than normal line voltage will also shorten element life, but this is not a problem in most communities.

The number of times the iron is turned on and off (heated and cooled) will affect its life. Don't turn off the non-gun type of iron for coffee breaks, lunch periods, or other short time intervals. Cooling and re-heating causes element wear.

Technicians don't often make the mistake of ignoring tinning methods for desoldering tool tiptlets. Its importance is as great as with soldering tips. Tin the tiptlet on one surface only, to prevent undesired heat radiation. Your aim is to apply heat only where needed.

A lug is heated by conduction. You can speed the conduction process by having a small bridge of molten solder between soldering iron tip and the lug. If both the lug and tip are comparatively dry, the conduction process (heat transfer) will take longer.

Use a fine file or other abrasive material to clean a lug or wire if dirt or corrosion is present. After cleaning, make sure no particles remain on the surface or other portions of the circuit. Next, make a good

(Continued on page 72)

Fig. 10—When a PC board is secured to a chassis by soldered lances, a high wattage solder tool should be used to remove the board.

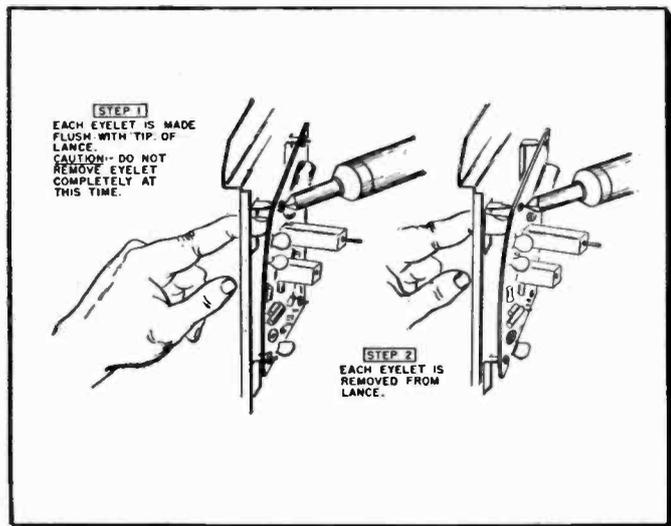
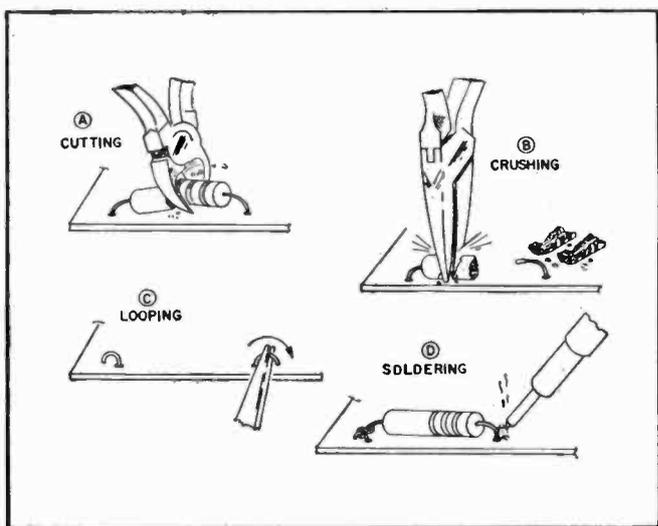


Fig. 11—Many components do not have to be desoldered to effect a replacement. It is often simpler to leave the soldered leads extended.



# SHOP HINTS



## Tips for Home and Bench Service

### CRT Warning

TV receivers with series heaters are not new. But recently some manufacturers have made one important change that may have escaped the attention of many technicians.

On older series string sets accidental burn-out of a CRT heater was minimized by inserting the CRT at the end of the heater string. Recently, the trend has been to move the CRT further up on the string. The first change placed the CRT before the tuner tube heaters to reduce 60 cycle pick-up by the tuner. With this arrangement there was still little danger to the CRT heater as it remained near the low end of the string, as illustrated in Fig. 1A.

More recently, however, the CRT heater is being connected toward the

high end of the string, as shown in Fig. 1B. Consequently, accidentally grounding some point on the heater string can easily blow the CRT heater, since the voltage on one side of the heater may be as high as 65 volts in some sets.

Because of this design trend, a misplaced or accidental ground could prove to be quite costly.—Albert J. Krukowski, West Springfield, Mass.

### Solder Feeder

A useful wire solder feeder that serves as a "3rd hand" and keeps the solder handy and easy to locate, is made from two spring-type clothespins, a small bracket and an empty spool. Simply fasten the clothespins

Fig. 1 (A)—The CRT has better protection if placed near the low end of the heater string. (B)—When placed near the high end, an accidental short increases danger of a CRT burn-out because of higher heater voltage.

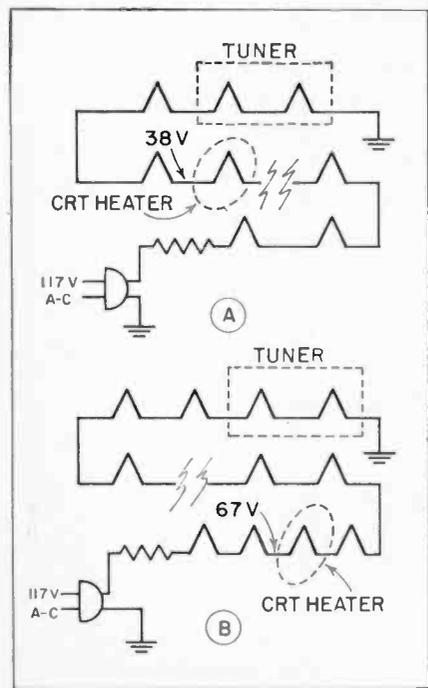


Fig. 3—Clothespin holder makes a handy solder dispenser and serves as "3rd hand."

together, handle-to-handle, and add a small corner bracket. Mount the spool atop the projecting bracket by means of a small bolt. It should turn easily. Wind the solder on this spool and bring the end of it to the sharpened jaws of one of the clothespins, as shown in Fig. 3. The jaws of the other clothespin may be used as a clamp for holding the device to any protrusion (edge of chassis or brace, etc.) or as a handle.—Glen F. Stillwell, Manhattan Beach, Calif.

### Case History File

When replacing components in TV chassis that have to be brought to the shop, I always circle the defective

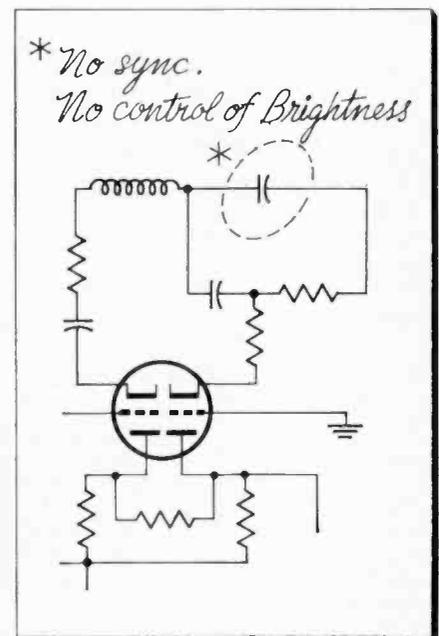


Fig. 2—Circling a defective component and entering symptom on the schematic simplifies future troubleshooting.

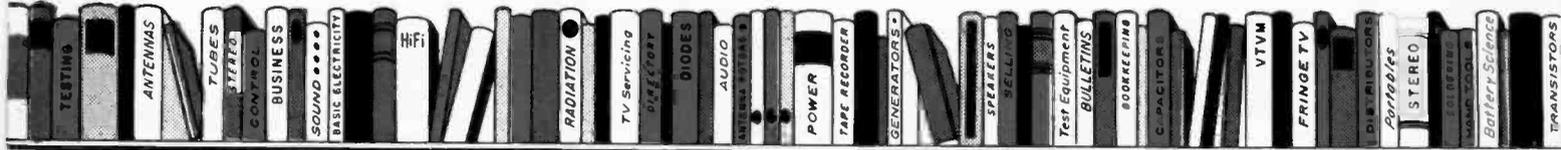
part on the schematic, as illustrated in Fig. 2. If it is an unusual kind of trouble, I will also make explanatory notes in the margin. This provides a case-history record on each schematic, and aids immeasurably in future troubleshooting of the same model.—Frank M. Dickinson, Stony Point, N.Y.

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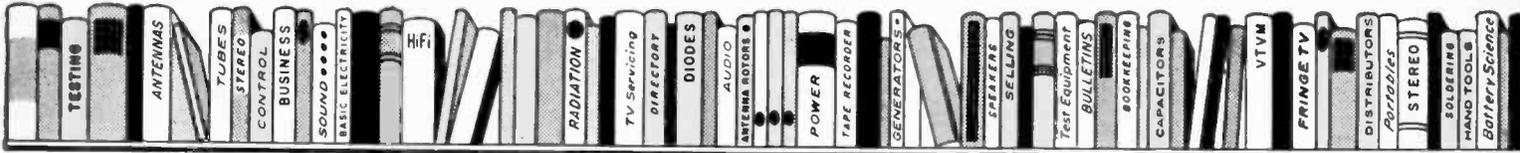
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Fig. 1—Depth finder may be mounted in open cockpit boat.

# Working With

## Operation And Servicing Of These Navigation And Fish-Finding Aids

ALLAN LYTEL

• The principle of reflection of underwater ultrasonic waves is used for depth finders or depth sounders. Because the same device reflects underwater objects such as schools of fish it is also known as a fish-finder.

Different indicator devices are used to indicate the water's depth. The most simple is a flashing neon bulb on a circular scale. Others are the indicating meter whose dial is read in depth, the recording device where a permanent trace on paper is made, and the cathode-ray oscilloscope.

In many respects the depth sounder is the most important instrument aboard ship after the compass and radio. Depth readings, when compared to navigation charts, can help the skipper navigate. Areas of danger underwater can be avoided and, for the sportsman, fishing is made easier.

Depth-finders are, in complexity, like a small radio; they frequently have from three to six tubes plus the power supply which is a vibrator or transmitter converter. Some types also have a small motor.

Tube-type instruments use up to 4 amperes at 12 volts; transistor types use less power.

Commercial examples of depth finders are shown in Fig. 1, 2 and 4. The professional depth recorder, as illustrated in Fig. 2 is the Edo model 255C. Note the permanent record on the paper plus the controls, depth and speed, for adjusting to specific situations.

The flashing neon-bulb indicator type shown in Figs. 1 and 4 are the Raytheon DE-708 and Sonar D-600, respectively.

### Operating Principles

Echoes are the heart of the depth finder unit; its operation may be seen from Figure 3. Acoustical energy or ultrasonic waves are sent

out and returned. A transducer is a device for changing energy in one form to energy in another form. In this case electrical energy is converted into sound waves. The transducer operates at frequencies in the 40 to 300 kc range.

As shown in Fig. 3 a transmitting device, which is usually a vacuum tube oscillator, generates a signal in the ultrasonic range. By means of a switch this energy is applied to the transducer for a short period. This causes the transducer to send out a burst or pulse of ultrasonic energy into the water. Mounting of the transducer is possible in the bilge and outside of the boat on the hull or in a temporary mount. Reflections from an underwater object return to the transducer which again con-

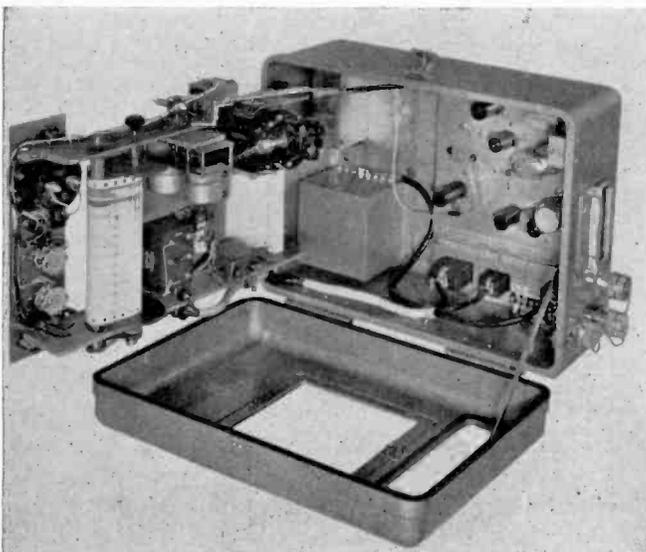
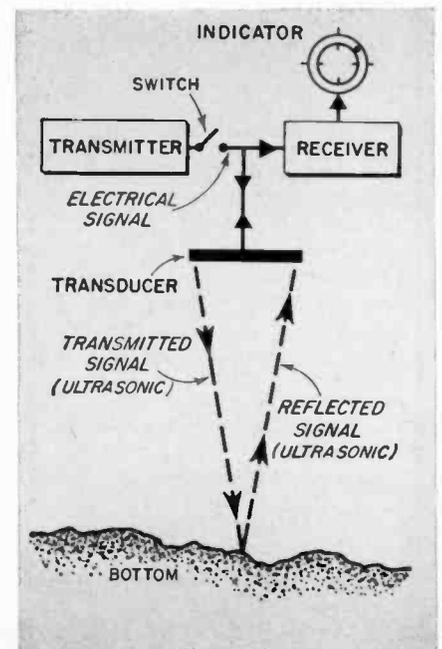


Fig. 2—Internal view of professional depth recorder shows motor driven paper roll on swing-out chassis at left. Electronic chassis which generates and receives pulses is at right.

Fig. 3—Ultrasonic depth finder indicates depth by measuring time it takes signal to go from transducer to bottom and back again.



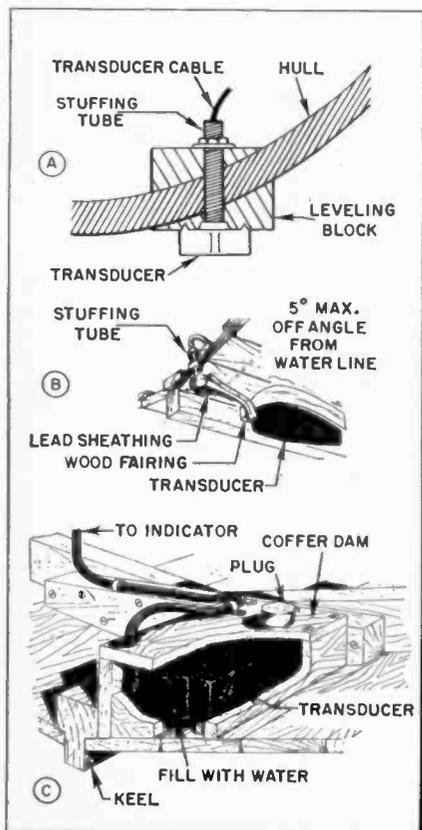
# Electronic Depth Finders

Are Discussed, And Commercial Equipment Types Examined



Fig. 4—This 600 ft. depth indicator employs flashing neon bulb principle.

Fig. 5—Transducer installation techniques for external mounting are shown in A and B. C indicates internal mounting.



verts them, this time from ultrasonic waves back into an electric signal. This signal is amplified and fed to the indicator device through the receiver and amplifier.

## Transducers

Energy conversion in a depth finder is done by the transducer. Operating in the 40 to 300 kc range these pulses travel at about 4800 feet per second, depending on factors such as water temperature and salinity. If it takes energy one-half a second for the round trip the total distance of travel is 2400 ft. This is a one-way trip or depth of 1200 ft. which is 200 fathoms. A time of 0.1 second is a depth of 40 fathoms.

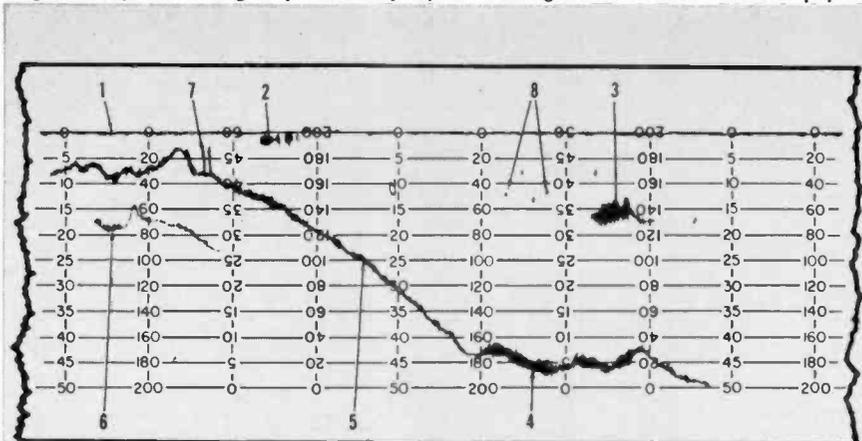
Transducers are mechanical vibrators of material such as barium titanate. They are encased in plastic, to prevent direct contact with the

water, and usually mounted external to the hull. When the transducer receives electrical energy from the transmitter it vibrates and creates ultrasonic waves. When these waves impinge upon the transducer as they return from the bottom, the ultrasonic vibrations are converted back into electrical signals.

Mounting of transducers may be seen from Fig. 5. A and B show an external unit; an internal unit is illustrated in C. Transducers may have the stuffing tube as an integral part as in A or separate as in B. Where the transducer is mounted inside the boat, as illustrated in C, a coffer-dam is required to keep the unit immersed in water.

For best performance, outside mounting is recommended, as operation through the hull may result in appreciably reduced sensitivity. In attaching the transducer on the hull,

Fig. 6—Depth recording is produced by stylus "burning" electro-sensitive coated paper.



- 1—Reference or "0" line.
- 2—School of surface fish—bait, etc.
- 3—School of fish.
- 4—Soft bottom—mud—vegetation—silt.
- 5—Hard bottom—rock—sand.
- 6—Second echo—caused by sensitivity control being advanced too far.
- 7—Seaweed—kelp.
- 8—Small scattered school of fish.

use care in selecting a location that is free from disturbed water. For example, do not install it immediately aft of any water inlet or outlet fitting. To operate properly, the transducer must have "smooth" water across its face. The sound waves will not penetrate properly through turbulent air bubbles.

### Flashing Indicator

There are several possible types of indicators for displaying the depth reading to the operator, such as meters, CRT, strip recorder and flashing neon.

Perhaps the simplest device of this type to understand is the flashing neon-bulb system as shown in Figs. 1 and 4. By means of a small electric motor, a neon-bulb is rotated clockwise. The speed of rotation may be changed in some units and depends upon the depth scale which is used. In front of the neon light is a translucent window which may be circular as shown or semicircular.

By means of the internal mechanism, a switch is closed for an instant when the bulb rotates past

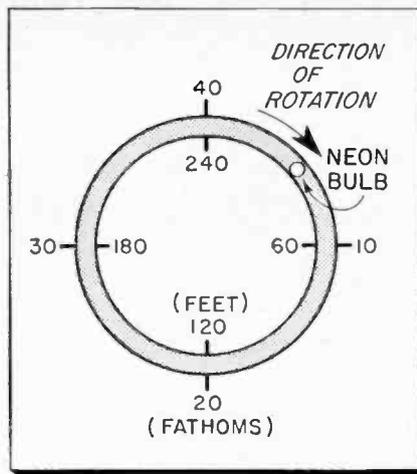


Fig. 7—Neon bulb flashes when reflected pulse is received. Reflection time, equivalent to depth, is calibrated on scale.

zero. This triggers the oscillator which sends an ultrasonic pulse through the water from the transducer. Traveling through the water the pulse of ultrasonic energy strikes the bottom, or other object, and returns to the receiver unit through the transducer. After the pulse is received and amplified it triggers the neon bulb which then flashes. The

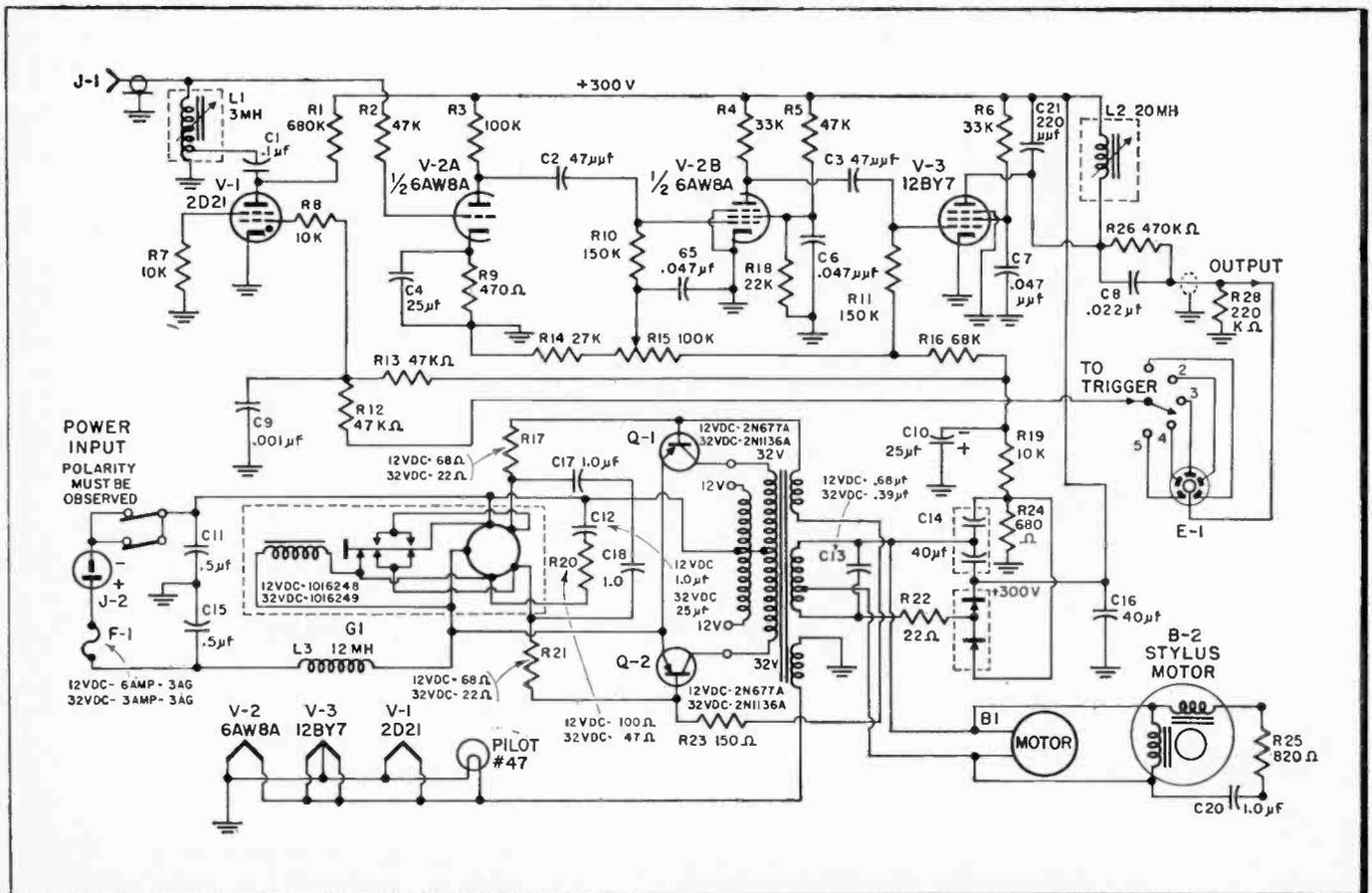
presence of the bulb at the moment of flash is read from the scale as the depth in fathoms or feet or both. On a 240 ft. scale, a 120 ft. depth would flash at half scale. In other words, the pulse round trip time equals the time it takes the bulb to make a half revolution. See Fig. 7.

If there are not one but several objects underwater this will cause the bulb to flash several times. The brightest of these flashes is the bottom reading. A sensitivity control on the receiver is used to provide a measure of adjustment for the amount of receiver amplification. By the use of this control the reading from the ocean or lake bottom can be made visible to the exclusion of the other flashes.

Range may be doubled by allowing the neon bulb to rotate twice between pulses. Range may be decreased or more shallow water measured by speeding the rotation of the indicator. Twice the speed of rotation will measure one-half the depth and so on. A continuous series of readings is made, several each second, so that the operator has a

(Continued on page 66)

Fig. 8—Schematic diagram of depth recorder employing thyratron as trigger tube.



# ELECT PROFITS: VOTE AGAINST CALL-BACK LOSSES

1960 is the big election year! And the *biggest* campaign in the industry is Raytheon's "Crusade Against Call-backs." It's designed to put the finger on the 10 tube types that cause you the greatest profit loss. Once the votes are in, we'll announce the top ten and at the same time introduce our platform to stop profit loss.

## VOTING DATES!

Now . . . through May 15, 1960.

## CAST YOUR BALLOT!

See your Raytheon Distributor, or vote when his representative calls at your place of business.

## ELECT!

Vote for the ten tube types that cause you the greatest loss through Call-backs.

## ANNOUNCEMENT DATE!

Raytheon will announce the ten tubes that give you the most trouble — and introduce our new candidate for top profits — on June 1, 1960.

The time for **ACTION** is now! There have been enough promises on what to do about Call-backs. Raytheon guarantees action! Get ready for great profit news to come! And don't forget to vote!



VOTE NO TO PROFIT  
LOSS in the  
RAYTHEON CRUSADE  
AGAINST CALL-BACKS



**RAYTHEON COMPANY**

Distributor Products Division • Westwood, Massachusetts

Vote at your Distributor's place of business, or when his representative calls on you.



# Collection Letter Precautions

## Asking a Customer To Pay An Overdue Bill Requires Delicate Handling

ERNEST W. FAIR

• Two areas of mistakes in the writing of collection letters can easily bring the radio-tv shop owner to grief. One is in committing an unintentional mistake which will lead to a possible libel, slander or damage suit and the other is in using an approach or words which anger the debtor and make him more resolved than ever not to pay the account.

