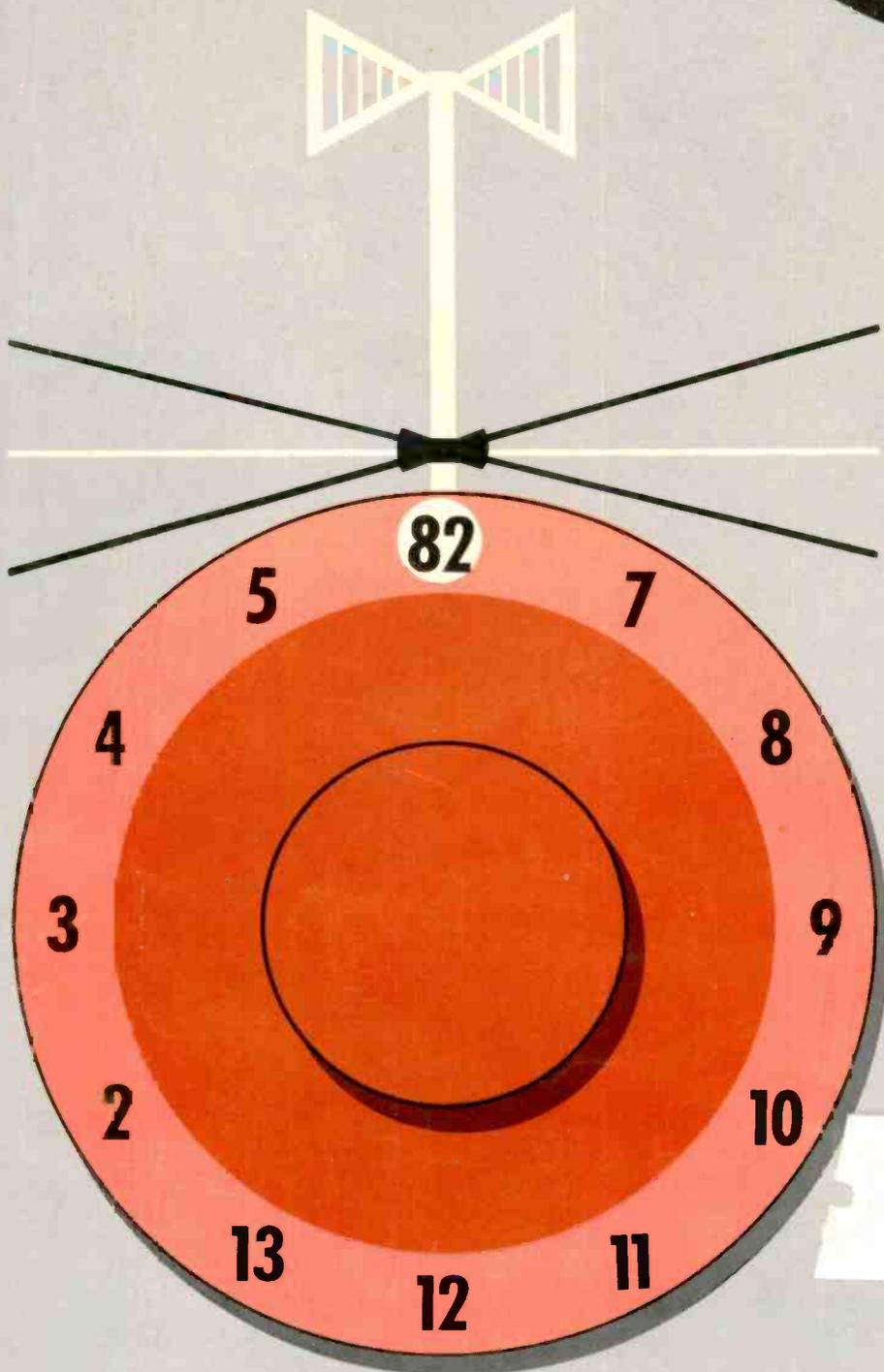


# ELECTRONIC TECHNICIAN

Including  
**SERVICE**  
Magazine



**UHF** CONVERTER  
INSTALLATION and REPAIRS

Also in this issue:  
TRANSISTOR RADIO SERVICE  
HI-FI TUNER ALIGNMENT

MARSHALL F. TACKETT  
EUBANK  
KENTUCKY  
101-1066-1-102X1-13

January 1962



## BIG REASONS

why

## SYLVANIA 6AW8A

is preferred for

## VIDEO AMPLIFIER SERVICE

1. Automount construction provides uniform and tight mount structure featuring low noise and microphonics.
  2. Insulator coating on heaters is electronically controlled to maintain exacting tolerances, provide improved heater warm-up time.
  3. Embossed cathodes provide extra-firm positioning of cathode in the mica.
  4. Automated grid manufacture eliminates handling and contamination, provides uniformity. Result: improved cutoff characteristics, reduced noise, more stable characteristics.
  5. Exclusive hook-design heater connectors enable reliable heater welds, longer life through reduced open welds.
  6. Special radiators on screen grid dissipate heat rapidly, virtually eliminate secondary emission, reduce interelement shorts, maintain cutoff characteristics; longer tube life is realized.
  7. Tubes are set-tested for microphonism; assures against "picture tearing and jittering."
  8. Special plate material provides stable plate characteristics during life, enhances stability of contrast and brightness.
- There's another big reason why SYLVANIA is preferred—it offers the complete line of popular TV types. For example, this group of video amplifier tubes: 6AU8, 8AU8, 8AW8A, 6GN8, 8GN8, 6BA8A, 8BA8A, 6ET7, 8ET7, 12BY7A, 6CL6, 6BH8, 8BH8, 6CX8, 8CX8, 6EB8, 8EB8. Always specify SYLVANIA TUBES—"quality" is the big, BIG REASON. Electronic Tubes Division, Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.



# SYLVANIA

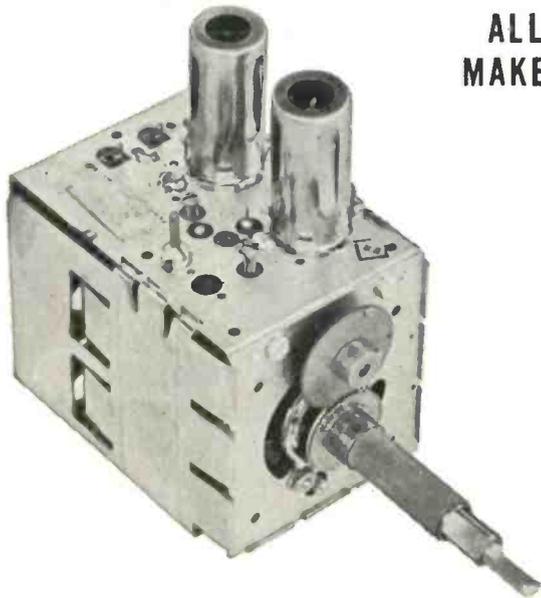
SUBSIDIARY OF

**GENERAL TELEPHONE & ELECTRONICS**



Tarzian offers

# FAST, DEPENDABLE TUNER REPAIR SERVICE



ALL  
MAKES

It just makes sense that a manufacturer of tuners should be better-qualified, better-equipped to offer the most dependable tuner repair and overhaul service.

Sarkes Tarzian, Inc., pioneer in the tuner business, maintains a complete, well-equipped Factory Service Dept.—assisted by Engineering personnel—and staffed by specialized technicians who handle **ONLY** tuner repairs . . . on **ALL** makes and models.

Tarzian-made tuners received one day will be fixed and shipped out the next. Cost is only \$8.50 and \$15 for UV combinations. That includes **ALL** parts (except tubes which are furnished at our cost) and labor, and a 6-month guarantee against defective workmanship and parts failure due to normal usage. Replacements available at low cost on tuners beyond practical repair.

Tarzian-made tuners are identified by this stamping. When inquiring about service on other tuners, always give tube complement . . . shaft length . . . filament . . . voltage . . . series or shunt heater . . . IF frequency . . . chassis identification. All tuners repaired on approved, open accounts. Check with your local distributor for Sarkes Tarzian replacement tuners, replacement parts, or repair service.

SERVICE MANAGER • TUNER DIVISION • DEPT. 3A



## SARKES TARZIAN INC

east hillside drive • bloomington, indiana  
edison 2-7251

MANUFACTURERS OF TUNERS . . . SEMICONDUCTORS . . . AIR TRIMMERS . . . FM RADIOS . . . AM-FM RADIOS . . . AUDIO TAPE . . . BROADCAST EQUIPMENT and SHISH-KABOB GRILLES

ONLY  
**\$8.50**  
INCLUDING

# ALL PARTS and LABOR

# 24-HOUR SERVICE 6-MONTH WARRANTY

# Tuners Repaired on Approved, Open Accounts

See your distributor, or  
use this address for fast,  
factory repair service



**GMW TRON FUSE**

Diameter: .270 inch  
Length of Body: 1/4 inch



**HWA FUSEHOLDER**

Diameter: .500 inch  
Length with Knob and Terminals: 15/16 inch

ACTUAL SIZES SHOWN

## Another BUSS sub-miniature fuse and holder combination

**EXTREME RELIABILITY UNDER HIGH SHOCK AND SEVERE ENVIRONMENTAL CONDITIONS.**

Rigid construction of fuse and holder assures extraordinary reliability under high shock and vibration conditions. Fully insulated ceramic body isolates fusible element from effect of dust, corrosion, moisture and vapors.

**DESIGNED FOR SPACE-TIGHT APPLICATIONS**

*Panel Mounted.* Holder can be mounted on panel by hand. No special tool required to run down holding nut.

Prong type contacts on fuse make it easy to install or replace.

A knob for the holder may be used to make holder water proof from front of panel.

**HOLDER CAN BE MOUNTED IN PRINTED CIRCUITS**

Terminals of holder can be inserted into holes and soldered on printed circuit board without additional forming.

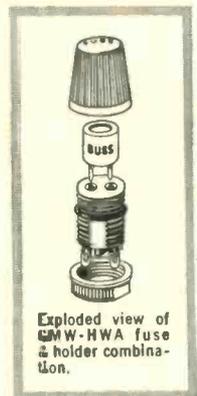
If desired, GMW fuse may be used without holder and mounted directly into printed circuit boards.

**AVAILABLE RATINGS FOR GMW FUSES.**

Fuses are made in sizes from 1/10 to 5 amperes for use on circuits of 125 volts or less where fault current does not exceed 50 amperes.

Transparent window in end of fuse body permits visual inspection of fusible element.

Before crystallizing your design using sub-miniature fuses be sure to get full data on the Buss GMW fuse and HWA holder combination.



**IN THE BUSS LINE, you'll find the type and size fuse to fit your every need... plus a companion line of clips, blocks and holders.**



**BUSSMANN MFG. DIVISION, McGraw-Edison Co., UNIVERSITY AT JEFFERSON, ST. LOUIS 7, MO.**



For more details, circle 15 on page 44  
ELECTRONIC TECHNICIAN

# ELECTRONIC TECHNICIAN

Including  
**SERVICE**  
Magazine

**WORLD'S LARGEST ELECTRONIC TRADE CIRCULATION**

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JACK HOBBS Technical Editor  
B. V. SPINETTA Assistant Editor  
HERB HOENE Circulation Manager  
EARL HINTZ Production Manager

January • 1962

Vol. 75 • No. 1

**FRONT COVER** If UHF TV broadcasts have started in your area, you can help customers receive them on their VHF sets. There are three ways to convert TV receivers: UHF tuner, UHF channel strips, UHF converter. The latter conversion method — installing a top-of-set UHF converter — will be chosen by many service technicians. Converter installation and repair is fully discussed in the article starting on page 30.



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PUBLICATION

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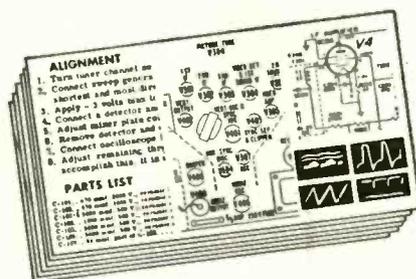
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## CIRCUIT DIGESTS



... PRECEDING BACK COVER

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GRANCO: AM/FM Radio Model 704  
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DELCO: Auto Radio 1961 Cadillac Model 7276605  
TOSHIBA: Transistor Radio Model 9TL-3655  
ADMIRAL: TV Chassis 1988B, 19UB8B, 18D8B, and 19UD8B

**Servicemen everywhere are saying:**

**TACO** brings in sharp

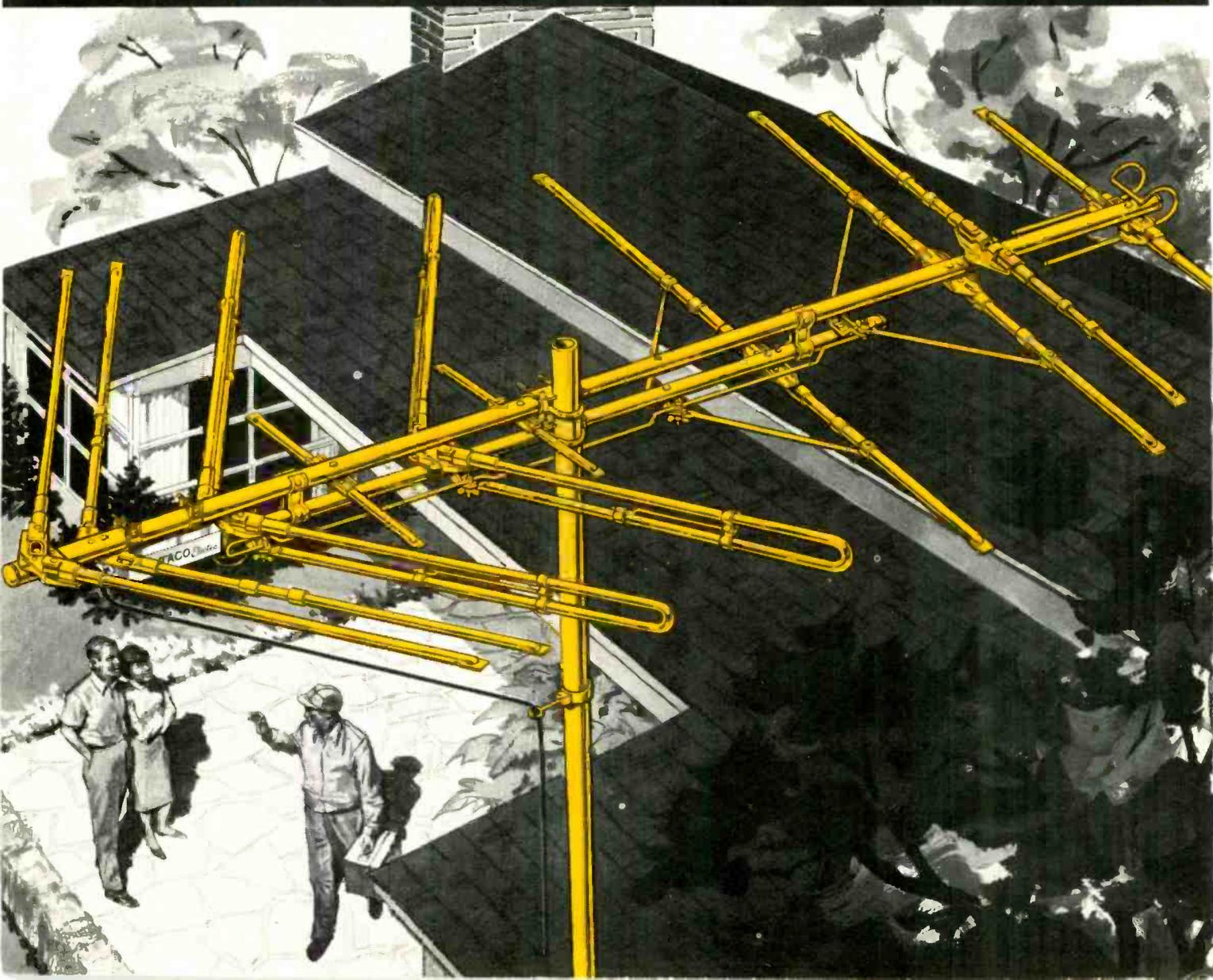
**pictures where other electronic antennas fail**

It stands to reason that TACO would produce, in the T-BIRD ELECTRA, the world's best electronic antenna. Only TACO gives you the combination of the most rugged, highest-performance antennas plus the finest in antenna-mounted transistorized amplifiers (designed by Jerrald).

So, with the T-BIRD ELECTRA you assure customer satisfaction, even in severest "problem" areas. Rigid chrome-alloy aluminum elements and

contacts eliminate the antenna "friction noise" and "signal flutter" inherent in some so-called "high-gain" antennas. There's a T-BIRD ELECTRA for every TV/FM home need, priced from \$79.75. And it's completely pre-assembled for your convenience.

Only TACO offers custom area-engineering on electronic antennas to help you solve any type of signal problem. For these special services, see your TACO distributor.

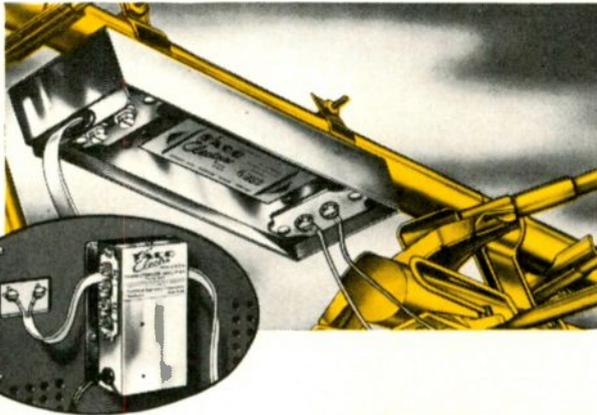
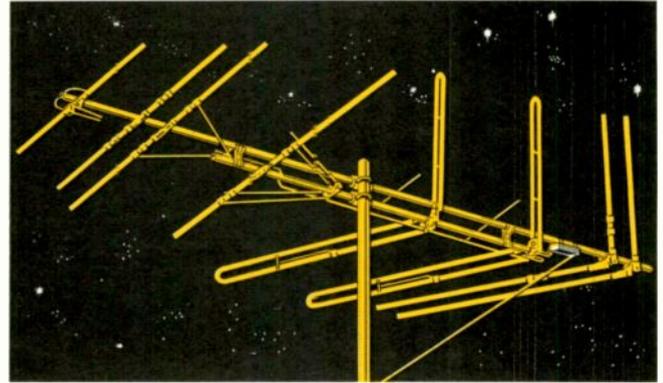


# HOW THE NEW



## combines the leading talents in electronics and antenna design

- Built rugged like all TACO antennas, the T-BIRD and T-BIRD ELECTRA use  $\frac{7}{16}$ " tubing, sturdiest in the industry.
- "Delta" ("T"-match) feed system gives sharpest forward pattern — on every channel. Better than 10:1 front-to-back ratio.
- 100% rustproof. Gold-anodized and iridited (a conductive coating). Exclusive stainless-steel U-bolts.
- Engineered to eliminate unnecessary elements or harnesses that add weight and invite wind damage.
- Chrome-alloy aluminum used throughout—twice as strong as other antennas.
- Complete pre-assembly makes installation fast, sure and permanent.



- TACO transistor preamplifier, designed by Jerrold, is matched to perform ideally with T-BIRD ELECTRA.
- Highest gain on both high and low channels, lowest System Noise Figure.
- No batteries, no polarity problems when connecting downlead.
- Remote a-c power supply feeds two sets.
- No maintenance worries—put up the T-BIRD ELECTRA and forget it!
- Every TACO antenna carries, in writing, a one-year warranty.
- The TACO ELECTRA preamplifier is available separately for use with any antenna.

### A T-BIRD and a T-BIRD ELECTRA for every home

With six models of T-BIRD (non-powered) and three models of T-BIRD ELECTRA (powered) antennas, TACO gives you the right antenna for every suburban-to-fringe-area requirement. Performance, reliability, and long life found in no other antenna at any price.

**G990-8**  
The world's most powerful electronically-amplified antenna. Gets pictures and sound where others fail. Supplies the finest signal source for multi-set installations.  
List \$109.75

**G990-6**  
Just right for installations not requiring the ultra-powerful gain of the G990-8. Will provide sparkling clear, sharp pictures in black-and-white or color, on one, two, or more sets.  
List \$91.75

**G990-5**  
Lowest-price T-BIRD ELECTRA. Offers all the inherent advantages of transistor amplification plus a matched system of amplifier and antenna. Brings in stations beyond the reach of ordinary antennas.  
List \$79.75

## WATCH TACO GO!

The new T-BIRD and T-BIRD ELECTRA are without doubt the line to watch in the big months ahead. When you're handling the TACO line, you'll be watching from the driver's seat. So don't be passed by—get all the facts on T-BIRD and T-BIRD ELECTRA antennas—the line that's making antenna history! Ask your distributor, or write for details.



### TECHNICAL APPLIANCE CORPORATION

Distributor Sales Division • Dept. JTD-12, Sherburne, New York  
A Subsidiary of Jerrold Electronics Corporation



# NEW VERSATILITY & COMPACTNESS in PROFESSIONAL TEST EQUIPMENT



**AC VOLT-WATT METER #260**  
Kit \$49.95      Wired \$79.95

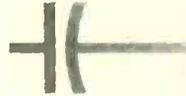


AC voltmeter and load-compensated audio-wattmeter of unique quality and accuracy. Measures AC voltage from 1 millivolt to 1000 volts in 11 ranges, and power from .015 milliwatt to 150 watts in 7 ranges, across standard loads from 4 to 600 ohms. The instrument incorporates a tapped power resistor load (4, 8, 16, and 600 ohms) to handle up to 80 watts of power on 8 ohms, and 40 watts on other taps. It may be switched to external load up to 150 watts. The meter is automatically compensated for any load selected, internal or external, to provide a single watt scale for all loads and ranges.

**VOLTMETER:** Ranges: .01, .03, .1, .3, 1, 3, 10, 30, 100, 300, 1000 RMS volts. Frequency Response:  $\pm 0$ db 10c to 150kc,  $-3$ db at 500 kc. Input Impedance: 2 megohm shunted by 15mmf. Accuracy:  $\pm 4\%$ .

**WATTMETER:** Ranges: 15mw, 1.5mw, 15mw, 150mw, 1.5W, 15W, 150W. Frequency Response:  $\pm 0$ db 10c to 100kc. Accuracy:  $\pm 5\%$ . Internal Loads: 4 (40W), 8 (80W), 16 (40W), 600 (40W). External Loads: 4, 8, 16, 600 (all to 150W).

## EDITOR'S MEMO



It's so easy to put things off. A short while back the weather turned cold enough to have the storm windows put up at my house. It didn't seem that a few days of delay would matter. And then a few more days.

Two weeks later I woke up to the realization that if storm windows were supposed to save heat, it was costing me to put off the day of reckoning. I put up the windows that same day.

The principle of doing things promptly is even more important in running a business. A few years ago we ran an editorial campaign with the slogan: "The man who needs new test equipment is already paying for it."

The greater efficiency or income which would be derived from improved instruments would more than pay for the investment. Failure to buy what's needed makes you pass up either a way of saving or an opportunity to earn more of the green stuff.

I recall visiting one TV service shop located in a fairly high traffic area near a shopping center. It was a logical spot for both sales and service, but this place depended almost exclusively on repair work. I asked the owner if he didn't think it a good idea to invest perhaps a thousand dollars or so in such items as radios, TV and other impulse items. He said he had the money and wanted to do it for a year. He expected the return would be eight times greater than at the savings bank. Then why hadn't he done it? After getting through the "too busy" routine, it turned out he kept putting it off because of the annoying one-day job of fixing up the window and changing the counter arrangement.

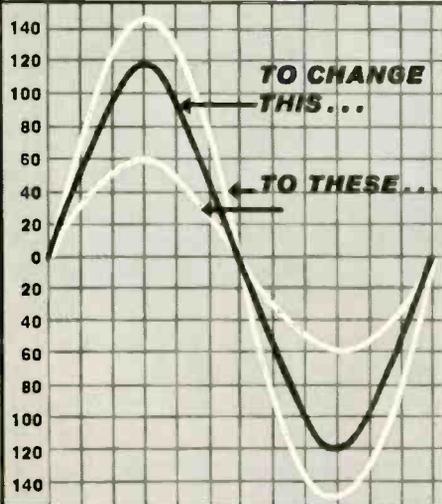
So if you have a logical money-saving or money-making idea, do it now.

A reverse twist on this is contained in the story of the large TV dealer who put up signs to inspire his employees. They all read: "Do It Now!"

A few weeks later, a friend stopped by to ask the boss how his "Do It Now!" campaign was coming along. Had it induced the staff to stop putting off things they wanted to do?

"And how," said the boss, "but not as I expected. The bookkeeper skipped with \$10,000. The salesman made a pass at the secretary. And the service manager threw three picture tubes out the window."

*Al Foman*



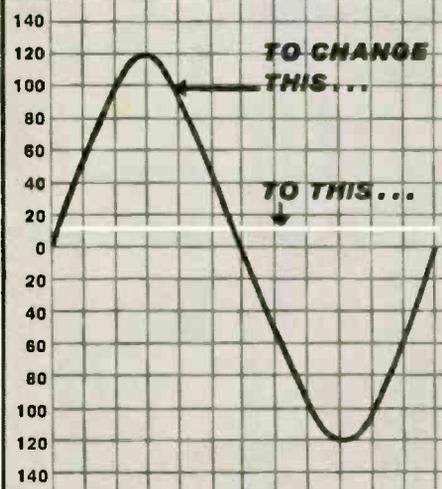
### ...USE THESE!



**METERED VARIABLE  
AUTO-TRANSFORMER  
AC BENCH SUPPLIES**

# 1073 (3-amp rating)  
Kit \$35.95      Wired \$47.95  
# 1078 (7½-amp rating)  
Kit \$42.95      Wired \$54.95

Connect to 60 cycle, 120 volt line and obtain any desired voltage between 0 and 140 volts. Highly efficient variable auto-transformer of toroidal core design gives you continuously variable output, linear versus rotation, with excellent regulation and negligible waveform distortion. Model 1078 permits either 50 or 60 cycle operation.



### ...USE THIS!



**Extra-Low-Ripple  
6- and 12-Volt  
BATTERY  
ELIMINATOR AND  
CHARGER #1064**

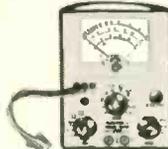
Kit \$43.95      Wired \$52.95

Connect to 60 cycle, 120 volt line and obtain highly filtered low dc voltage continuously variable over two ranges 0-8, 0-16 VDC. Heavy-duty pi-type LC filter is rated to take the full rated current output continuously (10 amps on 8V range, 6 amps on 16V range), reduces ripple as low as 0.3% at 2 amps on the 16V range. An essential instrument for servicing battery-operated equipment, including transistor or hybrid types, and an excellent battery charger.

#### Also New From EICO:



**AC VTVM &  
AMPLIFIER  
#250**  
Kit \$49.95  
Wired \$79.95



**TRANSISTOR  
AND CIRCUIT  
TESTER #680**  
Kit \$25.95  
Wired \$39.95



**IN-CIRCUIT  
CAPACITOR  
TESTER #955**  
Kit \$19.95  
Wired \$39.95

For complete catalog of over 80 EICO kits and wired units—hi-fi, test equipment, citizens radio, ham gear—plus name of nearest distributor, write to dept. ET-1

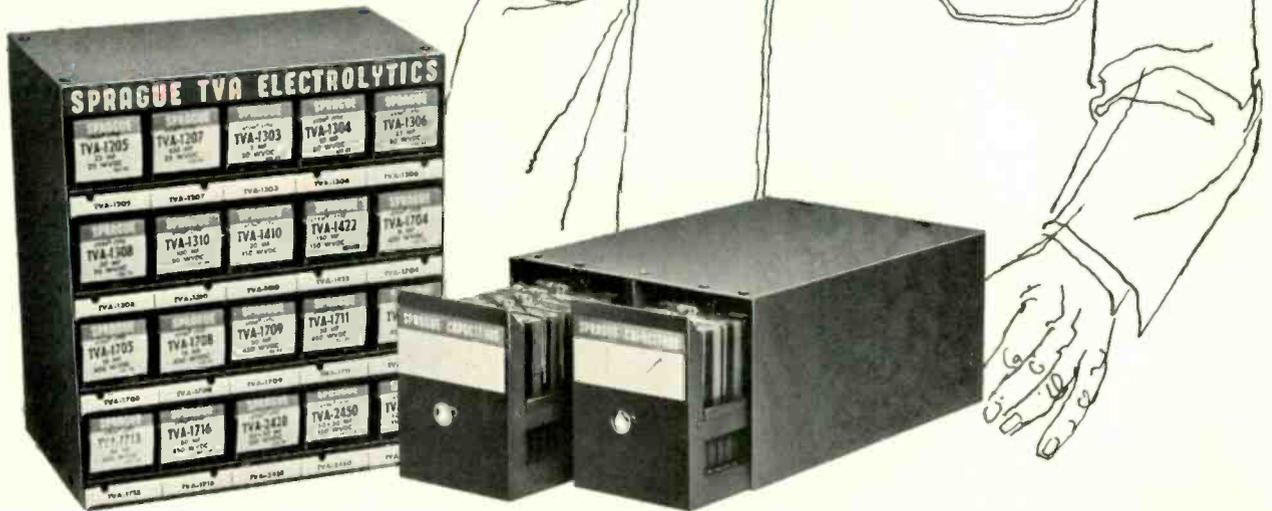


**ELECTRONIC INSTRUMENT CO., INC.**  
3300 Northern Blvd., Long Island City 1, N. Y.

ADD 5% IN THE WEST      Export Dept., Roburn Agencies Inc., 431 Greenwich St., New York 13, N. Y.

For more details, circle 21 on page 44

**WHEREVER COUNTERMEN  
WEAR THIS BUTTON  
YOU'LL FIND 31 WAYS  
TO HELP BUSINESS...**



## **31 Sprague Capacitor Assortments in FREE Stock Cabinets and Cases**

Radio and TV Service Technicians swear by Sprague's Capacitor Assortments for **SEVEN** good reasons. Widest line in the industry, Sprague's **31** Assortments in Custom-designed Cabinets and Cases . . .

### **1. Convert wasted time to profits!**

No need to run to your distributor when you need a capacitor. No searching through cluttered parts bins. Sprague Assortments give you more time at the service bench.

### **2. Assure balanced inventories—no dead stock!**

Sprague Assortments include only the most popular, most frequently used ratings. No dogs. No slow movers. Every capacitor rating is one you need and use in your day-to-day service work.

### **3. Simplify inventory-taking!**

You see at a glance what capacitors you have in stock. Clearly identified compartments in custom-designed cabinets and cases let you take inventory without loss of time.

### **4. Speed re-ordering!** Whether you handle re-orders yourself, or let Distributors' Salesmen do it, Sprague's "see-at-a-glance" Assortments save time all around.

### **5. Put capacitors at finger tips!** No hunting. No delay. Sprague Assort-

ments give you the types and ratings you need—when you need them. Repair jobs go out on time. Profits increase.

### **6. Make your shop more attractive!**

A planned Capacitor Section saves space, looks business-like, makes a good impression on customers.

### **7. Cost you nothing extra!** When you buy Sprague Capacitor Assortments, you pay for capacitors only. Sprague Custom-designed Cabinets and Cases are yours FREE!

**Take the first step to faster servicing and greater profit. Visit your Sprague Distributor and ask about Sprague's 31 Assortments. Or, write to Sprague Products Co., North Adams, Mass.**



**WORLD'S LARGEST MANUFACTURER OF CAPACITORS**

# MALLORY SILICON

**P. R. MALLORY & CO. Inc.**  
**MALLORY**  
**SILICON RECTIFIERS**  
**1N-2094**  
**500 MA. 400 PRV.**

*Precision*  
**ELECTRONIC COMPONENTS**

**MALLORY SILICON RECTIFIERS 1N-2094**

**DEALER NET**  
5 PCS

**P. R. MALLORY & CO. INC.**  
INDIANAPOLIS 6, INDIANA  
PATENTS ISSUED OR PENDING  
MADE & PRINTED IN U.S.A.

For top performance *every time*, use Mallory silicon rectifiers. From 50 to 600 PRV, you'll get all of the rating you pay for. You can stake your reputation on the quality of these rectifiers. They meet the standards required for military types, yet you don't have to pay premium prices. You'll get 750 ma up to +50°C and 500 ma at +85°C. Quality is

so high you won't even need equalizing resistors in most cases.

Available in parallel lead "T" type and axial lead "A" type from your nearest Mallory distributor, five to a pack, in a re-useable jewel box, on a handy file card.



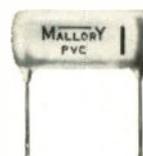
#### ELECTROLYTIC CAPACITORS

Famous FP-WP metal can types, reliable TC tubulars, and tiny TT tubulars.



#### VIBRATORS

Sure-start Gold Label® and every other type for auto or mobile communications.



#### PVC CAPACITORS

Premium quality Mylar\* Capacitors in handy zip-lip package.

\*Reg. Trademark E. I. du Pont de Nemours, Inc.



#### STA-LOC® CONTROLS\*\*

30 second delivery on every imaginable control.

\*\*U.S. Patent 2,958,838

# RECTIFIERS STOP CALL-BACKS

... premium quality *now at new low price*



NEW, EASY-TO-INSTALL  
RECTIFIER CIRCUIT PACKAGES

These new Mallory silicon rectifier packaged circuits are a cinch to install, ideal replacements for selenium stacks. Two models: Type FW full wave bridge, rated 1.5 amp. at 50° C, 1.0 amp. at 100° C; 50 to 600 volt ratings. Type VB voltage doubler, .75 amp. at 50° C, .5 amp. at 100° C, in ratings from 50 to 600 volts. Cold case design, encapsulated in moistureproof resin. Ask your distributor today!



#### DISCAPS®

The standard of the ceramic capacitor field.

®Trademark Radio Materials Company, a Mallory Division



#### MERCURY BATTERIES

Get the details on the New Mallory Battery Program today.

Distributor Division, Indianapolis 6, Indiana

P. R. MALLORY & CO. Inc.  
**MALLORY**

In Canada: A. C. Simmonds & Sons, Ltd., Toronto 7, Ontario

For more details, circle 33 on page 44

## For The Independent Serviceman Who Wants To Be Truly Independent

# The New Lafayette Associate Store Program Offers You A Most Unusual Opportunity To Own Your Own Business

If you have a basic knowledge of radio, television or electronics, and if you have ambitions for true independence and security, a Lafayette Radio Electronics Associate Store can be the beginning of a profitable and respected career.

■ Within the past year, Lafayette Radio Electronics began to explore the possibility of expanding on a nationwide basis. Twenty men such as you (some with established stores, some with little or no business experience) were granted associate store franchises. They have been given the benefit of Lafayette's many years of experience selling stereo kits, citizen band radios, recorders, science and electronics kits, tools, components, hobby supplies, television repair equipment and all the other things that make this the fastest-growing industry in the country. Today, every one of these men is the owner of a thriving business and is well on his way to a better way of life. (A list of these successful associates is available on request.) ■ As a result of this success, Lafayette has decided to expand the program. We are now looking for a limited number of men who are willing to invest at least \$10,000 to get the things they've always wanted out of life: travel, new home, new car, education for the children, security of their own business. ■ For more information on how you can own a profitable business, fill out and mail the coupon below and find out more about Lafayette's:

**Protected Territory** Yours will be the only franchised Lafayette Radio Electronics Associate Store in your marketing area. This means that when your customers want the advertised and branded merchandise supplied by Lafayette, they'll come to you. **Marketing Direction** With the knowledge gained from past successes, we will help you set up a complete program, from choosing the right location, to designing your store for maximum profits, to setting up your inventory. **Executive Guidance** Our program will help you function effectively in the day to day operations of your store. We'll show you how to deal with customers, how to establish a large, loyal following, how to build public relations. In short, Lafayette will show you how to be the kind of responsible executive who is a success in business, a leader in the community. **Advertising Support** Millions of dollars have been spent to establish Lafayette Radio Electronics and its franchised dealers as the primary source for electronics radio and science equipment. The Lafayette sign in front of your store will indicate to everyone that you are associated with a multi-million dollar organization, one of the largest of its kind in the world. Furthermore, all-year 'round advertising, public relations and promotion campaigns will continue to send customers to your store. ■ Fill out and mail this coupon today. This can be the beginning of a new way of life.

Lafayette Radio Electronics Corporation  
165-08 Liberty Avenue, Jamaica 33, New York  
Mr. Robert Laub

Please send me full information on how I can own my own profitable business.  
I understand there is no obligation.

NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

For more details, circle 31 on page 44

## LETTERS

### TO THE EDITOR

#### Conducting, Not Insulating

Editor, ELECTRONIC TECHNICIAN

May I call your attention to a serious error in your otherwise excellent article on the Channel Master "Cross-fire" antenna in your November issue. You refer to the gold coating of the antenna as a "gold insulating film." This is precisely what it is *not*.

Our whole approach to the matter of gold colored antennas is that insulating coatings interfere with the electrical performance of an antenna. Anodizing is such a coating. And if you will examine any anodized antenna taken from a factory-fresh box, you will notice that the anodizing has been ground off by abrasion wherever metal-to-metal contact is required on the antenna—for example, wherever director or reflector elements must contact the crossarm. Since it is these very points which must be protected from corrosion, you can see that any coating which insulates, as anodizing does, does not afford surface protection on the very antenna parts that need it most.

The golden coating on Channel Master antennas is applied by an exclusive process which we call E\*P\*C. It is a *conductive coating*. It is the very last process in the production of the antenna before it is boxed. Because it does not have to be ground off, it affords long-term protection for the entire antenna. No "Achilles Heels" are left exposed.

SAM SCHLUSSEL

Channel Master Corp.  
Ellenville, New York

#### Wants Communications Articles

Editor, ELECTRONIC TECHNICIAN

I would like to see more on communication type transmitter and receiver gear; mobile, ground and aircraft, also maybe an article on repair of microwave transmitters and receivers. So far, issues have been mainly on television.

BRUCE ROBERTS

Pasadena, Calif.

