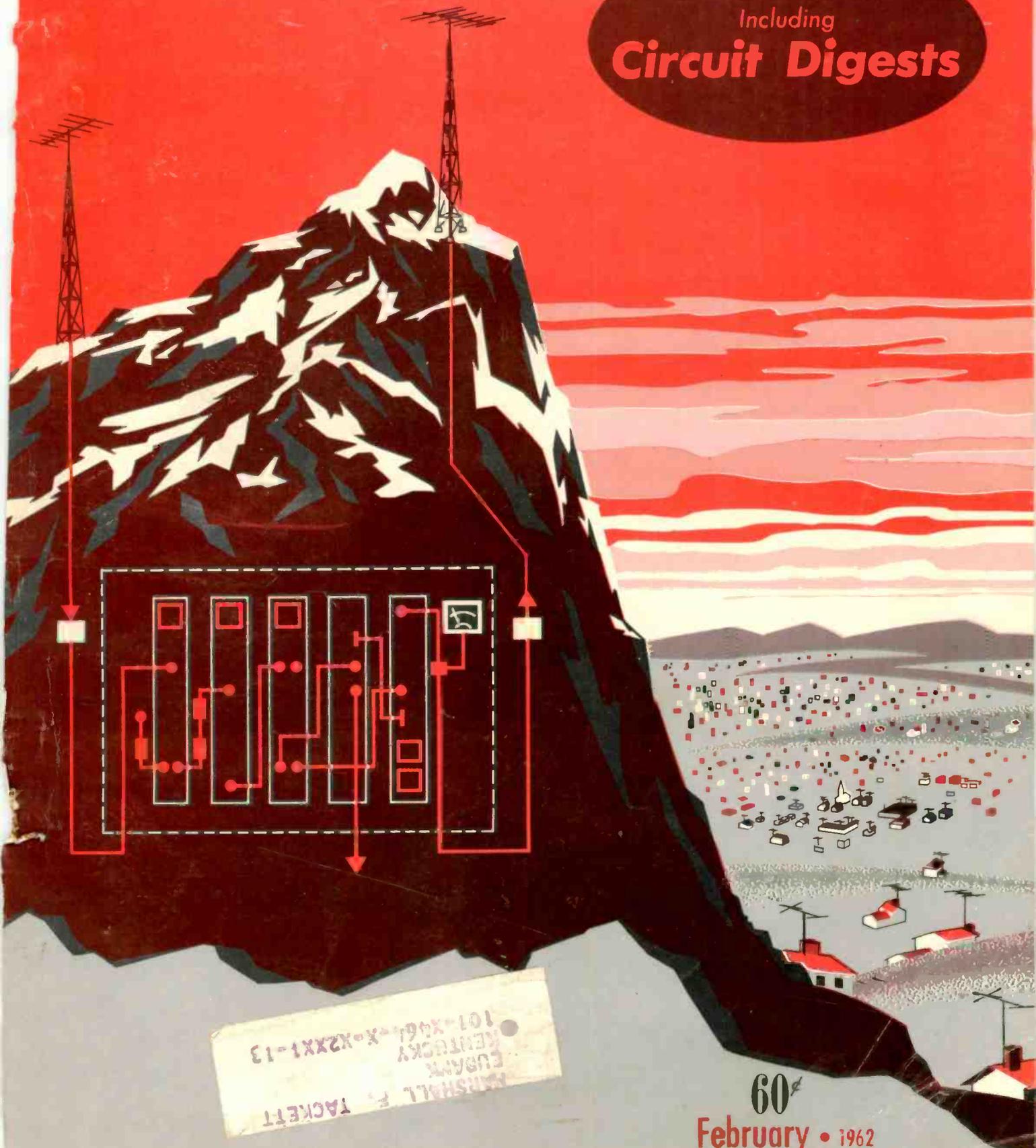


# ELECTRONIC TECHNICIAN

Including  
**Circuit Digests**



MARSHALL F. TACKETT  
EUBANK  
KENTUCKY  
101-4967-X-22XX1-13

60¢  
February • 1962



## This is the 300 ohm Belden Weldohm they're ordering...

... Yes, it is strong ... it has one and a half times the breaking strength and two and a half times the flexing life of ordinary lead-in. Order No. 8230.

Here's the Belden microphone cable Butch is going to take along for the high school job ... No. 8410. It's abrasion and impact resistant. It's limp ... lies flat on the floor. It has long flex-life and high tensile strength.

Call your Belden jobber. He carries a complete line of lead-in cable ... also microphone and shielded power supply cables; hi-fi, stereo and phonograph cables; power supply cords; rubber-vinyl, multi-conductor portable cordage; antenna rotor cables; hook-up wire; TV and cheater cords; aluminum ground wire ... and related items. He has it all ... in stock.



power supply cords • cord sets and portable cordage • electrical household cords • magnet wire • lead wire



### Be a Cartoon Gag Writer!

Win a \$25.00 Savings Bond



Send us your gag ideas for future cartoons. For each of your gag ideas our advertising manager uses, he'll send you a \$25.00 Savings Bond ... plus a Belden Gag Writer's Certificate. Write Belden Manufacturing Company, Att: Mrs. Madelsa Allison, 415 South Kilpatrick Avenue, Chicago 80, Illinois.

**Servicemen everywhere are saying:**



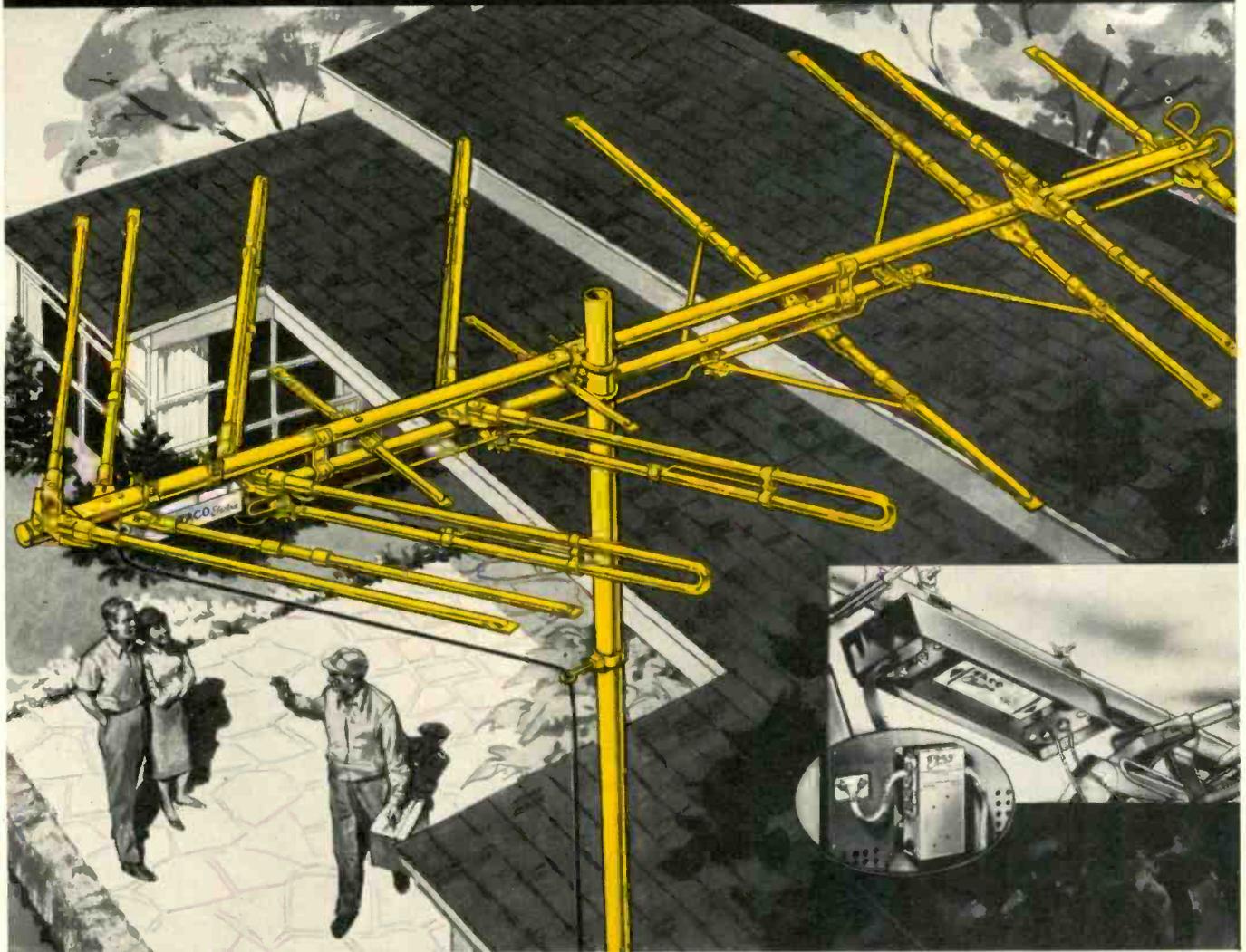
**brings in sharp pictures where other electronic antennas fail**

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 preamplifiers (designed by Jerrold).\*

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.



\*The TACO ELECTRA preamplifier is available separately at \$39.95 for use with any antenna.

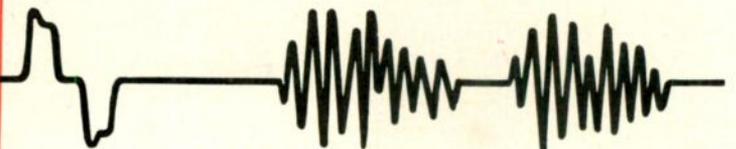
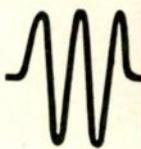


**TECHNICAL APPLIANCE CORPORATION**

Distributor Sales Division • Dept. JTD-18, Sherburne, New York

*A Subsidiary of Jerrold Electronics Corporation*

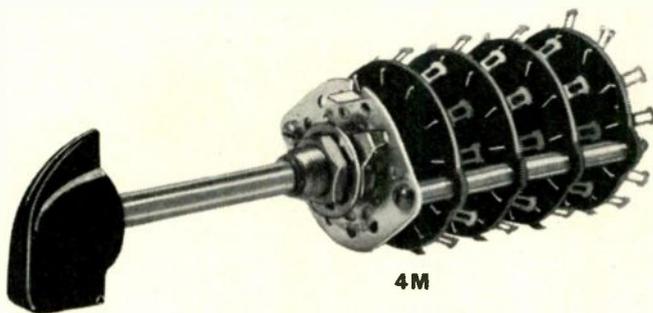
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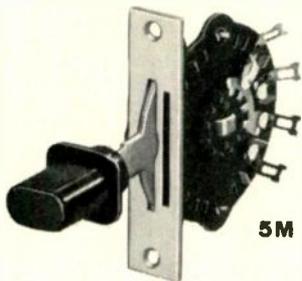
## Tips for Technicians

Distributor Division, P. R. Mallory & Co. Inc.  
 P. O. Box 1558, Indianapolis 6, Indiana

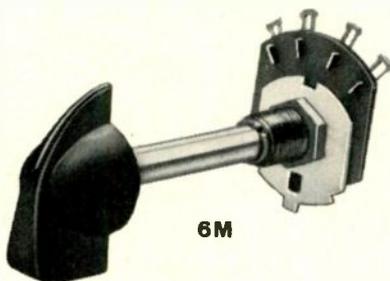
# Selector Switches for Circuit Shrinkers



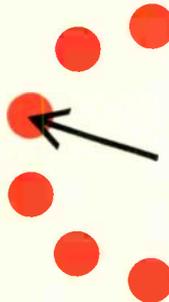
4M



5M



6M



Selector switches are smaller now. Especially the new Mallory-Grigsby switches. They're handy when you're working on equipment that has to be squeezed down to minimum size. And they come in both rotary and lever action models.

The 4M series (30° indexing) have a wafer diameter of only 1 3/8". They meet or exceed MIL-S-3786 specifications. The phenolic wafer type has 11 positions while the ceramic type has 12. Of course there are shorting and non-shorting styles with up to six sections. 60° and 90° indexing styles are available with a two-piece metal and phenolic shaft for use in circuits with high RF signals.

The 6M series is lever action. It uses the same wafer construction as the 4M series. It projects only 1 1/4" behind a panel. It's 30° indexing, with or without spring return, and 3 position. Furnished with all hardware and handsome lever knob.

The 5M series is a truly low-cost general purpose rotary switch in several shaft and circuit combinations.

● Two things to remember about Mallory-Grigsby switches. . . They have exclusive "Wedge-lock" terminal construction. That's a new way of attaching contacts to insure positive alignment and prevent distortion. And you can get Mallory-Grigsby switches from Mallory Distributors clear across the country.

**Write today for our Bulletin 9-250 and a handy cross-reference guide.** Better yet, see your Franchised Mallory Distributor for: Switches, Capacitors, Controls, Resistors, Rectifiers, Batteries, and Vibrators as well as every other electronic component.

For more details, circle 36 on page 48

# ELECTRONIC TECHNICIAN

Including  
**SERVICE**  
Magazine

**WORLD'S LARGEST ELECTRONIC TRADE CIRCULATION**

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**EARL HINTZ** Production Manager

February • 1962

Vol. 75 • No. 2

**FRONT COVER** Television translator equipment has brought TV reception to many areas normally blacked out due to mountains, hills, or other signal obstructions. Read how transmitted signals are picked up, converted to another channel, and relayed in the article starting on page 28.

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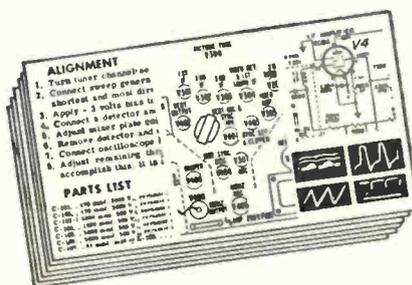
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**MOTOROLA:** Auto Radio 1962 Rambler, Model 2TMR  
**PHILHARMONIC:** TV Chassis TSL-001  
**RCA:** TV Chassis KC5130F, H, K and M  
**SONY:** Transistor Portable Radio, Model TRW-621  
**WESTINGHOUSE:** TV Chassis V-2409-4, -5, -6, -7, -8



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PUBLICATION

### OJIBWAY PRESS, Inc.

1 East First Street  
Duluth 2, Minn.  
Telephone: RA 7-8511

#### Sales Offices:

**NEW YORK:** Ron Kipp, National Sales Manager, 480 Lexington Ave., New York 17, N. Y. TN 7-0011

**CHICAGO:** William Klusack, 221 N. LaSalle St., Chicago 1, Ill. CE 6-1600

**CLEVELAND:** Bernie Edstrom, 15605 Madison Ave., Cleveland 7, Ohio LA 1-7900

**LOS ANGELES:** Boyd B. Garrigan, 1145 W. Sixth St, Los Angeles 17, Cal. HU 2-2838



ELECTRONIC TECHNICIAN and Circuit Digests, published monthly at 1 East First Street, Duluth 2, Minnesota, by Ojibway Press, Inc., Marshall Reing, president; Robert Edgell, executive vice president; Lawrence Rosenthal, vice president; H. B. Fryberger, Jr., secretary; E. A. Kuefner, treasurer. Single copies, 60c. Subscription rates: United States and Canada \$5 for one year; \$8 for two years; \$10 for three years. Pan American and Foreign countries, \$9 for one year; \$14 for two years; \$18 for three years. Application for second class re-entry pending at Waseca, Minn. Copyright 1962 by Ojibway Press, Inc., Duluth, Minn. Reproduction and reprinting prohibited except by written authorization of publisher. POSTMASTER: SEND NOTIFICATION (Form 3579) REGARDING UNDELIVERABLE MAGAZINES TO OJIBWAY PRESS, INC., 1 EAST FIRST STREET, DULUTH 2, MINNESOTA.

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1" tubular aluminum, weatherproof redwood back, seat and arms. 6" rubber tired wheels, plastic covered 2" thick soft poly-foam cushion. 3 positions. Folds compactly for storage. Ideal for indoors or outdoors, porch, patio or sunroom.



AD 3993



AD 3989

### Folding Arm Chair

Redwood and aluminum, 1" tubular frame. Folds flat to 6" for storage. Weatherproof.

FREE with \$130 worth of purchases



AD 3967

### Fitted Travel Case

For the ladies. Scuff resistant vinyl covering, fitted with Jewelite Nylon brush, comb and mirror set.

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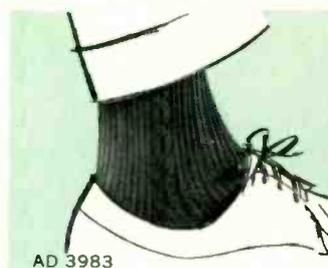


AD 3982

### Ronson CFL Shaver

1962 Mark II Electric Shaver. \$23.50 value. Multi-blade miracle cutter gives quickest shaves.

FREE with \$250 worth of purchases

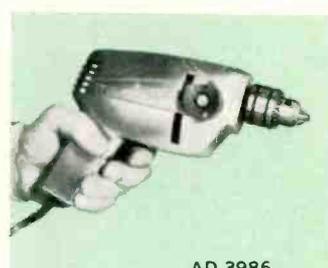


AD 3983

### Men's Ban-Lon Sox

First quality, 100% Ban-Lon yarn, reinforced top and heel. Stretch type, fits sizes 10 to 13.

FREE with \$12 worth of purchases



AD 3986

### 3/8" Electric Drill

3/8" electric drill with new "Speedsight" for easier drilling at any angle. "Speedway" brand.

FREE with \$225 worth of purchases

FREE WITH \$415 WORTH  
OF PURCHASES...  
\$25 LESS WITH BONUS CHECK

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I understand that by mailing this coupon to you today I will receive a colorful brochure featuring the Wonderful Philco World of FREE Gifts and my \$75 worth of FREE Philco Bonus Checks. My name and address is:

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MAIL TODAY TO: PHILCO ACCESSORY-SERVICE  
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All your purchases of PHILCO branded tubes, PHILCO parts, PHILCO accessories can be credited toward the gifts you want. Choose your Gifts... accumulate your purchases for Total Credit toward the gift. All your PHILCO purchases are included, all count toward FREE GIFTS. FREE Philco Bonus Checks save you up to \$75 on some items. Get your FREE Bonus Checks today.

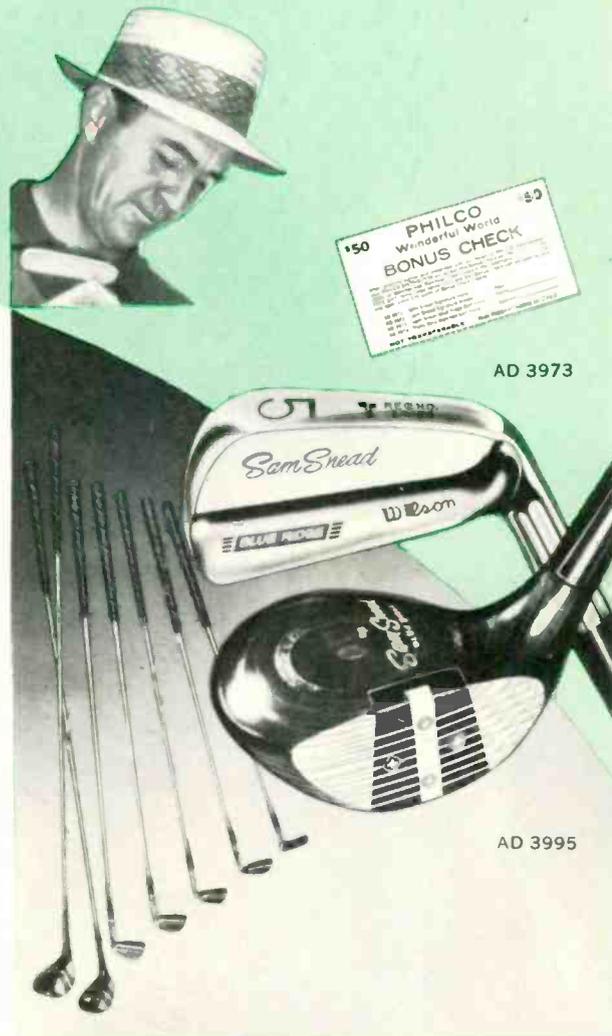
## Famous *Wilson* SAM SNEAD BLUE RIDGE Matched Golf Clubs

Set of 5 Irons... or Set of 2 Woods

Chrome plated matched irons with Aer-Flo steel shaft, calfskin Reminder Grip, famous Dynamic Balance. #3, #5, #7, #9 irons and putter. Strata-Bloc woods, matched Driver (#1) and Spoon (#3) in Walnut tone.

SET OF 5 IRONS FREE WITH \$600 WORTH OF PURCHASES... \$50 LESS WITH BONUS CHECK

Set of 2 MATCHED WOODS FREE with \$295 worth of purchases



AD 3973

AD 3995

For more details, circle 41 on page 48



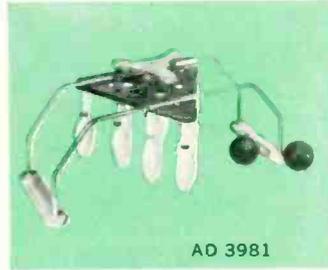
### Chino Work Shirts

Sanforized, vat dyed for lasting color. Full cut, two pockets. Unconditionally guaranteed. Gray.  
FREE with \$45 worth of purchases



### 30" Coffee Table

Weather resistant, 1" tubular aluminum legs, stained redwood top. Folds flat for storage.  
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Ten unbreakable 9" plastic pins on automatic resetting mechanism. Two 3 1/2" bowling balls.  
FREE with \$100 worth of purchases



### Classic Golf Cart

All steel, opens automatically. 12" wheels. Wilson Make.  
FREE with \$325 worth of purchases  
\$25 LESS with Bonus Check



AD 3862

### Metal Desk, File

Index folders, storage compartment with lock. File, 30" x 12 1/2" x 15", opens to 40" desk.  
FREE with \$250 worth of purchases



AD 3703

### Magnifier Lamp

Illuminates and magnifies, cool Circuline Fluorescent tube, spring balanced bracket. LUXO Make.  
FREE with \$550 worth of purchases



AD 3978

### Wilson Golf Balls

Package of 3. K-28 white-for-life finish golf balls. Tough balata cover. Best for distance.  
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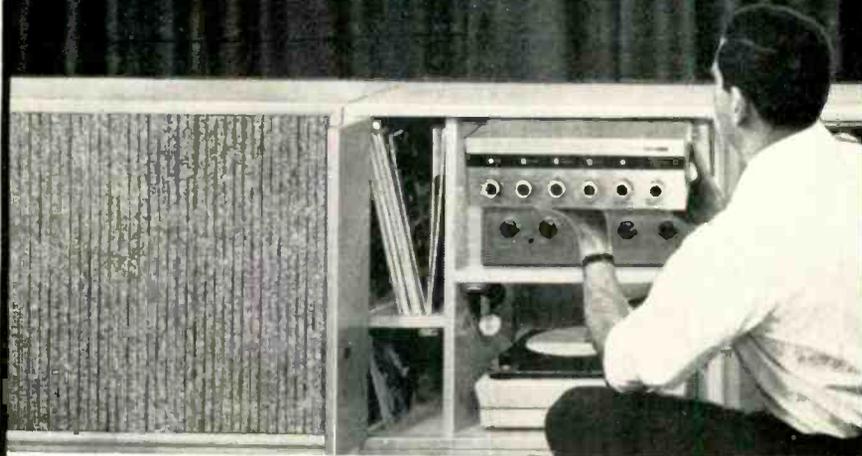
AD 3969

### Flower Plantama

Washable permanent plastic flower arrangement in aluminum planter. For home or shop!  
FREE with \$40 worth of purchases

TAKE ADVANTAGE OF THESE PHILCO FREE GIFTS

# For Big Profits Doing This...



## ...Use These:

Whether it's hi-fi in the home, or CB in car, boat, truck, or taxi, custom installation jobs jump into the big-profit category when you deliver *high quality at low cost.*

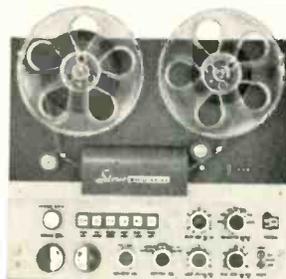
And especially with EICO kits, which average 40% less than our own, low, wired prices. Wire 'em up yourself and pocket the difference—with your customer's blessing, because if you build the components yourself, it's custom-made all the way through!

But kit or wired, EICO's all-out, no-compromise engineering, EICO's strikingly dramatic beauty, and EICO's fantastically low prices provide all the ingredients necessary for big profits on custom jobs. To put it simply: *You Profit from EICO Excellence.*



Deluxe Citizens Band Transceivers

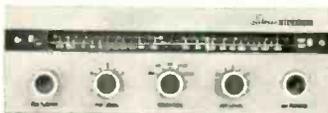
	Kit	Wired
#770: 117 VAC only	\$79.95	\$109.95
#771: 117 VAC and 6 VDC	89.95	119.95
#772: 117 VAC and 12 VDC	89.95	119.95



**NEW TRANSISTORIZED STEREO/MONO 4-TRACK TAPE DECK RP100**

Semikit \$299.95    Wired \$399.95

(An exclusive EICO product, designed and manufactured in the U.S.A. Pat. Pend.)



**FM/AM STEREO TUNER ST96**

Kit \$89.95    Wired \$129.95

Inc. FET



**70-WATT INTEGRATED STEREO AMPLIFIER ST70**

Kit \$94.95    Wired \$149.95

**40-WATT INTEGRATED STEREO AMPLIFIER ST40**

Kit \$79.95    Wired \$129.95



**FM-MULTIPLEX AUTODAPTOR MX99**

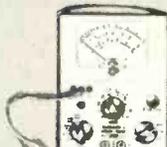
(Patents Pending)  
Kit \$39.95  
Wired \$64.95

Rely on EICO Excellence for your test equipment too:



**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

**EICO**

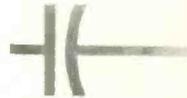
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See us at our IRE Booth.

For more details, circle 27 on page 48

## EDITOR'S MEMO



When I pick up my morning newspaper, I find it a little overwhelming to learn how many fronts there are in the cold war. It struck me that nations are not the only ones with cold war battles. Each business and profession has them, and electronic servicing is no exception.

The major front is the troublesome customer. His weapons are suspicion, price chiseling and unjustified complaints. The seeds of his own destruction are planted within, in the form of susceptibility to bait operators and butchered do-it-yourself sets. You have to offer good service at a fair price to counter these birds.

Another front is the distributor who subverts the service dealers' position by selling at the same price to consumers. You have to take a tough line with these fellows, and throw your support heavily toward distributors who really cater to the service technician's needs.

Some manufacturers also offer a little Berlin situation. I'm referring to those companies who make products without thought to the subsequent service needed in the field.

Perhaps the most frustrating part of the service industry cold war is the internal bickering. How can you get used to fighting your own colleagues whose interests should be the same as yours? Controversies over licensing becloud the need for unity. And the service associations find an inadequate number of recruits.

Cold war situations produce distorted attitudes. A story was told me in Europe about a Premier and his Finance Minister taking a tour. While visiting a country school, the Headmaster asked for an extra \$1,000 to buy necessary books and to repair broken windows. The Premier said he would authorize \$500.

At the next stop on the tour, they visited a prison. The warden asked for \$100,000 to put colored TV in each cell. The Premier thought it over and said he would authorize \$200,000 for the projects.

When they were outside the prison, the Finance Minister asked how the Premier could possibly cut in half the request of a poor schoolmaster for the children, while doubling an unnecessary luxury for prisoners.

"My dear fellow," said the Premier, "it is not at all likely that you and I will ever be sent back to school!"

*Al Forman*

ELECTRONIC TECHNICIAN

Another outstanding product by the HIDDEN

**500\***

who plan for your future:

## TYPE TE LITTL-LYTIC® CAPACITORS



Transistors revolutionized the industry. And to make the most of their inherent advantages, they called for an entirely new group of components. Here, Sprague Research was the first to answer the call with the smallest truly reliable dry electrolytic made for transistor circuits—the Littl-Lytic. This reasonably priced capacitor is the most reliable subminiature you can buy for transistorized radios, hearing aids, wireless microphones, pocket wire recorders, and other miniature electronic equipment.

The remarkable reliability of Littl-Lytic is the result of a new manufacturing technique in which *all the terminal connections are welded*. Units are hermetically sealed and metal encased . . . *with no pressure joints . . . there are no "open circuits" with the passage of time*. Leakage current is extremely low as the result of the use of high purity foil and ultra-stable formation techniques. Sprague's catalog replacement ratings are the most comprehensive in the industry. They assure you of exact replacements to meet your day-to-day service requirements.

Littl-Lytic is a typical example of how Sprague Research keeps its products up-to-the-minute. Reliable components mean reliable service work—your business keeps pace with the electronic industry when you use Sprague.

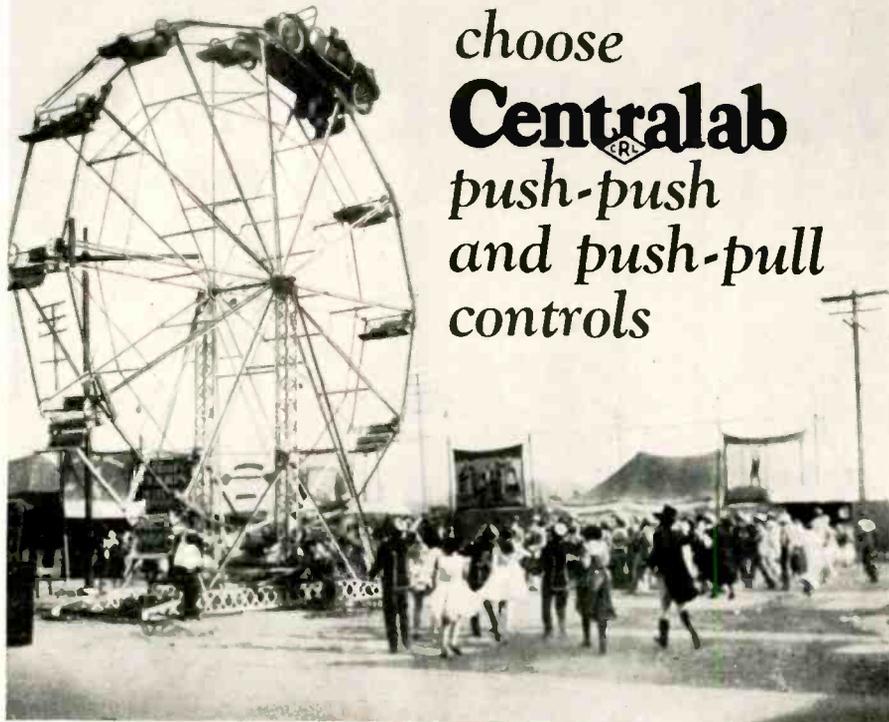
\*The "Hidden 500" are Sprague's 500 experienced researchers who staff the largest research organization in the electronic component industry and who back up the efforts of some 7,000 Sprague employees working in 14 manufacturing operations—four at North Adams, Mass.; Bennington and Barre, Vt.; Concord and Nashua, N.H.; Lansing, N.C.; Grafton, Wis.; Visalia, Calif.; two at Ponce, Puerto Rico; and Milan, Italy.

don't be vague...insist on



For more details, circle 54 on page 48

# Big Wheels in tv service



choose  
**Centralab**  
push-push  
and push-pull  
controls



ACTUAL SIZE

No need to go round in circles looking for push-push and push-pull switch-type replacement controls. Centralab has them—in 4 different types: Adashaft, Universal Shaft, Fastatch (for dual concentrics); twin types (for stereo).

As you know, controls of this type are original equipment in the vast majority of recent TV, radio, and hi-fi sets—and only Centralab has a complete line of replacements.

Incidentally, these easy-to-use units can also be used to replace any switch-type volume controls.

So get down to earth, and get over to your Centralab distributor for push-push and push-pull controls.

B-6204 S

**Centralab.**

THE ELECTRONICS DIVISION OF GLOBE-UNION INC.  
902B EAST KEEFE AVENUE • MILWAUKEE 1, WISCONSIN  
In Canada: Centralab Canada Ltd., P.O. Box 400, Ajax, Ontario

ELECTRONIC SWITCHES • VARIABLE RESISTORS • CERAMIC CAPACITORS

PACKAGED ELECTRONIC CIRCUITS • ENGINEERED CERAMICS

For more details, circle 21 on page 48

## LETTERS TO THE EDITOR

### Licensing Sentiment

Editor, *ELECTRONIC TECHNICIAN*:

By happenstance, I read the letter on licensing by a Mr. Oscar Schecter. I couldn't help but breathe a sigh of relief in that those poor "birds" in Pennsy have the same trouble that we have in this state.

It would be a waste of time to explain to him that licensing, *per se*, was never designed to protect the holder, but the public against untrained, unwarranted servicemen. But lest everyone lose hope, it's the SECONDARY effects that protects the holder.

He speaks out about the hardware discounters. But may I remind him that only by belonging to a strong central organization can he help rid himself and his fellow servicemen of these parasites.

I am pleased to announce that by reason of an independent survey, paid for by a large glass manufacturer, and conducted by an independent company, Hill and Knowlton, NYC, that 78.3% of all servicemen in the state of New York favor licensing.

Our license effort is going ahead. The bill will be refiled in the next session of the Legislature. Our sponsors are the same as last year's and we are delighted to have them, Sen. John H. Cooke and the Hon. Francis P. McCloskey, Assemblyman. I am pleased to say that we expect larger support from the New York City area than we got last year.

I now ask that all interested parties send personal letters and telegrams to their representatives, supporting this measure.

D. W. COOK, President  
ESFETA, Inc.  
Kenmore, New York

Editor, *ELECTRONIC TECHNICIAN*:

*The City of South Bend, Indiana did pass a Television Service Ordinance, Monday, November 27th, after a Public Hearing on the subject. The vote of the City Council was 7 to 2, which was two votes more than required to pass the ordinance. This ordinance, after the approval of the Mayor and the fulfillment of the statutory requirements, will become the law in South Bend.*

*The version passed licenses TECHNICIANS and ANTENNA INSTALLERS only! The version that "ARTS" proposed in 1957 for South Bend definitely included SERVICE DEALERS too; however, at this time our City Government decided against the licensing of Service Dealers. Association members believe that the version passed does have merit, and will be better than no ordinance; as it should help to establish some standards of performance in the television servicing business.*

# DOUBLES YOUR EFFECTIVE MANPOWER



Fix "Tough Dogs" Fast!

Save Half Your Time!

Step Up Your Profit!

**B&K** NEW  
MODEL 1076

## TELEVISION ANALYST

for Black & White and Color



Check all circuits—Pinpoint any TV trouble...in minutes

**By Easy Point-to-Point Signal Injection,  
You See the Trouble on the TV Screen and  
Correct it—Twice as Fast and Easy!**

There's no longer any need to "lose your shirt" (and customers)—and worry about the lost hours you never recover—on "tough dogs" or even intermittents. The remarkable B&K Analyst enables you to inject your own TV signal at any point and watch the resulting test pattern on the picture tube itself. Makes it quick and easy to isolate, pinpoint, and correct TV trouble in any stage throughout the video, audio, r.f., i.f., sync, and sweep sections of black & white and color television sets—including intermittents. Makes external scope or wave-form interpretation unnecessary. Most useful instrument in TV servicing! Its basic technique has been proved by thousands of successful servicemen the world over.