On the second named point it is always well to remember that we

are pursuing the money owed to our business. Our object in sending the collection letter is to get that money. We may feel like bashing the customer over the head with a TV set chassis but doing so, while it might give us some satisfaction, certainly wouldn't do much toward obtaining the money.

In this connection it is not always advisable to use form letters that are re-printed and sold in a package. Sometimes these will be effective, but in the majority of cases they are very familiar to the debtor and, therefore, have little effect on him.



Top letter is heavy handed, and certainly much too strong for a second reminder. Bottom letter is more suitable, to the point—yet conceding that the customer may not have neglected payment intentionally.

April 2, 1960

Dear Mrs. Smith:

This is the second time I am writing to you for payment of your \$24.50 bill for TV repairs.

Since I haven't received an answer, I am turning the bill over to my attorney unless I hear from you within one week (7 days) from this date.

Yours truly,

April 2, 1960

Dear Mrs. Smith:

Since we haven't received a reply to our inquiry regarding an unpaid bill (\$24.50) for repair of your TV set on January 4th, we wonder if you received our letter.

Won't you please get in touch with us concerning this matter? Thank you for your cooperation.

Sincerely,

He is much more apt to respond to something that is different and personal. The use of such standard forms can be much more effective if we take the trouble to type or write them out on our own letterhead. A degree of personal contact is thereby maintained; something vitally important in writing collection letters that get satisfactory results.

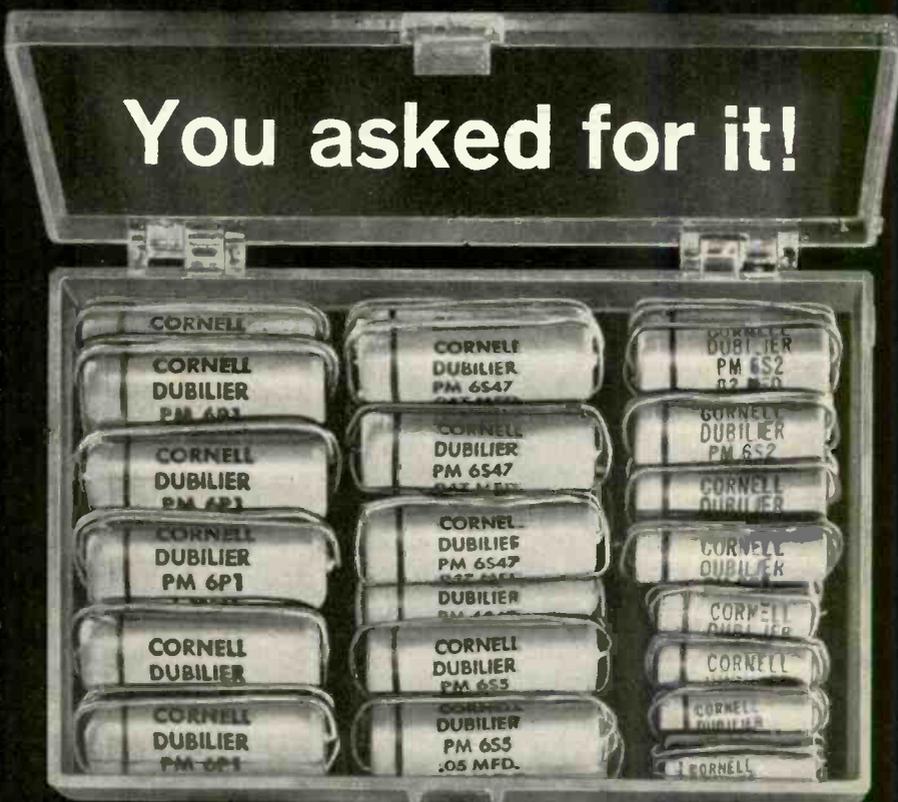
From the legal standpoint we should never forget that, while a threat may be used in a collection letter, it is unsafe to use that threat when it can be construed as extortion or blackmail. What we threaten to do can be most important. A threat to cut off further credit, to turn the account over to a collection agency, to file suit, etc., is always perfectly in order. A threat to go to an individual's employer or publicize the debt can be good grounds for a damage suit. Civil suit may be threatened without any fear of reprisal, BUT it is unwise to threaten criminal prosecution in any letter

(Continued on page 54)

NUMBER 3 IN A SERIES OF



50th ANNIVERSARY SPECIALS!



You asked for it!

# HIT KIT



35 POPULAR CDE MOLDED MYLAR TUBULARS

NOW — just in time for baseball TV-viewing (and TV-servicing) CDE has the Hit Capacitor Kit *you* asked for: 35 popular molded Mylar\* tubulars that “shortstop” call-backs! Quality-proven by two years of consistently dependable replacement service, these high temperature, moisture-resistant “PMs” are the values you need and use every day. And now you can have this convenient assortment—plus a sturdy, plastic parts-or-jewel box—all for the price of the capacitors alone! A real “double-header.” Get two “PM Kits” today—one for your shop, another for your service bag—from your CDE Distributor. Cornell-Dubilier Electric Corp., South Plainfield, N. J.

## HERE'S THE BOX SCORE

No.	Item	Mfd.
3	PM 6D2	.002
5	PM 6D5	.005
6	PM 6S1	.01
5	PM 6S2	.02
5	PM 6S47	.047
6	PM 6S5	.05
5	PM 6P1	.10

Voltage: 600 VDCW

Pick the four teams in each major league that you think will be standing in 1, 2, 3, 4-order as of midnight, May 31, 1960 and win \$100 worth of any CDE merchandise if the sequence you pick is closest to the actual order. See full contest details in kit.

ALL FOR ONLY \$6.87

\*DuPont T.M.



CORNELL-DUBILIER ELECTRIC CORPORATION

AFFILIATED WITH FEDERAL PACIFIC ELECTRIC COMPANY

# Masts and Towers Made of Armco ZINCGRIP Tubing Sell Easier, Maintain Customer-Confidence

TV towers and masts made of ZINCGRIP® Steel Tubing give you many sales advantages because they have the rugged strength of steel plus built-in ability to resist rust and corrosion.

It's easy to show customers how rigid and strong ZINCGRIP Tubing masts and towers are . . . how they keep antennas in alignment despite iceloads and wind. They can see for themselves that the durable hot-dip protective zinc coating hasn't flaked or peeled during fabrication. It stays on during erection, too.

After the sale, ZINCGRIP Tubing will help maintain customer confidence in you and the products you sell. Masts or towers stay free of rust for many years, look much better much longer than those made of painted or electro-galvanized tubing.

Sell TV towers and masts made of Armco ZINCGRIP Tubing. They will help you make profit-boosting sales and uphold your reputation for quality and service. Just mail us the coupon for names of manufacturers of TV towers and masts made of Armco ZINCGRIP Tubing.

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#### ARMCO STEEL CORPORATION

1650 Curtis Street, Middletown, Ohio

Tell me the names of manufacturers who make towers and masts of Armco ZINCGRIP Tubing.

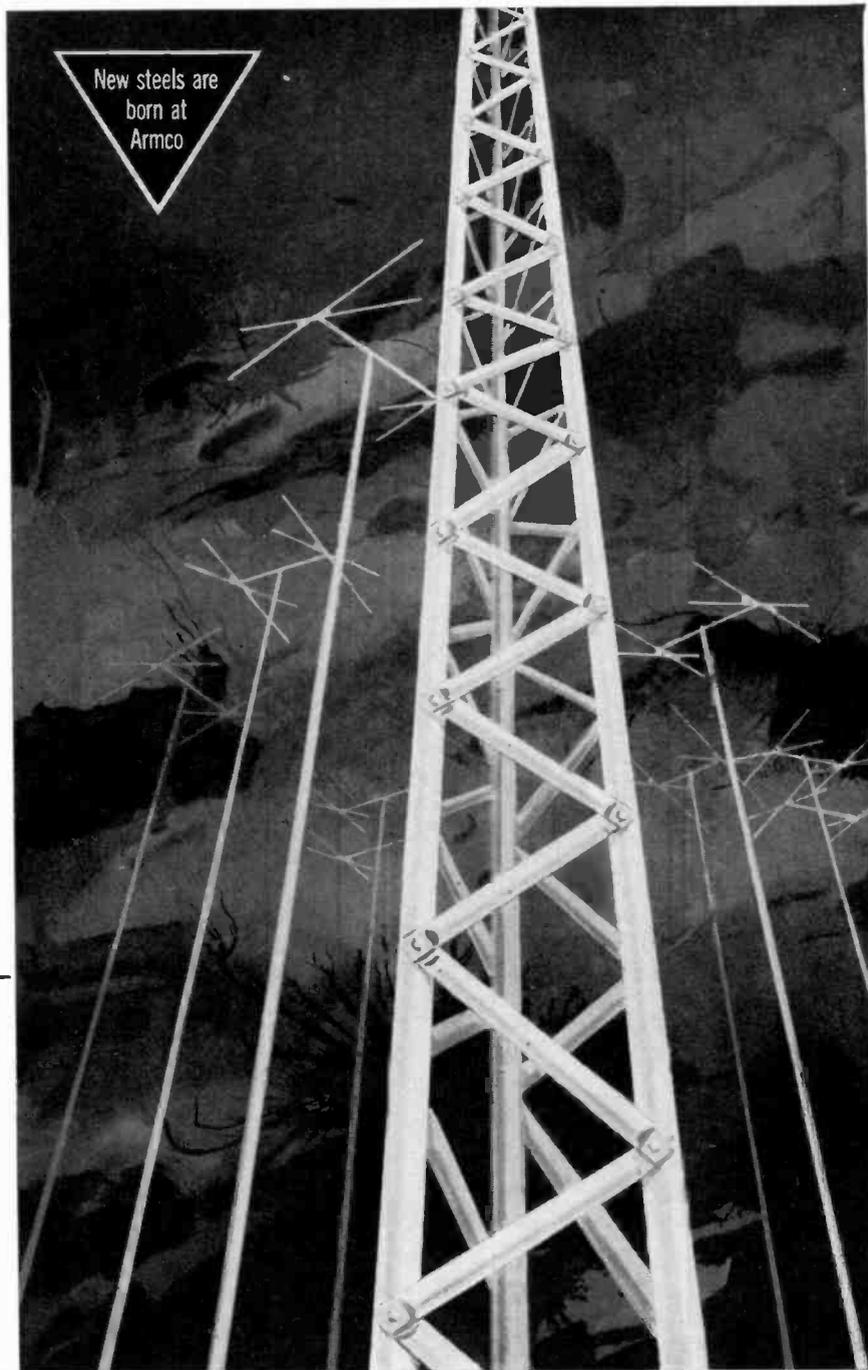
Name \_\_\_\_\_

Firm \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

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## ARMCO STEEL



Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation

**Vocaline CITIZENS BAND RADIO**

An integrated receiver-transmitter in a compact rugged cabinet, ED-27M "Commaire" is a new multi-channel version of the "Commaire" citizens band radio. It has four separate channels to provide the flexibility of a conference phone, and gives uniform performance throughout the 22-chan-



nel class D citizens band. It features the same audio circuitry as the ED-27, and has an improved transmitter. The receiver is a crystal-controlled double-conversion superheterodyne with a selectivity of 5 kc at points 6 db down and a sensitivity of  $\pm 0.3$  mv. \$189.50. Vocaline Co. of America, Old Saybrook, Conn. (ELECTRONIC TECHNICIAN 4-5)

**Standard Coil TV TUNERS**

To facilitate tuner repair or replacement, at both the distributor and the service dealer level, a new campaign introduces the firm's complete TV tuner repair and replacement program which allows independent TV technicians to send in improperly operating tuners. Specially designed shipping cartons, stocked by distributors, expedites the



handling of tuners sent to the factory for repair. These cartons are instantly recognizable as tuner repair jobs, and immediate attention are given to them. A special service department handles all repair jobs on a 48 hour in plant cycle. Standard Coil Products Co., 2085 N. Hawthorne Ave., Melrose Park, Ill. (ELECTRONIC TECHNICIAN 4-26)

# Build This Superb *Schober* Organ From Simple Kits and SAVE OVER 50%!



The Beautiful *Schober* CONSOLETTA

— the only small organ with two full 61-note keyboards and 22 stops. Requires only 2' x 3'2" floor space! Commercial value approximately \$1600 or more — yet you save over 50% when you build this thrilling instrument!

LET US SEND YOU FREE DETAILS HOW TO ASSEMBLE A *Schober* ELECTRONIC ORGAN IN SPARE TIME!

**Give Your Family A Lifetime of Musical Joy With A Magnificent Schober ELECTRONIC Organ!**

Now you can build the brilliant, full-range Schober CONSOLETTA or the larger CONCERT MODEL with simple hand tools. No skills are necessary to construct an instrument with one of the finest reputations among electronic organs. No woodworking necessary — consoles come completely assembled and finished. All you do is assemble clearly marked electronic parts guided by clear illustrations and detailed step-by-step instructions. Even teen-agers can assemble the Schober! You build from kits, as fast or as slowly as you please... at home, in spare time — with a small table serving as your entire work shop!

Send For Complete Details On Schober Organs and For Hi-Fi Demonstration Record

The coupon will bring you a handsome 16-page booklet in full color describing Schober organs in detail, plus articles on how easy and rewarding it is to build your own organ and how pleasant and quick it is to learn to play the organ. In addition, we have prepared an exciting 10" hi-fi LP record demonstrating the full range of tones and voices available on the Schober, which you may have for only \$2.00 (refunded when you order a kit). Literature on the Schober is FREE! There is no obligation; no salesman will call.

THE GREAT CONCERT MODEL meets specifications of American Guild of Organists

Pay As You Build Your Organ; Start With As Little As \$18.94!

You may start building your Schober at once with an investment of as little as \$18.94. The musical instrument you assemble is as fine, and technically perfect, as a commercial organ built in a factory — yet you save over 50% on top-quality electronic parts, on high-priced labor, on usual retail store markup! In your own home, with your own hands you build an organ with *genuine pipe organ tones* in an infinite variety of tone colors to bring into your home the full grandeur of the Emperor of Instruments. You may build the CONSOLETTA for your home, or you may want to build the great CONCERT MODEL for home, church, school or theatre. You save 50% and more in either case.



Mail This Coupon For FREE Literature and Hi-Fi Record Today!

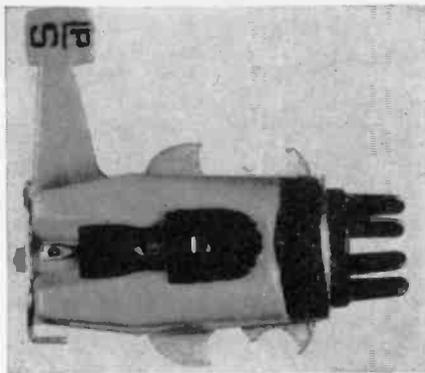
The Schober Organ Corp., Dept. TE-1 2248 Broadway, New York 24, N. Y.

- Please send me FREE full-color booklet and other literature on the Schober organs.
- Please send me the 10" hi-fi Schober demonstration record. I enclose \$2.00 (refundable on receipt of my first kit order).

Name.....  
Address.....  
City..... Zone... State.....

### Jensen STEREO CARTRIDGE

The new ceramic stereo cartridge, No. 53, has 16 to 25,000 cps response. Separation, 24 db at 1,000 cycles. Exclusive feature: "multi-morph" ceramic elements to eliminate magnetic hum. It will take care of more than 90% of stereo cartridge replacements. Available in four needle combinations using either sapphires or diamonds. Prices range from \$10.95 for cartridge with sapphire to \$22.95 for cartridge with two diamonds. Jensen Industries, 7333 W. Harrison St., Forest Park, Ill. (ELECTRONIC TECHNICIAN 4-31)



### V-M TUNER & AMPLIFIER

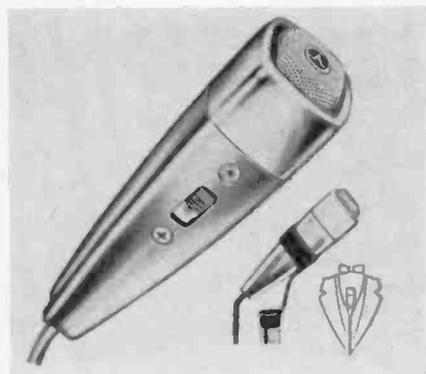
Model 1405 stereo tuner, for installation in the firm's consoles and as component hi-fi installations, features: Armstrong FM and superhet AM circuits; afc; built-in AM antenna; FM multiplex stereo jack, \$99.95. Shelf model 1406 stereo dual preamp-ampli-



fier, 14 watts/channel. Features include: stereo outputs to match 4-ohm accessory speakers; 9-socket jack panel consisting of stereo inputs for phono, tape and tuner and a stereo output for tape recording and a monaural TV input. V-M Corp., Benton Harbor, Mich. (ELECTRONIC TECHNICIAN 4-34)

### Astatic MICROPHONES

Model 335H dynamic-high impedance microphone has response of 50 to 12,000 cps; output, -56 db; on-off switch with lock-on position; die-cast housing in TV grey with chrome cap and grille and standard 8' of extra flexible, highly shielded conductor



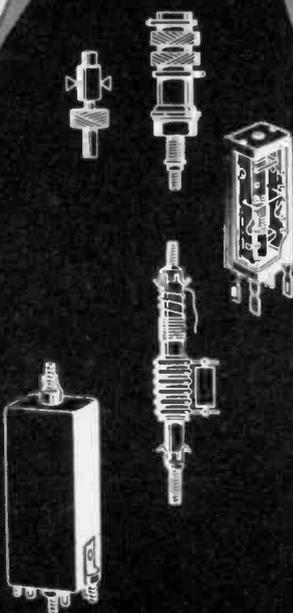
cable. Complete with lavalier and stand adaptor, \$26.50. Additional new models in this 330 series: 335L dynamic-low impedance, \$23.50; 333 ceramic-high impedance, \$17.90 and 331 ceramic high impedance, for communications and 27 mc citizens band, \$17.90. Astatic Corp., Conneaut, Ohio. (ELECTRONIC TECHNICIAN 4-35)

yes

# STANCOR<sup>®</sup>

has a complete line of  
**RF-IF COILS**

The Stancor name is a synonym for quality and dependability. Just as you rely on Stancor for the best in exact replacement flybacks and yokes, so you can expect the highest standard of performance from Stancor coils. Your parts distributor has them in stock.



**CHICAGO STANDARD TRANSFORMER CORPORATION**

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# make your first move to ROHN



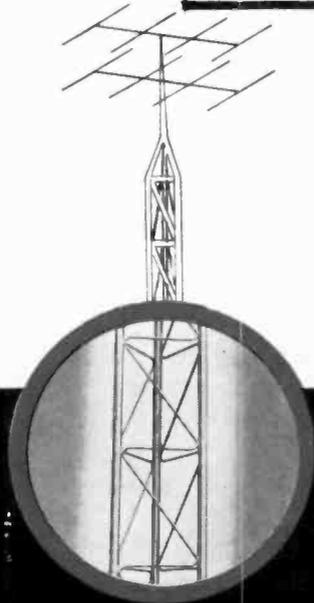
You Have the Greatest Sales Potential by Far With America's MOST COMPLETE LINE OF

## TOWERS—MASTS ROOF TOWERS Installation Accessories

### ROHN TV TOWERS

ROHN makes the finest towers available for television reception! Illustrated is the No. 25 with amazing "zig-zag" cross bracing design. The entire tower is rated 33% stronger than other similar sized towers. Yes, sell and install the No. 25 up to 50 feet self-supporting or, properly guyed, up to 360 feet!

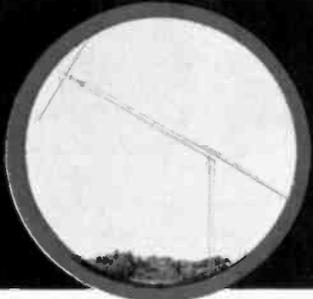
Or if you prefer, sell the popular ROHN No. 6 tower with the famous "Magic Triangle" cross-bracing. Both are fully HOT DIPPED GALVANIZED AFTER FABRICATION! Sections in easy-to-handle 10 ft. lengths.



From every standpoint, ROHN Towers offer you MORE . . . more quality, more variety, more advanced design, more sales features, more service, more total sales and more PROFITS! Move forward with these ROHN items!

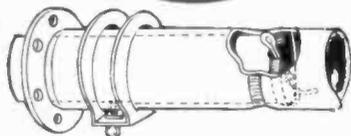
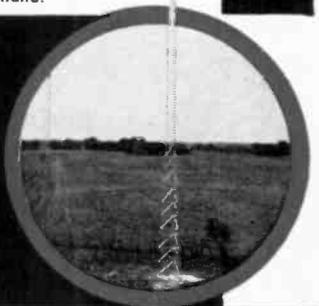
### ROHN COMMUNICATION TOWERS

Here you have FIVE complete lines of heavy-duty, FULLY ENGINEERED communication towers to fulfill any communications requirement. Shown is the ROHN "55" tower which is self-supporting up to 130 feet. Other models — (30-4C-50-60) are available in heights up to 630 feet when guyed! Handle these towers for the demand in your area. There's a complete NEW catalog on this line. Get a copy so you'll have it on hand.



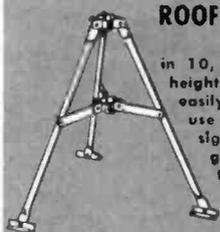
### AMATEUR "FOLD-OVER" TOWERS

Specially designed "fold-over" towers are the best ever designed for amateur radio and experimentation. They are the most desired because they "fold-over" completely so you work on the ground for ease and safety. Three sizes, including heavy-duty type to handle any needs. All hot dipped galvanized.



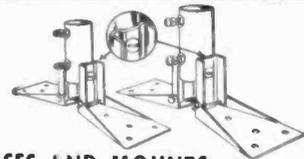
### TELESCOPING MASTS

Unexcelled in design, structural strength, and sales appeal. All popular sizes, heights, and weights available. Also, mast tubing in exact specifications that's demanded today.



### ROOF TOWERS . . .

in 10, 5, 3, and 2½ feet heights — very popular — easily shipped — ideal in use — the best ever designed — in hot-dipped galvanized finish — truly a big profit item for you!



### BASES AND MOUNTS

Wide variety of bases and mounts. Special features include "locking" device — also cast aluminum roof mounts — and a host of other installation items . . . get full details.



### TV SERVICE TABLE

For holding TV sets while servicing, or storing, or for mobile use of set in such places as motels, hospitals, etc. Ideal for dozens of uses — thousands sold. Large casters — a real work-saver.

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Manufacturing  
Company

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Get complete catalog from your ROHN representative or jobber or MAIL THIS COUPON!

Gentlemen: Please send me literature on ROHN Towers and Accessories.

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Name \_\_\_\_\_ Title \_\_\_\_\_

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# Introducing **ATR** CUSTOMIZED Karadio



Can be installed  
in dash or under  
dash as desired!

for  
small import cars  
and  
compact U.S. cars



There  
is a trim  
plate kit for  
YOUR CAR!

## **ATR** CUSTOMIZED Karadio

### • VIBRATOR-OPERATED with Tone Control

The ATR Customized Karadio is a compact, new, self-contained airplane-styled radio for small import and compact American cars. This economical unit is perfect for all small cars because it can be easily and inexpensively installed in-dash or under-dash on most any make or model automobile—and its powerful 8-tube performance provides remarkable freedom from engine, static, and road noises. ATR Karadios are built to look and fit like original equipment with sleek, modern styling and solid, single-unit construction. They offer many customized features and provide highest quality fidelity—yet cost far less than comparably designed units. The ATR Customized Karadio comes complete with speaker and ready to install... and is the ideal way to add fun and value to your small import or American automobile!



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... is ideal  
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completely self-contained—extremely compact!  
Can be mounted in-dash or under-dash—where-  
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**AMERICAN TELEVISION & RADIO CO.**  
Quality Products Since 1931  
SAINT PAUL 1, MINNESOTA, U. S. A.

## Collection Letter Precautions

(Continued from page 48)

to a debtor.

It's just good business sense to hold back legal threats of any kind for use against only the most obnoxious debtor or the individual whom we know has the money to pay the bill and still will not do so. It does little good to threaten the customer who is hopelessly in debt and consequently hasn't the money to pay. He is absolutely helpless and is apt to resent such threats at a time when he is under this terrific pressure. This may result in never seeing any of his business again, nor that of his friends. The best procedure in a case of this type is a collection letter suggesting the possibility of an easy method to pay off the amount due.

### Beware of Libel

The shop owner should also be most careful to watch what appears on the envelope of the collection letter. Anything that reflects upon the character or conduct of the customer is not only non-mailable, but is a source of possible libel as well. The safest procedure is to use regular envelopes and not resort to any trick methods of attempting to shame a debtor into paying the account.

If using open faced or window envelopes, we must also be careful that the window does not disclose any word which may accidentally show that the enclosure is a dun or a collection letter on a past due account. This is a common source of trouble in business through mistakes or carelessness in folding the enclosure. The safest procedure is not to use this type of envelope on a collection letter of any kind, though there is no reason why it cannot be used with conventional monthly statements. For the same reasons it is inadvisable to send any sort of collection message on an open postcard.

Offense to the customer should always be avoided in any collection letter. In most cases it will be worth our while to try to keep this customer's business since the usual reason for non-payment is nothing

more than a temporary poor financial condition of the individual. If we use patience and understanding in our collection procedure during such a period we may keep the goodwill of that customer.

It is also good procedure to exercise care in avoiding phrases which will create antagonism. Every collection letter we write should be re-read carefully to make certain that no such words or phrases are used.