• See microwave article this issue. You may be interested in an affiliated publication, INDUSTRIAL ELECTRONIC ENGINEERING & MAINTENANCE, which concentrates on the use of electronics and communications in business and industry.—Ed.

#### Orchids

Editor, ELECTRONIC TECHNICIAN:

Just a line to say "orchids to you" for your editorial, "Hi-Fi Repair Dilemma," on page 29 of your September issue. Best wishes to you and your fine magazine.

N. E. NELSON  
Sales Engineer

Centralab  
Milwaukee, Wis.

# New TRANSISTOR RADIO ANALYST

makes it Easy and Profitable to Service all Transistor Radios



**B&K** Model 960

TRANSISTOR RADIO ANALYST

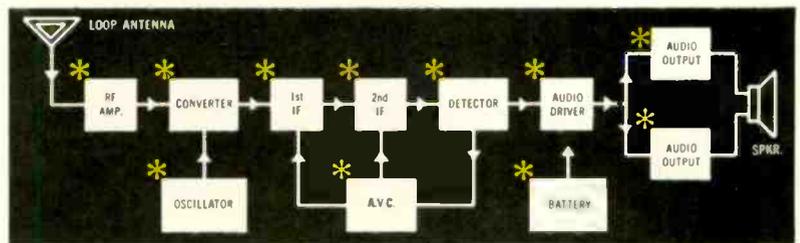
with Exclusive *DYNA-TRACE*  
Single-Point Probe—and Built-in  
Metered Power Supply and VTVM

Complete Transistor Radio  
Service Shop in One Instrument

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

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

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



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

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

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

#### BUILT-IN METERED POWER SUPPLY FOR EASY SERVICING

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

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

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

#### BUILT-IN VTVM

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

#### TESTS ALL TRANSISTORS OUT-OF-CIRCUIT

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

Model 960. Net, \$99<sup>95</sup>

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



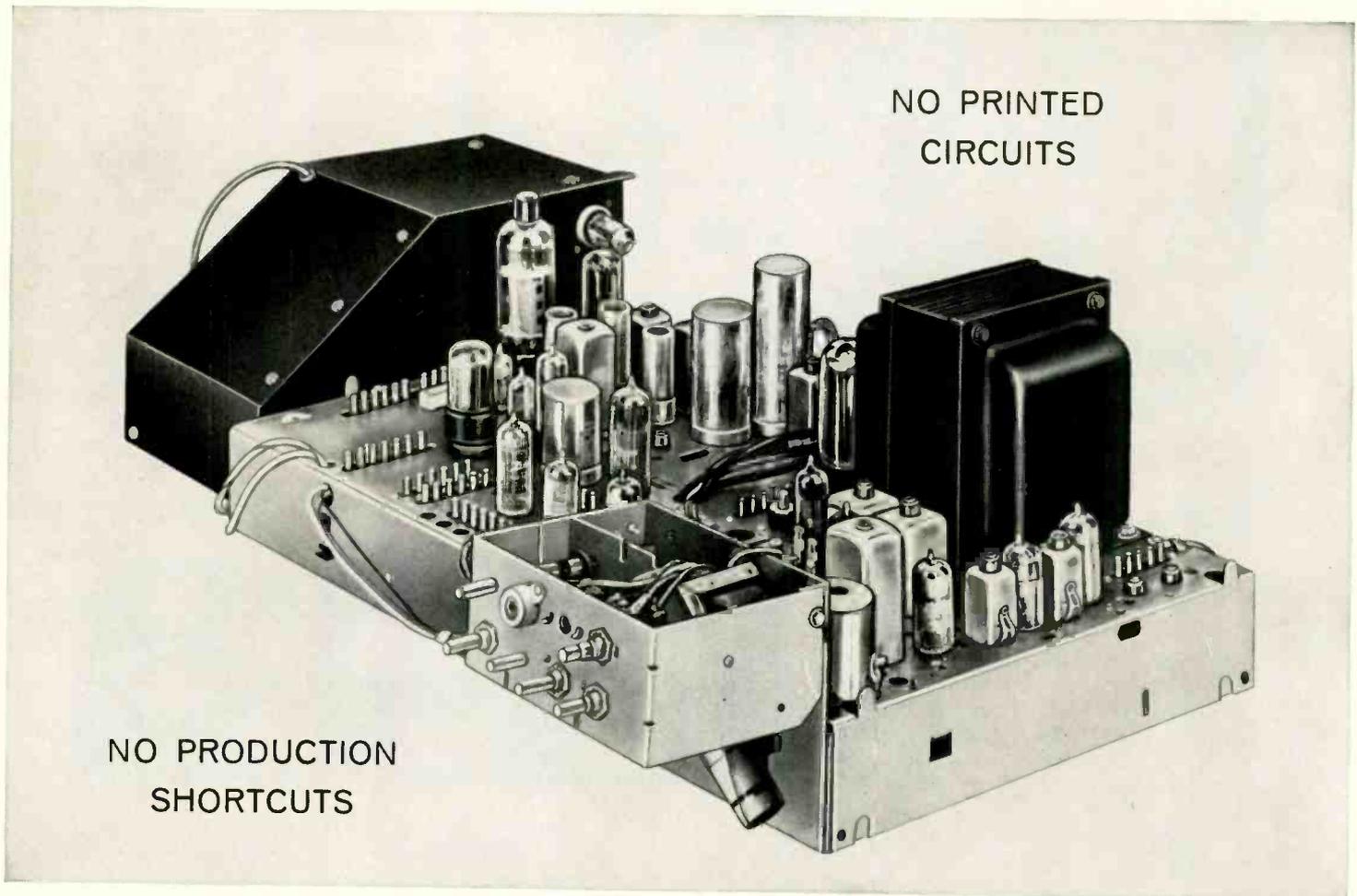
**B&K MANUFACTURING CO.**  
1801 W. BELLE PLAINE AVE • CHICAGO 13, ILL.  
Canada: Atlas Radio Corp., 50 Wingold, Toronto 19, Ont.  
Export: Empire Exporters, 277 Broadway, New York 7, U.S.A.

For more details, circle 12 on page 44

Only **ZENITH**

EXCLUSIVE

HANDCRAFTED



NO PRINTED  
CIRCUITS

NO PRODUCTION  
SHORTCUTS

**There are only two kinds of color TV made in America—  
ZENITH AND ALL OTHERS!**

Now Zenith brings you the easiest-to-service color TV ever made, with the only handcrafted horizontal Service Saver color TV chassis in the industry. No printed circuits! No production shortcuts!

Every connection is hand wired and hand soldered! Mechanical design is simplified—electrical circuitry is straight-forward for greater dependability and easier, faster servicing.

*EVERY ZENITH COLOR TV IS EXCLUSIVELY DESIGNED,  
DEVELOPED AND MANUFACTURED BY ZENITH!*

has it!

# COLOR TV CHASSIS!

**For greater dependability... simplified servicing**  
**90% OF CHASSIS ACCESSIBLE FOR SERVICING**  
**without removing it from the cabinet!**

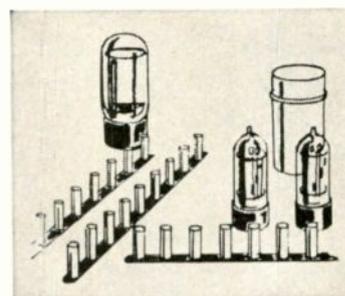
**ONLY HANDCRAFTED ZENITH**  
**has the "easy service" bottom plate!**

When this plate is removed, 90% of the chassis is accessible for servicing without taking it out of the cabinet. Saves time and effort! Even the back of the cabinet is specially designed to come off in seconds with just 5 easy-turn clips—no screws!



**ONLY HANDCRAFTED ZENITH**  
**has metal cone circuitry check points!**

Metal cone circuitry on the new Zenith Color TV chassis makes a majority of test points accessible on top of the chassis. You do not have to remove the chassis from the cabinet. Makes servicing easier, faster, less costly!



**Zenith's Special Training Program assures you an**  
**important role in the future of color television!**

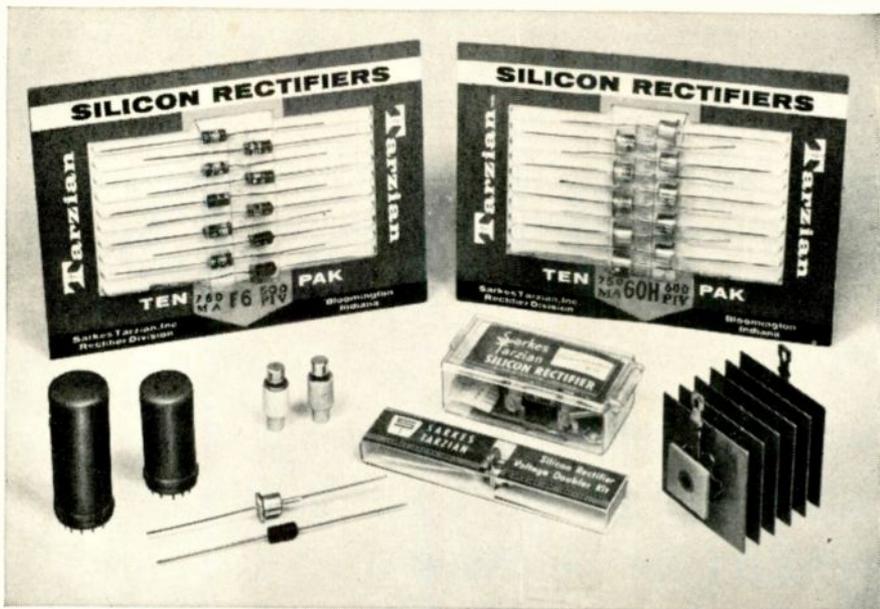
Zenith Distributors are conducting special color TV training programs now, and will continue these programs in the future. For complete information, see your Zenith Distributor.



ZENITH RADIO CORPORATION,  
CHICAGO 39,  
ILLINOIS. IN CAN-  
ADA: ZENITH RADIO CORPORATION OF  
CANADA, LTD., TORONTO, ONTARIO.  
The Royalty of television, stereophonic  
high fidelity instruments, phonographs,  
radios and hearing aids. 43 years of lead-  
ership in radionics exclusively.  
Specifications subject to change without notice

# ZENITH

*The quality goes in  
before the name goes on*



Tarzian 400 and 600 volt F and H series units are available in handy Ten-Paks, in Doubler Replacement Kits, and in bulk; M150 and M500 units are available in Conversion Kits and in bulk. Nine standard tube replacement rectifiers replace over 95% of all popular

vacuum tube rectifiers; S5347 replaces 6BW4 or 12BW4 in Citizen's Band radios; your 50 to 500 ma requirements are covered by four "condensed stack" selenium rectifiers, which Sarkes Tarzian has made more efficient—and smaller—than before.

## Sarkes Tarzian

...the preferred silicon rectifiers  
that mean fewer call-backs

■ Tarzian silicon rectifier dependability virtually eliminates call-backs that waste your time and profits. Units are available immediately from distributors throughout the country... in the shapes, sizes, and specifications you need to do your work quickly and easily.

Tarzian's industry-wide reputation for high quality at a pace-setting low price is a basic reason why more technicians like yourself prefer Sarkes Tarzian rectifiers than the next two most popular makes combined.

That statement is firmly based on the results of a 1961 mailing by Brand Name Survey, an independent research organization, to 23,000 service technicians in all major market areas of the United States, covering 36 states. You're in good company—and lots of it—when you make Tarzian rectifiers your first choice for replacement applications.

Free Tarzian "Distributor Line" catalog is available now as your guide to replacement rectifier quality. Ask your nearest Tarzian distributor for your copy.



### SARKES TARZIAN, INC.

World's Leading Manufacturers of TV and FM Tuners • Closed Circuit TV Systems • Broadcast Equipment • Air Trimmers • FM Radios • Magnetic Recording Tape • Semiconductor Devices

SEMICONDUCTOR DIVISION • BLOOMINGTON, INDIANA

In Canada: 700 Weston Rd., Toronto 9 • Export: Ad Aulema, Inc., New York

For more details, circle 39 on page 44

### Headlamp Control—Not Radio!

Editor, ELECTRONIC TECHNICIAN

See ET August 1961 issue, page 30, listing under Delco. If you will examine the figure showing parts you will find this is not an auto radio but is a GM Delco Guide-Matic power headlight control. Also, the 12K5 tube used here is a special 12K5 tube, UMS #5948660.

MERLE F. BARKER

Barker Electronics Service  
Concordia, Kansas

### Circuit Digests Complaint

Editor, ELECTRONIC TECHNICIAN

Since I keep an individual manufacturer's index to all of my Circuit Digests schematics, I have been wondering why you continue to repeat schematics from time to time? No. 547, appearing in the January 1960 issue, covering DuMont chassis 120601A, Model RA-601A, and No. 663, which appeared in the October, 1961 issue, covering DuMont TV chassis 120600A and 120601A, are identical. . . . I am not in favor of state licensing of servicemen. In fact, our local state Senator very recently told me that they didn't "want to mess around with this sort of control," so I guess they figure, in our state legislature, that competition will take care of itself. So why "growl" about the part-time servicemen, when the kind of product we put out ought to speak for itself, without regimented control by state law?

WALTER J. WILLIAMS

Williams Sales & Service  
St. Clair, Michigan

• We try to avoid repeats but because we received so many complaints on the January, 1960, DuMont schematic—printing too small and no voltage reading—we ran a better diagram in the October, 1961 issue. In addition, voltage readings and scope traces were added.—Ed.

### Orchids For Garner

Editor, ELECTRONIC TECHNICIAN

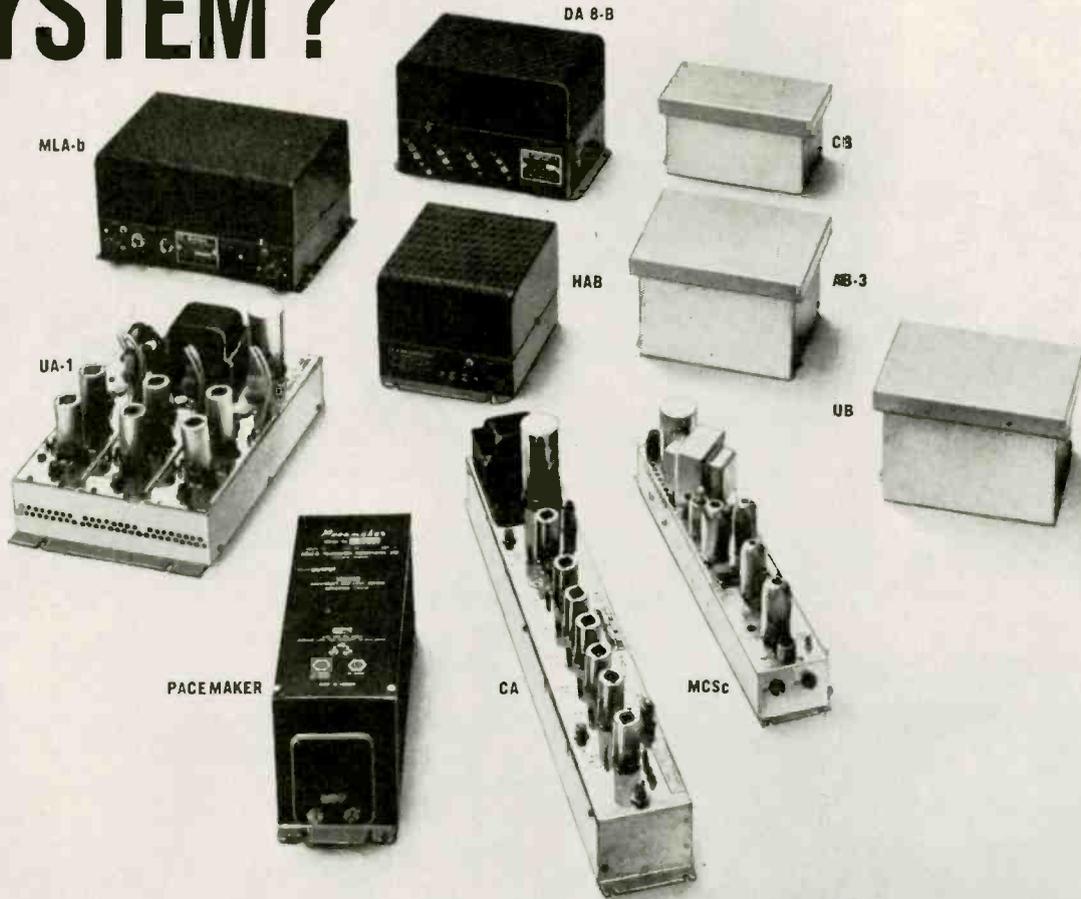
I was very much impressed with article on "A Bench View of Transistor Radio Defects," by Louis E. Garner, Jr., in the September issue. I was wondering whether Mr. Garner published any books on radio and also TV, which would describe defects as clear and brief as article I have mentioned.

JOE PEZZOTTI

Broomall, Penn.

• Louis Garner authored "Pinpoint Transistor Troubles in 12 Minutes," published by Coyne Electrical School, 1501 West Congress Parkway, Chicago 7, Ill.—Ed.

# PLANNING A MASTER TV SYSTEM?



select the ideal head end from the world's only matched and integrated line  
**BLONDER-TONGUE MASTER TV AMPLIFIERS**

	MODEL	IMPEDANCE INPUT	IMPEDANCE OUTPUT	FREQUENCY	GAIN MINIMUM	MAXIMUM OUTPUT *1% distortion **3% distortion	FEATURES	LIST PRICE
BROADBAND AMPLIFIERS	MLA-b	75 ohms	75 ohms	VHF	40db	*2 v/band	Separate hi & lo band gain & tilt controls.	142.50
	HAB	75/300 o.	75/300 o.	VHF/FM	25db	*0.9 v loband *0.6 v hiband **2.5 v loband **1 v hiband	Separate hi & lo band gain controls.	72.75
	PACE-MAKER	75 ohms	75 ohms	VHF/FM	VHF, 35db FM, 30db	*2 v/band	Separate hi & lo band input.	99.50
	AB-3	300 ohms.	75/300	VHF/FM	25db	*0.9 v loband *0.6 v hiband **2.5 v loband **1 v hiband	Remote power supply. Weatherproof mast mounted.	104.95
	DA8-B	75/300 o.	75/300	VHF	10db per outlet	*0.2 v	8 outlets for distribution.	99.50
SINGLE CHANNEL	MCS	75 ohms	75 ohms	VHF	35db to 46db	*1 v	Agc. dual mixing outputs.	140.50
	CB	300 ohms	75 ohms	VHF	18db to 20db	*0.5	Weatherproof for mast mounting.	57.75
	PA (not illus.)	75 ohms	75 ohms	VHF/FM	65db	*1 volt	Agc. low noise figure.	275.00
	CA	75 ohms	75 ohms	VHF/FM	60db	*1 volt	Agc. dual mixing output.	235.00
	CAP (not illus.)	75 ohms	75 ohms	VHF/FM	60db	*5 volt	Agc. dual mixing output.	295.00
	UA-1	75 ohms	75 ohms	VHF/FM (FM LIST 99.50)	35db	*1 volt	Requires external power supply.	59.25
UHF	UB	300 ohms	300 ohms	CH 70 thru 83	14db	*0.5 volt	Mast mounted with remote power supply.	84.50
	STRATO BOOSTER (not illus.)	300 ohms	300 ohms	CH 72 thru 76	20db	*0.5 volt	Mast mounted with remote power supply.	103.75

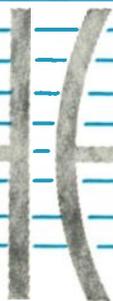


Today, contact your Blonder-Tongue distributor. Write for Free 28 page planning and installation manual. Free layout service. Also, engineering service available.

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Canadian Div.: Benco Television Assoc., Toronto.  
 Export: Rocke Int'l. Corp., N. Y. 16, N. Y.-CABLES: AR LAB  
 home TV accessories • UHF converters  
 master TV systems • closed circuit TV systems

For more details, circle 14 on page 44



# TUNING IN

**FAIR TRADE REVIVAL.** *Maurice Mermay, Director of Education on Fair Trade, New York, reports that: General Electric will fair trade color TV receivers, home laundry equipment and dishwashers in metropolitan N. Y. area. Westinghouse has a fair trade program for TV, phonos, and selected major appliances in N. Y. and N. J. In the Philadelphia area, Raymond Rosen Co., RCA distributor and Peirce-Phelps Inc., Zenith distributor are ready to fair trade color TV. Others include Andrea Radio for its TV franchise dealers in N. J., and the L&P Electric Co. for Fedders room air conditioners in N. Y.*

**PLUS TWO, MINUS ONE.** Admitted to membership in the Association of Better Business Bureaus, New York, N. Y. are two new Better Business Bureaus:

## WHAT'S COOKING



Designed for cafeteria use, this electronic oven permits patrons to "cook" their own meals in seconds with microwave energy. The "Radarange" oven, introduced by the Raytheon Co. at the recent National Hotel Exposition, has color coded push-buttons for automatic time cooking in flameless, heatless oven. Customers select pre-cooked, frozen dinners from refrigerated display cases.

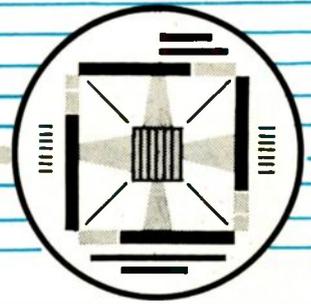
one in Nashville, Tenn., the other in Yakima, Wash. Suspended is the Denver area Bureau. According to ABBB's president, Victor H. Nyborg, suspension resulted from the Denver Bureau's refusal to relinquish the right to use the "Emblem of Truth" in its own advertising to promote the program locally. ABBB says this would leave the door open for the Bureau to list names of participating advertisers. ABBB policy prohibits the commercialization of the Better Business Bureau name and prohibits any BBB from approving, endorsing or recommending any company, organization, person, product or service directly or indirectly.

*RADIO-TV RADIATION proposed FCC label rules in the 30-890 Mc band needs clarification, says EIA. Points made are: Rules to be amended to show clearly that imported receivers are subject to certification. Back-panel positioning of seal considered impractical as in most cases the location is inaccessible and an affixed seal would not be visible and not always be seen by the purchaser. Proposed size, 1" x 3", considered inconsistent with miniaturization trend; if lettering is easily read size need not be specified. Lettering to contrast with seal's background and seal's color to contrast with cabinet finish would prevent silk screening and plastic molding of the seal, and these two methods should be allowed.*

**DON'T JUDGE** UHF station WUHF, New York, warned R. E. Lee, FCC member, while it is operating on half power. He said technicians might convert a TV set for reception over Channel 31, and be disappointed with the picture's quality in some areas. The UHF station will operate shortly at full power and have an antenna radiating in all directions. Mr. Lee also said technicians should exercise care in making estimates for converting TV receivers to UHF because of the antenna problem. The customer's rabbit ears or his present outdoor aerial and lead-in may work in some instances but, he said, many installations require a new UHF antenna and lead-in.

*200 MILLION TRANSISTORS is the year's production estimate by Japanese electronics manufacturers, according to EIA, Japan. This is based on the output of 83,500,000 units during the first six months and in the present rising rate of production. The sharp increase is attributed to, among others, an increase in transistor exports, valued at \$4 million for the first*

# THE PICTURE

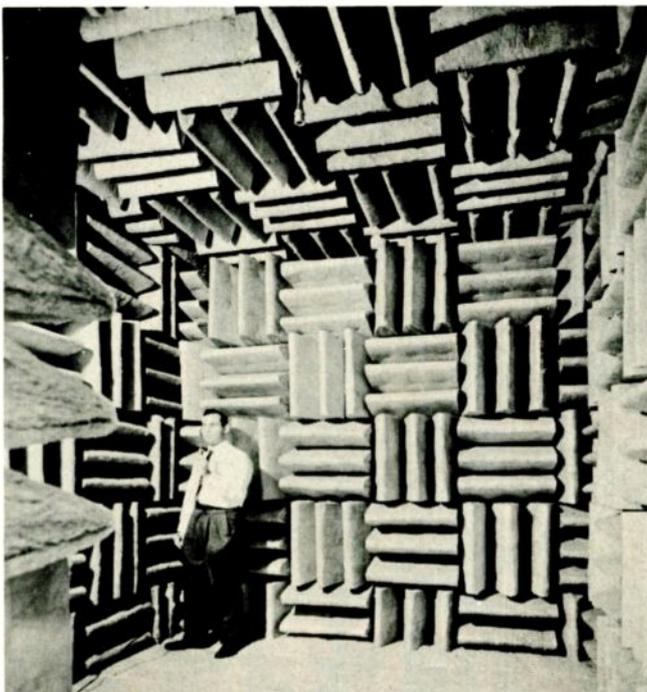


half of this year and comprising 20% of the total output, and the gain in exports of radios with more than three transistors.

SUBSCRIPTION TV will have a large scale operation over WHCT-TV, Hartford, Conn. late next spring. In preparation, Zenith has ordered *Phonevision* decoders from Veeder-Root, Inc., Hartford, to print subscribers' viewing records. Veeder-Root will also supply Zenith with direct reading indicators which will show subscribers when they have dialed the correct subscription program code.

*PHONETIC TYPEWRITER*, exhibited at the recent Acoustical Society of America meeting, transforms the human voice into typed code-like symbols. It uses some 5,000 diodes and 3,000 transistors and has three main electronic subsystems: a phoneme classifier, a control system, and a speech analysis system. Dr. Sakai, who developed the typewriter with an associate

## ANECHOIC TEST CHAMBER



This sound-proof chamber, recently installed at Shure Brothers, Inc., is used for the testing of precision microphones. It is entirely padded in sound-deadening, spun-glass wedges. The room is further isolated from building vibrations by an air-cushion that actually suspends the room independently.

## CALENDAR OF COMING EVENTS

- Jan. 23-27:** 3rd Annual Convention, Electronic Representatives Assn., (ERA), Hollywood Beach Hotel, Hollywood, Fla.
- Feb. 3-6:** 2nd Bi-Annual Palm Springs Conference. Southern Calif. Chapter, Electronic Representatives Assn., (ERA), Riviera Hotel, Palm Springs, Calif.
- Feb. 6-7:** 25th Regional Seminar, National Electronic Distributors Assn., (NEDA). Shrine Exposition Hall, Los Angeles, Calif.
- Feb. 9-11:** 2nd Pacific Electronic Trade Show, (PET). Shrine Exposition Hall, Los Angeles, Calif.
- Mar. 20-25:** 1962 Los Angeles High Fidelity Music Show, Institute of High Fidelity Manufacturers, Inc. (IHFM), Ambassador Hotel, Los Angeles, Calif.
- Mar. 26-29:** IRE International Convention, Coliseum and Waldorf-Astoria Hotel, New York, N. Y.
- Mar. 28-31:** 11th Biennial Electrical Industry Show and Conference. Electrical Maintenance Engineers Association of Calif. Shrine Exposition Hall, Los Angeles, Calif.
- Apr. 11-13:** S. W. IRE Conference and Electronics Show, (SWIRE-CO) Rice Hotel, Houston, Texas.

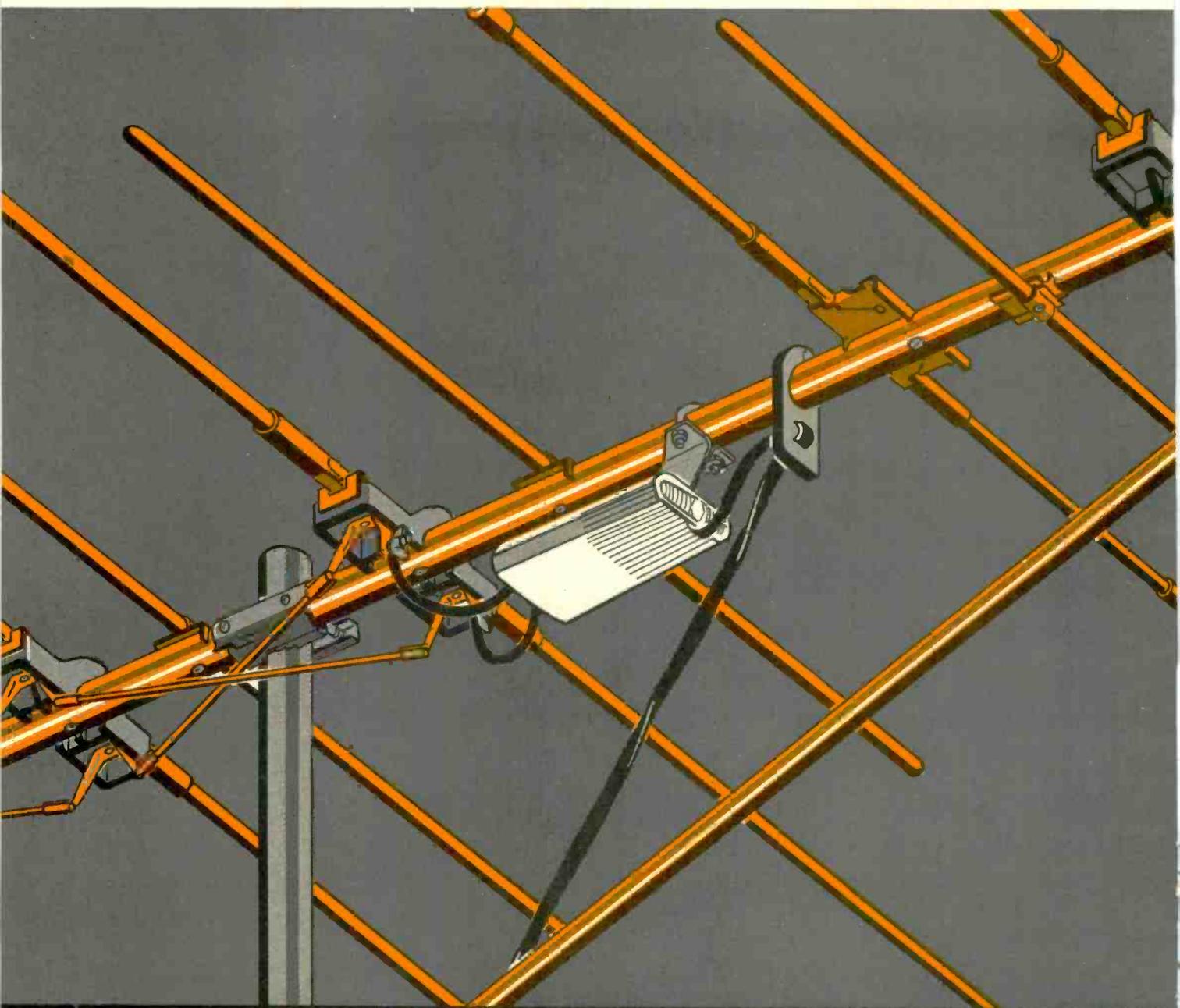
in Japan, told ASA members further research is underway on the automatic division of speech into linguistic symbols, and said the unit's language and transmission possibilities are unlimited.

ILLEGAL RADIATION persists despite FCC efforts to enforce the Communications Act passed in 1934. Cross-country violations recently disclosed by FCC include: Minneapolis, poor picture on a home TV set caused by use of old-fashioned and unapproved type of diathermy machine by next-door chiropractor. Alabama, transmission knocked out from a space vehicle, cause traced to emissions from a transmitter in Madrid. Louisiana, unlicensed radar used to track down speeders. Rhode Island, race track officials asked FCC to determine if radio was being used to flash race results. In a hayloft, the races were being watched through high-powered binoculars; beside the watcher were two radio sets. California, two-way radios were found in use by drag-racers to avoid the police.

*AUDIO-VISUAL LEARNING*, through community antenna systems, to be extended and improved. At the quarterly meeting of the Board of Directors of the National Community Television Association, plans were approved for full participation of its member systems in Civil Defense, emergency warning services and other public service programs in the national interest.

# The most powerful pair you can put on a TV mast!

*BEST...for black & white TV...color TV...and FM, too!*



## **CHANNEL MASTER<sup>®</sup>**

**GOLDEN CROSSFIRE** model 3600G

**JETRON** transistorized booster-coupler model 0020

## There are no lazy elements in the Golden Crossfire!

In less than three months, the Channel Master Golden Crossfire has become the most wanted antenna of all time! Dealers and customers alike have been quick to recognize the outstanding superiority of the Crossfire over every other antenna.

The remarkable performance of the Crossfire is made possible by the use of a revolutionary engineering principle . . . Proportional Energy Absorption. In other antennas, a great many of the elements are "lazy" on any given channel . . . they are not actively working. But in the Crossfire, Proportional Energy Absorption puts more picture-pulling elements to work on every channel. The result: the highest gain and front-to-back ratios ever built into a broad band antenna!

The Crossfire's performance is coupled with "take anything" construction that provides exceptional resistance to high winds and ice loading.

## Antenna-mounted booster... install it, then forget it!

The Jetron is built to last! Not only does it have fewer components than any other booster, but the Jetron amplifier pod on the antenna contains no transformer, no rectifier, no filter capacitor. These components are all in the power supply, right by the set, where servicing is quick and easy. This power supply also serves as a 4-set coupler.

The Jetron can be used with any make or type of antenna to add electronic power boost. You are not limited to a particular antenna. That's why the Jetron provides a convenient, trouble-free means of enhancing the performance of already existing installations.

## Here's why no other booster measures up to the Jetron!

FEATURE	Jetron	Booster A	Booster B	Booster C
No. of sets that can be coupled	4	1	2	4
Newest low-noise transistor	Yes	No	No	Yes
Low-cost AC operation	Yes	Yes	Yes	No
Antenna-mounted components subject to failure (electrolytic condenser, selenium rectifier)	No	Yes	Yes	No
No. of antenna mounted components	14	26	31	22
Highest gain on:	high band	low band	low band	low band
Consumer-appeal styling	Yes	Yes	No	No

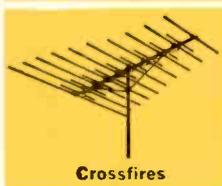
# PICK THE RIGHT ANTENNA FOR THE JOB! CHANNEL MASTER MAKES IT IN **GOLD...** AT NO INCREASE IN PRICE!

There's no need to sacrifice performance in order to meet a customer's desire for a gold antenna. Channel Master has the widest selection of gold antennas. Seventy-seven individual models are now available with Channel Master's exclusive E·P·C "golden overcoat".

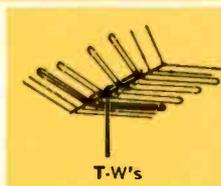
**ENHANCES** appearance for extra consumer appeal.

**PROTECTS** antenna performance against salt air, industrial atmosphere, chimney smoke, and other corrosive agents.

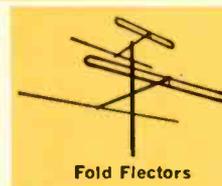
**CONDUCTS** electrical energy and assures metal-to-metal contact. Does not have to be scraped off like anodizing. E·P·C protects the entire antenna . . . and really lasts!



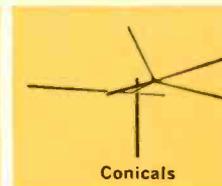
Crossfires



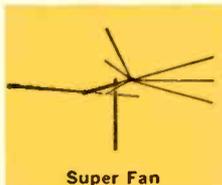
T-W's



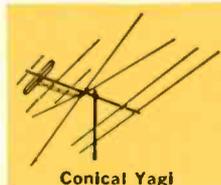
Fold Flectors



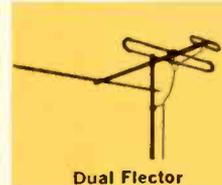
Conicals



Super Fan



Conical Yagi



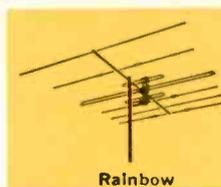
Dual Flector



City Vee



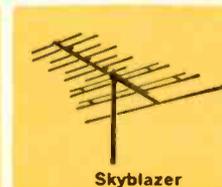
Champion



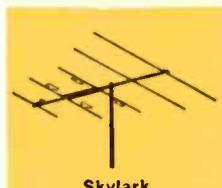
Rainbow



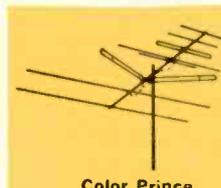
Super Rainbow



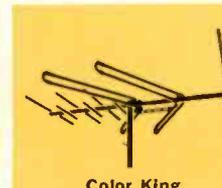
Skyblazer



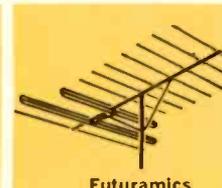
Skylark



Color Prince



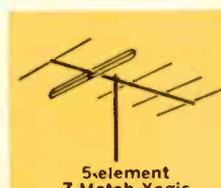
Color King



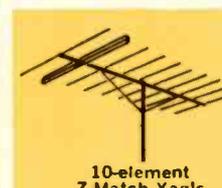
Futuramics



High Banders



5-element Z-Match Yagis



10-element Z-Match Yagis



UHF Para-Scope



3 element FM Yagi



5-element FM Yagi



10-element FM Yagi



FM Turnstile

For the best antenna of its type, select a Channel Master Gold Medal antenna.



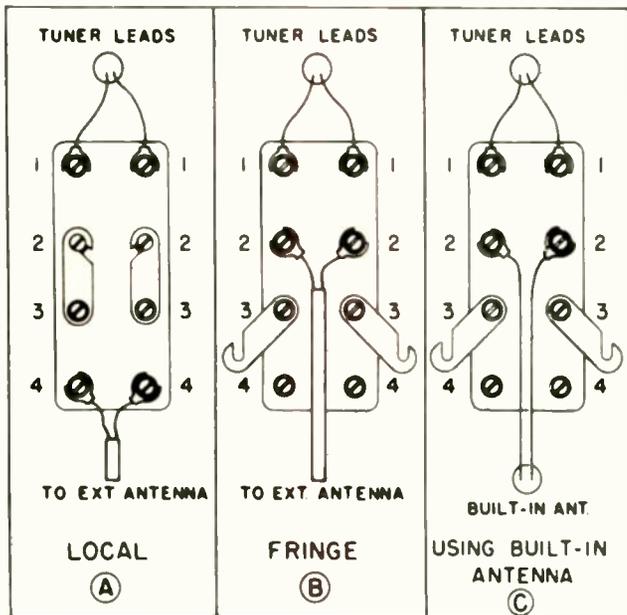
For more details, circle 18 on page 44

## ANDREA

### Chassis VT-123 — Antenna Terminal Board Connections

A built-in antenna is provided in this set for use in strong signal areas. This antenna connects to the two terminals marked No. 2, and the metal jumper strips (No. 3 terminals) are open.