The Analyst enables any serviceman to cut servicing time in half, service more TV sets in less time, really satisfy more customers, and make more money.

Model 1076. Net, \$29995

Available on Budget Terms. As low as \$30.00 down.

Combines all the features of both  
the Model 1075 and Model A107

- |   |                                      |
|---|--------------------------------------|
| COMPLETE R.F. and I.F.                          | HI-VOLT INDICATOR                    |
| VIDEO TEST PATTERN                              | YOKE and HI-VOLTAGE TRANSFORMER TEST |
| COMPOSITE SYNC                                  |                                      |
| FM MODULATED AUDIO                              | <b>Also Now Provides:</b>            |
| COLOR PATTERNS                                  | SWITCH-TYPE TUNER                    |
| HORIZONTAL and VERTICAL<br>PLATE and GRID DRIVE | NEGATIVE BIAS SUPPLY                 |
| B+ BOOST INDICATOR                              | AGC KEYING PULSE                     |
|   | PICTURE TUBE MODULATION              |



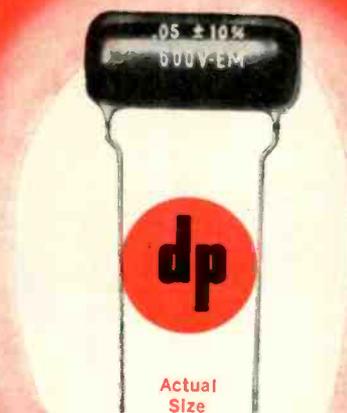
**B & K MANUFACTURING CO.**  
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For more details, circle 14 on page 48

MINIATURIZED  
**ELMENCO**

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\*DuPont Reg. Trademark

**First Choice with Service  
Technicians Everywhere!  
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Now being used in millions of television sets, radios, phonographs, electronic circuitry and military applications. ■ Operates at 125° C without derating. ■ Standard Tolerance  $\pm 10\%$  ■ Missile Reliability ■ Completely moisture proof ■ Up to 50% smaller than other types.

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Available at all authorized ARCO distributors in U.S.A.

**ARCO** electronics inc.

Community Drive, Great Neck, New York

Branches: Dallas 7, Los Angeles 35

For more details, circle 13 on page 48

**LETTERS**

**TO THE EDITOR**

One statute of this ordinance, that is not in any other license to my knowledge, is the requirement that an INSPECTOR BE APPOINTED AT ONCE TO ENFORCE THE INSPECTING OF REPORTED VIOLATIONS OF THIS ORDINANCE. This could be very worthwhile, as the INSPECTOR QUALIFICATIONS are: at least 25 years of age — at least five years experience in TV servicing — shall be of good character and habits — and shall be a qualified television technician. Other than the statute to establish the INSPECTOR, I believe the ordinance is quite similar to the Louisiana State Law, in that it, too, licenses the technician and not the service dealer.

RUSSELL BILLS, Secretary

St. Joseph Valley Radio &  
TV Association  
South Bend, Indiana

Editor's Note:

● *Our report on TV licensing in Louisiana is published in this issue. There is obviously much heated sentiment for and against licensing.—Ed.*

**Reprints For Public Relations**

Editor, ELECTRONIC TECHNICIAN:

I have been a student of your magazine for many years. I say "student" because as technicians, we have little time to read, but must put as much time as possible studying. I like your magazine very much. May I suggest that you make available reprints for handout or direct mail of two items in your Nov. issue. One is your Editor's Memo, "What is a TV Technician," and the other is your Letter to Consumers' Research. We can then hand out reprints to develop a better understanding with the public. It would be a good will builder. The cost should be about \$1.50 to 2.00 per hundred. What do you think?

WILLARD H. LYON

Lyon & Son  
Livingston, Alabama

Editor's Note:

● *If a sufficient number of readers are interested in reprints, we will make them available.—Ed.*

Editor, ELECTRONIC TECHNICIAN:

As secretary for the local service association, I would like to reprint, "What is a TV Technician," in our local paper. Thank you for your permission.

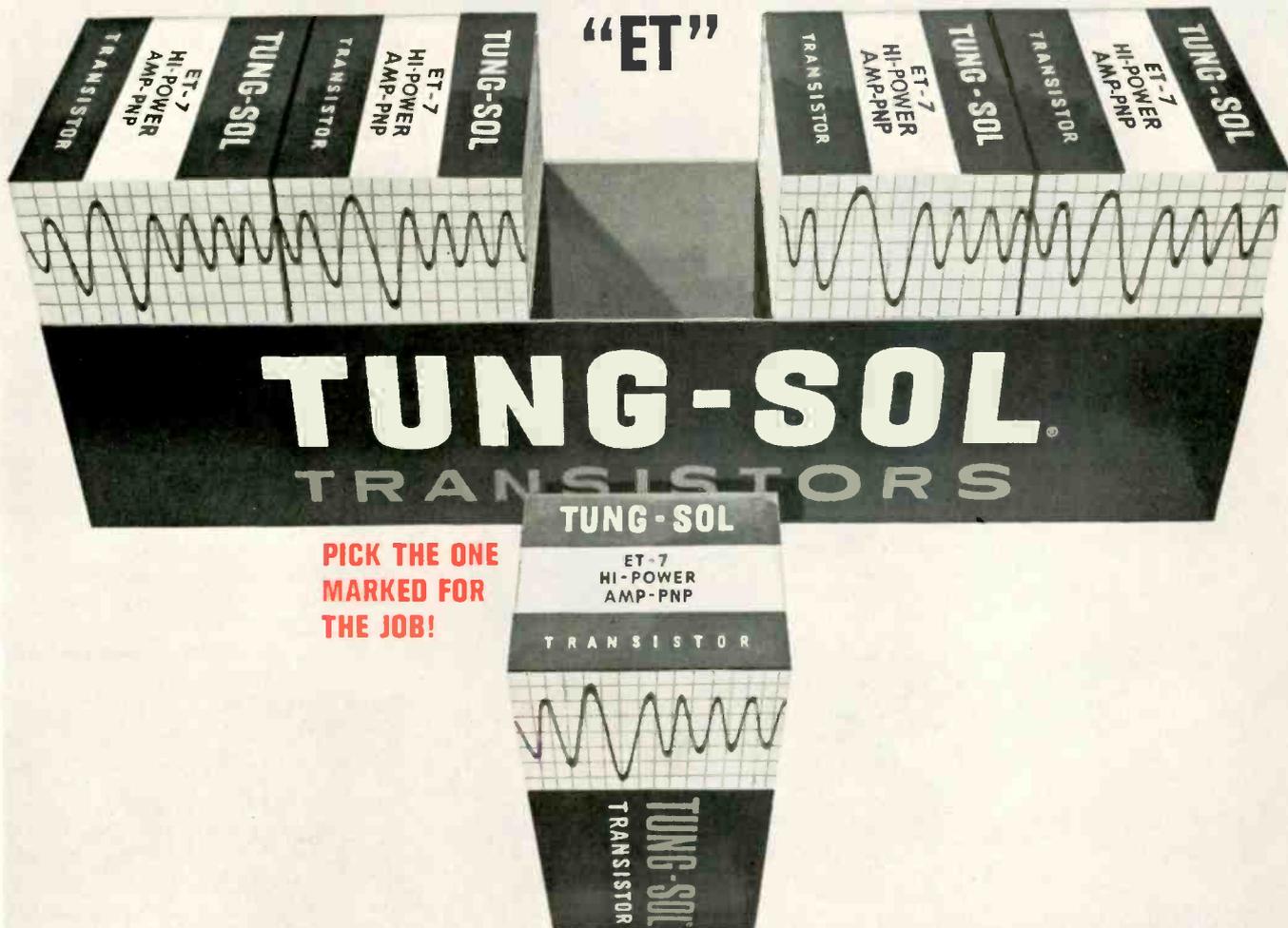
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Moss Point, Miss.

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ELECTRONIC TECHNICIAN

**EASY  
WITH  
"ET"**



**PICK THE ONE  
MARKED FOR  
THE JOB!**

Tung-Sol "ET" transistor packages are marked to eliminate guesswork in selecting the correct replacement for every job. Type numbers, class of service and junction polarity is stamped on each end flap. This is a time saving feature as well as a safeguard against service slip-ups. Tells you at a quick glance where your inventory stands.

The compact "ET" line was engineered by Tung-Sol specifically to eliminate confusion in entertainment service resulting from almost endless similarity and duplication of types. Eleven PNP and NPN units replace hundreds of older transistors. "ET"

transistors measure up fully to Tung-Sol's one high standard of excellence and reliability. The most advanced quality evaluation techniques assure product uniformity, lot after lot.

When you order transistors, specify "ET." High turnover with low inventory and customer satisfaction will show that it's the profitable way to buy transistors. 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.



Ask your Distributor for the Tung-Sol Transistor Interchangeability Guide  
For more details, circle 57 on page 48

# Now in breakproof plastic utility case!



Case can be used for carrying or storing tools, parts and equipment—or as a lunch box. Made of rugged polypropylene with self-hinge that won't rust.

Weller adds greater value to the Heavy Duty Soldering Kit with a new utility case of miracle plastic that won't break. Kit features the Weller 250-watt Soldering Gun used by electronic service technicians the world over. Instant heat. Twin spot-lights. Long life, long reach tip—made of copper for superior heat transfer and iron plated for long life. Also included in this kit are smoothing tip, cutting tip, tip interchange wrench and supply of solder. Model 8250AK.

**\$1495** list

## 100 Watt Gun and Solder Dispenser

A combination for faster, easier, better soldered connections—particularly in difficult-to-reach spots. 100-watt Weller Gun heats instantly. Weller-Kormat Dispenser feeds and supports the solder, prevents hand contamination that causes faulty connections, prevents finger burns. Model WK81 set.

**\$995** list



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For more details, circle 60 on page 48

## LETTERS TO THE EDITOR

reprint permission, with the usual credit line: Reprinted from *ELECTRONIC TECHNICIAN*, November, 1961. Copyright Ojibway Press, Inc. 1 E. First St., Duluth 2, Minn.—Ed.

### Association Arise

Editor, *ELECTRONIC TECHNICIAN*:

The purpose of this letter is to inquire: what happened to the service associations?

C.E.T.A., which I joined in 1958, has reached the point of inactivity where they only send out dues notices, but nothing else all year.

A.R.T.S. once sent a very illiterate brochure, not very encouraging to join.

E.S.F.E.T.A. requested recently that we write to our State Representatives to pass the licensing bill. When asked what the advantages would be, there was no answer to my letter.

So, I ask you, who seem to be the only ones interested in the serviceman's problems, what organization would it pay me, a mid-Manhattan TV & Hi-Fi serviceman, to join, for information, legal aid, if necessary, and the individual or community problems that arise in this hazardous business?

GRAHAM HOLZHAUSEN

Radio & TV Service  
New York, New York

● *We often chide technicians, who are not members of associations, for their lack of interest and activity in these vital organizations. Here is a willing member — what have the associations to say?—Ed.*

### Yoke Replacements

Editor, *ELECTRONIC TECHNICIAN*

I would like to know how accurate a replacement yoke must be and what effect a mismatch would cause. For example, replacing a 90° yoke with horizontal winding specification of 19 mh, 30 ohms; and vertical winding 40.5 mh, 41 ohms, with a 90° yoke 34.5 ohms, 24 mh, and 41 ohms, 37 mh, respectively.

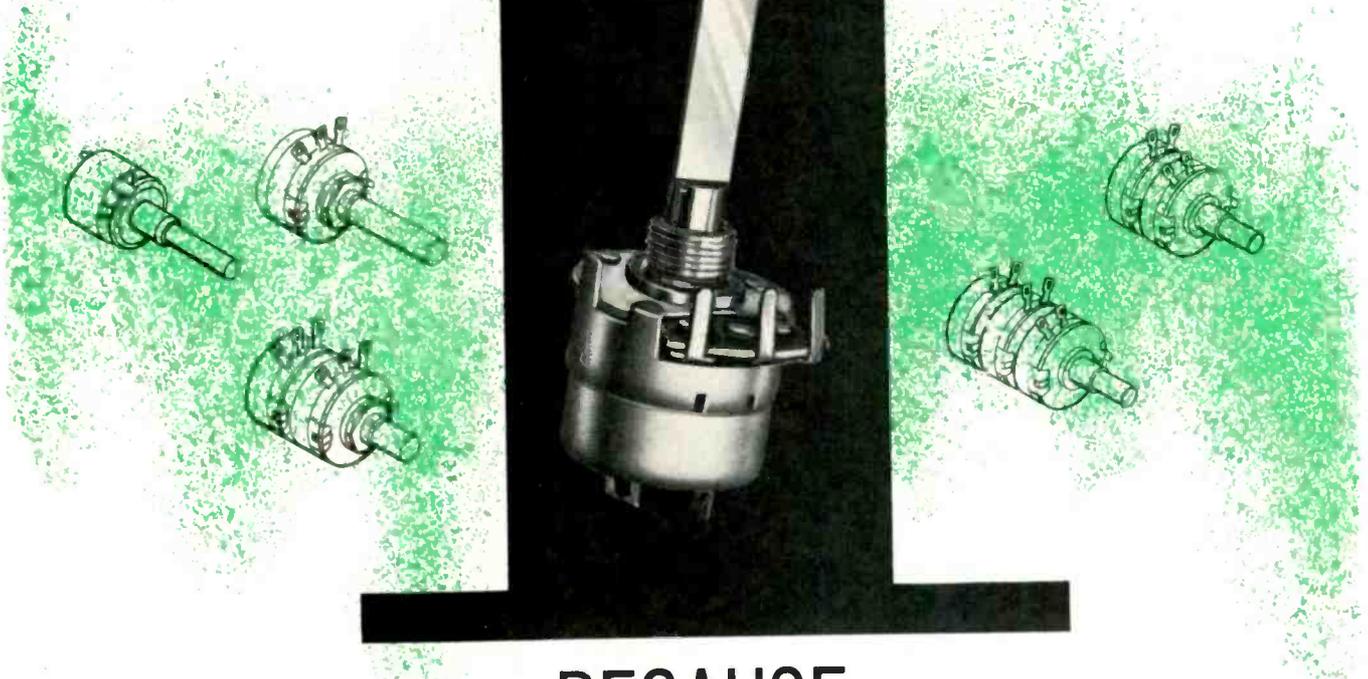
R. E. FERGUSON

Wolf Point, Montana

● *It's difficult to determine beforehand the effects of a replacement yoke. After selecting a replacement closest to the original, try it. If the mismatch is too great, a number of problems may arise, such as ringing or unlinear sweep. Frequently a closely matched yoke can be balanced to minimize unsatisfactory performance. See March, 1961 issue of ET for article on balancing a deflection yoke.—Ed.*

ASK  
FOR  
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BECAUSE

Get the No-1 habit—always ask for Clarostat first for every replacement control need. You'll discover the built-in quality that has made Clarostat a prime choice of original equipment manufacturers. You'll find your servicing problems are minimized thru Clarostats' greater reliability.

Clarostat offers you the most complete line of replacement controls on the market — a line that was planned with you in mind by providing the right replacements in the most logical, easiest-to-use assemblies and types.

Always look for the green box at your distributor. It's the mark of reliability and satisfaction.

QUALITY  
COMES  
FIRST  
WITH

★ RTV Controls meeting your needs for most TV and radio control replacements with ready-to-install factory-assembled units.

★ Uni-Tite field-assembled controls offering fast, easy assembly that stays put.

★ Unusual, but needed replacements for push-pull switch/control assemblies, sound system controls, duals, industrial and commercial equipment replacements.

★ Standard carbon and wire-wound controls with the added convenience of Pick-A-Shaft and Ad-A-Switch.

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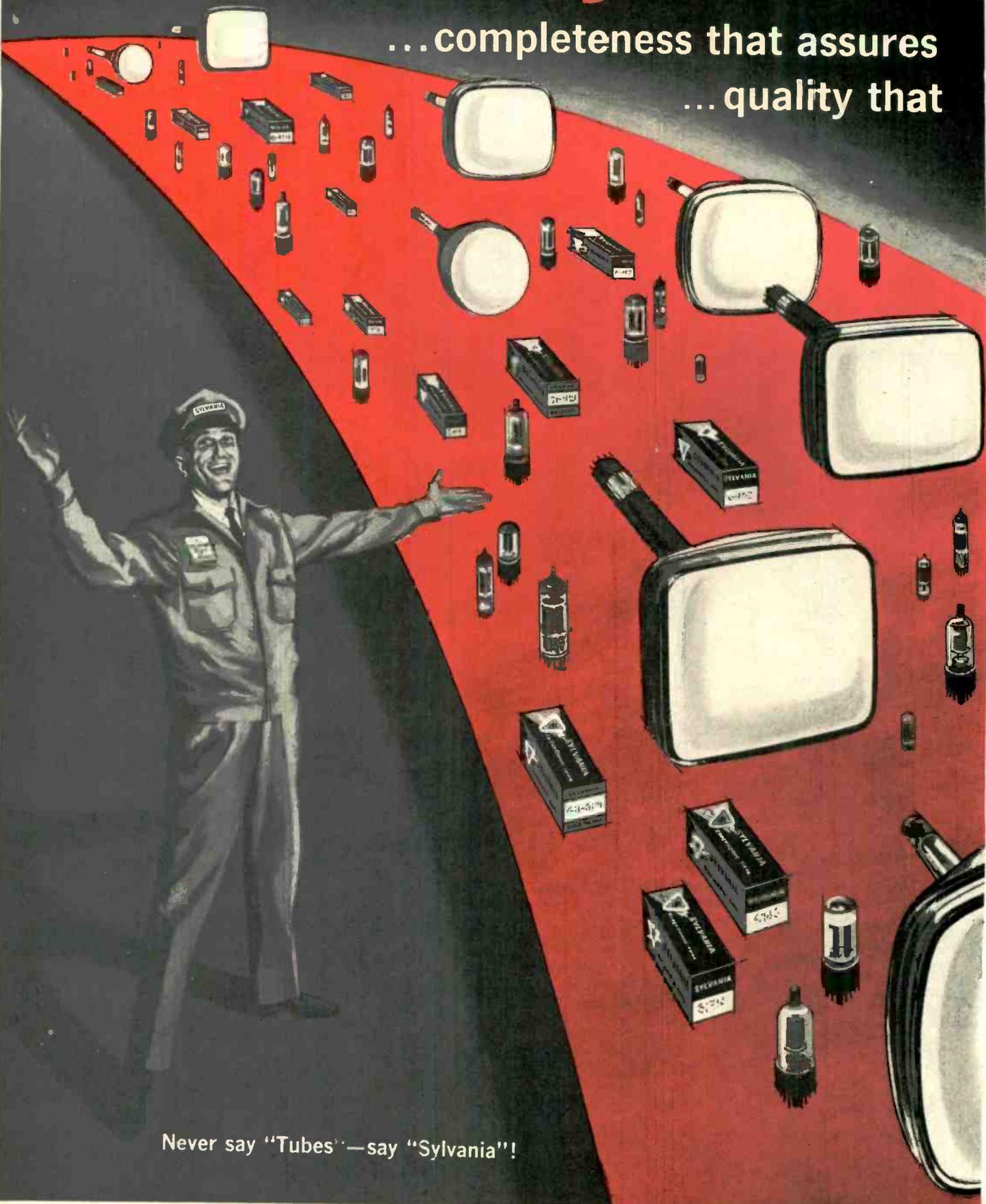
  
 **CLAROSTAT**

CLAROSTAT MFG. CO., INC. DOVER, NEW HAMPSHIRE

For more details, circle 24 on page 48

# Sylvania

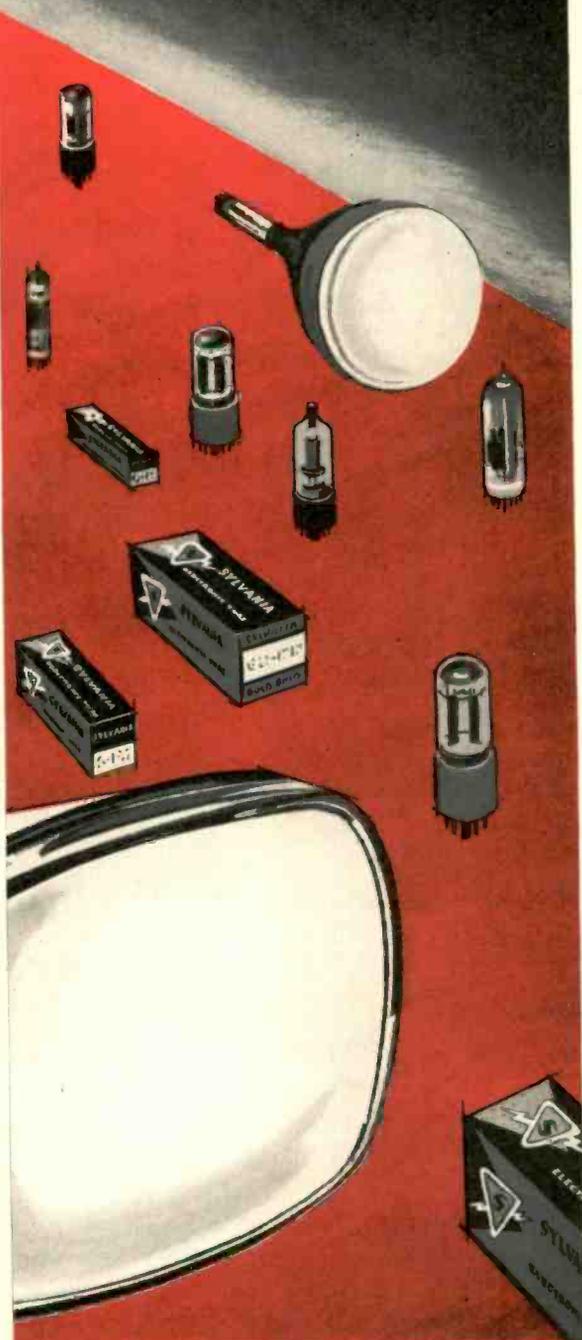
...completeness that assures  
...quality that



Never say "Tubes"—say "Sylvania"!

# Tubes

delivery!  
assures profits!



## SILVER SCREEN 85 PICTURE TUBES

Sylvania was a pioneer in the manufacture of commercially produced picture tubes. That kind of experience builds profit protection into every 1962 SILVER SCREEN 85—top performance, maximum assurance against callback. And, when you specify Sylvania for that replacement job, you are sure to get delivery... because SYLVANIA has the *comprehensive* line... SYLVANIA DISTRIBUTORS are wherever there is TV!

Bonded Shield • anti-reflection Bonded Shield • non-Bonded Shield • single and multiple branded • long and short necks • metal and glass envelopes • 50° to 114° deflection • magnetic and electrostatic focus • ion trap and non-ion trap types • rectangular and round faceplates • 2.35-v to 6.3-v and 450-mA to 600-mA heaters • 5" (50°-70°) and 8" (90°-114°) universal bench-test tubes.

Plus "universal" 17-, 21- and 24-inch picture tubes!

Plus color TV picture tubes!

## SYLVANIA RECEIVING TUBES

...for Color TV... Sylvania continues to prove its capabilities... in the production of tubes especially for color TV replacement. Since your customers are buying "performance"—not technical data—tubes at SYLVANIA are performance-tested continuously in actual color TV sets. Go with quality—go with Sylvania tubes for color TV: 6BK4 • IV2 • 3A3 • 6DQ5 • 6CB5A • 6AU4GTA • 6CG7 • 6AW8 • 12BY7 • 6AQ5 • 6AV5 • 6EM7.

...for Black & White TV... Sophisticated manufacturing techniques and processes have made Sylvania a preferred supplier of tubes for TV. Developments such as Sarong Cathode and Strap Frame Grid *plus* extensive automation in production assure that replacement tubes are... in every way... as good as the original.

...for TV Tuners... Sylvania-originated, the 6GK5 brings new advances to the state of the electron tube art. This new tube type, as manufactured by Sylvania, features Strap Frame Grid constructions and high Gm, provides high gain and low noise in rf amplifier-servicé in TV front-ends. When replacing a 6GK5, specify *Sylvania*—universally accepted by manufacturers of TV sets. Sylvania 6GK5 also replaces the popular 6FQ5, 6FQ5A and the 6FY5.

...for AM-FM Radio... Whether servicing an AC-DC table radio, a fine Hi-Fi tuner or one of the latest Multiplex units, make Sylvania your number one choice. Take, for examples of outstanding quality, the new 17C9 and 6JK8. Both are Sylvania-originated and provide superior performance in standard tuner and in multiplex circuitry.

...for Hi-Fi and Phono... One of the pioneers in tubes for audio amplifier service, Sylvania has led with old faithfuls like the 6L6, 6V6 and 6AQ5 and the new high-performance Sylvania 6GM5 and Sylvania 7591. Automated production techniques and final test procedures maintain precision, assure high quality. A Sylvania replacement tube is the best way to make old equipment perform like new again. Electronic Tubes Division, Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.

Sylvania Tubes—available wherever there is TV!

# SYLVANIA

SUBSIDIARY OF

GENERAL TELEPHONE & ELECTRONICS





# TUNING IN

*TV TEST STANDARD for black-and-white TV receivers for audio-video performance revised by American Standards Association. Developed by the IRE and approved by the ASA, the new standard includes assignment of specific channels for testing frequencies in the VHF and UHF bandwidths. Copies of American Standard C16.13-1961 are available at \$1.00 each from the American Standards Association, Dept. P 272, 10 East 40th St., New York 16, N. Y., or from the Institute of Radio Engineers, 1 East 79th St., New York 21, N. Y.*

PHILCO stockholders approve acquisition of the Company's properties and business by Ford Motor Co.

RADIO-TV appliance stores decreased 10% over the past three years. However, total number of outlets

## THE FURNACE SINGS



Hi-fi music flows out of every hot air register in the house from one specially-treated speaker, the "Musical-Aire," by Roger Mark Corp., Chicago, Ill. The system is installed directly on sheet metal furnace ductwork and connected to a hi-fi amplifier, radio or TV receiver. Two units, one on the hot air ducts, the other on the cold air return, provide a stereo effect. \$49.95, each unit.



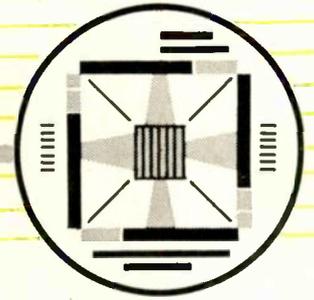
"Ernie Atwater and Sam Kent — having a terrible time getting a dealer franchise."

carrying radios, phonos and TV sets, which includes furniture and department stores, increased by 6%, reports National Appliance Audit. Radio-TV stores constituted 30% of all outlets handling such products in 1958. Today they account for only 26%.

TV LIFE EXPECTANCY in years, according to the Bureau of the Census are: All U.S., new 11, used 6. Regional: Northeast, new 11, used 6. North Central, new 11, used 7. South, new 10, used 7. By urbanization: Urban, new 11, used 7. Rural, new 10, used 6.

*HOTEL-MOTEL receiver developed by General Electric. Prototype, displayed at the National Hotel Exposition and at the Home Builders' Show, features a tuner that makes available seven consecutive TV channels plus five central radio stations or music plus maid*

# THE PICTURE

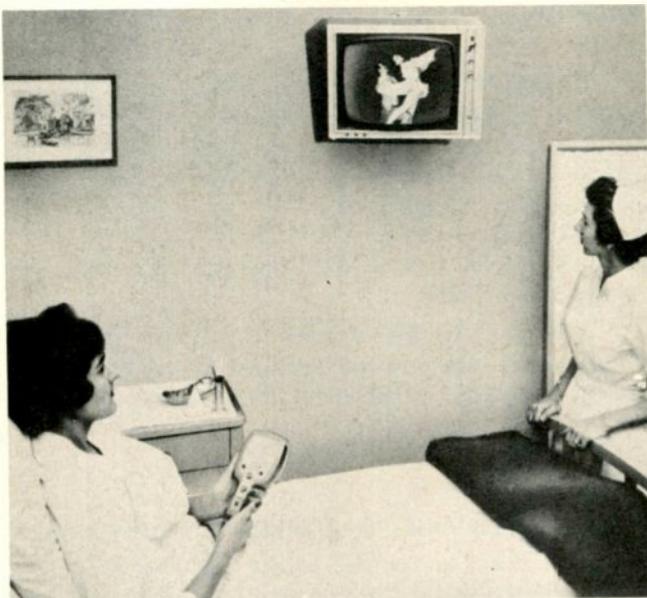


call service, controlled from color coded dial on the set, or from optional wired remote control for permanent installation on table tops, etc. Sets are similar to G-E's 19" Designer series.

**TRANSISTOR FACTORY SALES** in August increased to 17,193,860 units, about 6 million more than the year's low of 11,227,388 in July, when most plants were closed for vacation, according to EIA. Cumulative totals for this year continue to stay well ahead of those for the same period of 1960. Sold through August, 1961: 117,104,130, value, \$199,781,787. Through August, 1960: 77,289,560, value, \$193,756,732.

**SPEAKER REVITALIZATION PROGRAM** accepted unanimously by EIA's Loudspeaker and Speaker Parts Section. Cooperative program, an outgrowth of pilot studies by five subcommittees, includes the following projects: A public information program designed to promote sales of American-made speakers. An industry research and development center. Im-

## TV FOR HOSPITAL PATIENTS



Designed especially for hospital lease plan, a 19" Sylvania TV set is equipped with combination remote control and a pillow speaker. Operates only when remote unit is plugged into an outlet adjacent to the patient's bed to give the hospital control over set operation. Has volume limiter and audio switch. Mounting of receiver on wall is on a special swivel bracket.

## CALENDAR OF COMING EVENTS

- 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, (SWIRECO) Rice Hotel, Houston, Texas.
- Mar. 21-23: 9th Annual Spring Convention and Technical Sessions, Audio Engineering Society, Ambassador Hotel, Los Angeles, Calif.
- May 21-24: 1962 Electronic Parts Distributors Show, Conrad Hilton Hotel, Chicago, Ill.

proved industry-wide credit policies. Increased standardization of speakers and parts; and a new marketing data program.

**DEALERS SELL SERVICE CONTRACTS.** Non-servicing General Electric dealers will be selling TV service contracts to consumers for out-of-warranty repairs. They pick up a 10% commission. Contract cost varies as to type of appliance, age, and area.

**TV TECHNICIANS** in New York City area are reported reluctant to sell or install converters on TV sets to receive new UHF channel 31, station WUHF, according to Seymour N. Siegel, the station's director. He reports a number of complaints from the public in locating service techs to convert their VHF sets.

"HI" — four dots and two dots in International Morse Code — to be broadcast on international amateur frequency of 145 mc to 300,000 radio hams including those behind the Iron Curtain. An amateur-built satellite with the message will shortly ride into space aboard an Air Force Discoverer Rocket.

**SOLAR RADIO REFUSES TO QUIT.** Explorer VII, U. S. satellite, launched more than two years ago is still broadcasting scientific data about radiation conditions. The timing device on its solar-powered radio failed to function when it was to cut off broadcasting more than a year ago.

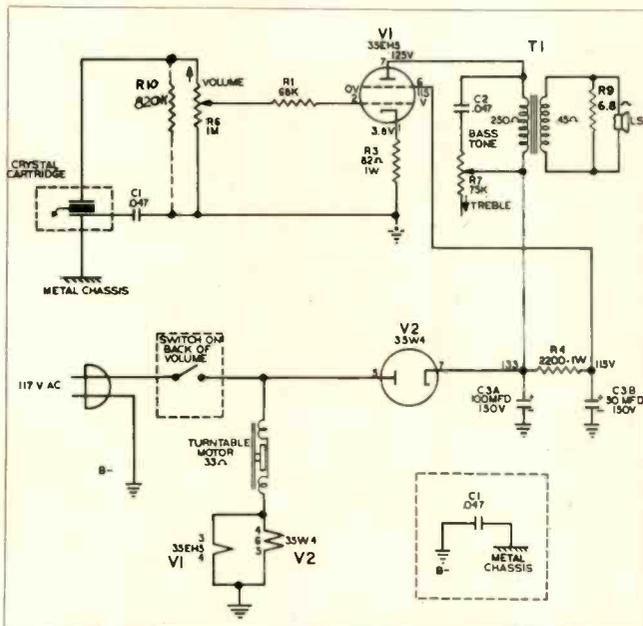
Continued on page 73

# TV MANUFACTURERS TECHNICAL DIGEST

## GENERAL ELECTRIC

### Portable Phonographs RP1500 series—Reducing Acoustical Feedback

Some circuit variations appear in a number of RP1500 series portable phonographs. Changes in the amplifiers were made at the factory when a phono-



Reduction of acoustical feedback in GE's RP1500 series portable phonographs can be obtained with these changes.

graph showed acoustical feed-back tendencies. Changes made to eliminate acoustical feedback were:

1. Cartridge leads reversed to obtain minimum acoustical feedback.
2. R-10, an 820 k ohm resistor, was placed across the volume control R-6, to roll off the lower frequencies from 170 cycles down. The effect on the speaker output is negligible and will normally not be noticed.
3. In future factory sets, volume control R-6 will be changed from 1 meg to 500 k. This will eliminate the need for an 820 k ohm resistor.
4. Some sets incorporate the Vaco tone arm and some a CBS tone arm. If servicing a set for acoustical feedback with the Vaco tone arm and 500 k ohm volume control, place a 1 meg resistor across the control.

## MAGNAVOX

### TV Chassis 35, 36 or 38 Series

With VHF Tuner 340007-1 or 340008-1—Vertical Jitter Complaints of vertical jitter can be corrected by

adding an isolation resistor in series with the r-f agc line. This resistor should be added at the agc tie-point on the VHF tuner. On VHF-only models the resistor should be 22 k and on VHF/UHF models an 82 k resistor should be used.

## MOTOROLA

### TV Chassis TS-430B-03 through C-02—Production Changes

**Chassis B-03.** To further improve sensitivity on channels 2 and 3, an 18 μf bypass capacitor (C-131) has been added from the converter cable terminal on the tuner to ground.

**Chassis B-04.** To eliminate the possibility of microphonic audio howl at high volume, capacitor C-309 (.01 μf) is relocated to the outside of L-303 can (quadrature coil).

**Chassis B-05.** The high voltage rectifier socket is rewired to accept either a 1S2A or 1AG2 high voltage rectifier tube. R-520 (22 k) is relocated from between pins 3 and 9 to between pins 4 and 7. The anode connector lead is relocated from pin 3 to pin 7. The high voltage wire, connected to pins 7 and 8, is connected to pins 3 and 5. R-519 (.82 ohm) is relocated from between pins 7 and 9 to between pins 1 and 3.

**Chassis C-00.** To improve vertical sync, coupling capacitor C-403 has been changed from 470 μf to 330 μf. R-403 (2.2 meg) changed to 12 meg and relocated from ground to B+ 265 volts. To eliminate the possibility of light and dark vertical bars in a raster, voltage dropping resistor R-522 (120 ohms) added in series between C-518 and pin 1 on the high voltage transformer.