The same thinking applies to sarcasm and ridicule; something the inexperienced collection writer always seems to employ because he is angry at the debtor for failure to pay the account. No matter how right we may feel in using such sarcasm and ridicule it can do nothing but put the debtor on the defensive.

Attempts to be funny can lead to the same result. Humor is the most difficult thing in the world to create.

Collection letters should always be straightforward and to the point. Efforts to embellish them usually leave the debtor cold. Long winded collection letters never have the desired effect that short ones have.

Form letters are the easiest to use, but they are not always the most effective. We must keep in mind that the reasons for default on an account are not the same with every debtor. The effectiveness of our collection letters depends upon the degree of mutual understanding that can be arrived at between the customer and ourselves. Routine letters can be used on a first past-due notice form with effect, but beyond that it is best for the shop owner to investigate the reasons for non-payment of the account and guide his collection efforts as well as his collection letters to those specific reasons.

It has also been found that a collection letter which seeks a partial payment on a past-due account can bring better results than one demanding immediate payment in full. Again we must remember that most of our customers are in that position because of personal financial troubles. In many cases they have no way of paying the bill in its entirety.

Individual consideration of each account makes for much more effective collection. Preparing a letter which takes into consideration those individual circumstances may take a little more time and effort but improved chances of effecting a return of the money due is worth it. •

GET THAT SYLVANIA SIGN UP TODAY!

# ARTHUR GODFREY IS SELLING YOU!

Now sponsored by Sylvania Silver Screen 85 picture tubes, Arthur Godfrey is selling America on you – the independent TV service dealer!

He's telling millions – on the CBS Radio network – coast-to-coast – that you are the man to see for the finest TV service. Millions more are reading about you in *The Saturday Evening Post*. When Arthur Godfrey tells folks to "look for the Sylvania decal in the window of your local independent TV service dealer's shop," make sure you're with it.

See your Sylvania distributor for Sylvania Silver Screen 85 picture tubes and Sylvania quality receiving tubes. Get your display kit of window streamers and posters. Get that sign up today!

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

**SYLVANIA  
SILVER SCREEN 85  
4 WAYS BETTER**

- \* Sharper focus
- \* Clearer picture
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See your local paper for time and station

**"IT'S ARTHUR GODFREY TIME"** – brought to you by



# SYLVANIA

Subsidiary of **GENERAL TELEPHONE & ELECTRONICS**



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**FOR THE FIRST *time***

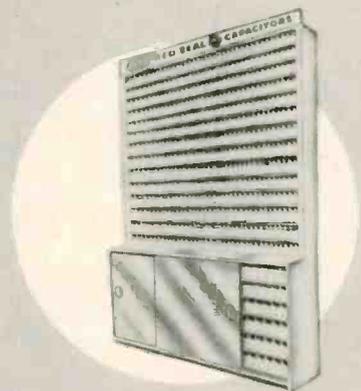
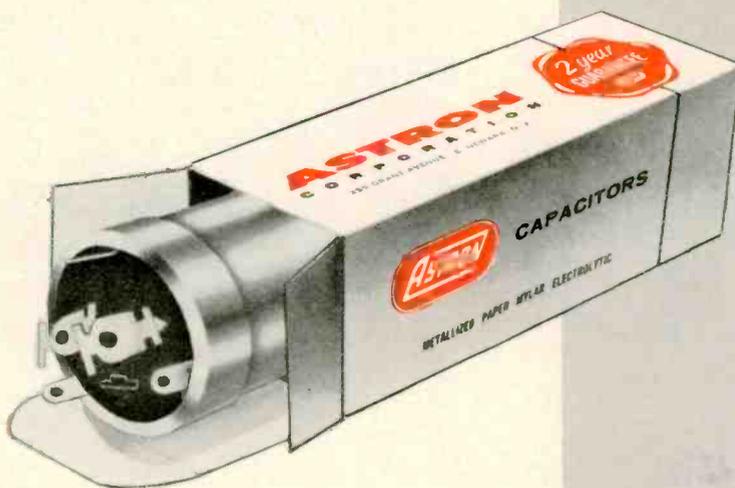
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**1 Citizens Radio:** A colorful, 4-page, brochure describes three models in a line of citizens band transceivers. (1B4: Acton Labs.)

**2 Chimney Mounts:** Three new heavy duty mounts are introduced in a new bulletin which includes a specifications chart covering all of the company's mounts. (2B4: Channel Master Corp.)

**3 Transformers:** 750 transformers are listed in a new 36-page catalog. A group of high current filament chokes and filament transformers, with multiple secondaries, are among those listed for the first time. (3B4: Chicago Standard Transformer.)

**4 Cartridges & Needles:** "1960 Power Point Needles & Cartridges" is an easy-reference catalog of phono cartridges and replacement

phono needles. Also issued is a cross-reference needle wall chart. (4B4: Electro-Voice.)

**5 Truck Bodies:** Described in a 6-page folder is the "Service-Master" truck body. There are 2 models—4 sizes—for ½, ¾, 1 and 1½ ton chassis. (5B4: McCabe-Powers Body Co.)

**6 Components:** A 32-page, 2-color stock catalog, No. 30A, provides latest prices, listings and data. (6B4: Ohmite Mfg. Co.)

**7 Publication:** The first edition of "The Raytheon Bond" has 12 pages of technical articles, service tips, etc. It will be published every other month. (7B4: Raytheon Co.)

**8 Tubes:** ICE-197, Interchangeability directory of Foreign vs

U.S.A. receiving tubes lists approx. 450 foreign types. (8B4: RCA Electron Tube Div.)

**9 Electronic Organ:** A full color booklet and other literature are available providing details on how to assemble the firm's electronic organs. (9B4: Schober Organ Corp.)

**10 Direct Mail Advertising Services:** Literature is available covering a direct mail advertising service designed to help the independent TV service dealer build greater business volume. (10B4: Service Promotions Co.)

**11 Communications:** A colorful 4-page brochure describes a line of personal communications equipment with a wide range of applications. (11B4: Seiscor Div. Seismograph Service.)

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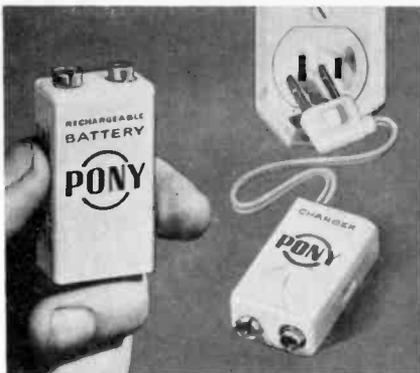
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### B&K BATTERY & CHARGER

"Pony" rechargeable battery, for transistor radios, is directly interchangeable with miniature 9v batteries and gives over 100 times more playing hours than regular dry batteries. It improves tone quality by maintaining the proper tone and volume over a longer period with less noise and better listening. It snaps into the charger and plugs into any a-c electric outlet, and can be recharged at any time. Complete with charger, \$4.95. B&K Mfg. Co., 1801 W. Belle Plaine Ave., Chicago 13, Ill. (ELECTRONIC TECHNICIAN 4-15)



### Perma-Power BRIGHTENERS

With the purchase of 12 "Vu-Brite" TV tube brighteners, a colorful, unbreakable, polystyrene flashlight is offered free, in the firm's new spring promotion. The special offer applies to



both parallel and series "Vu-Brites." This promotion is being merchandised by packing the colorfully-boxed brighteners in a heavy, clear plastic bag with the flashlight also packed inside. Perma-Power Co., 3100 N. Elston Ave., Chicago 18, Ill. (ELECTRONIC TECHNICIAN 4-22)

**1551 pages**

**The Radio-Electronic MASTER**  
OFFICIAL BUYING GUIDE OF THE INDUSTRY

UNITED CATALOG PUBLISHERS, INC.  
63 Madison Avenue • New York 17, N.Y.

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# 1960 RADIO-ELECTRONIC MASTER

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NEW...STREAMLINED...28 EASY-TO-USE PRODUCT SECTIONS COVER ALL LATEST PRODUCTS

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Covers all items necessary for radio-TV-audio servicing. Offers thousands of products for extra income in hi-fi, sound and industrial servicing. Buy, sell and bill direct from The MASTER...it shows list prices!

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RADIO ELECTRONIC MASTER, 55T Sewell St., Hempstead, N.Y.

**FREE...FROM YOUR DISTRIBUTOR**

24-page Foreign Tube Interchangeability Guide or write direct enclosing 25¢ for handling



### EICO CITIZENS BAND RADIO

Features of Model 760 include: 5-watt crystal-controlled transmitter; highly selective superheterodyne receiver with r-f stage and noise limiter and pre-set and sealed crystal oscillator circuit elements. It is easy to operate and covers up to 20 miles. Model 760, for



117v a-c station use only, \$59.95, kit; \$89.95, wired. Model 761, for 117v a-c and 6v d-c battery field operation, \$69.95, kit; \$99.95, wired. Model 762 for 117v a-c and 12v d-c battery-powered, \$69.95, kit; \$99.95, wired. Electronic Instrument Co., 33-00 Northern Blvd., Long Island City, N. Y. (ELECTRONIC TECHNICIAN 4-1)

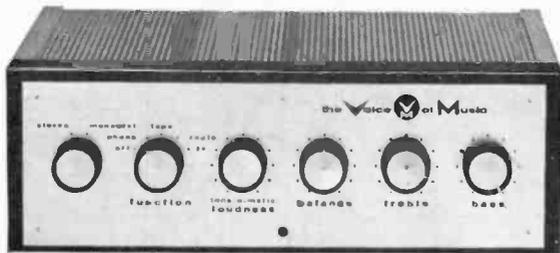
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V-M Quality  
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**V-M/MODEL 1404 HI-FI STEREO AMPLIFIER**—An AC type amplifier with built-in pre-amplifier and integral controls. Dual-channel, push-pull amplifier with total output of 28 watts (peak); 14 watts each channel. Jack panel with stereo inputs for phono, tape, tuner, a monophonic input for TV plus . . . outputs to drive a stereo or monophonic tape recorder . . . . . \$89.95\* List  
THE IDEAL AMPLIFIER FOR ANY CUSTOM INSTALLATION!



**V-M/MODEL 1405 HIGH-FIDELITY TUNER**—A combination AM-FM Tuner with Armstrong FM and Superheterodyne circuits. FM Automatic Frequency Control. Built-in AM antenna. External inputs. Equipped with FM Multiplex stereo adaptor jack for future use . . . . . \$99.95\* List

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**V-M/'STERE-O-MATIC'® AUTOMATIC 4-SPEED RECORD CHANGERS**—Acclaimed the world's finest changers! Play all record sizes and speeds both stereo and monophonic. Present monophonic records sound better than ever before! Also available with a 4-pole motor and plug-in head for magnetic cartridges. Ask your V-M Distributor about the complete line . . . . . From \$50.00\* List  
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### Centralab PACKAGES

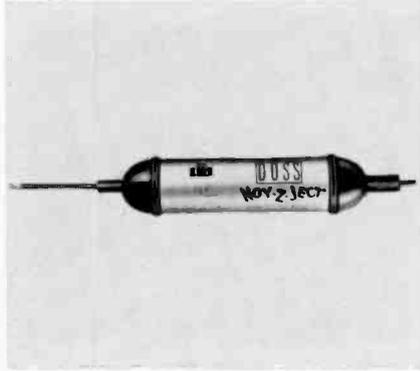
New, improved and simplified, packages reduce the size and shapes of cartons by more than 50%. Difficult-to-stack smaller sizes have been eliminated. The "blue-ribbon" design is retained but with a crisper more modern appearance. Heavier, special coated,



stock keep the cartons brighter and whiter. All switches and controls are now packed in the new cartons. Also those capacitors which are not packed in the "bubble-pack." Centralab Div., Globe-Union, Inc., 902 E. Keefe Ave., Milwaukee 1, Wis. (ELECTRONIC TECHNICIAN 4-16)

### Doss GENERATOR

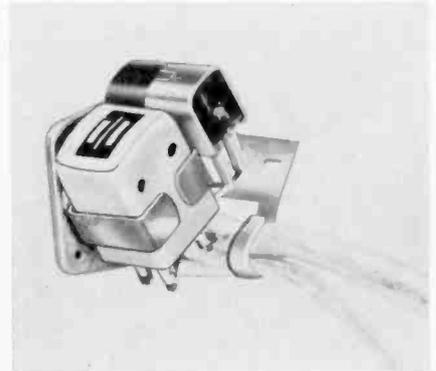
A new self-contained, transistorized, needle nosed unit in probe form, is the "Noy-Z-Ject" model D-800 rf-if audio pulse generator. Its application is in trouble-shooting rf-if or audio circuits. It is useful also for tracing video, printed circuits, etc., and is especially



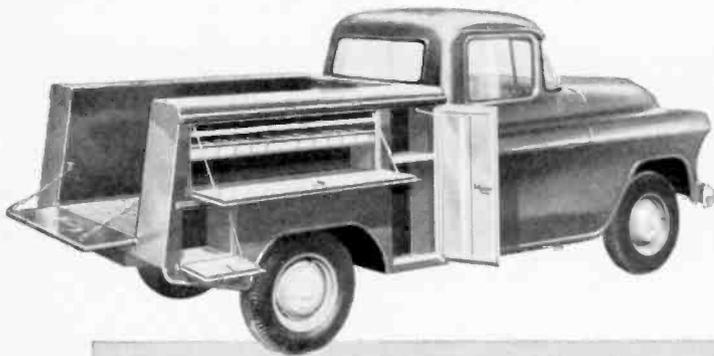
designed as a convenient, line isolated method of checking transistor radios. The circuit is a blocking oscillator with a pulse generator waveform output. Oscillator frequency, approximately 1,000 cycles. \$11.67. Doss Electronic Research, Inc., 820 Baltimore, Kansas City 5, Mo. (ELECTRONIC TECHNICIAN 4-8)

### Nortronics STEREO CONVERSION KITS

Announced are: Model WR-35, WR-40 and WR-45 for conversion of Wollensak-Revere units to 1/4 track play/mono record; mono record/1/4 track stereo play and 1/4 track stereo record play, respectively. \$25.50, \$32.50 and \$37.50. Also



model P-6 and P-7, for Pentron units, \$29.70 and \$15.00 and models V-6 and V-7, for V-M units, \$25.50 and \$14.50. Each kit complete with necessary stereo head(s), hardware and instructions. Nortronics Co., 1015 S. 6th St., Minneapolis 4, Minn. (ELECTRONIC TECHNICIAN 4-37)



Service-Master costs so much less in the long run that it's actually false economy to settle for any other make. Here's a truck body that has class... starting with the way it's put together and ending with the way it stays together without constant upkeep through the life of several chassis. See one, go over it carefully, get all the facts, compare and you'll know why Service-Master is your very best service body buy!

**POWERS**  
**Service-Master**<sup>®</sup>  
**TWO MODELS... FOUR SIZES**  
 for 1/2, 3/4, 1 and 1 1/2 ton chassis

A standard Model SM-15 (3/4 ton) Service-Master is shown at top left. Below is the same model with a Canopy Top. All bodies are available for immediate delivery in all 48 states.



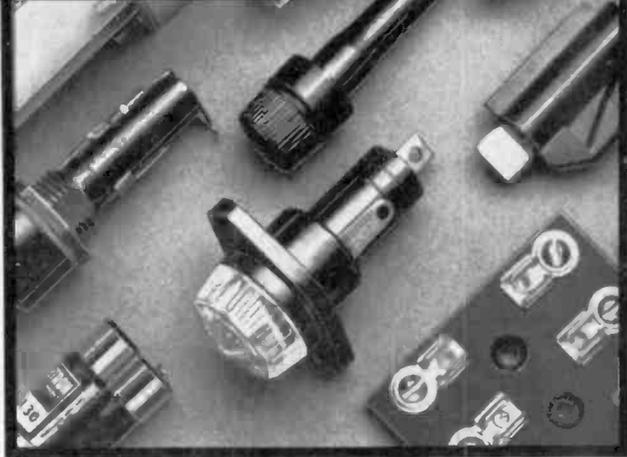
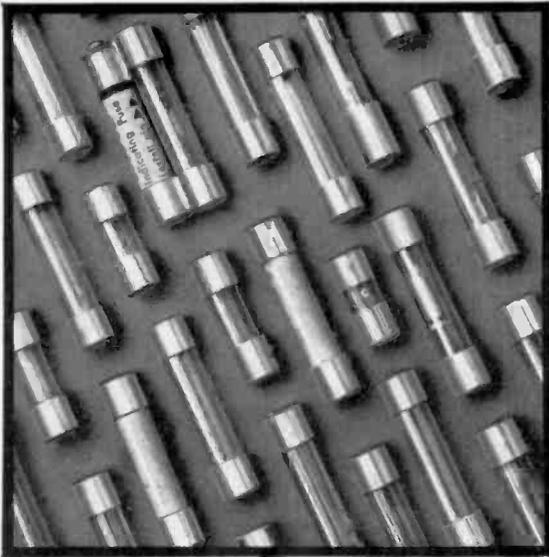
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It's loaded with valuable information

**McCABE-POWERS BODY COMPANY**  
 5900 NO. BROADWAY • ST. LOUIS 15, MO.





# Here are the plain facts!

*... why it pays to standardize on BUSS FUSES*

**IT'S A FACT!** BUSS fuses have provided dependable electrical protection under all service conditions for over 45 years in the home, in industry and on the farm.

**IT'S A FACT!** You never have to stop and explain why you carry BUSS fuses because your customers accept them as the finest available.

**IT'S A FACT!** Every BUSS fuse you sell or install is tested in a sensitive electronic device that automatically rejects any fuse not correctly calibrated, properly constructed and right in all physical dimensions.

**IT'S A FACT!** When you sell or install BUSS

fuses, you avoid complaints that your fuses failed to protect or that they opened needlessly.

**IT'S A FACT!** Selling and installing BUSS fuses saves you time and trouble by avoiding call-backs . . . you keep your full profit and create satisfied customers.

**IN SHORT . . .** why take a chance with your good name by carrying fuses that might be faulty? Standardize NOW on genuine BUSS fuses. They help you protect your profits and your reputation for service and reliability.

*For more information on BUSS and FUSETRON Small Dimension fuses and fuseholders, write TODAY for Bulletin SFB.*

BUSSMANN MFG. DIVISION, McGraw-Edison Co. University at Jefferson, St. Louis 7, Mo.

460

*BUSS fuses are made to protect - not to blow, needlessly.*

*BUSS makes a complete line of fuses for home, farm, commercial, electronic, electrical, automotive and industrial use.*



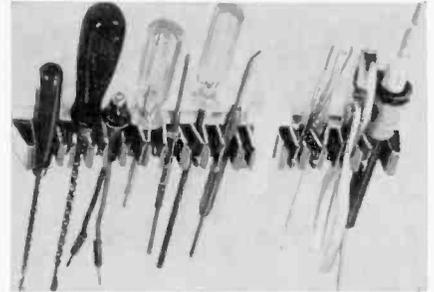
## Century VTVM

Features of the Model VT-10 line-operated VTVM include a multi-probe that, with a twist of the tip, can be set to function as either a d-c probe, a-c probe, lo-cap probe or r-f probe. A holder on the side of the case holds the multi-probe in place. The unit employs a large 6" 100 micro-ampere meter with 4 multi-color scales and an amplifier-rectifier circuit with frequency attenuator. \$58.50. Century Electronics Co., 111 Roosevelt Ave., Mineola, N. Y. (ELECTRONIC TECHNICIAN 4-7)



## G-C TOOL CADDY

A cleverly designed tool holder for work bench or shop is the G-C "Tool Kaddy," catalog No. 9525. This new device is designed to end some of the clutter in the average technician's work area. It holds tools of all sizes and types,



from hammers and soldering irons to tweezers and probes. A snap-in, snap-out feature provides easily mounted holder with unusual versatility. \$1.49. G-C Electronics Co., 400 S. Wyman St., Rockford, Ill. (ELECTRONIC TECHNICIAN 4-29)

# WARD UNIVERSAL DISAPPEARING ANTENNA

for FOREIGN, SPORTS,  
and AMERICAN  
COMPACT CARS

### MODEL M-182 D

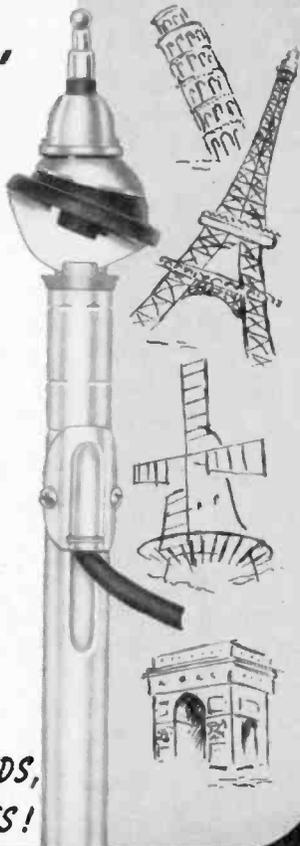
- Installs completely from the top without brackets
- Universal LokMatic Mount fits all holes
- 3 Sections extend to 25 3/4 inches

The first Universal Disappearing antenna designed for foreign, sports and compact cars. Petite and trim to complement small car lines, there's barely one inch visible when collapsed.

Custom designed for the rapidly growing small car market, this is the hottest model in the industry.

Available now, in moderate quantities, for immediate shipment.

**INSTALLS FROM THE TOP IN SECONDS,  
WITHOUT BRACKETS!**

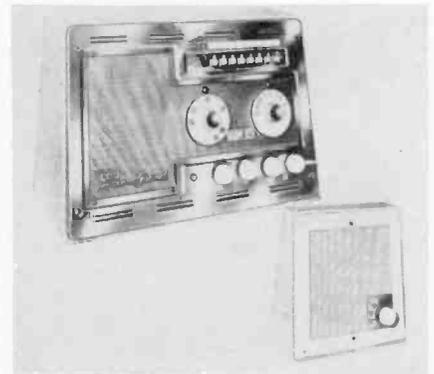


# ward

**PRODUCTS  
CORPORATION**  
AMSTERDAM, NEW YORK

## Progress INTERCOMS

Sound-Guard "Convertible" radio intercoms make the installation of Sound-Guard equipment simple and inexpensive in already existing houses and apartments. Eliminated is the need for cutting holes, carpentry and running wires through walls. Compact



master station and remote speakers in neutral tone beige leatherette cabinets can be placed almost anywhere. The Sound-Guard "Convertibles," which can be easily converted to "built-ins," provide all the convenience of Sound-Guard Systems installed in new houses. Progress Mfg. Co., Castor Ave. & Tulip St., Philadelphia 34, Pa. (ELECTRONIC TECHNICIAN 4-33)

## COMING NEXT MONTH

ELECTRONIC TECHNICIAN's annual directory of  
Manufacturers  
Service Associations  
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**Really dresses up  
your service work**

Reliable Tung-Sol tubes add real class to every service job — radio, tv, or hi-fi. Made to set manufacturers most exacting specifications, Tung-Sol Tubes are best for all replacements. Reduce your callbacks to new lows and keep your profitable new business rolling in high style. Tung-Sol Electric Inc., Newark 4, N. J.

*Tell your jobber you'd rather have*

**ts TUNG-SOL®**

*Blue Chip Quality* TUBES • TRANSISTORS • DIODES

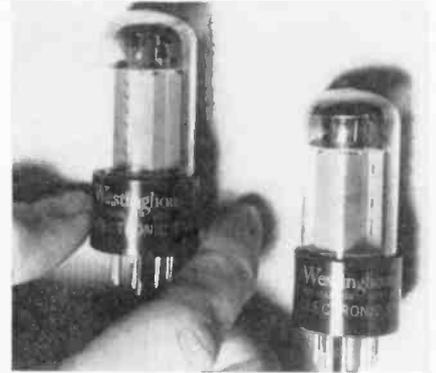
### Knight VTVM KIT

AC VTVM kit, 83 YX 608, features a motor-driven automatic range selector, printed circuitry, 10 tubes plus rectifier; is supplied with all parts, probe, wire and solder and housed in a 10¼" x 6⅝" x 10¼" steel case. Panel lights indicate the range in use and the motor unit is capable of driving the built-in range selector switch through all 11 ranges in 2½ seconds. Response, ±1 db from 20 cps to 2.5 mc; flat response from 50 cps to 500 kc. Can be used as a preamp. \$99.50. Allied Radio Corp., 100 N. Western Ave., Chicago 80, Ill. (ELECTRONIC TECHNICIAN 4-6)



### Westinghouse TUBES

Type 7591 beam-power pentodes, for hi-fi amplifiers, deliver up to 45 watts with less than 1.50% distortion. Operating conditions for this level of performance are: plate voltage, 450v; screen voltage, 400v; grid #1 voltage, -21v; maximum signal plate current, 72 ma



per tube; maximum signal screen current 15.0 ma per tube; and effective plate-to-plate load impedance, 6,600 ohms. These pentodes use a T-9 glass bulb, an octal base, and are suitable for mounting in any position. Westinghouse Electronic Tube Div., P.O. Box 284, Elmira, N.Y. (ELECTRONIC TECHNICIAN 4-39)

### Grove CITIZENS BAND RADIO

Chief features of a new transceiver kit are: power input, 5 watts to class C r-f amplifier; plug-in 3rd overtone crystal 0.005% accuracy oscillator; AM plate modulation with automatic limiting for less than 100% modulation; Astatic ceramic microphone; 50 to 75



ohms antenna impedance; superregenerative receiver with r-f amplifier; tuning range of 26.5 mc to 27.5 mc; full 2½ watts audio output; and 4" speaker. Available in 3 models: G-110 (110v); G-12 (12v) and G-6 (6v) \$39.95. Grove Electronic Mfg. Co., 4103 W. Belmont, Chicago 41, Ill. (ELECTRONIC TECHNICIAN 4-2)

COMPARE

QUAM SPEAKERS

feature  
for  
feature

then decide  
for yourself which brand  
gives you the best value and the best  
performance in every speaker installation

	QUAM	BRAND A	BRAND B
ADJUST-A-CONE SUSPENSION to assure precise voice coil centering and alignment	YES	NO	NO
U-SHAPED POT to give you lowest possible energy loss and accurate magnet alignment	YES	NO	NO
ALNICO V MAGNETS	YES	YES	YES
HUMI-GARD CONE for greater heat and humidity protection in outdoor speakers	YES	NO	NO
AVAILABLE WITH SPECIAL VOICE COILS, SPECIAL FIELDS	YES	NO	NO
ADVERTISED TO THE PUBLIC	NO	YES	NO
LISTINGS IN PHOTOFACTS AND COUNTERFACTS to save you time, assure correct replacements	YES	NO	NO
THIRTY YEARS OF EXPERIENCE in engineering and manufacturing quality loudspeakers under same ownership	YES	NO	NO

Write

for your free copy of the QUAM General Catalog, listing the full line of QUAM speakers for radio-tv replacement, public address, and high fidelity. QUAM speakers are completely manufactured in the United States of America.