If an outside antenna is used in a local reception



The antenna terminal board on Andrea chassis VT-123 provides separate connections for a built-in antenna, local outdoor antenna and for an outdoor antenna used in fringe areas.

area, the outside antenna's leads are connected to terminals No. 4, and the jumper strips are then connected between terminals No. 2 and No. 3.

In fringe areas the outside antenna leads are connected to terminals No. 2 with the jumper strips open.

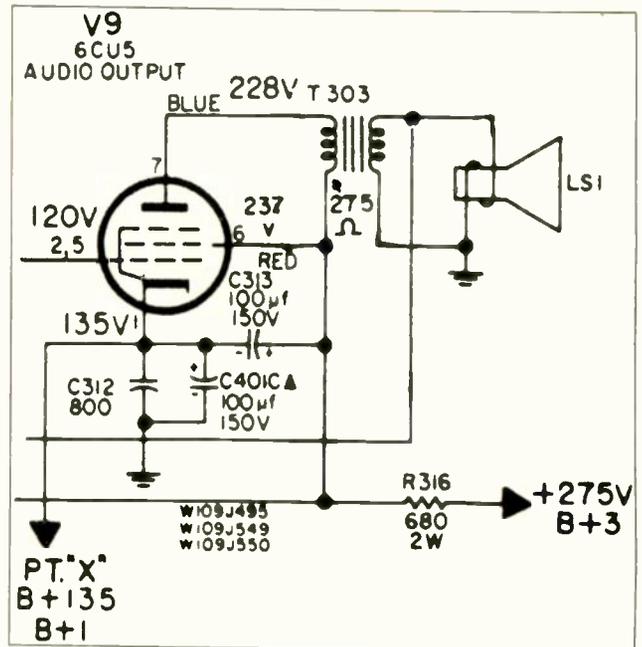
## GENERAL ELECTRIC (Canadian)

### Chassis M575 — Audio Output Transformer Connections

(See ET Circuit Digest #609 1/61)

The schematic diagram shows audio output transformer primary leads color coded blue and red. This is in error. Transformers being used have blue and yellow primary leads. Secondary leads are not color coded on the schematic and proper phasing of the secondary winding for satisfactory operation of the negative feedback circuit may be a problem.

While audio output secondary windings are usually colored green and black, with the black lead to



General Electric's Canadian Chassis M575 schematic showed audio output transformer primary leads color coded blue and red. Leads on transformers are actually blue and yellow. Since transformer's secondary leads are not color coded on schematic, it may be necessary to check speaker phasing for proper operation (see text).

ground, a few transformers have been used in this chassis with the green lead to ground. These particular transformers can be identified by the code FVD1 appearing beneath the regular part number — 783B776-2. If it becomes necessary to replace one of these transformers, first locate the ground lead of the defective transformer and then tie the black secondary lead of the replacement to this point.

## MAGNAVOX

### Model MV366 — Lead Dress Hum

Hum in this model may be caused by lead dress of the cabling extending from the TV chassis and the control chassis which contains the tuner and the loudness, contrast and tone controls. This condition can be eliminated by removing the short wire connected from the control chassis to the volume control "ground" terminal.

## PHILCO

### TV Chassis 12N54, Models 4850 and 5854 — Installing Remote Control Kit

If the cabinet back strikes the programming wheel after a RC-65 remote control kit is installed in these models, the tuner is improperly positioned. The tuning knob will usually be slightly tilted and not parallel



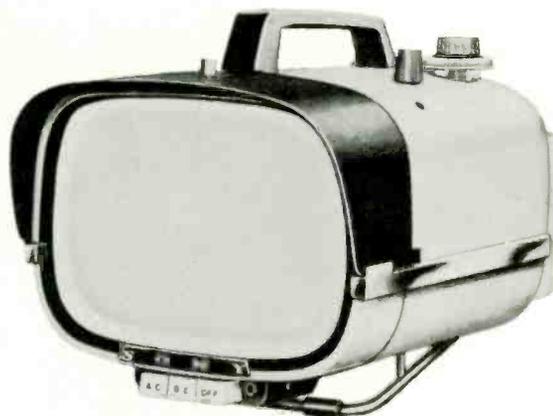
service kit  
for a SONY  
All-Transistor Television...

**SONY**® *Research makes the Difference*

**8-301W ALL-TRANSISTOR TV...  
EASIEST BY FAR TO SERVICE**

The screwdriver you see in the photo above is no exaggeration! In most cases, it's the only tool you'll need to service the remarkable new SONY 8-301W television set—lightest portable on the market (13¼ lbs.)\* and the only direct-view all transistor unit extant. Operates three ways: on a rechargeable battery pack, AC current or car/boat battery. Practically every component, from transistors and diodes, right down the line to resistors, capacitors and coils, is mounted on a set of four "snap-out" printed circuit boards. To service? Simplest thing ever. Just isolate the defective component, pull the board and replace the part. But better still, return the complete board to SONY's factory service department, and it will be repaired and returned to you in just days, at nominal cost. Then snap the board in, and the SONY 8-301W will operate like brand new. Equally important, you cut labor, reduce parts stocking, end tube checking (23 transistors, you know) and gain no end of customer satisfaction!

\*without battery pack



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For more details, circle 45 on page 44

# TV MANUFACTURERS TECHNICAL DIGEST

with the bezel. This condition can be corrected by removing the two tuner mounting screws and relocating them approximately ¼-inch higher. This should eliminate the tilt and allow the programming wheel to freely enter the protective cup on the cabinet back.

## PACKARD BELL

### TV Chassis 88-13 — Production Changes

A 1000 v, .01  $\mu$ f GMV (guaranteed minimum value) capacitor, C-80, has been added to the damper boost line. Connect the capacitor between terminal 6 of the 6DQ6 socket and ground (this is a tie point and is not connected to the tube). This eliminates parasitic oscillation in the horizontal sweep and is already added in sets stamped 3538 or higher.

Yoke 29758A was discontinued in this chassis and has been replaced with yoke 29797, which gives better interlace. When replacing yokes for any reason, use 29797.

PEC 24538B was replaced in some sets by PEC 24551. The latter had too much stray capacity and R-50, R-55 & R-57 had to be disconnected (by cutting

leads 1 and 2) and individual resistors wired in separately. Use 24538 for replacement although 24551 will perform as well when the aforementioned changes are made.

A 6EW7 is now used exclusively for the vertical oscillator and output tube instead of a 6DE7 or 6EW7. It gives better control of the height and vertical linearity. If insufficient vertical hold range exists, (picture will not roll downward with the 6EW7), change R-91 from 2.2 megohms to 1.8 megohms.

## RCA

### TV Chassis KCS 136 Series — A-C Input Tap

The primary winding of the power transformer used in this chassis has a tap which permits tube-saving operation in areas having high line voltage. Connecting the tap provides for operation at a design center of 128-volts; while normal connection, which is suitable in most cases, provides for operation at design center of 120-volts.

## WEBCOR

### Tape Recorder Model 2207 — Power Supply Changes

(See ET Circuit Digest #678 1/62)

The power supply circuit in this tape recorder has been modified by adding a fuse and by deleting two resistors. If an early production model is en-

## Fisher FM tuners are the world's most sensitive.

A simple under-the-rug dipole will seem to perform like a multi-element Yagi when there's a Fisher tuner at the end of the lead-in. Even the least sensitive of the new Fisher FM Stereo tuners with built-in Multiplex needs no more than 0.7 microvolts for 20 db quieting (2.2 microvolts IHFM); the most sensitive breaks all records with a 20 db quieting sensitivity of 0.45 microvolts (1.5 microvolts IHFM)! This kind of sensitivity can laugh at weak-signal areas... and makes up the important difference between mono and stereo FM sensitivity requirements with margin to spare. Explain Fisher tuner performance to your next customer with FM reception problems.

For more details, circle 24 on page 44

—USE THIS COUPON FOR DETAILED INFORMATION—

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ET102

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A high percentage of our fulltime resident students get their 1st class licenses within 12 weeks from the time they start the course. Intensive FCC license training is our specialty — not just a sideline.

## Is the course complete?

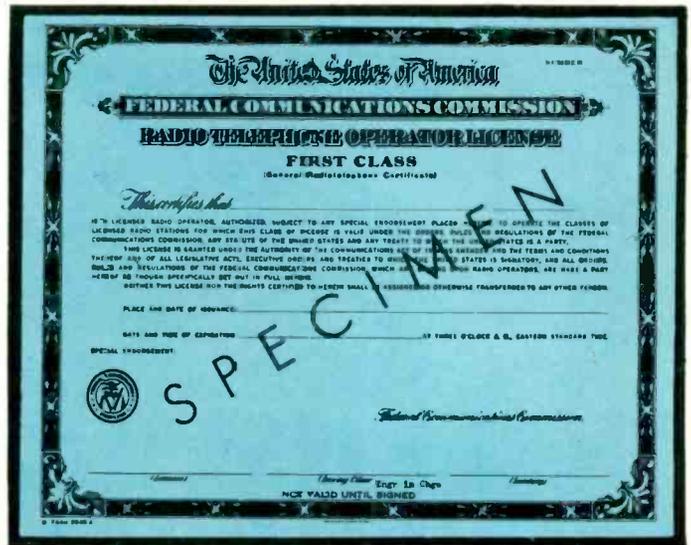
The Grantham course covers all the required subject matter completely. Even though it is planned primarily to lead directly to a first class FCC license, it does this by TEACHING you electronics.

## Is the course "padded"?

The streamlined Grantham course is designed specifically to prepare you to pass certain FCC examinations. All of the instruction is presented with the FCC examinations in mind. If your main objective is an FCC license and a thorough understanding of basic electronics, you want a course that is right to the point — not a course which is "padded" to extend the length of time you're in school. The study of higher mathematics or receiver repair work is fine if your plans for the future include them, but they are not necessary to obtain an FCC license.

## Is it a "coaching service"?

Some schools and individuals offer a "coaching service" in FCC license preparation. The weakness of the "coaching service" method is that it presumes the student already has a knowledge of technical radio. On the other hand, the Grantham course "begins at the beginning" and progresses in logical order from one point to another. Every subject is covered simply and in detail. The emphasis is on making the subject easy to understand. With each lesson, you receive an FCC type test so you can discover daily just which points you do not understand and clear them up as you go along.



## Is the course guaranteed?

The now famous Grantham Guarantee protects your investment. When such "insurance" is available at no extra cost, why accept less?

## Is it a "memory course"?

No doubt you've heard rumors about "memory courses" and "cram courses" offering "all the exact FCC questions." Ask anyone who has an FCC license if the necessary material can be memorized. Even if you had the exact exam questions and answers, it would be much more difficult to memorize this "meaningless" material than to learn to understand the subject. Choose the school that teaches you to thoroughly understand — choose Grantham School of Electronics.

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For more details, circle 25 on page 44

25



# TUBES



# ARRIVE

# SAME DAY!



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For more details, circle 26 on page 44



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(smart technicians stay with one major supplier!)

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For more details, circle 20 on page 44  
ELECTRONIC TECHNICIAN

# ET VIEWPOINT

## What's Ahead for '62

THE ELECTRONIC INDUSTRY did fairly well in 1961, but some serious weak spots held profits down and, in some cases, dropped sales below 1960. Industry sales hit over \$10 billion, and 1962 should see the figure climb to more than \$11 billion. Improved business conditions will aid growth, but a continued profit squeeze will combine with greater industry maturity to keep growth restrained.

While the annual growth rate exceeded 15 percent for the Fabulous Fifties, the Soaring Sixties will probably level off at 8 percent per year. Of course, this slower growth rate is very sizable in terms of dollars. The 1960 base of close to \$10 billion is almost four times the 1950 base.

The electronic service industry gross volume for labor and parts passed \$3 billion for the first time in 1961. Overall it was a fair year, and the growing use of color TV and other electronic devices in the home augurs well for 1962. The retail bill for servicing

should climb to about \$3.3 billion, a \$210 million gain over last year.

Manufacturers will be in better financial condition for the most part, but several shakeouts and mergers are still in the wind. Cut-throat pricing has placed several transistor makers in jeopardy. With fewer manufacturers in a firmer tube market, this area of the industry should hold its own. For one large TV set producer, 1962 may be do or die.

Large distributors will push harder for national coverage, absorbing smaller outlets where possible.

It looks like a fair year for service dealers, with a small gain over 1961. Licensing will be adopted in several areas. There will be greater activity in such "specialties" as color TV, transistor radio, hi-fi and communications.

In a nutshell, while 1962 is not expected to be a major boom year, it will be a good year, an improvement over 1961.

## Technician Know-How for Defense

As the nation focuses increasing attention at atomic defense, the role of electronic technicians becomes more important. In the armed forces and civil defense organizations, communications is a well established operation.

For the general public, however, we are still in the early stages of developing an adequate communications network. There's no sense in having a bomb shelter if there is no rapid means of notifying you to use it. Many millions of people are far beyond the range of conventional sirens.

This is where the electronic service technician comes in. The relatively simple installation of one of several electronic warning devices in the home can do the job. For example, in Dec. 1960 we described

the NEAR system — the National Emergency Alarm Repeater. Basically this is an alarm that plugs into the 60 cycle a-c line. A 240 cps carrier signal triggers the alarm.

Recently, a Richmond, Va., inventor was issued a patent for the AEBA system — Automatic Emergency Broadcast Alerting. It is triggered by the 1 kc tone broadcast by all stations during a Conelrad alert. Still other devices of this nature are bound to come.

When these electronic alarms become mass produced realities, not only will it be up to the nation's electronic technicians to install them, but to make sure that they work when triggered, and do not work when there is no signal to actuate them. Many lives may depend on it.

## VHF television receivers pickup UHF transmissions with top-of-set unit



Blonder-Tongue's Model BTU-2R "Ultraverter".

# How To Install And Service

by *Lon Cantor*

Blonder-Tongue Labs., Inc.

■ Most of us are aware that the FCC is pushing for more extensive use of UHF for TV stations. While the switch to UHF appears logical, it presents some problems. For example, a new UHF station going on the air in a VHF area has the problem of TV receivers in the area that aren't equipped to receive UHF transmissions.

### UHF Converters

With the reawakening interest in UHF, as evidenced by the number of new UHF stations all over the country, TV technicians will be called upon to convert VHF TV sets to receive UHF stations. If the VHF TV set doesn't have a tuner that can accommodate UHF strips, a UHF converter will make UHF reception possible.

The typical UHF converter sits on top of the TV set. It receives the UHF signal from the antenna,

converts it and sends it into the set at VHF frequency. As you would suspect, conversion is a mixing or "beating" process. The converter contains a tunable oscillator, which mixes with the incoming UHF signal. For example, the picture carrier frequency of channel 15 is 477.25 Mc. If this signal is mixed with a signal at 394.00 Mc, the output will contain the picture carrier of VHF channel 6. ( $477.25 \text{ Mc} - 394.00 \text{ Mc} = 83.25 \text{ Mc}$ .) In the same way, the sound carrier of channel UHF 15 is converted to the sound carrier of channel VHF 6 ( $481.75 \text{ Mc} - 394.00 \text{ Mc} = 87.75 \text{ Mc}$ .)

To receive channel 82, (878 to 884 Mc), the oscillator of the converter would have to be tuned to 796.00 Mc. This would convert UHF channel 82 to VHF channel 6. An oscillator frequency of 804 Mc would be required to convert 82 to channel 5. Most top-of-the-set UHF to VHF converters can be set to convert either to channel 5 or 6.

### Installation

Choose the proper antenna and converter to fit reception conditions encountered where the particular TV receiver is located. If this is a very strong signal area, almost any antenna will do, including rabbit ears. But a good high gain UHF antenna will generally be required. If

both VHF and UHF stations are to be received, a combination antenna can be arranged — using a single feed line and multiband coupler. In fringe areas, a high gain stacked array will normally be required.

Cable losses are much greater at UHF than VHF. When flat twin-lead gets wet or dirty, its loss may increase as much as six times. Therefore, if you use flat twinlead on UHF, you're inviting trouble, especially in weak signal areas. The system may work well when first installed, or in dry weather, but after surface dirt accumulates on the lead, or when reception is attempted in wet weather, increased cable loss may cause a snowy picture.

Heavy tubular, open-line, or other low-loss type line should be used on UHF antennas. And certain precautions should always be observed. For example, the lead-in wire should be kept at least one foot away from all other wires, drain pipes, or other metal objects. Stand-off insulators should be used to keep the cable away from the house. In weak signal areas, install as few stand-offs as possible to keep losses at a minimum. Also, keep the lead lengths short, avoid sharp angle bends and splices, wherever possible.

When tubular line is used its antenna end should be heat-sealed with a soldering iron or open

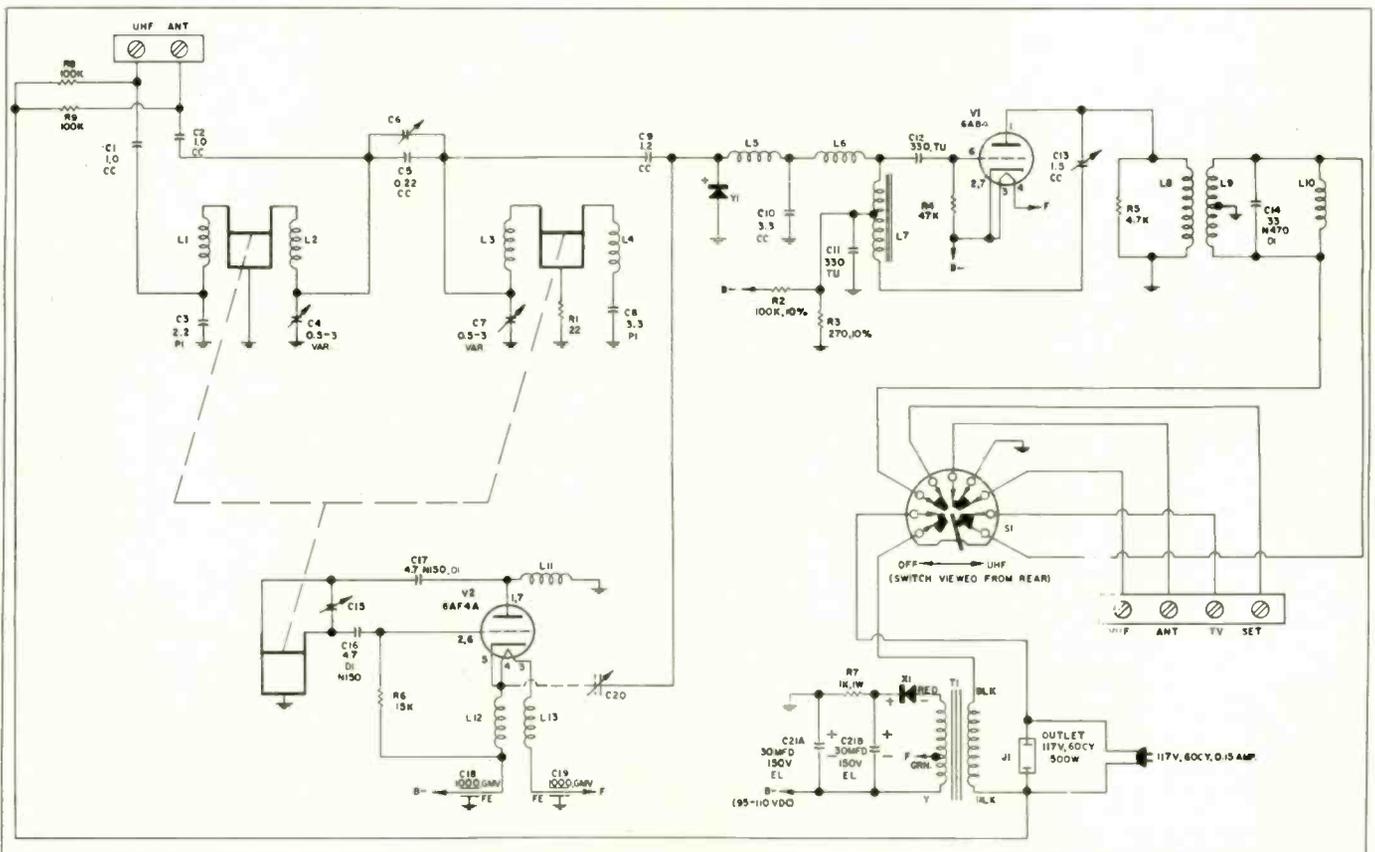
# UHF Converters

flame, crimping the plastic together in a water tight seal. An up-and-over top loop should be made here when the cable is connected to the antenna terminals. This will prevent water seeping into the cable

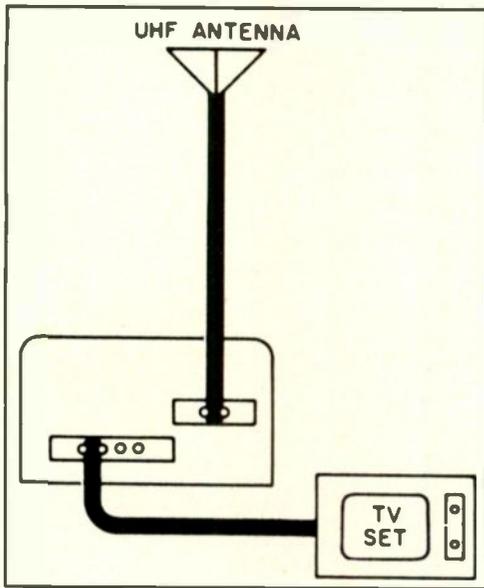
## CHART I

### Converter Troubleshooting Chart

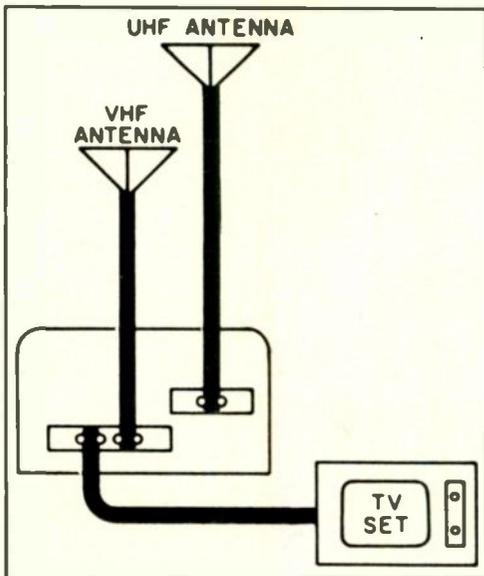
Symptom	Cure
1. No picture or snowy picture	Substitute tubes; check selenium rectifier; tighten tube socket, clean and lubricate tuner rings; check all solder joints; check filament voltage.
2. Intermittent	Tighten tube sockets; clean and lubricate tuner rings; check thermal relay (if used); check trimmer capacitors (if intermittent, remove trimmer screw carefully, apply "Lubiplate" inside capacitor with pipe cleaner and adjust screw to approximate original position.)
3. Oscillator Drifts	Substitute oscillator tube; clean and lubricate tuner, check filament voltage and B voltage



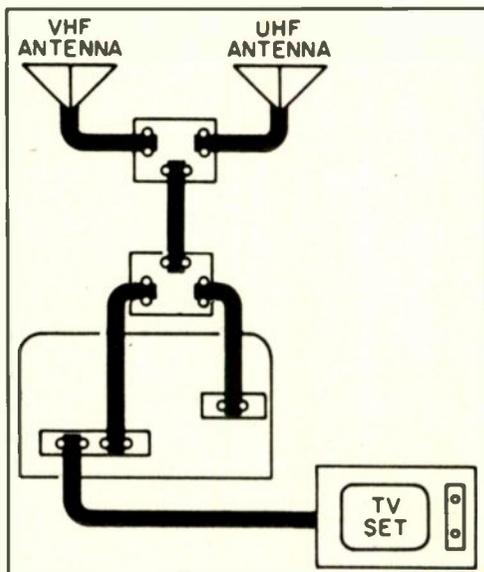
Schematic of the BTU-2 "Ultraverter" continuous tuning UHF TV converter.



Single antenna connected to converter for UHF reception only.



Separate antennas and feed lines connected to converter for UHF/VHF reception.



Separate VHF/UHF antennas can be coupled to a single feed line by using a multi-band coupling transformer. Another coupler is used to match feed line to converter.

if the seal opens. The loop should be taped tightly to the antenna to maintain its position and prevent strain on the connecting terminals. A drip-loop should be provided in the cable where it enters the house. A small hole is made at the loop bottom to allow water to drip from the cable. The loop also prevents water seeping through the wall cable entrance hole.

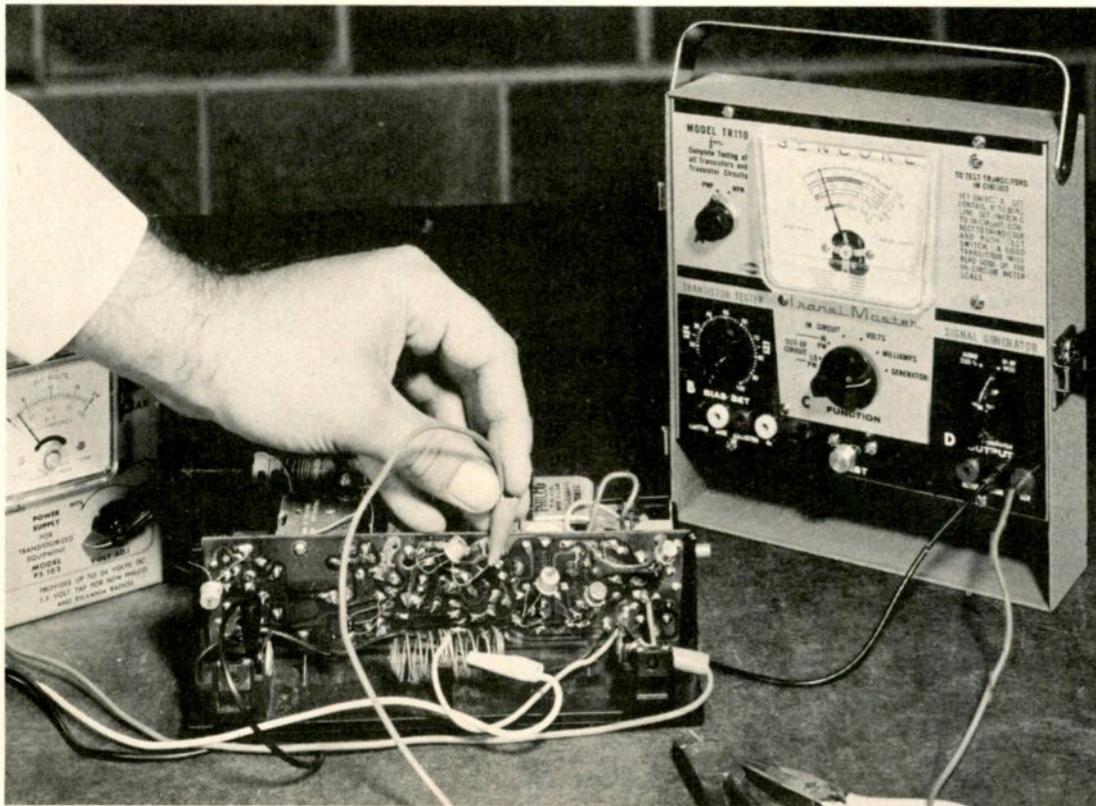
A mast mounted UHF pre-amplifier may be required in weak signal areas.

#### Servicing Converters

The TV technician should have little difficulty servicing UHF converters. Most troubles can be traced to a defective tube, diode, rectifier or poor contacts. Most converters made today have stable oscillator circuits, and alignment is rarely necessary. Of course, you have to be careful not to disturb adjustments during servicing. Any movement of the coils, silver strips or trimmer capacitors can cause misalignment. Once the unit is misaligned, the best thing to do is to send it to the factory, unless you have the equipment for UHF alignment. Some typical converter troubles and cures, are listed in Chart I.

#### Profit Potential

The shift to UHF represents an excellent potential for profit to the alert television technician. For example, one manufacturer has estimated that more than \$100 million will be spent, in the New York area alone, for UHF conversions. Electronic service dealers are in an ideal position to cash in on this business. While some converters will be sold to do-it-yourselfers, the average person prefers to have his converter (and antenna) installed by an expert. Service dealers who identify themselves as UHF headquarters in their area, as soon as they hear a UHF station is scheduled to go on the air, will have a headstart on competition. Bear in mind that UHF is not much different from VHF. Tie-in with a converter manufacturer and the UHF station in your area. They may be able to supply you with valuable sales aids. ■



**Fig. 1 — Philco radio is powered during test by Sencore PS 103 power supply at left. Harmonic generator in the TR 110 transistor analyzer at right is used to locate defective stage.**

# Practical Approach to Transistor Radio Service

How to track down trouble  
 Understanding what different tests accomplish  
 Interpreting results

*by Herb Bowden, President and Jim Neuman, Field Engineer*

Sencore, Inc.

*Last month the authors described how transistor radios play satisfactorily on reduced battery voltage. Even more dramatic, they showed how transistors can be replaced almost at random in some cases — and the radio still plays! There is often much margin for error in transistor operation. This is not an excuse to make repairs in a hit or miss way. That's too time consuming. In this article, the authors give us down to earth information on bench testing transistor radios quickly and effectively.—Ed.*

■ According to a recent survey, 30 to 40 per cent of all transistor radio troubles are in the battery, battery connections or due to corrosion. So these are the first things that you should tackle.

A power supply is very helpful as it will provide the power and monitor the current drawn. If the radio should operate immediately, you have pin-pointed your trouble.

If no current is being drawn, the B+ printed ribbon should then be followed down to look for a break in the board. It is handy to have a voltmeter to measure the B+ at

the distribution leads. Watch for voltage drop-off.

A second feature, which is present on some transistor circuit analyzers, is current measurement. This is especially handy when it comes to finding cracked boards. A metal divider placed across various sections may cause a sudden current increase. If so, you have found the cracked spot. Likewise, a shorted section can be found by opening main leads with a razor blade and noting the current change. Average currents are listed on all popular schematics.

Once the power supply has been eliminated as the source of trouble, the defective stage should be isolated before proceeding further. This can be done with a conventional signal generator, or even faster by the new harmonic generators. The harmonic generators are much like noise generators in that they require no tuning and can be applied to each stage from the speaker to the antenna. When the noise stops in the speaker, you have found your open spot. The transistor circuit analyzer, of the type shown in Fig. 1, employs the harmonic principle for r-f and i-f checks, but uses a sine wave for audio checks in order to determine distortion in these stages. Other analyzers on the market use the conventional r-f, i-f signal injection throughout the radio.

### Fixing The Defective Stage

Once you have tied the trouble down to a defective stage, the quickest method of determining the cause is to check the transistor first. This is especially true if the transistor tester has an in-circuit check. The in-circuit check provides a check on the ability of the transistor to amplify and feed back a signal great enough to sustain oscillation in a special low-impedance oscillator. This check will quickly tell you whether the transistor is working or not. It will not tell you whether or not the transistor is really up to "snuff." Also, a direct short in the circuit will cause the transistor to read bad if it is good. However, this does really signify a shortcoming as the transistor would have to be removed anyway to check the circuit that is shorted. If on the other hand, the transistor is shorted, and it is in many cases when this happens, the transistor must be removed for replacement. The in-circuit check requires much less time than out-of-circuit checks or substitution of transistors.

In-circuit checks are measured on the lowest scale of the meter shown in Fig. 2. Note that the scale is limited. Most transistors will come to about the same spot in this small area because the internal circuitry of the tester limits

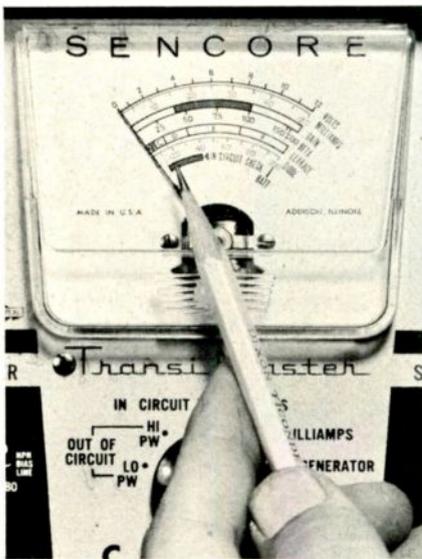


Fig. 2 — Lowest scale on transistor tester is for in-circuit tests. It rapidly tells if transistor is working, but does not specify how good it is.

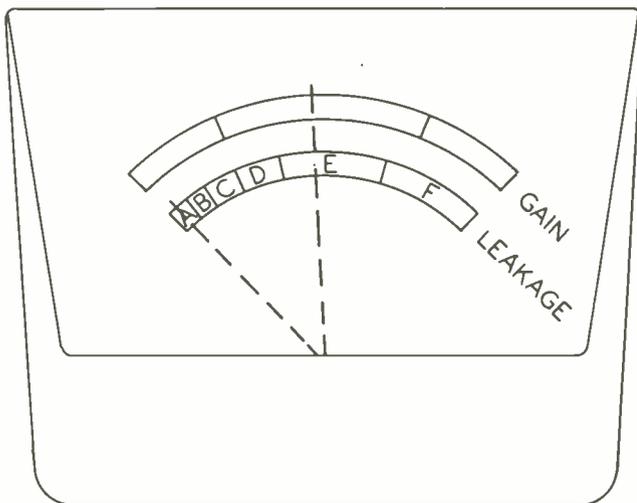


Fig. 3 — Out-of-circuit transistor test showing medium gain and low leakage (A on scale) is typical of normal, good transistor.

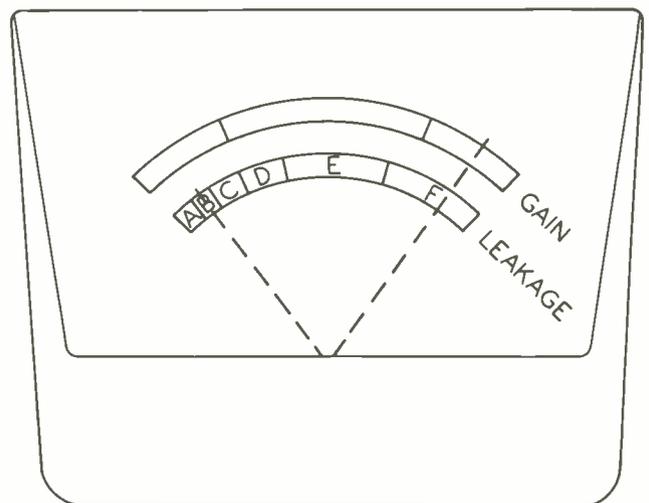


Fig. 4 — Transistor with very high gain causes higher leakage reading (B on scale), but it is still a good usable transistor.

the current. If this were not done, some transistors would indicate higher than others and the user might interpret them as better, when actually, this is not the case. This test merely indicates that the transistor is working.

Once the transistor is out of the printed board, you should take advantage of this to make an accurate out-of-circuit check. A d-c check is provided on the transistor tester for these accurate tests. The a-c oscillator check can also be made if you are in a hurry. The d-c transistor measurements are made because d-c can be controlled a little easier. Also, d-c and a-c gain measurements are virtually the same, except for very high frequencies. Service type testers do not test at these high frequencies, so from a practical standpoint, one is really as good as the other.

#### Out-Of-Circuit Checks

There are a number of times when you wish to make a more accurate out-of-circuit check on transistors. You may want to substitute a transistor and wish to compare it electrically to the one that was just removed from the circuit. You may want to match transistors in the audio output stages ( a direct reading beta scale is provided for this). You may want to learn if the transistor is absolutely bad, thereby necessitating a substitute tran-

sistor. You may want to compare one manufacturer's transistor against another's to help you determine which to purchase. These are only a few reasons for making out-of-circuit checks.

One thing that you can do with out-of-circuit transistors is to check the gain. This is called beta, just as the gain of a vacuum tube is called mu. Beta varies from mu in that beta measurement refers to current gain, while mu refers to voltage gain. A transistor tester can either be calibrated in beta directly or the tester can be made so that the bias is changed so that the transistor reads just good or bad, much as a tube tester.

The tester in Figs. 1 and 2 has both a good-bad scale and a direct reading beta scale. The beta scale is seldom used. It has about the same practical application as Gm readings on a tube tester. The tester is set up to either NPN or PNP, depending on the formation of the transistor. This can be determined from the set-up information or by switching back and forth until you get a reading. You can't do any harm in the wrong position. The function switch on a tester is set to out-of-circuit, either low power or high power type. This can often be determined by the size of the transistor. The bias control is set from the book for most accurate measurements, or to the bias

line for quick checks or when reading beta direct. Push the test button and you will be able to read gain.

Most transistor checkers check leakage also. From a practical standpoint, the leakage from the collector to the emitter with the base open is a more important check than gain. Release the test button and the meter reads leakage. The set-up chart indicates the allowable leakage.

#### Interpreting Test Results

It is easy to misinterpret test results on a transistor tester. The reason is that the transistor is unlike a vacuum tube because the transistor's different elements are tied together. Vacuum tube elements are separated. Because of this transistor inter-connection, one measurement has an effect on the other. It is evident when studying the formulas that are used to make up the set-up information provided with these testers that leakage is automatically higher when gain is higher. This means that you must always consider the ratio of the two instead of gain and leakage alone. For example, if we were to test a 2N129 transistor, the set-up chart indicates the following:

TYPE	LEAKAGE	BIAS SET
PNP	A	56

If the 2N129 is a normal acting transistor, the gain reading will fall into the middle of the green area, and the leakage indication will be in the middle of the A leakage section on the leakage scale, as shown in Fig. 3. If the gain of the transistor is exceptionally high, the transistor could check as shown in Fig. 4. Note that the leakage falls into the B section of the leakage scale. This is a good transistor even though the leakage reads a bit high (because of high gain), and should not be rejected. On the other hand, the readings could appear as shown in Fig. 5. Note that the gain is low and the leakage is high, falling into the C section of the leakage scale. This transistor should be rejected.