**Chassis C-01.** The damper tube socket is changed from a wafer type to a molded type to reduce the possibility of voltage breakdown between pins.

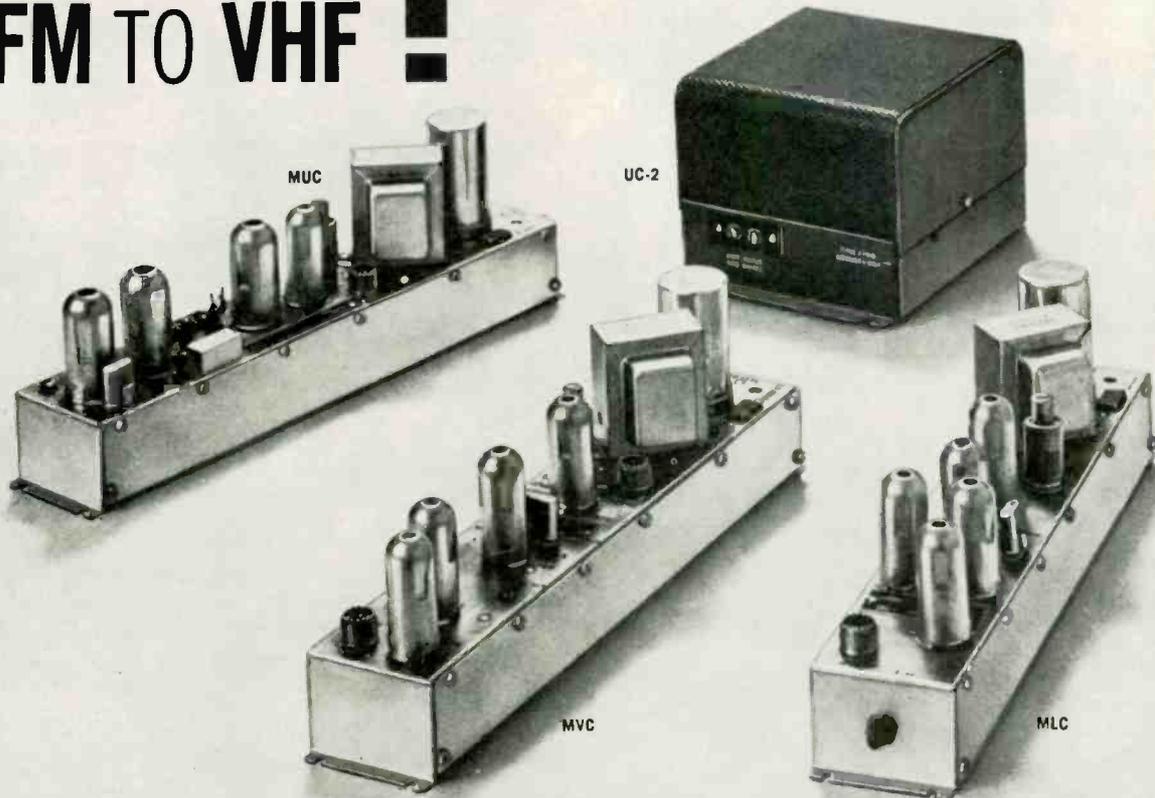
## PACKARD BELL

### TV Chassis V8-3, -8—Prevent Yoke Shorting

It is possible for the solder lug and grounding springs riveted to the yoke cover to become mislocated in such a way as to contact the graphite coating on the back panel. Should this occur, the interlock screw, and on some models the control shafts, would be connected to one side of the power line.

When servicing these models for any reason, the

# UHF TO VHF VHF TO VHF FM TO VHF ?



select the converter to do the job best from the world's only matched and integrated line

## BLONDER-TONGUE UHF & VHF CONVERTER-AMPLIFIERS FOR MATV, CATV, CCTV, ETV

MODEL	DESCRIPTION	GAIN	IMPEDANCE INPUT	IMPEDANCE OUTPUT	FEATURES	LIST
UC-2	UHF to VHF converter	6db to 10db	300 ohms	75 ohms	Built-in dual output mixing network.	165.00
MUC	UHF to VHF converter	15db to 30db	300 ohms	75 ohms	Crystal controlled. Dual output mixing network.	387.50
CO-3 (not illus.)	UHF to VHF converter	1db to 5db	75 ohms	75 ohms	Crystal controlled. UHF pre-amp	558.00
UNIVERTER (not illus.)	VHF to VHF converter	—	75 ohms	75 ohms	requires external power supply	143.25
MLC	Lo to Lo VHF converter	20db to 40db	75 ohms	75 ohms	Crystal controlled. Dual output mixing network.	400.00
MVC	HI to Lo VHF converter	33db	75 ohms	75 ohms	Crystal controlled. Dual output mixing network.	400.00
CO-2 (not illus.)	VHF & sub channel converter	up to 20db	75 ohms	75 ohms	Crystal controlled. (FM to VHF available, list 615.00.)	403.00



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

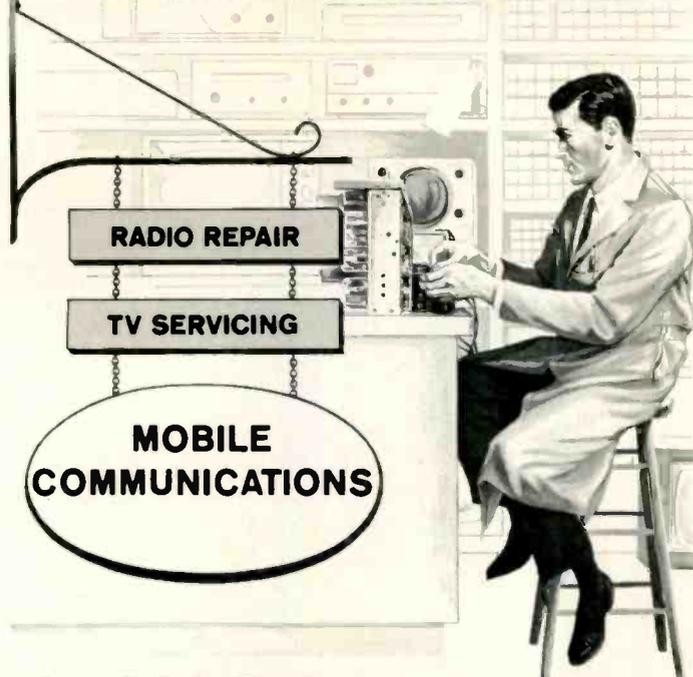
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9 Alling St., Newark, N. J.

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

For more details, circle 16 on page 48

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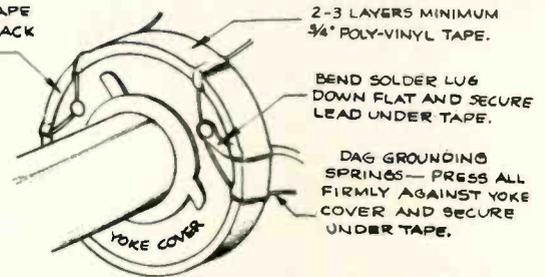
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## TV MANUFACTURERS TECHNICAL DIGEST

precautions illustrated here should be taken to eliminate this possibility.

EXTEND TAPE  
1/8" OVER BACK  
EDGE.



To prevent yoke shorting in Packard Bell's TV chassis V8-3 and V8-8, follow precautionary steps outlined.

### PHILCO

#### TV Chassis 12N53, 12N54—Auxiliary Brightness Control Adjustments

When replacing the CRT in "Black-Level" television models containing the 12N53 or 12N54 chassis it may be necessary to adjust the auxiliary brightness control in the receiver to compensate for small variations in CRT characteristics. This adjustment is performed as follows:

1. Allow 5 minute receiver warm-up period.
2. Remove the 1st video i-f tube, V3.
3. Insert a 0-1 ma meter in series with the CRT cathode.
4. Set brightness and contrast controls to maximum.
5. Set picture switch (SW1) to 'Black-Level.'
6. Adjust auxiliary brightness control (rear control of tandem controls VR5) for a CRT cathode current of 750  $\mu$ a.

### SYLVANIA

#### Chassis 546-1, -2, -3, -4, -5, Code 6 and 8—Reliability

Improvements For 120 Volts Line

To improve reliability when using 120 volt a-c line voltage, R-500 (4.7 ohms) resistor is changed to 5 ohms, 15 watts. New component specified in parts list as R500-1, part number 187-0103. Also, R-504 (41 ohms) resistor is changed to 45 ohms, 20 watts. This component is part number 187-0061.

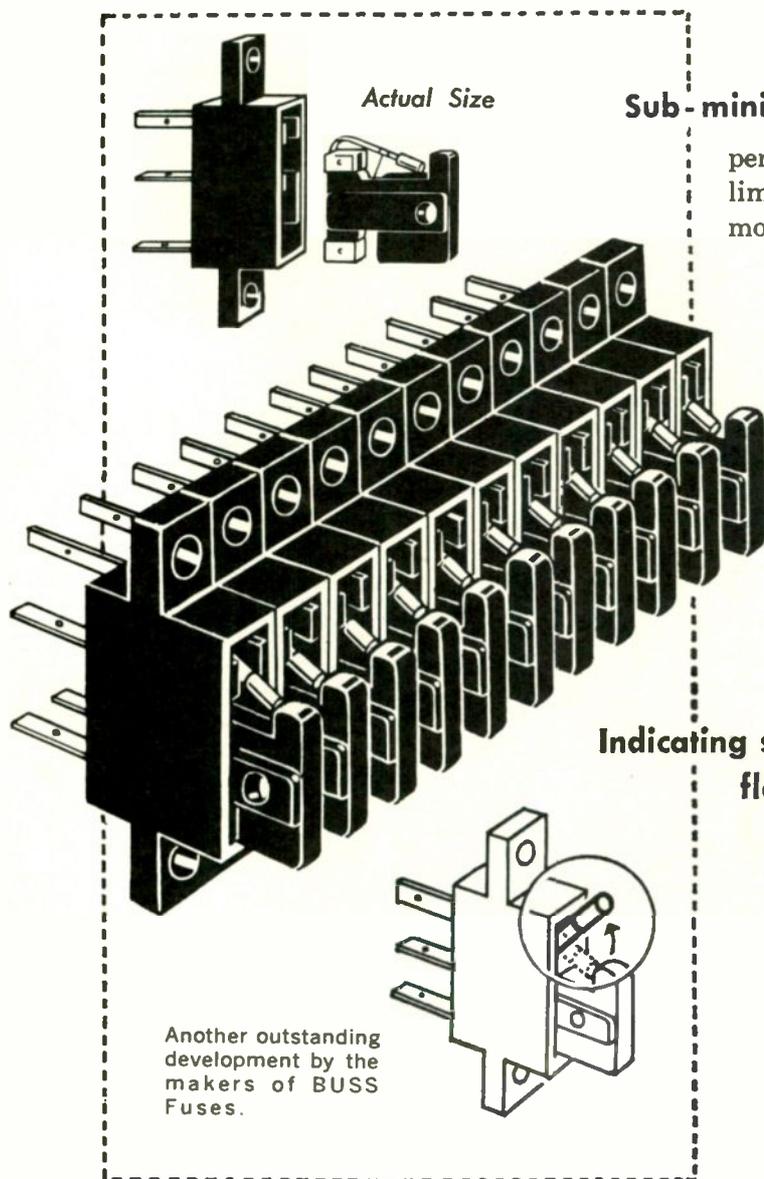
### RCA

#### 1962 23-inch TV — Automatic Tone Balance

An automatic tone balance circuit is featured in all 1962 RCA 23-inch black and white and color TV receivers. The circuit automatically boosts bass fre-

# NEW! BUSS

## Signal Indicating · Alarm Activating GMT Fuse & HLT Fuseholder



Actual Size

Sub-miniature design

permits multiple mounting of fuses in limited space. Fuseholders can be mounted on  $\frac{1}{4}$  inch horizontal centers.

Fuse and holder combination readily adaptable for use in equipment operating at 300 volts or less, such as: communication equipment, business machines, computers, control equipment or other multiple circuit apparatus where space is at a premium.

Indicating spring flashes color-coded flag when fuse opens

to give quick, positive identification of faulty circuit.

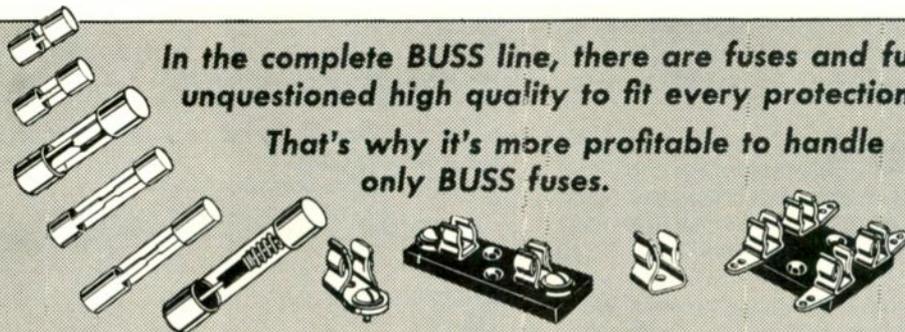
Indicator spring also makes contact with an alarm circuit so, it can be used to flash a light—or sound audible signal on fuse panel or at a remote location.

Ask for bulletin GMCS on BUSS GMT fuses and HLT holders.

Another outstanding development by the makers of BUSS Fuses.

In the complete BUSS line, there are fuses and fuse mountings of unquestioned high quality to fit every protection need.

That's why it's more profitable to handle only BUSS fuses.



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

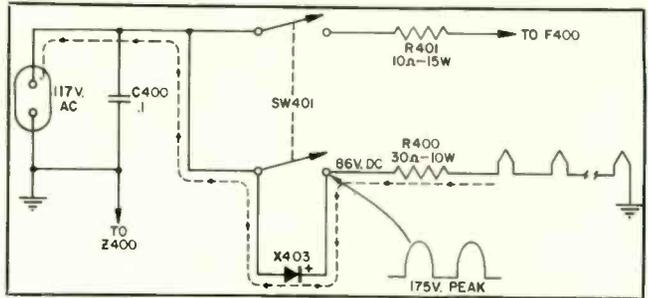
# TV MANUFACTURERS TECHNICAL DIGEST

## WESTINGHOUSE

### TV Chassis V2416-6, 7, 9—"Instant On" Power Circuit

A power supply circuit has been designed into these chassis to prolong component life and increase reliability.

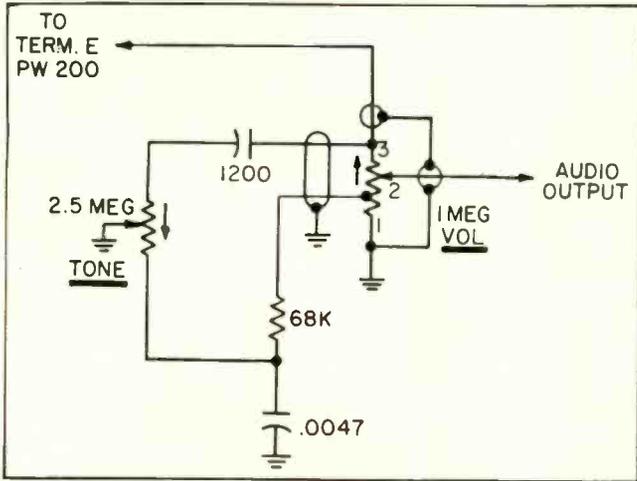
The TV set is never completely off when the power switch is open since the filament circuit will re-



"Instant On" power supply circuit used in Westinghouse chassis V2416-6, 7, 9 prolongs component life and increases reliability.

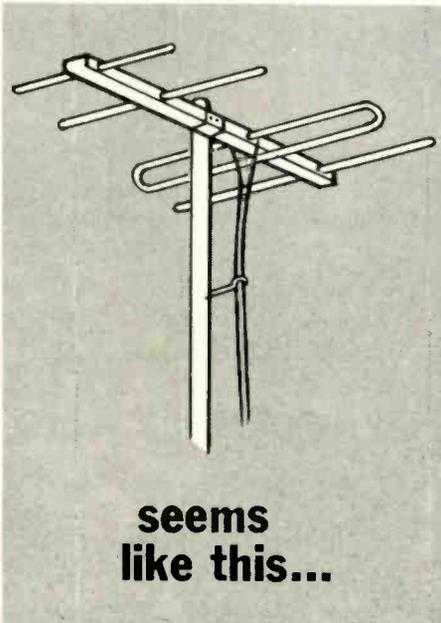
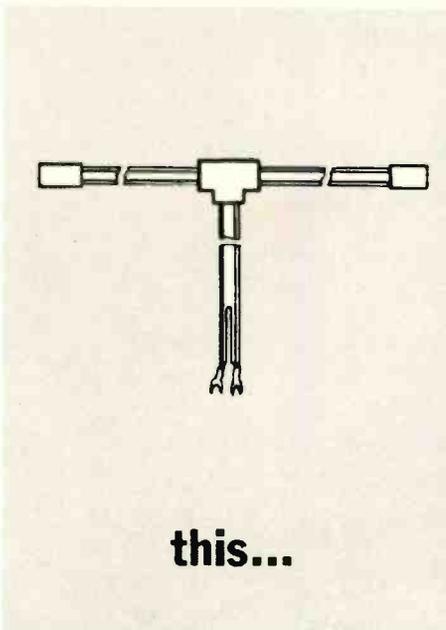
ceive about half the voltage it gets when the power switch is turned on. This eliminates the destructive filament current surges that occur when voltage is suddenly applied to a cold filament string. It also provides the TV set with ever-present warmth from the filaments, eliminating moisture damage. The dashed line in the schematic shows how diode X403 rectifies the a-c input.

*Continued on page 71*



Automatic tone balance circuit used in RCA's 1962, 23-inch TV sets. Circuit automatically emphasizes bass frequencies when volume is lowered — compensating for a normal human hearing shortcoming.

quencies when volume is lowered. This compensates for shortcomings in normal human hearing that cause low frequencies to sound attenuated as volume is lowered. In effect, the tone balance circuit functions as a loudness control.



## 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.

---USE THIS COUPON FOR DETAILED INFORMATION---

Fisher Radio Corporation  
21-24 44th Drive, Long Island City 1, N. Y.

Please rush free literature and complete specifications on all Fisher FM Tuners and Receivers.

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

87202

For more details, circle 31 on page 48

ELECTRONIC TECHNICIAN

# 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



## NEW, IMPROVED SENCORE SWEEP CIRCUIT ANALYZER MODEL SS117

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

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: 10 1/4" x 9 1/4" x 3 1/2". Wt. 10 lbs.

Model SS117

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

SEE YOUR AUTHORIZED SENCORE DISTRIBUTOR



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.
- A complete 33 RPM, 10 inch Permanent Record on "How to Simplify Sweep Circuit Trouble Shooting."

# SENCORE

ADDISON, ILLINOIS

# Install a Channel Master **golden crossfire** up **HERE...** and see the sudden difference



**HERE...**



**and HERE!**

All over the country, the new Channel Master Golden Crossfire is bringing primary area picture quality into difficult fringe areas.

The Crossfire delivers the sharpest, clearest pictures you've ever seen... even at great distances. It's perfect for either color or black and white. And the Crossfire is an excellent FM antenna, too... a fact that gives you *extra* sales potential.

### **The case against all-in-one "transistorized antennas"**

A booster can't replace an antenna...or compensate for an *inefficient* antenna. In order to get peak fringe area reception with a booster, you must start with the highest-gain antenna you can get... and that antenna is the Channel Master Golden Crossfire!

That's why you can install the powerful Golden Crossfire with full confidence that it will give your customers finer TV and FM reception than any other type of antenna available today.

### **New Improved JETRON Booster with built-in AM interference filter.**



This powerful transistorized booster mounts on antenna or mast. It cleans up snow and adds miles to TV and FM reception...dramatically improves the performance of any antenna... new or old. The Jetron has the lowest noise figure of any booster. Separate in-the-home power supply also serves as a 4-set coupler.

For more details, circle 22 on page 48

**CHANNEL MASTER** ELLENVILLE, NEW YORK

*works wonders in sight and sound*

# E/T VIEWPOINT

## Selling TV Via Supermarket Tapes

A new merchandising technique has hit the TV-Appliance industry like a bombshell. It has raised a storm of protest from the National Appliance Radio-TV Dealers Association, and has provoked heated exchanges between various manufacturers.

These sales programs are known by such names as ID for Instant Discount or Instant Dividend, A/B for Appliance Bonus or GB for Giant Bonus. Though the plans differ in small detail, their operations are basically similar.

Here's how the plans work. A manufacturer or set distributor arranges with a food supermarket chain to have some of their dealers sell a TV or appliance in connection with the supermarket. The customer agrees to pay a certain amount of money per month to pay out the cost plus finance charges. Against this amount, the customer receives a partial or complete credit based on the amount of cash register tapes the customer has accumulated.

The advantage to the supermarket is that the plan is a promotional attraction to bring people into the store. To the manufacturer and the dealers who tie into the plan, it is an opportunity to sell more products. For the customer there is the chance of getting an appliance at reduced cost.

However, all is not peaches and cream — or should we say profits and discounts. Some manufacturers charge that this is unsound marketing. TV dealers who do not or cannot get into the plan are left out in the cold. Some dealers charge that when the plan takes hold, the supermarkets will be able to bypass dealers by buying directly from the manufacturers and their distributors — a charge that anticipates a problem, but has no basis in present experience. Independent food stores charge that the plans tie customers down as they did in the old company stores.

Perhaps the greatest Achilles Heel for these plans

is the arithmetic involved for the consumer. One company pointed out that it takes \$4,732 worth of grocery receipts from one store to buy one low-priced TV set. Others indicate that the list prices at which the sets are sold are inflated, in some cases. Another store in opposition to the plan states that a portable TV listing for \$159.00 can be bought for \$125.00 cash, but costs the tape-plan customer \$270.00 in 27 monthly payments of \$10.00 each.

Pittsburgh is the hotbed of tape plan activities. Experience gained in this locale may be instructive for other areas where the plans are being initiated. When the plans were introduced a few months ago, supermarkets and the dealers tied in with them, reported major sales increases. These increases were mostly at the expense of food stores and dealers which did not participate in such plans. After several weeks of hectic plan activity, it seemed that most customers who had been drawn away from their usual shopping patterns were returning to the food stores and dealers they normally dealt with. Three reasons may have contributed to this setback to tap plan rate of growth, which had been meteoric in the first few weeks. First, after shopping the plans, many customers may have felt that they did not want to commit themselves to a purchase, which was fairly expensive to begin with. Their grocery expenses may not have been large enough to offset too much of the cost. Second, independent food stores have counterpunched with aggressive advertising magnifying the limitations in the tape plan. Third, the Better Business Bureau, in Pittsburgh, issued a stern warning that customers may not be getting exactly what they expected in the way of appliance bargains when purchasing through tape plans. This doubtlessly made many customers very cautious.

We'll keep a close watch on how the tape plans develop, and report new trends as they occur.

## Licensing Study

In this issue, on page 32, we have a special report on licensing from Louisiana, the only state which has such a state law regulating TV service. With many state legislatures throughout the country considering the passage of such a law, it will be most interesting for TV servicemen to examine what licensing has and has

not accomplished in the three years of operation in the state of Louisiana.

With so much venom and verbosity filling the air on this controversial subject, we hope that the unbiased report in this issue will result in a little more light — and a little less heat — on this subject.

Installations "bend" signals over hills and mountains

## How To Install And Service TV TRANSLATORS



Translator receiving antennas (center) and transmitting antennas (left) at Mexican Hat, Utah installation.

*by Lon Cantor*

Blonder-Tongue Labs., Inc.

■ There are a number of areas in the United States where television reception is not possible because receivers may be too far from transmitting stations or signals blocked by hills or mountains. These areas can be served if signals from the nearest stations are picked up and relayed. This relay device is called a "translator."

When the FCC legalized VHF translators more than a year ago, a new source of business was provided for enterprising technicians. Translators can increase business in two important ways:

1. You may get the contract for installing and/or maintaining the translator equipment.
2. All the new TV sets in the area will certainly be a source of new business.

### Translators

Early relay devices, known as boosters, consisted of an antenna, to pick up the transmitted signal, an amplifier (or amplifiers) and another antenna to transmit the signal. This system, however, had serious drawbacks. The transmitting antenna, for example, picked up the signal off the air as well as the signal from the amplifier. Feedback, ghosting, etc. resulted.

A solution to the problem was found by receiving and then converting the transmitted signal to an unused channel before re-transmitting it. This conversion became known as translating the signal; thus the units are called translators.

The first VHF translators licensed by the FCC were at Mexican Hat, Utah. These translators began to repeat programs from a station in Albuquerque, New Mexico in February 1961. The total path is 275 miles from the TV station.

This installation has made a great impression on the TV-hungry people in the Mexican Hat area. Television shops were swamped for months before the translator began operating. Indians in the area bought over 50 TV sets in anticipation of the broadcasts. Plans are being made to bring translator TV to the entire Navajo reservation, which will cover parts of three states.

A translator is a fairly expensive item. A good translator installation, meeting all FCC regulations, costs about \$3,000 plus maintenance.

Who picks up the tab? Sometimes it's an individual, like Charlie Starr, for instance, who wanted TV for his 5,000 acre Montana, Wyoming ranch. Sometimes it's a committee similar to the United Fund Raising Drive in the states of Washington, Idaho, Wyoming, and Montana. Often translators are

## to provide TV reception in valley areas

paid for out of taxes or recreation funds. Subscription plans seldom work out, since non-subscribers in the area can receive TV broadcasts also.

In some cases, a group of citizens may decide to provide their area with TV reception, raise the necessary funds and then look for a qualified technical man to install it. That technical man may well be the local TV technician. The most enterprising technicians may actually initiate sales, pointing out to civic leaders that they can provide good TV reception to out-of-the-way places.

### Typical Unit

A block diagram of a typical FCC type-approved VHF translator is shown in Fig. 1. The signal is picked up from the mother station by a receiving antenna. The ACMT matches the 300 ohm impedance of the antenna to 75 ohm coaxial cable. The signal is then amplified by the pre-amplifier to increase signal-to-noise ratio.

The PA amplifier has a low noise figure. Its agc circuits can maintain satisfactory picture quality with input levels as low as 50 microvolts. If any interference is present in the area, it is removed at the output of the pre-amplifier by filters or traps.

CO-2 is a converter. It converts

the VHF channel being received to another VHF channel. Not all conversions are practical, some can cause interference. Table I shows practical conversions. After the conversion, the signal is further amplified by the CAT, another agc controlled stage. The CAT provides separate outputs. One drives the HTA output amplifier; the other supplies signal to the IU identification unit. FCC regulations permit a maximum of 1 watt output. To use any less power would reduce the range of the translator. Therefore, a meter is provided as an output indicator. When it reads "Maximum Permissible Power," the translator is delivering 1 watt to the transmitting antenna. This level is set at the factory by a control on the CAT. The CAT agc insures maximum permissible output power, even if the input signal varies. Also, since translators are often located at the end of poor a-c power lines, a voltage regulating power transformer is used.

FCC rules also require that translators send out identifying signals. Every half hour the IU modulates the r-f with a 4 kc signal in a pre-set code that contains the identification letters assigned by the FCC. The IU also acts as an automatic shut-off device. It turns the translator off when the master station goes

off the air. When the master station starts to broadcast again, the IU turns the translator back on. The automatic shut-off works on the 4.5 mc beat between sound and picture. Any time the amplitude of this beat remains below 10 microvolts for longer than 4 seconds, the translator is shut off.

In case of emergency, another FCC regulation requires provisions for shutting the transmitter off within 15 minutes after notification. If the translator is installed in a desolate area, a twisted pair telephone line with an on/off switch, must be run from the IU to a spot which the translator operator can reach within 15 minutes.

### Installation

Be very careful in choosing a translator site. Use a temporary Yagi antenna and a field strength meter to probe the area for a location giving the strongest signal. In hilly country, the side of a hill facing the TV station often provides a better signal than the top of the hill. Ordinarily, the translator can be no more than 150 miles from the TV transmitter, with no exceptionally high mountains in between. Once you find a good site, monitor it for about 100 hours. You must receive a signal of at least 100 microvolts at all times.

In flat country, use a mast or

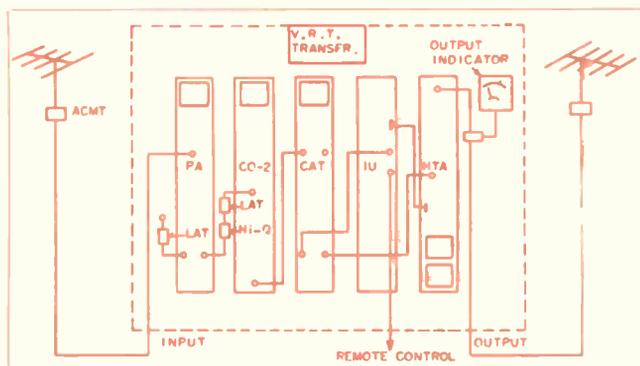


Fig. 1 — Block diagram of Benco's T-1 VHF translator delivers 1-watt to the antenna.

Received Channel	Possible Output Channels												
	2	3	4	5	6	7	8	9	10	11	12	13	
2				x			x	x	x	x	x	x	x
3					x	x	x						
4						x	x	x	x	x	x	x	x
5	x						x	x	x	x	x	x	x
6		x						x	x	x	x	x	x
7		x	x						x	x	x	x	x
8	x	x	x	x						x	x	x	x
9	x		x	x	x						x	x	
10	x	x	x	x	x								x
11	x	x	x	x	x	x							
12	x	x	x	x	x	x	x						
13	x	x	x	x	x	x	x	x					

## TV TRANSLATORS...

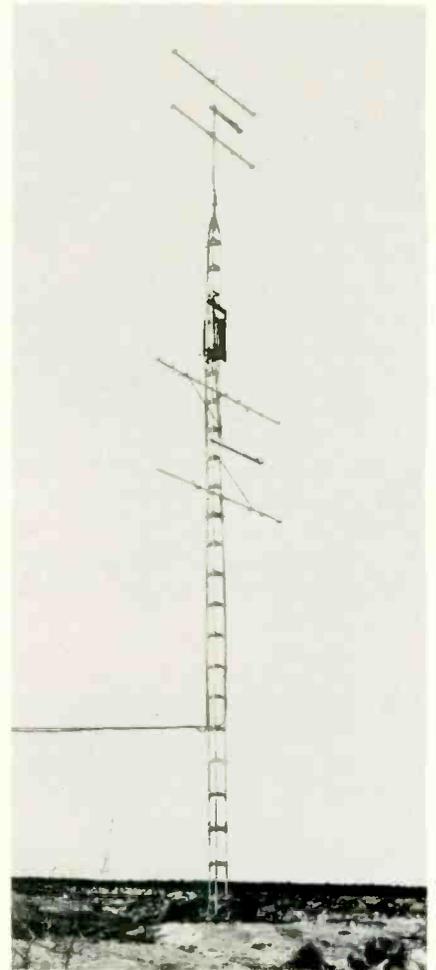


Mexican Hat, Utah transmitting antennas and translator housing.

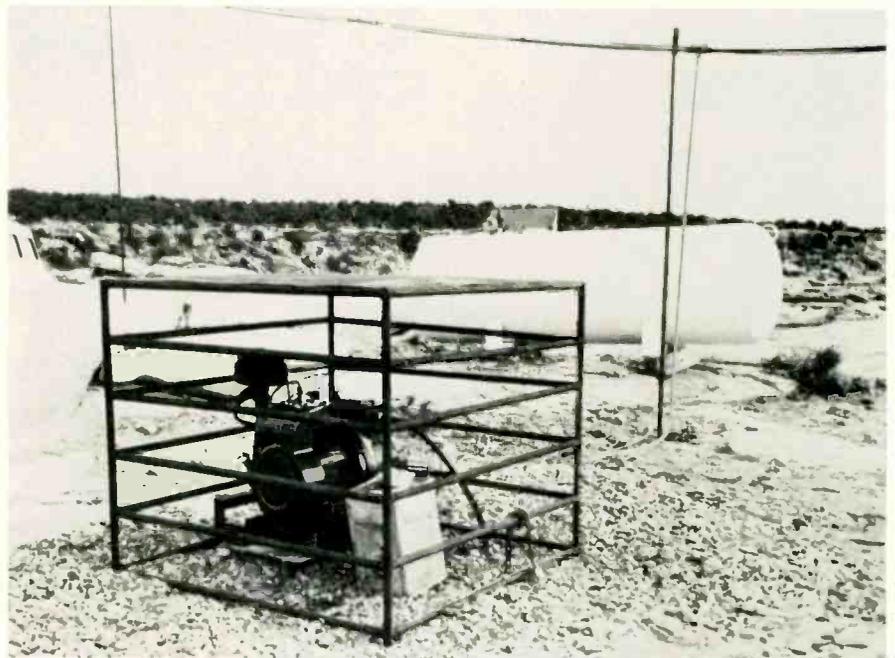
tower as high as possible. Be sure that a 117 volt a-c power source is available. If the translator is in a remote area, the power source should be capable of delivering enough power for a hotplate or a heater. Also, it is a good idea to house the translator in a little shack, to make servicing easier. Use a transmitting antenna with the proper polar radiation pattern to serve the area for which it is intended.

Installation of the translator equipment itself is easy if you use a packaged, FCC type approved translator. A number of companies now have translators available, including Benco, Emcee, Mars, Adler, etc.

Check the output of the final amplifier with a field strength meter to be sure the sound carrier is not as strong as the picture carrier. It's a good idea to keep the sound carrier at about  $\frac{1}{4}$  the voltage of the picture carrier.



Mast-mounted preamp between receiving antenna's two bays.



Portable gasoline engine is used to generate power for translator.

Translators may use either UHF or VHF for input or output. Usually VHF outputs are preferred because they can cover more territory, especially in hilly terrain. Where all the VHF frequencies are in use, however, the FCC will not license a VHF translator.

UHF translators are permitted to deliver up to 100 watts to their transmitting antennas. In flat country, a UHF translator of 2 or 3 watts can cover quite a bit of territory. Because of their freedom from interference, UHF translators are preferred where their range is sufficient.

#### Maintenance

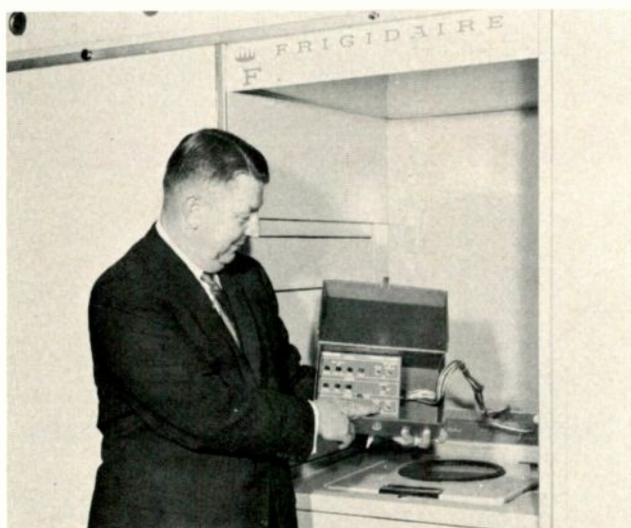
A good TV technician will have no difficulty in servicing translators. You should, however, add a field strength meter to your service equipment. The field strength meter can be inductively coupled to the output of each of the units in a translator to isolate the defective unit. As in a TV set, most troubles are caused by bad tubes. Other common troubles will be poor coaxial connections and possible physical damage to antennas and towers.