**QUAM-NICHOLS COMPANY**

226 East Marquette Road • Chicago 37, Illinois

# RCA Electronic Instruments

"PREFERRED BY PROFESSIONALS"

## GENERATORS



**WR-46A VIDEO  
DOT/CROSSHATCH  
GENERATOR**

A "must" for making color-TV static and dynamic convergence adjustments in the home or shop. Derives sync from station-tuned TV set and reinjects highly stable video dot, bar or crosshatch patterns to picture tube grids or video amplifier grids. \$179.50\* (complete with cables, instruction book).



**WR-61B  
COLOR-BAR  
GENERATOR**

For checking overall operation of color-TV receivers and a "must" for adjusting and troubleshooting color phasing and matrixing circuits. Generates signals for producing 10 bars of different colors simultaneously. \$295.50\* (complete with cables, TV-input adapter, instruction book).



**WR-99A CRYSTAL-  
CALIBRATED  
MARKER GENERATOR**

To supply a fundamental frequency rf carrier of crystal accuracy for aligning and troubleshooting color, black-and-white TV, FM receivers and other electronic equipment operating in 19 Mc to 260 Mc range. \$242.50\* (complete with output cable, two phone tips, instruction book).



**WR-49B  
SIGNAL  
GENERATOR**

For alignment and signal tracing of AM/FM receivers, low-frequency signal tracing and alignment of TV vt/af amplifiers. Six ranges—85 Kc to 30 Mc. Internal 400 cps modulation. Low rf signal leakage! DC blocking capacitors at rf and af output terminals prevent damage to instrument or external circuits. \$79.50\* (complete with shielded cable for rf and af output, instruction book).



**WR-69A  
TELEVISION/FM  
SWEEP GENERATOR**

For visual alignment and troubleshooting of TV rf/af/vf circuits and other electronic equipment. IF/video frequency ranges 50 Kc to 50 Mc, TV channels 2 to 13, plus FM range—88-108 Mc. Sweep width 0-12 Mc or more. Output level—0.1 volt or more. Attenuation ratio 60 db or more below maximum output. \$295.00\* (including all cables, instruction book).



**WR-70A  
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MARKER ADDER**

To be used with WR-69A, WR-99A or similar electronic equipment. Eliminates waveform distortion due to overloading receiver during visual alignment techniques by adding markers after the rf signal is demodulated. \$74.50\* (complete with cables, instruction book).

## SCOPES



**WO-91A  
5-INCH, COLOR-TV  
OSCILLOSCOPE**

High-performance, wide-band oscilloscope ideally suited for color-TV, black-and-white TV, and other electronic applications.

Dual bandwidth (4.5 Mc, 0.053 volts rms/in.), (1.5 Mc, 0.018 volts rms/in.). Internal calibrating voltage and calibrated graph screen. Includes special direct/low cap shielded probe and cable. \$239.50\* (includes ground cable, insulator clip, instruction book).



**WV-98A SENIOR  
VOLTOHMYST®**

For making accurate ac and dc voltage measurements as well as measuring resistances from 0 to 1,000 megohms. Measures peak-to-peak values of complex waveforms. Ruggedized, die-cast aluminum case. Large, easy-to-read 6½-inch meter! A fine VTVM for electronic technicians and engineers! Includes special dc/ac—ohms shielded probe and cable. \$79.50\* (complete with ground lead, alligator clip, instruction booklet).



**NEW! WV-77E  
VOLTOHMYST®**

To measure AC and DC voltages, 0 to 1,500 volts; resistances from 0.2 to 1,000 ohms. Famous RCA VoltOhmyst quality at a low price! Separate scales, 1½ volts rms and 4 volts peak-to-peak, for accuracy in low ac measurements. Fuse-protected ohms-divider network. Complete with ultra-slim probes, long flexible leads, only \$49.95.\* (Easy-to-assemble kit, WV-77E(K), only \$29.95\*).



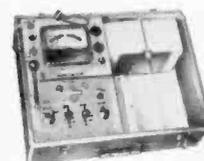
**NEW! WO-33A  
SUPER-PORTABLE  
OSCILLOSCOPE**

A low-cost all-purpose scope you can carry anywhere—only 14 pounds—ideal for in-the-home servicing of black-and-white and color TV, audio and ultrasonic equipment. High gain and wide bandwidth to handle the tough jobs! Rugged and compact—scaled 3" graph screen. Only \$129.95,\* complete with low-cap direct input probe, cable, power cord and cord carrying brackets. (As an easy-to-assemble kit, WO-33A(K), only \$79.95\*).



**NEW! WV-38A  
VOLT-OHM-  
MILLIAMMETER**

To measure AC or DC voltages, 0 to 5,000 volts; resistances 0 to 20 megohms; DC current 0 to 10 amps; power—10 to +50 dbm. Exclusive special ranges for transistor servicing: 1 volt, 250 mv—50 µa and 1 ma full scale. Fuse-protected ohms divider network. Polarity reversing switch. Big meter (5½"). Buy of a lifetime at \$43.95.\* (Easy to assemble kit, WV-38A(K), only \$29.95\*).



**WT-110A  
AUTOMATIC  
ELECTRON  
TUBE TESTER**

Especially designed for TV and general electron-tube service testing through automatic punched-card selection of correct test conditions on wide variety of tubes. Checks vacuum-tube rectifiers under high-current conditions. \$199.50\* (complete with 263 punched cards, 24 blank cards, card punch, instruction book).

There's an RCA test instrument to help you do every job better, and easier—and to save you valuable time. Plus a complete line of test accessories: video multimarkers, TV isotaps and bias supplies, probes and cables. See your Authorized RCA Electronic Instrument Distributor for complete information.

\*User Price (Optional)



**RADIO CORPORATION OF AMERICA**  
Electron Tube Division

Harrison, N. J.

You have a ready-made market among over 6,000,000 CBS-Ronette cartridges used in American phonographs. One of 27 CBS-Ronette models will make each phonograph sound like new.

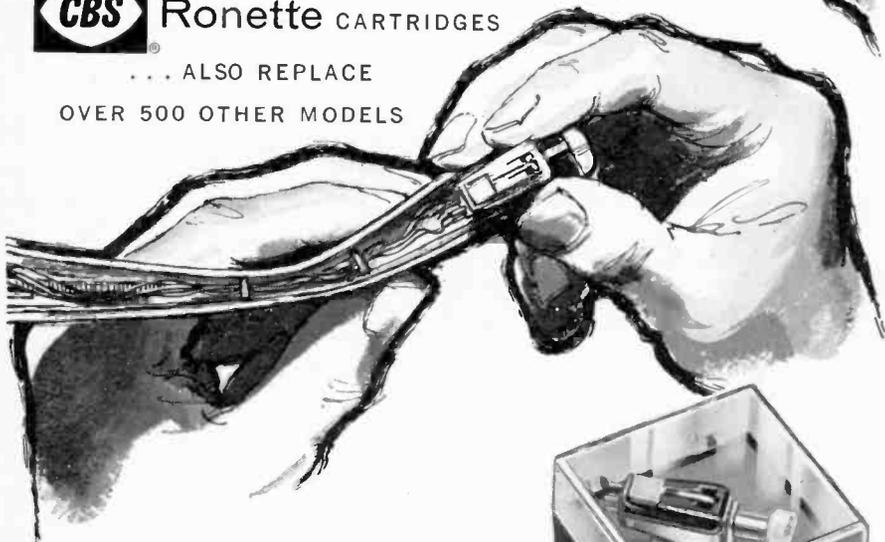
These same jeweled-styli cartridges will replace over 500 other models . . . and actually improve the performance of most phonographs.

Ask for the CBS-Ronette Catalog and Cross Reference Chart, PF-285. It makes your job fast, easy, and profitable. Tell your distributor you want CBS-Ronette, the world's most popular quality cartridge.

## Exact Replacements for 6,000,000

**CBS** Ronette CARTRIDGES

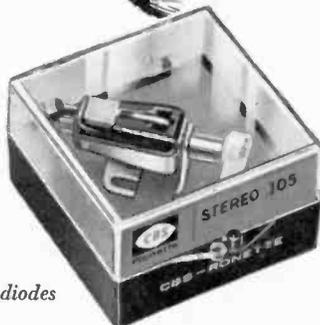
... ALSO REPLACE  
OVER 500 OTHER MODELS



**CBS ELECTRONICS**

Danvers, Massachusetts, U.S.A.  
A Division of Columbia Broadcasting System, Inc.

Receiving, industrial and picture tubes • transistors and diodes  
audio components • and phonographs



## Working With Depth Finders

(Continued from page 46)

running record of the depth beneath his keel.

### Commercial Equipment

The Bendix DI-5 neon-indicator type has a range beyond 240 ft. or 40 fathoms. It meets the requirements for both shallow and deep water use. The large diameter dial permits greater spacing of the scale graduations. Depth variations of one foot are indicated. See Fig. 9.

Since the Bright-Lite indicator will continue flashing past the 240 ft. mark, readings in excess of 240 ft. may be taken. After the depth flash of the Bright-Lite indicator has passed 240 ft., a flash at the 20 ft. graduation, for example, would indicate a depth of 260 ft. This unit operates at a frequency of 75 kc and makes 600 soundings a minute.

Two transistors are used in the power supply of the DI-5. Its indicator unit is mounted in a stainless steel bracket which permits adjustment of the viewing angle.

The transducer and battery leads are provided with plug-in connections to facilitate easy removal and storage of the indicator unit. This feature is particularly desirable on small, open, cockpit boats.

The RCA Depth-O-Meter III, type CRM-E2A, also utilizes the flashing neon light. The indicator, calibrated in 1 ft. increments, measures only 8½ in. x 4¼ in. x 8 in. Power consumption is 1 watt from either 8 ordinary flashlight batteries or the

Fig. 9—Flashing neon depth indicator reads to 240 feet, or 40 fathoms.



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boat's 12 volt system. Range is up to 120 ft. The sounding rate is 20 cps, and the transmitting frequency is 200 kc. See Fig. 10.

Raytheon's transistorized Angler fathometer, priced at \$125, is just 6 in. in diameter, 5 in. long. Depth range is 120 ft., and sounding rate is 20 cps. It employs printed circuits, and is powered by the boat's 12 volt supply or self-contained mercury batteries. See Fig. 1.

ERA Dynamics Corp. offers the Dual-Beam Pilot depth/distance indicator, a transistorized unit with 140 ft. depth scale on the left, 140 ft. horizontal distance scale on the right. The DD140 sells for \$195.

See photo in Fig. 11.

#### Depth Recorders

Depth finders which produce permanent records are depth recorders.

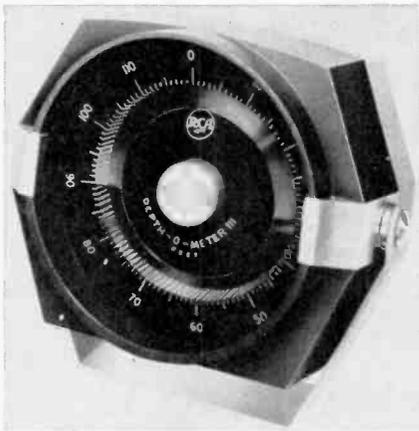


Fig. 10—Flashing neon "Depth-O-Meter" operates from 8 flashlight batteries or boat's 12 volt system.

By accurately recording depth and underwater hazards, they serve as an invaluable aid to the navigator. On any of the ranges (0-200 ft., 200-400 ft., 400-600 ft.) in typical equipment one can instantaneously observe continuous indications of conditions below the ship on a large, dry paper chart. A fourth or searching range (as in the RCA Portograph) has all ranges superimposed and indicates the presence of fish or bottom anywhere between the zero and 600 ft. level. Once it has been ascertained that fish or bottom are present, their exact depth can be determined by selecting one of the three principal ranges.

The mechanical section consists of a scanning mechanism operated by

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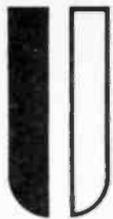
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a constant speed motor. This motor, through a gear drive, moves a guided scanning arm carrying a wire stylus over the surface of the paper. During each rotation of the scanning arm, the pulse generator is keyed, and a short ultrasonic pulse is sent to the bottom by the transducer. It is through the stylus that the electrical return signal is sent to the recording paper, causing it to be



Fig. 11—Combined indicator measures depth and horizontal distance to 140 ft.

marked at the proper time.

As the stylus makes its mark and the paper moves forward, a continuous line is recorded, reproducing the profile of the sea bed and indicating the presence of fish.

The unlined, dry, recording paper has a carbon body and a light, electrosensitive coating. When voltages come in contact with the paper through the stylus, they burn it, leaving a black mark at the spot. A typical recording is shown in Fig. 6. There are eight points of interest indicated.

The Edo 255C Survey Depth Recorder was designed for measuring the depth of water for survey purposes and for presenting in permanent form an accurate record of the water's depth. It is accurate to 1/2%. The instrument is shown in Fig. 2.

This equipment may be installed to operate aboard survey vessels of all types, traveling at any speed up to 15 knots, in any water depth from 1 1/2 feet to 230 fathoms, in clear or muddy water.

Compensation for the draft of the survey vessel or for tidal conditions can be made manually with the draft setting control which has a range of from -5 to -25 ft. To permit accurate chart reading the overall range scale is broken down into eight overlapping ranges: 0 to 65 ft., 55 to 120 ft., 110 to 175 ft., and 165 to 230 ft.

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14-C1	455 kc Input I.F.
14-C2	455 kc Output I.F.
14-C6	455 kc Output I.F.*
14-C7	455 kc Input I.F. - battery radios
14-C8	455 kc Output I.F. - battery radios
14-C9	455 kc Input I.F. - AC-DC radios
14-C10	455 kc Output I.F. - AC-DC radios
6270	4.5 Mc Input or Interstage
6271	4.5 Mc Ratio Detector

\*with diode filter capacitors

### TOP-TUNED PRINTED CIRCUIT IF TRANSFORMERS

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16-PH2	262 kc Output I.F.
16-PH6	262 kc Output I.F.*
16-PC1	455 kc Input I.F.
16-PC2	455 kc Output I.F.
16-PC6	455 kc Output I.F.*
16-PC7	455 kc Input - battery radios
16-PC8	455 kc Output I.F. - battery radios
16-PC9	455 kc Input I.F. - AC-DC radios
16-PC10	455 kc Output I.F. - AC-DC radios
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inches per minute) can be selected by a front panel control. Accuracy is maintained by the use of a synchronous motor that receives 60-cycle ac power from a precisely-controlled dc-to-ac power supply. Indication of the frequency of the power supply is obtained on a direct-reading frequency meter. The meter covers a range from 57 to 63 cycles; the meter can be read to within a tenth of a cycle. Frequency of the power converter is adjustable to compensate for changes in velocity of sound in water. The usual frequency is 37.5 kc.

The Edo Survey Depth Recorder consists of two components for 60 cycle ac operation: 1. Recorder Unit; 2. One transducer mounted in the hull or over the side. A portable power converter as required by the

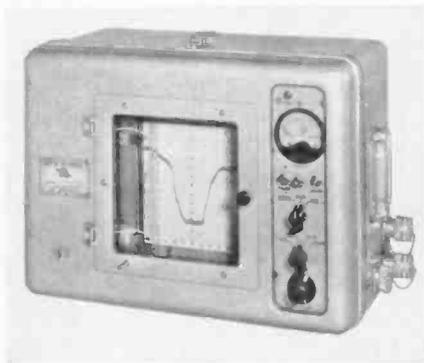


Fig. 12—Depth recorder weighs 55 lbs. Meter at right is calibrated from 57 to 63 cps.

ship's power supply is necessary for dc operation.

The recorder is housed as shown in a cast aluminum case 18½ in. long, 13½ in. high, 10½ in. deep, and weighs approximately 55 lbs. The Recorder includes a recorder panel assembly, an electronic chassis, and a power supply chassis. See Fig. 12.

Chart paper is light in color, dry, electrosensitive, and unaffected by light or atmospheric conditions. Chart speed is either one or two inches per minute. Thus, a roll of chart paper provides 20 hours of continuous operation on slow speed; or 10 hours of continuous operation on fast speed. An "end of chart" warning appears well ahead of the actual end of the roll.

To facilitate quick and accurate reading of the chart, the paper is laid out in rectangular coordinates and depth readings are on a vertical

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scale 6¾ in. high. A hinged window lets the observer make notations on the chart without interfering with the progress of the stylus. There is in addition a marker button which can be depressed to draw automatically a vertical line on the chart paper.

The Bendix DR-18 and DR-19 are shown in the schematic diagram, Fig. 8. A reed-stabilized power-supply is used with two transistors (Q1 and

Q2) for the dc-to-dc converter providing the 300 volt plate supply.

V-1, a 2D21 thyratron, is the trigger tube. When it conducts, because of a positive pulse on its grid, capacitor C-1 discharges. The resonant frequency of this capacitor and L-1 is 75 Kc output to the transducer.

A returning input signal is applied, through R-2, to the grid of V-2A. (This returning pulse has no effect upon the plate of V-1). The

tubes V-2 and V-3 are R-C coupled amplifiers; output from V-3 drives the recording of the data by the stylus on the paper roll.

The DR-18, for 0 to 60 fathoms, and DR-19, for 0 to 300 ft., utilize a ceramic transducer with a wide angle beam of 30°, allowing continuous accurate indication in spite of the vessel's pitch and roll.

RCA's Portagraph recording depth sounder, CRM-E1A, offers three

ranges, 0-200 ft., 200-400, and 400-600, all searched simultaneously. Its sounding rate is 144 spm at a 50 kc transmitting frequency. The tube line-up, consuming 50 watts, is: 2-6AU6, 1-6X4, 1-6AQ5, 1-6BE6, 1-SN4-GT discharge tube and a vibrator. The recording paper roll is 26 ft. long, 3 7/8 in. wide, and moves at 0.5 in./min.

Some companies such as Bludworth Marine and Multi-Elmac

make depthfinders using a conventional meter as the indicator. In the case of the Multi-Elmac DM-1, selling for \$158, there is a choice of three scales calibrated on the meter face: 0-10 ft., 0-50 and 0-250. Among the advantages claimed for the meter—all types have their own advantages—are easy needle reading in sunlight, no rotating parts and ease of installing additional remote indicators.



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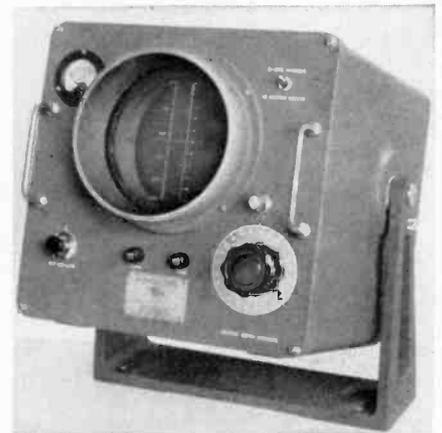


Fig. 13—Fishscope is example of CRT type of depth finder utilized by commercial fishing vessels.

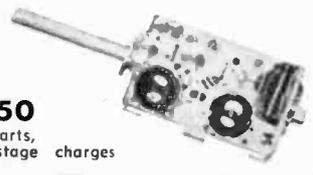
Fig. 13 illustrates Edo's Fishscope, a CRT type.

Care and cleaning are the two elements of preventive maintenance to keep in mind. The basic instrument, cables and transducer should never be abused. The transducer should be cleaned periodically with fine sandpaper to remove marine growth which may encrust it. Don't use steel wool, since fine particles can embed themselves and rust later. Alcohol or similar solvent may be used to cleanse the transducer. If it is to be painted, use only the special paint recommended by the depth finder manufacturer.

Troubleshooting is straightforward from an electronic viewpoint. The circuits are much simpler than any TV set. If the unit does not function check the power source (batteries may be weak) or connections to the boat's own supply. Fuses may, of course, also blow.

The transducer is a high impedance element, so an ohmmeter looking into the transducer cable from the depth finder should read a couple of megohms. If the resistance is very low, there is probably a cable short. If the resistance is ex-

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tremely high, the break can be either in the cable or transducer itself.

Tubes, transistors and components may be tested in the conventional way with regular instruments. Where vibrators are used, this is a common trouble source.

Where the flashing neon indicator is used, the driving motor or bulb could fail, but this is not a common occurrence.

When examination of the elements shows all is well, but the depthfinder still does not operate properly, it is possible that the transmitting frequency is not according to spec. The output frequency should be checked. If a frequency meter is not available, the output may be compared with that of a signal generator on a scope.

If the transmitted frequency is off, an internal adjustment is usually possible to correct the problem. If the output frequency is all right, the receiver should be adjusted for maximum sensitivity to the transmitted frequency.

Depth finders are interesting, yet reasonably simple devices. We can expect many thousands of boats, large and small, to be installing them for the coming boating season. •

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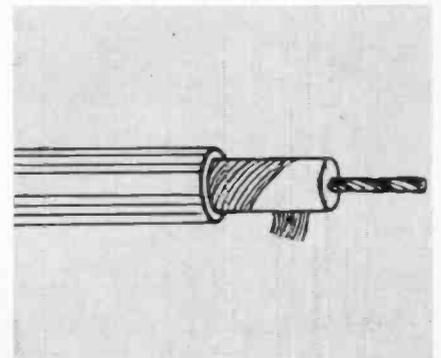
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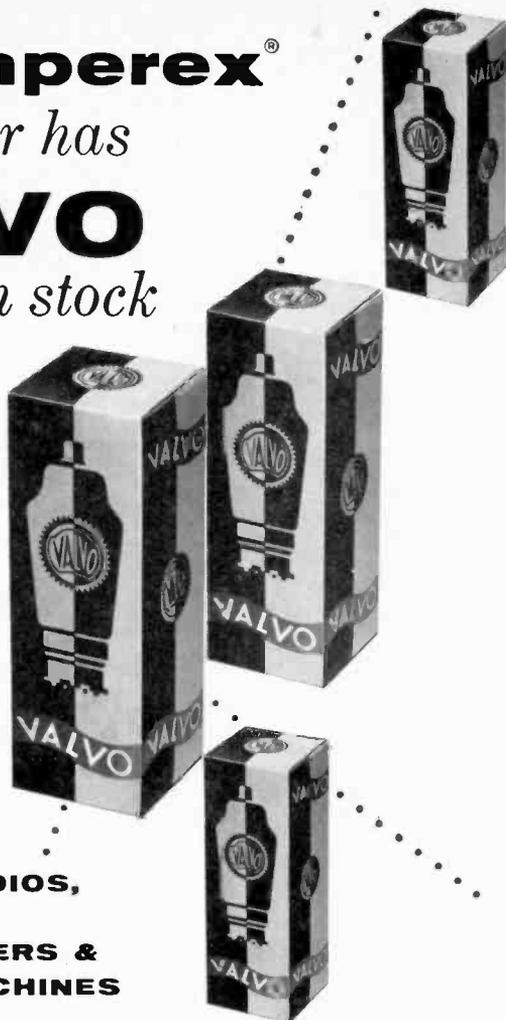
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## Desoldering Methods

(Continued from page 40)

mechanical connection. In printed circuit work, make sure the lug presses against the eyelet. (You might find it necessary to bend the lug to assure a good mechanical contact.)

Be especially careful when removing components. Don't force a component out; ease it out. Don't twist or bend unnecessarily. You may damage a part, the printed circuit foil and even the board itself.

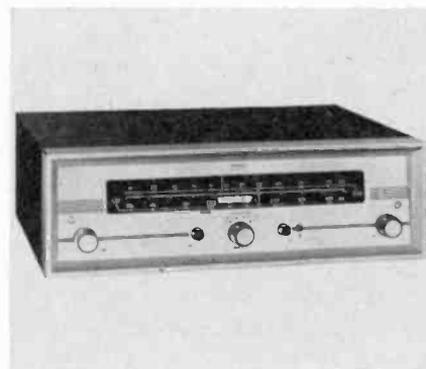
Don't apply excessive heat; you're working with delicate parts, such as transistors and diodes. Using a low-wattage iron is not absolute insurance against excessive heat, either. Sometimes, a long application of a low-wattage tool can overheat a part.