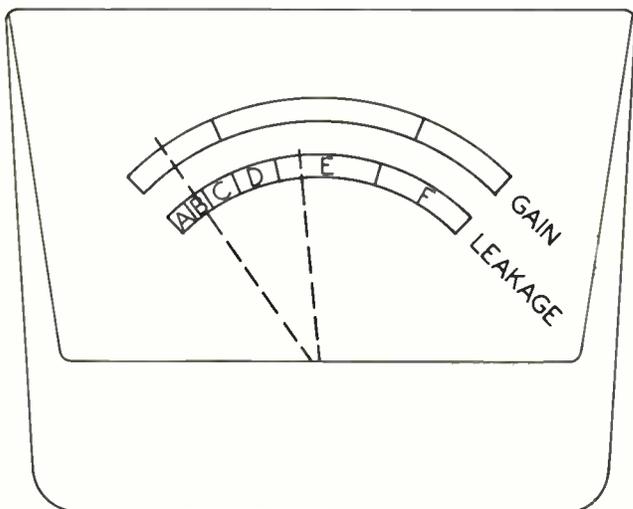


Fig. 5 — A low gain combined with high leakage reading (E on scale) is the mark of a bad transistor which should be replaced.

Continued on page 73

How to make precise frequency response  
and distortion tests

# Advanced Alignment Methods for Hi-Fi Tuners

by Norman H. Crowhurst

■ Obviously, there's more to high fidelity FM tuner servicing than simply substituting a defective tube or other component. A thorough job, by today's standards, must provide optimum equipment performance — with accurate checks on frequency response, distortion, and dynamic range.

It's very well for me to say this, but how can the average service shop afford the facilities involved? Admittedly, this is a problem. Adequate equipment for advanced — third echelon — servicing, *is* expensive. But there are ways of solving this problem. I personally believe, for instance, it is possible to design and produce test equipment which can be used by the hi-fi service technician for accomplishing a third echelon job — without having to purchase a shelf full of "lab-standard" equipment.

## Second Echelon Approach

Let's face it. In recent times the audiophile's appetite for higher standards and refinements has been whetted by technical advancements in this area. And we all know that second echelon methods of tuner alignment is purely visual, hinging primarily on the technician's personal judgment. For example, how well can you discriminate between

a straight line, and a slightly curved one? Can you detect a 1%, or a .1% curvature in the line? We already know this is not a practical approach to the cold realities of servicing.

For example, in second echelon work, we adjust the phasing of a scope trace until left-to-right coincides as closely as possible with right-to-left. Then we flip the scope's blanking switch to knock out one of the traces to avoid a double line — to make it easier to perform the job at hand. But then we realize the double line is usually there, in the first place, because of distortion!

Actually, we are using a 60 cycle sweep here, and view that part of the wave from negative peak to positive peak, which moves the spot from left to right. The return half is blanked out. Alignment on the visible part may well be achieved by putting the distortion kinks where we can't see them. Believe me, it happens!

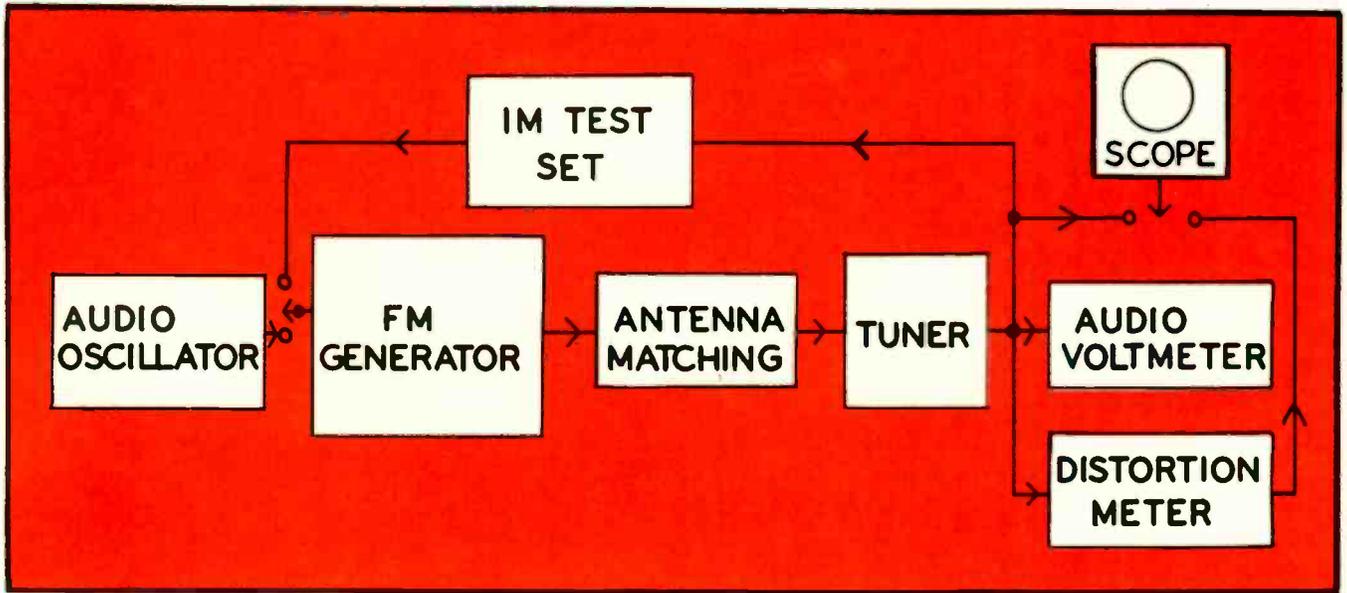
Likewise, by using 60 cycles for the sweep, the transfer curve we see is determined by the way the tuner behaves with 60 cycle modulation (actually overmodulation, but still at this frequency). The performance we set for only applies to 60 cycles modulation.

So the question naturally arises, is the tuner's distortion more or less at other frequencies, say at 1000 cycles? What's the frequency response? The afc circuit could have too short a time constant, causing low frequency loss. You may suspect bass loss by listening to it, but you'd never know for sure, or be able to trace it, without performing more accurate checks than second echelon methods afford.

You can check the de-emphasis response in the audio section, but this assumes the radio section and demodulator handles everything "flat" to that point. It's almost like assuming a preamp is perfect and only the basic amplifier is checked.

## Third Echelon Servicing

Once you are equipped to handle amplifiers properly, the only thing you need to perform 3rd echelon tuner work is a lab-standard FM signal generator. With this instrument you can use a regular audio oscillator, harmonic distortion meter, or IM analyzer. A set-up for checking a tuner is shown here. You merely connect the signal generator, with impedance adaptors, balanced line and dummy antenna, to the tuner's antenna terminals.

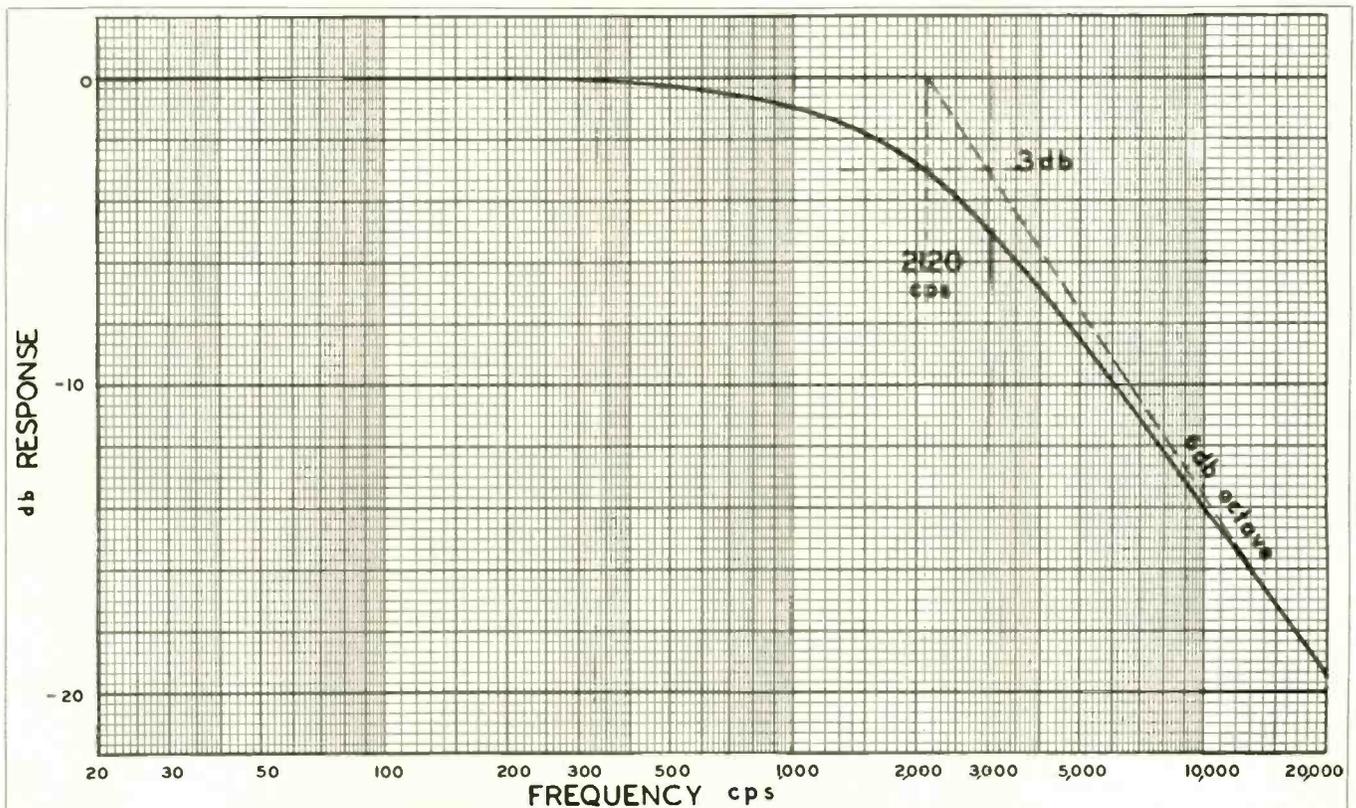


Complete test set-up for measuring a Hi-Fi tuner's frequency response, distortion, and dynamic range characteristics. Sensitivity and noise checks can also be made.

Then check the whole thing, from generator external modulation, as input to the tuner output, in the same manner as you would an amplifier. You can use the harmonic distortion test, set up at

1000 cycles, to optimize the alignment. It may be well, if the tuner is "way off," to do an approximate job with a sweep generator first. After this, the finishing touches are done with the distortion meter.

Set the FM signal generator to give 75 kc deviation with the audio oscillator at 100 cps. Then repeatedly align each stage in the tuner to work the distortion reading down to the lowest possible minimum. A



Correct frequency response curve for a typical tuner showing de-emphasis point on curve.

tuner aligned to a distortion null in this way will sound surprisingly "cleaner" than one visually aligned.

Try different signal levels to the antenna input by varying the FM generator output control. If changing antenna input level affects the distortion reading, and if different levels require slightly different final adjustments to get minimum distortion, you need to pick a compromise setting. Choose a setting where the average distortion remains low over a range of realistic levels.

This is important when attempting to obtain the best performance from a tuner in the home. The sweep alignment method may show a good curve (as closely as you can judge it visually) because you are working at an unrealistic level. At more normal signal levels, the over-all r-f response may be hopeless, causing considerable distortion. By using third echelon methods to make checks at various known levels, typical of your neighborhood, the set's performance can be optimized for its everyday job.

FM tuners seldom give better performance at one end of the band than at the other, unless the r-f section is way off. What causes variation in quality from different stations (which naturally may occupy different parts of the band), is usually the difference in signal

strength at the antenna. This assumes, of course, that the transmitted signal quality is good. This difference in signal level changes the tuner's response and causes more distortion at some levels.

Next, you can check IM distortion, which will reveal the low frequency distortion better than the sweep generator can. As with an amplifier, abnormally high IM distortion shows up as an inability to handle bass — it breaks up.

Run the audio oscillator input frequency through the audio range and check frequency response. This will show if the de-emphasis is in the right place (See Graph) and then determine whether the afc is blanking out some of the low frequencies by its attempt to follow the modulation.

In a sense, the third echelon method is less "visual" than the sweep generator method of alignment, so at first you "can't see what you're doing." For rough alignment, a sweep generator will be quickest. But for final alignment, which really gives you the performance designed into a tuner, there is nothing to beat the "feel" you will soon acquire with the third echelon method.

Finally, with the third echelon test, you can check the sensitivity, and the tuner's performance at any input level. This is a great advant-

age over the sweep generator method, where you get very little information about level. For sensitivity measurement, use a deviation of 22.5 kc (30% of the nominal 75 kc).

This will tell you when your output signal is 30 db above the residual noise when the input modulation is off. The antenna input setting required to obtain this information will reveal the tuner's maximum usable sensitivity.

With the same set-up you can check hum and noise. Simply remove modulation from the input, the same as you would to measure amplifier hum and noise, with the antenna input signal at a normal level. You can try a variety of levels typical of your neighborhood.

These last two checks, sensitivity and noise, enable you to do something that is impossible without third echelon equipment: optimize the tuner's operation for the actual signal strengths it receives in your area. With any tuner there is some latitude for trading bandwidth for sensitivity, or vice versa. But without measurements you cannot get the best performance for a particular range of levels.

If you're already upgraded to third echelon servicing for your amplifier work, you will quickly find it well worth while to equip for tuners. ■

## WHAT'S MY LINE?

USE a scalpel and forceps but am not a surgeon.  
use a stethoscope and a hypodermic but am not a doctor.  
use a dental probe and dental mirror but am not a dentist.  
cure tired old dogs and howlers but am not a veterinary.  
use dangerous chemicals and solvents but am not a chemist.  
read blueprints and schematic diagrams but am not an architect.  
draw up and sign legally binding contracts but am not a lawyer.  
find clues and make logical deductions but am not a detective.  
watch for smoke and clean up after fires but am not a fireman.  
collect many technical magazines and books but am not a librarian.  
use an expensive cathode-ray oscilloscope but am not an engineer.  
spin phonograph records and replace needles but am not a disk-jockey.  
compose handbills and clever advertisements but am not an editor.

*Continued on page 70*

# TOUGH DOG CORNER

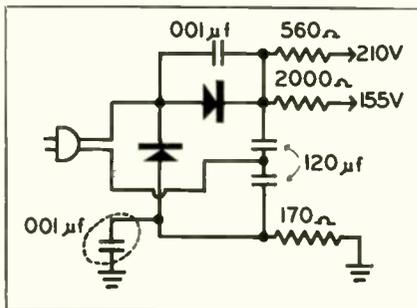


## Difficult Service Jobs Described by Readers

### Painful Parasitic

The trouble in this 19" Silver-tone portable was a sharply defined dark area in the picture. It caused no bending, and no poor sync but was clearly evident in the video amplifier's waveform, when observed on my scope.

An r-f probe indicated the distortion was in the i-f strip. This led me to believe the trouble was a-c



A parasitic "pip," caused by absence of of .001  $\mu$ f by-pass capacitor in the TV set's power supply rectifier circuit, resulted in a dark area in the picture.

ripple from the power supply. But hum content from the supply output as observed on the scope appeared well below the permissible amount. Substitution of silicon rectifiers, and filter capacitors gave no favorable results.

When the scope's vertical sweep was greatly expanded, a small pip could be seen in the power supply ripple waveform. At this point an unconventional thought came to me. Could a part have been left out of the power supply circuit?

Close inspection of the manufacturer's schematic revealed that a .001  $\mu$ f capacitor was missing from the rectifier circuit to ground. A new capacitor in the circuit cured the strange trouble immediately.—  
*Pat E. McGee, Monmouth, Ill.*

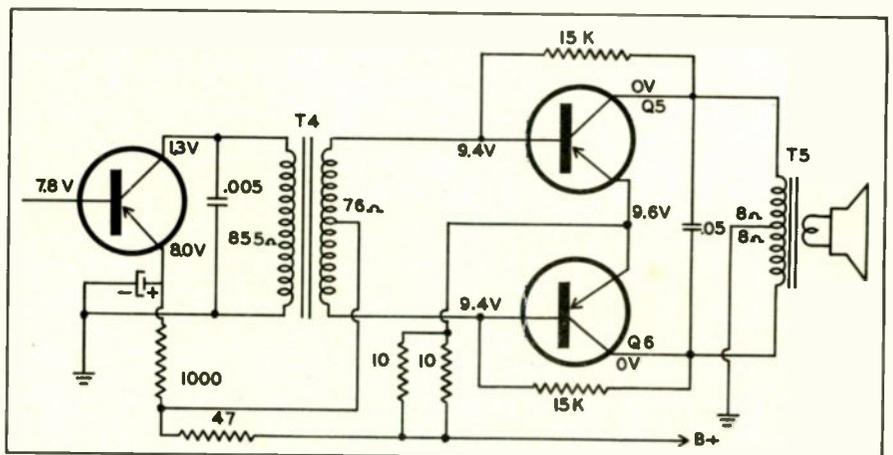
### Intermittent Transistor Radio

I recently serviced an Admiral model 7L1 transistor radio that gave me considerable trouble. It had an intermittent audio condition. The sound would suddenly become very weak and badly distorted, and one of the output transistors would overheat severely.

When the radio performed normally, voltages in the audio driver and output stages were very close to those listed by the manufacturer. But when the sound level decreased and became distorted, transistor Q-5 would overheat badly, transistor Q-6 would remain normal, the VTVM voltages read as follows: Transistor Q-5, emitter 5.90 v, base 5.75 v, collector 4.55 v. Transistor Q-6, emitter 5.90 v, base 6.85 v, collector 0 v. Both transistors checked good with my transistor tester.

I spent some time checking components and eliminating various possibilities, with no results.

I had originally suspected T-4, the driver transformer, since the



Intermittent short in top section of driver transformer, T-4, caused transistor Q-5 to overheat—with resultant distortion and reduced sound volume.

### TOUGH DOGS WANTED

\$10.00 paid for acceptable items. Use drawings to illustrate whenever necessary. A rough sketch will do. Photographs are desirable. Unacceptable items will be returned if accompanied by a stamped envelope. Send your entries to "Tough Dog" Editor, ELECTRONIC TECHNICIAN, 480 Lexington Ave., New York 17, N. Y.

d-c resistance of the secondary winding is part of the bias network for the output transistors. But I measured the transformer's resistance several times, and always found it OK. Finally in desperation, I ordered a new driver transformer and installed it. Normal operation was restored in the radio and my troubles were finally over. The transformer's secondary winding was obviously intermittent.—  
*Lambert C. Huneault, Windsor, Ontario, Canada.*

## Tube and component changes "soup-up" horizontal and HV circuits

# EXAMINING 1962

## TV Horizontal

by E7 Editorial Staff

● Modifications have been made in the horizontal sweep and high voltage circuits of some 1962 TV receivers. Advance knowledge of these circuit and component changes may prove helpful when technicians are called upon to service these new models.

### Admiral

Admiral's "picture guard" control (connected from the horizontal output tube's control grid circuit and the noise inverter tube grid), together with a re-ramped damper tube circuit, are two engineering efforts in the direction of improving circuit performance.

The new circuit eliminates a 1 megohm resistor between pin 5 and ground of the horizontal output tube circuit, and substitutes separate 820k, 100k, and 150k resistors in series to ground. The 100k resistor is a pot. The output tube bias, -33 volts, remains the same in both designs. This is part of the triple-function sync separator, gated agc amplifier, and noise inverter circuit employing a compactron triple triode tube. Purpose of the revision is to allow manual adjustment and compensation for various degrees of electrical interference which upsets sync stability.

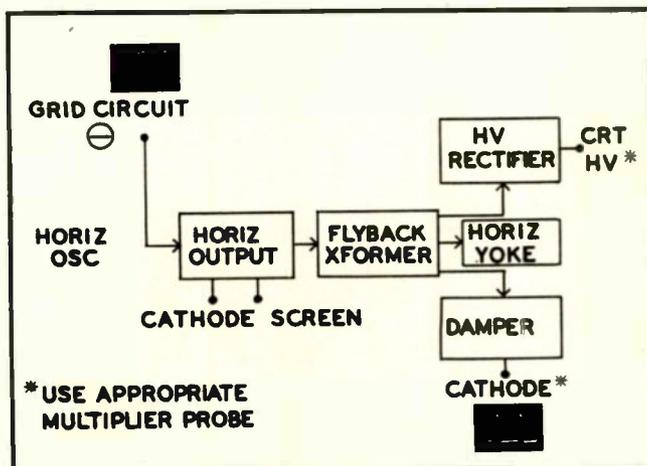


Fig. 4 — Block diagram of a typical TV's sweep section showing major check points and some waveforms.

In the damper area, some chassis have one, others two, r-f chokes and a capacitor, inserted to provide more efficient operation. The picture guard control is shown in Fig. 1.

### General Electric

G-E's recently introduced MW line is almost identical with last year's M6 TV receiver, with the exception of slight changes to increase high voltage 4 or 5 kv. The 6DQ6's screen grid resistor has been reduced from 13k to 12k ohms. The 4 kv capacitor across the 6AX4GTB's cathode-plate has been reduced from 315 pf to 260 pf. Boost has been increased about 50 volts. Slight changes have been made in the vertical and horizontal blanking circuitry. A .01  $\mu$ f and a .015  $\mu$ f 1 kv capacitor has been eliminated from this circuit. One end of the horizontal blanking signal winding on the fly-back now goes direct to ground.

### Magnavox

The 35 series chassis continue an automatic contrast and brightness control arrangement employing a

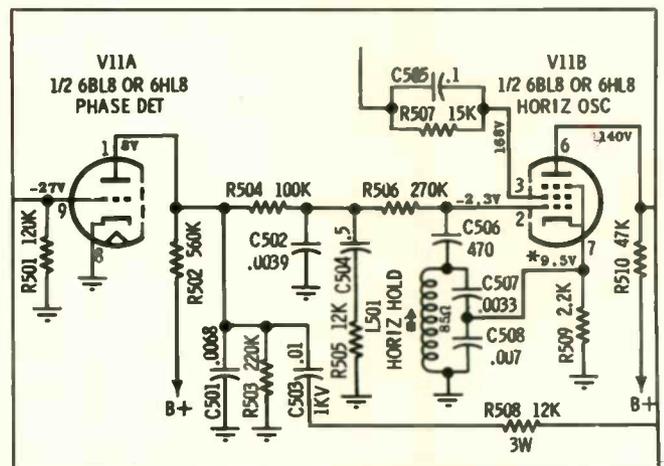


Fig. 2 — Motorola's slug-tuned Colpitts horizontal oscillator circuit.

# Sweep Circuits

calcium sulfide cell (See ET Manufacturers Technical Digest, June, 1961). Because of CRT cut-off characteristic variations, it may be necessary to vary the CRT's 1st anode voltage to obtain a correct ratio between the brightness and contrast throughout the light-dependent-resistor's range. This adjustment would not normally be required unless a new CRT is installed, but it is generally desirable to check this setting prior to installing a set for the customer. To check for proper 1st anode voltage, increase and decrease the amount of light in the room where the set is to be operated. By inserting a lead into one of two jacks in the lower right hand corner of the chassis, the proper voltage can be obtained. Alternate the lead between each jack until optimum performance is obtained.

The 35 Series chassis which employs a 27" CRT is also provided with a manual 2.5 megohm focus pot.

## Motorola

Except for Motorola's transistor TV and one  
*Continued on page 72*

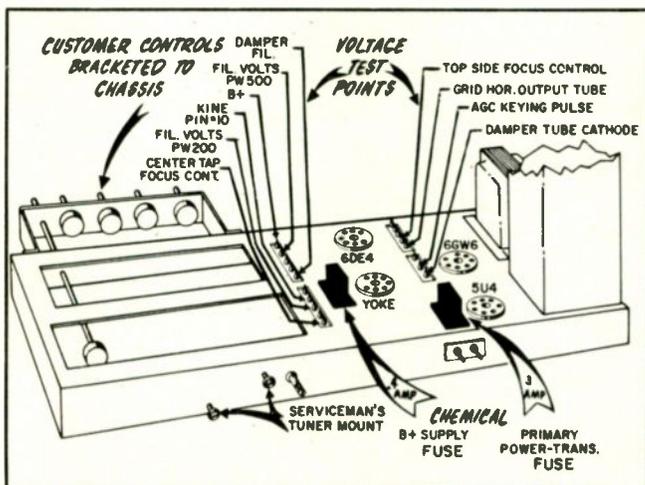


Fig. 5 — Some of the serviceability features of RCA's KCS136 chassis are shown here.

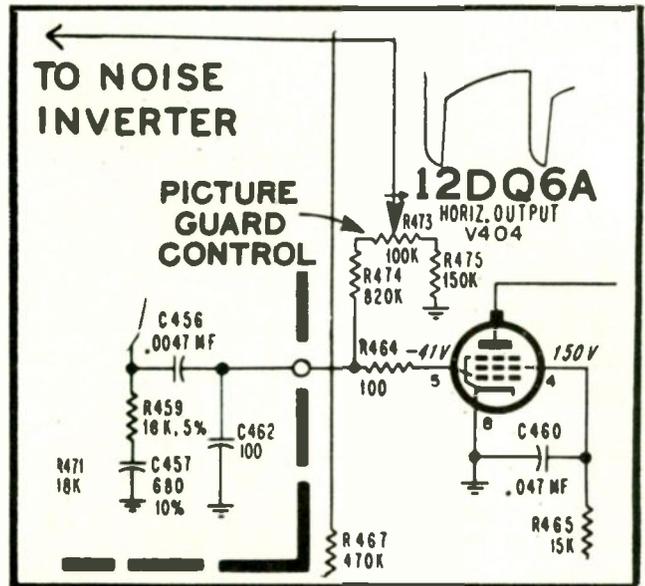


Fig. 1 — Admiral's "picture guard" control allows manual adjustment and compensation for different ambient noise levels.

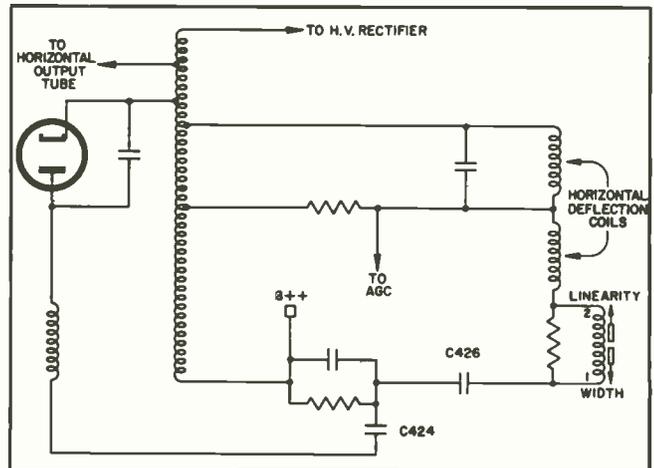
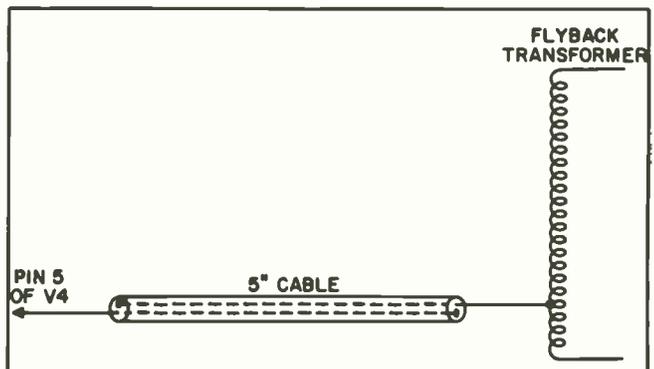


Fig. 3 (A) — Permanent magnet slug in rear of Westinghouse combination horizontal width/linearity coils adjusts yoke's current waveform shape. Front slug varies current amplitude in yoke. (B) — Pulse to keyed agc is coupled through a 5 in. length of concentric cable.



# SHOP HINTS

TIPS FOR HOME AND BENCH SERVICE

## Replacing Changer Ball-Bearings

Many record changers use loose ball bearings in a race under the drive gears or to float the turntable. At times it is necessary for technicians to replace a worn or chipped bearing. This can be a tedious job because the bearings may drop out of the race or slip from a technician's grasp as he tries to insert a ball in place.

I've overcome this difficulty by using plastic spray on the race and bearings. The tacky area of the ball and race permits me to hold both parts firmly while working on the changer.

After the individual bearing or race is properly positioned, I use a plastic solvent on the sprayed area.

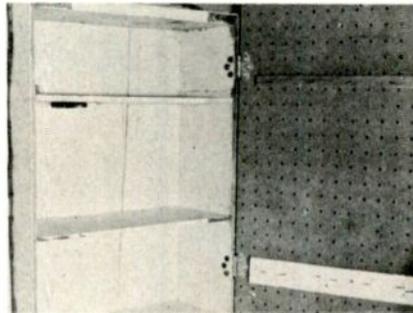
This hint is especially useful when working on foreign changers that employ unusually small bearings. — *H. Meermans, Wooster, Ohio.*

## Pegboards Upgrade Shop Image

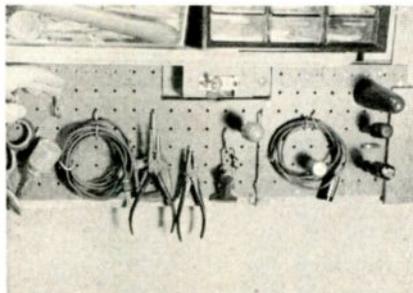
When a customer walks into a radio-TV shop where tools, wires, soldering irons, and other gear is spread around haphazardly, he frequently registers a mental image of "poor service." It seems many customers regard a shop's service standards by the way you arrange your tools.

My shop goes along with this line of thinking, therefore I utilize pegboards and a pegboard-fronted cabinet to hold and arrange tools in an orderly manner. A standard rule here requires a tool to be replaced on the board immediately after using it. A few hours of practice can get you into the "swing-of-things," and your shop soon acquires a professional appearance.

As an example, I have one pegboard mounted near the service bench, and I use "U" clamps held in place with nuts and short bolts to house my many hand tools.



A pegboard door (top) can be installed on a cabinet with hinges from the cabinet's regular door. Small machine screws and nuts are substituted for regular wood screws. Pegboards (bottom) are ideal for racking small tools. Various type hooks can be made quickly from heavy steel wire.



In addition, I have a wall cabinet with a pegboard front that houses my soldering tools, cheater cords and other servicing implements. On this board I have a few "C" hooks that I use to hold my small VOM and transistor tester.

We know where to find every tool and the shop has an on-the-ball technical look. — *Glen F. Stillwell, Manhattan Beach, Calif.*

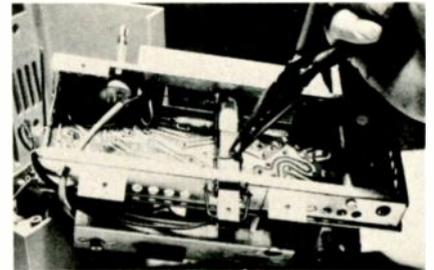
## Prevent Locking Of Clock Radio Dial

A GE clock radio model F-22-100 came into the shop dead. A tube fixed up the radio so it would play efficiently, but the dial would only turn half way. It was necessary to remove the radio's chassis.

At first, we thought the dial cord was slipping on the shaft but this wasn't so. A dial light assembly is mounted on the end of a folded fiber board with a pivot point at the rear of the chassis. The fiber

board had bowed out and caught on the printed wiring board half way across the dial.

To make certain this would not



Locking of dial drive on this clock radio was prevented by placing one turn of heavy wire around the dial light assembly. Ends of wire are twisted and then soldered.

happen again we wrapped a turn of copper wire around the fiber piece and twisted the ends tightly together. The twisted joint was soldered. — *H. L. Davidson, Ft. Dodge, Iowa.*

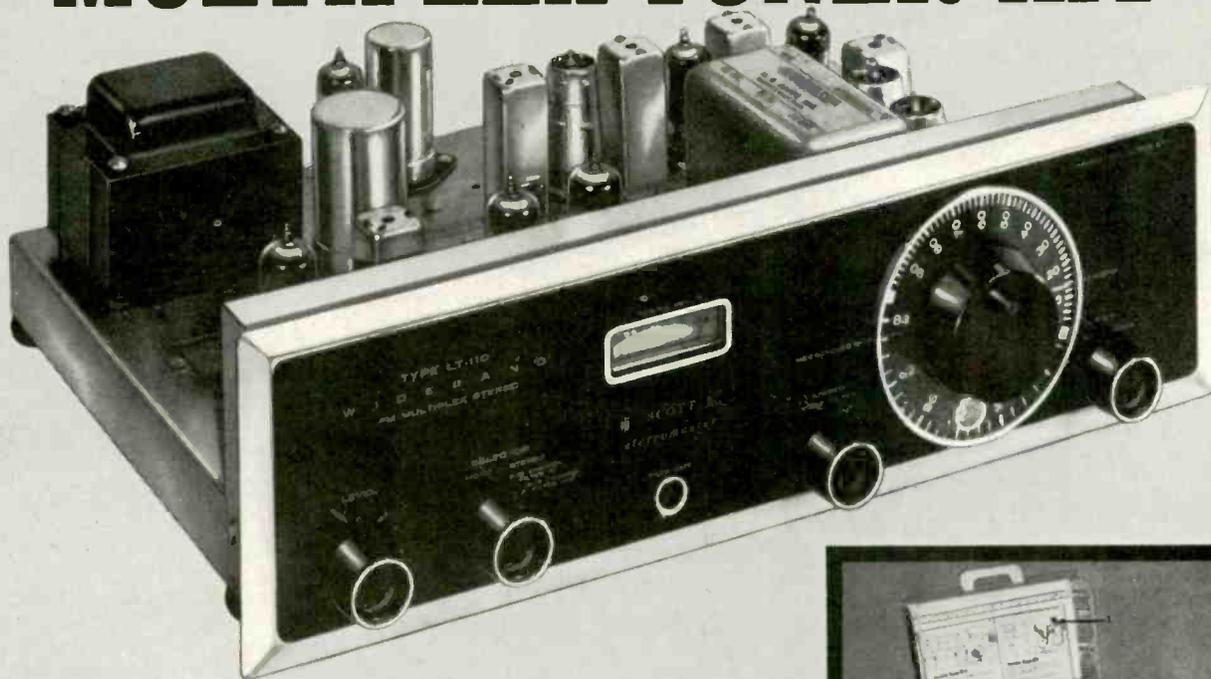
## SHOP HINTS WANTED!

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



"When you said, 'Pass me the screw-driver,' did you mean the six-sided Phillips, the reverse Allen, the straight split blade, the obtuse Bristol, the round clutch head, the Kirby head or the flat-head?"

# SUPERB NEW SCOTT MULTIPLEX TUNER KIT



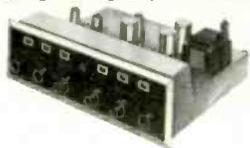
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Now have the fun of building a genuine H. H. Scott Wide-Band FM Stereo Tuner in just a few hours . . . and save money, too. Revolutionary Scott-developed kit building techniques assure you of performance equalling Scott factory units.

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Scott Wide-Band multiplex tuners are the standard of the industry. They have been chosen by leading FM stations from Boston to San Francisco. If you want to build a truly professional component choose a Scottkit. All H. H. Scott kits are backed by over 15 years experience in the design and production of superb components. Important features include front panel tape recorder output and precision illuminated tuning meter. All critical parts heavily silver plated. Unique Ez-a-Line system assures factory performance without expensive test equipment. Dimensions: 15 1/2 W x 5 1/4 H x 13 D in accessory case.

## New Scott Amplifier Kits to match the LT-110



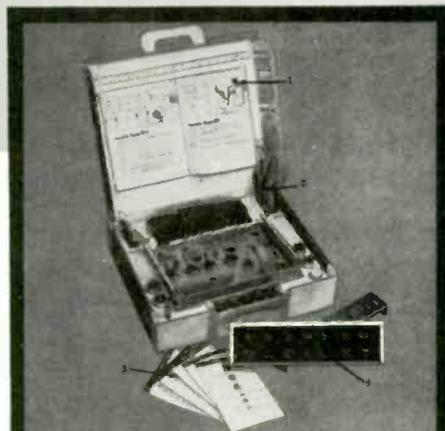
**LC-21 Preamplifier Kit**  
Performance so outstanding this kit is used for laboratory purposes. Hum level -80 db., distortion less than 0.1%, frequency response 8 to 50,000 cps. **\$99.95\***  
Matching LK-150 130 Watt Power Amplifier **\$169.95\***



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Plenty of power for any hi-fi system. Complete tape recording and monitoring facilities. Oversized transformers weigh 12 pounds! Performance equal to the best pre-amp/power amp systems. **\$159.95\***



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12 front panel controls. Gives full power down to 20 cps. Husky output transformers. All aluminum chassis and DC operated preamps. Scott quality at a best-buy price. **\$119.95\***



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For more details, circle 41 on page 44

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... for more details, circle 300 below

**2** *Parts & Equipment:* 1962 Catalog #210, 444 pages, lists over 60,000 items including large selections of tape and disc recorders. Allied Radio Corp.

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**4** *Needles/Cartridges:* A complete direct replacement phono cartridge and needle line, covered in literature, is reported as the industry's first and only. Electro-Voice, Inc.

... for more details, circle 303 below

**5** *Antennas:* Literature covers #AFM450 "S" folded dipole antenna and #AFM475 "S" folded dipole FM antenna kit, introduced to round out antenna line in the 88 to 108 Mc range. JFD Electronics Corp.

... for more details, circle 304 below

**6** *Transformers:* Replacements covered in literature are: TV-238, 4.5 Mc second sound i-f for Olympic CL4021 and others; TV-158, 4.5 Mc trap and transformer for Philco 32-4688-10; and MDF-133 110° cosine wound deflection yoke for Warwick-Silvertone 80-12-4. Merit Coil & Transformer Corp.