Most equipment manufacturers maintain their own service departments for repairing and aligning amplifiers and converters. You can repair most equipment troubles yourself, however, with the aid of manufacturers' service literature.

Once a translator is in operation, its users will usually be up-in-arms if you even hint you're going to shut down for a week. Therefore, it's a good idea to have spare units available. You can then replace the defective unit quickly and repair the defective unit at your leisure. If the trouble is difficult, you can send the unit to the factory, perhaps obtaining a temporary substitute.

To prevent breakdowns, the technician must carry out a systematic program of preventive maintenance.

Although an unlicensed technician can handle most servicing, the FCC requires that any adjustments affecting frequency, radiation or power output, must be made by a technician with a commercial radiotelephone license. ■



E. E. Landis, Frigidaire's general service manager, is shown demonstrating a new electronic analyzer which provides a complete systems check and service diagnosis for the company's high-speed, self-service dry cleaner.

## Dry Cleaner

## Electronic

## Analyzer

- 
- 
- 
- General Motors' Frigidaire Division has developed a compact electronic analyzer that will provide a complete system check and service diagnosis of the company's new high speed dry cleaner in little more than five minutes time. The dry cleaner is designed for use in self-service type stores.

The electronic analyzer will soon be made available to Frigidaire service technicians across the country. It is expected to save up to 60 per cent in diagnosis time. There are analyzers of similar design for the company's automatic washers, clothes dryers and dishwashers.



# Here's What Louisiana Techs Think of Licensing

## Service Industry In Only State With TV Licensing Favor Control By Small Majority

### *Electronic Technician Research Department*

■ Louisiana has the only state-wide TV licensing bill in the country. This year, many other state legislatures will be considering bills for similar laws.

We thought it would be instructive to survey Louisiana's TV service technicians to find out their attitudes and experiences with licensing. With three full years of licensed TV activity, Louisiana technicians offer a meaningful picture of the favorable and unfavorable results of such licensing.

We sent questionnaires to almost 800 Louisiana TV technicians. There was very little statistical change in the replies after the first 10% of returns were received. To be doubly sure, the compilation was continued until 20% of surveyed technicians had responded.

The answers were provided according to four

groups. The chart code shown here presents the code used on the various barred graphs.

A national study we conducted a year ago, with very few areas having licensing, showed that 53.1% of all technicians favored licensing. In the current Louisiana study, 62.1% favored licensing before the law went into effect, but this was reduced to 53.0% who favor the law now. The groups are broken down in Chart I. 45.8% favored licensing before the law went into effect, and still favor it today. 30.7% were against licensing before the law, and are still against it. 16.3% were in favor of licensing before the law went into effect, but have changed their minds and are now against it. 7.2% were against licensing before the law went into effect, but changed their minds and are in favor of it now.

All of the 45.8% favoring group are currently licensed by Louisiana, 93.6% of the 30.7% against group are so licensed, 88% of the 16.3% pro-before-against-now group are licensed, and 90% of the 7.2% against-before-pro-now group are licensed.

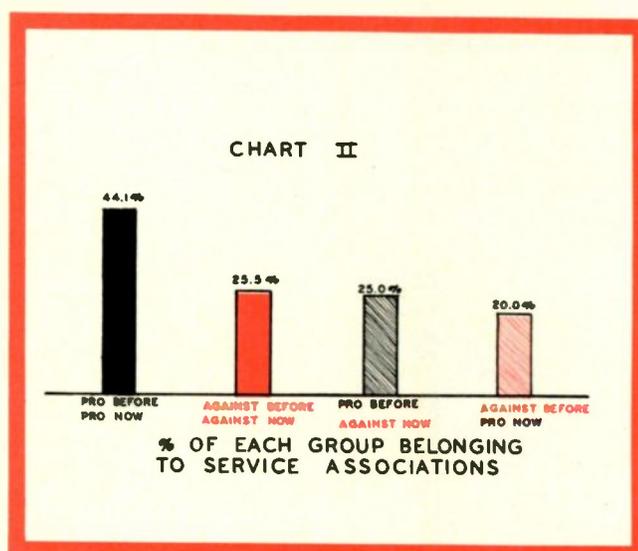
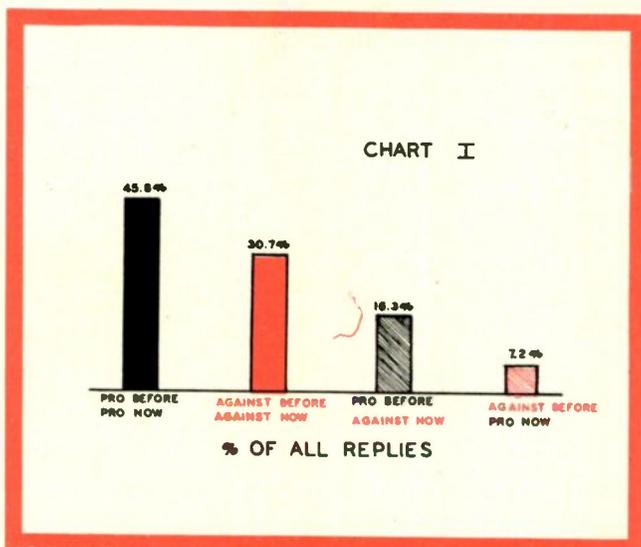


CHART CODE



Period Licensed

The following chart shows the length of time which technicians in each of the four groups have been licensed:

	1 Year or Less	Over 1 Year Under 3 Years	3 Years or More
Pro Before			
Pro Now	9.5%	33.4%	57.1%
Against Before			
Against Now	13.1%	39.4%	47.5%
Pro Before			
Against Now	13.4%	46.7%	39.9%
Against Before			
Pro Now	12.5%	37.5%	50.0%

From the above, it appears that those who now favor licensing have been licensed a little bit longer, for the most part, than those who oppose.

Association Membership

The relation of TV Service Association membership with viewpoint in favoring or opposing licensing is correlated on Chart II. Though association mem-

bers still constitute the minority of technicians, these are the people who steadfastly favored licensing before and still favor it now. 44.1% of all people having this attitude were TV Service Association members, while only 25.5% of those against before and still against now were association members. In last year's national survey, association members were approximately 4 to 1 in favor of licensing, while non-members were 4 to 3 against.

Are Public and Industry Helped?

As shown on Chart III, approximately 80% of the 45.8% group which favored licensing before and still favors it, believe that licensing has helped both the public and the TV service industry. As would be expected, those groups which are against licensing now, do not believe licensing has helped public or industry. Only 2.2% to 13.6% of the against groups think it has helped. Interestingly, the small 7.2% group which was against licensing before but has changed its mind and favor it now, is 100% in agreement that it is helping the public, and 9 out of 10 of this group believe that it is also helping the TV service industry.

Impact On Service Charges, Competition, Customer Confidence

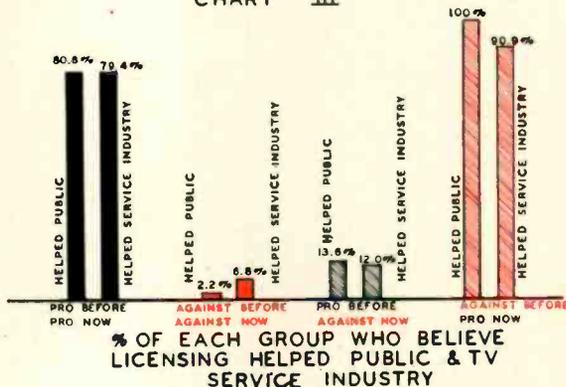
As is shown in Chart IV, both supporters and opponents of licensing tend to agree that service charges remain about the same despite the passage of the licensing law. Those who have always favored this law, are strongest in this belief, 81.1% of this group stating charges are the same. Among those who even now, or at one time, were opposed to licensing, there is a little more sentiment for believing that the licensing law resulted in raising service charges. Between 16 and 30% of such groups stated this belief, while from 0 to 16% indicated a decrease in service charges.

Though the majority of all groups expressed the belief that competition remained the same before and after the licensing law was passed, there are substantial minorities who believe otherwise. Of those groups who are now in favor of licensing, 31.9% and 50% thought competition had decreased, while only 0% to 10.1% thought it increased. On the other hand, those groups presently against licensing, showed only 6.6% and 12% as competition being reduced, while 15.5% and 28% of the anti-licensing groups reported competition had increased.

When it comes to customer confidence in the TV service technician, those who now favor licensing strongly believe, by votes of 69.6% and 80%, that this confidence has increased as a result of licensing. Practically none of them think that it has decreased. On the other hand, those groups now against licensing overwhelmingly believe, by votes of 84% and 84.4%, that customer confidence has not changed as a result of licensing. Practically none of the against group think customer confidence has increased, while 11.1% and 16% believe it actually had decreased as a result of licensing.

If we were to attempt to relate attitude toward

CHART III

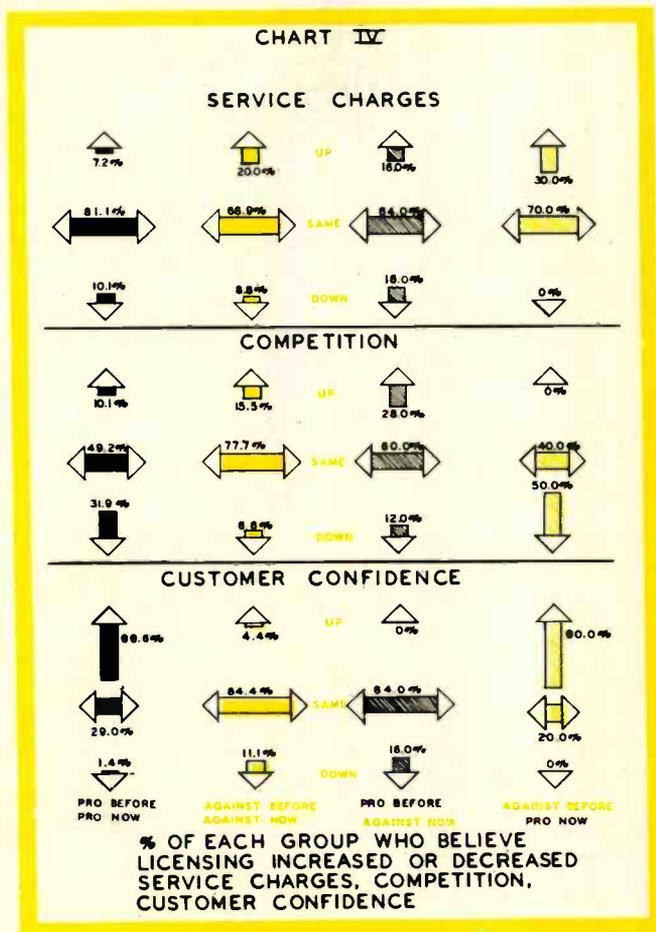


# ... Licensing

licensing with the impact of such licensing, it appears from the above data that customer confidence plays a greater role than service charges or competition. In other words, a man who favors licensing thinks such licensing has increased customer confidence in TV service dealers much more than he believes that service charges have increased or competition has decreased.

In reviewing Charts II, III and IV, it should be emphasized that the percentages shown on each graph, are actually those percentages of the figures shown in Chart I. For example, the 20% who believe service charges have gone up, in Chart IV, actually represent 20% of the 30.7% in Chart I, or a total of a little more than 6% of all technicians represented.

It appears to us from the preceding statistics that the TV service industry has a very much divided attitude concerning the benefits to be derived from a state TV licensing law.



## INDIVIDUAL COMMENTS

Additional insight into the views of Louisiana technicians can be gained by reading their various individual comments on how they believe licensing has or has not helped the public and the TV service industry. These comments are divided in the same four groups as the charts.

### How Licensing Has Affected the Public

*Comments of those who favored licensing before the law and favor it now.*

- Provides better trained technicians.
- A licensed man can be forced to rectify overcharges, inferior parts, charges for parts not installed, etc.
- It is weeding out the "fly-by-nights."
- It has, or is, helping rid the repair field of gyps and incompetent service personnel.
- More competent service.
- By eliminating night crawlers and sharpies.
- People get better service.
- By keeping unqualified persons out of their sets.
- We have a grievance committee here that works in close cooperation with the Local Chamber of Commerce, who investigate all grievances registered by public with regards to overcharges, neglect, malpractices, etc. A conviction would result in loss of license. The public could not be better serviced.
- We still have men working without licenses.
- Maybe it helps, but the general public does not know about technicians with licenses.

*Comments of those who did not favor licensing before the law and do not favor it now.*

No comments.

*Comments of those who favored licensing before the law but do not favor it now.*

Gives public a recourse.

*Comments of those who did not favor licensing before the law but do favor it now.*

- More customer confidence.
- By stopping some of the dishonest service men from doing business.
- By working with Better Business Bureau to spot the gyps.
- More confidence in service men.
- It has helped the TV man more than the public.
- The public has better chance for selection.

### HOW HAS LICENSING AFFECTED THE TV SERVICE INDUSTRY

*Comments of those who favored licensing before the law and favor it now.*

- Has helped, but could be better if distributor would cooperate by discontinuing to sell to unlicensed personnel, mainly to industrial firms for personal use of their personnel.
- Same as before.
- By keeping professional people in the field.
- Has upgraded the industry.
- Sets a standard.
- Through service organizations and general meetings of technicians, prices have been stabilized.

Inducement for more enlightened young men to enter profession. Requirements are stricter.

I can not see actually where it has helped the industry.

We do not get as many butchered sets.

As of yet, it has not helped, but given time I think it will.

It has upgraded the quality of our industry. Our state offers additional night classes through the State Board of Education, for all licensed technicians desiring to participate. Of course, nothing of this type of legislation is accomplished over night. After almost two years, we are gradually obtaining results. Many temporary technicians received licenses under the grandfathers' clause, now they are gradually dropping out. Things are getting better all the time. A license has made the public cognizant of the fact that a TV technician is a professional man.

It has weeded out some of the backyard technicians.

Does not help when there is not any cooperation from distribution points.

Does not help in the least. It just cost me \$15.00 a year.

People are still able to buy parts and sets from wholesalers.

Does not help yet.

Too early to say.

The technician now has an opportunity to defend himself against unfair claims, if he is right.

*Comments of those who did not favor licensing before the law and do not favor it now.*

By putting qualified technicians out of business, who would not take the test, because it's a political movement.

There are a minority of customer chislers whom we cannot protect ourselves from. The law gives them and others a big club to swing at us.

No comments.

*Comments of those who did not favor licensing before the law but do favor it now.*

Has eliminated firemen and policemen and others doing this work.

We now have organizations that are helping the licensed man by having factory demonstrations and schooling free of charge to most.

Has stopped the wholesale parts houses from selling to everyone at wholesale prices, and to those not in the service business. For a time before licensing just about anyone, like the corner grocery man could go to any parts house and buy just about anything to repair his TV, then he would take the set apart, you know the rest, the set would be a mess and still not fixed.

It has increased the volume of business.

The public hardly cares in most cases how he gets his TV or radio fixed just as long as he gets it done ok and at the cheapest price. Therefore, the man that couldn't get any license from lack of experience was eliminated.

## GENERAL COMMENTS

*Those who favored licensing before the law and favor it now.*

The law will have long range effects. It is not an overnight panacea. No industry ever cleaned house overnight, but the law is a necessary basis for such long range program.

Has not helped the public or the service men yet because:

1. Licenses were issued to practically all applicants. Some had no training background and were not actively engaged in servicing but because they obtained a license, became active. The Board says incompetents will be weeded out later according to complaints from the public.

2. There are many unlicensed operators now engaged in part time servicing because of poor law enforcement. However, I am still in favor of licensing and believe that with proper enforcement, everyone will benefit.

I believe it has not cut down on wholesalers selling to the public.

Still plenty of people without licenses working on TV and the penny pinchers go to them and most get what they deserve.

I believe that all states of the union should have the licensing law that we have in La. The technician will then be forced to do an honest job.

It has helped a great deal but I don't think the Board has enough personnel to police the field and keep all unlicensed personnel from doing repair work.

It is not enforced properly.

*Comments of those who did not favor licensing before the law and do not favor it now.*

I am opposed to the licensing law because I dislike giving the government any more power than necessary to control small businesses. Also, this will possibly lead to licensing in other fields and trades. If licensing gets out of hand, the average person would not be able to repair his own auto, air conditioner, house or even his lawnmower. Of course, at this time this is a bit farfetched but, possible.

I think that the best way for better customer-service relations is for the TV manufacturer to build a set that is much more dependable and while they're at it to design it so that the technician doesn't have to spend an hour to free it from the cabinet and ten times as much to isolate and repair the trouble. In the past few years, the labor charges in some shops has had to increase due to poor design of some sets that cause the technician to spend much more time than is usually necessary.

I think that licensing does much more for the Treasury of the State than it does for the customer.

This law is improperly enforced. Does not help because most customers are price conscious and do not look for the ability of a service man.

\$15.00 fee per year with no increase in service charges makes less profit per year.

Licensing tends to cause monopoly.

It's politics.

This law does not help the service man or the public — I know from what I've seen. As far as I'm concerned it's a means by which a few men can have a well paying job.

The public is hardly aware that a license is required. People still pull out TV tubes and take them to the corner drugstore for replacement.

Customer feels licensing decreases competition and narrows freedom for choice.

I only favor TV and radio licensing if the service-men had to take an exam such as given by the F.C.C. Men here in La. only had to claim 1 year experience to get a license. This caused quite a few part-time men and experimenters to get their license even though they were not qualified. The present exam procedure is not like the Federal test and, therefore, it is possible for discrimination to creep in.

I think the licensing law is a racket.

My reason for believing the licensing law has not helped either the public or the service industry is based on the frequency with which we have to repair equipment showing evidence of inefficient and/or careless work.

The law would be all right if it were enforced. As it is, it's only another tax burden on TV service men.

Every jack leg that applied for license got it without test and everyone that wants to operates without license. All I got out of this deal is a few dollars less and a few photos.

Everybody is still fixing sets, license or not.

*Continued on page 50*

# New Test Instruments for Bench and Caddy

● Here are four new instruments you may want to consider to upgrade your service and sales capability. Two are audio/public address equipment testers: a multiple-speaker phase checker and an a-c RMS Volt-Decibel-load compensated Watt meter. The other two units checked out by ET editors are radio-TV tube testers: a low-priced, compact portable tube tester and a higher priced, lab-quality transconductance tube tester.

*B & K, Dyna-Quik Tube Tester, Model 600 @ \$69.95*—Many TV service technicians carry a tube tester with them on home service calls. It helps verify their findings to customers and locates defective tubes that have not yet caused a fault symptom to appear on a TV screen or sound section. A few small, light, accurate tube testers are available to lighten the carrying load of overburdened technicians. One of these testers is reviewed here. It's a light weight (approximately 5¼ lbs.), a-c operated unit that seems ideally suited for home service TV work. The 8½" x 11" x 4¼" tester is packaged in a leatherette-covered carrying case with handle.

The tube tester is designed to check all commonly used radio-TV tubes, including nuvistor, 10-pin and 12-pin types. Many other tubes can be tested, too, such as: European hi-fi, hybrid auto radio

tubes and industrial types. The front panel incorporates 7 and 9-pin tube pin straighteners and a flexible plate-cap lead.

A 37-page spiral type dial setting booklet accompanies the unit. Up-to-date listings are assured when new tubes are announced by a "new tube" information service which is provided.

The tester offers grid emission, cathode emission and short tests. When dial settings (four) are made, each tube is automatically checked for grid-to-cathode leakage and shorts when inserted into its tester tube socket; indicator is a neon lamp. Short checks between other elements are made by rotating one of the tester's four controls through its positions.

Two pushbuttons are on the front panel for grid emission and quality checks which are read on a meter scale. The grid emission test circuit is designed to indicate when

a tube is gaseous or when its grid is contaminated by dross from the cathode. A grid emission-reject meter scale identifies such defects. Although the grid emission circuit's sensitivity is factory adjusted to 25 megohms, which reads slightly within the grid emission-reject scale area when testing average factory-fresh tubes, a front panel screwdriver adjustment permits greater sensitivity adjustment (to 100 megohms) for tighter testing standards. The second pushbutton is used to check cathode emission quality on a *replace?-good scale*.

Some luxury features have been omitted in the interest of maintaining maximum portability and keeping the instrument's cost down. These are the absence of a roller chart and an on-off switch. (The unit is turned on or off by inserting or removing its line cord from an a-c outlet.) However, everything else about the instrument belies its low cost. It has a smart, quality look. More important than this, though, is its high testing speed and excellent service test accuracy. We averaged about 30 seconds test time per tube. This included looking up dial settings, setting them, waiting for filament warmup and all tests. Further, we quickly identified a gassy 7189 hi-fi output tube from a tuner-amplifier that caused some obvious sound distortion. A new tube corrected the trouble.

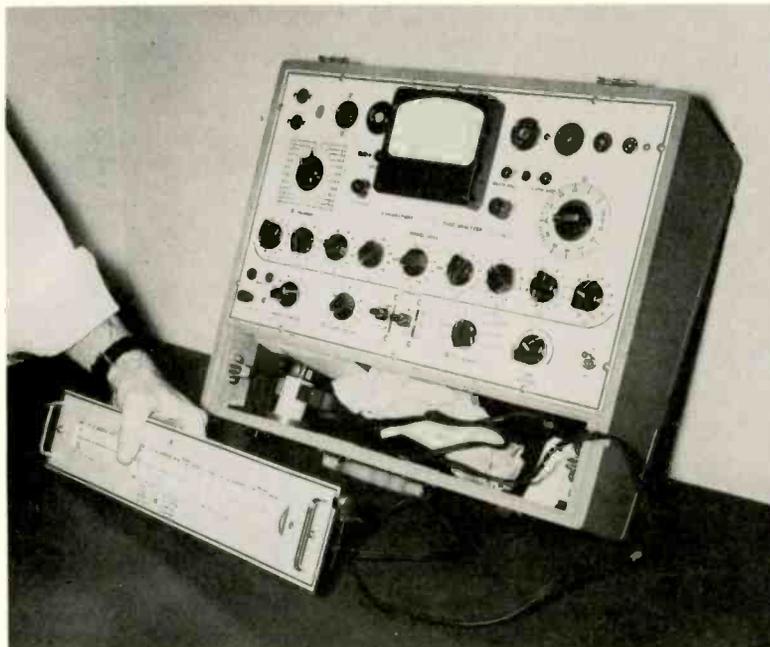


**LEFT**

Test equipment inspected by ET Editors include (left) B & K portable tube tester, EICO a-c/decibels-load compensated wattmeter (right) RCA Speaker Phase Checker, and Triplet lab-quality tube tester.

**LEFT BELOW**

Triplet tube tester's roll chart snaps out to reveal storage compartment. Snap-out feature simplifies new chart substitution.



*RCA, Speaker Phase Checker, Model WG-360A @ \$14.95*—If an audio system employs more than one speaker facing the same general direction their cones should move in unison to prevent cancellation of sound waves. Thus, the speaker cones should move forward and backward together (in-phase) when driven from the same source.

We've all been made especially aware of this need by the introduction of stereophonic sound equipment. If a stereo unit doesn't contain a phase reversal switch — and

many don't — we can generally determine whether speakers are in-phase or out-of-phase by physically reversing connections to one speaker. Sometimes it's necessary to do this a number of times, trusting to our frail hearing judgment to detect the correct phasing. RCA's Phase Checker takes the guess work and back-and-forth bother out of this procedure.

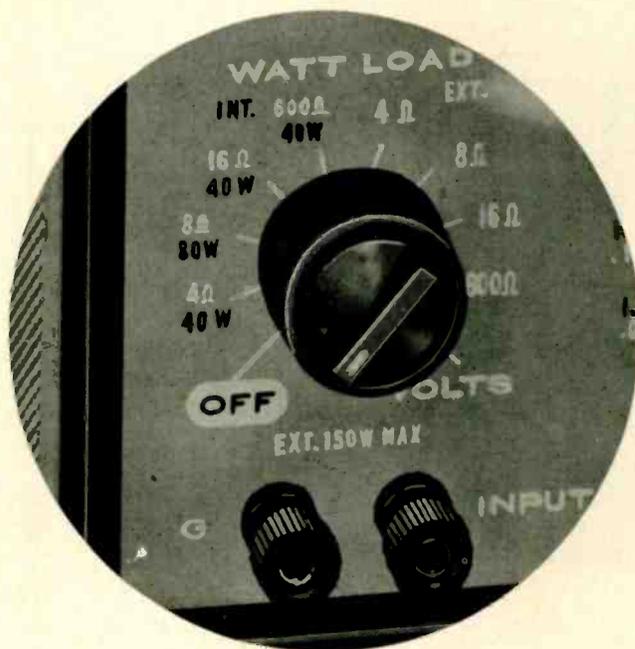
Frankly, our initial reaction to the checker, after only a cursory glance, was a startled "so what!" But after closer examination we reversed our opinions. This is not

a glorified phase reversing switch. It's a test system that conclusively checks, without physical connection to circuits, the phasing of *any* sound system with more than one speaker facing the same direction. Thus, mono sets with multiple separate speakers and public address systems can also be checked for proper phasing. As you may know, checking speaker phasing of PA systems can be an especially frustrating job. Faced with many speakers, a technician can't simply "stand in the middle and listen" as with a stereo set. Here's where this unit really shines.

The phase checker is non-electronic. It has no tubes, transistors or batteries. It operates on the sound wave energy from speakers. The checker, which consists of two separate units, is designed to operate in conjunction with a separate indicator, either a VOM, VTVM, or oscilloscope. Each unit contains a four-inch speaker which operates as a sound pickup.

Receptor A includes a 15-foot double conductor lead which is terminated in an RCA-type phono plug. This plug fits a jack of the rear of receptor B. Receptor B also contains a DPDT slide switch, an audio frequency step-up transformer, crystal diode and a three connection terminal board for connecting an external indicating device. Each receptor is housed in a smooth fabric covered wooden case

# New Test Instruments



EICO's a-c/volt-wattmeter features watt load-compensation. Volts are calibrated in rms.

with front and rear recessed metal grilles.

In actual use, each receptor is placed against the grille of a speaker (low frequency speaker if tweeter is employed). Unit A is generally propped up against one speaker; unit B is usually hand held. A suitable indicator, for instance a VTVM, is attached to unit B's terminal board. If checking phase of a stereo system, the system should be in the mono position and the balance control adjusted for equal speaker output from both speakers.

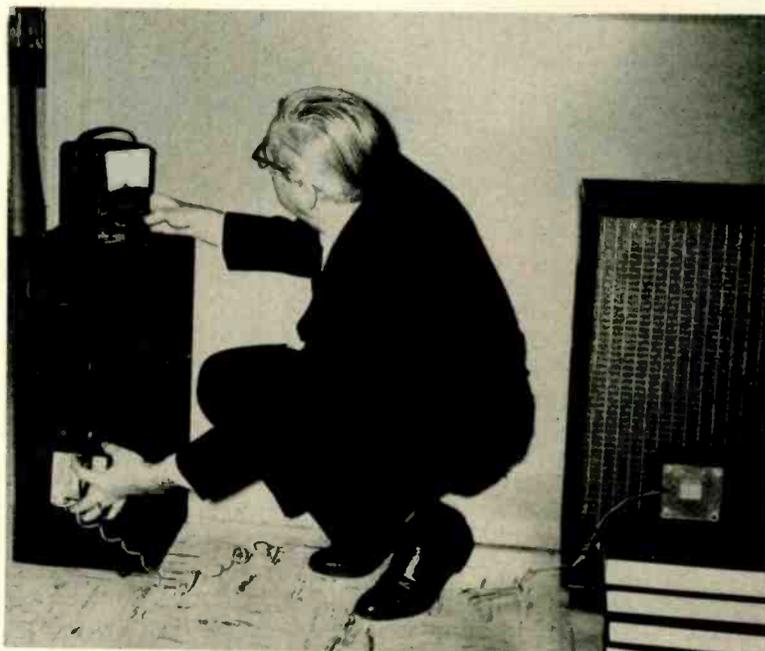
When a sound source is played, preferably a constant source such as an audio generator's signal (about 120 cps) or record test tone, though normal program music may be used too, a decidedly higher meter reading should be noted in unit B's DPDT in-phase position than the out-of-phase position. If the out-of-phase switch position indicates a higher reading, the connections of one speaker to the audio amplifier should be reversed to correct the phasing.

Phasing of many PA speakers that face the same direction can be accomplished by checking phasing of the first and second speakers, then the first and third, etc. It may be necessary to extend the 15-foot

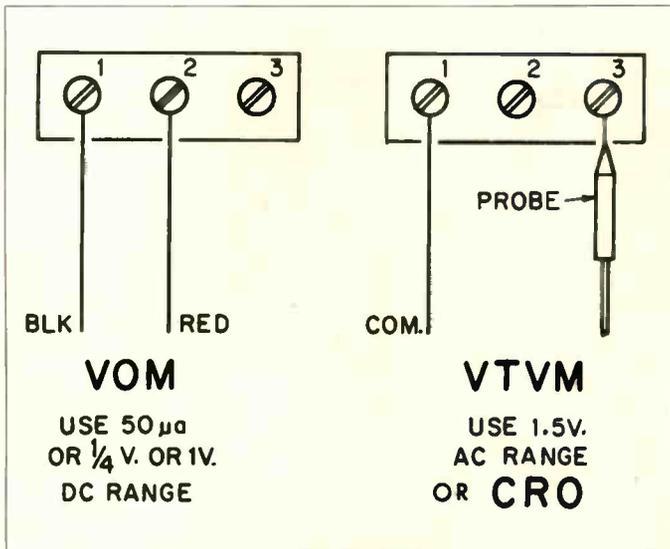
lead between units A and B if the distance between speakers is too great. The Phase Checker speakers employ high impedance voice coils (approximately 50 ohms) to minimize effects of long cables. The extension cable, however, should be shielded microphone wire to avoid hum pickup.

*Triplet, Tube Analyzer, Model 3444 @ \$279.50*—This 24 lb. portable or shop bench mutual conductance tube tester is a sophisticated analyzer that can help solve tube problems in any electronics field whether it be consumer or industrial.

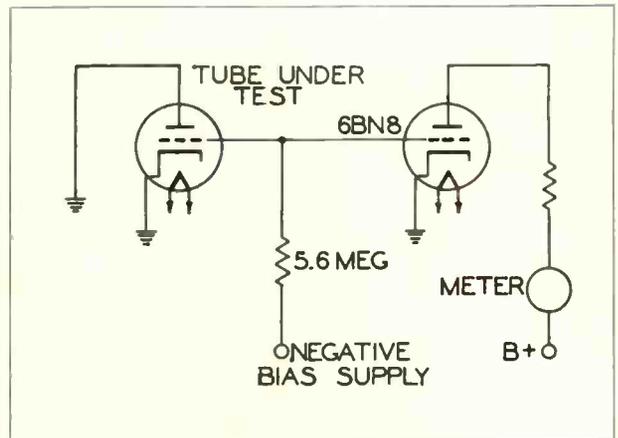
It measures true Gm using prop-



ET technical editor, Jack Hobbs, checks phasing of two speakers from stereo hi-fi set. VTVM is employed as indicator. Editor's forefinger flips DPDT to reverse one amplifier's output connections.



RCA unit B's terminal board showing connections for external indicators.



B & K's grid emission test circuit. If tube being tested is gassy or contaminated, current will flow from grid to plate and through the 5.6 meg resistor back to the grid. This will produce a positive voltage across the resistor which lifts the cut-off bias on 6BN8, producing a meter deflection.

er value d-c potentials, a 5 kc a-c signal, and a vacuum tube 200 microammeter. Other tests include shorts, leakage, cathode emission, plate current and cut-off measurements. In addition to testing receiving tubes, the analyzer includes test circuits for checking thyratrons, voltage regulators and "tuning eye" indicators. An accessory adapter (\$39.50) permits tests of low power transmitting, industrial and special purpose tubes.

The a-c powered tester is easy to use, considering the multitude of accurate tests it accomplishes under dynamic conditions. The wide range of applied potentials and signal amplitudes contributes to the lab accuracy attribute of the unit. For example, the filament setting range gives the user a choice of 23 voltages — about twice as many as typical low-priced tube testers — ranging from 0.63 volts to 117 volts.

Other features include noise test jacks for checking noisy or intermittent tubes with ear phones; a 7 and 9-pin straightener; overload red signal light; illuminated tube roll chart and line voltage control.

The tube roll chart is easily removed to reveal a storage compartment, as shown in the accompanying illustration. A 3 amp, 250 volt

fuse is located in the compartment.

The front panel view of the roller chart is interesting. To speed up location of tube settings, three columns are employed. Each column has an area beneath it for the user to insert the first and last tube number of its chart. Tube settings include a reject and average reading of mutual conductance to simplify determination of a good or defective tube.

It must be apparent from the foregoing description that Triplet's analyzer is as complete a tube tester as any service dealer can desire.

*EICO, AC Volt-Watt Meter, Model 260 @ \$79.95 wired, \$49.95 kit*—Technicians who do high fidelity and public address service-installation work will find this meter a time-saving addition to their basic collection of test instruments.

The instrument enables users to measure a-c volts, decibels, and power output of audio amplifiers directly on a meter scale. It's an average reading device that's calibrated in RMS voltage or power of a pure sine wave. A-c voltage measurements are measured in 11 ranges: 1 millivolt to 1000 volts (for power transformer checks).

Power measurements are in 7 ranges: 0.015 milliwatt to 150 watts across from 4 to 600 ohms.

A tapped power resistor load — 4, 8, 16 and 600 ohms — handles up to 80 watts on 8 ohms and 40 watts on other taps. Up to 150 watts of power can be measured with external loads. The decibel scale in voltmeter use reads directly in dbm with a 60 ohm load. A nomograph is supplied to correct db readings with loads above or below 600 ohms.

Other features of the a-c volt-watt meter include:  $\pm 0$  db at 10kc to 150kc, a 200  $\mu$ a meter movement, a blocking capacitor rated at 1500 volts incorporated in the input circuit of the unit. The binding post input terminals are used for both voltage and power measurements. They will accommodate wire, pin tip or banana test leads. An extractor type fuseholder for a  $\frac{1}{2}$  amp fuse is located at the rear apron of the well-ventilated attractive case. The power supply of the instrument has a 0B2 voltage regulator tube to assure constant voltage.