Since much of the work consists of desoldering, you'll work faster, better and more profitably if you keep your tools in good condition and, when faced with a desoldering job, choose the right desoldering tool. •

*Illustration Credits: Ungar Electric Tools, Inc., Los Angeles, Calif., RCA Service Co. & RCA Victor TV Div., Camden, N. J.*

### PACO STEREO TUNER KIT

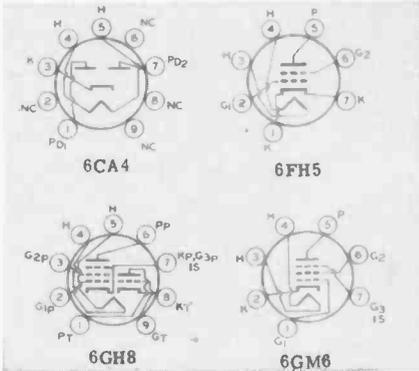
Model ST-45PA features separate pre-wired and prealigned AM tuner and FM tuner circuitry on two printed circuit boards. It can play simulcast stereo, FM separate and AM separate. Multiplex socket, on the chassis, has space beside it for a multiplex adapter.



FM tuner sensitivity, 2  $\mu$ v for 30 db quieting; bandwidth, over 200 kc; harmonic distortion less than 1% from 20 cps to 20 kc. The circuit has dual limiters and a Foster-Seeley discriminator. Afc, push-button controlled and pilot indicated. \$99.95. Paco Electronics Co., 70-31 84th St., Glendale 27, L.I.N.Y. (ELECTRONIC TECHNICIAN 4-38)

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6CA4, full-wave vacuum rectifier tube in the 9-pin miniature type, for use in compact hi-fi audio equipment, utilizes a unipotential cathode with a 6.3v heater. 6FH5, semiremote-cutoff tetrode of the 7-pin miniature type, for use as a grounded-cathode r-f amplifier tube in VHF tuners of TV receivers. 6GH8, multiunit tube of the 9-pin miniature type containing a medium-mu triode and sharp-cutoff pentode in one envelope. For use in multivibrator-



type horizontal-deflection oscillator circuits in TV receivers. 6GM6, semi-remote-cutoff pentode of the 7-pin miniature type for use in gain-controlled picture i-f stages of TV receivers operating at intermediate frequencies of the order of 40 mc. 6L6-GC, high-perveance beam power tube of the glass-octal type for use in the output stage of audio amplifiers and radio receivers where relatively large power output is required. Can be used in place of 6L6, 6L6-G, 6L6-GA and 6L6-GB. RCA Electron Tube Div., Harrison, N.J. (ELECTRONIC TECHNICIAN 4-24)

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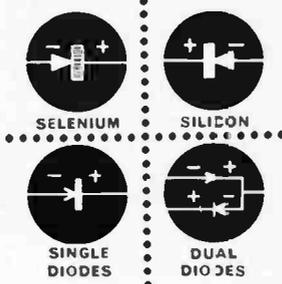


built-in handle which doubles as a stand. Red or black nylon case with gold anodized grill. Complete with carrying case and magnetic earphone in leather case, \$34.95. Radio only, \$29.95. Channel Master Corp., Ellenville, N. Y. (ELECTRONIC TECHNICIAN 4-17)

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- SELENIUM RECTIFIERS.** Substitutes for all types used in Radio, TV and other electronic devices up to 500 ma.
  - SILICON RECTIFIERS.** Types found in many new TV sets.
  - SINGLE DIODES.** With exception of some used in high frequency circuits.
  - DUAL DIODES.** Types used in sync Discriminator circuits. Third test lead is provided for center connection.

Sencore has simplified trouble shooting rectifiers and diodes with this unique substitution unit. The RS106 gives you a positive check everytime... Substitute for suspected rectifier or diode... watch picture or listen to sound and you'll know in seconds whether or not the rectifier or diode should be replaced. No guess work, no soldering mess, no time lost. The RS106 actually costs less than having loose rectifiers and diodes in the shop for testing and is worth many times more.

- Rectifiers & Diodes at your finger tips for fast substitution
- Protected by 1/2 amp. Slow Blow Fuse.

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DEALER NET. **1275**

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# THE PRACTICAL APPROACH



Robert Cornell\*

## "Sneaky Pete"

Q. What is a Sneaky Pete?

A. A Sneaky Pete is an ersatz antenna system that became popular in some of the metropolitan areas where landlords added an additional two or three dollar tab on the monthly rent for the privilege of mounting an antenna on the roof. Depending upon reception conditions and the ingenuity of the servicing technicians, these devices work to some degree. As a general rule, however, no indoor antenna or substitute thereof is as good as a proper outdoor installation.

An interesting experience I had not too long ago, may be of some amusement to you, but it had me roof-hopping for a while. It was a modern 12-story apartment house on the outskirts of New York City. Extreme antenna crowding conditions, aggravated by a requirement that they all had to be mounted on the back side of the apartment house, caused the plane of one antenna to intersect the plane of another in many instances.

The customer had a good clear signal but was troubled by intermittent flashes on the screen. This condition was more noticeable on a windy day and at times it was impossible to watch. All the earmarks of an old antenna with loose connections were present. One look at the roof and I knew I was in for it. A countless number of lead-in wires ran even with the top of the roof, from the antennas on the back side of the building to the front, before beginning their downward trip to the various apartments.

Some one, in an effort to be neat, cabled all the lead-in wires. It was impossible to trace the one transmission line I was after, and the customer didn't know which antenna belonged to him. So, with my colleague as a lookout I proceeded to cut through the miles of tape and cord that made up a cable of assorted 300 ohm flat lead-in wire, about 125 feet long and about 3 inches in diameter.

After working my way around the building and isolating the customer's transmission line, I was suddenly confronted with a new surprise. His transmission line ended in thin air . . . he was not connected to any antenna on that roof. In order to clean up this mess, he would have to install a new antenna system. One alternative was to have his neighbors replace their defective antennas . . . it was their signal. Master Antenna System anyone? If you need any help on antenna systems, or if you have any weird antenna stories, I'll be glad to hear from you.

Consider Blonder-Tongue's TV signal Distribution Amplifier, Model DA8-B, designed for continuous duty, to feed 8 transmission lines to TV sets, from a single antenna. It is a broadband all-channel unit, has a variable gain control and provides up to 10 db gain, and 22 db isolation at each terminal. Lists for \$94.50. Take advantage of our Free Planning Service. Contact me at Blonder-Tongue Laboratories, 9 Alling St. Newark 2, N. J.

\*Member: IRE, AES, & N. Y. State Attorney General's Committee on Fair Practices in The Radio And TV Supply Industry. President of Certified Electronic Technicians Association. Former Technical Editor, Electronic Technician Magazine.

ET-4

## Sophisticated Approach To AFC TV Problems

(Continued from page 33)

is originating before, within, or after the afc circuit.

Depending upon the particular circumstance at this point, the horizontal sync input to the phase detector should be checked with a scope, paying particular attention to the p-to-p voltage of the pulse. The feed-back waveform should also be checked. Average waveforms are illustrated in Figs. 3 and 4.

In observing scope waveforms, it must be remembered that these traces seldom appear *exactly* like those on a manufacturer's schematic or service manual. Idealized waveforms are generally shown, and in addition, they will vary somewhat depending upon the particular scope. Most experienced technicians are aware of this fact and focus attention upon major considerations such as the presence or absence of a pulse or waveform; its p-to-p voltage, its phase characteristic and general shape.

A rapid approach to further isolation is to disconnect the sync input at points A in Figs. 3 and 4. The picture must be steadied carefully by adjusting the horizontal hold control while observing if the pulling or bending is still present. If not, the trouble is obviously before the afc circuit or from B+. If the symptom remains it is either in or after the afc circuit—or from B+.

The next step is to disconnect the afc output from the grid of the control triode at points B. Again keeping the picture in sync with the horizontal hold control, observe if the symptom is still present. If it is not, the trouble is somewhere in the afc circuit or feeding into it through B+. If it remains, then the trouble is originating in the horizontal oscillator, feed-back circuit or from B+.

A scope check of B+ should be made to determine if more than the normal amount of 60 or 120 cycle ripple is passing the power supply filters. Also, if vertical pulses or sawtooth ripple is getting past the decoupling capacitors in the vertical oscillator or output stages. It should be noted at this point that a defective capacitor in the damper boost filter can also cause trouble. The



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- No. 59-4 E-Z-HOOK TIP Adapter for Banana test prods. . . . . .69 net
- No. 56-1 E-Z-HOOK TIP Adaptor for Standard (.080") test prods. . . . . .89 net
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scope should be set at 7,875 cps and a probe made on the B+ boost line—especially if the horizontal oscillator is being powered from boost.

Once a fault has been isolated to the afc circuit the normal procedure calls for complete and thorough visual inspection of components in the circuit, particularly for charred, discolored or overheating resistors. Voltage measurements with a VTVM are often helpful but the technician should be careful not to allow conflicting voltage readings to cause misleading conclusions.

### Horizontal Tearing

In some oscillator circuits, "Christmas tree" or heavy tearing can be caused by improper phase setting. In some modern circuits, however, this effect is normal at one extreme position of the hold control. A defective horizontal oscillator tube can also cause tearing. Likewise with a-c ripple from the power supply or feedback from the vertical section. Any resistor or capacitor drifting out of tolerance in the afc grid circuit and defective diodes are common causes.

### Loss Of Sync

Assuming tubes are good and horizontal coils are properly adjusted, when the horizontal hold control has little or no range (see Fig. 3) or when there is a complete loss of sync, check the sync pulse from the sync clipper to the afc circuit. If this pulse is good then check the sawtooth feedback waveform. Substitute in turn C-1, C-2, C-3, C-4 and the dual diodes or tube. Checking semiconduction diodes for forward and reverse resistance is not conclusive unless the diodes show a definite open or shorted condition. Substitute them! R-1, R-2, R-3, R-4, R-5 and R-6 should be checked or substituted in turn, if the fault is not located.

Referring to Fig. 4, R-1, R-2 and R-3 are critical resistors and replacement with 5% tolerance types is required. Capacitors C-1, C-2 and C-3 are equally critical. Replacement should be made with 5% tolerance silver mica capacitors. C-1 should be rated at 1,000v d-c or better.

In some pulse-width circuits of older vintage a 1% temperature com-



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ADDISON 2, ILLINOIS

pensating resistor can be found in series with the regular carbon potentiometer hold control. Trouble will develop if this resistor is not replaced with a similar type.

Where a symptom is intermittent, generally because of thermal changes, it may be necessary to give components "heat" or "cold" treatment.

Troubleshooting afc circuits is not as difficult as it sometimes appears. Remembering afc's many symptoms can prevent "hair pulling." •



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OUTPUT: 15 mv per channel. CHANNEL SEPARATION: 30-35 db. FREQUENCY RESPONSE: + 2 db 20-20,000 cycles. SIGNAL TO NOISE RATIO: -65 db below reference. TRACKING FORCE: "A" type stylus—2.5 grams; "C" type stylus—3.7 grams.

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# NEW PRODUCTS

For More Information On

NEW PRODUCTS

Circle Code Numbers, p. 57

## E-V ELECTRONIC ORGAN

A complete spinet and chord organ, on one keyboard, is the new "Baron." Features include: dual control that switches from manual to chord accompaniment; a shortened 2-manual keyboard of 32 keys in the upper register and 17 keys or chords in the lower; 6 voices (diapason, cello, flute, oboe, violin and strings) available individually



"Baron" Model

or in combination; and a cabinet in an exclusive Paul McCobb design. By carrying miniaturization to every logical electronic component, big organ performance is provided in compact size. Available in two models: the "Baron," a console type, has an especially designed hi-fi loudspeaker and tone chamber, a 13' pedal bass and a dynamically-balanced swell shoe, \$545.00; the "Baroness" eliminates the



"Baroness" Model

console base with its accompanying foot pedals and swell shoe. It uses a specially designed speaker mounted inside the organ cabinet, \$445.00. Both models have polyphonic note construction, standard size organ keys, a continuously variable tremolo control, variable level control, an auxiliary output, silver and gold clad contacts, printed circuit wiring and a variety of hand-rubbed finishes—walnut, mahogany, fruitwood or ebony. Electro-Voice, Inc., Buchanan, Mich. (ELECTRONIC TECHNICIAN 4-36)

# TV Tube Inventory Guide

The chart shown below includes most of the tubes used in TV receivers both old and new. It is based on information obtained from various manuals, service publications, sales records and individual service technicians.

Obviously, it should not be considered as a recommendation to stock all of the types shown or the quantities given. It should only be used as a guide. If this information is combined with your own experience, you should be able to develop an in-

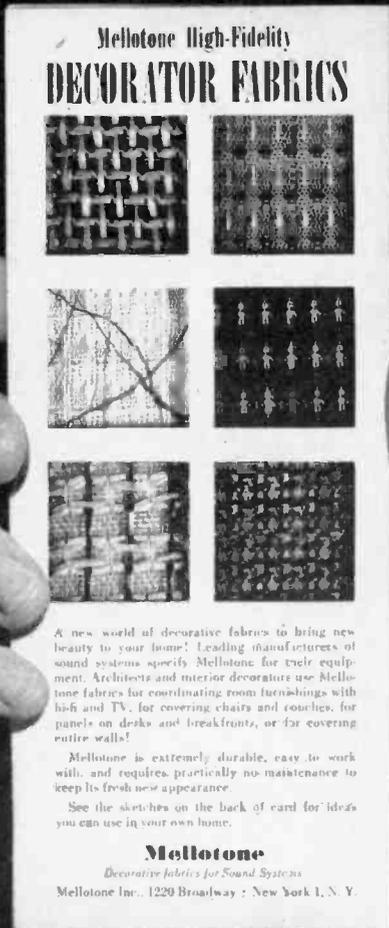
ventory guide tailor-made to your own operation.

Color TV types are preceded by (\*).

*Courtesy of General Electric Co.*

Tube Type	Quantity	Tube Type	Quantity	Tube Type	Quantity	Tube Type	Quantity
1B3GT	3	5Y3GT	3	6BU8	1	6Y6GT	1
1H2	1	6AB4	2	6BV8	1	7AU7	2
1J3	3	6AC7	2	6BW8	1		
1V2	2	6AF4	3			7EY6	1
1X2A/-B	5			6BX7GT	3	7F8	1
		6AF4-A	3	6BY6	2	7N7	1
2AF4A	2	6AG5	1	6BY8	1	8AU8A	1
2BN4	1	6AG7	1	6BZ6	1	8AW8A	1
2CY5	1	6AH4GT	1	6BZ7	5		
*3A2	1	6AH6	1			8BH8	1
*3A3	1			6BZ8	1	9BR7	1
		6AK5	2	6C4	1	9CL8	1
3AL5	2	6AK6	1	*6CB5A	1	9U8	1
3AU6	5	6AL5	3	6CB6-A	5	10C8	1
3AV6	2	6AL7GT	1	6CD6GA	3		
*3B2	1	6AM8-A	1			10DE7	1
3BC5	5			6CF6	1	12A7	5
		6AN8	1	6CG7	2	12AU7-A	5
3BN4	1	6AQ5-A	2	6CG8A	1	12AV5GA	1
3BN6	2	6AQ6	1	6CH8	1	12AV7	1
3BU8	1	6AR5	1	6CL6	2		
3BY6	1	6AS5	1			12AX4GTA	3
3BZ6	2			6CL8-A	1	12AX7	1
		6AS8	1	6CM6	1	12AZ7	1
3CB6	5	6AT6	2	6CM7	1	12B4A	1
3CF6	1	6AT8	1	6CN7	1	12BH7A	3
3CS6	1	6AU4GTA	2	6CQ8	1		
3DK6	1	6AU5GT	1			12BK5	1
3DT6	1			6CR6	1	12BQ6GA	3
		6AU6A	4	6CS6	1	12BQ6GTB	2
4BC5	2	6AU8-A	2	6CS7	1	12BR7	1
4BC8	1	6AV5GA	3	6CU5	1	12BV7	1
4BN6	1	6AV6	2	6CX8	1		
4BQ7A	2	6AW8A	1			12BY7-A	1
4BS8	1			6CY7	1	12BZ7	1
		6AX4GT	5	6CZ5	1	12C5/12CU5	1
4BU8	1	6AX5GT	1	6DB5	1	12CA5	1
4BZ6	1	6AZ8	1	6DE6	1	12CT8	1
4BZ7	1	6BA6	2	6DG6GT	1		
4CB6	2	6BA8A	1			12D4	1
4DT6	1	6BC5/6CE5	5	6DN7	1	12DB5	1
		*6BC7	1	6DQ6A	2	12DQ6-A	2
5AM8	1	6BC8	1	6DS5	1	12DQ7	1
5AN8	1	6BD6	1	6DT6	1	12L6GT	1
5AQ5	2	6BE6	1	6EA8	1		
5AS8	1					12R5	1
5AT8	1	6BF5	1	6EB8	1	12SN7GTA	4
		6BF6	1	6EH8	1	12W6GT	1
5AV8	1	6BH6	1	6EW6	1	17AV5GA	1
5AW4	1	6BG6GA	3	6EZ8	1	17AX4GT	1
5B8	1	6BH8	1	6H6	1		
5BE8	1					17D4A	1
5BK7A	1	6BJ6	1	6J5	1	17DQ6A	1
		6BJ7	1	6J6	3	17H3	1
5BQ7A	1	*6BJ8	1	6K6GT	2	18A5	1
5BR8	1	*6BK4	1	6L6GC	1	19AU4GTA	1
5BT8	1	6BK5	1	6S4A	1		
5CG8	1					19B6	1
5CL8-A	1	6BK7B	3	6S8GT	1	19T8	1
		*6BL4	1	6SH7	1	25AV5GA	1
5CQ8	1	6BL7GTA	3	6SL7GT	2	25AX4GT	1
5CZ5	1	6BN4	1	6SN7GTB	5	25BK5	1
5DH8	1	6BN6	1	6SQ7	2		
5J6	1					25BQ6-GA	3
5T8	1	*6BN8	1	6T8A	4	25BQ6GTB	2
		6BQ5	2	6U8A	5	25C5	1
5U4GB	5	6BQ6GA	3	6V3A	2	25CD6GB	3
5U8	2	6BQ6GTB	2	6V6GT	3	25DN6	1
5V3/5AU4	1	6BQ7A	5	6W4GT	3		
5V4GA	1					25EC6	1
5V6GT	1			6W6GT	3	25L6GT	2
		6BR8	1	6X4	1	25W6-GT	1
5X8	1	6BS8	1	6X8	3	50DC4	1

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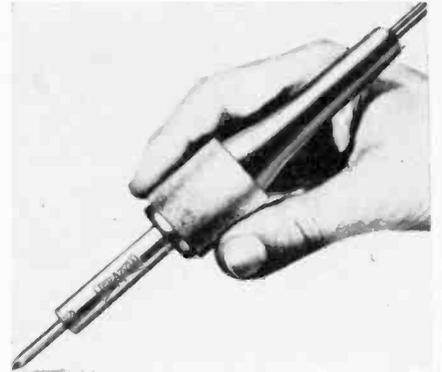
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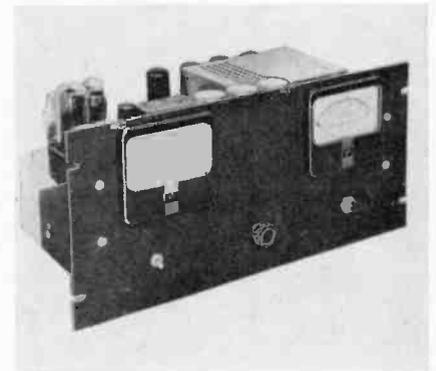
A new, rugged, 60 watt soldering pencil, catalog No. 24S60, designed for constant duty on fast production lines, operates on any a-c or d-c, any cycle. Available 110 or 220 v. The 1/4" tip, rated at 60 watts, is capable of doing



the work of 100 watt soldering irons, but weighs only 2 oz. The tip and element are separate parts and both are replaceable independently with a return to the factory. It has a cool, comfortable handle. Hexacon Electric Co., 594 W. Clay Ave., Roselle Park, N.J. (ELECTRONIC TECHNICIAN 4-19)

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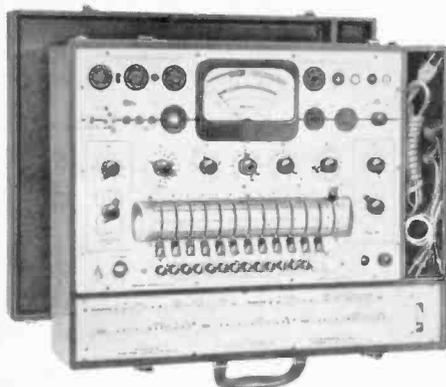
10 variable 8 to 12 kv, \$260.00 and RG-15, variable 13 to 17 kv, \$275.00. All units are furnished with current and volt meters. Spellman High Voltage Co., 3029 Webster Ave., Bronx 67, N. Y. (ELECTRONIC TECHNICIAN 4-25)

## Antronic BRITENERS

The new "Heart-O-Gold" briteners are now available in a new self-dispenser 12-Pak, an attractive, durable, 2-color package for counter, shelf or wall use. The "Heart-O-Gold" material used on the transformer results in longer life, truer performance, less service trouble and better TV pictures. Several models of briteners are available in the new Pak. Antronic Corp., 2712 W. Montrose Ave., Chicago 18, Ill. (ELECTRONIC TECHNICIAN 4-12)

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## New Books

Books marked with an asterisk (\*) may be obtained prepaid from Electronic Marketers, Book Sales Division of Electronic Technician

\***HOW TO USE METERS.** By John F. Rider & Sol D. Prenskey. Published by John F. Rider Publisher. 216 pages, soft cover. \$3.50.

This is the second edition of a book that has been highly popular with electronic technicians. It has been revised and brought up to date to include such instruments as transistorized voltmeters and digital displays. Testers, and how they are used, for both consumer and industrial electronics are pictured, with circuit schematics and explanation on use. Among the many meters covered are ohmmeters, voltmeters, milliammeters, wattmeters, panel meters, grid dip, VTVM, thermocouple meters and many others. This volume should be a valuable addition to the shop library.

**TV DISTRIBUTION SYSTEM HANDBOOK.** Prepared and published by Jerrold Electronics Corp., 15th & Lehigh Ave., Philadelphia 32, Pa. 48 pages, soft cover. \$1.00.

Written especially for the TV service technician, this handy little book provides 150 typical layout charts for installing master TV systems in motels, homes, dealer showrooms, trailer camps, apartments, etc. Data includes calculation of layouts for coaxial cable systems, figuring decible requirements, antenna erection hints, channel frequency data and proper equipment location. A special feature is the split-page which allows the reader to make a wide variety of antenna and distribution combinations without flipping pages back and forth. This is a practical working handbook on the subject—and it's a subject that offers substantial income potential for service dealers.

\***PIN POINT TRANSISTOR TROUBLES IN 12 MINUTES.** By Louis E. Garner, Jr. Published by Coyne Electrical School. 478 pages, soft cover. \$5.55.

This is a comprehensive and practical source of troubleshooting and repair information for all types of transistorized equipment, directly referenced to recently manufactured transistorized radios, TVs, hearing aids, mobile receivers, preamplifiers, audio amplifiers; auto radios, both hybrid and fully transistorized. Appropriate techniques for troubleshooting and repair are thoroughly discussed. One chapter covers special types of equipment, including transistorized fire, burglar and smoke alarm systems, geiger counters, servo amplifiers, shift registers, etc. A classified reference table for troubleshooting charts aids in quickly locating desired information. Recommended for every TV-radio and industrial electronic service technician.

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**HOW TO USE METERS (2nd edition)** by John F. Rider & Sol D. Prenskey. Engineers, laboratory and service-technicians—everyone who uses meters in their daily work—will find this revised, expanded and modernized version of the fabulously popular original text absolutely indispensable.

Everything that is new in meter instrumentation will be found in this book. For example, in addition to full coverage of the many types of conventional d-c, high frequency a-c and modulated type VTVM, the digital voltmeter is also discussed in full detail. Also covered are the ultra-high impedance electrometer vacuum tube voltmeter; transistor voltmeter and industrial transducers for voltmeters.

Explains in detail the construction and operation of all types of electrical meters to use for making different kinds of measurements in electronic and electrical equipment and industrial applications. Also explains how to make measurements . . . namely, where to connect the meters. A section is devoted to multi-phase circuit measurements. #144, \$3.50.

**HOW TO TROUBLESHOOT TV SYNC CIRCUITS** by Ira Remer. The sync system of TV receivers provides the triggering for the horizontal and vertical stages. This text covers the many variations in monochrome and color TV sync circuits and the possible troubles that might occur in them. It covers such areas as: sync takeoff, sync clipping and limiting, noise cancellation and time constants. The discussion of the output circuits of the sync section includes the integration and differentiation of the vertical and horizontal circuit signals. Possible sync failures with relationship to the components that might cause them are explained. Sync circuits found in modern TV receivers are covered in great detail. Special circuitry is analyzed. Synchronization in color TV receivers is covered. #249, \$2.90.

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FOURTH SUPPLEMENT** by H. A. Middleton. Contains the latest receiving tube and picture tube substitutions. #139-4, \$1.35.

**HOW TO USE GRID-DIP OSCILLATORS** by Rufus P. Turner K6AI. The first book ever devoted entirely to grid-dip oscillators tells you how to construct and use this very versatile instrument with best possible results. Its very many applications are useful to service technicians. It is applicable to all kinds of radio receivers and transmitters, also to television receivers. The grid-dip oscillator is a troubleshooting device—an adjusting device—a frequency measuring device—applicable to circuits and components in circuits—to antennas; also a signal source of variable frequency. #245, \$2.50.

**REPAIRING TELEVISION RECEIVERS**, by Cyrus Glickstein. The most modern completely practical book, written by an expert with long experience in television receiver repair. Devoted to troubleshooting and repair techniques which are modern, yet down-to-earth. Covers the use of simple as well as elaborate test equipment #191, Only \$4.40.