... for more details, circle 305 below

**7** *Home-Study Courses:* Literature covers a pay-as-you-learn 38-lesson course on principles and service of 2-way radio systems. Motorola, Inc.

... for more details, circle 306 below

**8** *Decade Resistor/Dividers:* Model 1601, covered in literature, provides a source of resistance for use with bridges and in the determination

of resistance values in development circuits. Precision Apparatus Co.

... for more details, circle 307 below

**9** *Speakers:* Catalog sheet CB1061 features bulk-packed speakers; and the new shallow 6 x 9 in. speaker is covered in catalog sheet AS69. Quam-Nichols.

... for more details, circle 308 below

**10** *Tubes:* "The Trouble Shooter Guide" in an 8-page, pocket-size booklet which helps pinpoint causes of TV set failure, with a minimum amount of tube testing. Also available, an illustrated circular covering tubes, transistors, diodes, amplifiers, speakers, kits, and many other items. Rad-Tel Tube Co.

... for more details, circle 309 below

**11** *Transformers:* Bulletin 598 covers Part #VO-114 vertical deflection output transformer, which has a 6:1 turns ratio with a primary impedance of 5000 ohms at 30 d-c ma. Stancore Electronics, Inc.

... for more details, circle 310 below

CUT HERE

1-62

Cut out and mail to ELECTRONIC TECHNICIAN, 1 East First Street, Duluth 2, Minn.

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

Please send me literature of companies whose code numbers I have circled below (includes editorial and advertised items):

## ADVERTISED PRODUCTS

10	23	36	49
11	24	37	50
12	25	38	51
13	26	39	52
14	27	40	53
15	28	41	54
16	29	42	55
17	30	43	56
18	31	44	57
19	32	45	58
20	33	46	59
21	34	47	
22	35	48	

## NEW PRODUCTS

416	424	432
417	425	433
418	426	434
419	427	435
420	428	436
421	429	437
422	430	
423	431	

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300	303	306	309
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302	305	308	311

Name.....Position.....

Firm.....Address.....

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

Note: If you have given your residence address, please enter your company name and address on this line:.....



# 5 WAYS TO SAVE MONEY ON YOUR TV REPAIRS

For window-size blow-ups  
of this message, send 10¢ to  
Sprague to cover handling  
and mailing costs.

**1 DON'T BE A "SCREWDRIVER MECHANIC."**  
Every year, hundreds of "do-it-yourself-ers" damage or ruin their sets, pile up needless expense, and endanger their safety by trying to make their own TV repairs. Your TV is the most intricate piece of equipment you've ever owned—far more complicated than your car! If you're tempted to tinker with it, DON'T! Guesswork is much too costly.

**2 LEAVE YOUR TV REPAIRS TO A "PRO."**  
Years of training and experience make the TV technician an expert. He has repaired hundreds—perhaps thousands—of TV sets. He spends countless hours and hundreds of dollars on manuals, keeping up-to-the-minute on new developments, circuits, trouble-shooting techniques. He is qualified in every way to diagnose TV trouble accurately—cure it quickly and safely.

**3 DON'T LOOK FOR SERVICE "BARGAINS."**  
There aren't any! Cut-rate prices mean cut-rate methods and cut-rate parts in your TV set. And these lead to unsatisfactory set performance, probable damage, and additional costly repairs. The expert TV technician charges a fair price for honest service. He can't afford special deals and service "bargains" any more than you can!

**4 CALL YOUR TV EXPERT AT THE FIRST SIGN OF TROUBLE.**  
Don't wait for your set to go completely dead. Failure of one TV part sets up a chain reaction—other parts are damaged and repair costs pile up. Early attention prevents this and also makes it easier—and less expensive—to find and cure the trouble. To keep your repair costs low, call your TV technician when trouble *starts!*

**5 TRUST YOUR INDEPENDENT TV TECHNICIAN.**  
As a member of your community, he stakes his reputation on your continued satisfaction. His years of study and experience, his large investment in equipment, and the fact that *he's in business for himself* are your assurances of good work and honest prices. His first loyalty is to *you*—his customer.

**THIS MESSAGE WAS PREPARED BY SPRAGUE PRODUCTS COMPANY,  
DISTRIBUTORS' SUPPLY SUBSIDIARY OF SPRAGUE ELECTRIC COMPANY, NORTH ADAMS, MASSACHUSETTS FOR...**

**YOUR NEIGHBORHOOD TV-RADIO TECHNICIAN**

# NEW PRODUCTS

## Duotone NEEDLES

A new package for its line of diamond needles is attractively designed in gold and black. For easy and quick



recognition, the needle is bubble-packed with a translucent cover and the type number is clearly marked front and back on a removable tab. Tabs, when tallied, simplify reordering and the packages, when stacked or placed on display, reduce inventory taking time. On the back of each package is the needle number, the type and model number of the cartridges the particular needle fits. It also provides easy-to-follow replacement instructions. Duotone Co., Inc., Keyport, N. J.

--- for more details, circle 400 on page 44

## Sony DISPLAY MERCHANDISERS

Shown is a counter merchandiser, one of three designed to display the firm's transistor radios and TV receivers and available without charge. Features include: oiled walnut finish; glass shelves, fluorescent illumination and a lock to prevent pilferage. It stands 24½ in. high, 21¼ in. wide and 12 in. deep and displays up to 12 Sony transistor radios. A second merchandiser, designed for the dealer with limited counter space, is 14 in.



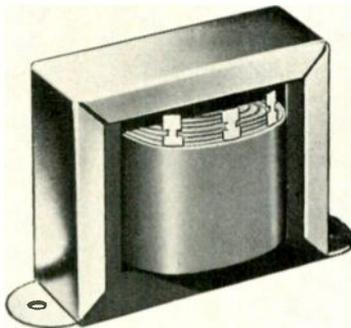
SONY ILLUMINATED DISPLAY CASE MERCHANDISER

long, 11 in. high, 8 in. deep, fits easily on a shelf, has fluorescent illumination and may be locked. The third, a bent-wire display for windows, holds 12 items including the firm's TV set, reported to be the world's lightest and smallest. The design is that of a musical scale. Has a removable header for messages. Measures 40 in. high, 36 in. wide, 12 in. deep. Sony Corporation of America, 514 Broadway, New York 12, N. Y.

--- for more details, circle 401 on page 44

## Stancor TRANSFORMERS

Model A-8109 shown is one of two new line matching public address transformers. It is for 70.7 v line use and has taps for primary impedances of 2500, 5000, and 10,000 ohms. The



other is for 25 v line applications and has taps for primary impedances of 312.5, 625 and 1250 ohms. Both units have outputs of 4 and 8 ohms and provide power steps of 0.5, 1.0 and 2.0 watts. They are 1¼ in. high with a base area of 2½ x 1¾ in. mounting centers. A standard open channel frame mounting is used, with solder lugs for both primary and secondary leads. These units are available individually packaged for bulk packed in 100 quantities. Stancor Electronics, Inc., 3501 Addison St., Chicago 18, Ill.

--- for more details, circle 402 on page 44

## Seco TUBE TESTERS

Announced is a new low-cost tube tester with ten sockets, including sockets for all the newest tubes. Model 88 permits testing of 9-pin novars, the new 10-pin tubes, 12-pin compactrons and novistors, as well as all previous popular TV and radio tube types including battery types. It incorporates the patented Seco grid circuit test, plus a reliable emission test. It also checks filament continuity and provides an open element test. One easy-to-read meter shows results



of all tests. The two-stage d-c amplifier circuit protects meter from damage. \$69.50. Seco Electronics Inc., 5015 Penn Ave. South, Minneapolis 19, Minn.

--- for more details, circle 403 on page 44

## EICO TRANSISTOR/CIRCUIT TESTER

Model #680 provides significant measurement of actual transistor parameters, plus all the VOM ranges needed to service transistor equipment. A 50  $\mu$ a, 3½" meter movement is employed to provide the sensitivity and scale length necessary for accurate readings. The transistor measurements include ICBO and ICEO, with separate ranges for signal and power transistors, d-c B (directly, in two ranges, 2-30 and 20-300), a-c B (indirectly). The d-c B readings are actually measurements of base current read on a red reciprocal scale, with the collect-



or current adjusted to 1 ma. To determine a-c B, the two base currents are read on the black current scales with collector currents of 750  $\mu$ a and 1250  $\mu$ a respectively. \$25.95, kit. \$39.95, wired. Electronic Instrument Co., Inc., 3300 Northern Blvd., Long Island City 1, N. Y.

--- for more details, circle 404 on page 44

## ITT PORTABLE RADIOS

A new line of transistorized portable radios include: 2 six-transistor pocket

**TESTS**  
All TV and Radio  
Tubes—Old and New

**TESTS**  
the Nuvistors  
and Novars

**TESTS**  
the New 12-Pin  
Compactrons

**TESTS**  
the New 10-Pin Tubes

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

**TESTS**  
for True Dynamic  
Mutual Conductance (Gm)

**OBSOLESCENCE  
PROOF**  
Designed for Maximum  
Use Today and  
Tomorrow

**NEWEST  
FINEST  
MONEY-MAKER**

*for Professional  
Servicemen*



# Multiple-Socket Speed with Gm Accuracy **PLUS** OBSOLESCENCE PROTECTION

## Model 700 DYNA-QUIK

*Fastest, Most Complete  
Most Up-to-Date*

**DYNAMIC  
MUTUAL CONDUCTANCE  
TUBE TESTER**

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

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

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

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

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

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

Size: 16½" x 15¾" x 5⅝" deep. Net wt: 15½ lbs.

Net, **\$169<sup>95</sup>**

**NEW TUBE INFORMATION SERVICE**

Available every 3 months, on subscription,  
for all B&K Dyna-Quik Tube Testers



**B & K MANUFACTURING CO.**

1801 W. BELLE PLAINE AVE • CHICAGO 13, ILL.

Canada: Atlas Radio Corp., 50 Wingold, Toronto 19, Ont.

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

For more details, circle 13 on page 44

## NEW PRODUCTS

size and a seven-transistor model for the standard broadcast band; 1 eight-transistor AM-shortwave model; 1 all-round AM-marine band or AM-shortwave radio featuring battery-life indicator, visual tuning indicator and auxiliary antenna pickup; 1 fully-transistorized portable clock-radio; and 1 ten-transistor AM-FM model, weight 4 lbs., and equipped with a built-in antenna. All models complete with batteries and earphones. Most models have carrying cases. Model 600, six transistors, \$17.95. Model 631, six transistors, \$29.95. Model 731, seven transistors, \$39.95. Model 871. AM-shortwave, \$47.95. Model

881-S, AM-shortwave, and model 881-M, AM-marine band, \$54.95. Model 1011, AM-FM, \$89.95. Model 721, clock radio, \$89.95. IIT Distributor Products Div., International Telephone and Telegraph Corp., Lodi, N. J.

... for more details, circle 405 on page 44

### G-E TUBES

Added to the Black Daylite line of TV picture tubes are: 17CRP4, aluminumized 90° glass tube with low grid #2 voltage, 6.3 v heater and 0.45 amp heater current. 19AXP4, 114° deflection angle tube with 6.3 heater volts and 0.45 ampere heater current. 23EP4, twin panel 110° tube with low grid #2 voltage, 6.3 heater volts and 0.6 amp heater current. 23JP4, twin panel 110° tube with low grid #2

voltage, 6.3 heater volts and 0.45 amp heater current. 24AUP4, 90° glass tube with very short neck, 6.3 heater volts and 0.6 ampere heater current. 24AVP4, 110° tube with a 2.35 volt, 0.6 amp heater. 27LP4, 90° magnetic focus tube. 8XP4, 90° test tube similar in other respects to the 110° 8YP4. Electronic Components Div., General Electric Co., Owensboro, Ky.

... for more details, circle 406 on page 44

### Sola TRANSFORMERS

Designed for use with color TV receivers, new regulating transformer the Colorvolt automatically and instantaneously compensates for variations in line voltage. It is a static-magnetic a-c voltage regulator specially designed to improve TV reception. No installation is required as its cord

**GUARANTEED FM AND  
FM STEREO RECEPTION  
FROM 200 MILES!**

# Winegard STEREO-TRON

World's Most Powerful FM Antenna!

**NEW ELECTRONIC FM ANTENNA FOR LONG DISTANCE FM AND STEREO!** Now Winegard Guarantees unexcelled FM performance with the new Winegard electronic Stereo-Tron. Actually **GUARANTEES** you will receive 85% of all FM stations in a 200 mile radius over normal terrain with a rotor. Built in transistor amplifies signals, really gets L-O-N-G distance reception. For Multiplex, the added gain of the Stereo-Tron offsets the power loss of the carrier and sub-carrier.

**MODEL PF-8 FM STEREO-TRON YAGI—Gold Anodized!** This is the world's most powerful FM antenna. Because Multiplex requires an antenna with greater sensitivity and gain to offset the power loss of the carrier and subcarrier, Winegard's PF-8 is the best antenna you can install for Multiplex. When you hook up a PF-8, weak signals come in like "locals." Recommended for use where signals are under 10,000 microvolts. For strong signal areas, same antenna without amplifier, Model FM-8, is recommended.

The PF-8 has a minimum gain of 26 DB over a folded dipole with a flat frequency response of  $\pm \frac{1}{4}$  DB from 88 to 108 m.c. It features a built-in TV-FM coupler and has eight elements with **EXCLUSIVE "TAPERED T"** driven element engineered

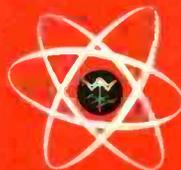
to perfectly match the powerful transistor, direct coupled, *built-in* amplifier. It is available two ways—Model PF-8 for 300 ohm twin lead or Model PF-8C for 75 ohm coax.

#### Important Features of Winegard Electronic FM Antennas

1. Transistor amplifier is designed as part of the "Tapered T" driven element (model PF-8) for unprecedented efficiency and signal-to-noise ratio.
2. At no extra charge, built-in FM-TV coupler allows you to use one power supply and down lead when used with a WINEGARD POWERTRON TV antenna.
3. Beautiful gold anodized permanent finish—100% corrosion proofed—all hardware irridized. This is the finest finish of any antenna—has richest appearance—meets U.S. Navy specifications.
4. The quality of craftsmanship and fine materials in these antennas tell their own story—perfect mechanical balance—100 m.p.h. wind tested.

Winegard makes a complete line of FM antennas. Write for information and spec. sheets. Also get **FREE**, Station Log and FM map of U.S.

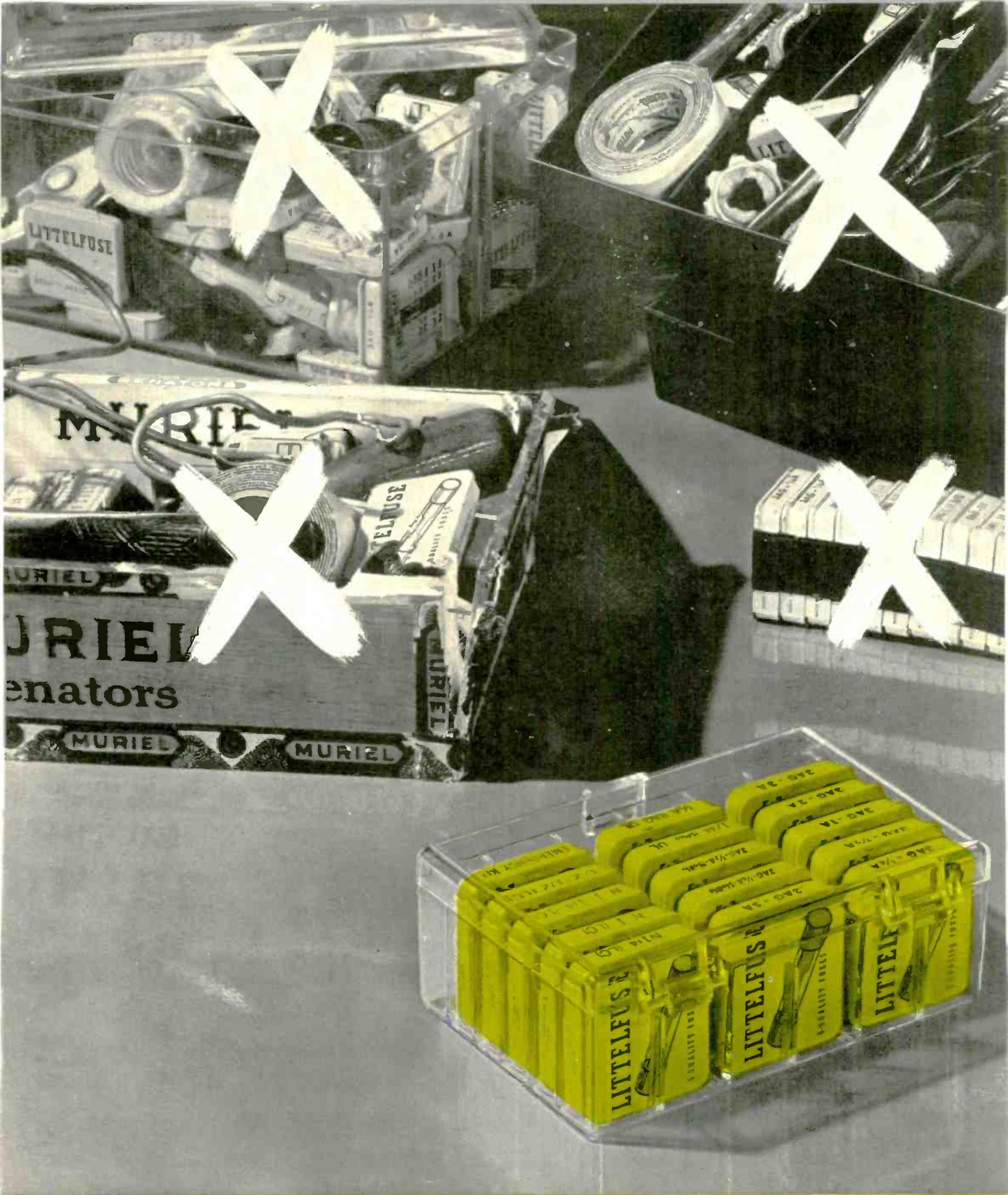
**MODEL PF-4 FM ELECTRONIC TURNSTILE**  
Gold Anodized! Non-directional FM antenna with 16 DB gain in all directions over a folded dipole. Has Winegard offset mount and transistor amplifier with TV-FM coupler. Also available without amplifier, Model FM-3T.



# Winegard

**ANTENNA SYSTEMS**

3019-1E Kirkwood • Burlington, Iowa  
For more details, circle 50 on page 44



Burton Brown Advertising

## THERE'S ONLY ONE RIGHT WAY

A fuse caddy for your tube caddy: 18 individual compartments for fingertip selection. The fuse caddy is complete with the 15 boxes of fuses required to service 93% of all TV sets. Three spare compartments are provided for additional fuses of your own selection.

**LITTELFUSE** Des Plaines, Ill.  
For more details, circle 32 on page 44

**"I've got  
satisfied  
customers  
and  
profits..."**



**by improving communications equipment reliability with  
IERC Heat-dissipating Electron Tube Shields!"**

Extra profits in contract servicing are yours with TR type heat-dissipating tube shields—at installation, of course, and from the 2 to 12 time increase in tube life and reliability they provide. Electron tube failures, caused by heat, account for almost 70% of equipment failures. Service profits go out the window when valuable work, other service calls or "off hours" time must be given to meet service contract requirements just to change a tube! You can eliminate this problem by increasing the tube life and reliability of your customer's communications equipment with TR's—time-proved in vital military, aerospace and precision electronic equipment applications. A complete installation of TR's in almost any equipment takes only a few minutes—reliability and profits are immediate!

patented



**SERVICE TECHNICIANS—**  
Write today for complete data on  
IERC TR shields.

**IERC**  
heat-dissipating

**DIVISION**  
electron tube shields.

**International Electronic Research Corporation**  
135 West Magnolia Boulevard, Burbank, California  
heat-dissipating tube shields for miniature, subminiature, octal and power electron tubes  
For more details, circle 27 on page 44

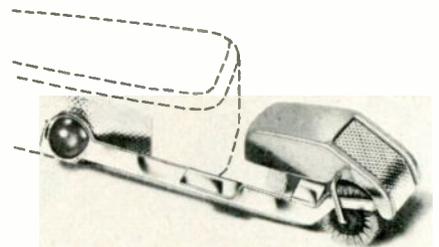
**NEW PRODUCTS**

is simply plugged into an a-c wall outlet and the TV set power cord is plugged in the receptacle of the Colorvolt. Designed to serve loads of 240-400 va. These ratings are based on currently available color sets. Input, 95-130 v at 60 cps. Nominal output, 115-120 v at 400 va. Sola Electric Co., Busse Rd. at Lunt, Elk Grove Village, Ill.

- - - for more details, circle 407 on page 44

**ESL DUST BUG**

Announced is a completely redesigned changer model of the Dust Bug, developed with stereo require-

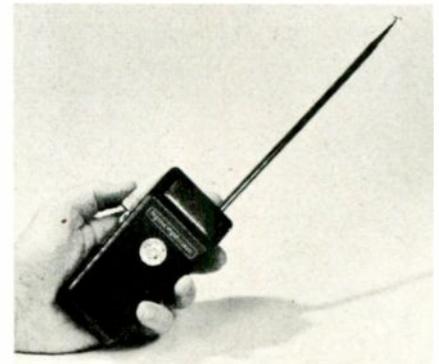


ments in mind. It sweeps each record clean just before the stylus plays the grooves and utilizes a brush of individually pointed soft nylon fibers in conjunction with a cylindrical plush pad dampened with special antistatic fluid. Features include installation on any tone arm, no vertical stylus loading on the cartridge and user replaceable brush and pad. \$4.75. Electro-Sonic Labs., 627 Broadway, New York 12, N. Y.

- - - for more details, circle 408 on page 44

**Electrosolids WALKIE-TALKIE**

Reported as the smallest 2-way Walkie-Talkie, the new Spacephone is a minaturized 2-way transistor radio



just 5 in. high. It fits into a shirt pocket or the palm of your hand. Operating range, up to ½ mile. Operates on simple press to transmit; release to listen. Weight, 8 oz, including battery. Size, 2½ in. x 5 in., with a high-impact, shock resistant case. Circuits are sub-miniaturized, all-transistorized, with close tolerance crystal control. \$29.95, with battery. Elec-



©1962 VOLKSWAGEN OF AMERICA, INC.

# Ain't ours.

Volkswagen owners don't dig this stuff.  
Not when it's only this deep.

For one thing, our engine's in the rear.  
The weight sits on our drive wheels.

It's like putting concrete blocks in your trunk.

For another, most trucks only clear about 7 inches, but the VW clears 9½.

Our bottom doesn't drag.

Even our air-cooling helps. The Volkswagen engine does not use water. There's nothing to freeze up. You always go.

(New VW owners sometimes feel uneasy about not buying anti-freeze. But there's no place to put it.)

All this, however, doesn't mean our

trucks never get stuck. A drift's a drift.

That's why we ask owners to use chains or snow tires. Just to be sure.

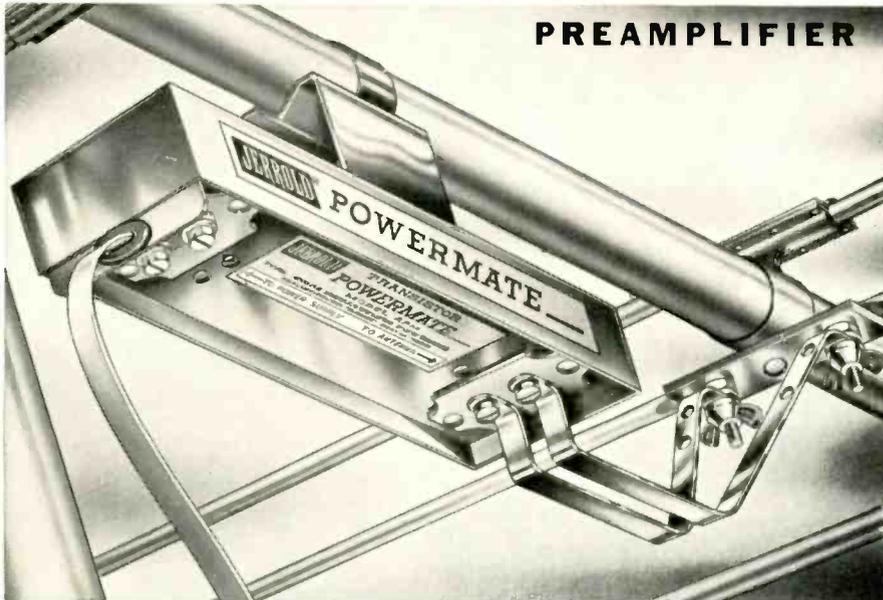
Would you like to know who has a Volkswagen Truck in your neighborhood? Wait until you get about 6 inches of snow. Then look to see who isn't shoveling.



For more details, circle 55 on page 44

Servicemen everywhere say,  
**"OUTPERFORMS THEM ALL!"**

# NEW TRANSISTOR **JERROLD® POWERMATE**



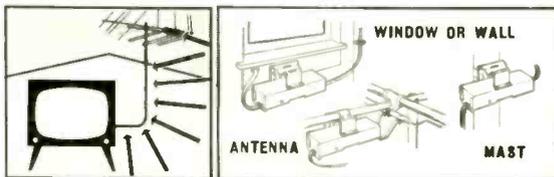
## offers highest gain, lowest noise figure

Here's the preamplifier for every TV antenna in your area, whether new or up for years! The exclusive universal bracket of the new JERROLD Transistor POWERMATE permits mounting directly on the antenna boom (for greatest boost before downlead losses) or at any other point—along the mast, on the wall or windowsill, behind the set—anywhere your best judgment dictates.

And look at this gain: An average of 13.9db at Channel 13 and 18.25db at Channel 2—by far the highest in the business! This remarkable gain gives any antenna system the lowest System Noise Figure obtainable—the key to better pictures.

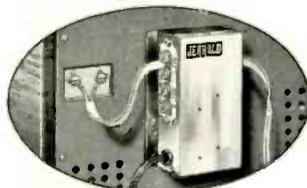
See your distributor today, or write for special bulletin describing System Noise Figure.

*Only \$39.95 list, complete with power supply*



### NO TUBES, NO BATTERIES, NO OSCILLATION, NO FEEDBACK

Mount it on the boom or anywhere along the downlead. Thoroughly neutralized against oscillation; output impedance balanced to prevent radiation back to antenna. Same 300-ohm lead that carries signal also carries 15 volts ac to POWERMATE. No tubes or batteries to replace.



### REMOTE AC POWER SUPPLY OPERATES 1 OR 2 TV OR FM SETS

Installs on or near receiver, draws less current than an electric clock. No polarity problems when attaching to lead, no danger of transistor damage.

**JERROLD® ELECTRONICS CORPORATION**  
 Distributor Sales Division, Dept. IDS-200  
 The Jerrold Building, Philadelphia 32, Pa.

Jerrold Electronics (Canada) Ltd., Toronto, Ontario  
 Export Representative: CBS International, New York 22, N.Y.

AMERICA'S LEADING MANUFACTURER OF TV-FM RECEPTION AIDS AND MASTER-ANTENNA-SYSTEM PRODUCTS  
 For more details, circle 30 on page 44

## NEW PRODUCTS

trosolids Corp., 12740 San Fernando Rd. North, Sylmar, Calif.

... for more details, circle 409 on page 44

### Euphonics MICROPHONES

Model C47D is reported as the first noise-cancelling microphone to sell under \$10, and giving much cleaner



communication than the ordinary microphone. It features a combination of noise cancelling and uni-directional properties which result in maximum discrimination against distant and off-axis noise, while retaining euphonic voice fidelity at normal speaking distances. Euphonics Corp., Box 2746, Rio Piedras, Puerto Rico, U. S. A.

... for more details, circle 410 on page 44

### Chemtronics CLEANERS

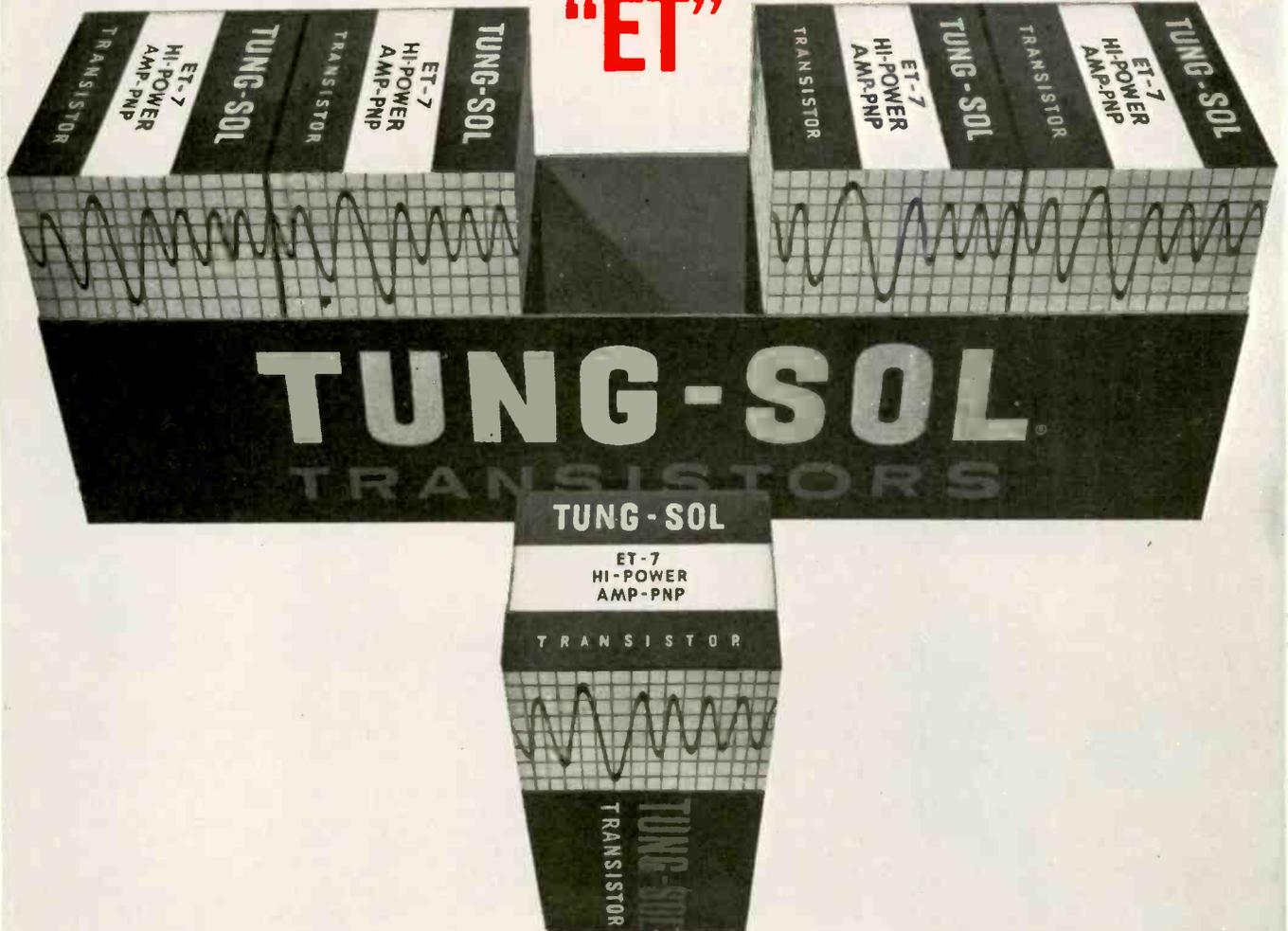
Mask-N-Glas cleaner, proven safe for both glass and plastic, including late model cabinets made of plastic, is announced. As a special introductory premium, a large lint-free cloth is packed with every can. Mask-N-Glas comes in the anti-static solution of carefully blended chemicals developed for use on glass tube faces, safety glass, plastic masks, cabinets, etc. It is non-staining, non-abrasive and anti-static. It is packaged in a distinctive aerosol 6 oz can. \$1.79, including free cloth premium. Chemtronics, Inc., 870 E. 52nd St., Brooklyn 3, N. Y.

... for more details, circle 411 on page 44

### Hunter TOOLS

Announced is a light weight, plier-like design, thermal wire stripper. Mounted on the firm's standard plier frame, it is long and slim to reach deep into chassis and other electronic assemblies. A compact control box with a rheostat wound 80 plus for any degree of heat at the tips, makes it possible to strip any type of insulation from low-temp vinyl to Teflon. Strips lengths from 1/8 in. up and mid-wire sections. Can be used on multi-stranded or solid wires from 40 to 12 AWG,

**BUY  
"ET"**



**THE TRANSISTOR LINE THAT TUNG-SOL TAILORED TO YOUR NEEDS**

- LOW INVENTORY ■ HIGH TURNOVER
- RELIABILITY ■ PROFIT
- CUSTOMER SATISFACTION

"ET" is your guide to the compact transistor line engineered and packaged specifically for entertainment replacement. You can make just about every radio and TV replacement from only a handful-size inventory. Eleven PNP and NPN types replace hundreds of older numbers.

Each package is plainly marked with the type of service as well as the part number to save you time in selecting the units you need. Every Tung-Sol

transistor is fully warranted. Tung-Sol takes *your* responsibility seriously and spares no effort to provide the very highest in transistor performance. So make your transistor purchases with an eye to convenience, profit and customer satisfaction. Tell your supplier you'd rather have Tung-Sol "ET" transistors. Write for the Tung-Sol Transistor Interchangeability Guide. Tung-Sol Electric Inc., Newark 4, New Jersey

 **TUNG-SOL®**

**A TYPE FOR EVERY JOB**

**PNP TYPES**

**Low power**

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

**Medium power**

- ET6 AF power amplifier

**High power**

- ET7 AF high power amplifier

**NPN TYPES**

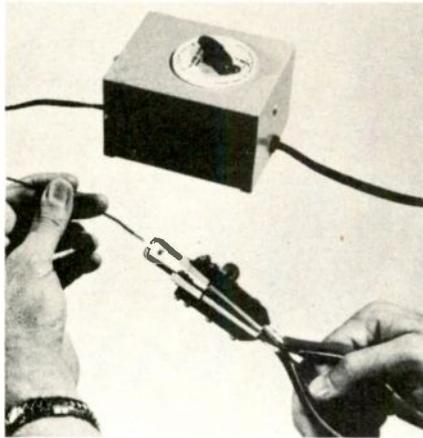
**Low power**

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



For more details, circle 53 on page 44

## NEW PRODUCTS



co-axial cables, shielded cables, etc. Removes insulation in one quick operation. R. N. Hunter Sales Co., 9851 Albutus Ave., Santa Fe Springs, Calif.

- - - for more details, circle 412 on page 44

### University MICROPHONES

Model DS-10 desk stand is designed to accommodate any microphone or accessory with standard  $\frac{1}{8}$ -27 NPSM



MODEL DS10

thread and can be used with both the SSP10 and SA10 stand adaptors. The SA10 is a slide on stand adaptor. The SSP10 mates with the basic University microphone modules and incorporates

an on-off switch as well as a receptacle for Cannon or Amphenol microphone connectors. A knurled lock nut insures reliable mounting of microphones or accessories to the stand. Constructed of heavy, solid casting. Designed to resist accidental tipping. Bottom covered with anti-skid sponge rubber. Finish is non-reflecting wrinkle black. \$7.95. University Loudspeakers, Inc., 80 S. Kensico Ave., White Plains, N. Y.

- - - for more details, circle 413 on page 44

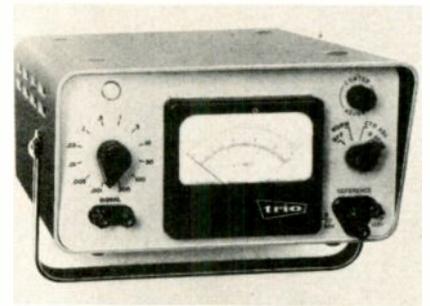
### Philco RADIOS

Model T-905 combination portable/table transistor radio features AM/FM reception. Has 9-transistor chassis. Weighs 4½ lbs. Plays on 6 standard flashlight batteries ("C" type). Has lift-off handle which quickly converts it from a portable to a table model. A special push-button band switch, easily accessible at the front of the set, enables the selection of AM or FM with the press of a finger. A built-in super-sensitive ferrite antenna is utilized for AM reception, and a 30 in. telescopic antenna pivots for full range FM reception. Other features include a wide range 4 in. heavy duty speaker and vernier tuning. \$85. Philco Corp., Tioga and "C" Sts., Philadelphia 34, Pa.

- - - for more details, circle 414 on page 44

### Trio VOLTMETERS

Model 131-1 dual-mode vacuum tube voltmeter implements complete phase and amplitude analysis of the performance of a-c circuits and components. In the "normal" mode of this floating-signal VTVM, both signal input leads are isolated from the case, power line, or any other path-to-ground potential, the minimum common input impedance being over 10 megahms at 60 cps with insulation of input circuits rated at 400 v peak. In its "phase-discriminating" mode the floating-signal-circuit features are retained and combined with a phase-sensitive demodulator, which makes possible a complete vector analysis of a-c signals. A low-impedance, low-distortion, completely decoupled



ed amplifier output is provided to permit external monitoring of the signal waveform. \$345. Trio Laboratories, Inc., Dupont St., Plainview, L. I., N. Y.

- - - for more details, circle 415 on page 44

### Antronic MERCHANDISER

Announced is a new compact 110° accessory merchandising rack for the display of Anchor 110° adaptors,

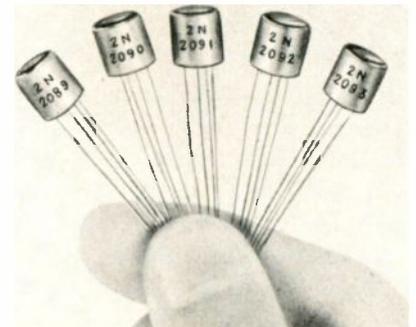


cables, and kits. It is provided free with an assortment of test equipment accessories which have been designed to adapt existing test equipment to 110° test needs. Selector Guides are contained in a pocket of the "Accessory Center" rack to help in the selection of proper components. May be used on the counter or as a wall rack. Antronic Corp., 2712 W. Montrose Ave., Chicago 18, Ill.