The instrument may be used for null indications and "Q" measurements as well as measurement of amplifier gain response, power output and network response. ■

# TV Control Problems

How to reduce control call-backs and replacement delays

by John Haskell

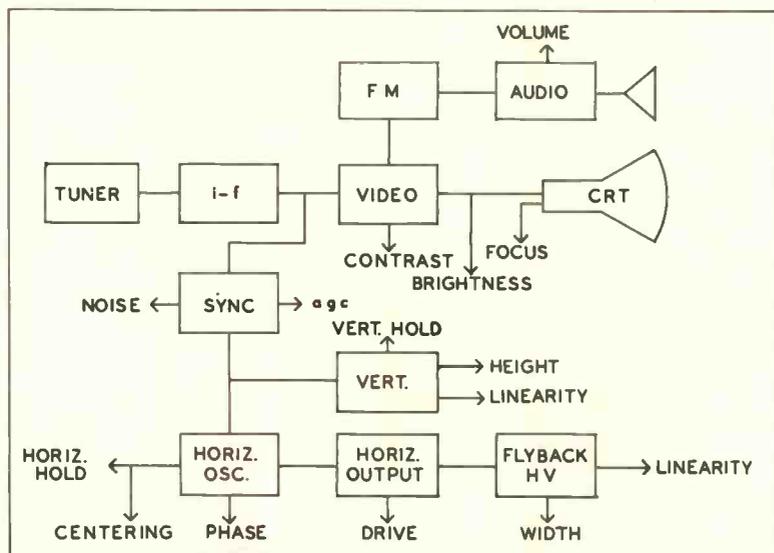
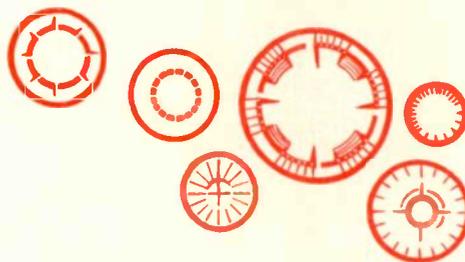


Fig. 1 — Locations of variable controls in a typical TV. Some sets may have a carbon width control in the horizontal output circuit instead of a slug tuned coil. While some sets employ a slug tuned horizontal hold control, others use a variable carbon potentiometer.

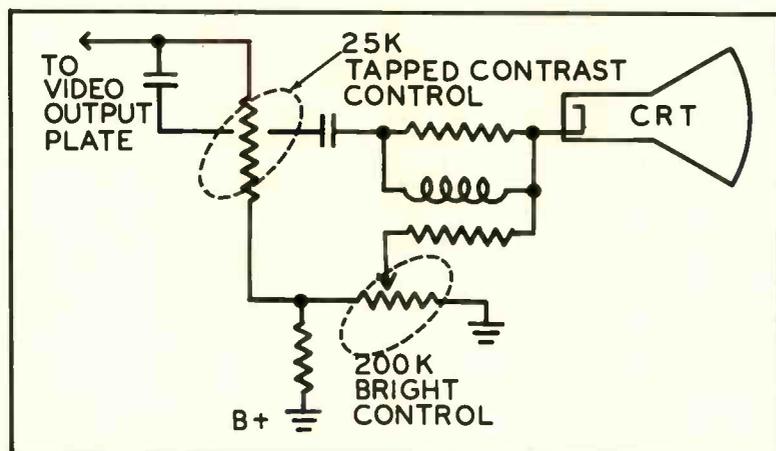


Fig. 2 — Brightness and contrast control circuitry of GE's MW chassis. The 25k ohms contrast control is tapped.

■ Numerous controls are used in modern TV sets. Some are personal adjustment controls — for the owner's use — while others are adjusted by technicians. Both types are necessary to compensate for narrow circuit and component tolerances. If these tolerances were tightened to a point where controls could be dispensed with, the cost of manufacturing an operable TV would be exorbitant. It is infinitely more economical to provide a control for adjusting certain critical circuits to obtain optimum set performance.

The variety of control types appear endless. Ignoring shapes and values, however, they can be categorized as: carbon potentiometers, wire-wound potentiometers, slug-adjusted inductances, and variable capacity types. Like all electro-mechanical components, they wear out from use, become defective through overheating or other reasons that necessitate their replacement.

Each control for a particular circuit is designed with certain characteristics to meet that circuit's requirements. Carbon pots are generally used to vary RC time constants voltages and currents in low power circuits. For example, audio volume, brightness, contrast, vertical and comparable controls. Wire wound pots vary voltages and currents in higher power circuits, for instance, focus controls. Few wire

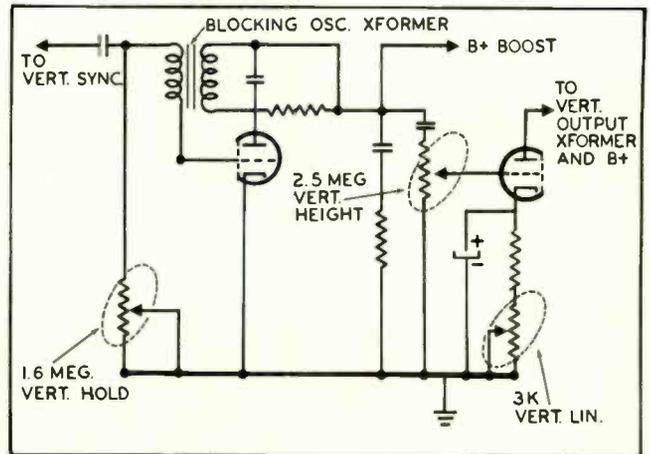
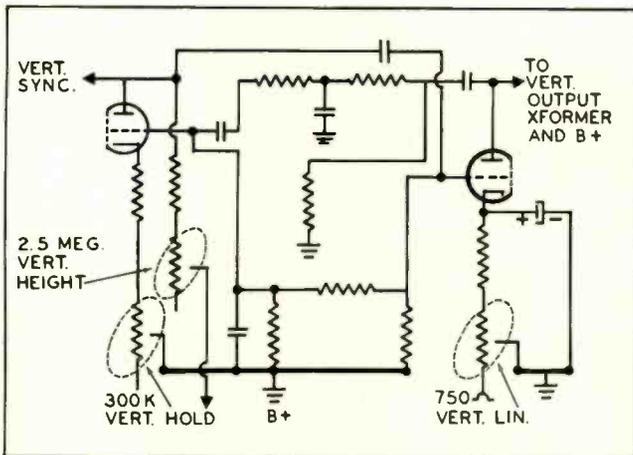


Fig. 3 (A) — Schematic of vertical multi-vibrator in Admiral's TV chassis 15A2, B2, and B3. Vertical hold, height, and linearity controls and their values are shown. (B) — Vertical blocking oscillator circuit of the Magnavox 35 series TV chassis with locations of similar controls illustrated.

wound focus controls are used today since the advent of electrostatic and self-focus tubes.

Permeability tuned inductances may be used to change frequency or phase in horizontal oscillator circuits, or to alter the amplitude or shape of the sawtooth wave in the high voltage areas of horizontal sweep circuits: width and linearity coils. Variable padder capacitors are often used as drive controls to increase or decrease sawtooth voltage amplitude at horizontal output tube grids.

Carbon controls, as a broad group, may vary in resistance from 1k ohms upward to about 10 megohms — with power ratings from 0.5 to 1 watt. Wirewound controls generally range from 1k to 20k ohms, with ratings at 3 or 4 watts. Variable mica compression type capacity drive controls may have ranges from 130 to 700  $\mu\mu\text{f}$ , although many modern TV sets do not use them. A few sets may employ a carbon pot as the drive control.

The block diagram in Fig. 1 illustrates some typical control locations found in TV sets of recent vintage.

Under normal circumstances the volume, brightness, contrast, vertical hold, and in some cases the horizontal hold control, will require replacement more frequently than others. This is true simply because they are used more often.

### Control Functions

Each control serves a specific purpose in the circuit where it functions. The brightness control, for example, is employed to adjust the voltage relationship between the cathode and control grid in the set's CRT. In the past, this component has been called by various other names: shading, brilliance, or background control. Its adjustment varies the overall brightness on the CRT screen.

Brightness control resistance values may range from 1k ohms upward to approximately 5 megohms, depending upon the particular manufacturer's circuit design. It may be wired into the CRT's grid or cathode circuit, but most modern sets employ it in the cathode circuit. A typical simplified brightness control arrangement is shown in Fig. 2. Some TVs may have this control mounted on the set's rear.

Contrast controls are used to adjust the set's video output gain. It is normally located in the cathode or the plate circuit of the video output tube. Contrast control values do not vary as widely as those in brightness controls. They generally range from 200 ohms upward to 30k ohms, with 8 or 10 different values in between. A few may include a tap or a tap and stop, allowing a certain fixed value of resistance to remain in the cir-

cuit at all times. Both the brightness and contrast controls must be adjusted together in order to provide gray-scale balance in black-and-white pictures. A simplified contrast control circuit is also shown in Fig. 2.

Vertical hold controls are used in vertical multivibrators and blocking oscillators to adjust their frequencies to exactly 60 cycles so the oscillator can "lock" with the incoming 60 cycle vertical sync pulse from the TV transmitting station. This control may be inserted in the vertical oscillator's grid or its cathode circuit, depending upon the manufacturer's vertical oscillator circuit design.

Vertical hold control resistance values may vary from 50k upward to approximately 3 megohms, again depending upon circuit design; and the control pot usually has a fixed resistance in series. This fixed series resistance may vary widely from about 100k to beyond 8 megohms, in some cases. The two extremes are exceptions, of course. The resistance of most vertical hold pots range between 1 and 3 megohms, with average series resistances somewhere between 500k and 1 meg, but with widely varying exceptions, as previously described. A few vertical hold controls may be found with fixed shunt resistors, in addition to a series resistor. Hold controls in a vertical multivibrator and a blocking oscillator are shown

# TV Control Problems

in Figs. 3A and 3B on page 41.

Vertical height and linearity control adjustments frequently pose some confusing problems. This is true because some present-day vertical sweep circuit design configurations have extremely interactive characteristics. Under normal conditions, however, when the vertical height control is adjusted, the technician will note a spreading of the horizontal sweep lines in the raster's top area. Adjustment of the vertical linearity control will appear to extend the bottom area of the raster.

Actually, this is an over-simplified explanation. To obtain a raster or picture having the proper vertical aspect ratio dimension, both controls must be properly adjusted simultaneously. When both controls are properly adjusted the horizontal sweep lines will normally have equal separation throughout the entire raster or picture. This means, in effect, that the vertical sawtooth waveform will be a straight line from rise point to discharge point. This is the primary purpose of the linearity control. The height control's basic function is to vary the vertical sawtooth waveform's p-to-p amplitude.

Height control resistance values usually vary between 1 and 5 megohms and may or may not have a series resistor. Most circuits include a series resistor ranging from 200k to 1 megohm, however. This control will normally be found in the oscillator's plate circuit. Occasionally it may be included in the grid circuit of a vertical output tube. Many variations occur, from double triode cathode-coupled multivibrator circuits with separate beam power outputs, to single beam power tubes which function as both oscillator and output.

In some of these latter type cir-

cuits a height control with a rather low value resistance may be found in the tube's screen grid circuit.

Linearity controls may be located in the grid or cathode of the multivibrator's second triode section, the grid of a separate output tube section, or the grid of a single beam power tube oscillator-output arrangement. These controls vary in resistance from 500 ohms upward to about 3 megohms, and usually have an associated series resistance from 1k to 1 megohm — with the average around 470k. Vertical height and linearity controls are shown in the schematics of Figs. 3A and 3B.

Horizontal hold controls may be potentiometers or slug tuned coils. A pot varying from 40 to about one megohm may be used in the set's horizontal multivibrator or blocking oscillator to control frequency. Slugs in both blocking oscillator transformers and ringing coils may also be used for frequency control.

Drive controls are either capacitive or resistive, when used, but most sets today use potentiometers.

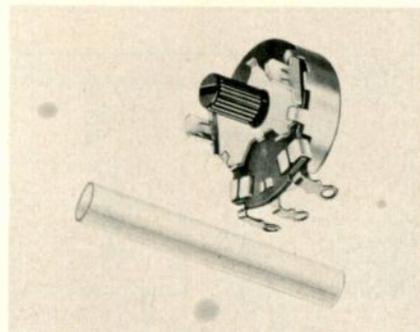
The volume control is perhaps the most standardized control found in TV sets. It will generally be around 1 megohm, although some are less, and a few are tapped.

Fringe, agc, noise gate, etc., are other type controls that technicians may be called upon to replace on occasion. And some sets may be found with resistive width controls.

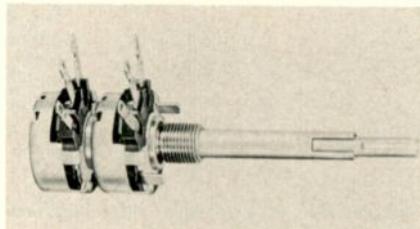
## Control Maintenance

Many technicians have found that a preventive-maintenance approach to TV control servicing has eliminated costly call-backs, improved the shop's overall service image, and established a high-level customer-relationship.

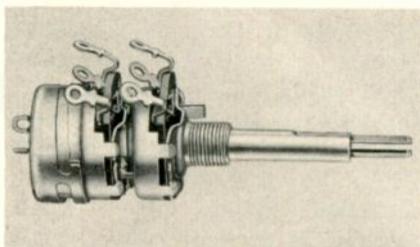
Whenever a TV set is brought into the shop for any type repair,



Centralab control with a length of flexible plastic shafting which is easily cut to any length for shaft extension.



IRC's "QJ" dual concentric control.



Mallory's Sta-Loc dual control and switch.

these technicians systematically check each carbon control. Leads of each control are quickly disconnected, if necessary, an ohmmeter is placed across a control's terminals, and its shaft is turned through the total resistance range. If the meter needle moves smoothly through the control's resistance range, with no rough spots and flickering of the meter needle, the component is considered good.

If the meter needle moves erratically, then a few drops of de-oxidizing contact cleaner is injected into the control with a "hypo-needle" type applicator through one of the small openings in the control housing. The shaft is then worked back-and-forth quickly through its entire range. After drying a few moments, the control is again checked with the meter. If the control does not function properly

after this, or if rough spots can be felt in the control when its shaft is turned slowly, the control is replaced to prevent early failure.

While ferrite or powered iron core width, linearity, and oscillator ringing coils give little trouble, they may require occasional adjustment or replacement. Some technicians run into difficulty when attempting to adjust these coils by using a regular type small thin blade screwdriver. The notch in the end of the threaded brass core-shank will frequently split off. A regular hollow ended plastic tool with metal insert, especially designed for slug adjustment should always be used to avoid this problem.

### Control Replacements

Every technician would like to substitute defective controls, with fresh exact replacements from the shelf. A large percentage of the TV sets found in most areas *can* be serviced with a modest stock of standard replacement controls. An exact replacement fits the circuit design perfectly, functions normal and saves time.

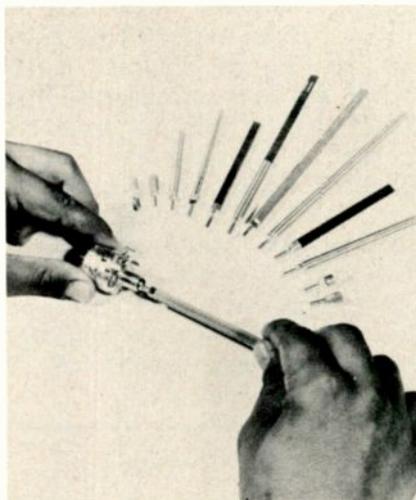
Controls for a significant percentage of TV sets in many areas, however, cannot be easily and quickly obtained. For example, a random check of the brightness controls found in a hundred TV chassis in one area, made by more than 23 different manufacturers during the past few years, indicate a wide variation in values.

Thirty-six sets out of the hundred used 100k ohms brightness controls. The other 64 sets had controls with values as follows: 18 sets, 500k; 12, 50k; 9, 200k; 7, 250k; 4, 150k; 3, 1 megohm; 2, 3 megohms; 1, 4 megohms, and one had a 5 megohm pot. Each of the remaining seven sets had brightness controls of the following odd values: 1k, 20k, 35k, 40k, 300k and 400k.

Thus it is interesting to note that the brightness controls of 86% of the sets could be covered by having one each of six controls in stock, while the remaining 14% required one each of 11 controls, or a total of 27 controls to accommodate the 100 sets. Add this to the replacement stocks necessary

for a dozen other different controls in most TV sets, plus requirements for replacing a number of defectives each month, and the average technician finds himself in a "hand-to-mouth," or constant jobber-to-chassis position. Picking up a single control here and there costs money in time. And there are many areas where the jobber cannot furnish the exact value control. Of course, it is realized, that some controls on the shelf are duplicate or even triplicate replacements in certain sets.

While there is no immediately sure-fire solution to this problem, when an exact replacement is not



Claroostat control and a selection of pre-cut shafts of various lengths.

available, in most cases the problem can be easily surmounted.

### Making The Control Fit

Study any controlled circuit for a few moments: vertical or horizontal hold; vertical height or linearity; brightness or contrast, etc. Associated series resistors will appear in the controlled circuit in most cases.

Select a replacement control having a value near the original, and substitute a different value series resistor to bring the total resistance in the circuit to normal. Select a fixed value resistance that will bring the control's wiper as near center point as possible to give optimum results. If a lower value control is substituted, increase the fixed resistance and vice versa.

If this does not make the control

serve, then select one with a value near twice that of the original control, and shunt a fixed resistor of similar or somewhat lower value across the control. By the selection of proper values, a control can usually be found that will fit and give optimum results. In some cases, both a shunt and series resistor alteration will serve to make the control work. In parallel alterations, remember to select values so that the optimum control point on the pot will be near center — to give maximum control range — and also to prevent extreme current unbalance in the circuit which may cause the control to overheat.

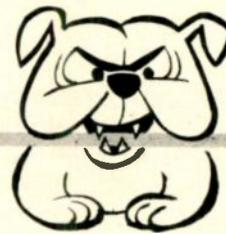
Other problems will arise, especially in printed circuit board mounted controls, which will not be so easily solved. Exact replacements will usually be required in these cases.

Defective on/off switches on some PC board mounted volume controls, however, can frequently be replaced without removing the entire unit from the board. The switch is gently disconnected by lifting the tabs holding the switch to the volume control housing, and a new switch is installed. If the units are not connected by tabs, the switch unit can usually be twisted off carefully with diagonals. The new switch is soldered to the volume control housing.

One important aid to obtaining exact replacement controls is a complete file of control manufacturers' replacement manuals and guides. These should be kept up to date and can be obtained from parts jobbers or direct from manufacturers.

Control assembly kits for various dual control combinations, including a selection of pre-cut shaft lengths, can be used to reduce exact replacement stocks. Easy-to-cut plastic shaft extensions are also available.

With a reasonable control stock, a little planning and ingenuity, control replacement problems can be solved in a reasonable length of time and the technician can avoid holding a customer's TV in the shop for days or perhaps weeks while waiting for a control to be delivered. ■



## Difficult Service Jobs Described by Readers

### Filter Pack Leakage Upsets TV Set

A house call was made on a KCS 116A RCA TV. When the set was turned on a terrific roar was heard on the speaker and the screen had hum bars rolling down slowly. Both vertical hold and contrast controls were inoperative.

I substituted all i-f, vertical, agc and video output tubes without favorable results. I then took the set into the shop.

At the shop, all B+ voltages checked within 5% of normal specifications. High voltage was also normal. Voltage at the audio output cathode was about 25% low, however. The value of the audio output cathode bias resistor was about half of specifications and it was discolored from overheating. I suspected excessive current through the audio output tube, but the tube appeared to be running cool and the plate supply resistor showed no sign of overheating.

The scope showed only a slight ripple in the B+ line. When the scope probe was moved to the plate of the audio output tube a positive spike of approximately 10 volts appeared on the scope screen. The same spike appeared at the audio output tube's cathode. When the audio output tube was removed from its socket the spike did not appear at the socket's plate terminal but it remained on the cathode terminal. The resistor R-2 con-

tinued to overheat even with the tube out of the socket. Removal of the lead from C-1B killed the a-c voltage at that point and stopped R-2 from overheating.

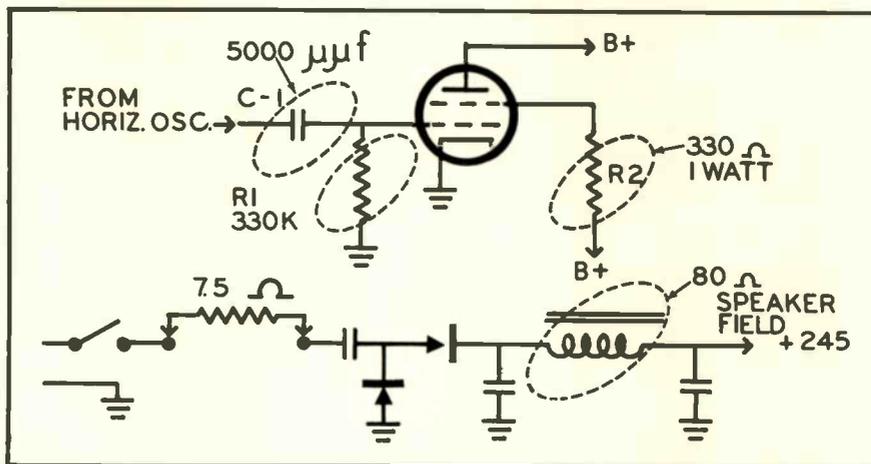
Then I noticed that R-1 was hot and smoking. The lead from the contrast control to R-1 was removed, but R-1 continued to smoke. There were 10 volts a-c at the junction of R-1 and C-1D. When R-1 was disconnected from C-1D the 10 volts a-c were still present at the terminal. This indicated leakage between sections of the filter can. Although C-1A is the input filter and leakage from it into both C-1B and C-1D caused the trouble, there was insufficient loss of B+ to disable the horizontal or vertical sweep circuits.—*H. D. Morgan, Gonzales, Tex.*

### Defective Speaker Coil Causes Pix Pulling

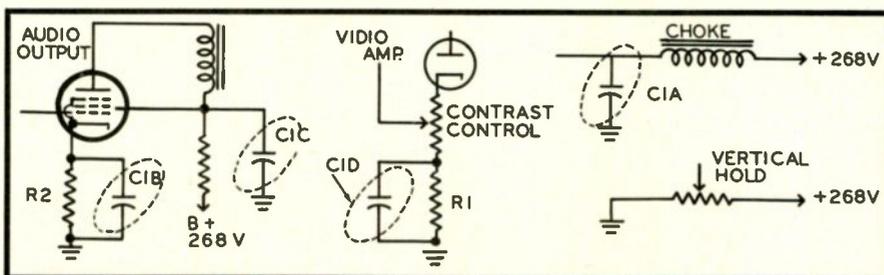
A Motorola TV Model 21K33 was brought into the shop stone dead. Preliminary checks showed that the 25L6 sound output and 25BQ6 horizontal output tubes were both defective. When these tubes were replaced the filament string became operative and high voltage was restored.

After running about two minutes the horizontal output tube plate turned red, indicating a heavy overload or loss of drive. A meter showed the drive voltage to be -35 volts when the tube was cold, but this voltage dropped off to -10 in about two minutes.

One end of the 5000  $\mu\text{f}$  coupling capacitor was clipped from the horizontal output tube grid. A



When C-1 shorted, the speaker coil overheated, shorted, and became ineffective because fuse-ohm resistor failed to open. R-1 and R-2 also overheated, changing value.



Filter pack leakage in this TV allowed hum in sound and video. Ripple through C-1A caused R-1 and R-2 to overheat.

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\$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.

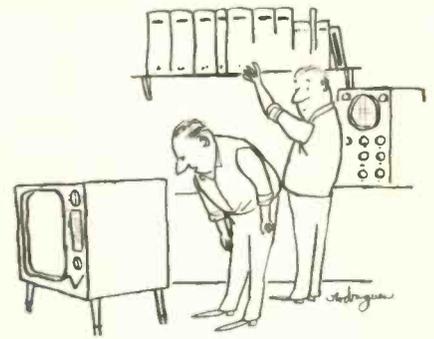
meter check showed a capacitor to be leaky, and the 330K grid resistor measured only 22K ohms. In addition, the screen grid resistor was charred. Replacement of these components restored the voltages at the horizontal output tube to normal.

When the brightness control was advanced, I noticed that the picture pulled slightly. I then checked the B+ supply for a-c ripple, using my shop scope. About 2 volts p-to-p a-c ripple appeared where manufacturer's specifications indicated 1 volt ripple. I now checked the speaker's field coil and found its resistance was almost zero ohms instead of 80 ohms as specified on

the schematic. Since an exact replacement was not available, I used a one henry choke rated at 300 ma d-c. The set now operated normal.

I delivered a workable receiver to the customer until an exact replacement part was available at my distributor. (This certainly keeps customers happier than holding the set.—Ed.)

What I can't understand is why the 7.5 ohm fuse resistor in the power supply did not open to protect the speaker and other components. All the damage was caused by a 25¢ capacitor failure and a fuse resistor that did not open.—*Jerome J. Hoepfner, Grand Forks, N. D.*



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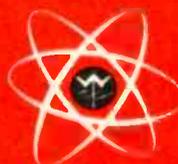
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# SHOP HINTS

## TIPS FOR HOME AND BENCH SERVICE

### Insulating A-C Plug Terminals

The a-c plugs on test instruments, soldering irons, and other gear, takes a beating through re-



Loose connections and shorting plugs can be avoided by insulating a-c plug screw terminals with wax from a lighted candle after wires are attached.

peated insertion and withdrawal from a-c receptacles. A fuse may blow occasionally because the wire is loose on the instrument's line cord terminal. Other problems, including poor a-c connections, may develop.

To avoid this condition I cover all my plug screw terminals with a coating of wax. Not only am I guaranteed a permanent terminal connection, but I've insulated the connecting area as well.

I use a candle and hold it over the plug, allowing the melted wax to drip over the screws and surrounding area. This also prevents screws from becoming loose. So far I've had no more blown fuses. —Glen F. Stillwell, Manhattan Beach, Calif.

### Allen Wrench Frees Xformer Slugs

I have found that an allen wrench will free stuck slugs in powdered iron core i-f or detector transformers. Once freed, the slugs then can

be adjusted with the non-metallic alignment tool. This procedure frequently avoids breaking a plastic alignment tool, or, worse, cracking the slug.—William N. Keller, Detroit, Mich.

### Eliminating HV Rectifier Failure

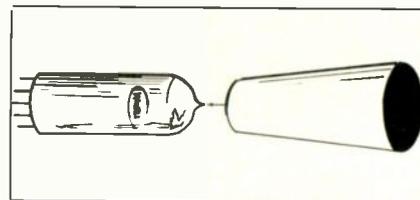
Soon after replacing a defective flyback in a Muntz TV chassis, Model 2055B, with a Merit HVO-31 exact replacement, I began receiving complaints of "no picture." The fault was usually caused by a defective 1B3. Each one I replaced would burn out soon thereafter. I concluded that excessive voltage was being applied to the 1B3 heater.

After cutting a few inches off the 1B3 heater leads from the flyback transformer and dressing the leads straight away from the transformer core, I experienced no further trouble. — Frank Bou, Audubon, N. J.

● When replacing flyback transformers, the filament leads on the new transformer should always be cut to the exact length of the original. The winding should be positioned at the identical spot on the transformer core, and leads should be dressed straight away from the core at a 90° angle.—Ed.

### Tube Shield Aids Auto Radio Servicing

Because of crowded components and cramped quarters, tubes in auto radios are a little difficult to replace when the radio is still in the car. This problem can be solved in most cases merely by lifting one of the cone-type shields from a tube, reversing it, and pushing the small end of the shield on the tube to be substituted or replaced. Push the shield far enough on the tube to get a tight grip on it. If the particular radio has none of these shields on tubes, keep a spare shield on hand for this purpose.



The small end of a tapered tube shield can be used to hold auto radio tubes when replacing them in radio's cramped quarters. After tube is in its socket, index finger is used to hold tube in socket while shield is removed from tube.

The added length of the shield almost doubles the tube's length and gives you something to hang on to while attempting to maneuver the tube's pins into socket holes. When the tube has been seated, slide your index finger inside the shield to keep the tube in place when the shield is removed.—John H. Larry, St. Albans, Vt.

### Coding Transistor Terminals

Here is a hint that saves me much time when searching for transistor connections on printed boards every time the board is turned around or when soldered-in transistors are removed for testing.

All I do is label the three leads. I locate the base-emitter-collector on the underside of the board once and then I code each connection with quick drying paint. I use the same color coding as my transistor tester so that each connection corresponds with the tester leads; black for emitter, yellow for base, and red for collector.—Frederick J. Seidel, Hamburg, Pa.

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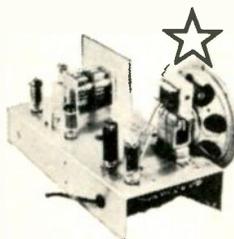
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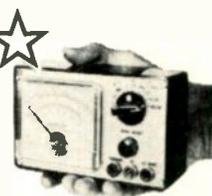
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47

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- - - for more details, circle 300 below

**2** *Boosters:* Literature covers new transistor 4-set booster model IT-3 which provides all gain needed from one antenna for four TV or FM sets. Blonder-Tongue Labs.  
- - - for more details, circle 301 below

**3** *Antennas:* Catalog #14 describes full line of Dura-Gold antennas for metropolitan to deep fringe areas. Also 30 different indoor antennas, 167 outdoor antennas, and 835 do-it-yourself antenna kits. Clear Beam Antenna Corp.  
- - - for more details, circle 302 below

**4** *Test Instruments:* Literature covers line of kits and wired units. Includes stereo and mono hi-fi, CB transceivers, radios, test equipment, etc. Conar Instruments Div., National Radio Institute.  
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**5** *Hi-Fi Equipment:* Catalog covers over 80 kits and wired units — hi-fi, test equipment, citizens radio, etc. Electronic Instrument Co.  
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- - - for more details, circle 306 below

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- - - for more details, circle 307 below

**9** *Home-Study Courses:* NRI Course for FCC Licenses, described in

literature, prepares students to meet FCC requirements; teaches fundamental principles of electronics; and covers new devices. National Radio Institute.  
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**10** *TV Receivers:* New fully transistorized, 13 lb, personal portable TV model 8-301 with snap-in circuit boards, is described in literature. Sony Corp. of America.  
- - - for more details, circle 309 below

**11** *Transistors:* Four new NPN type transistors for radio, TV, and audio circuits are included in complete catalog of semiconductors, rectifiers, transistors, etc. Also available is a transistor interchangeability guide. Semitronics Corp.  
- - - for more details, circle 310 below

**12** *Tubes:* A new marketing concept in electronic tube distribution is covered in literature. Plan is formulated to generate greater profits and promote sound manufacturer-distributor-dealer relations. Westinghouse Electric Corp.  
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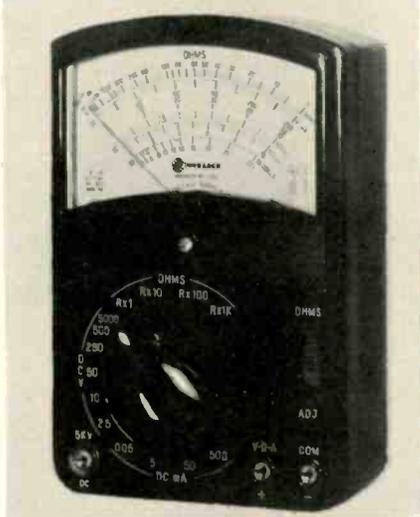
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ohms per volt, a-c volts, 0-10-50-250-500-1,000 volts at 10 k ohms per volt. D-c current, 0-0.05-5-50-500 ma. Resistance, 0-12 k-120 k-1.2Meg-12Meg. Decibels, -20 to +62 db. With test leads and battery. Case, 5½" x 3½" x 1½". \$19.50. Monarch Electronics International, Inc., 7035 Laurel Canyon Blvd., North Hollywood, Calif.

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### G-E STEREO CARTRIDGES

A new variable reluctance stereo cartridge, the "Orthonetic," has frequency response of 20 to 20,000 cps, ±3 db; separation between channels, 25 db at 1000 cps; channel balance, 2 db or better at 1000 cps; and tracking force of one to three grams. VR-1000-5, with .5 mil diamond stylus, for turntables, \$29.95. The .7 mil version, VR1000-7, for changers, \$24.95. Specifications for the VR1000-5: lateral compliance, 6 x 10<sup>-6</sup> cms-dyne; vertical compliance, 9 x 10<sup>-6</sup> cms-dyne; recommended load resistance each channel for flat response, 47K ohms; output, 1 millivolt per cm/sec minimum, resistance, 1100 ohms/channel; inductance, 400 mh/channel. General Electric Co., Decatur, Ill.

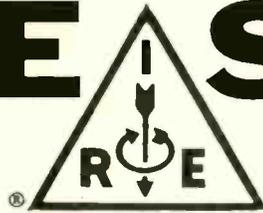
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### R-Columbia COMPOUNDS

Fono-Magic, a liquid compound of special rubber and carbide particles, forms a live rubber coating on metal phonograph drive parts and stops slipping and dragging. \$1.95. R-Columbia Products Co., 2008 St. Johns Ave., Highland Park, Ill.

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## ... Louisiana Licensing

Continued from page 35

Comments of those who favored licensing before the law but do not favor it now.

The license has brought the tube changers to the same standards as a full time technician because all he had to do to receive a license under the grandfather's clause was to produce affidavits signed by people for whom they may have repaired sets, who know nothing about electronics. Others receive licenses through political pull. Also, the License Board is supposed to consist of qualified techni-

cians who are engaged in this particular field of maintenance, but they are men holding a license to be on the board, who do not qualify in this field. I am in favor of licensing TV but not in its present form. In my estimation, it is a political football.

Every Tom, Dick and Harry can obtain a license if he has political pull. They don't enforce the law at all and any other state that can avoid this mistake is better off.

I have never been asked by a customer if I was licensed.

Too many servicing TV sets without licenses.

The public feels the license is used to justify increased service charge.

I'm against it because it has fallen into the ranks of corrupt politics. I don't think it is fair to the hobbyist and young people try to get into the industry. It is discouraging people from applying themselves to electronics and I feel this is just what it is being used for in La. I had a hard time getting it even after I passed the exam. I feel it should be done away with.

TV licensing has been a complete flop in this area.

The La. TV Tech. law is one of the most unfair laws ever passed. I say this for both the experienced and novice tech. For instance, a technician in a large city such as New Orleans, where I stay, needs a license. Just about a 1/2 mile from me is Jefferson Parish, which is growing a tech does not need a license. Do you think this is a fair law? So what happens? A tech in New Orleans rents a small place in Jefferson Parish and there, he doesn't have to bother about a license. The same thing happens in places like St. Bernard and Plaquemine Parishes.

Anyone can get a license if he has the fee. Licensing may be helping the public in large towns only, not in small ones, where people know you by your reputation, license or no license. As for helping the service industry, this is almost insignificant. Somebody gets plenty of money for doing nothing but selling licenses to anybody.

Some unqualified people have received licenses in order to increase their business. Their service charges are a \$1.00 cheaper so customers go to these people, even though their work isn't what it should be.

Comments of those who did not favor licensing before the law but do favor it now.

I guess the licensing law is all right but like every other law, the politician always seem to get his hand in the till.

The people know that a man who shows them a license has more than just a backyard knowledge of what's going on in their TV set. It is great help to the legitimate TV man when properly handled. I think that most of the objections that have been heard here were due to lack of proper information to begin with. After the information and policies were set forth, then most objections were from those who were in the business that knew very little about the inside of a set to start with. Those who knew had no arguments, just praise.

Licensed technicians can buy with a discount.