**ADVANCED TV SERVICING TECHNIQUES**, by Zbar and Schildkraut. A complete advanced TV servicing course, developed by the Radio-Electronics-Television Manufacturers Association. Shows how to use every conceivable type of test equipment, how to service every part of a TV receiver. Explains latest techniques. Soft cover, 8 1/2" x 11".  
**MAIN TEXT**, 192 pp., illus. #161, \$3.60. ET-4

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**CLASS D CITIZENS RADIO.** By Leo G. Sands. Published by Ziff-Davis Publishing Co., Book Div., 1 Park Ave., New York 16, N.Y. 181 pages, hard cover. \$4.95.

It has been reported that some 80,000 Citizens Band units have been sold in less than one and one half years, including a goodly number by TV-service dealers. This book discusses the use of the Citizens Band of frequencies. Major emphasis is placed on the equipment itself, its circuitry and performance characteristics. One chapter is devoted to maintaining Citizens Band radio equipment. An appendix covers various FCC rules governing such service. Each of the major equipment sections—receiver, transmitter, power supply, antenna—is subdivided into the elements which compose the section. The author carefully examines each one of these elements, and does a good job of explaining same to the reader.

**TRIPLE PINDEX.** Prepared and published by RCA Electron Tube Div., Harrison, N. J. Also available from RCA tube distributors. 280 pages, soft cover. \$1.75.

This Pindex-109 gives base diagrams for more than 2000 JEDEC-registered receiving and picture tubes. An ingenious feature of the receiving tube section covering 1500 tubes is that the page is cut in thirds for triplicate presentation. This allows rapid base comparison, without flipping back and forth. 400 pix tubes are in a second section. The third section contains 200 small industrial receiving tubes and 200 foreign types. This is a mighty handy tube reference to have around the shop.

**\*REPLACEMENT GUIDE FOR TV AND AUTO RADIO CONTROLS.** Prepared and published by Howard W. Sams & Co. 80 large pages, soft cover. \$1.00.

This second edition lists practically all TV set volume control numbers by set manufacturer. It also lists replacement part numbers in cross reference columns. Centralab, Clarostat, IRC and Mallory controls are included. This is a time saving, working tool for the service shop.

**\*HOW TO USE GRID-DIP OSCILLATORS.** By Rufus P. Turner. Published by John F. Rider Publisher. 112 pages, soft cover. \$2.50.

One of the more versatile instruments, the grid-dip oscillator is capable of checking resonant circuits, capacitances, inductances, tank circuits, coupling, etc. It may also be used as a signal generator, alignment meter, monitor, absorption wave meter, and a variety of other functions. This book tells how the GDO operates and how to make use of it in resonant, L & C measurements, receiver and transmitter applications, and testing antennas and transmission lines. A selection of commercial units is described. The well written text should be of considerable interest to any electronic specialist working with a variety of circuits.

**\*ADVANCED MAGNETISM AND ELECTRO-MAGNETISM.** Edited by Alexander Schure. Published by John F. Rider Publisher. 104 pages, soft cover. \$2.25.

Magnetism is the basis for a great many of the electronic phenomena which we almost take for granted. This text book gives us the fundamental concepts and the performance considerations not only for simple magnets, but for such advanced devices as the cyclotron, betatron, and mass spectrograph. After discussing the nature of the magnetic field, the author goes on to cover induction and inductance, ferromagnetic effects, magnetic poles and forces, magnetism in technology and such basic laws as Biot's Law, Faraday's Law, Lenz's Law, and the Curie-Weiss Law. Review questions are at the end of each chapter. For a solid grounding in electromagnetics, this book should be a real asset.

**SILICON RECTIFIER HANDBOOK.** Prepared and published by Sarkes Tarzian, Inc., Semiconductor Div., Section 3002B, Bloomington, Ind. 64 pages, soft cover. Price to ELECTRONIC TECHNICIAN readers, 50¢ (normal price \$1.00).

This practical reference covers both the theory and practical considerations in working with silicon rectifiers. Among the subjects covered in the seven chapters, are manufacturing methods, rectifier characteristics and circuits, test circuits, filter design and application techniques. A supplement section provides specifications of the manufacturers' rectifiers. This is no simple, superficial treatment. Even though the text is easy to read, it offers a very substantial amount of valuable information. If you really want to understand silicon restifiers, this book is to be highly recommended.

**MOST OFTEN NEEDED RADIO DIAGRAMS AND SERVICING INFORMATION.** 3 Vols. Compiled by M. N. Beitman. Published by Supreme Publications, 1760 Balsam Rd., Highland Park, Ill. 1926-1938, Vol. I, 240 large pages, soft cover, \$2.50; 1941, Vol. IV, 192 large pages, soft cover, \$2.00; 1960, Vol. R-20, 192 large pages, soft cover, \$2.50.

These handy volumes provide the radio schematics of the most popular sets produced for their respective years. Of particular value to the service technician are the volumes for the old sets. You may not run across these sets too often, and when you do, finding a schematic can be worse than looking for a resistor in a haystack. Many of the schematics also include parts lists.

**\*HOW TO TROUBLESHOOT TV SYNC CIRCUITS.** By Ira Remer. Published by John F. Rider Publisher. 128 pages, soft cover. \$2.90.

Here is a practical and informative book on repairing that often troublesome part of the TV set, the sync section. After discussing fundamentals, the author digs into sync troubles, commercial sync circuits and color TV sync. The signal traces and raster photos are instructive. Most important, a technician should really understand what horizontal and vertical circuit functions are after studying this book.

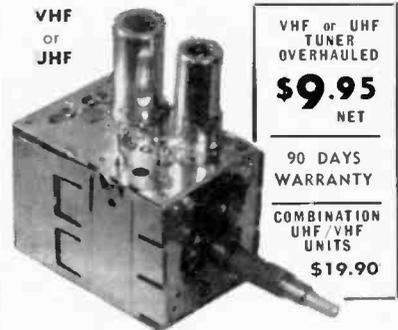
**\*F-M SIMPLIFIED.** By Milton S. Kiver. Published by D. Van Nostrand Co. 384 pages, hard cover. \$7.50.

The third edition of this volume has no doubt been made even more welcome by the increasing popularity of F-M broadcasting. This revised edition follows the previous pattern of explaining F-M principles, and discussing the individual pieces of equipment with non-mathematical explanations. Some

complete foldout schematics of commercially available equipment are included. There is much detailed coverage on the circuitry involved. Problems are given at the end of each chapter devoted to such subjects as tuners, oscillators, limiters, detectors, F-M receiver alignment, servicing F-M receivers, and commercial F-M transmitters. The book is nicely prepared and is to be recommended.

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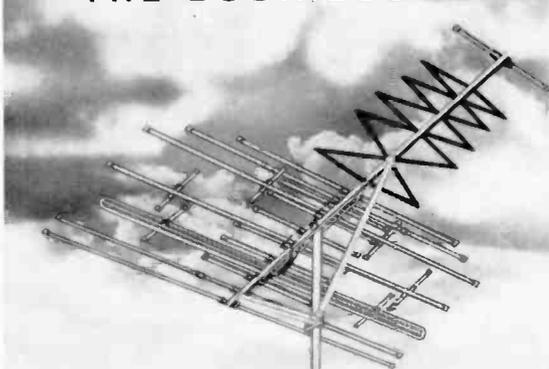
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## Cross Modulation

(Continued from page 37)

pins. There was no improvement in reception when the back was replaced.

With the sound turned high, I steadied the unsecured back with the palm of my hand to minimize vibration. This produced some improvement but did not clear up the trouble entirely.

I now knelt beside the set, looking at the picture and, with one hand behind the set, fiddled in desperation with the antenna connections to determine if I could cause the interference to become worse.

Suddenly I touched what I thought was the antenna lead-in and while shaking it the trouble became worse. Upon examination, I found I was holding the transmission line leading from the built-in antenna. This antenna lead was not connected to, or even grazing, the set's antenna terminals.

On the end of this line were two spade lugs to fit under screws at the antenna terminals. An instruction tag was tied around the line in such a way that the two lugs were touching each other. Removal of the tag and separation of the lugs cleared up the "sound-bar" trouble for good.—Leonard Cox, Jr., Chevy Chase, Md.

## Vaco TOOLS

Crimcut tool, 8" long, heavily plated, cuts wire, strips wire, crimps solderless terminals, shears 5 sizes of bolts and machine screws, 4-40 to 10-32 sizes. Free, with this tool: 69¢ pak of solderless terminals. \$4.64 value, offered in



current "Golden Key" promotion at \$3.69. Also, 3-in-1 reversible screw and nut driver, has 1/4" hex socket, #1 Phillips bit and 3/16" regular blade. \$1.80 value, offered at \$1.25. Vaco Products Co., 317 E. Ontario St., Chicago 11, Ill. (ELECTRONIC TECHNICIAN 4-28)

## THE WINNER!



Walter Ermer Sr., Cleveland, has been selected as winner of the GE sponsored 1959 Edison Radio Amateur Award for public service. Here, Cleveland Police Lt. Michael Roth, also a "ham," uses portable amateur transmitter.

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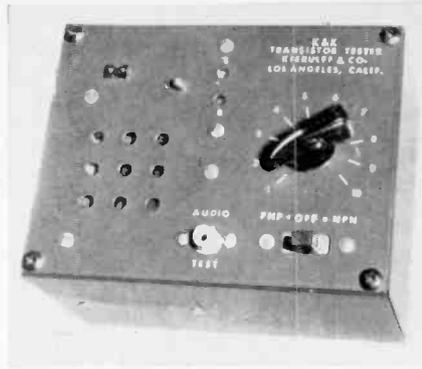
KRYLON, INC., Norristown, Pa.

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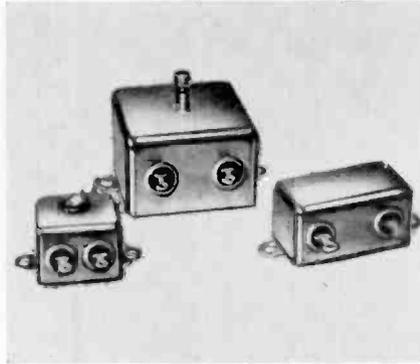
### Kierulff TRANSISTOR TESTER

A simple, quick and positive tester is the model K&K which is ideally suited for matching transistors in push-pull audio circuits. Power and general types may be quickly tested to determine if the transistor is open, shorted, noisy or has a high value of leakage. The ability of a transistor to oscillate in the test circuit, in which the feedback is controlled, determines the value of the unit under test without reference charts or meters. Kierulff & Co., 6303 Corsair St., Los Angeles 22, Calif. (ELECTRONIC TECHNICIAN 4-9)



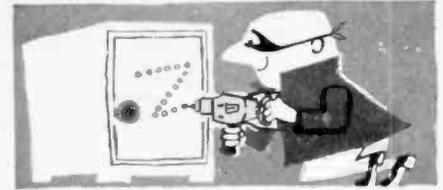
### Plastic Capacitors CAPACITORS

Three new lines of polystyrene capacitors, in bathtub cases, have high stability with power factors at 1,000 cps of less than 0.05%. Type PV and type PW capacitors are adjustable within the limits of  $\pm 1\%$  of the nominal capacitance. Type PX is stabilized and available in capacitance tolerances of 1%, 0.5%, 0.25% and 0.1%. Capacitance change per year of life is claimed to be less than 0.1%. Plastic Capacitors, Inc., 2620 N. Clybourn Ave., Chicago 14, Ill. (ELECTRONIC TECHNICIAN 4-23)



### Olson POWER SUPPLY KIT

Model T-266, rated at 300 watts, provides a source of variable a-c voltage from 0 to 150v. It consists of: variable voltage auto transformer, 0 to 150v a-c; meter, fuse, pilot light, line switch and 2 a-c receptacles. Input voltage, 110-120v. A-c output voltage, 0-150v. Housed in aluminum hammertone cabinet, 8" w x 4 7/8" h x 4 1/2" d. Two-page instruction manual included. \$15.95. Olson Radio Corp., 260 S. Forge St., Akron, Ohio. (ELECTRONIC TECHNICIAN 4-21)



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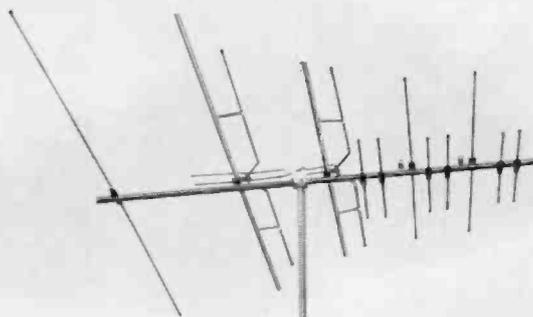
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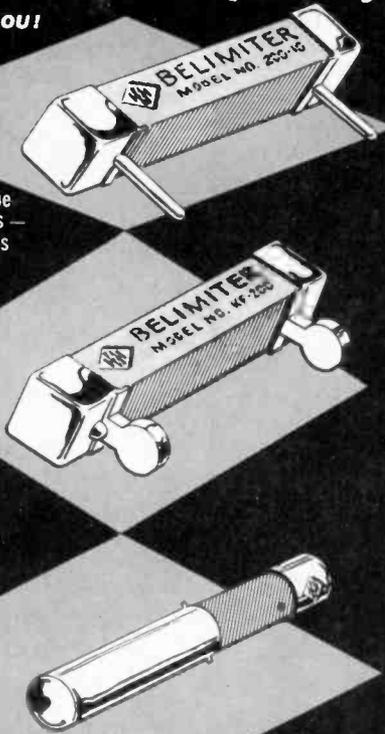
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# ASSOCIATION NEWS

## Arizona

### Model Apprentice Program

BEST, Phoenix, has published a 34 page booklet containing its apprenticeship standards for the radio, television and electronic service industry. The comprehensive program was developed and approved by the Better Electronic Service Technicians of Arizona, Inc., in cooperation with the U. S. Department of Labor, Bureau of Apprenticeship and Training. By assuming responsibility for the beginner in electronic service, and implementing the concept with a well planned four year practical educational program, the organization may prove to be a pioneer in solving some problems now preventing a general upgrading of the entire service industry.

## California

RTA, Pasadena, announced election of the following officers: Pres. Virgil Gaither; 1st V.P., Ken Mendes; 2nd V.P., Dave Wyman; Sec'y., Bob Kealey and Treas., Chester W. Shepherd.

### Service Charges Up 15%

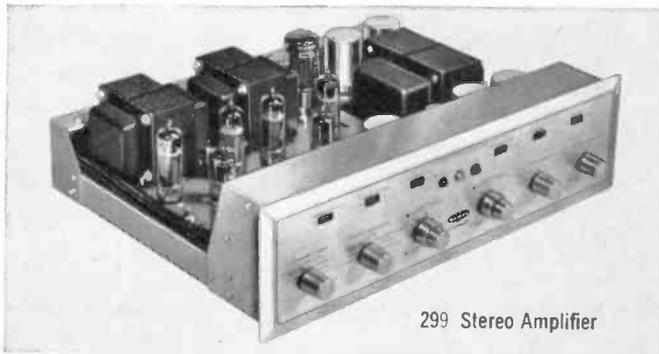
RTASCV, San Jose, has revised its consumer guide to TV service fees. The list is based on average charges in the area and represents an increase of about 15% over fees approved in January 1958. Service calls to the home range between \$5.95 and \$7.50.

TSDA, San Mateo, Board of Directors have voted in favor of a California State License Bill. The Kansas City ordinance was viewed as having possibilities for a good California State license foundation.

## Florida

### New Association

ESA, Ft. Lauderdale, is a new service technician's organization known as Electronic Service Association of Broward County. Temporary officers are: Chairman, Harry C. Richardson; Sec'y., Hamilton Boyd; Treas. Jack Wolmer. Two additional members, Ken Weiss and Bob Austin, were elected to round out a five-man committee charged with the responsibility of obtaining a charter and drawing up a constitution and by-laws.



299 Stereo Amplifier

## Here's Why You, Too, Should Recommend H. H. Scott Stereo Hi Fi Components

A recent survey showed that electronic technicians recommended H. H. Scott most often. The reason: H. H. Scott components have advanced features and circuit designs found nowhere else. The highest quality electronics parts are used to give years of trouble-free operation. Spacious chassis layout simplifies servicing when required. That's why when you recommend H. H. Scott, you can do so with confidence.

**H. H. SCOTT**

H. H. SCOTT INC., 111 Powdermill Road, Dept. ET-4, Maynard, Mass.

**FREE**—Rush me your free catalog and hi-fi guide containing complete technical information on H. H. Scott components.

Name .....

Address .....

City ..... State .....

Export: Telesco International Corp., 36 W. 40th St., N.Y.C.

TECA, Miami, voted 45 to 2 in favor of a draft license bill soon to be presented to the County Commission.

Indiana

IESA, Indianapolis, has completed a draft of its proposed State radio-TV license bill. The bill establishes minimum standards of training, qualifications and experience. It provides for examinations and authorizes suspension or revocation of licenses on certain specific grounds, including unethical conduct by a licensee which tends to deceive or defraud the public. Another section requires all service dealers to give customers a written statement showing the nature and extent of repairs made, labor involved, and the cost of parts used in the repair. Injunctive relief against persons violating the act is included, and misdemeanor penalties are prescribed.

Michigan

TSA, Detroit, announces its State Licensing Bill has been introduced in the house and is being co-sponsored by the following Representatives: Apply, Mt. Clemens; Roberts, Birmingham; Anderson, Pontiac; Van Till, Holland; Beedle, Livonia; Rapp, Muskegon and Young, Lansing.

Missouri

TSE, Kansas City, reports the City Council has ratified the following members for the Commission to Administer the Kansas City Tele-

vision and Electronic Service License Ordinance: Avery Fouts, C. L. Foster, Don Ellis, John Gardner and Don Day.

New Jersey

Convention Plans

TSCTSA, Pennsauken, announces the Tri-State Council has worked out plans for its 4th Annual "TELE-RAMA" Convention to be held in the Shelburne Hotel and adjoining Empress Motel, Atlantic City, June 24, 25, and 26th.

TTA, Onslow, Vice-President J. T. McLendon announced his association has launched a customer-educational drive to up-grade public respect for technicians. Said McLendon: "One thing which makes TV service more expensive is the do-it-yourself owners. Pulling tubes out of a set to test them is quite often more expensive than calling in a repairman. Do-it-yourself tube testers will check about as many good tubes 'bad' as it will check bad tubes 'good'. Putting tubes back in wrong sockets proves fatal to resistors, tube sockets and sometimes transformers."

Ohio

TESA, Sandusky, officers are: Pres., Robert Bloomquist; V.P., Richard Camp; Treas., Wayne Geasan and Sec'y Mearing Williams.

Pennsylvania

TSADV, Philadelphia was urged to consider joining NATESA by

George Carlson, Eastern Sec'y. of NATESA. Mr. Carlson expressed NATESA's need for large, well-developed associations, such as TSA of Delaware Valley, to solidify a united front for the service industry. He pointed out the poor NATESA representation in the eastern section of the U.S., emphasizing the "...



# Olson



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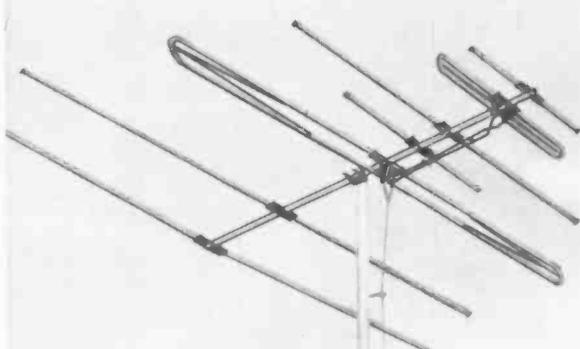
THE BUSINESSMAN IN THE SERVICEMAN SUIT

Features

## HI-FI FIREBALL

TV ANTENNAS

by JFD of course!



Customer confidence in your experience goes up when you install the JFD Hi-Fi Fireball!

Newly improved and expanded to give you 8 natural silver or gold anodized models to choose from — Hi-Fi Fireballs now have fringe-proved

JFD ELECTRONICS CORPORATION Brooklyn 4, New York U.S.A.

WHEN REPLACING OLD ANTENNAS — INSTALL THE HI-FI HELIX . . . BANSHEE . . . OR FIREBALL THE BRAND THAT PUTS YOU IN COMMAND OF YOUR MARKET!

Satellite dipoles plus famous ghost-killing Twin-Driven Fireball design.

Make the smart move today to Hi-Fi Fireballs at your JFD distributor.

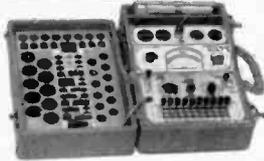
## 3 POPULAR **SECO** TESTERS

...Top Choice of  
Service Technicians  
**EVERYWHERE**



### COMPLETE, PORTABLE TUBE TESTER

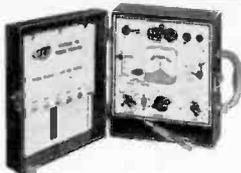
MODEL  
107



Provides 3 important tests: amplifier types tested for gain by Dynamic Mutual Conductance method—power types tested for cathode current by Cathode Emission method—all types tested for shorts and grid error by Grid Circuit Test developed and patented by Seco. Dynamic Mutual Conductance Test pre-wired for fast set-up. Cathode Emission Test done by free point pin-selector method—will not be obsolete. Self-contained in portable case.  
MODEL 107—Wired and factory tested . . . . . \$139.50 NET

### NEW! LOW-COST GRID CIRCUIT AND TUBE MERIT TESTER

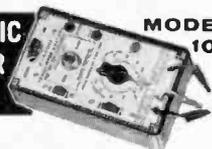
MODEL  
78



Designed expressly for TV servicing—easy to set-up and simple to use, a highly accurate professional tester! Complete coverage of all modern TV tube types as well as all heater type radio tubes including hybrid types, using only 5 sockets. Incorporates patented Seco Grid Circuit Test plus reliable Cathode Emission test also checks filament continuity and provides open element test. One easy-to-read meter. Two-stage DC amplifier isolates meter from tube under test to protect meter—provides a wide range of load currents and test conditions. Complete in a portable carrying case, with pin straighteners, and index-chart for quick set-up data.  
MODEL 78—Wired and factory tested . . . . . \$69.50 NET

### NEW! DYNAMIC TRANSISTOR CHECKER

MODEL  
100



This low-cost transistor checker safely tests PNP and NPN transistors either "in or out" of circuit. Covers wide range of types: small signal including "drift" types, medium power; and power types. Provides positive check for "opens," shorts, and gain—condition indicated by means of a visual indicator plus jacks for meter or scope. Also provides GO-NO-GO test at practical currents—and permits matching of similar types. Will not be obsolete—no set-up or roll charts required! Compact, lightweight, complete, and ready-to-use.  
MODEL 100—Wired and factory tested . . . . . \$19.95 NET

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East Canada: Daveco Agencies, Ltd., Montreal, Quebec  
West Canada: Ron Merrill Co., Vancouver 1, British Columbia

powerhouse of dealing ability with manufacturers, governmental agencies, etc." represented by the three eastern states, Pennsylvania, New York and New Jersey. NATESA now represents well over 100 associations throughout the country.

Texas

TEA, San Antonio, has voted to discontinue "SARTA NEWS," consolidating their local news in the State organization's TEA Times, now being published monthly. New officers are: Pres., Ralph McCory; V.P., George Stowe; Sec'y, Douglas Anderson; Treas., Tom Boyd.

Washington

#### Newspaper Cooperates

TSA, Seattle, reports the display advertising department of the newspaper, Seattle Post Intelligencer, has requested all ad personnel to scrutinize proposed advertising of so-called power line antennas in line with the recommendations of the National Better Business Bureau. The association reporter was also informed that the paper requires all TV Service advertisers to submit proof that they are holders of a State Excise Tax Certificate.

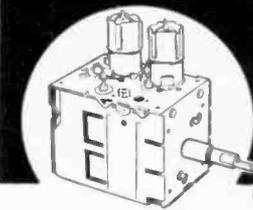
#### Jerrold ANTENNA

"Magic Carpet" flexible printed circuit antenna has silver antenna elements on a 6' x 2½' sheet of flexible material. The antenna's 12-square foot printed circuit design duplicates, on a flat surface, the characteristics of an outdoor antenna. Stapled to the attic floor or placed under the carpet near the TV receiver, it eliminates unsightly outdoor antenna masts. It can also be used with the firm's built-in antenna system which includes a TV-FM amplifier and plug-in antenna outlets for various locations. Jerrold Electronics Corp., 15th & Lehigh Ave., Philadelphia 32, Pa. (ELECTRONIC TECHNICIAN 4-20)

#### Triad YOKES

Three new 90° yokes feature small size necessary for replacement in portable receivers. Eight new 110° yokes are furnished with six leads in both network and unnetworked versions. Both series feature anti-pin cushion magnets. Thirty-nine new flybacks for national distribution and twenty of the new "600" category, primarily for limited use or regional application, feature extensive field testing and supply service information packaged in each box with the product. Triad Transformer Corp., 4055 Redwood Ave., Venice, Calif. (ELECTRONIC TECHNICIAN 4-27)

## TARZIAN Offers 48-Hour, Direct Factory Service on Tuner Repairs



only  
**\$8.50**

Price Effective Jan. 1, 1960

That's right. Net, \$8.50 per unit and \$15 for UV combinations, including ALL replacement parts. 90-day warranty against defective workmanship and parts failure. Tuners repaired on approved, open accounts. Replacements offered at these prices\* on tuners not repairable:

VHF 12 position tuner . . . . . \$22.00  
VHF 13 or 16 position . . . . . 23.00  
VHF/UHF combination . . . . . 25.00  
UHF only . . . . . 15.50

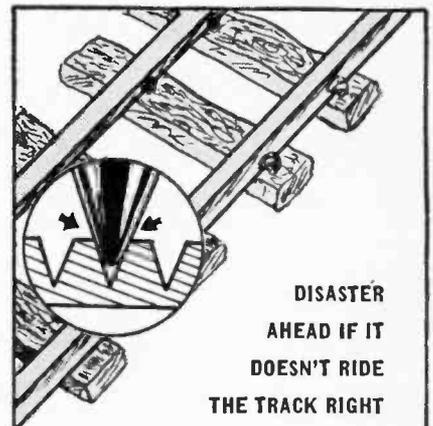
\*Subject to change



Tarzian-made tuners are easily identified by this stamping on the unit. When inquiring about service or replacements for other than Tarzian-made tuners, always give tube complement . . . shaft length . . . filament voltage . . . series or shunt heater . . . IF frequency, chassis identification and allow a little more time for service. Use this address for fast, 48-hour service:

### SARKES TARZIAN, Inc.

Att.: Service Mgr., Tuner Division  
East Hillside Drive  
Bloomington, Indiana



DISASTER  
AHEAD IF IT  
DOESN'T RIDE  
THE TRACK RIGHT

Perfect smoothness and very close tolerance in the radius of a phonograph needle is absolutely essential for a stereo or hi-fi record track. A tip too big or too small invites musical disaster. Many needles vary as much as ±.0007 from the perfect radius. The hand constructed Duotone Needle, hand set, hand polished and microscope-inspected, guarantees you no more than ±.0001 deviation in the radius to insure the closest tolerance and safety.