- - - for more details, circle 416 on page 44

### Amperex FM TRANSISTORS

Announced is a series of five PADT germanium alloy-mesa FM transistors for FM and AM home and portable



radios. Three of the group comprise a high frequency FM kit: the 2N2089, 2N2090 and 2N2091 are respectively an r-f amplifier, oscillator-mixer and an i-f amplifier. The fourth of the

## MERCURY TV TUNER SERVICE

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PACK WELL AND INSURE  
24 HOURS ON POPULAR TYPES

**ALL MAKES  
ONE PRICE!**

**\$9.50**

For more details, circle 34 on page 44

# Wake Up



**A new day is dawning in electronics. Transistors are here to stay... they are now being used everywhere; in radio, television, Hi-Fi, intercoms, and in nearly all new electronic equipment...**

**Why put off transistor circuit servicing any longer... there's gold in them thar hills. But you must be equipped to do the job fast and efficiently. Here are the tools that you will need.**



## NEW SENCORE TRANSI-MASTER

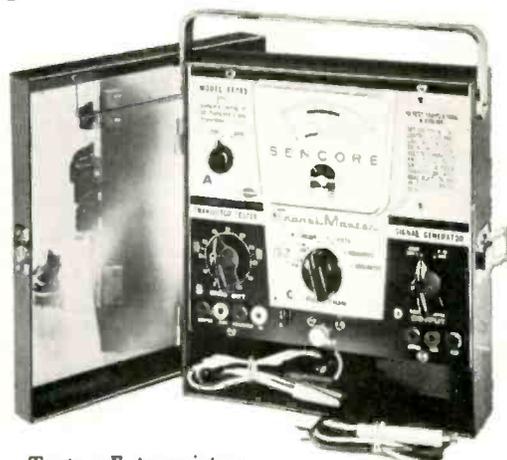
This Tester will analyze the entire circuit in minutes and test transistors in-circuit or out of circuit. Here is how you can pin point troubles step by step.

First, check the batteries with the 0 to 12 voltmeter. If the batteries are O.K., check the current drain with the 0 to 50 milliamp meter. A special probe is provided so that you do not need to break the circuit. Excessive current indicates a short; low current indicates an open stage or cracked board. All PF schematics indicate average current.

If trouble is not located by now, isolate the trouble to a specific stage by touching the output of the harmonic generator to the base of each transistor and note spot where sound from speaker (or scope where no speaker is used) stops or becomes weak. The generator becomes a sine wave generator for audio stages to help find distortion.

If trouble points to a transistor, check it in a jiffy with the exclusive in-circuit power oscillator check provided by the TR110. A special probe is also provided for this.

If the transistor checks bad in-circuit, remove it and give it an out of circuit check with the oscillator check or the more accurate DC check. The DC check is provided for comparison reasons, experimental or engineering work and to match transistors in audio output stages. Beta (current gain) is read direct or on a good-bad scale for service work. **DEALER NET. ONLY \$4950**



*Tests all transistors in-circuit or out-of-circuit*

### Model TR110

**It's a COMPLETE TRANSISTOR TESTER**

- SIGNAL TRACER • VOLTMETER
- BATTERY TESTER • MILLIAMMETER



## NEW SENCORE TRANSISTOR AND DIODE CHECKER

Here is a low cost tester that has become America's favorite. The TR115 provides the same DC out of circuit checks as the TR110; leakage and current gain. Beta (circuit gain) can also be read direct or as good or bad. Opens or shorts in the transistor are spotted in a minute. The TR115 checks them all from power transistors to the small hearing aid type. Japanese equivalents are listed also. This famous tester is used by such companies as Sears Roebuck, Bell Telephone and Commonwealth Edison. New circuits enable you to make service checks without set-up charts even though charts are provided for critical checks.



**Model TR115**  
Dealer Net  
**\$1995**



## SENCORE BATTERY ELIMINATOR AND TROUBLE SHOOTER

For replacing batteries during repair. Many servicemen say that they wouldn't service transistor circuits without this power supply. The tried and proven PS103 is a sure fire answer. It can be used to charge the nickel cadmium batteries as well. Dial the desired output from 0 to 24 volts DC and read on meter. Low ripple insures no hum or feedback. Total current drawn can also be read on the PS103 by merely flicking the function switch to milliamps. The PS103 is the only supply that will operate radios with tapped battery supplies such as Philco, Sylvania and Motorola. No other supply has a third lead.



**Model PS103**  
Dealer Net  
**\$1995**

Now in stock at  
your Authorized  
Sencore Distributor



# SENCORE

ADDISON, ILLINOIS

PROOF OF SUPERIORITY  
NO OTHER MICROPHONE  
CAN MATCH!



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MAGAZINES PICTURE E-V  
MORE OFTEN THAN THE NEXT  
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Write now for catalog of  
microphones preferred by top radio, TV,  
newsreel and sound engineers!

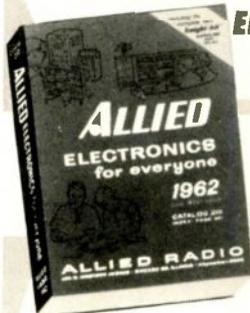
**Electro-Voice**

ELECTRO-VOICE, INC.  
Commercial Products  
Div., Dept. 121T  
Buchanan, Michigan

For more details, circle 22 on page 44

free send for the 444-page

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For more details, circle 10 on page 44

## NEW PRODUCTS

group, the 2N2092 is a universal type used in the standard broadcast and short wave bands up to 6 Mc in all stages from r-f through i-f. The fifth, the 2N2093, is identical to the 2N2092 except for a higher 2 v emitter breakdown voltage (BVebo) figure for use in auto radios. The 2N2093 need be used only in the r-f stage. All five types are designed to sell for less than 75c each in 1000 lot quantities. Amp-erex Electronic Corp., 230 Duffy Ave., Hicksville, L. I., N. Y.

for more details, circle 417 on page 44

### Lafayette GENERATORS

Model TE-24 multi-purpose marker generator is capable of aligning any tuned circuit within its wide frequency

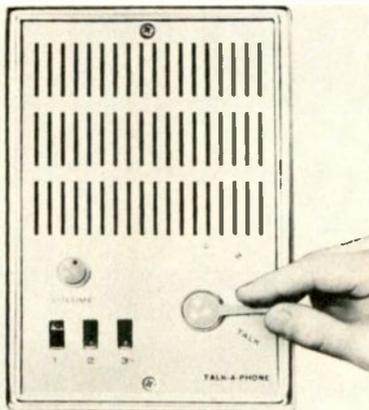


range. Six bands provide an r-f output of 120 kc to 130 Mc on fundamentals; 120 Mc to 260 Mc on calibrated harmonics. Etched metal dial can be self-calibrated to within 0.005% with a selection of marker crystals, available at extra cost. Built-in loudspeaker permits unit to be used as an adjustable heterodyne frequency meter. Can also be used as a 400 cps audio output and r-f signal tracer. \$57.50. Lafayette Radio Electronics Corp., 165-08 Liberty Ave., Jamaica 33, N. Y.

for more details, circle 418 on page 44

### Talk-A-Phone INTERCOM RADIOS

Model HI-4, a new four-station home intercom radio unit, is offered for either built-in or surface mounted

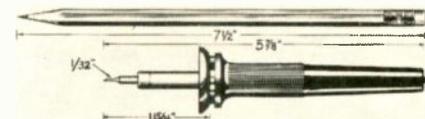


installations and may be operated in four, eight or sixteen-station Talk-A-Phone transistorized home intercom systems. Featuring simplicity of operation and installation the new model requires a wall opening  $4\frac{1}{8}$  in. w x  $6\frac{1}{2}$  in. h x 2 in. d and has a custom-designed stainless steel front panel measuring  $4\text{-}13/16$  in. w x  $7\text{-}3/16$  in. h. It may be utilized for private conversation with any three other indoor or outdoor stations in the system. Talk-A-Phone Co., 5013 N. Kedzie Ave., Chicago 25, Ill.

for more details, circle 419 on page 44

### Hexacon SOLDERING IRON

Announced as the world's smallest soldering iron, Catalog No. M10, is held so close to the work that solder-



ing is done like writing. Distance from hand to work is under 2-inches. Overall length,  $5\frac{7}{8}$ -inches, tip diameter,  $1/32$  of an inch. Durotherm long-life iron coated tips, available in many different point shapes, also in  $1/16$  and  $1/8$  of an inch diameter. Wattage, 12 watts. Solder melt time, less than one minute. Reaches working temperature ( $550^{\circ}\text{F}$ ) in less than two minutes, and  $700^{\circ}\text{F}$  in less than three minutes. Thin  $5/16$ " diameter element housing gets into tight places. Designed for soldering micro-miniature components such as dot modules, miniature assemblies, etc. 115v, a-c and d-c. Hexacon Electric Co., 642 W. Clay Ave., Roselle Park, N. J.

for more details, circle 420 on page 44

### Semitronics KITS

A new kit, #10NPD contains 10 transistors reported to replace more than 95% of all transistors in miniature radios. Packed in a reusable pocket-size plastic box, the kit contains an assortment of PNP, NPN and diode types selected for replacement for nearly every type of transistor radio including foreign makes. Complete interchangeability and replacement guide is included with each kit. Semitronics Corp., 370 Broadway, New York, N. Y.

for more details, circle 421 on page 44

### Bussmann FUSES

Buss electronic fuse assortments offer a balanced stock of fuses plus a built-in inventory feature. The assortments offer a neat, compact way to have a balanced stock of popular fuses available at all times, plus a sturdy unbreakable metal service stand which can be kept on the work bench or hung on a wall. Individual shelves hold 5-in. metal boxes. Behind each box is a tab that has the size and type

# Can you afford to guess

AT SWEEP, SYNC OR HIGH VOLTAGE TROUBLES?

WHEN IT'S SO EASY TO WALK THE TROUBLE  
RIGHT OUT OF THESE TIME CONSUMING  
CIRCUITS..... STEP BY STEP.....



SYNC. CIR.  
& H. SYNC.  
DISCRIM.

VERT.  
OSC.

VERT.  
OUTPUT

VERT.  
OUTPUT  
XFORMER

VERT.  
DEFLEC.  
YOKE

HORIZ.  
OSC.

HORIZ.  
OUTPUT

HORIZ.  
FLYBACK  
XFORMER

2nd ANODE  
VOLTAGE  
CIRCUIT

HORIZ.  
DEFLEC.  
YOKE



PUSH BUTTON TESTING . . .  
for Color and Black and White

## NEW, IMPROVED SENCORE SWEEP CIRCUIT ANALYZER MODEL SS117

How many times do you ask, "Why do I take so long finding that sweep trouble?" How often have you wondered whether weak horizontal sync was caused by defective sync circuit, horizontal oscillator, or sync discriminator? Can you quickly isolate inadequate width or low 2nd anode voltage to oscillator, output, flyback transformer, or yoke? How many times have you changed a good yoke by mistake?

The SS117 will pinpoint troubles like these in minutes with tried and proven signal injection, plus yoke substitution for dynamic in-circuit tests. Error proof push button testing enables you to make all tests from the top of the chassis without removal from cabinet for maximum speed and profit on every job.

Here are the checks the SS117 makes . . .

- Horizontal Oscillator: Checked by substituting 15,750 variable output universal oscillator from SS117. Signal can be injected at any spot from horizontal output grid to horizontal oscillator to determine defective component.
- Horizontal Output Stage: Checked by reliable cathode current and screen voltage checks made with adapter socket and two push buttons,
- Horizontal Output Transformer: Checked for power transfer in circuit and read as good or bad on meter.
- Horizontal Deflection Yoke: Checked by direct substitution with adjustable universal yoke on SS117.

- Vertical Oscillator: Checked by substituting 60 cycle synchronized oscillator.
- Vertical Output Transformer: By simple signal injection for full height on picture tube.
- Vertical Deflection Yoke: By signal substitution for full height on picture tube.
- Sync Stages: Checked by synchronizing triggered horizontal SS117 oscillator from any stage. If oscillator synchronizes, sync is O.K.
- 2nd Anode Voltage: A new dynamic check using simulated picture tube load. C.R.T. does not need to be operating for current tests. No interpretations—read direct from 0 to 30 KV.
- External Circuit Measurements: By applying from 0 to 1000 volts AC or DC to external meter jacks. Meter will read DC or peak-to-peak volts. 0 to 300 milliamp scale also provided for measuring horizontal fuse current.
- New features include: Large 0 to 300 microamp meter for minimum circuit loading; all-steel carrying case with full mirror in adjustable cover; two 115 volt AC outlets in cable compartment.

Size: 10¼" x 9¼" x 3½". Wt. 10 lbs.

Model SS117

Dealer Net **\$89<sup>50</sup>**



Sencore Sam says . . . How can you miss . . .

EACH PACKAGED UNIT CONTAINS:

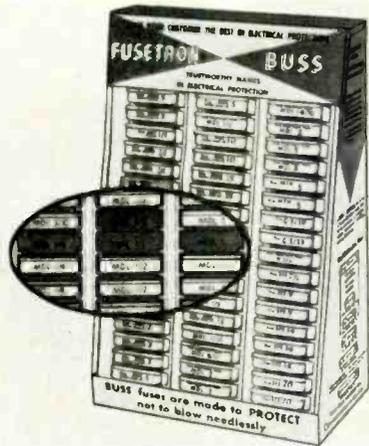
- An Easy to Follow Instruction Book Especially Prepared and Edited by H. W. Sams.
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# SENCORE

ADDISON, ILLINOIS

## NEW PRODUCTS

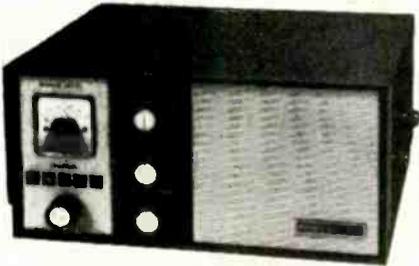


of fuse in the box printed on it. There are two Buss electronic fuse assortments to choose from. The assortments are: the full-service assortment, containing 255 fuses, 30 different sizes; and special assortment containing 130 fuses, 26 different sizes. Bussmann Mfg. Div., McGraw-Edison Co., St. Louis 7, Mo.

--- for more details, circle 422 on page 44

### Kaar "D" PHONE

The new 327B "D" phone will be welcomed by citizens band enthusiasts for its ability to tune all 32 citizens



band channels. This new radio telephone offers stability, top selectivity, and precise calibration with maximum convenience and ease of operation. Signal level meter and exclusive front panel antenna loading control are add-

ed advantages. Also, not shown, the TR327 with four crystal-controlled channels; TR327A with tuneable standard AM broadcast band added; and TR330 Han D phone, rugged, all-transistor, hand portable model. Kaar Engineering Corp., 2995 Middlefield Rd., Palo Alto, Calif.

--- for more details, circle 423 on page 44

### Heath DECADE KITS

Kit IN-21, 3-decade condenser kit, for use in any application requiring precision capacitor values, provides capacitor values from 100 pf to 0.111  $\mu$ f in 100 pf steps. Capacitors are precision 1% silver mica types rated at 350 vdc, continuous: 500 vdc, intermittent; and 1000 vdc test. Switches are high quality low-loss ceramic wafer types with positive dent action. \$17.95. Also, kit IN-11, 6-decade resistance kit



which provides easy switch-selection of any resistance value from 1 ohm to 999,999 ohms in one step. Uses 54 1/2 % 1 w precision resistors. \$24.95. Heath Co., Benton Harbor, Mich.

--- for more details, circle 424 on page 44

### Precision BATTERY ELIMINATOR/CHARGER

Model P-28 is especially designed to meet the rigid low-ripple output requirements needed to power modern, transistorized auto radios and other electronic apparatus of 6 v and 12 v ranges. It also serves as a reliable battery charger for 6 v and 12 v batteries, with special high current output at separately labeled terminals. Standard output current capacity for the 6 v range is 10 amps d-c contin-



uous, 20 amps d-c intermittent; and for the 12 v range it is 6 amps d-c continuous, 12 amps d-c intermittent. Power requirements, 117 v, 50/60 cps, 150 w at full load. Precision Apparatus Co., 70-31 84th St., Glendale 27, N. Y.

--- for more details, circle 425 on page 44

### Lafayette RF SIGNAL GENERATORS

Model TE-20 RF signal generator is a completely factory-wired and calibrated unit. Stable wide range design makes it ideal for IF-RF alignment, audio signal tracing, TV linearity checks, etc. Features include: 4 1/2-inch etched steel circular dial (vernier tuned); fundamental frequency output, 120 kc to 130 mc in six bands plus a calibrated harmonic band of 130 to 260 mc; built-in 400 cps audio oscillator with adjustable output to 8v;

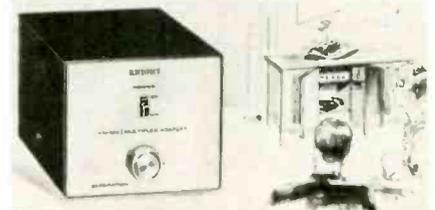


continuously variable r-f attenuator; and high-low r-f outputs. Frequency accuracy,  $\pm 5\%$ . \$27.95. Lafayette Radio Electronics Corp., 165-08 Liberty Ave., Jamaica 33, N. Y.

--- for more details, circle 426 on page 44

### Knight ADAPTOR

Model KN-MX stereo multiplex adaptor works in conjunction with any FM or FM-AM tuner having a multiplex output jack. Stereo separation is said to be excellent; an external con-



## TV Tuner Problems?

Simply send us your defective tuner complete: include tubes, shield cover and any damaged parts with model number and complaint.

Send for details and FREE Mailing Kit



## CASTLE TV TUNER SERVICE, INC.

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For more details, circle 16 on page 44

# .....VALUE ENGINEERED

**NEW**

## FOR LOWEST INSTALLED COST

### 8" SPEAKERS FOR DISTRIBUTED SOUND

This new line of Jensen 8-inch Professional Series loudspeakers is specially designed to meet the exacting rigorous demands for commercial sound installations. The 8-inch size is ideal for the majority of all distributed sound systems giving more than adequate low frequency range without enclosure and mounting complications.

A wide selection of models to meet every need—from the lowest cost highly competitive application to the most sophisticated highest quality system.

This entire line is *value engineered* for lowest installed cost of the entire system. Convenient 10-pack with or without preattached 70.7 or 25-volt transformers are options available. Handy KWIKON\* instant connectors for input and power tap adjustment.

For full details write for individual data/specifications available on each speaker.

### 1. AVAILABLE IN HANDY 10-PACK

Added savings and convenience in bulk-packed carton of ten speakers, with or without preattached transformers.

### 2. PREATTACHED TRANSFORMERS

CHOICE OF 70 AND 25-VOLT LINE TYPES

Especially designed for use with the popular "constant voltage" distribution systems. Center-tapped primary windings for balanced-line or special circuit needs. Tapped secondary for adjustment of power to 8-ohm speaker in 3 db steps from 1/4 watt to 4 watts. Core size 3/4" x 3/4". Two 3/16" dia. mounting holes on 2 5/8" centers. Prices below are for transformers only.

**70CV4.** For 70-volt distribution systems.

**25CV4.** For 25-volt distribution systems.

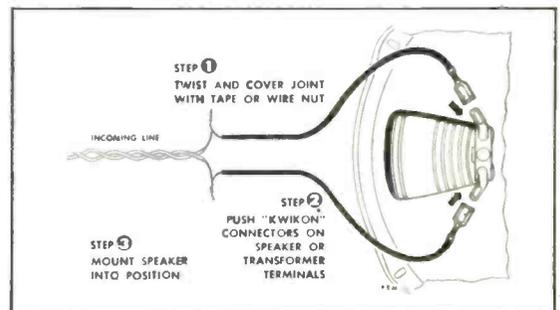
List Price ..... \$4.75



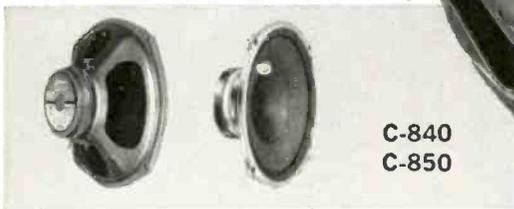
### 3. KWIKON \* INSTANT CONNECTORS

Simply twist bare ends of two 12" input leads supplied for each speaker to incoming signal cable leads, insulate with wire-nut or tape. Slide sleeve clips onto input terminal lugs of speaker or preattached transformer as speaker assembly is raised into place. KWIKON\* instant connectors also provide simple fast power tap re-adjustment on transformer.

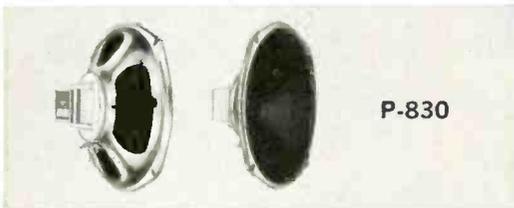
\*T.M.



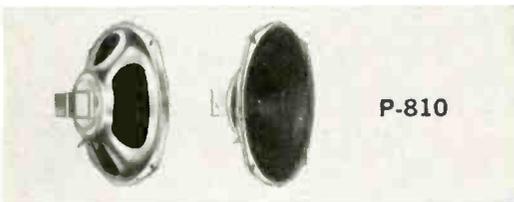
C-855



C-840  
C-850



P-830



P-810

Model	Power Rating Watts	Magnet Weight Ounces	Loudness Level (3)	Overall Depth	Net Weight Pounds	List Price
C-855	12	10.0 <sup>(1)</sup>	85.0	3 1/16"	2 1/2	\$13.50
C-850	12	10.0 <sup>(1)</sup>	85.5	3"	2 3/8	12.95
C-840	11	6.0 <sup>(1)</sup>	84.5	2 15/16"	2	10.95
P-830	10	2.5 <sup>(2)</sup>	84.0	3 1/4"	1 1/4	7.25
P-810	9	1.47 <sup>(2)</sup>	82.0	3 5/16"	7/8	5.80

(1)—SYNTOX-6® Ceramic. (2)—DP-Alnico-5.  
 (3)—db above 2x10<sup>-4</sup> dynes/cm.<sup>2</sup> @ 10 Ft. for input power of 1.0 watt standard 800-1250 cps warble signal.  
 Speakers conform to applicable EIA Standards. Max. O.D. 8 5/8"; width and height 7 1/16". Recommended baffle cutout 6 3/4" dia. Nom. voice coil impedance 8 ohms. Facilities for standard 2-hole mounting transformers up to 3/4 x 3/4 nominal core size.

**Jensen** MANUFACTURING COMPANY  
 Division of THE MUTER COMPANY  
 6601 S. Laramie Avenue, Chicago 38, Illinois  
 In Mexico: Universal De Mexico, S.A., Mexico, D.F.

# NEW SECO "TRI-TESTER"

With Seco's Patented Grid  
Circuit Test—copied  
by many, equalled  
by none



Model  
107A

ONLY  
\$14950  
NET



Tests all tubes including the new  
Nu-Vistors, Novars, Compactrons and 10-pin types.

©1961 Seco Electronics, Inc.

The Seco 107A "Tri-Tester" is the finest, fastest, most complete tester on the market—and at a popular price. Extremely accurate and easy-to-use, this deluxe model provides *all* essential tests for a wide range of Radio-TV, Industrial and Foreign tube types including sub-miniature types.

Eye and Line Adjustments are set up only once—not individually for each tube. Handy new "FLIP-CHART" tube index lists complete tube data set-up information. Cards on new tube types are issued to registered owners, keeping your unit up-to-date. The

107A "Tri-Tester" is compact, portable and completely self-contained in a handsome, vinyl plastic carrying case.

Seco is a pioneer in the field of modern tube testing research—the originator and exclusive patent holder of the nationally accepted Grid Circuit Test. The "Tri-Tester" is well accepted as a standard by both industry and government agencies. It meets specifications for: FEDERAL STOCK CLASSIFICATION, Tube Tester Type 107-FSN-6625-713-9075. Make your next purchase a Seco product.

ONLY SECO GIVES YOU ALL THESE TESTS IN ONE TESTER

GCT

### GRID CIRCUIT TEST:

All tubes get 11 positive, simultaneous checks for leaks, shorts and grid emission. This Seco designed and patented "Electron-Eye" test detects "hard to find" faults passed up by conventional short tests.

DMCT

### DYNAMIC MUTUAL CONDUCTANCE TEST:

Pre-wired chassis for effective testing of voltage amplifier and similar tube types. "Fil. Sel." and "Load" are the only settings required. "Good-?-Bad" meter indicates relative transconductance.

CET

### CATHODE EMISSION TEST:

The best method for testing pulse amplifier, power output and damper type tubes. Number of set-up operations is kept to a minimum. This test is provided by the free point selector system.

See your distributor for complete details on the Seco Model 107A Tube Tester. He has a complete line of quality Seco units for testing electronic equipment.



SECO ELECTRONICS, INC.

5021 Penn Ave. So., Minneapolis 19, Minn.

Please send Free...  Model 107A Operating Instructions and Schematic

"How to Test Tubes" Chart

Complete Seco Electronic Equipment Line Folder

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

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

For more details, circle 42 on page 44

## NEW PRODUCTS

trol on the unit's case permits quick adjustment of separation to the listener's choice. Easy to install, it simply plugs in between the tuner and stereo amplifier of a stereo system. All necessary connecting cables are supplied. It is self-powered; needs only to be plugged into the convenience outlet on the amplifier or tuner. \$44.50. Allied Radio Corp., 100 N. Western Ave., Chicago 80, Ill.

--- for more details, circle 427 on page 44

### Hitachi RADIOS

A full-color, 3-dimensional display picturing the new Hitachi TH-660 6-transistor portable radio in the person-



al gift presentation case occupies little more than 1/2 sq ft of counter space. The transparent personal presentation case is shown projected in front of the basic display and features the radio, its 2 batteries and 2 leather carrying cases—one for the radio and the other for the ear phone. \$24.95. The Sampson Co., 2244 S. Western Ave., Chicago 8, Ill.

--- for more details, circle 428 on page 44

### Switchcraft AUDIO ADAPTORS

Model #373 audio adaptor converts binding post, screw type or solder type terminals on stereo hi-fi amplifi-



ers, tuners, speakers, record players, and turntables to "quick-connect" type phono jack terminations. This molded adaptor features a 2-conductor long handle phono jack connected to 3 in. long, stripped and tinned grey shielded cable. Molded phono jack

## NEW PRODUCTS

on adaptor mates with standard Switchcraft and RCA type phono plugs. Switchcraft, Inc., 5555 N. Elston Ave., Chicago 30, Ill.

--- for more details, circle 429 on page 44

### Jensen NEEDLES

Model TR-3795 Tri-Rack displays, on peg hangers, 4 sapphire Dyna-Point and 4 diamond Dyna-Point

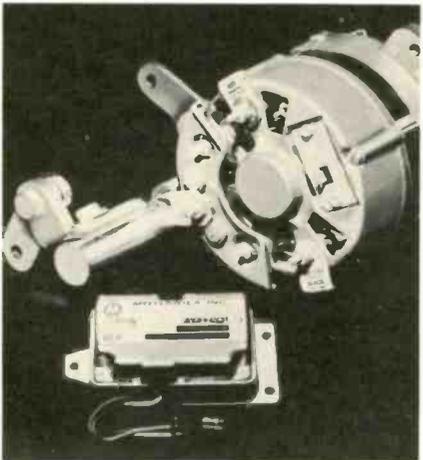


phonograph needles together with 4 each of these accessories: silicone-treated record brush, record inserts and 45 rpm spindle adapter. The three-sided display, set up as a counter display stands 14 in. high on a 7 in. base. Can also be opened up to hang flat against a wall. Colors are red, white and black. A free barometer will be given to each dealer and distributor ordering the new Tri-Rack. Jensen Industries, Forest Park, Ill.

--- for more details, circle 430 on page 44

### Motorola ALTERNATORS

A new all-electronic alternator system consists of an alternator, a voltage regulator, and a universal installation kit. It replaces the d-c generator and its regulator in motor vehicles; is designed to last the life of the car, and



JANUARY 1962

is reported to extend battery life from 25 to 50% even with large electrical requirements. Available in 30 or 45 amp units, fitting most 12 v, negative ground vehicles built since 1959. The system is marketed as a complete package. Motorola Inc., 9401 W. Grand Ave., Franklin Park, Ill.

--- for more details, circle 431 on page 44

### Sherwood STEREO AMPLIFIER/PREAMPLIFIER

Model S-5000 II features a presence-rise switch which increases the level around 2800 cps by 5 db to dra-



matize vocalists and certain instruments over the rest of the music. Other features include: 12 db/octave scratch and rumble filter which operates on all inputs; low hum noise, 60 db below 80 watts on phono channel; 1.2 millivolt phono sensitivity; and four low level and eight high level inputs. Front panel lights indicate stereo or mono operating mode. \$199.50, less case. \$204.50, with case. Sherwood Electronic Labs., 4300 N. California Ave., Chicago 18, Ill.

--- for more details, circle 432 on page 44

### Mark ANTENNAS

The new J-150 is a unity gain half wave end fed vertical dipole antenna designed for operation between 144 and 180 mc to a power level up to 250 watts. The quarter-wave matching and isolating stub eliminates most coupling and the need for ground radials. It is supplied as a standard shelf-stock and is easily cut to frequency in the shop or field. Base has 1¼-inch IPS female pipe thread and will mount on standard steel or aluminum rigid electrical conduit or water pipe. At any specific frequency and cutting length, it has a VSWR of less than 1.1 to 1. Across a bandwidth of 5 mc, VSWR is better than 1.5 to 1. Mark Products Co., 5439 Fargo Ave., Skokie, Ill.

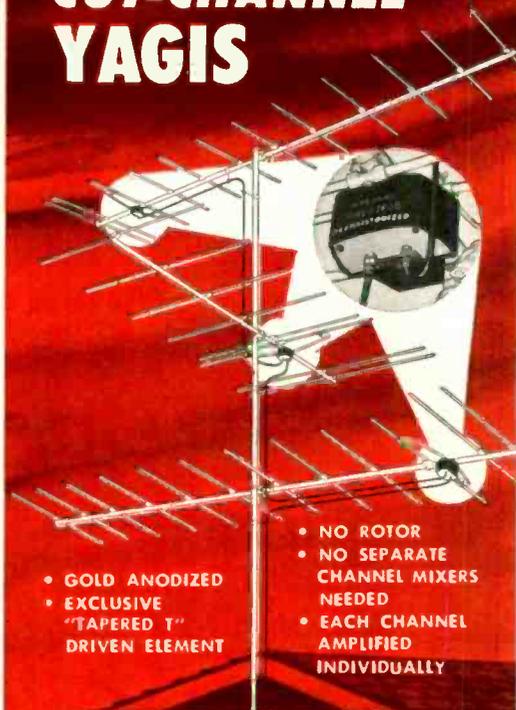
--- for more details, circle 433 on page 44

### K TOOL BAGS

Made of top grain cowhide, a leather tool bag for technicians features: An upper section to hold large tools, parts, meters, instruments, etc. A lower section which has 3 sliding metal trays with divided compartments for small parts. And optional outside pocket for service books and papers. Available in black or ginger color. Outside measurements: 15 in. long, 12½ in. high, 5 in. wide. Pocket measurements: 13½ in. long, 9 in. high with 1¾ in. gusset expansion.

For more details, circle 57 on page 44 →

# NEW Winegard ELECTRONIC CUT-CHANNEL YAGIS



- GOLD ANODIZED
- EXCLUSIVE "TAPERED T" DRIVEN ELEMENT

- NO ROTOR
- NO SEPARATE CHANNEL MIXERS NEEDED
- EACH CHANNEL AMPLIFIED INDIVIDUALLY

## AMPLIFIED TV RECEPTION IN ALL DIRECTIONS

ABSOLUTELY THE ULTIMATE IN BLACK AND WHITE AND COLOR FRINGE AREA RECEPTION!

Winegard's new cut channel yagis are the HIGHEST GAIN (28 DB) TV ANTENNAS EVER MADE! Each is powered by a transistor amplifier individually peaked for perfect results. Because TV signals are amplified at the point of interception, the finest possible signal-to-noise ratio results.

Each Powertron yagi amplifier has two 75 ohm coaxial connectors: for down-lead to the power supply and from built-in mixing coupler for connection to another Powertron without interaction.

Power consumption is only .05 Watt each. Eight Powertron yagis can be run from one power supply on one down-lead. Low band, FM and all channel models can be stacked 72" apart. High band models can be stacked 30" apart and placed between low band.

There are six (8-element) cut channel and broad low band models—eight (12 element) cut channel and broad high band models plus two FM and three all channel models. Ideal for motels, apartments, trailers, wherever the finest installation is needed.

Run up to 8 antennas from one power supply

For full details ask your distributor or write for technical bulletin.



# Winegard

3019-1E Kirkwood • Burlington, Iowa



those who  
Serve Best  
Use

# QUIETROLE



6 oz. SPRAY PACK CAN  
(with FREE Extender Tube)

2, 4, 8 oz. Bottles  
(with dropper)

Product of

## QUIETROLE

COMPANY

Spartanburg, South Carolina

in Canada: CROSS CANADA ELECTRONICS  
12 Laurel Street, Waterloo, Ontario

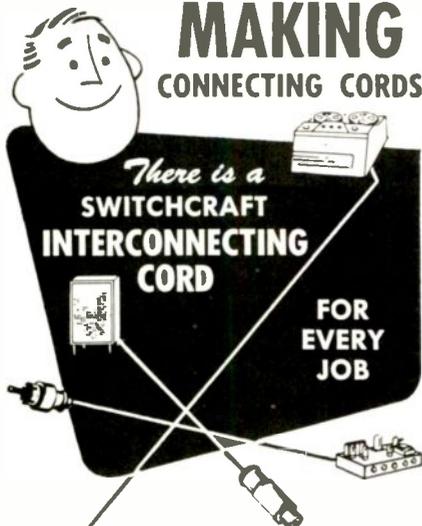
For more details, circle 36 on page 44

There's never any doubt with QUIETROLE... it always says "Sh, Sh" to noisy controls and switches on TV, radio and electronics instruments. Now, Quietrole is even easier to use... has FREE EXTENDER TUBE that hits those hard to reach places right on the button. It's Quality Quietrole that makes those once pesky repairs easier than ever. See how Quietrole can ease the jangled nerves of even your hardest to please customers. Quietrole helps the serviceman serve better than ever.



## DON'T WASTE TIME

# MAKING CONNECTING CORDS



There is a  
**SWITCHCRAFT**  
**INTERCONNECTING**  
**CORD**

FOR  
EVERY  
JOB

Eliminate soldering and "make-shift" connections! Over 180 different cable combinations of plugs, jacks, lug terminals and microphone connectors. Interconnect—quickly and simply—Stereo, HI-FI, Amplifiers, Speakers, Turntables, Tuners, PA, Ham and CB equipment.

Also, a complete line of ADAPTERS for interconnecting two pieces of equipment that do not have matching connectors.

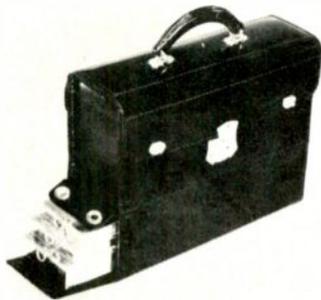
Write for Audio Accessory Catalog A-401.  
In stock at leading Electronic Distributors.

## SWITCHCRAFT

5583 N. Elston Ave., Chicago 30, Ill.  
Canadian Rep.: Atlas Radio Corp., Ltd.,  
50 Wingald Ave., Toronto, Ontario

For more details, circle 49 on page 44

## NEW PRODUCTS

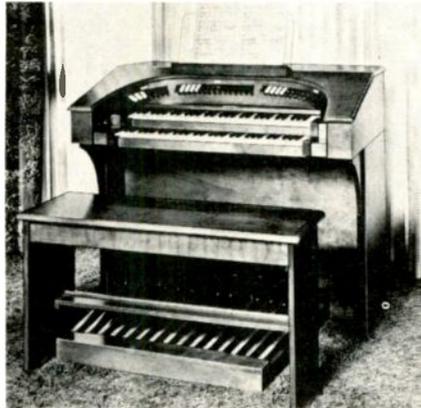


\$30.50, with pocket. \$27.50, without pocket. K. Leather Products, Inc., 427 Broadway, New York 13, N. Y.

For more details, circle 434 on page 44

## Artisan ORGANS

York model two-manual theater-styled organ, reported ideally suited for homes, offers an impressive stop-

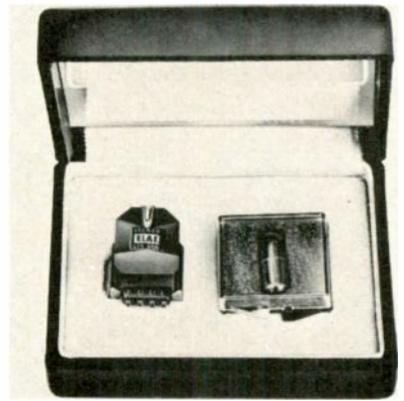


list of authentic theater voices characteristic of the great romantic theater organs of the 1920's. Features full 61-note manuals, a 25-note radiating pedal board, and a curved "horse shoe" stopboard with 40 multi-colored stop tablets. Has dual expression pedals, separate vibrato on each manual and independent oscillators for each note. Available in either finished or kit form. Artisan Organs, 4949 York Blvd., Los Angeles 42, Calif.

For more details, circle 435 on page 44

## Benjamin STEREO CARTRIDGES

Model Stereotwin STS-220 moving magnet stereo cartridge for both stereo and mono records features: wide channel separation of better than 25 db from 1,000 to 10,000 cps; and excellent characteristics to 15,000 cps and beyond. The all inclusive MU-metal shielding and high output (10 mv @ 5 cm/sec) is reported to completely eliminate hum. It is merchandised in a presentation case which includes the cartridge with diamond 0.7 mil stylus mounted, plus an extra diamond stylus. \$34.50.