The License Board has started several classes in the state to increase the technician's knowledge and help him to make further advancements in his chosen profession.

The benefits, so far, are very small. For the pro story, contact any or all of the TESA group in La. For the con story, talk to the boys in the bushes.

# SAVE CUSTOMERS MAKE MONEY

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Most Widely Used Today  
by Professional Servicemen



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## CRT 440



For Black & White and Color

"Most valuable and useful" . . . "Wouldn't be without it" . . . "Pays for itself over and over again" . . . servicemen say. Quickly checks and corrects television picture tube troubles in a few minutes right in the home without removing tube from set. Gives new life to weak or inoperative tubes. Checks for leakage, shorts, open circuits and emission. Removes inter-element shorts and leakage. Repairs open circuits and low emission. Restores emission and brightness. Life Test checks gas content and predicts remaining useful life of picture tube. Makes new tube sales easier. Completely self-contained. Rich leatherette-covered carry-case. Net, \$74.95

TESTS AND REJUVENATES

all picture tubes at correct filament voltage from 1 to 12 volts

TESTS AND REJUVENATES

110° tubes and the new 19" and 23" tubes

TESTS AND REJUVENATES

color picture tubes. Checks each gun of color tube separately

UP-DATE YOUR B&K CRT WITH THESE ACCESSORIES

Model C40 Adapter. For use with previous Models 400 and 350 CRT's—to test and rejuvenate TV color picture tubes and 6.3 volt 110° picture tubes. Net, \$9.95

Model CR48 Adapter. For use with previous Models 400 and 350 CRT's—to test and rejuvenate 110° picture tubes with 2.34, 2.68, and 8.4 volt filaments. Net, \$4.95

Subscribe to New Picture Tube Information Service

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Canada: Atlas Radio Corp., 50 Wingold, Toronto 19, Ont.  
Export: Empire Exporters, 277 Broadway, New York 7, U.S.A.



For more details, circle 15 on page 48

"How does  
a gal pick  
a good  
Radio-TV  
service dealer?"



**1 DOES HE HAVE AN ESTABLISHED PLACE OF BUSINESS?**

A big investment goes into a properly equipped TV-Radio service operation. The Service Dealer with a place of business has made this investment. As an independent, small businessman, his future depends on satisfying you.

**2 DOES HE GUARANTEE HIS LABOR AND THE PARTS HE USES?**

Most qualified dealers guarantee work and parts. Ask about the guarantee so you will know just how long you are protected, but remember, the guarantee covers only the parts replaced by the dealer, not everything in the set.

**3 DOES HE CHARGE A FAIR PRICE, PROVIDE AN ITEMIZED BILL?**

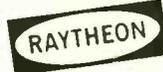
Your Service Dealer has taxes, rent, salaries, and other business expenses. He establishes his service charges fairly and renders itemized bills because he wants you to know what work was done and which parts were replaced.

**4 DOES HE REPLACE WITH DEPENDABLE RAYTHEON TUBES?**

Raytheon is the world's largest manufacturer devoted exclusively to electronic components. Raytheon TV-Radio replacement tubes carry the Good Housekeeping Guaranty to give you extra protection at no extra cost.

A "yes" answer to these four important questions is your assurance of fast and expert service at a reasonable price.

Your Raytheon Bonded Technician offers a 90-day work and parts guarantee that's actually backed up by a Bond issued through one of America's largest insurance companies. Look for the Raytheon Bonded Technician in your neighborhood.



**RAYTHEON COMPANY**

DISTRIBUTOR PRODUCTS DIVISION

The same Raytheon tubes which guard the nation in 23 missiles guard the life of your TV set

**EDUCATIONAL TOY MISSILE CENTER**  
Special Offer from your Raytheon Service Dealer  
Only \$1.00



To get this 9-piece missile center with operating scale model, send \$1 with a Raytheon tube box top. The name of your Raytheon Service Dealer will be included with the missile center if you send \$1 with-out a box top.

**RAYTHEON, Box 500**  
Distributor Products Division  
Westwood, Massachusetts

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

# 5 Million Housewives are being sold on your Service!

That's right! All Raytheon receiving and picture tubes now carry the famous Good Housekeeping Guaranty Seal — for years a symbol of trust with families all over America. And those families will have extra faith in the service dealer who uses Raytheon tubes backed by the Good Housekeeping Seal.

Raytheon is telling the whole persuasive story in full page ads in the March issue of Good Housekeeping. Nearly 5 million readers will be urged to call on the Radio-TV service dealer who uses Raytheon tubes with the Good Housekeeping Seal for extra protection at no extra cost.

You can be that dealer! Tie in now with Raytheon's "Seal Deal" . . . a complete, effective promotion program to help you build prestige and profits. See your Raytheon Distributor Salesman or mail this coupon today.

Mail this coupon for details on how you can profitably tie in with the Raytheon "Seal Deal."

**RAYTHEON, Box 755**  
Distributor Products Division  
Westwood, Massachusetts

Name \_\_\_\_\_  
Store Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_  
State \_\_\_\_\_

For more details, circle 49 on page 48

**RAYTHEON COMPANY**

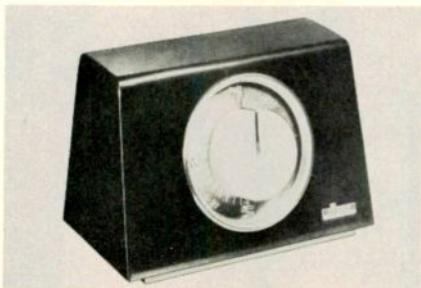
DISTRIBUTOR PRODUCTS DIVISION



# NEW PRODUCTS

## Alliance ROTATORS

Model U-98 "Tenna-Rotor" control automatically turns the antenna towards the station desired. Designed



to give TV viewers sharp black and white, color, and UHF reception, the "Golden Spectre" antenna rotator unit is available in golden metal. The rotator can also be used with FM radio to reduce interference in crowded FM broadcast areas. Features include positive mechanical stops, stainless steel bearing inserts and corrosion resistant components. Also, not shown, model T-12 which is manually operated by a touch of the control bar. Alliance Manufacturing Co., Alliance, Ohio.

... for more details, circle 403 on page 48

## Knight STEREO FM RECEIVERS

Model KN-310MC compact stereo FM receiver is announced. Housed in one compact cabinet are a stereo



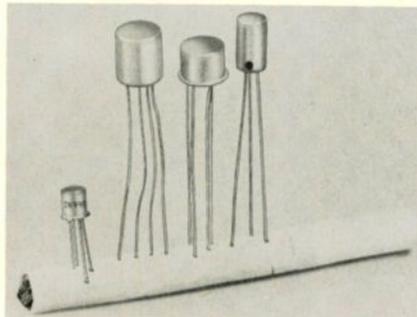
FM tuner with a transistor/nuvistor circuit, 40-watt all-transistor stereo amplifier, and built-in automatic clock-timer. Receiver includes a tuning meter that shows when an FM station is tuned for optimum reception, plus an automatic frequency control circuit that eliminates drift. Usable IHFM sensitivity,  $2 \mu\text{v}$  for 30 db of quieting. Harmonic distortion, less than 1%. Frequency response,  $\pm 1$  db, 20-20,000 cps at rated power. \$254.50. Allied Radio Corp., 100 N. Western Ave., Chicago 80, Ill.

... for more details, circle 404 on page 48

## Amperex TRANSISTORS

Four PADT germanium alloy-mesa r-f transistor types, for FM and AM pocket portable radios, are announced. Shown is the new subminiature enter-

tainment transistor, mounted in 4-lead TO-18 case, (extreme left) compared in size to conventional transistors in (2nd from left to right) TO-7, TO-33 and TO-1 cases. Three of the group constitute a high frequency FM kit: the 2N990, 2N991 and 2N992 are respectively an r-f amplifier, oscillator-mixer and an i-f amplifier. The fourth, 2N993, is a universal type for use in standard broadcast and short wave bands up to 6 mc in all stages from r-f through i-f. All are held to tight specs and feature low collector leakage current (avg  $1.2 \mu\text{a}$ ), high current gain ( $h_{FE}$ ) of 150 and high



collector-base breakdown voltage (min, 20 v). Price range from 70c each to 94c each in quantities of 1,000. Amperex Electronic Corp., 230 Duffy Ave., Hicksville, L. I., N. Y.

... for more details, circle 405 on page 48

## CDE POWER SUPPLIES

A portable power source, "Sportsman Senior," model 125514 will supply up to 560 watt-hours of 12 v power or 420 watt-hours of 110 v a-c power. It consists mainly of a 12 v automobile battery, a built-in battery charger, and a vibrator inverter. In use, electrical energy from a 110 v a-c power outlet is put into the

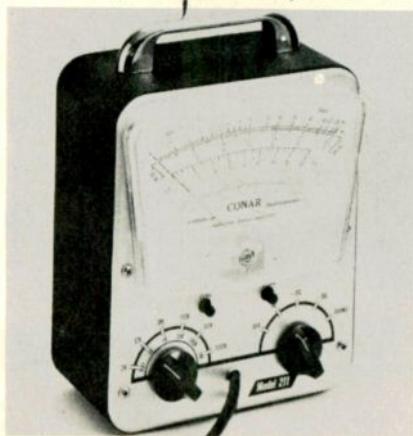


battery over the charging circuit. The recommended battery has a 55 amp-hour rating and is capable of storing approximately 660 watt-hours of energy. Of this, about 560 watt-hours are available at usable terminal voltage. Specifications include: output power, 140 watts max. continuous at 70-100% power factor, and 175 watts intermittent at 80-100% power factor for not over 15 minutes at 25% duty cycle. Cornell-Dubilier Electronics Div., Federal Pacific Electric Co., Fuquay Springs, N. Car.

... for more details, circle 406 on page 48

## Conar VTVM

Model 211 VTVM, with six-inch full-view meter, measures a-c, d-c, ohms, rms and peak-to-peak scale. Has sensitive bridge-type circuit with 12.2 megohm resistance. Shunting capacity,  $36 \mu\text{mf}$ , permit a-c measurements over a wide range of frequencies and well up into the r-f region. The six-inch two-color jeweled meter has 1 ma. sensitivity. It has twenty-four separate ranges. Sizes,  $6\frac{1}{2}$ "W,  $7\frac{3}{4}$ "H,  $3\frac{3}{4}$ "D. Weight, 5 lbs. Kit, #211 UK, \$31.95. Wired, #211 WT,

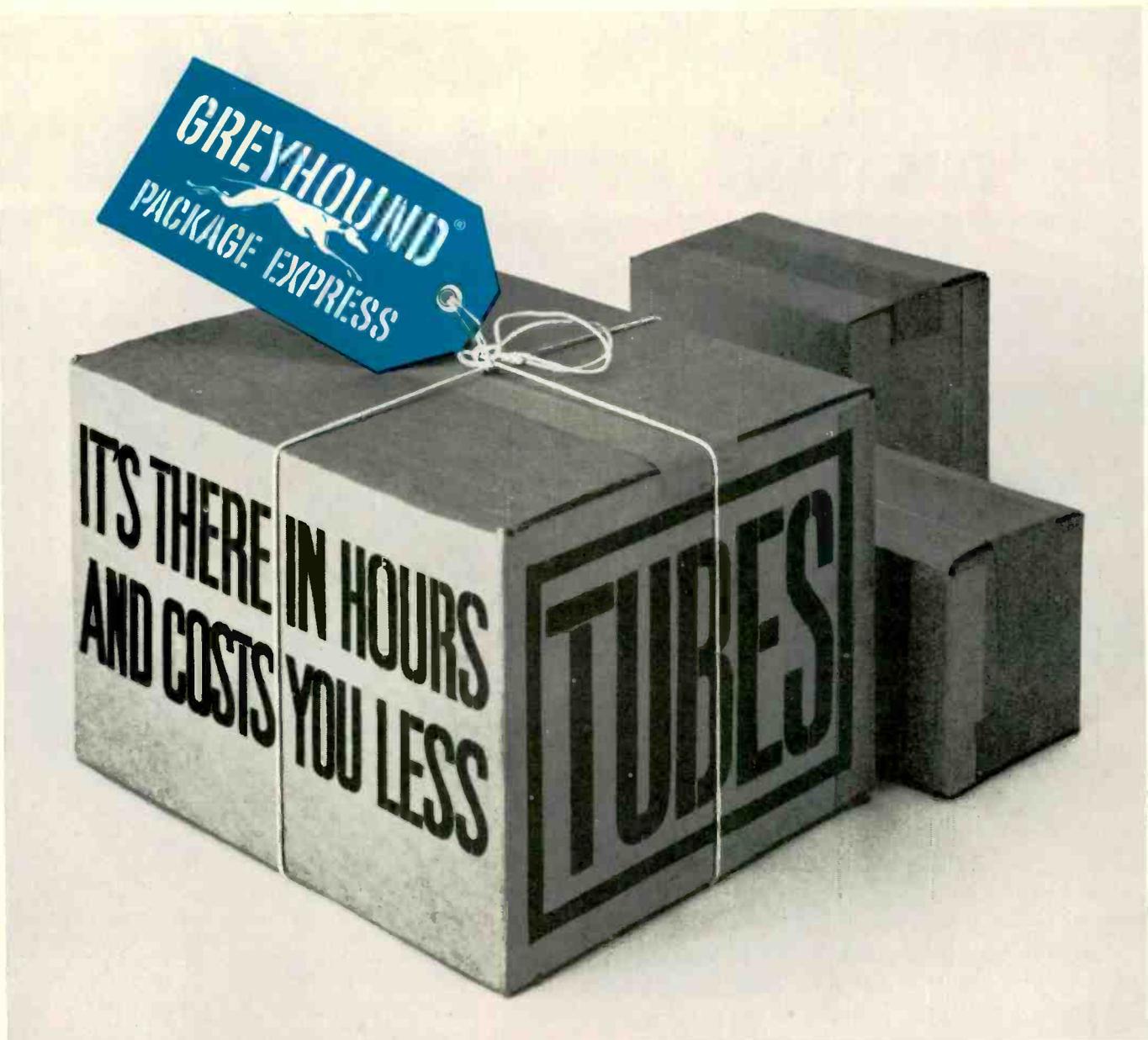


\$44.95. Optional high voltage TV probe, #13 PB, \$5.50. Conar Instrument Div., National Institute, 3939 Wisconsin Ave., Washington 16, D. C.

... for more details, circle 407 on page 48

## G-E COMPACTRONS

Type 2AH2, 12-pin Compactron rectifier is designed to supply power to the anode of the picture tube. Lower seated height and a 2.5-volt cathode-type heater are features of the new Compactron diode as compared with conventional-tube type counterparts, such as 3A3, 1B3, 1K3 and 1G3, (see illustration). Seated height, about  $\frac{1}{8}$ " less than conventional tubes. Overall



## COMPARE GREYHOUND WITH ANY OTHER WAY TO SHIP!

		20 lbs.	30 lbs.	50 lbs.
MEMPHIS TO BIRMINGHAM	Greyhound Package Express	\$1.80	\$2.10	\$2.65
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CHICAGO TO MINNEAPOLIS	Greyhound Package Express	\$2.20	\$2.65	\$3.55
	Railway Express	3.62	4.27	5.54
	Motor Freight	4.80	4.80	4.80
LOS ANGELES TO PHOENIX	Greyhound Package Express	\$1.95	\$2.25	\$2.90
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Whatever you're planning to ship... Greyhound Package Express can save you time and money! Packages usually arrive next morning—and very often, the same day shipped. They travel on regular Greyhound buses in weatherproof compartments. That means you can ship any time...twenty-four hours a day, seven days a week...weekends and holidays, too! Ship C.O.D., Collect, Prepaid, or open a charge account. Always specify Greyhound Package Express. **It's there in hours...and costs you less!**



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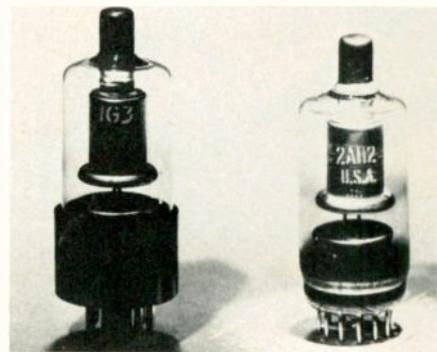
City.....Zone.....State.....

ACCREDITED MEMBER NATIONAL HOME STUDY COUNCIL

**NRI is America's oldest, largest home-study  
school for Electronics, Television, Radio.**

For more details, circle 39 on page 48

## NEW PRODUCTS



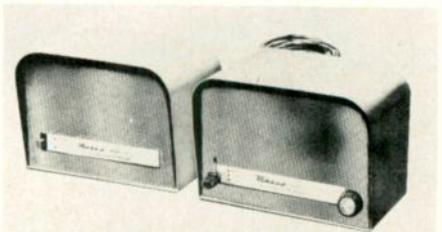
height, about  $\frac{3}{8}$ " shorter. Maximum peak inverse plate rating, 30,000 v for total d-c and peak; 24,000 v in the d-c component. Maximum steady peak plate current, 80 milliamperes and maximum d-c output current 1.5 milliamperes. Suggested user price

in production quantities, \$2.90. Receiving Tube Dept., General Electric Co., Owensboro, Ky.

--- for more details, circle 408 on page 48

### Mark Simpson INTERCOMS

Masco model 1400 "Thrifty-Call" continuous-duty, two-station transistorized intercom system is powered by standard penlight batteries and can be located anywhere.



It has a special battery-saver switch to conserve battery strength for periods when the system must remain on for long periods. Further battery saving results from the beep tone, on the master, enabling the master to be signalled by the remote without being turned on at all times. Two-station system complete with fifty feet of two-conductor cable, \$34.95. Additional cable, \$4.00 per 100 feet. Additional remote units, 140, \$8.95. Mark Simpson Mfg. Co., 439 Frelinghuysen Ave., Newark 12, N. J.

--- for more details, circle 409 on page 48

### Precision RESISTANCE SUBSTITUTION BOX



Model 1720 resistance substitution box permits direct substitution of 36 different resistance values through the use of either of two clearly marked rotary switches. Standard EIA resistance values in this unit range from 15 ohms to 10 megohms. Wattage dissipation of all resistors, 1 watt  $\pm 10\%$  tolerance. Dimensions  $6\frac{1}{2}$ " x  $3\frac{3}{4}$ " x  $2\frac{3}{4}$ ". Shipping weight, 2 lbs. Price, \$15.95. Precision Apparatus Co., 70-31 84th St., Glendale 27, L. I., N. Y.

--- for more details, circle 410 on page 48

### Progress Webster INTERCOMS

The Guardian CI-50 portable "Intercompact" wireless electronic intercom system plugs into any conventional electronic outlet for immediate two-way conversation. The cleanly-styled unit, no larger than a man's hand, may be moved easily from room to room. Also permits communi-

# EXTRA VALUE AT NO EXTRA COST RCA ELECTRONIC INSTRUMENTS

## The V-O-M with the EXTRAS!

Compare this superlative RCA VOM with the instrument you may have been thinking of buying. See if the RCA WV-38A doesn't offer you more "plus" features.



RCA WV-38A  
VOLT-OHM-WILLIAMMETER

- 10 volt and 0.25 volt DC ranges!
- Big easy-to-read 5V-C meter!
- Non-breakable plastic case, no glass to crack or shatter!
- Frequency response of low AC ranges is flat within 1 db to 200,000 cycles!
- Red test lead has probe and silicon alligator clip for added versatility!
- Orderly location of jacks below switches keeps leads out of the way!
- Spring clips on handle to hold test leads!
- DB scales clearly marked: no squinting!
- Rugged, scuff-proof, stain-resistant laminated vinyl carrying case. Optional equipment. Only \$4.95\*.

Factory wired and calibrated **\$43.95\***

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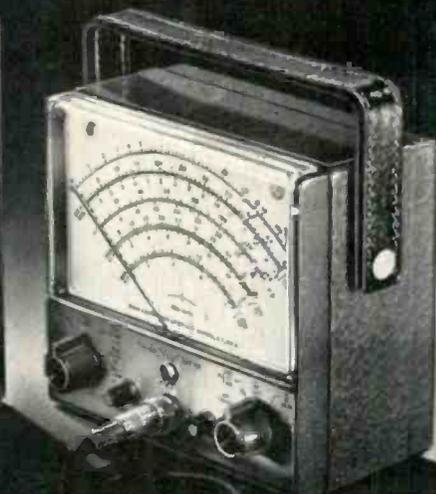


RCA WV-77E  
VOLTOHMYST®

Measures AC and DC voltages to 1500 volts; resistance from 0.2 ohm to 1,000 megohms. Separate scales, 1½ volts rms and 4 volts peak-to-peak for accurate low AC measurements, color coded scales for easier readings.

Factory wired and calibrated **\$43.95\***

KIT ONLY \$29.95\*



RCA WV-98B  
SENIOR VOLTOHMYST®

Measures AC and DC voltages (3% accuracy full-scale); resistance from 0.2 ohm to 1,000 megohms. Measures peak-to-peak values of complex waveforms. Rugged cast aluminum case, field-tested etched circuits. Big 0½" meter.

Factory wired and calibrated **\$79.50\***

KIT ONLY \$62.50\*

## RCA SCOPES



WO-91A 5-INCH OSCILLOSCOPE

High-performance, wide-band oscilloscope especially suited for color-TV, black-and-white TV, and other electronic applications. Dual bandwidth (4.5 Mc with 0.053 volt rms/in. sensitivity and 1.5 Mc with 0.018 volts rms/in. sensitivity). Internal calibrating voltage and calibrated graph screen. Includes special direct/low-cap shielded probe and cable.

Factory wired and calibrated **\$239.50\***



WO-33A SUPER-PORTABLE OSCILLOSCOPE

A low-cost all-purpose scope you can carry anywhere—only 14 pounds—designed for in-the-home servicing of black-and-white and color-TV, audio and ultrasonic equipment. High gain and wide bandwidth to handle the toughest jobs! Rugged and compact—3" graph scale screen.

Factory wired and calibrated **\$129.95\***

complets with low-cap./direct input probe and cable.  
KIT ONLY \$79.95\*

## RCA GENERATORS



WR-64A COLOR-BAR  
DOF/ CROSS-HATCH  
GENERATOR

Gives you all essential Color-TV test patterns; Color-bar signals for checking, adjusting and trouble-shooting Color-TV circuits; dot and cross-hatch patterns for adjusting convergence in color receivers and for adjusting linearity and overscan in both color and black-and-white receivers. Designed for in-the-home or shop servicing.

Factory wired and calibrated **\$189.50\***



WA-44C  
AUDIO GENERATOR

Generates sine and square wave signals for testing audio systems. Frequency range: 20 cps to 200 Kc. Used in the measurement of Intermodulation distortion, frequency response, input and output impedances, speaker resonance, speed of recording and playback mechanisms, transient response, phase shift, etc.

Factory wired and calibrated **\$98.50\***



WR-49B SIGNAL  
GENERATOR

For alignment and signal tracing of AM, FM and AM/FM receivers, low-frequency signal tracing and alignment of TV v/f amplifiers. Six ranges—85 Kc to 30 Mc. Internal 400 cps modulation. Low rf signal leakage!

Factory wired and calibrated **\$79.50\***



WR-69A  
TELEVISION/FM  
SWEEP GENERATOR

For visual alignment and troubleshooting of TV rf/ if/vf circuits and other electronic equipment IF/video frequency ranges 50 Kc to 50 Mc, TV channels 2 to 13, plus FM range—88-108 Mc. Sweep width continuously adjustable to 12 Mc.

Factory wired and calibrated **\$295.00\***



WR-333 CRYSTAL-  
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MARKER GENERATOR

Supplies a fundamental frequency carrier of crystal accuracy for aligning and troubleshooting color-TV, black-and-white TV, FM receivers and other electronic equipment operating in 19 Mc to 253 Mc range.

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A.C. Household Electricity Anywhere . . . in your own car, boat or plane Operates Standard A.C.

- Record Players
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- Electric Shavers
- Heating Pads, etc.

MODELS  
6-RMF (6 volts) 60 to 80 watts. Shipping weight 12 lbs. DEALER NET PRICE . . . \$33.00  
12T-RME (12 volts) 90 to 125 watts. Shipping weight 12 lbs. DEALER NET PRICE . . . \$33.00  
\*Additional Models Available



### 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 amps. 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!

Ask 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 8-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

Alplane 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 1/8 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.

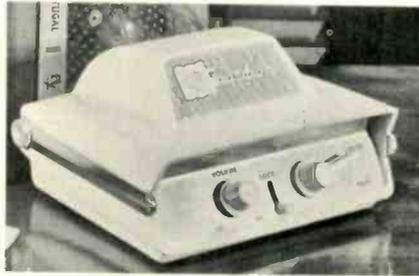
Extra-sensitive radio has 6 tubes (2 double-purpose), over-size Alnico 5 PM speaker for full, rich tone. Big, easy-to-read illuminated dial. Fingertip tuning control. Volume and tone controls. 33-in. stainless steel antenna. Neutral gray-tan enameled metal cabinet, 7 x 6 1/2 x 4 in. high over-all. Shipping weight 10 1/2 lbs.  
Model TR-1279—12 A for 12V Dealer Net Price \$41.96  
Model TR-1279—6 A 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 10 on page 48

## NEW PRODUCTS



cation between separate buildings fed from the same utility power transformer. A quick flick changes the selector from "listen" to "talk" position. The range is extensive and a built-in squelch circuit holds interference to a minimum. An unlimited number of stations may be used in the same system. Designed in desert sand colored durable styrene with gold metal trim. The sets are reported to use less electricity than an electric clock. \$74.50 per pair. Progress Webster Corp., 182 Ave. D, Rochester, N. Y.

--- for more details, circle 411 on page 48

### Raytheon TUBES

Four new tubes are: 5FG7 and 6HF8 combination triode-pentodes, 9-pin miniature, designed for use in oscillator and mixer circuits in TV receivers; 6DR4, 7-pin miniature high-mu triode for applications in phase inverters, voltage amplifiers and other high gain circuits; and the octal-based 6FW5 beam power pentode used primarily as a horizontal deflection amplifier in TV sets. Prices: 5FG7, \$2.75; 6HF8, \$3.70; 6DR4, \$1.85, and 6FW5, \$3.90. Raytheon Distributor Products Div., 411 Providence Turnpike, Westwood, Mass.

--- for more details, circle 412 on page 48

### Sadelco METERS

A new compact, portable, TV field strength meter features six transistors operated from a zener diode voltage-



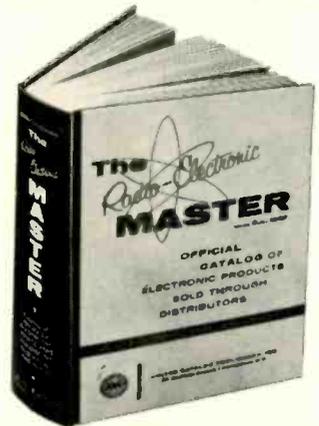
regulated battery supply. Separate tuning is provided for all VHF picture and sound carriers which can be measured from 20  $\mu$ v to 1 v. It can also measure power output of low power VHF translators from .1 to 1.5 watts. Size 8" x 4 1/4" x 2 1/2". Weight, 3 lbs. Operates on two standard transistor radio batteries. Supplied with simulated leather carrying case. \$195.00. Sadelco, Inc., 601 W. 26th St., New York 1, N. Y.

--- for more details, circle 413 on page 48

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).

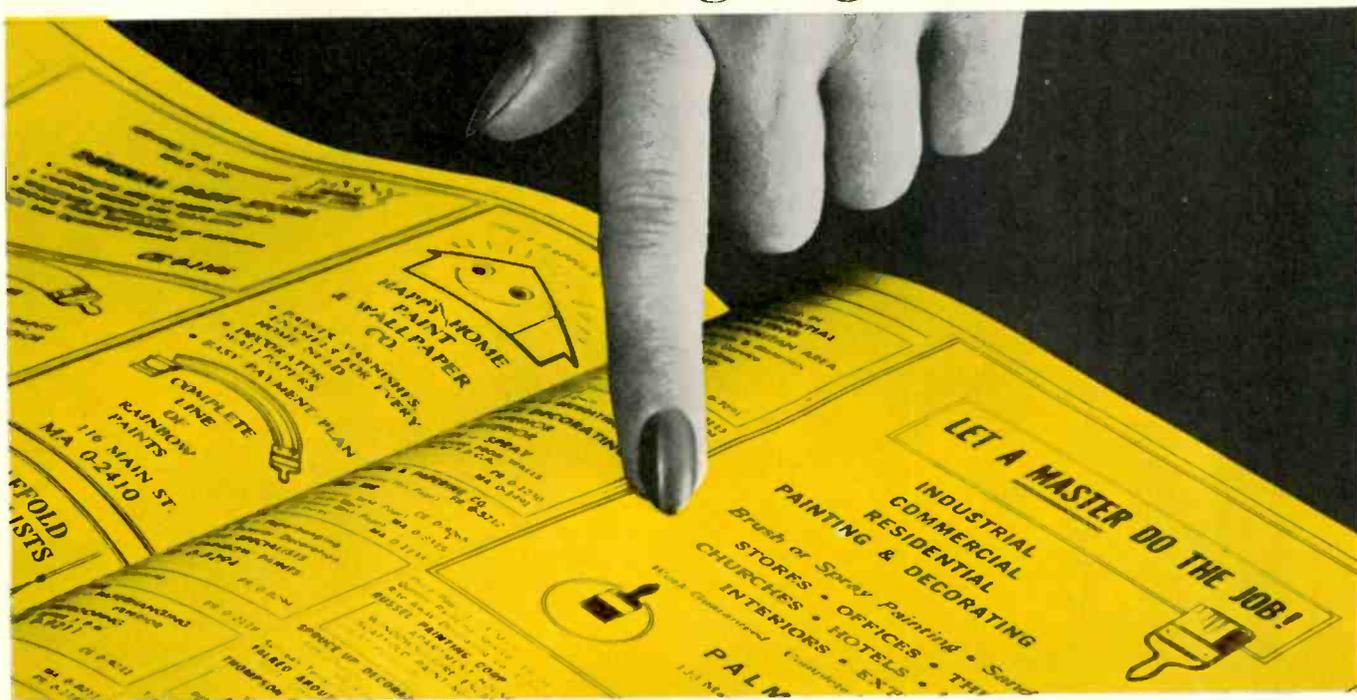
**THE RADIO-ELECTRONIC MASTER**  
60 Madison Ave., Hempstead, N.Y.

For more details, circle 58 on page 48

ELECTRONIC TECHNICIAN



The walking fingers...



are pointing business your way!

Now and throughout the year! The most concentrated, co-ordinated drive in the history of the Yellow Pages is telling people in *your* neighborhood to "let your fingers do the walking—shop the Yellow Pages way." Yes, again and again, the same memorable message will sell your very best prospects—in magazines and newspapers...on TV, radio and billboards. And when these people are ready to buy what you sell,

they'll turn to the Yellow Pages, where they'll get *your* message—if, of course, you're a Yellow Pages advertiser.

Make this powerful, co-ordinated national and local Yellow Pages backing of local business work for *you*. Plan your Yellow Pages program now! Call the Yellow Pages man at your Bell Telephone Business Office for full information on the walking fingers that are pointing up business—for *you*!

Display this emblem.  
It builds your business!



For more details, circle 12 on page 48

# MUSIC BIG AS LIFE

## Utah's High-Fidelity CONTINENTAL SPEAKERS



**C12RD 12" WOOFER**  
2 Lb. Alnico  
V Magnet and  
2" Voice Coil

YOU GET LIFE-SIZE SOUND in every range, from 20 to 20,000 CPS, with Utah's precision-engineered stereo/high-fidelity speakers. Tweeters and mid-range speakers feature a specially engineered horn formula to enhance "presence". Each speaker has color-coded 4-way terminals.



1124 Franklin St.  
Huntington  
Indiana

Please mail me prices, specifications and performance details of your Continental Speaker line.

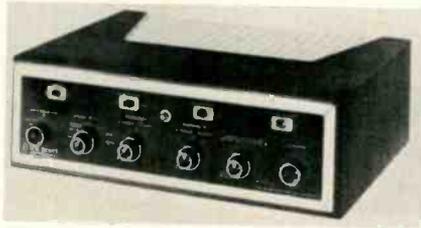
NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_

For more details, circle 59 on page 48

## NEW PRODUCTS

### Scott STEREO AMPLIFIERS

Model LK-48 stereo amplifier kit is rated at 24 watts/channel and delivers 28 watts (IHFM) at the low

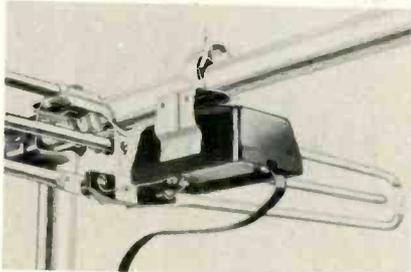


end. Features include separate bass and treble on each channel, special stereo balance control, front panel tape monitor facilities, and derived center channel output. Parts come mounted on separate parts-charts, one for each page of a full color instruction book. Wires are pre-cut and pre-stripped. Mechanical parts are pre-ripped to the chassis. No external equipment is needed for adjustment. \$124.95. H. H. Scott, Inc., 111 Powdermill Rd., Maynard, Mass.

... for more details, circle 414 on page 48

### Winegard AMPLIFIERS

The new Tenna-Boost amplifier, model MA-300, fits any antenna and has a rated gain up to 19 db for both



TV and FM. A 3-way mount permits mounting on antenna, wall or mast. Power supply, all a-c, completely shockproof, equipped with local distance and polarity switch, a-c outlet and built-in two set coupler. Has an input high pass filter to reject interfering signals such as ham and citizens band radio, garage door openers, etc. Nothing is amplified except TV and FM signals between 54 and 108 mc and 174 to 216 mc. Packed in counter-type package, \$34.95. Winegard Co., Burlington, Iowa.

... for more details, circle 415 on page 48

### Seco ADAPTORS

Model 1278 adaptor has six sockets for all of the newest tubes. It permits testing of 9-pin novars, the new 10-pin tube, 12-pin compactrons and nuvistors and battery types as well as all previously popular TV and radio tubes. It is designed for the model 78 tube tester and is easy to install, fitting neatly into the a-c cord compartment. Accurate setup information furnished

NOW FOR THE  
FIRST TIME EVER!  
The exact or equivalent  
replacement for nearly  
every record player  
made since 1930

## MASTER CARTRIDGE SUBSTITUTION GUIDEBOOK

by Jack Strong

For everyone who services or sells record players this guidebook will pay for itself over and over again by:

1. saving time in locating the right replacement quickly.
2. saving money by cutting down on the number of cartridges you need to stock.

This cross reference guide book will help you locate the exact replacement or equivalent cartridge (mono or stereo) for virtually every record player made since 1930. Even the old record players can be serviced through the use of universal replacement types. The book consists of two parts. In Part I, substantially all cartridges made since 1930 are listed, first by numerical order, and then in alphabetical order. This listing also shows one or more equivalent cartridge types and its manufacturer. Part II, lists (60) record player manufacturers, and the model numbers of their players, and the part number of the original cartridge used. Even when a cartridge is lost, or the number is unidentifiable, or is no longer obtainable, the serviceman can identify the cartridge replacement by using the model number of the record player as the basic guide and referring to Part I. Thus the correct replacement for any record player can be found quickly.