**DUOTONE**

DIAMOND NEEDLE

Keyport, New Jersey

In Canada: Chas. W. Pointon, Ltd., Toronto

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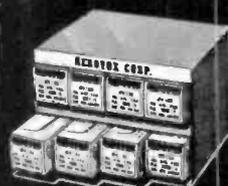


## TWIST-PRONG ELECTROLYTICS

A satisfactory repair job means a satisfied customer. To keep your customer happy and to prevent costly call-backs you must depend on a reliable replacement. Aerovox AFH Twist-Prong Electrolytics can always be depended on to give long-life and excellent service because they're made better . . . high-purity aluminum foil construction throughout, 85°C operation, improved hermetic sealing and rugged prongs and mounting terminals. Available in the widest selection of exact-duplicate replacements including printed-wiring and selenium rectifier types. Your local Aerovox Distributor stocks the replacement you need when you need it. Call on him today for all your capacitor requirements.

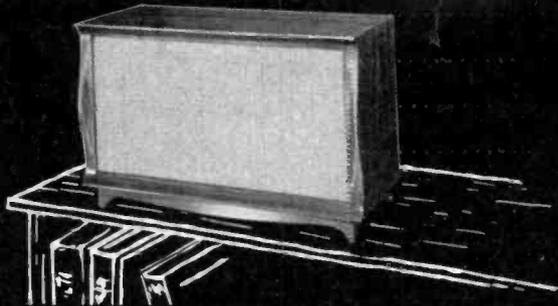
### BUY THEM BY THE KIT . . .

Your Aerovox Distributor offers you special "Stack-A-Lytic" kits (AK-400 and AK-401) with a selection of 8 or 16 popular TV replacements with a FREE handy metal storage rack with stacking features.

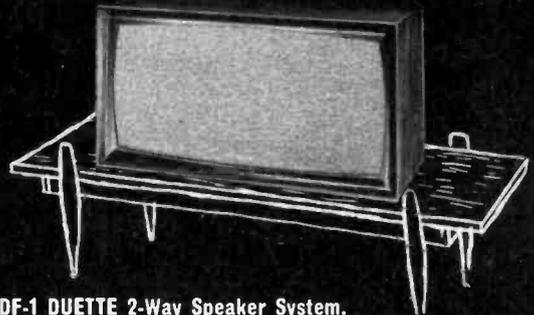


**AEROVOX CORPORATION**  
DISTRIBUTOR DIVISION  
NEW BEDFORD, MASS.

While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.



**TR-10 TRI-ETTE 3-Way Speaker System.**  
 Compare the Jensen TRI-ETTE with any bookshelf speaker and let your own ears tell you the reason for its rocketing popularity . . . *it sounds better!* It's what you'd expect from advanced Jensen engineering that begins where others leave off. Efficient too . . . needs only a 10-watt amplifier. Handsome in graceful contemporary design with fine woods in choice of Walnut, Mahogany or Tawny Ash. Get a TRI-ETTE speaker system for superb mono hi-fi . . . add another for the finest stereo reproduction in small space at only \$119.50 each. Table Base (extra) . . . \$5.45. Matching Floor Stand 14" high (extra) . . . \$12.95



**DF-1 DUETTE 2-Way Speaker System.**  
 A new high in loudspeaker value . . . a high quality, economically priced 2-way "bookshelf" system made possible by an *entirely new and different* high compliance 8" FLEXAIR® woofer by Jensen . . . capable of movement *more than twice as far* as previously available units . . . with low distortion bass down to 36 cycles in tube-vented **BASS-SUPERFLEX®** enclosure. Fine furniture crafted of 3/4" selected veneer in choice of Walnut, Mahogany or Tawny Ash finished on four sides for horizontal or vertical placement. Only \$79.50. Table Base (extra) . . . \$5.45. Floor Stand for vertical placement (extra) . . . \$7.50

You should know there is something better!

# Jensen "BOOKSHELF" LOUDSPEAKERS AND KITS

SPEAKER SYSTEMS IN FINE FURNITURE OR KITS FOR STEREO AND MONO HI-FI

## USE THESE KITS IN YOUR OWN CABINETY OR BUILT-IN SYSTEM



**KT-33**  
**3-WAY**  
**SPEAKER**  
**SYSTEM**  
**KIT**

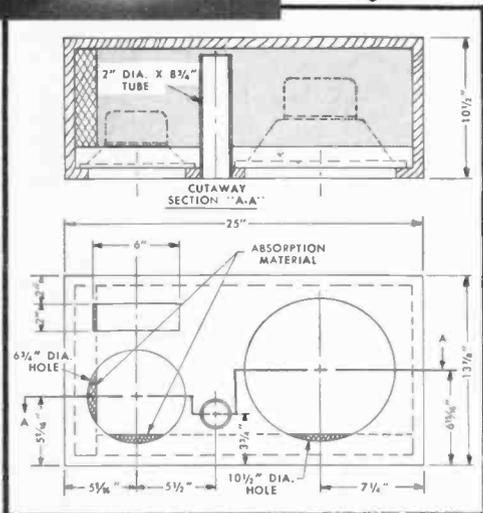
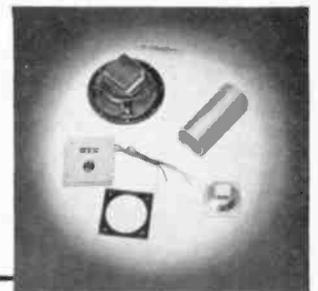
BASIC  
 ENCLOSURE  
 DATA

For outstanding TRI-ETTE performance in your own enclosure or custom built-in system, the KT-33 Kit is the answer. Includes P12-NF 12-inch FLEX-AIR woofer, P8-UM 8-inch midchannel, RP-103A compression driver tweeter, H-F control, crossover network, wiring

and full instructions for enclosure construction and installation. (Enclosure vent-tube 46MP06 must be ordered separately. Price 50c postpaid, direct from factory.) **KT-33 Speaker Kit.** Net only \$80.00. **KT-233 TWINKIT®.** Two matched systems for stereo. Net Only \$160.00.

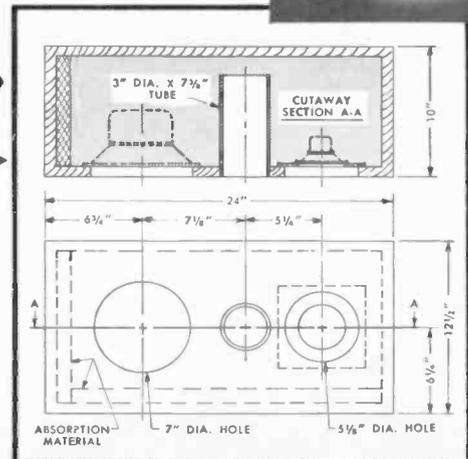
## KDF-1 2-WAY SPEAKER SYSTEM KIT

For fine sound at minimum cost, Jensen's KDF-1 DUETTE Speaker Kit gives you complete 2-way system performance. When you make your own cabinet or built-in speaker system and install the KDF-1 Kit you'll save and get the same fine performance of the DF-1 DUETTE furniture model. Includes P8-QF 8-inch FLEXAIR woofer, enclosure vent-tube, P35-VAH tweeter, coupling element, terminal panel, H-F control, wiring material and complete instructions for building enclosure. Net only \$29.75.



BASIC  
 ENCLOSURE  
 DATA

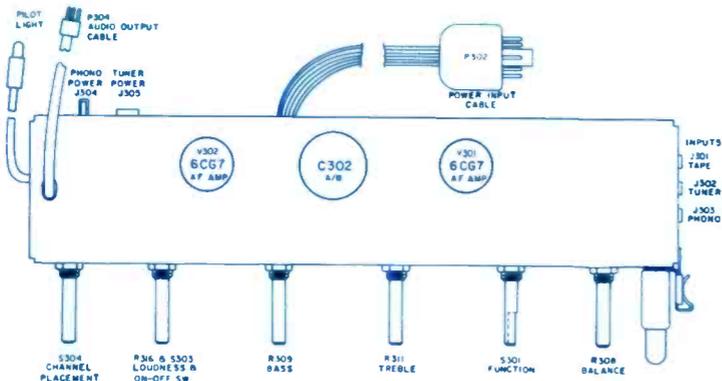
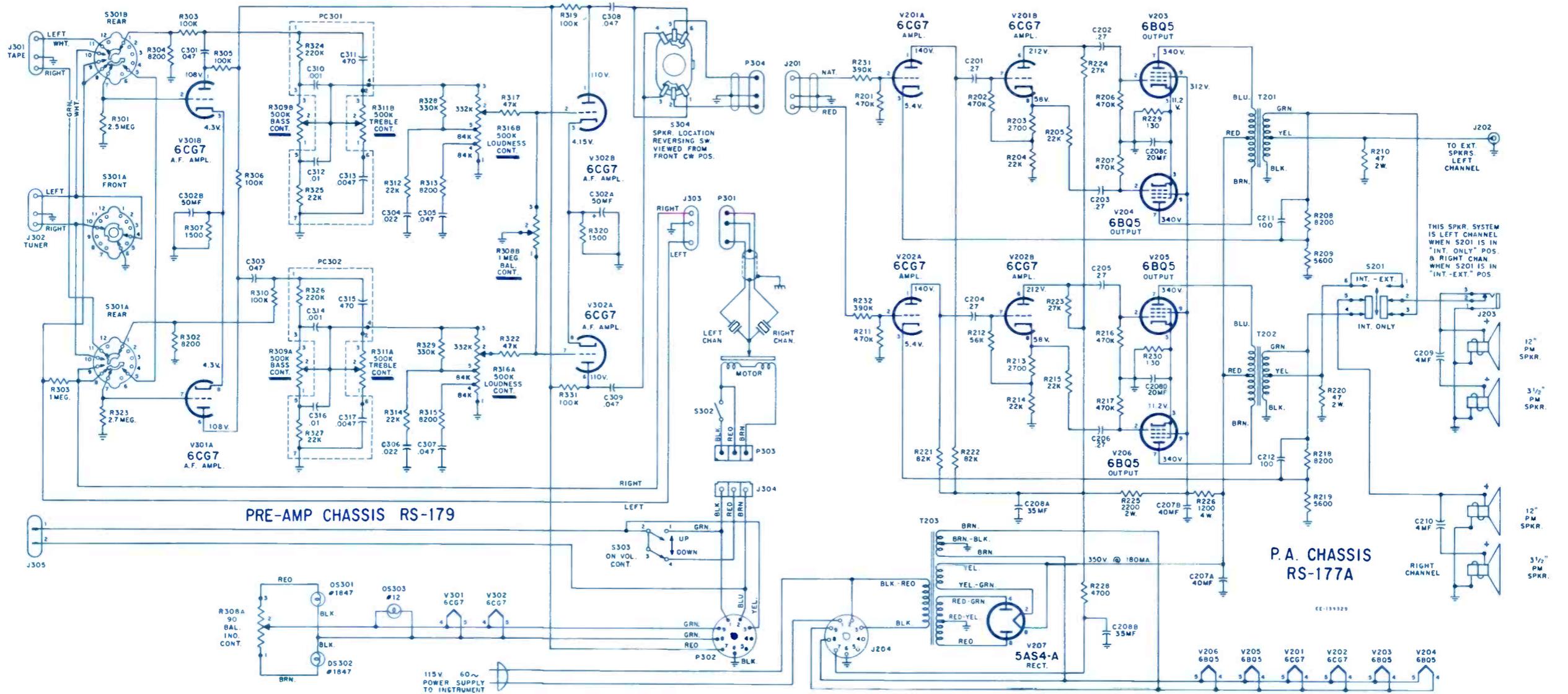
ALL JOINTS MUST BE  
 AIR TIGHT  
 USE 3/4" PLYWOOD  
 THROUGHOUT



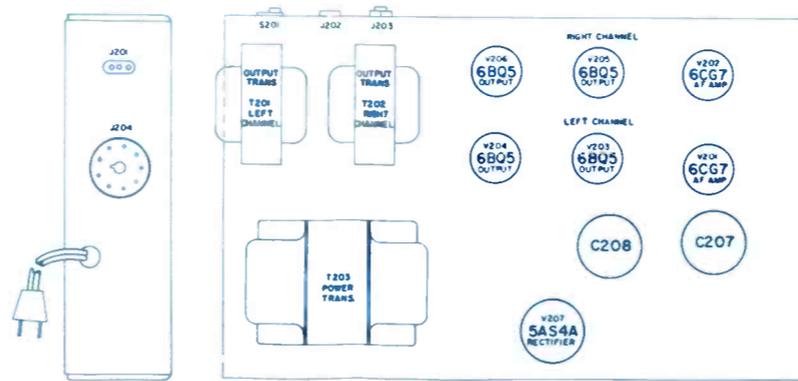
**Jensen** MANUFACTURING COMPANY  
 6601 S. Laramie Avenue • Chicago 38, Illinois  
 In Canada: Renfrew Electric Co., Ltd., Toronto  
 In Mexico: Radios Y Television, S.A., Mexico, D.F.

Division of The Muter Company

•T.M.



RS-179 Chassis — View Showing Locations of Tubes and Components



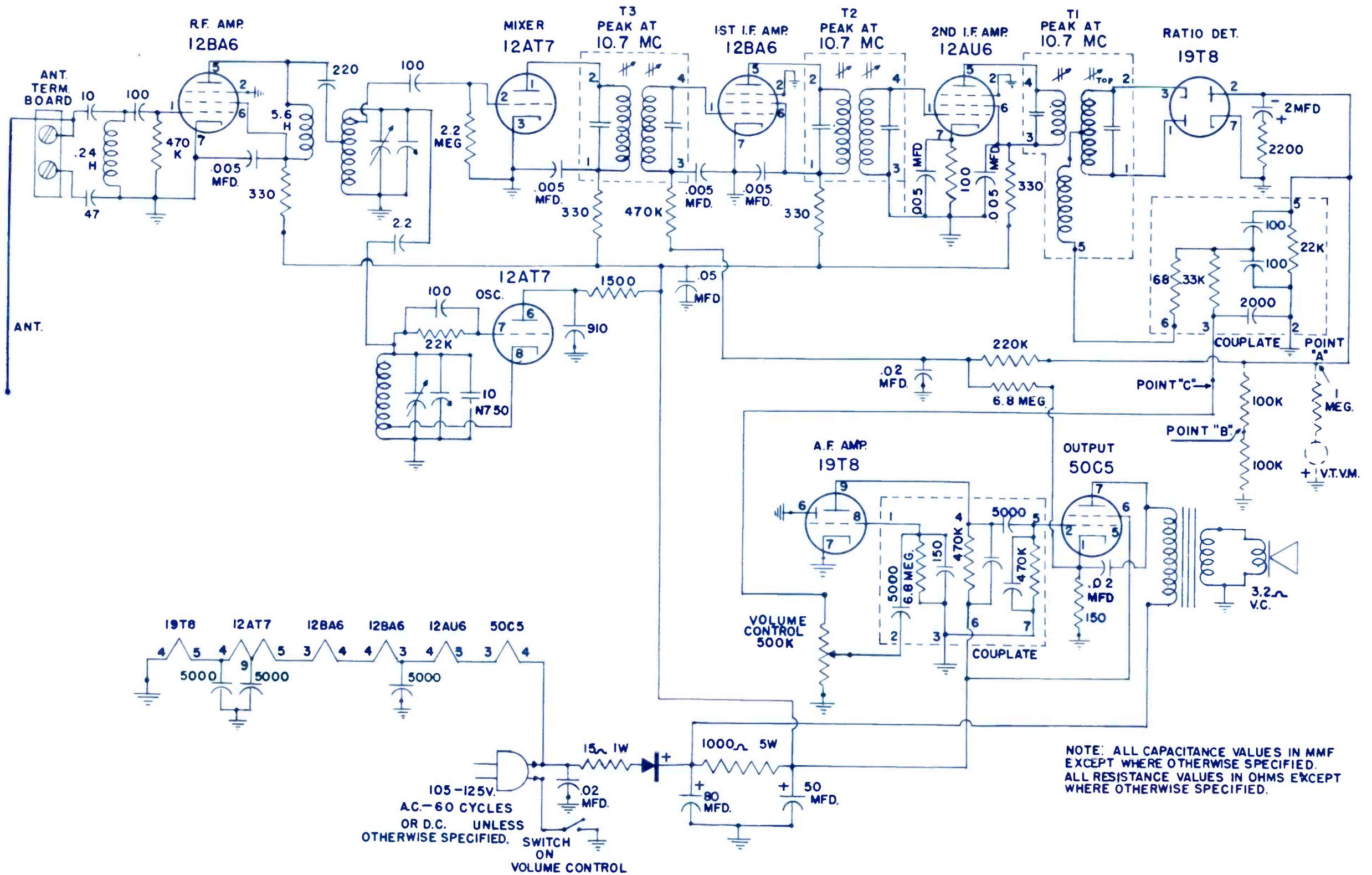
RS-177A Chassis — View Showing Locations of Tubes and Components



Model TPM-11, PM-17 with KS-11  
The "Mark XI" and "Mark XVII"

More Data on Reverse Side





# ELECTRONIC TECHNICIAN 561

## CIRCUIT DIGEST

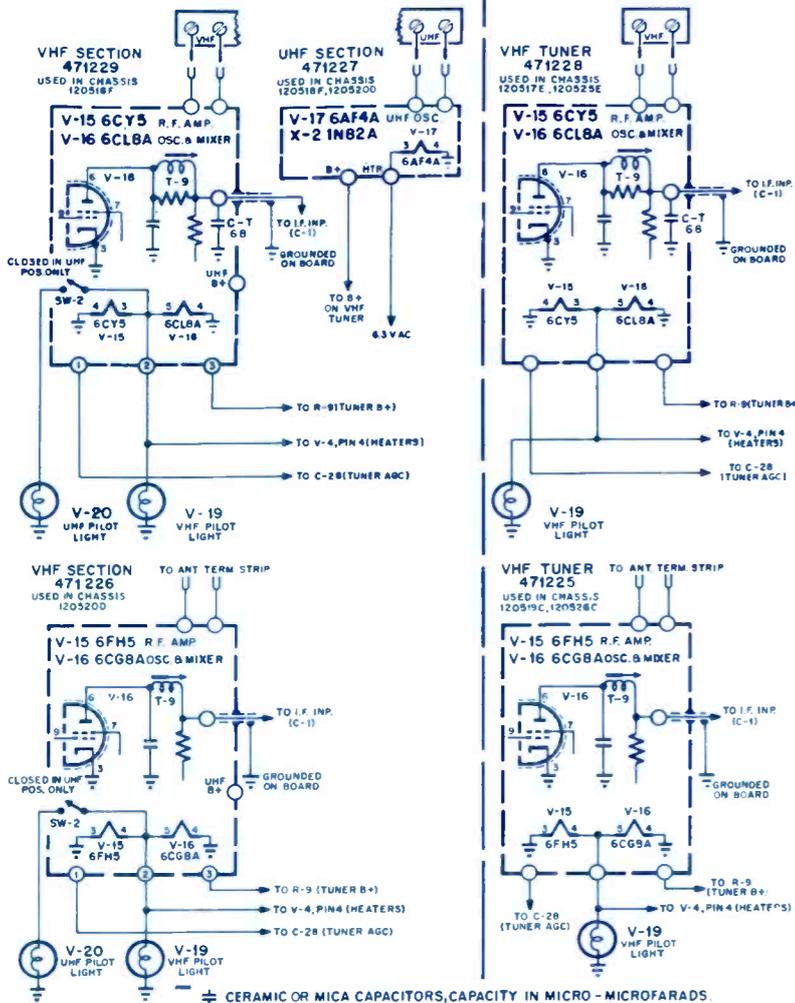
**EMERSON**  
TV Chassis 120517E,  
120518F, 120519C,  
120520D, 120525E,  
120526C

April • 1960

TYPE	MODEL	CHASSIS	REMOTE	STYLE	CRT	TUNER
VHF	1600	120517E		PORT TM	17DTP4	471228
	1602	120525E	471235			
	1604	120517E				
	1608	120519C		TABLE MODEL	21DAP4	471225
	1610	120526C	471235			
	1612	120519C				
UHF	1614	120526C	471235	LO BOY CONSOLE		
	1601	120518F		PORT TM	17DTP4	471229 UHF
	1606			TABLE MODEL		471227 UHF
	1609			LC BOY CONSOLE	21DAP4	471226 UHF
1613	120520D				471227 UHF	

### UHF-VHF TUNER ASSEMBLIES

### VHF TUNERS



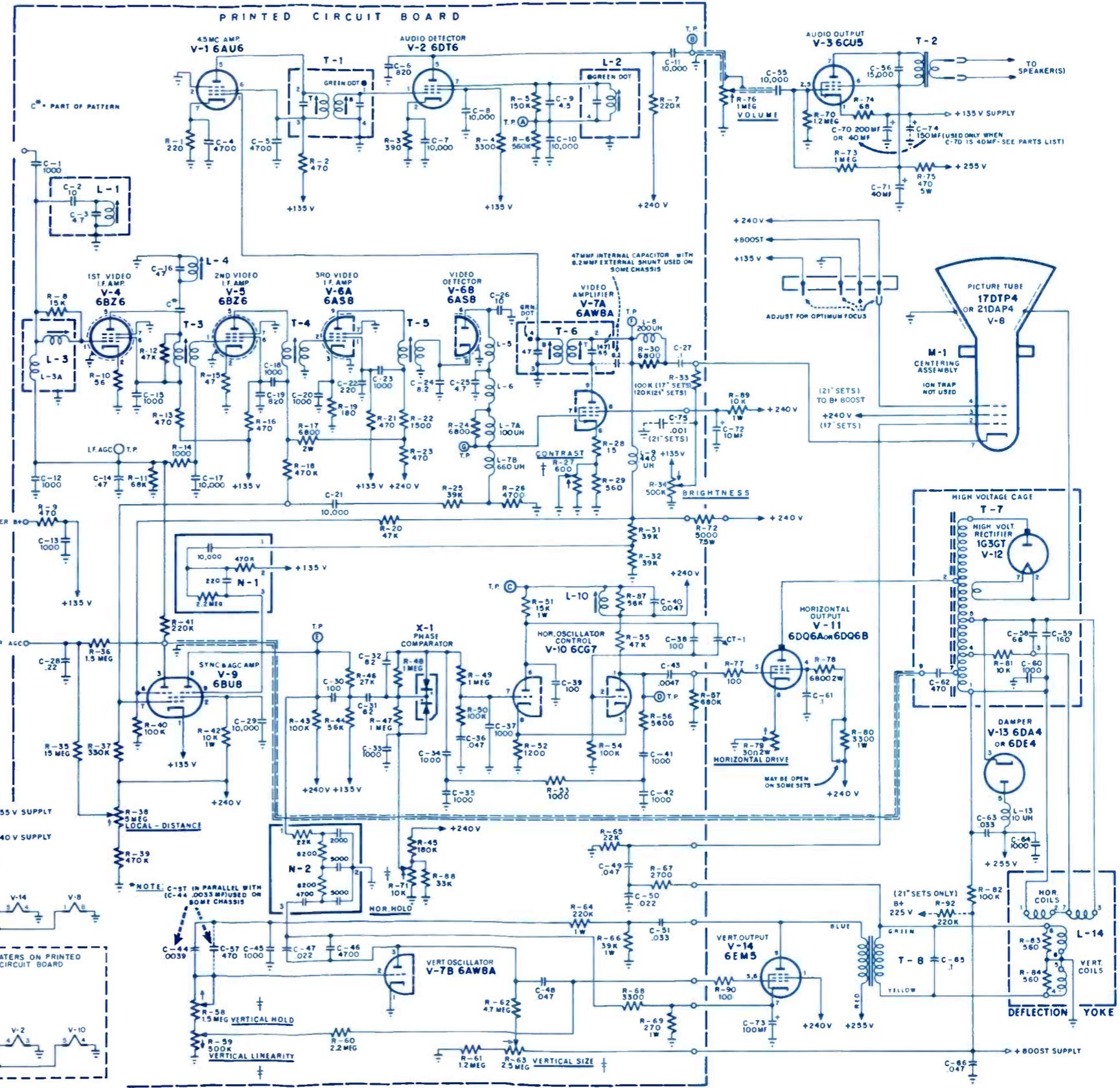
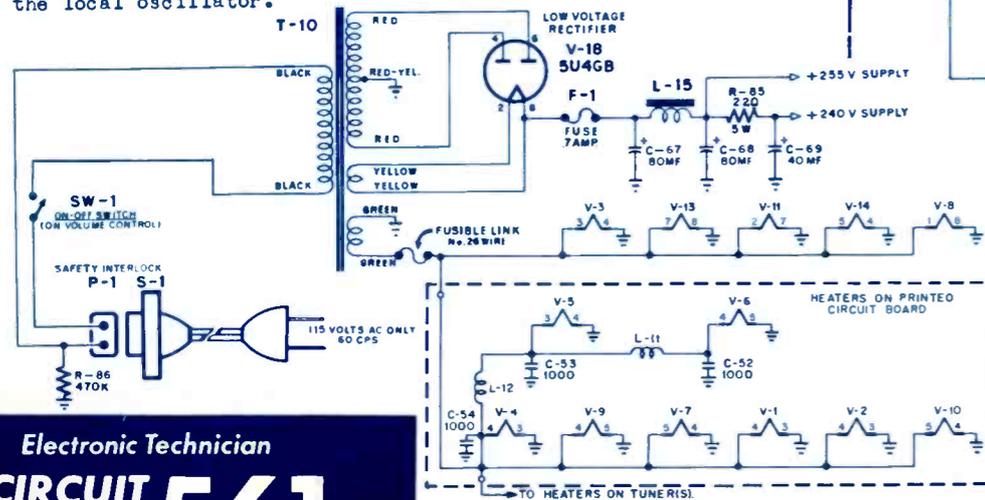
⊕ CERAMIC OR MICA CAPACITORS, CAPACITY IN MICRO-MICROFARADS

⊕ TUBULAR CAPACITORS, CAPACITY IN MICROFARADS

RESISTORS IN OHMS (K=1000 OHMS) AND 1/2 WATT, UNLESS NOTED. ARROWS AT CONTROLS INDICATE CLOCKWISE ROTATION. T INDICATES TOP CORE, B INDICATES BOTTOM CORE IN DOUBLE TUNED TRANSFORMERS.