Benjamin Electronic Sound Corp., 97-03 43rd Ave., Corona 68, N. Y.

For more details, circle 436 on page 44

## Minn. Mining & Mfg. TAPES

A single-use plastic taping dispenser, for the familiar 3/4 in. x 66 ft roll of "Scotch" brand electrical tape #33,



is a compact hand taping and cutting tool. Advantages are: easy cutting of the tough tape; cutter leaves a clean, square edge; tape roll is exposed for easy thumb control of wrapping tension; and a convenient end tab of tape remains ready for each new use. "Scotch" #33 in the dispenser pack is available at no extra cost. Minnesota Mining and Manufacturing Co., 900 Bush Ave., St. Paul 6, Minn.

For more details, circle 437 on page 44

## RCA TUBES

Three new novar high-perveance beam power tubes feature all-glass, integral base design and the new "dark heater." These 9-pin tubes, RCA-6GT5, RCA-12GT5, RCA-17GT5, are designed especially for use as horizontal-deflection-amplifier tubes in high-efficiency deflection circuits of TV receivers. They are alike except for their heater voltage and current ratings. Some significant features are: Single-ended structure in T-12 bulb for compact equipment designs. Can deliver a plate current of 390 milliamperes with zero bias and 60 v on plate. High ratio of plate current to grid-No. 2 current. High pulse plate voltage ratings and high dissipation ratings. Two base-pin connections for both grid-No. 1 and grid-No. 2, and a special mount structure to assure cool grid operation. Electron Tube Div., Radio Corp. of America, Harrison, N. J.

*Amphenol-Borg, Borg Equip. Div.*—appointments: HARRY BLUMENSCHNEIN and ROBERT PECORE named district sales managers, Distrib. Div., former for Wash., D. C., latter for Syracuse.

*Assoc. of EP & EM*—2nd part of SALES DEVELOPMENT SEMINAR held in Chicago, Oct. 20th, brought such a response that announcement of '62 seminars will be made soon.

*Stancor Electronics*—GEORGE MENA has been promoted to the post of distributor sales manager. Mr. Mena previously served as field sales manager of the division of the Chicago based transformer manufacturer.



Mena

*Jensen Industries*—PETER L. JENSEN, co-inventor of loudspeaker, died Wed., Oct. 25th at Western Springs, Ill.

*JFD*—ALBERT FINKEL, Pres., named Admiral in North Carolina Navy for outstanding contribution to U. S. S. North Carolina Battleship memorial.

*Euphonics Corp.*—J. N. GRIEVESON becomes a resident of Puerto Rico, where he is building a plant to produce new type, low cost microphones. The new component plant is another affiliate of the EUPHONICS CORP.

*Electro-Voice*—nears completion for a 28,000 square foot expansion to bring the firm's plant area to 175,000 square feet.

*P. R. Mallory*—appointments: JOHN F. KEARNEY as eastern regional sales manager; FRANK P. VENDELY as general sales manager of Distrib. Div.; O. E. BISHOP as marketing manager of Battery Co. and W. H. ANDERSON as central regional sales manager.

*Centralab*—FRANK C. ARRANCE joined manufacturing staff.

*Raytheon*—announces purchase of RHEEM SEMICONDUCTOR CORP., Mountain View, Calif.

*General Electric, Receiving Tube Div.*—GENE B. PURINGTON named district equip. sales manager, Syracuse. Also, ROLLIN J. SLOAN as manager, new office, Orlando, Fla. New picture tube warehouse and testing facility,

## HERE'S EXTRA PROFIT FOR YOU!

You can  
**SAVE**  
**\$2.00**  
by renewing  
**NOW!**



Here's a chance to ring up an extra two dollars profit. You can save \$2.00 by renewing your subscription to ELECTRONIC TECHNICIAN now for another two years.

**Two full years of service to ELECTRONIC TECHNICIAN—\$8.00**

By renewing in advance, you save us the expense of mailing reminders and invoices—and we're passing these savings on to you.

**More important—by renewing now you avoid the possibility of any irritating interruption in your monthly ELECTRONIC TECHNICIAN service.**

Use the convenient renewal form below. Please be sure to attach your address label off a recent issue of ELECTRONIC TECHNICIAN.

### SPECIAL RENEWAL OFFER — MAIL TODAY!

If this is a renewal, please be sure to include your address label from a recent issue of ELECTRONIC TECHNICIAN.

#### ELECTRONIC TECHNICIAN

1 East First Street  
Duluth 2, Minnesota

Yes, I want to take advantage of your special renewal offer. Renew my subscription to ELECTRONIC TECHNICIAN for the period checked below.

- |  |   |
|--|---|
| <input type="checkbox"/> One year—\$5                | <input type="checkbox"/> Payment enclosed |
| <input type="checkbox"/> Two years—\$8 (Save \$2.00) | <input type="checkbox"/> Bill me later    |

**Please check your type of business:**

- Independent TV-Radio Service  
 Maintenance, Installation and Operation of Industrial electronic equipment and communications  
 Retailer with service department  
 OTHER (please describe) .....

**Please check your title:**

- Owner, self-employed  
 Service manager  
 Employed technician  
 OTHER ..... (please describe)

NAME .....

BUSINESS NAME .....

STREET ADDRESS .....

CITY .....ZONE .....STATE .....

# NEW 4-WAY POCKET TOOL

a real "working partner"  
for removing backs of TV sets  
and installing antennas



1 It's a 1/4" nut driver!  
Fits Parker-Kalon screws.

Genuine Xcelite  
plastic handle—  
shaped and  
balanced for  
working ease.  
Equipped with  
pocket clip.

2 It's a 7/16"  
nut driver!  
Ideal for  
antenna  
installations.

3 It's a No. 1  
Phillips  
screwdriver!

Double-end blade  
inserts in 7/16" hex  
opening. Just push  
it in or pull it out!  
Patented spring  
holds it firm.

4 It's a 3/16"  
slotted screwdriver!



Ask to see  
"No. 600"  
next time you  
pick up parts...

## XCELITE

XCELITE, INC. • ORCHARD PARK, N.Y.  
Canada: Charles W. Pointon, Ltd., Toronto, Ont.  
For more details, circle 58 on page 44

## NEWS OF THE INDUSTRY

opened in Nov., at Bakersfield, Calif.,  
N. J. RAMOS, manager.

**Duncan Electronics**—names three  
new sales reps: WESTERN ENGINEER-  
ING CO., Phoenix, for Ariz., New  
Mex., and Colo.; OSCAR SALME &  
ASSOC., Salt Lake, for Utah and Idaho;  
and DAGE CORP., New York, N. Y.,  
for all foreign markets.

**Electronic Parts Distributors Show  
Corp.**—launches second annual adver-  
tising awards contest for exhibitors in  
the 1962 show and their advertising  
agencies. Entries are invited in various  
categories of advertising and direct  
mail promotion. The show will be  
held at the Conrad Hilton Hotel,  
Chicago, May 21-24.

**Howell**—announces acquisition of  
DON BOSCO ELECTRONICS, Hanover,  
N. J.

**Winegard**—builds plant for elec-  
tronics mfg., TV-FM amplifiers &  
accessories in Burlington, Iowa.

**Finney Antenna**—MORRIS L. FIN-  
NEBURGH, SR., named chairman of  
newly formed Speakers' Bureau, All-  
Industry Electronics Conference, Chi-  
cago.



Finneburgh



Haase

**Sylvania**—announces price reduc-  
tions from 5% to 40% on 50 EIA  
transistor types. Electronic Tube Div.  
appointments: EDWIN J. HAASE as mid-  
western regional sales manager. E.  
BRUCE McEVOY as distributor sales  
manager, replacing HAROLD H. RAIN-  
IER, retiring January 1.

**RMS**—promotions: HAROLD MER-  
SON as vice pres. for mfg. ARTHUR A.  
FINK as vice pres. for sales, both also  
on Board of Directors.

**Seco**—LOUIS P. POLRIES named  
director of research and development.

**Chemtronics**—ERWIN SEAMAN nam-  
ed sales manager.

**Delco**—LOUIS F. WENISCH named a  
semiconductor sales engineer for the  
New York Metropolitan area.

**RCA's** two-way radio marketing or-  
ganization—establishes seven new dis-  
trict sales offices. Pittsburgh, V. J.  
BAUER, district sales manager. West  
Palm Beach, M. L. HAAS, manager.  
Dallas, J. R. BOOTH, manager. Detroit,  
C. T. BURGETT, manager. Seattle, W.  
T. GLASS, manager.

**British Industries**—elects to vice-  
presidencies FRANKLIN S. HOFFMAN  
and ARTHUR M. GASMAN.

**Empire Scientific**—HERB HORO-  
WITZ named president.

**Telex**—STEPHEN A. KELLER named  
executive vice president.

**Zam & Kirshner**—named ad agency  
for VOGUE INSTRUMENT CORP.

**Olympic Radio & TV**—ROBERT T.  
BURNS, JR. appointed as regional sales  
manager for Texas and Okla.

## ASSOCIATION NEWS

### California

**TSDA**, San Francisco, announced  
that the San Mateo County organiza-  
tion's President, Lloyd Williams, ap-  
pointed Raymond E. Morris as Ex-  
ecutive Director of the association. An  
expert in trade association manage-  
ment, business administration, and  
public relations, Mr. Morris will de-  
velop and execute several programs  
for the technician's organization.

**APA**, Los Angeles, elected the fol-  
lowing officers: Pres., Oran Bridges;  
V. P., Hazen Simpkins; Sec.-Treas.,  
Rollie Grinder.

**GAES**, Los Angeles, announced  
election of the following officers to  
serve this West Coast Chapter of the  
organization: Pres., Lambert F.  
Craemer; V. P., E. M. Fairchild; Sec'y,  
Roy F. Rafenstein; Treas., Richard J.  
Petersen.

**ACTRA**, Oakland, has begun im-  
plementation of its "customer rating  
service" by mailing out cards to all  
members requesting information on  
"dead-beat" customers.

### Illinois

**NATESA**, Chicago, Executive Dir-  
ector Frank J. Moch addressed a  
lengthy letter to President John F.  
Kennedy regarding some of the pro-  
blems facing the 120,000 TV and  
radio technicians in the nation. Mr.  
Moch pointed out that . . . "the fac-  
tories and their agents" have moved  
into the entertainment electronics field  
"to make this service market captive  
by various schemes tied into market-  
ing policies." "More recently," con-

tinued Mr. Moch, "we have run into another gross injustice which is growing by leaps and bounds . . . namely the complete perversion of wholesale practices as they apply to the sale of replacement components and electron tubes . . ." Mr. Moch concluded his letter by requesting the President's aid in solving these problems.

### Indiana

ARTS, South Bend, elected the following officers: Pres., Lew Woods; V. P., Bill Rapport; Sec'y, Russ Bills; Treas., Dick Tepe; Sgt.-at-Arms, Ralph Zellers.

### Michigan

#### Court Upholds License Law

TSA, Detroit, reported that the Supreme Court at Lansing has unanimously upheld the Detroit TV license ordinance. A television service dealer, William Murphy had challenged constitutionality of the ordinance on grounds that the nine-member board, with four of his competitors as members, constituted a threat of discrimination against him.

RTA, Lansing, elected the following officers: Pres., Mel Parks; V. P., E. Snyder; Sec'y, Dean Pope; Treas., Ralph Sheldon. P. R., Bill Sommers.

MEA, Macomb, elected the following officers: Pres., Walter Gargala; V. P., John D. Brown; Sec'y, Edward Ballentine; Treas., Carl Batkins.

TESA, Grand Rapids, Secretary Howard Larsen points out that the Wayne County organization has always made it a policy to help members solve their "tough dog" problems. Members are urged to bring along both B/W and color sets to regular monthly meetings where the ailing sets are usually "de-bugged" in short order.

### North Carolina

NCFEA, High Point, elected the following officers: Pres., George Kiser; V. P., W. T. Reynolds; Exec.-Sec'y, Jim Hornaday; Sec'y Joe Warren. The Greensboro chapter also elected new officers: Pres., C. E. Garrett; V. P., Bill Burgess; Sec'y Vaughn Petty; Treas., Dayton Ward.

PESA, Roxboro, a new group, the Person County Electronic Association, elected: Pres., Ben Hester; V. P., Alvin Dickerson; Sec.-Treas., James Morris.

### Pennsylvania

#### Dealers Face New Threat

FRTSAP, Carbondale, announced a meeting, under the sponsorship of

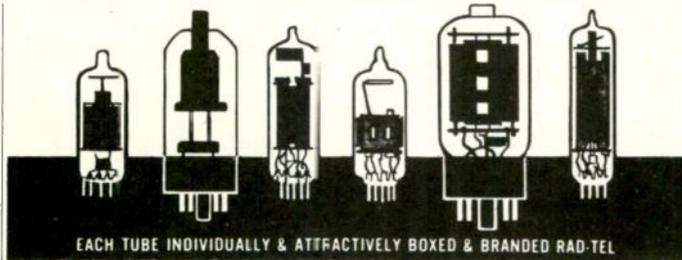
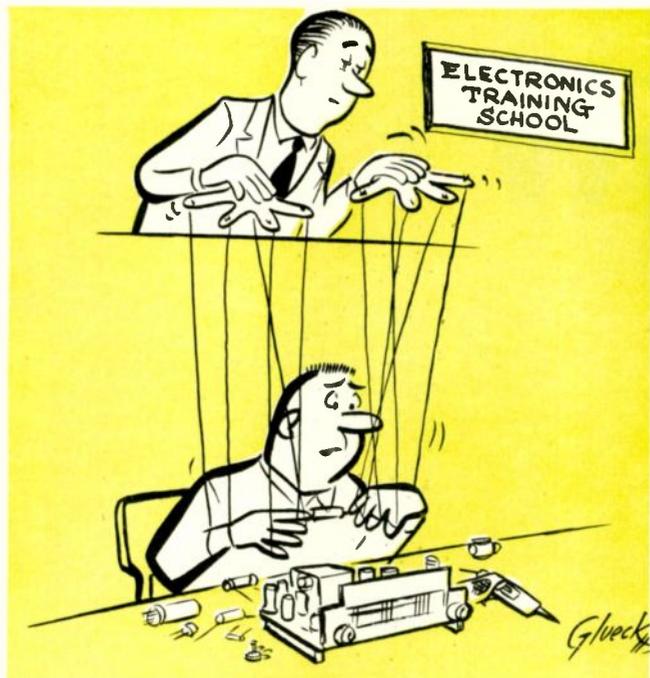
ESDA of West Pennsylvania, in Pittsburgh, to discuss a new threat to radio, TV, and appliance service dealers. The organization stated that the threat comes from a program designed by Philco, Sylvania and Norge, backed by the manufacturers and their product distributors, is tied in with local food chains. Bonus credits on food purchases would be applied to purchase of certain heavy home appliances, including radio and TV sets. The association believed the scheme would eventually cut into regular TV-radio and appliance dealers' sales and service.

### Oregon

OTSA, Portland, elected the following officers: Pres., Bob Kelly; V. P., Don Willis; Sec'y Paul Brandon; Treas., Les Armstrong.

### Missouri

TESA, St Louis puzzled about attendance at service meetings. Though attendance was good at their last three meetings, a combined service-instrument product promotion meeting out-drew two 100% service meetings by five to one. All meetings were well advertised and subjects were timely.



## BUY DIRECT FROM RAD-TEL

Save on Rad-Tel's Quality **BRAND NEW TUBES**

**NOW!** { Over 450 Types  
Up to **75% OFF**

1-Year Guarantee • 1-Day Service

- Send For New Tube & Parts Catalog
- Send For Free Trouble Shooting Guide

Qty.	Type	Price	Qty.	Type	Price	Qty.	Type	Price	Qty.	Type	Price
—	1B3	.79	—	6AL5	.47	—	6BZ6	.55	—	12AU7	.60
—	1X2B	.82	—	6AU6	.52	—	6CB6	.55	—	12BH7	.77
—	3CB6	.54	—	6AX4	.66	—	6CG7	.61	—	35W4	.42
—	4BQ7	1.01	—	6BQ6	1.05	—	6SN7GT	.65	—	35Z5	.60
—	5U4	.60	—	6BQ7	1.00	—	6U8	.83	—	50C5	.53



### RAD-TEL TUBE CO.

Dept. 67102 55 CHAMBERS ST., NEWARK 5, NEW JERSEY

TERMS: 25% deposit must accompany all orders, balance COD. Orders under \$5 add \$1 handling charge plus postage. Orders over \$5 plus postage. Approx. 8 tubes per 1 lb. Subject to prior sale. No COD's outside continental USA.

For more details, circle 38 on page 44

## IF YOU CHANGE YOUR ADDRESS

Notify us at 1 East First Street, Duluth 2, Minn.  
Please include the address label from a recent issue and allow 30 days for the change.

# Eliminate That CRT Spot!

■ Many service technicians have heard customers complain about a bright spot lingering in the center of the screen after the TV set has been turned off.

TV techs know that the spot is produced by, among others, the high voltage filter capacitor's slow discharge after the set is turned off. You can eliminate this spot for a distressed customer by adding an extra switch to the on-off switch of the receiver.

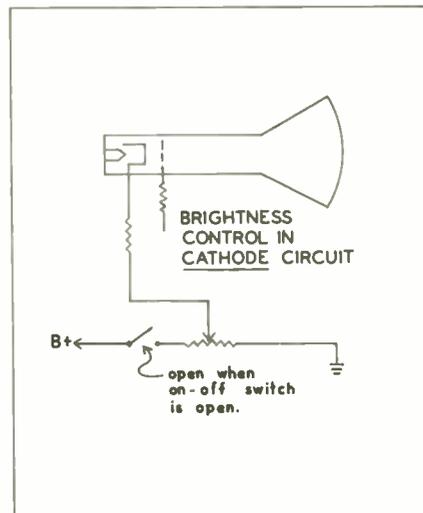
To effect this, a double-pole double throw switch should be substituted for the existing on-off switch. One section of the new switch replaces the on-off switch. The other section is used to eliminate the spot.

Before connecting the extra sec-

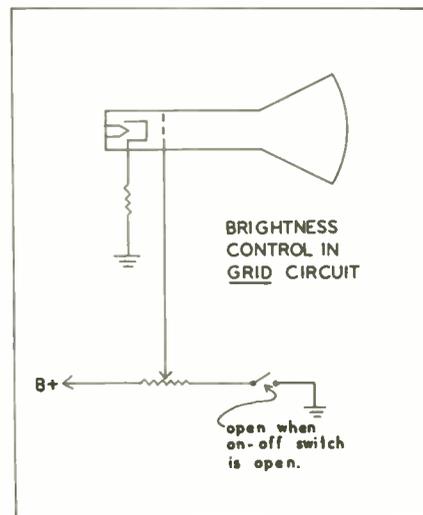
tion of the switch it is necessary to determine if the brightness control is in the cathode or grid circuit of the CRT.

Drawing A shows the method to be used if the brightness control is in the CRT's cathode. The switch should be connected between B+ and the hot end of the brightness control. When the set is turned off, B+ is removed from the cathode causing the grid to become positive with respect to the cathode. The CRT conducts heavily, instantly discharging the high voltage filter capacitor.

If the brightness control is in the grid circuit of the CRT, the extra switch section must be connected between the ground end of the brightness control and ground,



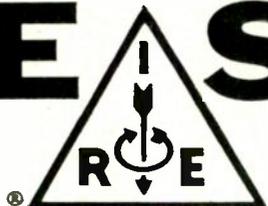
A



B

as shown in drawing B. Here again, when the set is turned off, the grid becomes positive, causing the CRT to conduct heavily, discharging high voltage. ■

## IRE SHOW



presenting

### "THE GOLDEN AGE OF ELECTRONICS"

March 26-29, 1962

The New York Coliseum

... part of the

International Convention of the IRE

The Institute of Radio Engineers

1 East 79th Street • New York 21

Members \$1.00. Non-members \$3.00. Age limit: over 18

For more details, circle 28 on page 44



"That solder doesn't grow on trees."

## REPS AND DISTRIBUTORS

**Almo Radio**—2nd session on color TV repair seminars held Oct. 25th, Phila. Dealer-servicemen completing the course are awarded certificates.

**Atlas Sound**—new sales reps.: F. A. DAUGHERTY Co., Cleveland for Ohio area including Covington, Ky.; COOPER-DAUGHERTY SALES Co., Cannonsburg, Pa., for western Pa., West Va. and Ky. and Md. areas; THOMAS & SUKUP, INC., Indianapolis, for Ky. and KOENIG-MYERS ASSOC., Bridgeport, Miss. assigned to central and southern Ill.

**Fanon**—appoints ART CERF & Co., as sales rep for eastern Pa., southern N.J., Dela., Md., Va. and Wash., D.C.

**Newark Electronics**—appoints STRAL ADVERTISING Co., Chicago as agency.

**Trjad Transformer**—announces LYNCH ELECTRONICS, INC., Monrovia, Calif. as distributor to industrial accounts in southern Calif.

**University Loudspeakers**—names THE TEXPORT Co. to represent the firm's entire line including hi-fi, PA and modular microphones, in Texas and Okla.

**Sonotone**—HYDE ELECTRONICS Co. appointed as firm's rep for Mont., Wyo., eastern Idaho, Utah, Colo., N. M., and the El Paso, Texas, trading area.

**Electronic Representatives Assoc.**—JACK PERLMUTH appointed vice chairman; J. ROBERT NATOLI and JOHN LIGHTNER as trustees.

**Williams Assoc.**—expands facilities to new offices in Salt Lake City, GERALD TRACY, manager & Phoenix with ROBERT MIKKELSON, manager.

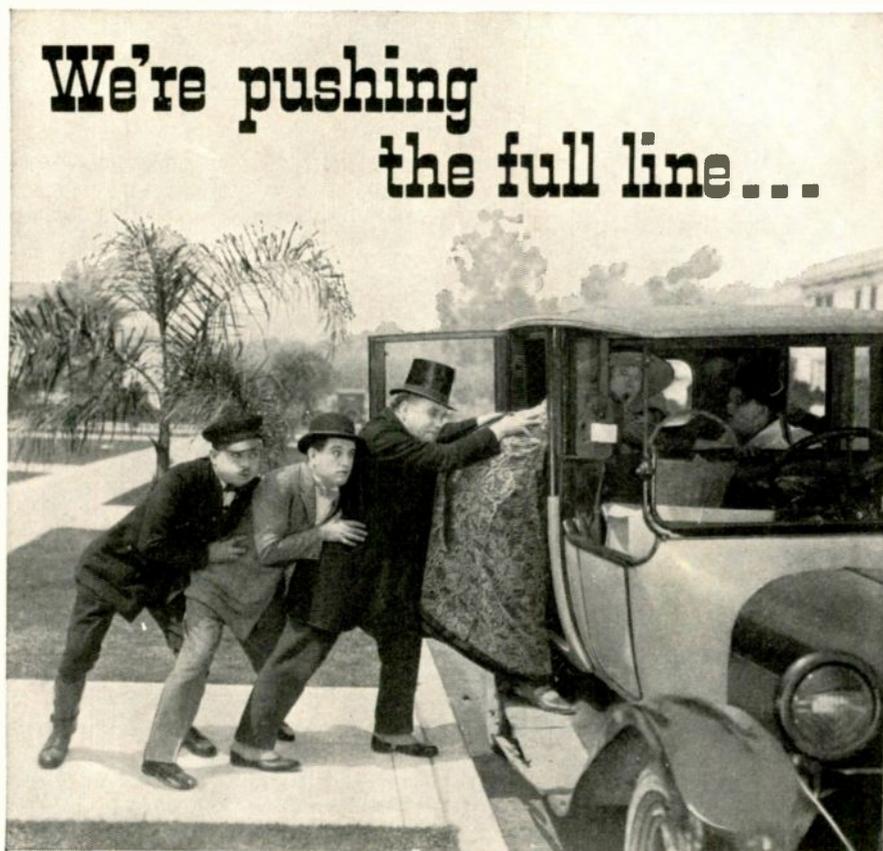
**Olympic Radio & TV**—names RYE WHOLESALE Co., North Little Rock as distributor for Ark.

**Progress Webster**—appoints DAVE MILLER SALES Co., Seattle as sales rep in Northwest.

**Olson**—announces opening of branch store, Atlanta, under management of WILFORD FERRELL.

**Amphenol-Borg, Borg Equip. Div.**—appoints ROBERT E. NESBITT Co. as rep for Okla., Ark., La. and eastern Texas.

**Monarch**—announces SOUTHERN CALIF. MUSIC Co. San Diego, as exclusive distributors.

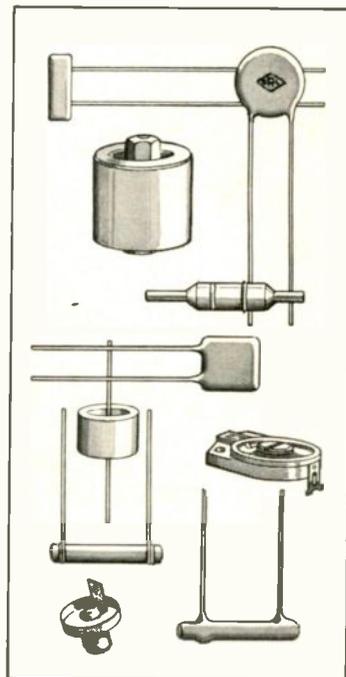


## (of Centralab Ceramic Capacitors)

Sometimes we get so wound up in talking about our "only from CENTRALAB" ceramic capacitors that we forget to remind you about the *standard* ones.

CENTRALAB has plenty of both—as well we should. We *pioneered* ceramic capacitors many years ago—and we still give you the finest product and the widest choice.

Discs, tubulars, buffers, trimmers, feed-thrus—for every standard and special application, in radio-tv servicing or industrial use—CENTRALAB makes them and makes them best. That's why CENTRALAB is the best ceramic capacitor line for you to buy.



# Centralab.

THE ELECTRONICS DIVISION OF GLOBE-UNION INC.  
902A EAST KEEFE AVENUE • MILWAUKEE 1, WISCONSIN  
CENTRALAB CANADA LIMITED—AJAX, ONTARIO

D-61335

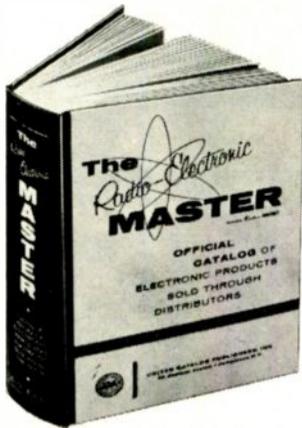
ELECTRONIC SWITCHES • VARIABLE RESISTORS • CERAMIC CAPACITORS

PACKAGED ELECTRONIC CIRCUITS • ENGINEERED CERAMICS

For more details, circle 17 on page 44  
67

every standard electronic part you'll ever need is pictured and described in the 1962 RADIO ELECTRONIC MASTER

JUST OUT!  
'62 EDITION



1600 PAGES  
world's largest electronic catalog

It's new! Covers all the latest parts and equipment necessary to repair and maintain radio-TV-audio electronic equipment.

It's the world's biggest electronics purchasing guide! 1600 pages, more than 175,000 items — with descriptions, specs, illustrations and prices.

It's easy to use! organized in 32 product sections for rapid references; fully indexed to save you time. At parts distributors, \$3.95 (\$4.95 in Canada).

THE RADIO-ELECTRONIC MASTER  
60 Madison Ave., Hempstead, N.Y.

For more details, circle 54 on page 44

## CATALOGS AND BULLETINS

**LAMPS:** 1962 catalog describes a complete line of precision engineered portable lamps. 12 pages. Illustrated. Acme Lite Products Co., Congers, N. Y.

... for more details, circle 300 on page 44

**CAPACITORS:** A pocket-size booklet, AFH-461, lists 1059 types of AFH 85°C twist prong electrolytic capacitors. Capacity, voltage size and prices included. Aerovox Corp., New Bedford, Mass.

... for more details, circle 301 on page 44

**HI-FI COMPONENTS:** Two new natural walnut bookshelf enclosures and two unfinished birch bookshelf kits, plus a new Slimline console enclosure —all with matching Jensen speakers —are introduced in a new catalog. Argos Products Co., Genoa, Ill.

... for more details, circle 302 on page 44

**HEADPHONES:** A colorful, 4-page, booklet covers model ED-300 headphone set which features a frequency response of 50 to 10,000 cps. Impedance, 50,000 ohms at 1,000 cps. Sensitivity, 8 dynes/cm<sup>2</sup>/v at 1,000 cps. Clevite Electronic Components, 232 Forbes Rd., Bedford, Ohio.

... for more details, circle 303 on page 44

**EARSETS:** An improved Earset for private listening with transistor radios is featured in literature. Molded to a flexible 3' cord, the set is an economical model designed to fit all transistor radios. Communications Accessories Div., Telex, Inc., Telex Park, St. Paul 1, Minn.

... for more details, circle 304 on page 44

**AMPLIFIERS:** Model LT-80 "Mc-Martin" transistorized audio/PA amplifier, described in current literature, is the first model available in a series under development. It is a conservative 8 watt continuous duty amplifier specially designed for background music and PA applications. Continental manufacturing, Inc., 1612 California St., Omaha, Neb.

... for more details, circle 305 on page 44

**COMPONENTS:** Radio & TV catalog No. RT-61 provides 28 pages of information on speakers, remote controls, balance controls, antennas, couplers, fire alarms, soldering irons, and many more items. Well illustrated. Includes prices. Fedtro Inc., Federal Electronics Sales Div., Federal Electronics Bldg. Rockville Centre, N. Y.

... for more details, circle 306 on page 44

**TUBES:** A new edition of General Electric's "Television Picture Tube Replacement Guide" features a section on picture tube interchangeability.

The 24 in. x 30 in. wall chart covers 460 types of CRT's ranging in size from 2 in. to 30 in. faceplates. Designated Pub. No. is ETR 702-F. Electronic Components Div., General Electric Co., Owensboro, Ky.

... for more details, circle 307 on page 44

**SPRAYS:** An illustrated 12-page, 5-color, catalog gives pictures, descriptions and prices of the firm's complete line of aerosol spray paints and protective coatings. Krylon, Inc., Norristown, Pa.

... for more details, circle 308 on page 44

**CALIBRATORS:** Transistorized crystal calibrators, covered in literature, are: Model TE-27 featuring a 100 kc and 1 Mc oscillator; and TE-29 producing only 100 kc. Both units are completely self-contained and powered by a standard 9 v transistor battery. Lafayette Radio Electronics Corp., 165-08 Liberty Ave., Jamaica 33, N. Y.

... for more details circle 309 on page 44

**MAGNETIC TAPES:** "Four Track, A New Dimension in Tape Recording" is the title of a colorful, illustrated, booklet which provides a non-technical description of this method and its benefits. It also lists available "Scotch" brand tapes and accessories and gives hints on tape care and storage. Minnesota Mining and Manufacturing Co., 900 Bush Ave., St. Paul 6, Minn.

... for more details, circle 310 on page 44

**RADAR SENTRIES:** An illustrated bulletin covers a dual-band radar warning device that gives motorists advance warning of radar controlled speed and danger zones. Clipped on sunvisor or set on dashboard, Radar Sentry gives audible warning whenever it intercepts a radar beam on either the "S" or "X" microwave bands. Radatron, Inc., 232 Zimmerman St., North Tonawanda, N. Y.

... for more details, circle 311 on page 44

**ELECTRIC ORGANS:** Literature covers a "do-it-yourself" electric organ with 88 keys and 13 pedals, weighing less than 100 pounds, which can be assembled in 50 hours. Tone quality performance are reported as comparable to models selling for more than twice the cost of this kit which is \$500. Schober Organ Corp., 43 W. 61st St., New York, N. Y.

... for more details, circle 312 on page 44

**MANUALS:** The 1961 Master Index lists available Radio and TV manuals. The manuals listed contain diagrams and service material including radio material from 1926 through 1961 and TV material from 1951 through 1961. The index sells for 25c. Send your order with payment to Supreme Publications, 1760 Balsam Rd., Highland Park, Ill.

... for more details, circle 313 on page 44

# AUDIO NEWS LETTER

**SUPEREX** new stereo phones have separate woofer and tweeter elements in each phone, and adjustable cross-over networks.

**BRITISH INDUSTRIES** resigns as American marketing agent for English-made Leak line of amplifiers, pre-amplifiers and FM tuners.

**UNIVERSITY** has been awarded a U. S. Army Signal Corps contract for special gun-blast-proof field inter-communication loudspeakers.

**EIA** reports August factory sales for both mono and stereo phonos set a record for 1961. Mono for August totaled 106,157; and stereo 242,164.

**ELECTRO-VOICE** reports 6-month sales volume of \$5,236,942, a 12% increase over last year's total for the same period. Earnings for the period were \$91,984.

**SHURE's** president, S. N. Shure, was awarded the "Professional Manager" citation for 1961 by the Society for Advancement of Management at recent midwest conference.

**AMPEX** announces the 1200 series 4-track stereo and mono tape recorder/player as highlighting their 1962 line. It records 4-track stereo and mono, plays back

2 and 4-track stereo and 4 track mono. Speeds are 3 3/4 and 7 1/2 ips. Has new master selector switch, 3 newly designed heads, and new tape and guidance systems. Prices range from \$499.50 to \$645.

**CROSBY-TELETRONICS** and Crosby Electronics plants were closed by the Internal Revenue Service because of a deficiency in withholding taxes. Company may re-open plants soon.

**AUDIO DYNAMICS** introduces the Pritchard pickup system, combining the ADC-1 stereo cartridge with a balanced tone arm. Tracks at 3/4 g. Fundamental resonance, 6 cps. \$85. Arm accommodates other pickups and is available separately @ \$39.50.

**CBS LABS** introduces new stereo frequency test record to test stereo phono equipment. Includes checks for frequency response, channel separation, and the means for checking tone arm resonance and stylus compliance, among others.

**ALLIED RADIO's** 144 page Discount Stereo Record and Tape Catalog covers more than 1600 stereo record releases, 300 mono recordings, and some 800 4-track stereo tapes.

**TV SERVICEMEN** sponsor Hi-Fi Music Show at Benjamin Franklin Hotel, Philadelphia, this past weekend, as part of customer education program. Nearly 61 hi-fi manufacturers display equipment.

**HARMAN-KARDON** launches a special mail campaign promoting the Commander series of amplifiers and accessories, featuring eight postal cards written in verse and illustrated with humorous cartoons.

## TRU-VAC

# FREE

UP TO 100  
1-YR. GUARANTEED  
TRU-VAC TUBES

TO QUANTITY BUYERS!

Now quantity buyers get a FREE assortment of individually-boxed, regular stock TRU-VAC tubes with each order.

PLACE YOUR ORDER TODAY!  
GET UP TO 100 TUBES FREE!

Here's how this FREE offer works!

15	FREE TUBES	With Order of	\$25
25	FREE TUBES	With Order of	\$50
50	FREE TUBES	With Order of	\$100
100	FREE TUBES	With Order of	\$500

LOOK! 1,000 USED TV'S

Costly, famous make console models with little or no tube replacement! Re-quire only minor adjustment. Perfect for resale, or as your own second set! 16", 17" and 19" screens none smaller! Sets shipped FOB, Harrison, N.J.

\$16<sup>95</sup>

As Is

## 1-yr. guaranteed Radio & TV Tubes

Factory Used or Factory Second Tubes! TRU-VAC will replace FREE any tube that becomes defective in use within 1 year from date of purchase!

ALL TUBES INDIVIDUALLY BOXED!  
CODE DATED & BRANDED "TRU-VAC"

Partial Listing Only . . . Thousands More Tubes in Stock!

<b>SPECIAL! 6SN7GT . . . 30¢</b>	<b>6W4GT . . . 30¢</b>		
0Y4 3BN6 5V4G 6AU5GT 6BQ6GT 6CS7 6SA7 7A4/XXL 7Q7	6AU6 6BQ7 6CU5 6SC7 7A5 7S7	12BA7 12SN7GT 36	
0Z4 3RZ6 5V6GT 6AU8 6BR8 6CU6 6SD7GT 7A6 7X6	6B8 6C4B 6F5 6SK7 7B7	12BD6 12SQ7 38	
1A7GT 3CB6 5X8 6AU8 6BR8 6CU6 6SD7GT 7A6 7X6	6B8 6C4B 6F5 6SK7 7B7	12BE6 12V6GT 39/44	
1B7T 3D4 5Y3 6AV5GT 6BSB 6D6 6SF5 7A7 7X7	6B8 6C4B 6F5 6SK7 7B7	12BF6 12W6GT 41	
1H5GT 3S4 8A6 6AV6 6SY5G 6DE6 6SF7 7A8 7Y4	6B8 6C4B 6F5 6SK7 7B7	12BH7 12X4 42	
1L4 3V4 6AB4 6AW8 6BZ6 6DG6GT 6SG7 7B4 7Z4	6D6 6F6 6H7 7B5 7B6	12BL6 14A7/12B7 43	
1L6 4BQ7A 6AC7 6AX4GT 6BZ7 6DF6 6H7 7B5 7B6	6D6 6F6 6H7 7B5 7B6	12BQ6 14B6 50A5	
1NSGT 4BS8 6AF4 6AX5GT 6C4 6E5 6S17 7B6 7B6	6D6 6F6 6H7 7B5 7B6	12AB5 12BR7 14Q7 50B5	
1R5 4BZ7 6AG5 6B8 6C4B 6F5 6SK7 7B7 7B7	6D6 6F6 6H7 7B5 7B6	12AD6 12BY7 17AX4 50C5	
1S5 4CB6 6AH4GT 6BA6 6CB6 6F6 6SL7 7B8 7B8	6D6 6F6 6H7 7B5 7B6	12AF6 12CA5 17D4 50L6	
1T4 5AM8 6AH6 6BC5 6CD6G 6H6 6S07 7C4 12A05	6D6 6F6 6H7 7B5 7B6	12C65 19AU4GT 56	
1U4 5AN8 6AK5 6BC8 6C6B 6J4 6SR7 7C5 12AT6	6D6 6F6 6H7 7B5 7B6	12D4 19B6GT 80	
1U5 5AT8 6AL5 6BD6 6C7 6J5 6T4 7C8 12A77	6D6 6F6 6H7 7B5 7B6	12E7 12F5 19J6 84/624	
1V2 5AV8 6AM8 6BE6 6CG8 6J6 6T8 7C7 12A06	6D6 6F6 6H7 7B5 7B6	12F8 12F8 19T8 117Z3	
1X2 5AZ4 6AN8 6BF5 6CH8 6J7 6U5 7E5 12A07	6D6 6F6 6H7 7B5 7B6	12K5 24A 12A05	
2AF4 5BR8 6A05 6BG6G 6CL6 6K6GT 6U8 7E6 12A06	6D6 6F6 6H7 7B5 7B6	12C4 12K7 25Z6GT	
2BN4 5CG8 6A06 6BH6 6CM6 6K7 6V6GT 7E7 12A07	6D6 6F6 6H7 7B5 7B6	12V7 12L6 27	
2CY5 5J6 6A07 6BJ6 6CM7 6N7 6W6GT 7F7 12AX4GT	6D6 6F6 6H7 7B5 7B6	12Q7 35A5	
3A5 5R4 6AR5 6BK5 6CN7 6Q7 6X4 7F8 12AX7	6D6 6F6 6H7 7B5 7B6	12R5 35B5	
3AL5 5T8 6AS5 6BK7 6CQ8 6S4 6X5GT 7G7 12AZ7	6D6 6F6 6H7 7B5 7B6	12S47 35C5	
3AU6 5U4 6AT6 6BL7G 6CR6 6S7 6X8 7H7 12B4	6D6 6F6 6H7 7B5 7B6	12S17 35W4	
3BC5 508 6AU4GT 6BN6 6CS6 6S8GT 6Y6G 7N7 12BA6	6D6 6F6 6H7 7B5 7B6	12SK7 35Z5	

# 35¢

Per 100 TUBES

\$33

Any tube not listed also available at 35¢ each!