Every service technician in America will want this comprehensive and exhaustive guidebook of cartridge substitution detail in his shop. #288, \$2.00.

## TUBE CADDY-TUBE SUBSTITUTION GUIDEBOOK

NEW 1962 EDITION NOW AVAILABLE

by H. A. Middleton

(Direct Receiving Tube Substitutions Only... plus added new feature—1300 direct CRT substitutions)

This direct substitution guide, designed to be carried in the tube caddy, contains only direct receiving tube substitutions which can be made without modification of the wiring.

This guidebook will—

- save you time
- eliminate carrying needless tube types
- enable you to select the best substitution
- minimize sales losses because you don't have the right tube

It will pay for itself on the first service call!

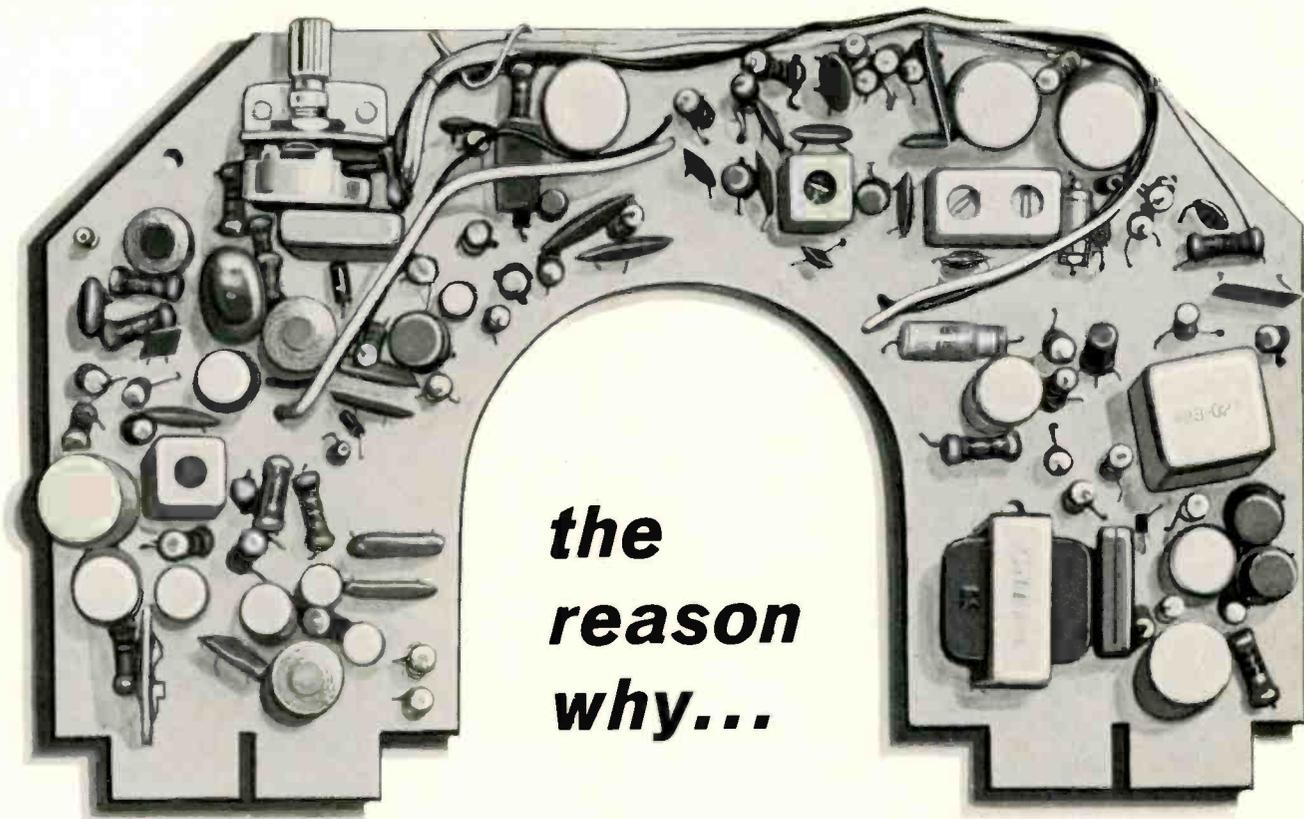
It contains substitutions for: • Receiving tubes • Ruggedized tubes • European-to-American tubes • American-to-European tubes • Cathode-Ray Picture tubes.  
Cat. #299 ... still only 90c

Order this indispensable service 'tool' today at your electronic distributor

JOHN F. RIDER, PUBLISHER, INC.  
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66 Racine Road, Rexdale, Ont.

For more details, circle 50 on page 48

ELECTRONIC TECHNICIAN

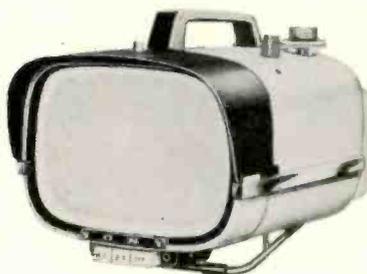


**the  
reason  
why...**

**SONY®**

*Research makes the Difference*

SONY quality is almost legendary in the service field, and with good reason: At SONY—Research Makes the Difference®. But back of its quality, there's another factor that makes SONY rather remarkable: Intelligent Design. Take the popular SONY 8-301W television, the all-transistor set that's probably the world's most versatile instrument. It operates on straight AC, auto/boat battery, or its own BCP-2 alkaline battery power pack. But to the service man, Intelligent Design makes the 8-301W just about the simplest set of all to service. Why? Because just about every open-



to-failure component is mounted on a series of snap-out circuit boards that reduce trouble shooting to almost no time at all. Simply pinpoint the trouble, snap out the board, replace the component, snap it back in. And you're back in business. Or, better still, send the board back to SONY, and we'll reduce service to just a matter of a screwdriver and a stamp. Quicker than you'd think possible, we'll have the repaired unit back to you, at just a nominal charge that leaves plenty of room for a fair profit margin. And no stocking of parts you'd rarely have use for. Write for details today.

**SONY CORP. OF AMERICA**

514 Broadway, New York 12, N. Y.

*Regional Offices:*

*Central:* 4959 W. Belmont Ave., Chicago 41, Ill.

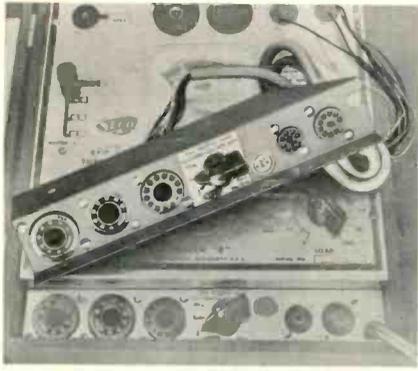
*Western:* 627 South Towne Ave., Los Angeles 21, Calif.

SONY CORPORATION OF AMERICA 514 Broadway, New York 12, N. Y.  
Gentlemen: I am interested in the SONY portable television. Please rush full details.

STORE NAME .....  
 NAME ..... TITLE.....  
 ADDRESS .....  
 CITY .....ZONE.....STATE.....

For more details, circle 53 on page 48

## NEW PRODUCTS



for the new type tubes. \$10.95. Seco Electronics, Inc., 5015 Penn Ave., South, Minneapolis 19, Minn.

--- for more details, circle 416 on page 48

### Vaco TOOLS

Two new colorful counter displays are: RA-48 Screw Driver Assortment display holding following 48 assorted screwdrivers in self-contained shipping carton: 12 each of 3/16" x 6", 3/16" x 4", 1/4" x 6", and 1/4" x 4", all round blade plastic handle screwdrivers. SA-75 Nut Driver Assortment display holding following 40 assorted nut drivers in self-contained shipping carton: 8 each of 3/16" black handles, 1/4" red handles, 5/16" amber han-



dles, 11/32" green handles, and 3/8" blue handles, all hollow shaft color-coded for size. Screwdrivers, 69c each. Nut drivers, 75c each. Each driver purchase includes coupon for magnetic pick-up tool with flexible shaft which lifts up to 5 lbs., available at 60c with the coupon. Vaco Products Co., 317 E. Ontario St., Chicago 11, Ill.

--- for more details, circle 417 on page 48

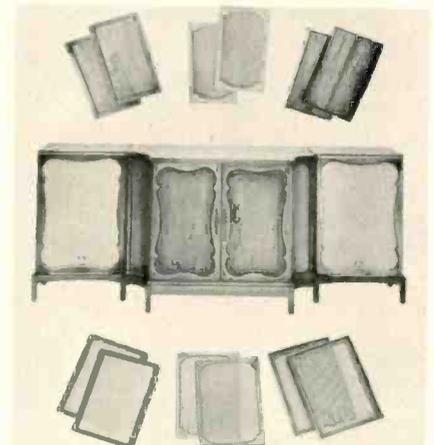
### Utah SPEAKERS

Speakers offered in a universal replacement series are thinner than the parts to be replaced. The use of G-E's new magnetic material "Lodex" permits magnetizing radially. This, in turn, permits elimination of a protruding "pot" structure which reduces speaker depth. An example is a 2" transistor radio speaker with a total thickness of 1/2". The new material can be precision formed into a shape permitting the use of a highly tooled basket which eliminates some parts of the conventional pot structure. Some advantages are: greater performance uniformity from speaker-to-speaker and from run-to-run; high resistance to temperature and humidity change; negligible interference from stray magnetic fields and more stable operation over long periods. Utah Electronics Corp., Huntington, Ind.

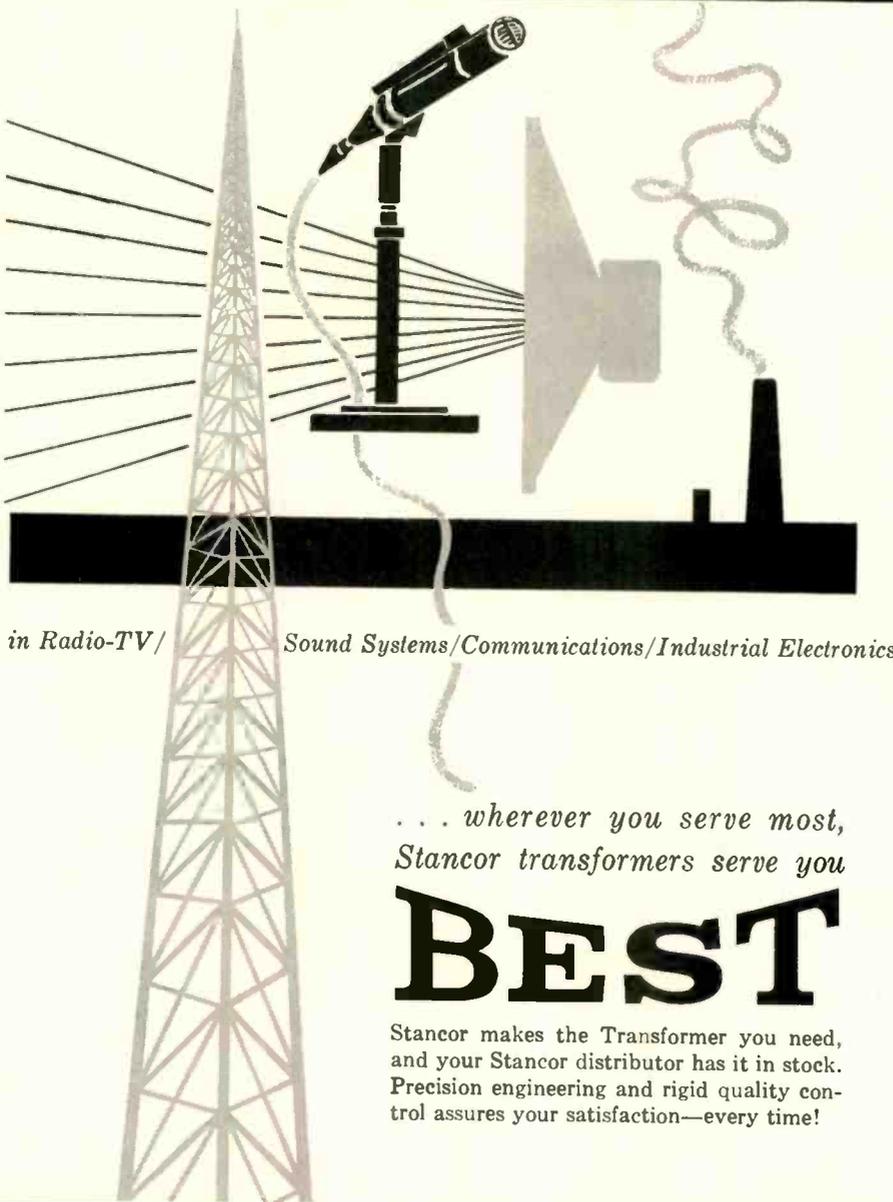
--- for more details, circle 418 on page 48

### University CABINETS

Introduced is a complete collection of impeccably crafted Credenza component cabinets suitable for any decor,



easily integrated with other fine furniture of any period, and featuring furniture-styled doors that can be re-



in Radio-TV/Sound Systems/Communications/Industrial Electronics

... wherever you serve most,  
Stancor transformers serve you

# BEST

Stancor makes the Transformer you need, and your Stancor distributor has it in stock. Precision engineering and rigid quality control assures your satisfaction—every time!

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**ELECTRONICS, INC.**  
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Ask your distributor for a copy of the latest Stancor catalog—listing your widest choice of transformers for any branch of electronics.

moved and replaced with differently styled doors in seconds. Originally developed to complement the Medallion XII speaker system, the wide variety of Credenza styles enable them to match virtually any compact speaker system. Made of finest hardwoods and veneers. The Medallion Credenza Cabinet is priced at \$179.95 with choice of Decor Doors. Additional Decor Doors \$42.00. University Loudspeakers, Inc., 80 S. Kensico Ave., White Plains, N. Y.

- - - for more details, circle 419 on page 48

### Semitronics TRANSISTORS

For replacement in auto radios, a new serviceman's assortment Pack #5PT contains five specially selected

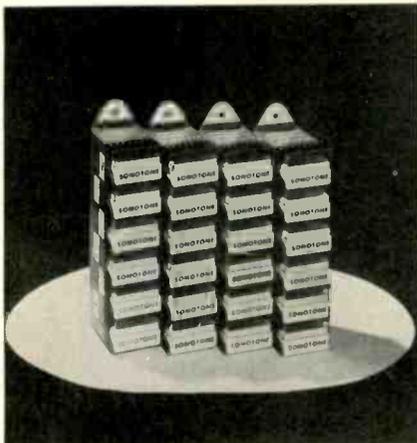


PNP power transistors and a complete replacement and interchangeability guide. Included are a high wattage transistor, medium wattage transistor, normal wattage transistor and a Semitron replacement for the 2N155 and the 2N176 types. More than 100 types may be replaced by Pack #5PT. Also, not shown, PT501 to replace all high wattage stud type power transistors. Semitronics Corp., 370 Broadway, New York 13, N. Y.

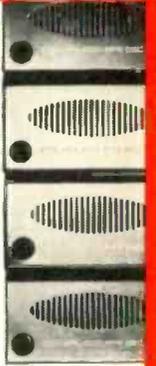
- - - for more details, circle 420 on page 48

### Sonotone CARTRIDGES

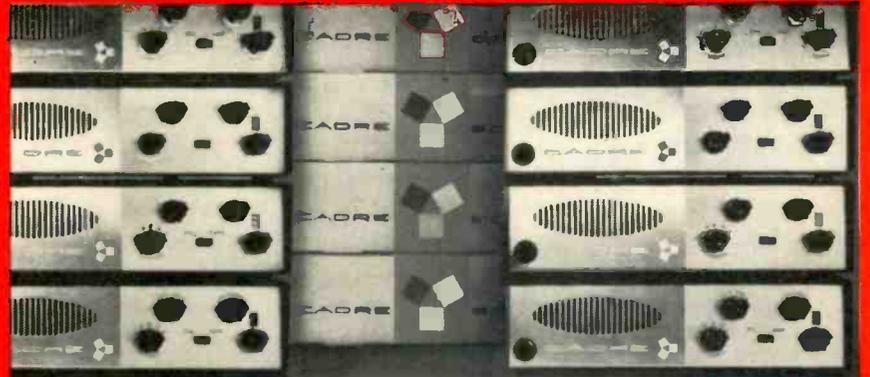
A new phono cartridge package, called the 6-Pak phonograph cartridge sleeve, comes in a two-color combina-



FEBRUARY 1962



**we couldn't supply enough then...**



**but we're ready for you now!**

The Cadre 5-watt Citizens Band Transceiver was the only fully transistorized unit on the market when we introduced it 8 months ago. Events proved that those who really needed Citizens Band Communication preferred to buy the most reliable unit available, even at a premium price.

We couldn't meet the demand. Not only did we underestimate the size of the "quality" market, but each and every unit had to be put through rigorous quality control and slow, painstaking inspection...including tests under field conditions to assure trouble-free, dependable performance in any locale and despite climate and shock environment.

Today—after 8 months—production has caught up.

We are ready for additional distributors now. If you're looking to do real volume on the finest Citizens Band transceiver available, fill in and mail the coupon below. We offer new distributors special introductory terms and a complete sales-building package. And soon to be announced—another Cadre 100% transistorized transceiver, to expand your CB merchandising opportunities and boost your CB sales and profits.



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

For more details, circle 19 on page 48

# AEROVOX ELECTROLYTIC CAPACITORS PROVIDE TOP QUALITY IN EVERY EXACT REPLACEMENT TYPE YOU NEED



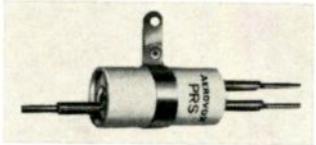
Continuous research and product development by Aerovox engineers, coupled with advanced manufacturing techniques, has produced the most dependable and complete line of 'lytics in the electronics industry. Some of the most widely used types are featured here.



**AFH** twist-prong 'lytics feature 85°C operation, improved sealing, high-purity aluminum foil construction throughout, ruggedized prongs and mounting terminals. Tops for filter audio bypass in TV-radio and amplifiers.



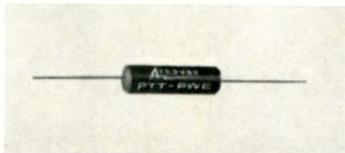
**PR** wax-filled tubulars manufactured to same high standards as more expensive metal-cased units. Made for exact replacements in TV receivers and antenna rotating devices. Available in singles, duals, triples, quads, and quints for 0-65°C operation



**PRS** compact "Dandee" units for trouble-free repair of series-string TV and AC-DC table radios. Aluminum cans with cardboard insulating sleeves. Made in singles, duals, and triples, as well as AC rated and non-polarized units.



**SRE**... "Bantam" metal tubular 'lytics hermetically-sealed in aluminum cans with cardboard insulating sleeves. Smaller than the PRS but capable of handling full size loads to 85°C.



**PTT-PWE** miniaturized tubular 'lytics for repair of personal transistor radios, portable TV sets, and all space-tight requirements. Feature "Polycap"® plastic cases with exceptional humidity resistance.



**BCD** upright mounting 'lytics for replacement in printed circuits, transistorized and auto radios. "Polycap" case and epoxy seal offer excellent moisture barrier to protect against drying out or leakage.



**HCB**... high-capacity-low voltage 'lytics designed especially for applications such as motion picture sound equipment, electric fence controls and other low voltage applications. Feature bakelite case which eliminates need for cardboard outer insulating tubes.

Ask your local Aerovox Distributor for a free copy of the TV Electrolytic Capacitor Replacement Guide AFG-370 and AFH Twist-Prong 'Lytic Booklet AFH-461.



## NEW PRODUCTS

tion and is stocked with six balanced or mixed cartridges. It is designed for easy stocking in small space and has a tab for wall mounting. The new package serves as shipping container, display package and stocking dispenser. Sonotone Corp., Elmsford, N. Y.

... for more details, circle 421 on page 48

## Argos SPEAKERS

New Slimline console, AD-1AS, offers a Jensen 12" woofer and 3½" tweeter, wired through cross-over net-



work to 8 ohm terminals on back. Cabinet uses tube-vented design to increase bass without booming, and boost effective power output. Covered with wood-grained pyroxylin in either walnut or blonde color; has cane grille and brass-finished legs. Internal volume, 3630 cu. inches. Size, 19¼"W, 22½"H, 10¼"D. \$39.95. Cabinet only, model AD-1A, \$24.95. Argos Products Co., Genoa, Ill.

... for more details, circle 422 on page 48

## IRC CONTROLS

A new line of TV-radio replacement controls, Snaptrol, augments the Concentrikit parts system and the exact duplicate QJ control line. The easy-to-assemble units provide a broad variety of basic, factory control sections which snap together to provide concentric dual controls. International Resistance Co., 401 N. Broad St., Philadelphia 8, Pa.

... for more details, circle 423 on page 48

## Dart MICROPHONES

A new carbon microphone, model M-100, for citizens band, ship-to-shore, intercoms, and PA systems, is ultra thin in design and weighs only three ounces. Features include: shatterproof case; push-to-talk switch button for hand operation; and a



Remember—it pays to use Aerovox!

**AEROVOX CORPORATION**  
DISTRIBUTOR DIVISION NEW BEDFORD, MASS.

Technical Leadership — Manufacturing Excellence

For more details, circle 11 on page 48

# BOGEN Instant Communications



ATTEND-A-PHONE

New modular design system with Central Master, Remotes and Add-On Expansion Boards. A vital aid for providing fast communications service to the active areas of your plant without tying up operators or switchboards. Low cost installation, push-button ease, excellent intelligibility, handsome styling and the flexibility of simple adaption for plant-wide paging . . . the BOGEN TQA-21 Attend-A-Phone and XQA-21 Expansion Board.



TWIN-COM

Instant communication with the advanced design two station intercom—the BOGEN Twin-Com. Perfect for "busy point" communications . . . warehouse to shipping, plant manager to floor foreman, etc. Simple installation, negligible maintenance, sensitive pick-up, life-like voice reproduction . . . the lightweight, rugged BOGEN Twin-Com.

BOGEN Communications Systems are certified by 30 years of leadership in the design of quality sound products. You own them . . . no monthly charges. There is an efficient intercom, telephone, paging, or P.A. system designed for your plant. Write today for full details.

**BOGEN-PRESTO**   
Desk ET-2 • Paramus, N. J. • A Division of The Siegler Corporation

For more details, circle 17 on page 48

## TIME-TESTED HEATHKITS NOW WITH NEW FEATURES



**World's  
largest selling  
VTVM**

No finer VTVM value at this price anywhere! A favorite for years because of its high accuracy and dependability at low cost. Now, with improved styling, extended low frequency response, and single test probe convenience, an even greater value! Precision components and high quality throughout for years of dependable, trouble-free performance. Check the specifications below and you'll see why Heathkit offers more.

**Kit IM-11 . . . 5 lbs. . . no money down, \$5 mo. . . . . \$29.95**  
**Assembled IMW-11 . . . no money down, \$5 mo. . . . . \$46.75**

**SPECIFICATIONS**—Meter scales: **DC & AC (RMS)**: 0-1.5, 5, 15, 50, 150, 500, 1500 volts full scale. **AC peak-to-peak**: 0-4, 14, 40, 140, 400, 1400, 4000. **Resistance**: 10 ohm center scale x1, x10, x100, x1000, x10K, x100K, x1 meg. Measures .1 ohm to 1000 megohms with internal battery. **Meter**: 4½" 200 uA movement. **Multipliers**: 1% precision type. **Input resistance DC**: 11 megohms (1 megohm in probe) on all ranges. **Circuit**: Balanced bridge (push-pull) using twin triode. **Accuracy**: DC ± 3%, AC ± 5% of full scale. **Frequency response**: ±1 db, 25 cps to 1 mc (600 ohm source). **Battery**: 1.5 volt, size "C" flashlight cell. **Dimensions**: 7¾" H x 4 1/16" W x 4¾" D.



**Lab quality—low price AC-VTVM**

New features . . . new styling . . . new performance in this brand new Heathkit AC VTVM! An excellent meter for use where high accuracy AC measurements are a must! 10 ranges, 0.01 to 300 volts RMS.

**Kit IM-21 . . . 4 lbs. . . no money down,  
\$5 mo. . . . . \$33.95**  
**Assembled IMW-21 . . . no money down,  
\$7 mo. . . . . \$60.25**

**SPECIFICATIONS**—Frequency response: ±1 db 10 cps to 500 kc, ±2db 10 cps to 1 mc, all ranges. **Ranges**: VOLTS—Ten ranges from 0.01 to 300 volts RMS full scale. **Decibels**: Total range -52 to +52 db, meter scale -12 to +12 db (0 db = 1 mw in 600 ohms), ten switch selected ranges from -40 to +50 db in 10 db steps. **Input Impedance**: 10 megohms shunted by 22 uuf on ranges 10 to 300 volts, 10 megohms shunted by 22 uuf on ranges .03 to 3 volts. **Accuracy**: Within 5% of full scale. **Dimensions**: 7¾" H x 4 1/16" W x 4¾" D.

*Remember! Heathkit offers more kits,  
better quality, guaranteed satisfaction*



**HEATH COMPANY**

Benton Harbor 24, Michigan

Yes, Send free 1962 Heathkit Catalog  
 Enclosed is \$ \_\_\_\_\_; send \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

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**ORDERING INSTRUCTIONS:** Fill out the order blank. Include charges for parcel post according to weights shown. Express orders shipped delivery charges collect. All prices F.O.B. Benton Harbor, Mich. A 20% deposit is required on all C.O.D. orders. Prices subject to change without notice. Dealer and export prices slightly higher.

For more details, circle 34 on page 48

## NEW PRODUCTS



heavy-duty shoulder rivet permanently attached to the back of the case for

panel mounting. Impedance, 100 ohms. Exciting voltage, from 6 volts; working current, 50 milliamperes; frequency response, 300-3,000 cps. \$6.50. Also, not shown, model M-200 crystal and M-300 ceramic microphones. All available with either straight or coiled cords. Dart Electronic Devices, 6409 New Utrecht Ave., Brooklyn 14, N.Y.

... for more details, circle 424 on page 48

### Lafayette VTVM KITS

KT-202 VTVM, in easy-to-build form, with printed circuitry employs a 6", 400  $\mu$ a meter with two color scales. Features include: 11 megohm input impedance; a-c and d-c voltmeter with up to 1500 volts and a-c peak-to-peak



up to 2000 volts on any wave form from 30 cycles to above 5 mc, without using accessory probes. Direct resistance measurements on ohms scale from 0.2 ohms to 1000 megohms and decibel scale range from -10 to +15 with db readings possible to +58 db plus a zero center scale. \$25.95. Accessory r-f probe is optional for KT-202 or any other VTVM, KT-205, \$3.75. Also, carrying case, KT-203, \$2.95. Lafayette Radio Electronics Corp., 165-08 Liberty Ave., Jamaica 33, N. Y.

... for more details, circle 425 on page 48

Tarzian offers

# FAST, DEPENDABLE TUNER REPAIR SERVICE

# ALL MAKES



ONLY  
**\$850**  
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

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. 23



## SARKES TARZIAN INC

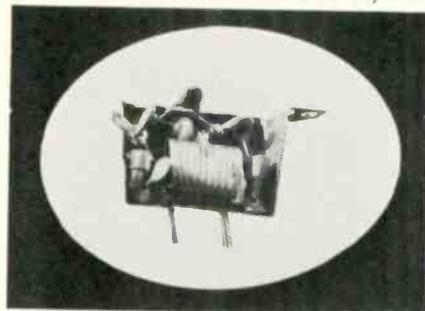
east hillside drive • bloomington, indiana  
edison 2-7251

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

For more details, circle 51 on page 48

### Colman ANTENNA COILS

A complete antenna coil assembly replacement for RCA and Admiral tuners, designated as No. 1359A, con-



sists of a high-efficiency balun coil and a 3-section i-f trap designed to eliminate interference between TV sets over the entire i-f band. Mounted on a phenolic board and metal plate assembly makes replacement of defective antenna coils in these TV sets much easier. Colman Electronic Products, Amarillo, Texas.

... for more details, circle 426 on page 48

### Browning CB TRANSMITTERS

Model 23/S-Nine citizens band



ELECTRONIC TECHNICIAN

# Built to Stay Sold!



Ruggedness, Reliability, Range—these are the three R's that spell total customer satisfaction in the growing, exciting, new 100 MW transceiver market. This was our target in designing the CB-4. Peak performance under the most punishing conditions that sports and industry can create. A realistic price tag. For you . . . the Hallicrafters name and the Hallicrafters approach mean mass volume and clean profit.

*littlefone*

CB-4  
\$89<sup>95</sup>

Power input: 100 MW • Receiver sensitivity: 1 microvolt • Plug-in crystals and transistors for easy channel changeover and service • Shatter-proof, vinyl-clad aluminum cabinet • Fully transistorized • Mercury-type battery (not included).



No FCC license required

the new ideas  
in communications  
are born at . . .



**hallicrafters**

Chicago 24, Illinois

Dealers: A limited number of Authorized Hallicrafters Dealerships are available in some territories. See your Hallicrafters distributor, representative or write to: The Hallicrafters Company, 5th & Kostner Avenues, Chicago 24, Illinois.

For more details, circle 33 on page 48

## NEW PRODUCTS

transmitter has an all-channel selector for switching to any one of the 23 CB channels. \$144.00 with one crystal. \$189.00 with 23 match crystals installed. Browning Labs., Laconia, N. H.

--- for more details, circle 427 on page 48

### Lionel RADIATION METERS

A new radiation measuring instrument is reported capable of measuring

radiation intensity, following an atomic blast, not only inside the fallout shelter but also by remote control at various places inside the house and in the open at a distance from the house. The "Home Owners Radiation Meter" is a portable, battery-operated instrument. Lionel Corp., Hoffman Place, Hillside, N. J.

--- for more details, circle 428 on page 48

### Riemer METERS

Announced is the new RYSTL MR Model SM-39 "S" meter. Being marketed under the "Rystl MR" trademark, the SM-39 meter features signal strength built on VTVM principles

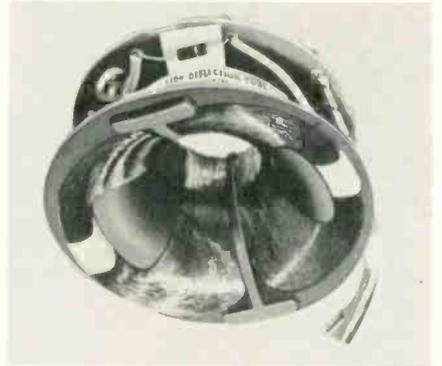


with 6C4 tube, illuminated meter and magnetic feet for dashboard mounting. The unit is simple to install. Comes complete with instructions and carries a warranty. The David Riemer Co., 601 W. 26th St., New York, N. Y.

--- for more details, circle 429 on page 48

### Stancor DEFLECTION YOKES

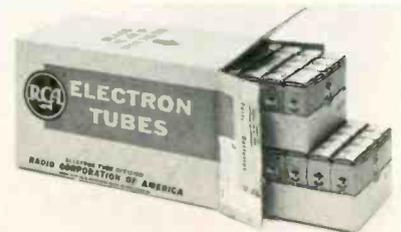
A new 110° deflection yoke, DY-44A, is designed as an exact replace-



ment for four Westinghouse yokes. It is supplied already wired with the network components, and replaces Westinghouse parts 490V006H01 and H02, 490V006M01 and 490V007H01 in 29 chassis and 175 models. Horizontal coil inductance, 18.5 mh. Vertical inductance, 34 mh. Horizontal coil resistance, 33 ohms. Vertical resistance, 34 ohms. Stancor Electronics, 3501 W. Addison St., Chicago 18, Ill.

### RCA TUBE-TRAY PACKAGE

A new tray-type package simplifies the handling and storage of miniature receiving tubes. It utilizes a shipping



container that can be opened with one slit of the gummed tape. This container accommodates two paperboard trays, each holding 50 tubes packed in five-tube handipaks. Both trays have the tube type identification number printed on the front panels. With the new package, a distributor can remove an entire tray and place it on his shelf without any further handling. RCA Electron Tube Division, Harrison, N. J.

# NEW a true DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER

for \$79<sup>95</sup> Net

Tests all present tube types... and all new tube types including the

- NEW NUVISTORS
- NEW 12-PIN COMPACTRONS
- NEW 10-PIN TUBES
- NEW NOVARS



Model 1000  
MUTUAL CONDUCTANCE TUBE TESTER

✓ Tests for true dynamic mutual conductance (GM)

✓ Tests for shorts and leakage between any tube elements

✓ Tests for gas and grid emission... sensitivity over 100 megohms

✓ Tests picture tubes

See your local electronics parts distributor

The Model 1000 is one of the most up-to-date mutual conductance tube testers available today. It is extremely quick to set-up, enabling you to make a complete and accurate test in just seconds of any tube you may possibly come across — present types or new types — under actual dynamic operating conditions.

#### JUST CHECK THESE ADDITIONAL FEATURES

• Also tests foreign and hi-fi tubes, voltage regulators, battery type tubes, auto radio hybrid tubes, thyristors and most industrial tube types • 13 lever switches provide complete versatility in accommodating all tube types and basing arrangements • Two point test principle overcomes obsolescence caused by new base pin arrangements or new internal jumpers in tubes • Automatic line voltage regulation • Built-in 7-pin and 9-pin straighteners on panel • Long lasting phosphor bronze tube sockets • Handsome two-tone etched aluminum panel • The most complete tube chart conveniently located in cover • New tube listings subscription service available • Housed in handsome gray leatherette case with convenient compartment for cables • Small compact size: 14" x 9 1/2" x 4 3/4".

\* Slightly higher in the West

**Mercury** ELECTRONICS CORPORATION

manufacturers of quality electronic products

111 Roosevelt Avenue, Mineola, New York

West coast branch: 4306 W. Victory Blvd., Burbank, Calif.

For more details, circle 37 on page 48

# NEWS OF THE INDUSTRY

**University Loudspeakers**—HASKEL BLAIR, president and general sales manager, CHARLES RAY, visited Caracas, Venezuela and agreed facilities were suitable for the winners of their all-expenses-paid 8-day vacation contest for dealers chosen on the basis of sales over quota for the next six months.

**Volkswagen**—promotions: PAUL R. LEE as manager and PAUL R. DAVIS as manager of special projects, both for newly-formed Marketing Dept. HELMUT SCHMITZ as national advertising manager.

**Sylvania**—W. E. BLANCHARD appointed Coordinator-Distributor Sales-Electronic Tube Div. and EDWARD M.



Blanchard

Wesick

WESICK named western district sales manager-midwestern region.

**RCA**—announces DR. ELMER W. ENGSTROM as president and a director succeeding JOHN L. BURNS, who will continue on a special assignment basis. New Promotion sales program for the ELECTRON TUBE DIV., called Tube Roadshow, inaugurated for distributors.