### TUNER ADJUSTMENT

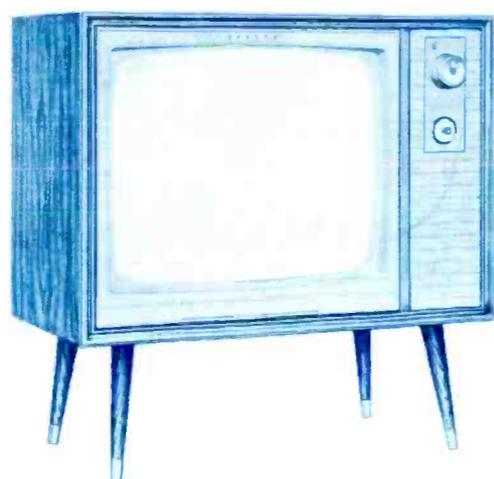
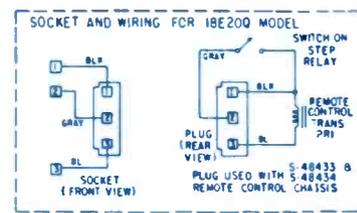
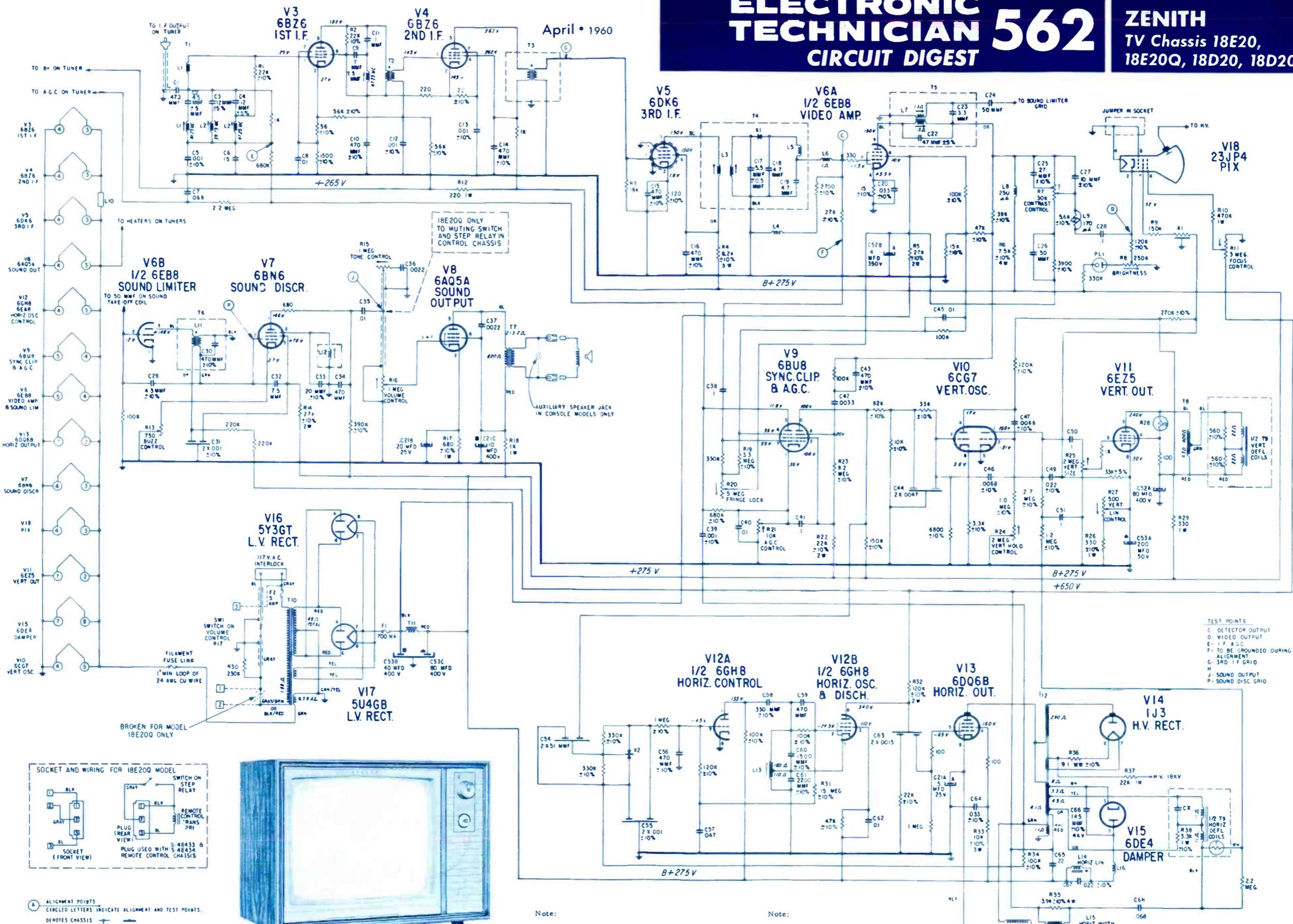
VHF tuners 471225 and 471226 used in chassis 120519C, 520D and 526C are new MINI-TURRET tuners which require the use of an alignment tool with a tip no wider than 1/8" for adjustment of the local oscillator.



\*NOTE: C-31 IN PARALLEL WITH C-44 .0033 MF USED ON SOME CHASSIS

Electronic Technician  
**CIRCUIT DIGEST 561**

April • 1960



ALIGNMENT POINTS  
CIRCLED LETTERS INDICATE ALIGNMENT AND TEST POINTS.  
DROTES CHASSIS

Note:  
The voltage dependent resistor R 28 varies in resistance with applied voltage. As the pulse increases the resistance automatically drops. This prevents possible flashover in the tube or transformer during the retrace period.

Note:  
In late production receivers the PL 1 circuit is omitted and the brightness control is connected to the screen (Pin 8) of the video amplifier tube.

TEST POINTS  
C- DETECTOR OUTPUT  
D- VIDEO OUTPUT  
E- I F A.G.C.  
F- TO BE GROUNDING DURING ALIGNMENT  
G- 3RD I.F. GRID  
H- J- SOUND OUTPUT  
P- SOUND DISC GRID



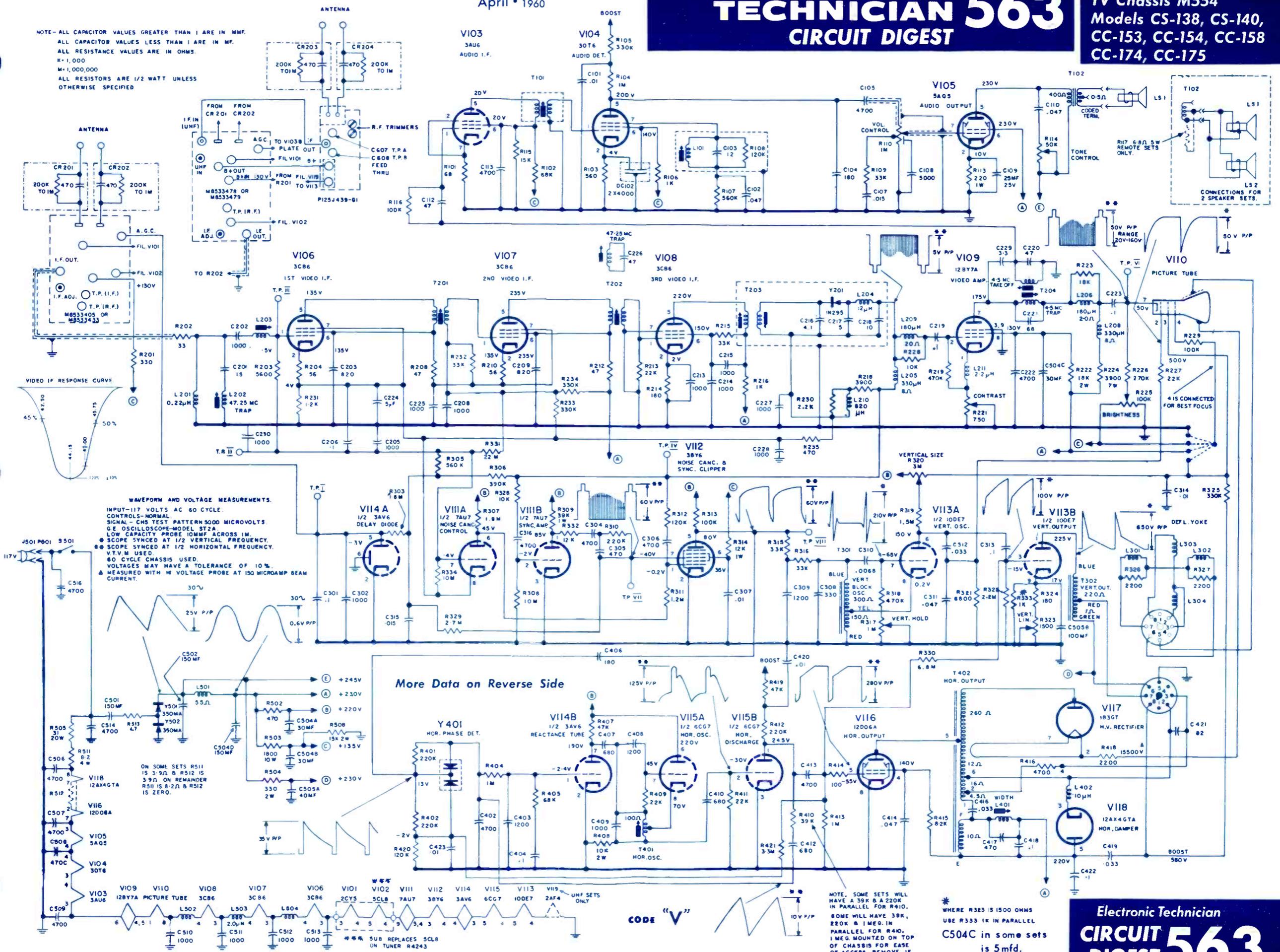
# ELECTRONIC TECHNICIAN 563

## CIRCUIT DIGEST

**GENERAL ELECTRIC**  
**TV Chassis M554**  
**Models CS-138, CS-140,**  
**CC-153, CC-154, CC-158**  
**CC-174, CC-175**

April • 1960

NOTE—ALL CAPACITOR VALUES GREATER THAN 1 ARE IN MMF.  
 ALL CAPACITOR VALUES LESS THAN 1 ARE IN MF.  
 ALL RESISTANCE VALUES ARE IN OHMS.  
 K=1,000  
 M=1,000,000  
 ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED



More Data on Reverse Side

ON SOME SETS R511 IS 3-9/16" R512 IS 3-9/16" ON REMAINDER R511 IS 8-2/16" R512 IS ZERO.

NOTE. SOME SETS WILL HAVE A 35K & A 220K IN PARALLEL FOR R410. SOME WILL HAVE 38K, 220K & 1MEG. IN PARALLEL FOR R410. 1MEG. MOUNTED ON TOP OF CHASSIS FOR EASE OF ACCESS. REMOVE IF DRIVE LINE ENGOUNTERED.

\* WHERE R325 IS 1500 OHMS USE R333 1K IN PARALLEL C504C in some sets is 5mfd.

# ELECTRONIC TECHNICIAN

## CIRCUIT DIGESTS

In This Issue (No. 92)

Circuit Digest No.

DEWALD 560

FM Table Radio  
Model P-705

EMERSON 561

TV Chassis 120517E, 120518F, 120519C,  
120520D, 120525E, 120526C

GENERAL ELECTRIC 563

TV Chassis M554  
Models CS-138, CS-140, CC-153,  
CC-154, CC-158, CC-174,  
CC-175

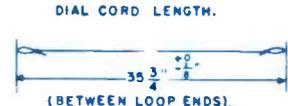
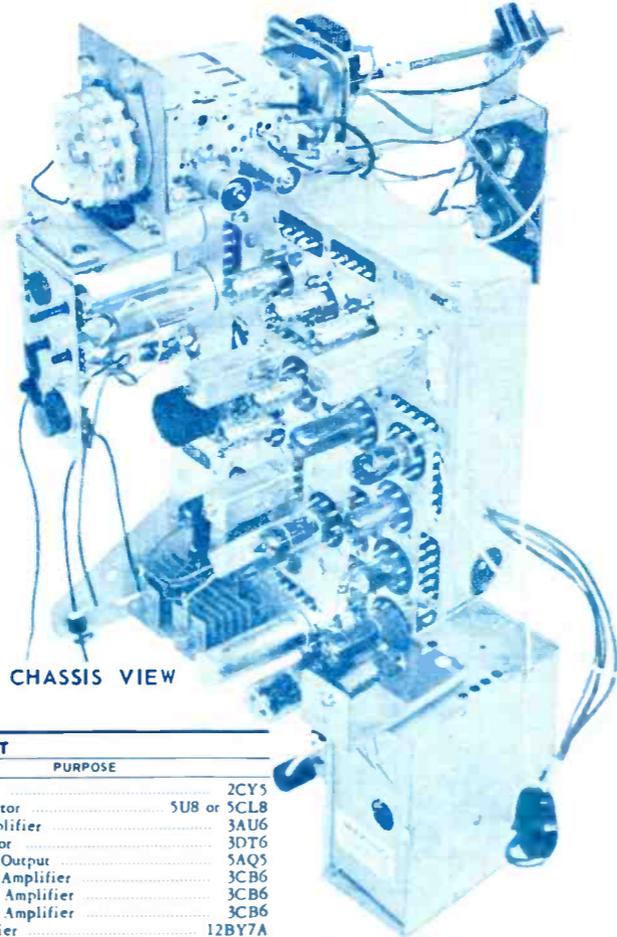
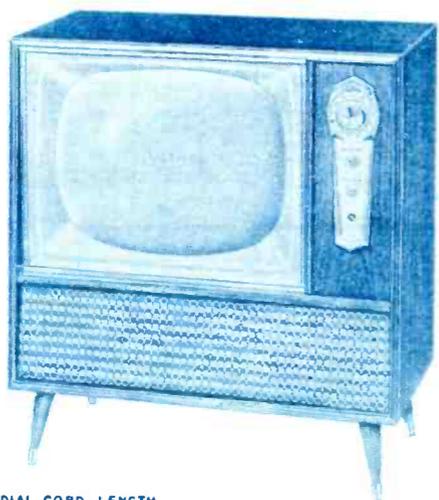
RCA 559

Stereo Hi-Fi Console  
Models PM-17, PM-18

ZENITH 562

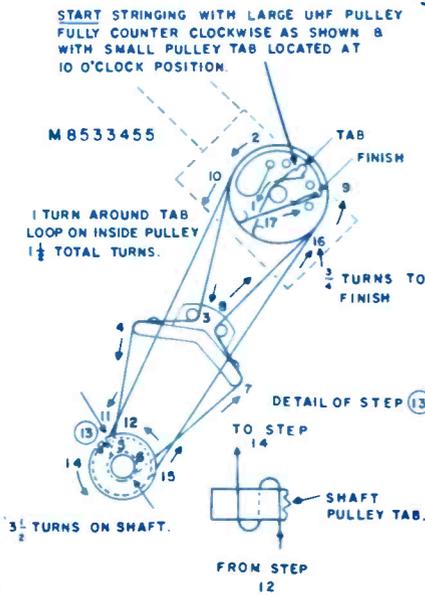
TV Chassis 18E20, 18E20Q, 18D20,  
18D20Q

# 92



UHF DIAL STRINGING

TOP CHASSIS VIEW



TUBE COMPLEMENT		
SYM.	PURPOSE	
V101	RF Amplifier	2CY5
V102	Mixer Oscillator	5U8 or 5CL8
*V103	Audio IF Amplifier	3AU6
V104	Audio Detector	3DT6
V105	Audio Power Output	5AQ5
V106	1st Video IF Amplifier	3CB6
V107	2nd Video IF Amplifier	3CB6
V108	3rd Video IF Amplifier	3CB6
V109	Video Amplifier	12BY7A
V110	Picture Tube	21DAP4
V111	Noise Canc. Control & Sync Amp.	7AU7
V112	Noise Canc. & Sync Clipper	3BY6
V113	Vertical Oscillator and Output	10DE7
*V114	Reactance Tube, Delay Diode	3AV6
V115	Horizontal Oscillator and Discharge	6CG7
V116	Horizontal Output	12DQ6A
V117	High Voltage Rectifier	1B3-GT
V118	Damper	12AX4GT A
V119	U.H.F. Converter	2AF4
Y501	Low Voltage Rectifier	Selenium
Y502	Low Voltage Rectifier	Selenium
†Y401	Horizontal Phase Detector	R3057

\*M554 Early Production Sets only, use the following tubes:  
V103 Audio IF Amplifier, Delay Diode 5AM8  
V114 Horizontal Phase Detector, Reactance Tube 6CN7  
†Y401 Horizontal Phase Detector, not used.

GENERAL ELECTRIC  
TV Chassis M554  
Models CS-138, CS-140,  
CC-153, CC-154, CC-158  
CC-174, CC-175

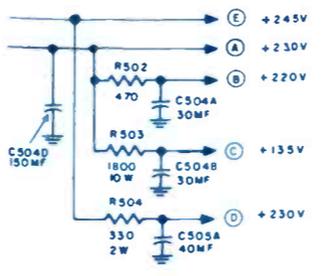
Electronic Technician  
CIRCUIT DIGEST  
**563**

More Data on Reverse Side

PRODUCTION CHANGES:

"NO" CODE:  
"No code" schematic applies as printed.

"Z" CODE:  
"No code" schematic applies with the following change.  
To increase vertical size R504 location changed to provide B+ to V113 from (E) instead of from (A).



"Y" CODE:  
"No code" schematic applies with "Z" change and the following changes.  
To reduce current through vertical linearity control - 1K resistor R333 added from Pin 9 of 10DE7 to chassis. R324 changed from 33 ohms to

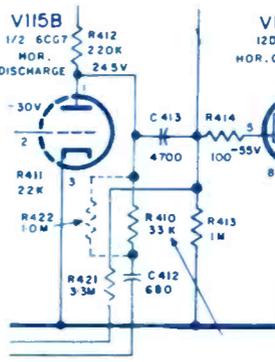
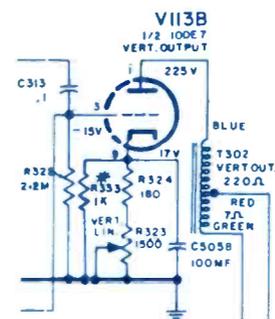
180 ohms.  
L503 in filament string changed from 2.2µh to 2.0µh

\* WHERE R323 IS 1500 OHMS USE R333 1K IN PARALLEL

"X" CODE:  
"No code" schematic including "Z" and "Y" changes applies with the following changes.  
To reduce drive lines 150K resistor added in parallel with R410 39K resistor.

"W" CODE:  
"No code" schematic including "Z" and "Y" changes applies with the following changes.  
To reduce drive lines 220K resistor added in parallel with R410 in place of the 150K resistor referred to under "X" code change. See note under M 554 "V" code schematic referring to R410.

"V" CODE:  
Code "V" schematic applies as printed.



GENERAL ELECTRIC  
TV Chassis M554  
Models CS-138, CS-140,  
CC-153, CC-154, CC-158  
CC-174, CC-175

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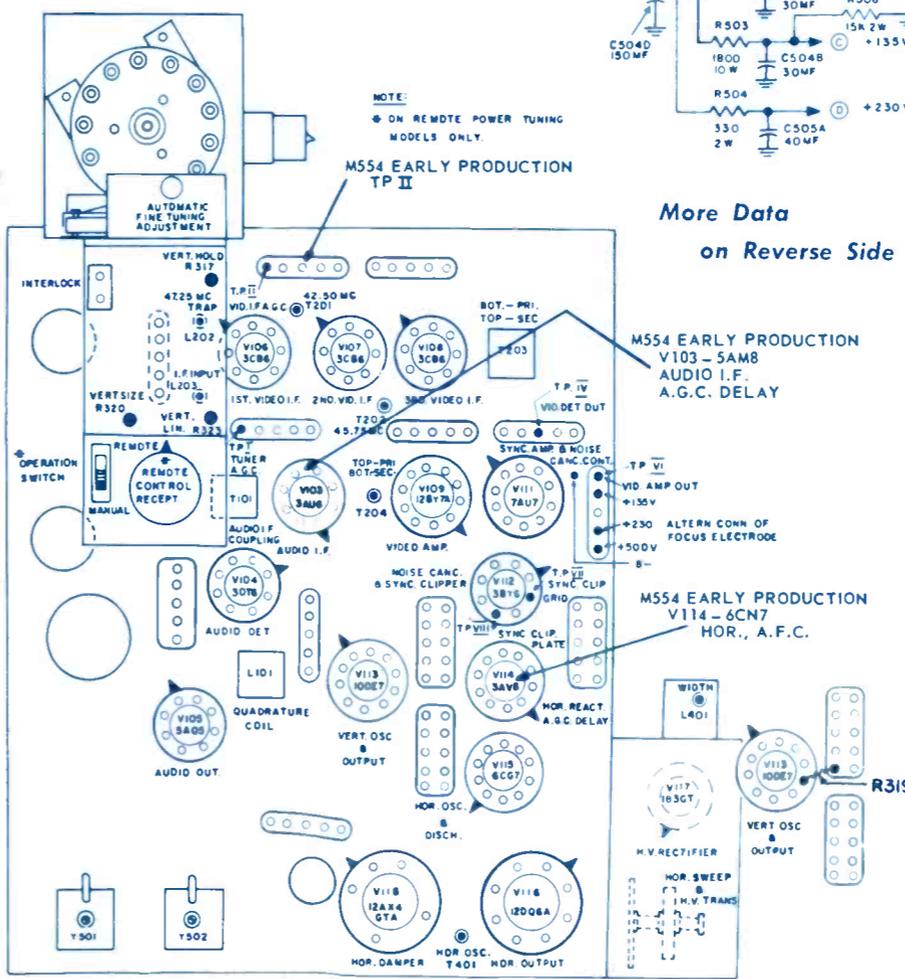
NOTE: SOME SETS WILL HAVE A 59K & 220K IN PARALLEL FOR R410. SOME WILL HAVE 59K, 220K & 1MEG. IN PARALLEL FOR R410. 1 MEG. MOUNTED ON TOP OF CHASSIS FOR EASE OF ACCESS, REMOVE IF DRIVE LINE ENCOUNTERED.

"U" CODE:  
Code "U" schematic applies with the following changes.  
To reduce 60 cycle hum in Audio.  
R502 deleted. R514-470 ohms 2 watts added. C504A reconnected to point (E). Points (B) in schematic changed to read (A).

"T" CODE:  
Code "V" schematic applies with "U" change.  
Connections of R513 (R501 in M554 "No code" schematic) and C501 reversed to connect R513 directly to switch S501 and capacitor C501 directly to junction of Y501 and Y502.

"S" CODE:  
Code "V" schematic applies including "U" and "T" and the following changes.  
To prevent spurious vertical synchronization, C308 330mmf mica capacitor deleted.

"R" CODE:  
Code "V" schematic applies with "U", "T" and "S" and the following changes.  
To improve stability of Audio I.F. and detector alignment.  
R102 - value changed from 68K to 220K.  
R106 - value changed from 1K to 15K.  
R115 - 15K resistor, deleted.  
C114 5mmf. ceramic capacitor N5600 temperature coefficient, added in parallel with T101 Audio I.F. Transformer. Secondary voltage at pin 6 of V104 (screen) changed from 140 volts to 100 volts due to above changes.



TEST POINT & TUBE LOCATION CHART M554 AND M556 CHASSIS

More Data on Reverse Side

# SUCCESSFUL SERVICEMEN



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