1-YEAR GUARANTEED TV PICTURE TUBES

These tubes are made only from new parts and materials, except for the envelope which is re-used. Below listed prices do not include duty. Add additional \$5.00 deposit on tubes sizes to 20", an 21" and 24" tubes—\$7.00. Deposit refunded immediately when duty is returned prepaid. Aluminized tubes—\$4.00 extra.

10014 2.00	16284 11.00	179P4 16.00	209P4 17.50	21AWP4 17.40	21BP4 17.40
12LP4 10.40	161P4 12.10	179P4 16.00	21AP4 21.40	21EP4 17.20	21FP4 18.30
14B-CP4 11.00	169P4 11.90	17CP4 13.80	21AP4 18.70	21FP4 18.30	21FP4 17.40
16AD4 10.00	17AP4 15.40	20CP4 15.80	21AP4 18.70	21AP4 21.20	24AP4 20.40
16DP4 12.10	17BP4 13.40	19AP4 18.30	21AMP4 17.00	21FP4 18.30	24CP4 27.70
16GP4 16.00	17CP4 16.00	17FP4 16.00	21AP4 18.70	21WP4 17.40	24DP4 29.70
16HP4 12.10	17CP4 17.40	20DP4 15.10	21AP4 18.70		

**ATTENTION QUANTITY USERS! Big Discounts Are Yours . . . Call or Write For Our 1000 Tube "Private Label" Special Attention Bonding Dept. MGE.**

**Money cheerfully refunded Within Five (5) Days, if Not Completely Satisfied!**

**TRU-VAC (R) PAYS YOUR POSTAGE—On orders of \$5 or more in USA and Territories. Send approximate postage on Canadian and foreign orders. Any order less than \$5 requires 25¢ handling charge. Send 25¢ on C.O.D.'s. All orders subject to price sale. Complying with Federal regulations, the following statement appears in all Tru-Vac advertisements: Tubes in this ad may be FACTORY SECONDS or USED tubes and are clearly marked.**

# TRU-VAC

Harrison Avenue • Box 107 • Harrison, N. J. HUmboldt 4-9770

For more details, circle 52 on page 44

# WHATS MY LINE?

Continued from page 38



## CITIZEN BAND CLASS "D" CRYSTALS

All 22 Frequencies in Stock  
3rd overtone. .005% tolerance—to meet all FCC requirements. Hermetically sealed HC6/U holders. 1/2" pin spacing — .005 pins. (.093 pins available, add 15c per crystal.) **\$2.95 EACH**

The following Class "D" Citizen Band frequencies in stock (frequencies listed in megacycles): 26.965, 26.975, 26.985, 27.005, 27.015, 27.025, 27.035, 27.055, 27.065, 27.075, 27.085, 27.105, 27.115, 27.125, 27.135, 27.155, 27.165, 27.175, 27.185, 27.205, 27.215, 27.225.

Matched crystal sets for all CB units . . . \$5.90 per set. Specify make and model numbers.

### RADIO CONTROL CRYSTALS IN HC6/U HOLDERS

Specify frequency. 1/2" pin spacing . . . pin diameter .05 (.093 pin diameter, add 15c) **\$2.95 ea.**

### FUNDAMENTAL FREQ. SEALED CRYSTALS

in HC6/U holders  
From 1400 KC to 2000 KC .005% Tolerance **\$4.95 ea.**

From 2000 KC to 10,000 KC any frequency .005% Tolerance **\$3.50 ea.**

### SEALED OVERTONE CRYSTALS

Supplied in metal HC6/U holders  
Pin spacing .486, diameter .050

15 to 30 MC .005 Tolerance **\$3.85 ea.**  
30 to 45 MC .005 Tolerance **\$4.10 ea.**  
45 to 60 MC .005 Tolerance **\$4.50 ea.**

### QUARTZ CRYSTALS FOR EVERY SERVICE

All crystals made from Grade "A" imported quartz—ground and etched to exact frequencies. Unconditionally guaranteed! Supplied in:

FT-243 holders MC-7 holders  
Pin Spacing Pin Spacing  
1/2" Pin Diam. 3/4" Pin diam-

eter .093 eter .125  
Cria/ar Holders FT-171 holders  
Pin Spacing 1/2" Pin Spacing  
Pin Diameter 3/4" Banana  
.125 pins

### MADE TO ORDER CRYSTALS

1001 KC to 2600 KC: **\$4.50 ea.**  
.005% tolerance

2601 KC to 9000 KC: **\$2.50 ea.**  
.005% tolerance

9001 KC to 11,000 KC: **\$3.00 ea.**  
.005% tolerance

Specify holder wanted

Amateur, Novice, Technician Band Crystals  
.01% Tolerance . . . \$1.50 ea.—80 meters (3701-3749 KC), 40 meters (7152-7198 KC), 15 meters (7034-7082 KC), 6 meters (8335-8650 KC) within 1 KC

FT-241 Lattice Crystals in all frequencies from 370 KC to 540 KC (all except 455 KC and 500 KC) 50c ea.

Pin spacing 1/2" Pin diameter .093  
Matched pairs ± 15 cycles \$2.50 per pair

200 KC Crystals, \$2.00 ea.; 455 KC Crystals, \$1.25 ea.; 500 KC Crystals, \$1.25 ea.; 100 KC Frequency Standard Crystals in HC6/U holders \$4.50 ea.; Socket for FT-243 crystal 15c ea.;

Dual socket for FT-243 crystals, 15c ea.;

Sockets for MC-7 and FT-171 crystals 25c ea.;

Ceramic socket for HC6/U crystals 20c ea.  
Write for new free catalog #961 complete with oscillator circuits

### ASK YOUR PARTS DEALER FOR TEXAS CRYSTALS

See big red display . . . if he doesn't stock them, send us his name and order from our Florida plant.

Now! Engineering samples and small quantities for prototypes now made either at Chicago or at Ft. Myers Plant. 24 Hour Service.  
IN CHICAGO, PHONE GLADSTONE 3-3555

RUSH YOUR ORDER TO OUR NEW PLANT  
Use coupon below for 1st Class shipment.

### TEXAS CRYSTALS

Dept. T-12, 1000 CRYSTAL DRIVE, FORT MYERS, FLORIDA  
For extra fast service, Phone WE 6-2100

ATTACH THIS COUPON TO YOUR ORDER FOR SHIPMENT VIA 1ST CLASS MAIL AT NO EXTRA COST

TERMS: All items subject to prior sale and change of price without notice. All crystal orders must be accompanied by check, cash or M.O. with PAYMENT IN FULL.  
Dept. T-12

For more details, circle 51 on page 44

handle sums of money and I am bonded but am not a treasurer.  
keep records and balance ledgers but am not an accountant.  
type letters and answer the telephone but am not a secretary.  
demand payment of overdue accounts but am not a bill collector.  
appease the wrathful and irate customers but am not a claims adjuster.  
count stock and take annual inventory but am not a stock clerk.  
stock very many slow moving items but am not a distributor.  
must compete with the wholesale houses but am not a wholesaler.  
often demonstrate and sell merchandise but am not a salesman.  
sell nuts, bolts, batteries and radio tubes but am not a hardware-man.  
gripe about low wages and long hours but am not a union leader.  
check circuits and replace blown fuses but am not an electrician.  
join pipes and assemble aluminum tubing but am not a plumber.  
use a telephone handset and side-cutters but not a lineman.  
climb high ladders and walk over rafters but am not a roofer.  
use a drill, a hammer and a saw but am not a carpenter.  
use stains, varnish and furniture polish but am not a cabinet maker.  
use a screwdriver and pair of pliers but am not a mechanic.  
use grease, oils and lubricants but am not a garage-man.

PRODUCE sharp clear pictures but am not a photographer.  
produce loud clear music but am not a musician.  
maintain the church organ but am not an organ tuner.  
use a loupe and tiny screwdrivers but am not a jeweler.  
kill worms, cockroaches and mice but am not an exterminator.  
work both at night and during the day but am not a moonlighter.  
use chokes and take an occasional fall but am not a wrestler.  
have to lift and carry heavy weights but am not a strongman.  
use a big hand truck and dollies but am not an expressman.  
drive for miles through heavy traffic but am not a truck driver.  
use a squeegee and detergent solution but am not a window washer.  
put up big display cards and decals but am not a window dresser.  
listen to squeals, squawks and growls but am not a farm hand.  
perform wonders and minor miracles but am not a magician.  
keep little children out of mischief but am not a baby-sitter.  
have tantrums and nervous breakdowns but am not a mental case.  
make and break many promises but am not a politician.  
am subjected to lethal high voltages but am not a condemned man.  
cut, stab and burn myself every day but am not a Hindu holy-man.  
have education and a diploma but am not a professional man.  
adjust profits and minimize losses but am not a business man.  
have much technical skill and training but am not a tradesman.  
work very hard and break my back but am not a laboring man.  
enjoy meeting and helping people but am not a liar or a saint.  
am most of the preceding things but am not any one of them.

I Operate A One Man Radio-TV Repair Shop

**MACK'S RADIO-TV REPAIRS,**

**Waterloo, Ill.**

## NEW BOOKS

**101 KEY TROUBLESHOOTING WAVEFORMS FOR VERTICAL-SWEEP CIRCUITS.** By Robert G. Middleton. Published by Howard W. Sams & Co., Inc. 127 pages, soft cover. \$2.00.

Key waveforms for four vertical sweep circuits, oscillator and output configurations, is the third book in a series which concentrates in one section of a TV receiver. The four circuit variations analyzed probably cover 99 percent of the TV sets in existence today. Distorted waveform examples shown are associated with specific component defects; are accompanied by symptom descriptions, and in many cases, voltage and resistance variation notes. "Evaluation-of-results" data are included to explain what takes place in the particular circuit when a component fails. This book can prove helpful in speeding up vertical-sweep circuit troubleshooting procedures.

**BASIC RADIO Vols. 1 & 2.** By M. Tepper. Published by John F. Rider Publisher, Inc. 138 pages ea., soft cover. \$2.70 ea. volume.

Both texts state in plain, everyday language, the fundamentals of d-c and a-c electricity. It would be difficult to expound basic electronic theory in a more comprehensible manner. Although directed toward the student of communication, the fundamentals portrayed here apply with equal validity to basic principles in all areas of the broad electronic field. The first chapter of volume 1 is a brief but thorough explanation of the electron theory as it applies to an understanding of electricity. Cells and batteries, resistance and resistors, Ohm's law, electrical

power; series, parallel, and series-parallel circuits; magnetism, induced electromotive force, meters and measuring devices, are all fully explained. Volume 2 covers the fundamentals of a-c electricity. Normally difficult for the beginner, a-c and its characteristics are easily hurdled. Fundamental mathematics is simplified. Inductance, reactance, impedance; transformers, capacitance, the time constant, and a-c circuits are reviewed. Fundamentals of a-c meters are outlined. Review questions appear at each chapter ending. The "pictured-text" technique is employed in both volumes.

**SOUND AND TELEVISION BROADCASTING, GENERAL PRINCIPLES.** By K. R. Sturley, Published by Iliffe Books, Ltd., Dorset House, Stamford Street, London, England. 382 pages, hard cover. \$6.50.

Here is another of the BBC's engineering training manuals. It replaces an earlier text that was issued in 1941 to meet special wartime needs. This text explains the work that the broadcast engineer or operator has to do, the apparatus he must use and how it is used. After detailed coverage of the fundamental principles of sound, light, electricity; conversion of sound and light into electrical impulses, and other basic TV and sound transmission details, the text explains the how and why of telecasting. All facets of the sound studio and recording, TV studio, telecine and tele recording, outdoor telecasting, transmitters, antennas and monitors; and line interconnection systems and their operation are reviewed in detail. This volume contains many pictures and over two-hundred line illustrations. Although written principally for the new BBC recruits, the book can serve as a handy reference for any one now employed in TV engineering, or who plans entering the telecasting field.

**TWO-WAY MOBILE RADIO MAINTENANCE.** By Jack Darr. Published by Howard W. Sams & Co., Inc. 256 pages, soft cover. \$4.95.

Here is a book for the radio-TV technician who is interested in mobile radio installation and service. Al-

Continued on page 73

### WARNING!

Readers who order their subscriptions from field representatives instead of by mail from the publisher are cautioned to make checks payable only to Electronic Technician. Do not pay cash. Sales people not authorized to represent this magazine have been known to defraud technicians by claiming to be authorized, the most recent instances noted in the Miami, Florida, area.



"It's NOT 'My goodness, what an explosion!' It's 'My goodness, what an implosion!'"

## ATR PRODUCTS FOR MODERN LIVING



**ATR PLUG-IN TYPE PORTABLE INVERTERS\***

A.C. Household Electricity MODELS  
Anywhere in your 6-RMF (6 volts) 60 to 80  
watts. Shipping weight 12  
lbs. DEALER NET PRICE \$33.00  
Operates Standard A.C. PRICE  
• Record Players 12T-RME (12 volts) 90 to  
• Dictating Machines 125 watts. Shipping weight  
• Small Radios 12 lbs. DEALER NET  
• Electric Shavers PRICE \$33.00  
• Heating Pads, etc. \*Additional Models Available  
In your own car or boat!



**ATR "A" Battery ELIMINATOR**

For Demonstrating and Testing Auto Radios—TRANSISTOR or VIBRATOR OPERATED—Designed for testing D.C. Electrical Apparatus on Regular A.C. Lines—Equipped with Full-Wave Dry Disc-Type Rectifier, assuring noiseless, interference-free operation and extreme long life and reliability.

MAY ALSO BE USED AS A BATTERY CHARGER  
MODEL 610C-ELIF . . . 6 volts at 10 amps. or 12 volts at 6 a.m.s. Shipping weight 22 lbs.  
DEALER NET PRICE \$49.95  
MODEL 620C-ELIT . . . 6 volts at 20 amps. or 12 volts at 10 amps. Shipping weight 33 lbs.  
DEALER NET PRICE \$66.95

**AUTO-RADIO VIBRATORS**

By every test ATR Auto-Radio Vibrators are best! . . . and feature Ceramic Stack Spacers, Instant Starting, Large Oversized Tungsten Contacts, Perforated Reed, plus Highest Precision Construction and Workmanship and Quiet Operation!

There is an ATR VIBRATOR for every make of car!  
As your distributor for ATR's Low Priced type 1400, 6 volt 4-prong Vibrator; and 1843, 12 volt 3-prong; or 1840, 12 volt 4-prong Vibrator. THE WORLD'S FINEST!

There is a trim plate kit for YOUR CAR!



**ATR CUSTOMIZED KARADIO**

Vibrator-Operated with Tone Control  
ATR KARADIO . . . is ideal for small import cars or compact American cars! Unit is completely self-contained—extremely compact! Powerful B-tube performance provides remarkable freedom from engine, static, and road noises. The ATR Customized Karadio comes complete with speaker and ready to install. Can be mounted in-dash or under-dash—wherever space permits! No polarity problem. Neutral Gray-Tan, baked enamel finish. Overall size, 7" deep, 4" high, and 6 1/2" wide. Shipping weight, radio set, 7 lbs. Model K-1279—12 for 12V Dealer Net Price \$33.57  
Model K-1279—6 for 6V Dealer Net Price \$33.57

Airplane Style Overhead Mounting under Cab Roof NO PRINTED CIRCUITRY



**ATR TRUCK KARADIO**  
Excellent Tone Volume, and Sensitivity!  
Compact, yet powerful. Fits all trucks, station wagons, most cars and boats. Just drill a 3/8 inch hole in roof and suspend the one-piece unit (aerial, chassis and speaker) in minutes. Watertight mounting assembly holds antenna upright. Yoke-type bracket lets you tilt radio to any angle.  
Extra-sensitive radio has 6 tubes (2 double-purpose), over size Alnico 5 PM speaker for full, rich tone. Big, easy-to-read illuminated dial. Fingertip tuning control. Volume and tone controls. 33-in. stainless steel antenna. Neutral gray-tan enameled metal cabinet, 7 x 6 1/2 x 4 in. high over-all. Shipping weight 10 1/2 lbs.  
Model TR-1279—12A for 12V Dealer Net Price \$41.96  
Model TR-1279—6A for 6V Dealer Net Price \$41.96

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**ATR ELECTRONICS, INC.**  
Formerly: American Television & Radio Co.  
Quality Products Since 1931  
ST. PAUL 1, MINNESOTA—U.S.A.

For more details, circle 11 on page 44

Continued from page 41

other portable, all new sets are hand-wired and horizontal oscillator modules are absent. Considerable changes were made in the horizontal oscillator and control section. The double crystal diode phase detector is out. The double triode, blocking oscillator and control tube, is also out. A 6BL8 or 6HL8 sine wave oscillator, with the triode section operating as phase detector, is in the circuit. The oscillator's basic configuration is a Colpitts circuit. The slug in the oscillator's grid-cathode tank circuit becomes the horizontal hold control. The phase detector-horizontal oscillator circuit is shown in Fig. 2.

**Philco**

Philco's 12N50 Series chassis has a varistor, or voltage variable resistor, in its horizontal output control circuit. The small component is located just inside the high voltage cage. This circuit keeps the high anode and scan voltages constant under varying load conditions. (See ET Manufacturers Technical Digest, September, 1961.)

**RCA**

Few major sweep circuit changes have been made by RCA. Plenty of new tubes with slight circuit variations to match. Some models have more rugged tube types added to horizontal output and damper areas. Some sets use a double crystal diode phase detector in the horizontal oscillator control and some do not. Width coils vary. 23-inchers use a 3A3 HV rectifier, a rugged 6CW6 horizontal output tube, and appropriate flyback and damper variations to boost HV beyond 20 kv.

**Sylvania**

Some slight changes may be noted in the horizontal output section of Sylvania's 1962 circuits. Grid bias and screen voltages may be somewhat different. Some resistor values vary. Wiring of the 50k width control may vary, and the horizontal linearity network in the damper tube's plate circuit may be different in some chassis. Most, if not all, of these changes appeared in year-end 1961 sets.

**Westinghouse**

The Westinghouse V-2417 chassis has a combination horizontal width/linearity network in series with the horizontal yoke windings. Adjustment of the permanent magnet linearity slug in the rear of this combination coil, varies the yoke current waveform shape. The front slug varies the yoke current amplitude. This arrangement appears in all 23" table models and consoles. The circuit is shown in Fig. 3.

Previous sets took the keyed agc pulse from a separate winding on the flyback transformer. New sets couple the pulse through a 5" length of concentric cable acting as a capacitor, as shown in Fig. 3B.

**Zenith**

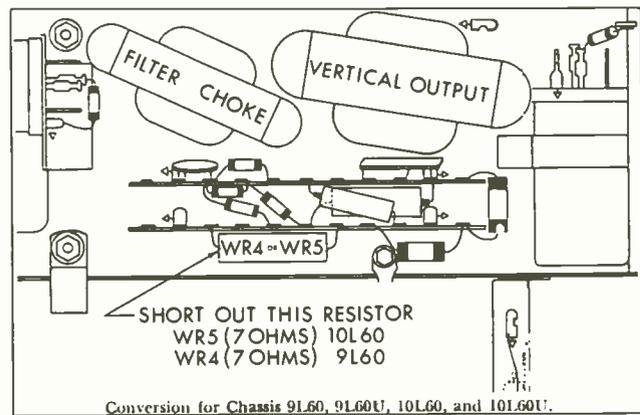
Few changes in the horizontal sweep circuitry have been made by Zenith. The 23" CRT sets have higher power horizontal output and damper tubes. Previously made improvements have been brought over from year-end models.

A block diagram of a typical TV set's horizontal sweep circuit, with key check points and some waveforms, is shown in Fig. 4.

**TV MANUFACTURERS TECHNICAL DIGEST**

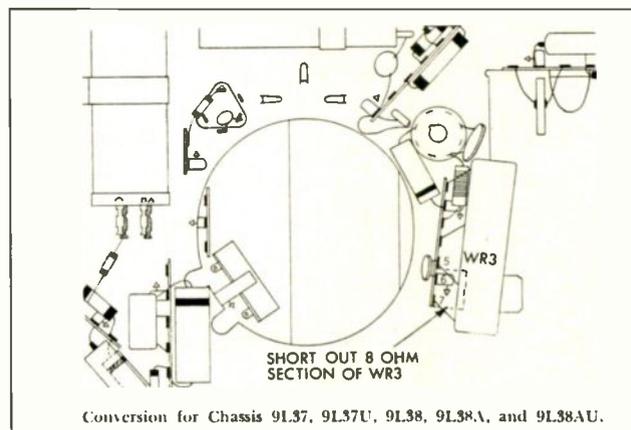
Continued from page 26

ment for the type 21EAP4. Since the 21FDP4 is rated at 6.3 volts and the 21EAP4 is rated at 2.34 volts, heater circuit modifications are required.



Chassis 9L60, 9L60U, 10L60 and 10L60U, have parallel heater wiring, and a filament dropping resistor which must be shorted out.

Chassis 9L37, 9L37U, 9L38, 9L38U, 9L38A and 9L38AU, have series string heaters and the 8 ohm section of resistor WR-3 must also be shorted out if the type 21FDP4 is used.



Philco chassis having a 21FDP4 CRT can be converted to the recommended 21EAP4, by making heater changes as shown here.

# NEW BOOKS

Continued from page 71

though one-third of the text discusses receiver, transmitter, and remote control design and circuitry, two-thirds represents a gloves-off technician's experiences on installation and maintenance of this equipment. Chapters deal with proper methods for installing base station towers, (location, guying, anchorage, transmission line installation, etc.); installing a mobile system (antenna, cabling, control-head, speaker, microphone, dashboard mounts, etc.); and noise location and its elimination. In addition, one chapter lists service equipment necessary for the two-way radio shop. The final chapter lists many tests and measurements required by the FCC on two-way equipment. As the author says, in a brief one-page preface, the subject has been trimmed of the excess "fat" and only the nourishing "lean meat" of two-way radio remains.

**HOW TO AVOID LAWSUITS IN TV-RADIO-APPLIANCE SALES AND SERVICE.** By Leo T. Parker. Published by John F. Rider. Publisher, Inc. 66 pages, soft cover. \$1.00.

In addition to the inexorable laws of death and taxes, service technicians are also confronted forever with general business law. This book, written by an attorney at law in layman language, details the specific problems technicians may become involved in. The eight chapter-headings include: When can a serviceman collect for repairs. When is a service guarantee enforceable. When can a serviceman demand cash payment. When does a lien protect a serviceman. How can a knowledge of contract law earn profits. What are the legal advantages of written contracts. How valid are written contracts, and the Law of insurance. Pertinent cases and legal opinions are reviewed briefly. A glossary of legal terms is included, too. This book does not replace a lawyer, of course. Rather, it offers practical information on how to side step potential law suits.

**A TO Z IN AUDIO.** By G. A. Briggs. Published by Gernsback Library, Inc. 224 pages, soft cover \$3.20. Cloth bound \$5.00.

The first American printing of a unique hi-fi audio glossary which was originally printed in Great Britain. It is a comprehensive book-of-definitions, as its title implies, covering names of people, places, terms, and technical jargon of the audio world. Many definitions take up several pages in clear, simple-to-understand language. Some are flavored with a sprinkling of witty Yorkshire philosophy which makes

normally-dry technical explanations substantially more palatable. In addition to photos, charts and illustrative diagrams, the book contains a number of humorous cartoons which actually sharpen certain points made in text material. The book is recommended for hi-fi audiophiles, technicians and audio equipment dealers.

**INDUSTRIAL ELECTRONICS MADE EASY.** By Tom Jaski. Published by Gernsback Library, Inc. 288 pages, soft cover. \$3.95.

This book was written for the TV technician interested in industrial electronic devices and control methods. It covers everything from dielectric and induction heating through decade counters and saturable reactors to pH measuring instruments and X-Y recorders. Twelve chapters are devoted to industrial generators, interference prevention, counting and counters, industrial controls—including static control systems—static switches and program control, industrial recorders, transducers and other subjects. Test material is enhanced by photos, drawings, and schematics. The book is recommended as an easy-to-understand introductory text to the industrial side of electronics.

## TRANSISTOR RADIO . . .

Continued from page 35

Most transistors that have excessive leakage will continue to increase in leakage readings during the test. In almost every case, a transistor of this type will give trouble in the circuit and, therefore, should be rejected.

Keep in mind, however, that leakage will automatically increase if heat is applied to the transistor. So, when testing, do not hold your hand on the transistor for a long period of time.

One reason that there are so many transistor numbers on the market today is that manufacturers of transistors leave a rather wide margin in production tolerance. When a transistor falls out of this tolerance, they often use it anyway, but they simply assign a new number to it.

Transistor circuits will operate with a fairly wide tolerance for deviation from nominal values. So, for practical servicing, you don't need the kind of extreme accuracy found in lab instruments. Fair instrument accuracy, combined with your own down-to-earth understanding of transistors, will give you fine results. ■

## Exact Replacements for Original Equipment



The following special parts have been manufactured as exact replacements for the set manufacturers shown, so as to assure top performance.

Cat. No. Use O.E.M. Part No.

Admiral		
1471-A	Sound Take-Off	72B185-2
1472-A	Sound Take-Off	72C132-19
6332	Horiz. Osc.	94C17-4
7701	455 KC I.F.	72 B 31,2

Bendix		
6501	Auto Radio I.F.	2090237-1
6502	Auto Radio I.F.	2090237-2
6503	Auto Radio I.F.	2090237-3
6504	Auto Radio I.F.	2090237-4
6505	Auto Radio I.F.	2090237-5
6506	Auto Radio I.F.	2090239-1
6507	Auto Radio I.F.	2090239-2
6508	Auto Radio I.F.	2090239-3

Crosley		
7101	2nd Sound I.F.	157856-1

### General Electric and Hotpoint

12-C11	Home Radio	RTL-143 and 163
12-C13	Home Radio	RTL-172
6206-PC	TV Ratio Det.	RTD-026 (WT56X38)
6207-PC	TV Ratio Det.	RTD-025 (WT56X37)
6208-PC	TV Ratio Det.	RTD-020
6209-G1	TV Ratio Det.	RTD-024 (WT 56X36)

Hallicrafter		
1482 IFF	Sound I.F. and Trap	51B1996
7101	2nd Sound I.F.	51A1859

Philco		
6209-P1	TV Disc.	32-4721
6209-P2	TV Disc.	32-4689-1, 2
6209-P3	TV Disc.	32-4735-1, 2

R.C.A.		
1483 IF	Sound I.F.	76437
1484 RD	Sound Ratio Detector	102692
1485 RD	Sound Ratio Detector	102644
1486 RD	Sound Ratio Detector	102253
1487 RD	Sound Ratio Detector	100364
1488 RD	Sound Ratio Detector	79141
1489 RD	Sound Ratio Detector	101219
6333	Horiz. Osc.	103103

Westinghouse		
12-C14	Home Radio I.F.	235V025H-11, 2 (V157661)
68 Osc	Home Radio Osc.	230V039H-01 (V15764-1)
6204-W3	TV I.F.	V12128-1, 2, 3



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CANADIAN REPRESENTATIVE:  
Atlas Radio Corp., Ltd., Toronto 19, Ont.

For more details, circle 35 on page 44

# 1961 Electronic Statistics

## TELEVISION

New sets (Inc. approx. 6% with UHF)	6,200,000
\$ volume at retail	\$1,160,000,000
Sets scrapped	4,600,000

## TELEVISION SETS IN USE

U.S. homes* with b & w sets	46,300,000
Secondary sets in above homes	7,900,000
Sets in business places, institutions	2,700,000
Color sets (included in above)	620,000
Total TV sets in U.S.	56,900,000

## RADIO

New sets (including 1.4 million FM)	15,100,000
\$ volume at retail	\$ 510,000,000

## RADIO SETS IN USE

U.S. homes* with sets	54,900,000
Secondary sets in above homes	61,300,000
Sets in business places, institutions	15,000,000
Automobile sets	44,400,000
Total radio sets in U.S. (including 17,100,000 FM)	175,600,000

## ANNUAL RETAIL BILL FOR SERVICING

180,000,000 replacement receiving tubes	\$ 360,000,000
7,600,000 replacement picture tubes	310,000,000
Antennas, components, parts, instruments	970,000,000
Labor	1,450,000,000
Total servicing bill	3,090,000,000

## INDUSTRIAL ELECTRONICS

Industrial electronics, factory sales	\$2,070,000,000
Industrial electronic & communications maintenance	700,000,000

## TV-ELECTRONIC TECHNICIANS

Major service outlets	64,100
Parts jobber business accounted for	64%

## TUBES MANUFACTURED

Picture Tubes	
Number made (including rebuilds)	13,800,000

\*Includes all dwellings such as apartments, hotels, etc.

% used for replacement ..... 55.1%

## Receiving Tubes

Number made	390,000,000
% used for replacement	46.1%

## TRANSISTORS

Number made	195,000,000
% used for replacement	5.5%

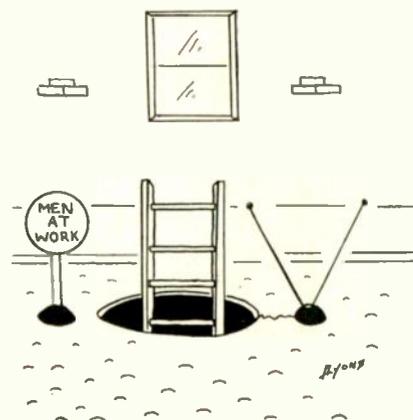
## TELEVISION STATISTICS 1946-1961

Year	Sets Manufactured	Total Sets in Use	TV Stations on Air
1946	10,000	8,000	5
1947	250,000	230,000	20
1948	1,000,000	1,000,000	44
1949	3,000,000	3,800,000	100
1950	7,500,000	10,500,000	107
1951	5,600,000	15,750,000	108
1952	6,300,000	21,800,000	123
1953	7,300,000	28,000,000	350
1954	7,300,000	33,000,000	440
1955	7,800,000	39,000,000	485
1956	7,300,000	43,900,000	512
1957	6,800,000	47,240,000	521
1958	5,100,000	50,300,000	546
1959	5,900,000	53,100,000	570
1960	6,000,000	55,300,000	588
1961	6,200,000	56,900,000	594

## AUDIO

Home Hi-Fi Service (78% of outlets)	\$ 150,000,000
PA Installation & Repair (38.2% of outlets)	\$ 69,000,000
Phonographs sold	4,100,000
Phonographs & volume at retail	\$ 460,000,000
Phonographs in U.S.	41,700,000
Tape recorders sold	490,000
Tape recorder \$ volume at retail	\$ 94,000,000
Hi-Fi audio \$ volume	\$ 280,000,000

ELECTRONIC TECHNICIAN statistics are an industry reference, used each year by such authoritative sources as the World Almanac.



# TOP

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Lower Noise

# OF THE HEAP

85% of all TV servicemen prefer Standard turret type replacement TV tuners.

1 year guarantee backed by the world's largest TV tuner manufacturer.

Trade-in allowance for the defective tuner being replaced.

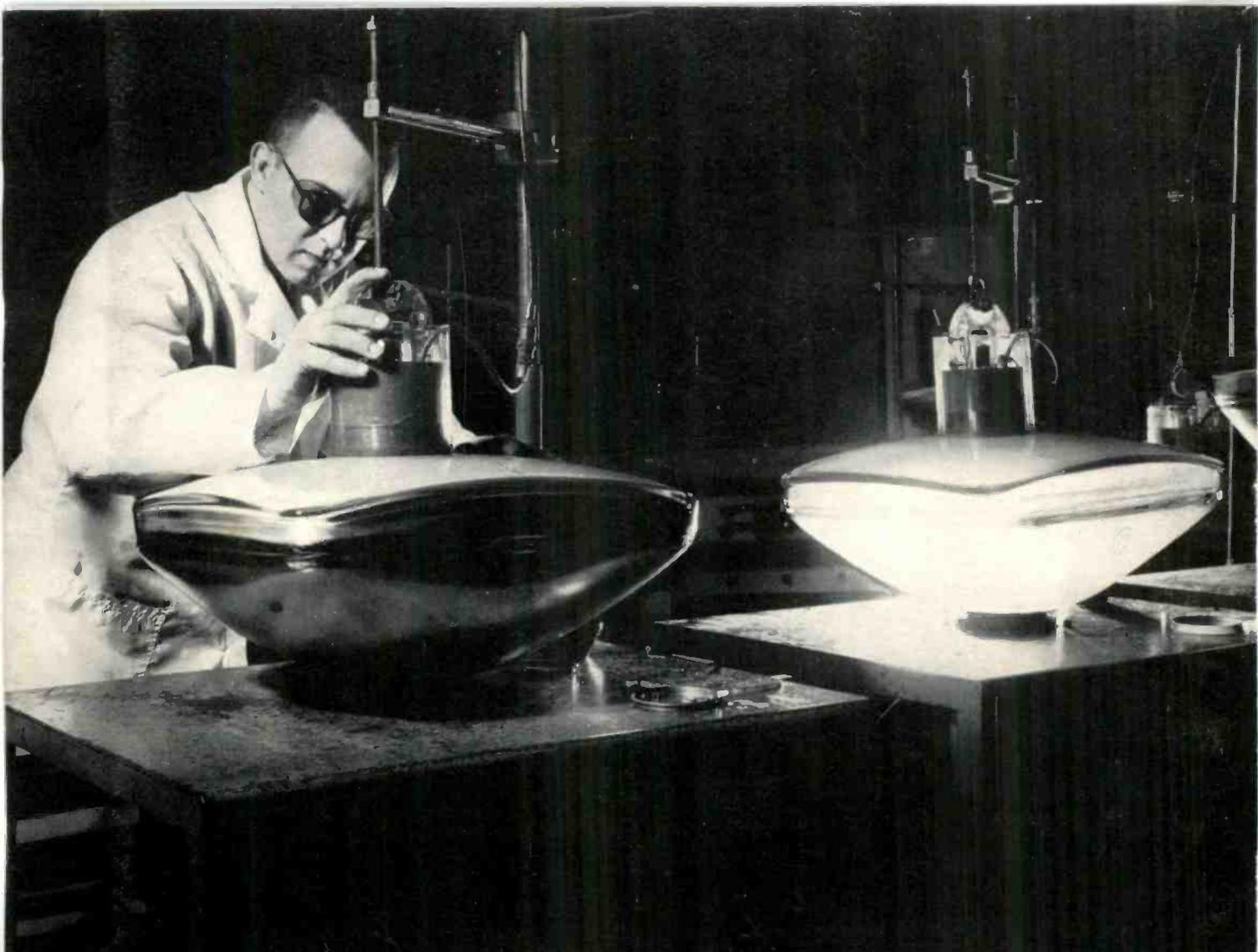
In TV It's Standard

See your local authorized Standard Coil Distributor

## **standard kollman**

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FORMERLY STANDARD COIL PRODUCTS CO., INC., MELROSE PARK, ILLINOIS



# HOW SILVERAMA BECOMES "SILVER"

## High-Vacuum Aluminizing Assures Sharpest TV Picture Possible

Here RCA Silverama picture tubes become "silver" at the aluminizing station on our Marion, Indiana, production line. In a burst of light, aluminum is vaporized in a high vacuum and is deposited over the entire inner surface of the tube. Then the operator, with an RCA-designed electronic gauge, checks to be sure the aluminum film is of proper thickness. If it is not, the tube is rejected.

Such extra care in manufacture is an important reason why the Silverama you install today is free from "picture-spoiling" dark centers caused by an excess of aluminum deposited on the tube face. This extra care is the reason, too, why Silverama delivers

the brightest, sharpest picture your customers' sets can produce. Obviously, Silverama picture tube service is the surest way toward satisfied customers, repeat business, favorable word-of-mouth advertising for you—plus freedom from call backs and costly in-warranty failures.

Equally important is the fact that RCA is a picture tube manufacturer. This means that your customers can take advantage of the latest innovations in picture tube design and manufacture when they buy RCA Silverama. It is made with a precision electron gun, the finest parts and materials, plus a reused envelope.



Final checkout before shipment. Here Silverama tubes receive final focus check before being shipped to customers.



Packing for final shipment. Before it can go into this box, RCA has made certain this Silverama is the best picture tube modern science and technology can produce.

RCA ELECTRON TUBE DIVISION, HARRISON, N. J.



The Most Trusted Name in Television