**Philco, Consumer Prod. Div.**—ROBERT G. URBAN resigns as vice president of Marketing—no successor named.

**Tokyo Shibaura Electric**—CHOZO TAMURA named director of New York office with MAKOTO MITA as assistant director.

**Triad Transformer**—announces formation of Distributor Div. with H. RICHARD OLSEN as general manager.

**JFD**—appoints FRED VOORHAAR as sales promotion manager-TV Antenna & Accessory Div.

**Jerrold**—names PAUL GARRISON as general manager of Taco.

**Clear Beam Antenna**—Slimline Series, which started production 14 months ago, has produced its millionth TV antenna.

**General Electric**—color slide film for Electronic Components Div. called "A Few Will Do," available for sponsored service dealers' and parts distributors' meetings, explains basic functions of electrolytic filter capacitors and gives hints for choosing replacements. JACK L. HUNTER named manager-Distribution Planning-Radio & TV Div.; H. WAYNE BRACKEN named merchandising manager, Syracuse-new post and STEVEN R. MIHALIC replaces him as district sales rep in Atlanta.

**International Electronic Research Corp.**—announces orders for Oct. & Nov., '62 up 64% above the like '60 period.

**Hepco**—SAM CHINKAS resigns as general manager.

**British Industries Corp.**—announces appointment of GEORGE G. COHEN as product sales manager.

**ITT, Distrib. Prod. Div.**—appoints R & D SALES Co., Denver, as rep for Rocky Mountain area.

**Olympic Radio & TV**—DON CALAMAN CO., Martinsville, Va., named distributor for 15 counties in southwest Va.

**Precision Apparatus Co.**—announcement of a color TV Seminar at

New...

## Model 1100 TUBE TESTER

# TESTS THEM ALL!

Tests all present and all new tube types including:

- NEW  
NUVISTORS
- NEW 12-PIN  
COMPACTRONS
- NEW  
10-PIN TUBES
- NEW NOVARs

... and is priced amazingly low ... only \$39<sup>50</sup> Net

Here is the answer to aggressive-minded technicians who seek a dependable, professional performing tube tester at a minimum cost. Hard-to-find tube defects are a snap for the Model 1100! It will test all the present tube types and all the new tube types ... in fact any type you may possibly come across. It is so compact and versatile, the serviceman will want it at his side wherever he goes.

**JUST CHECK THESE ADDITIONAL FEATURES**

- Also tests battery type tubes, auto radio hybrid tubes, voltage regulators, foreign and hi-fi tubes, thyratrons and most industrial tube types
- Exclusive meter bridge circuit provides accuracy found only in the more expensive tube testers
- Will detect any short in a tube, even where internal pins are tied or heater is tapped
- Checks each section of multi-section tubes separately
- Long lasting phosphor bronze tube sockets
- Handsome two-tone etched aluminum panel
- Built-in 7-pin and 9-pin straighteners on panel
- The most complete tube chart conveniently located in cover
- New tube listings subscription service available
- Housed in handsome black leatherette case with a special lead compartment
- Small compact size: only 10<sup>3</sup>/<sub>4</sub>" x 8<sup>1</sup>/<sub>4</sub>" x 3<sup>1</sup>/<sub>4</sub>".

\* Slightly higher in the West

Mercury

## ELECTRONICS CORPORATION

manufacturers of quality electronic products

111 Roosevelt Avenue, Mineola, New York

West coast branch: 4306 W. Victory Blvd., Burbank, Calif.

# NEWS OF THE INDUSTRY

Voorhees Technical Institute, 67th & 2nd Ave., NYC, on Feb. 14, 1962 at 7:30 p. m., accommodating 500 servicemen, to be conducted by BILL HATTERS & ED TILLEN, electronic training specialists at General Electric.

*Otarion Listener*—adopts new name, OTARION ELECTRONICS, INC., "Otarion" & "Listener" being retained as trademarks. Also formation of a Micro-Miniature Controls Div.



Marchiano

*Newhope Corp.*—Vice President, THOMAS A. MARCHIANO, named as president and a director of Lee Rocke, Inc., succeeding Mr. LEE ROCKE, who continues as treasurer and a director.

*Mark Simpson Mfg.*—rep appointments: E. O. HAGESTAD & ASSOC., Minneapolis, for Minn., No. Dakota, So. Dakota, Western Wisc.; KELLY-SCHMITZ-WINKLER-ASSOC., Kansas

City, for Mo. Kan., Iowa., Neb., southern Ill.; J. EARL SMITH CO., Dallas, for Texas, Ark., Okla. and La.

*Marty Bettan*—MARTY MARGULIS joins staff as liason man to assist dealers.



Margulis

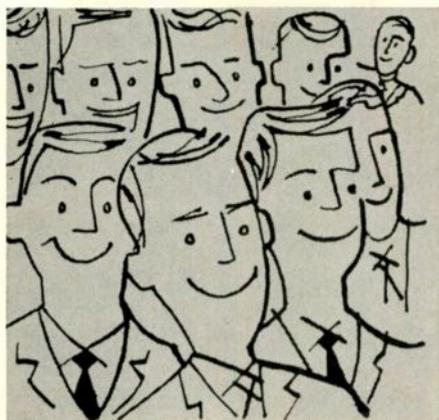


Neal

*Morris F. Taylor*—EARL C. NEAL joins staff as director manager for Ga., Ala. and Tenn.

## There are 2 Kinds of Radio-TV Servicemen-

Those who use  
**QUAM**  
replacement loudspeakers



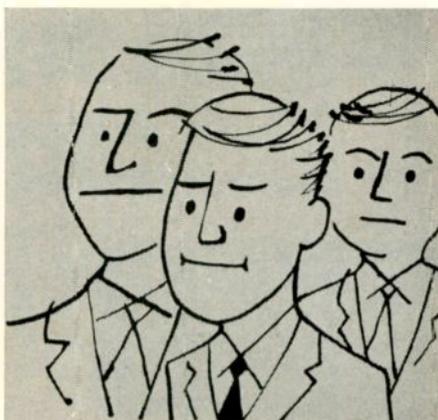
We're proud to say that  
this group is bigger\*

\* According to the findings of Brand Name Surveys, Chicago, Illinois in March and April 1961, more servicemen prefer Quam speakers than all other replacement brands combined. Major reasons stated for the preference: Quality! Availability! Performance!

### QUAM-NICHOLS COMPANY

226 East Marquette Road, Chicago 37, Illinois

For more details, circle 46 on page 48



## CATALOGS AND BULLETINS

**ADAPTORS:** FM stereo adaptor model MXA-614, covered in literature, is designed for use with any FM tuner or receiver having or capable of accepting a multiplex jack or outlet. Produces better than 30 db of stereo separation from 50 to 15,000 cps with less than 1% total harmonic distortion. Calbest Engineering & Electronics Co., 4801 Exposition Blvd., Los Angeles 16, Calif.

... for more details, circle 312 on page 48

**TAPE RECORDERS:** Literature covers a new transistorized tape recorder offered at \$29.95, less batteries. Has single foolproof control to change from rewind, off, play, and record, crystal microphone, and built-in Alnico V dynamic speaker. Edmund Scientific Co., Barrington 74, N. J.

... for more details, circle 313 on page 48

**RESISTORS:** Reference File CE-2.10. describes LPI-style low cost, low power film resistors for radio and TV. Ratings, 3, 4, 5, 7 and 10 watts. Units are non-inductive up to 250 mc. Corning Electronic Components, Corning Glass Works, Bradford, Pa.

... for more details circle 314 on page 48

**HI-FI EQUIPMENT:** Eight page, four-color, illustrated catalog covers: the four Norelco Continental tape recorders that comprise the line; the full line of T-7 hi-fi loudspeakers; and includes a Buyers' Guide and Condensed Applications Chart for all four Continental recorders. North American Philips Co., 230 Duffy Ave., Hicksville, L. I., N. Y.

... for more details, circle 315 on page 48



**ANOTHER SERVICE-PROVED  
PRECISION INSTRUMENT  
NEW MODEL CR-60  
PICTURE TUBE TESTER  
AND REJUVENATOR.  
HEATER VOLTAGE  
CONTINUOUSLY  
VARIABLE  
FROM 1.5 TO 12V  
INDEPENDENT OF  
LINE VOLTAGE  
VARIATIONS**



At last a picture-tube tester that can't become obsolete! Operating on the proven true "Beam-Current" circuit method, the CR-60 is a time and labor saver that pays for itself many times over. Tests and rejuvenates all picture tubes — black & white (110°, 114°, low G2) and color (each gun separately). Renews tube life. checks and repairs shorts, leakage, opens and low emission. Determines need for booster and predicts probable tube life. Portable, leatherette-covered case. See your PRECISION distributor or write. Net only \$64.95. This and all other PRECISION PRODUCTS are guaranteed for one full year

**PRECISION APPARATUS CO., INC.**

SUBSIDIARY OF PACOTRONICS, INC. 70-31 84th ST., GLENDALE, NEW YORK

For more details, circle 42 on page 48

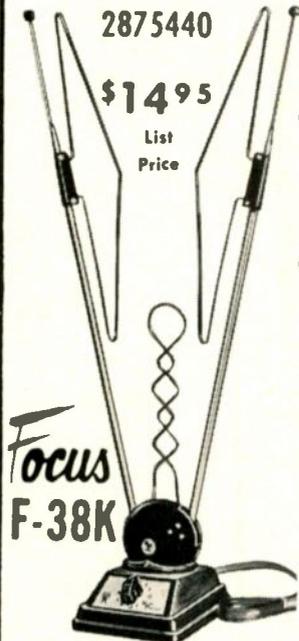
**2 YEAR FIELD TEST PROVES**

U.S. PAT. NO.

2875440

\$14<sup>95</sup>

List Price



Focus  
F-38K

Dept. ET

- THE "FOCUS" F-38K OUTPERFORMS ALL OTHER INDOOR ANTENNAS!
- THE ONLY INDOOR ANTENNA COMPARABLE TO AN OUTDOOR ANTENNA!
- BEST RECEPTION ON VHF, UHF, COLOR, AND FM . . . EVEN IN SEMI-FRIDGE AREAS!

**FEATURES**

1. 102" of Dipole when fully extended.
2. Patented Diamond Phasing Loops producing the Power of 3 separate switch type indoor antennas.
3. 12 Position Switch for maximum signal.

**ELIMINATES GHOSTS AND CO-CHANNEL INTERFERENCE!**

**SOLD ON A MONEY BACK GUARANTEE BASIS!**

**RMS**  
ELECTRONICS, INC.  
BRONX 62, N. Y.

For more details, circle 47 on page 48

**ASSOCIATION**

**NEWS**

**California**

CSEA, San Diego, reports interest in color TV servicing is at a high level in this area. The first session of an 18-hour course on servicing which is sponsored by Chapter 13 and 18, drew a capacity crowd of 88 members. Approximately 40 were expected. The Santa Clara Valley and Santa Cruz Chapter elected the following officers: Pres., Mel Haury; Vice Pres., Ervin Daniel; Sec'y-Treas., Clyde McCool. Mel Haury is the first president of the local chapter who holds both of the industry's highest titles — the State of California journeyman's certificate, and CSEA's Master Technician title.

**Florida**

TESA, Miami, held a color convergence class where latest developments were demonstrated on a live color set. The organization also conducted a technical clinic on transistor auto radio servicing. The transistor clinic was sponsored by Harold Friedman, local distributor. Lecturing was under the direction of Phil Powell, field rep of Delco, and Barney Blevins, zone service manager of United Motors, supervised the clinic.

**Indiana**

**Technicians "License" Selves**

ITTA, Indianapolis, an affiliate of the State of Indiana Electronic Service Association, announces it has inaugurated a self-licensing program by issuing license certificates to its members, pending events of the 1963 legislative session. Frank J. Teskey, publicity director, said that similar self-licensing certificates are being presented to technicians throughout the state by other IESA affiliates.

ARTS, South Bend, announces that the St. Joseph Valley group has elected the following officers: Pres., Lew Woods; Vice Pres., Bill Rapport; Sec'y, Russ Bills; Treas., Dick Tepe; Sgt.-at-Arms, Ralph Zellers.

**Michigan**

TSA, Glendale, reports a number of clinics have been held to aid service dealers. A Channel Master sponsored transistor servicing clinic was attended by 300 technicians and service dealers. Another, sponsored by Glendale Electronics, was devoted to color test equipment and its use. Speakers at this meeting were George Harbaugh, Hickok representative, and Jim Iden, factory engineer for Zenith. A third clinic, devoted entirely to color TV servicing, was attended by eighty-five members and their key technicians. This clinic was held at the RCA Victor Distributing Corporation's service training center and was conducted by Jerry Ratz, assisted by Phil Schweinforth, distributor service engineers. A series of color service clinics are planned.

**Missouri**

TESA, Kansas City, reports plans to recover some of the lost tube market and improve service technicians' business image. The organization is sponsoring a drawing for customer benefit, featuring possibilities of winning over \$2,000-value in TV, Hi-Fi, transistor radios, and phono records. The program has the cooperation of RCA Victor Distributing Co., General Electric Supply Corp., and the Lee Wholesale Company.

Accountants of local TV servicing firms have arrived at cost figures necessary for successful operation which would have appeared fantastic a few years ago. The accountants stated that very few TV shops realize that operation costs include depreciation reserve and profit. It was pointed out that calculations showed a minimum charge of \$8.25 per hour was necessary for a technician to show a profit. A case in point concerned a contract at \$8.25 per hour, portal-to-portal, which an elated technician obtained for a certain job. The technician's elation was short lived, however, when total cost calculations revealed an actual profit, after wages, of only 8%.

## New Mexico

TESA, Albuquerque, reports its first annual meeting adopted plans to obtain legislation requiring licensing of TV shops and technicians. Members heard Thomas W. Hall of the Bureau of Training and Apprenticeship of the U. S. Department of Labor. A plan was also approved by delegates to require potential members of the association to complete a two-year apprenticeship by correspondence or direct training.

## Ohio

TESA, Springfield, announced that its official organ, "Springfield TESA News," is being consolidated with the "TESA of Ohio News," together with other local organization organs.

## Oklahoma

TESA, Oklahoma City, presented KOCO-TV channel 5 with a "friend of service" certificate. The station was recognized as a friend of service by the NATESA convention in Chicago. A warm relationship and close cooperation exists between the organization and the station. The station's regular "trouble" slide carries the TESA-NATESA emblem.

## Pennsylvania

ESDA, Pittsburgh, announced a committee has been named to take action on the present super market invasion into the appliance field. Some chain groceries, in collaboration with certain appliance manufacturers, have installed an "instant dividend" (I-D) plan for giving away free appliances, including TV sets. The organization also announced a meeting to discuss the problem. Four Congressmen from the area, the Manager of the Better Business Bureau, a representative of Commerce, and representatives from the trade and local press, were invited.

## ... TV DIGEST

*Continued from page 24*

Resistor R400 serves as a filament dropping resistor and protects other components by acting as a fuse. Note that the plate supply is not a part of the "instant on" feature — there is no B+ present when the TV set is turned off.

When the TV set is turned on, X403 is shorted out and is no longer in the filament circuit. The full normal filament voltage is applied to the tubes. The usual wait for the tubes to warm up is eliminated. Sound and picture come on instantly.

If X403 shorts, the excessive current through it would probably cause the diode to open. If it opens, operation of the TV set would be the same as for conventional sets.

In the event of a short anywhere near the high end of the filament string, R400 would open. If an open filament is found, R400 should be checked for damage and for value change.

### 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.

### 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.

## ANOTHER SERVICE-PROVED PRECISION INSTRUMENT NEW MODEL P-25 TRANSISTOR RADIO BATTERY ELIMINATOR AND CHARGER

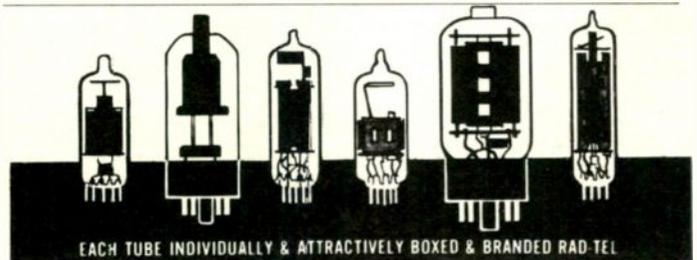


The sure way to save money and effort, for a minimum investment. The P-25 supplies 0-25VDC continuously variable, panel-controlled and metered to 0-100Ma. Has a +1.5VDC tap for radios using a tapped supply. A center tap is also provided for radios without output transformer and where one lead is connected to C.T. of the battery. Simulates weak battery conditions for checking overall performance and recharges nickel-cadmium batteries. See your PRECISION distributor or write today for a complete catalog. Net only \$19.95. This and all other PRECISION PRODUCTS are guaranteed for one full year

**PRECISION APPARATUS CO., INC.**

SUBSIDIARY OF PACOTRONICS, INC. 70-31 84th ST., GLENDALE, NEW YORK

For more details, circle 43 on page 48



## 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. ET-200 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.

ANOTHER SERVICE-PROVED

**PRECISION**

INSTRUMENT

MODEL 650

GRID CIRCUIT

ANALYZER

TUBE TESTER

AND

MEGOHMMETER



Tests most tubes including 10-pin miniatures, 12-pin Compactrons, 5- and 7-pin Nuvistors, Novars, octals, picture tubes (with optional adapter AD-65) and a wide variety of foreign and industrial types. Indicates gas currents as low as 1 ua. Checks for intermittent shorts, gas content, grid emission, leakages (sensitivity over 100 megohms). Special megohmmeter circuitry for measurement of condenser leakage, continuity and leakage of printed circuitry. Complete in leatherette-covered case. See your PRECISION distributor or write today for a complete catalog. Net only \$69.95. AD-65 Adapter: Net only \$5.95. This and all other PRECISION PRODUCTS are guaranteed for one full year

**PRECISION APPARATUS CO., INC.**

SUBSIDIARY OF PACOTRONICS, INC.  70-3184th ST., GLENDALE, NEW YORK

For more details, circle 44 on page 48

*Binders . . .*

for your

**CIRCUIT DIGESTS**

10 $\frac{3}{4}$ " x 14 $\frac{1}{4}$ "

are now available to **ELECTRONIC  
TECHNICIAN** subscribers!

These sturdy spring-type (no holes to punch) binders are bound in dark red, hard book-cover material . . . they hold 24 monthly issues of CIRCUIT DIGESTS plus other reference literature . . . and are embossed in gold on the front and the back binding. Another **ELECTRONIC TECHNICIAN** service — to help you preserve and get more convenient use out of your valuable CIRCUIT DIGESTS!

\$2.95 each—Postpaid  
(for Canada and Foreign—add 50¢ postage)

**ELECTRONIC TECHNICIAN**  
1 East First St., Duluth 2, Minn.

Please ship....."CIRCUIT DIGEST BINDERS." I enclose  
\$.....

(please print)

Name.....

Street & No.....

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

## AUDIO NEWS LETTER

SARGENT-RAYMENT files a voluntary bankruptcy petition in Federal Court, San Francisco, Calif.

IHFM received about 1,000 consumer coupon inquiries within two weeks of ad appearances which launched national consumer magazine campaign.

BRITISH INDUSTRIES appoints George G. Cohen as a product sales manager, whose primary interests will be Wharfedale Loudspeakers and Gold Lion Custom Tubes.

FAIRCHILD appoints hi-fi component reps: Paul Kurtz Co., Detroit, for Michigan; William Tauber, Syracuse, for upper New York state.

FISHER dedicates new 62,000 sq ft plant in Milroy, Pa. Governor David L. Lawrence officiated. Opening the additional plant also marked the firm's 25th Anniversary Year.

MONARCH announces model ES 300 stereo headphones. Soft, foam earpads are featured. Impedance 8-16 ohms. Frequency response from 25 to 15,000 cps. \$19.95.

ZENITH announces new line of hi-fi stereo record players in Danish modern styled consoles, \$199.95 to \$285.00. With AM-FM Stereo FM radio, \$319.95 to 399.95.

INT'L SOUND FAIR, combination retail business congress and public exhibit of equipment, records and tape, to be held in Cobo Hall, Detroit, Mich., July 25 through 29.

WTFM, New York, claiming first station in North America to broadcast FM Stereo 24-hours-a-day. Operates at 103.5 mc. Has a 50,000 all-stereo record library.

ALLIED reports the Knight KN310MC stereo FM tuner with a transistor/nuvistor circuit, 40-watt all-transistor stereo amplifier, and built-in automatic clock-timer. \$254.50.

ERA announces a series of Audio Specialists Seminars to be held in various geographical areas of the country to help members upgrade selling skills of local dealers and distributors.

JENSEN DE MEXICO has been organized to manufacture Jensen needles in Mexico. It will turn out the same full line of Jensen needles made by Jensen Industries in its U. S. headquarters.

ROBINS offers 9 standard hi-fi component and test

instrument covers made of vinyl. Each is designed to fit several makes and models. Sizes range from 10 3/8" x 6 1/2" x 7" to 20" x 14 1/4" x 10 1/4".

DUOTONE offers a diamond needle dispenser free with 32 needle assortment. Suggested dealer cost for the diamond needles, \$54.80. The dispenser, known as Deal DR-1, hangs on a wall, stands on a counter or lays flat in a display case.

H. H. SCOTT announces models 299C and 222C amplifiers, 72 watts and 44 watts respectively. Frequency range, 20-20,000 cps. Features include stereo headphone output on front panel and push-pull on-off switch to pre-set all controls. Model 299C, \$224.95. 222C, \$154.95.

LAFAYETTE announces the non-electronic Pioneer Stereoscope model SH-100 which includes 1 stereo phone tone arm with cartridge, 1 adaptor, 1 set of earphones, and accessories. A simple air pressures system activated by movements of the tone arm stylus is the only moving part. \$29.50.

SWITCHCRAFT announces model #671 remote speaker selector switch. The compact unit features a 5 position tap switch which permits selecting any of 5 mono speakers to a mono amplifier. Mounts to wall or cabinet.

## ANOTHER SERVICE-PROVED PRECISION INSTRUMENT MODEL IC-60 "IN-CIRCUIT" CAPACITOR TESTER



A true time-and-labor saver, the IC-60 discloses opens and shorts in bypass coupling, blocking and filter capacitors of all types (dried-out electrolytics too) without removing them from the circuit. Also indicates actual electrolytic values, from 2 mfd. to 400 mfd. in two ranges, while capacitor is "in-circuit." Sharp, non-confusing readings on wide-angle indicator. See your PRECISION distributor or write today for a complete catalog. Model IC-60: Net only \$32.95. This and all other PRECISION PRODUCTS are guaranteed for one full year

**PRECISION APPARATUS CO., INC.**

SUBSIDIARY OF PACOTRONICS, INC. 70-31 84th ST., GLENDALE, NEW YORK

For more details, circle 45 on page 48

### ... TUNING IN THE PICTURE

*Continued from page 19*

ELECTRONIC KITS sales running about 20% ahead of 1960. Estimated sales volume for 1961: about 2 million kits, more than \$50 million.

MICRO-ELECTRONICS, which replaces a group of miniaturized components with one block of material, will have total volume of \$400 million in three years, estimates Lear, Inc. A General Instrument Corp. market study indicates that some \$10 million in packaged circuits of all types will be sold in 1961, and predicts \$100 million volume by 1965.

COMMANDS spoken into a microphone may be carried out by machines. Forerunner, "Shoebbox," by IBM is the smallest voice-responding machine ever built and the only one capable of fully automatic recognition of complete words. Invented by William C. Dersch, it recognizes sixteen words comprising a vocabulary of ten digits and six command words. Employs 31 transistors, fewer than two to a word. May lead to composing typewriters.

# 34¢

EACH

\$32

per 100

All tubes not necessarily new, but may be electronically perfect factory 2nds or used. Each clearly marked. ELECTRONIC MARKET will replace FREE any tube that becomes defective in use within 1 year from date of purchase. All tubes individually boxed and marked. Partial Listing Only — Thousands More Tubes in Stock!

024	SAY0	GAX5GT	GCH8	GSK7	12BH7
1A7ET	SAZ4	6BB	GC16	GS17	12BG6
1B5GT	SC80	GBA8	ECM6	GS27	12BR7
1W5HT	SR4	GBCS	ECM7	GS77	12CA5
155	STR	GBCO	ECM7	GT4	12D4
174	SU4	GBD6	GC88	GT8	12F8
1UE	SUB	GBE8	GC86	GU5	12K5
1V2	SV4G	GBFS	GC57	GV6GT	12K7
1X2	SV6GT	GBG9G	GC99	GW6GT	12L6
2A7A	SW	GBH6	GC06	GSX	12S7
2B4A	SW	GBJ6	GC06	GS5GT	12S5
2C15	SW	GBK6	GC06	GS8	12SA7
3AL5	GAB4GT	GBL6	GC06	GS8	12SA7
3BC5	GAB4GT	GBM6	GC06	GS8	12SA7
3BN6	GAB4GT	GBN6	GC06	GS8	12SA7
3CZ6	GAB4GT	GBN6	GC06	GS8	12SA7
3CC5	GAB4GT	GBN6	GC06	GS8	12SA7
3F4	GAD7	GBR8	G17	12A06	12V6GT
4B4A	GAS5	GBS8	GB5GT	12AV7	12X4
4B5B	GAT6	GBT6	GB7	12AV7	18AU4GT
4C95	GAX4GT	GBZ7	GS2GT	12AX4GT	18B06G
5AM6	GAX4GT	GC4	GS2GT	12A7	19T8
5AN6	GAX4GT	GC8A	GS7	12B4	25Z6GT
5AT6	GAX4GT	GC8B	GS7	12B7	25Z6GT
		GC8C	GS7	12B7	25Z6GT
		GC8D	GS7	12B7	25Z6GT
		GC8E	GS7	12B7	25Z6GT
		GC8F	GS7	12B7	25Z6GT

## 25¢

QUANTITY DISCOUNT

per tube

When purchasing lots of 50 or more same type tube Applies to tubes below only

6SN7	11A	12AX7	12CH5	6J6	90C3	6EB6	12AT7	12BY7	6W4
6AX4	1R5	6AR5	12BA6	6K7	6AW6	6AU6	6C80	6AU6	6AF4
6AR4	6S4	6CB7	12SH7	6K7	6AM6	12AU7	6AK5	6AC7	6AB5

## 74¢

EACH

\$49

per 100

SHIPPING INSTRUCTIONS: ELECTRONIC MARKET PAYS YOUR POSTAGE on orders of \$10 or more in U.S.A. and Territories. Send approx. postage on Canadian and foreign orders. Any order less than \$10 requires 25¢ handling charge. Send 25¢ on C.D.D.'s. ANY RECEIVER TUBE NOT LISTED ALSO AVAILABLE AT 34¢ EACH!

SILICON RECTIFIERS ALL PURPOSE Epoxy construction

500 MA - 'TOP HAT'

COMPLETE LINE OF INDUSTRIAL TUBES

ONE OF THE LARGEST INVENTORIES IN THE COUNTRY

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3750 E. 10th CT., HIALEAH, FLORIDA

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For more details, circle 28 on page 48

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## NEW BOOKS

**SERVICING TV REMOTE CONTROLS.** By Samuel L. Marshall. Published by Howard W. Sams & Co. 160 pages, soft cover. \$2.95.

For those technicians who have been waiting for a volume integrating basic theoretical data and service information on TV remote controls, here it is. Following a brief chapter on basic principles, various types of remote control transmitters and receivers are discussed. The receiver's relay and

motor-control section are covered in detail. A number of systems, including the Sylvania 500, the Zenith 400, the Packard-Bell 21DC16, and the General Electric RW-324 are covered in detail. Schematics, drawings and photographs make it easy to follow explanatory material. Trouble symptom and adjustment charts are also provided. This can be a helpful book for a TV service technician.

**BASIC RADIO, VOL. 3.** By M. Tepper. Published by John F. Rider Publisher, Inc., 138 pages, soft cover \$2.70.

The initial section of this third volume in a six-volume series on basic

radio, deals at length with the construction, operation, and fundamental characteristics of diode, triode, and multigrad tubes. Rectifier circuits, power supply filters, and a-c/d-c power supplies are discussed. Auto radio power supplies, voltage regulators, various amplifier classes, coupling methods, phase inverters, feedback, and power amplifiers are detailed. Fundamentals of radio-frequency amplifiers, electron tube oscillators and detectors are reviewed. Contents of this volume are easily palatable, aided by the familiar "pictured-text" method of illustration.

**VACUUM-TUBE CIRCUITS FOR THE ELECTRONIC EXPERIMENTER.** By Julian M. Sienkiewicz. Published by Ziff-Davis Co., 1 Park Avenue, New York 16. 177 pages, hard cover. \$4.95.

One chapter of this book, almost half the text, in fact, is devoted to actual vacuum tube circuit schematics—a collection of 50 practical electronic construction projects—from power supplies through hi-fi preamps to crystal oscillators and a diagram for a darkroom timer. Each circuit is accompanied by a parts list and construction notes. Four of the book's six chapters are devoted to basic diode, triode, and multi-element tube operation and characteristics. One chapter covers component test methods, test equipment, and tools necessary for chassis construction. An appendix includes complete data on some popular tubes, and color code charts for capacitors and resistors. The book can prove helpful to the electronic beginner, as well as provide a ready file of basic circuits for the advanced electronic constructor.

**PRINCIPLES OF APPLIED ELECTRONICS.** By Ralph S. Carson. Published by McGraw-Hill Book Co., Inc., 485 pages, hard cover. \$9.95.

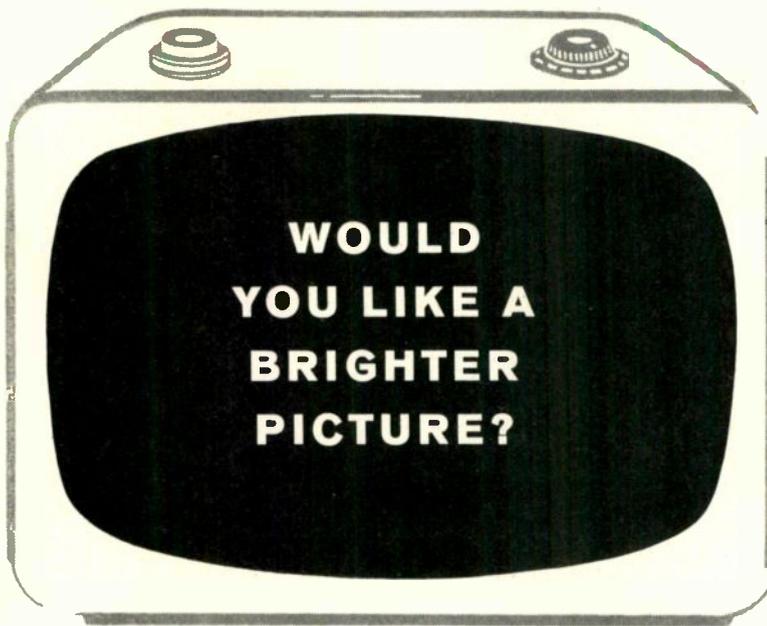
This is an up-to-date volume with the basic principles of vacuum, gas, and semiconductor electron devices. Directed to the professional engineer, technician, and hobbyist, the book is designed for easy reference and for easy reference and for home study. The physical phenomena of the three electronic devices are compared, and their advantages and disadvantages in applications are discussed. Basic d-c circuits of the devices are portrayed in great detail, including voltage and current amplifier circuits. Electronic power converters—half and full-wave rectifiers—voltage doubles, triplers and thyatron rectifiers are reviewed. Oscillation and basic oscillators are covered in one chapter, with magnetron, crystal, and RC oscillation principles outlined. Communication and electronic control systems are substantially reviewed. The book is well illustrated with photos, drawings, and diagrams. Review questions, problems, and research projects appear at each chapter ending.

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TO SELL — ELECTRO-VOICE!

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REPLACEMENT  
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Complete line  
to fill every need

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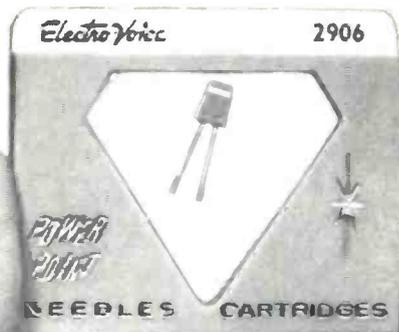
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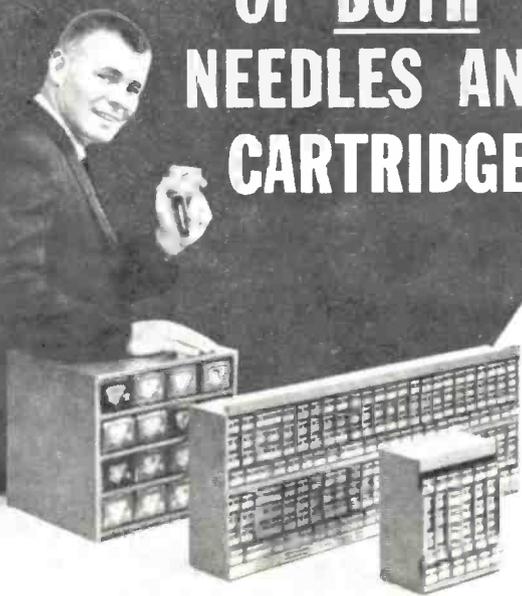
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Needles & Cartridge Div., Dept. 227T  
Buchanan, Michigan

For more details, circle 30 on page 48

**Electro-Voice®**



# NOW! Only 4 Picture Tubes can fill 50% of your replacement needs\*



## RCA 21CBP4A, 21AMP4A, 21ZP4B and 21YP4A Universal Silverama® Picture Tubes Replace 33 Industry Types

Now, four—*only four* RCA Universal Silverama types can take care of *half* your picture tube replacements. Think of what this means to you in terms of simplicity, economy and efficiency:

- **Fewer trips to the distributor.**

You can keep these four types in your shop, knowing that you will quickly have use for them.

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For half your picture tube replacements, you have the right tube on hand, in the shop. Saves hours of time picking up the proper tube or waiting for it to be delivered. The time saved gives you a competitive edge!

- **Picture tube replacements from your service truck.**

It's simple to carry one of each of these Universal types on your service truck so you can make half of your picture tube replacements *right on the spot*.

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Think of the headaches and extra bookkeeping this simplification saves.

These four types are part of a growing family of RCA Universal Picture Tubes designed to help you fill the maximum number of sockets with the minimum number of types.

RCA Universal Silverama Picture Tube types are made with an all-new electron gun, the finest parts and materials and a high-quality envelope that has been thoroughly inspected, cleaned and rescreened prior to reuse.

Start now to simplify your picture tube replacement problems. See your authorized RCA Distributor this week about RCA Universal Silverama Picture Tubes.

\*Based on EIA figures for the national movement of the picture tube types below.

RCA Silverama "Universal" Type	Replacing		
21CBP4A	21ALP4	21ANP4A	
	21ALP4A	21BTP4	21CBP4B
	21ALP4B	21CBP4	21CMP4
	21ANP4	21CBP4A	
	21ATP4	21BAP4	21CWP4
	21ATP4A	21BNP4	21DNP4
	21ATP4B	21CVP4	21FLP4
21AMP4A	21ACP4	21AMP4A	21BSP4
	21ACP4A	21AQP4	21CUP4
	21AMP4	21AQP4A	
21ZP4B	21ZP4	21ZP4A	21ZP4B
21YP4A	21YP4	21YP4A	21AFP4

RCA Electron Tube Division, Harrison, N. J.



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