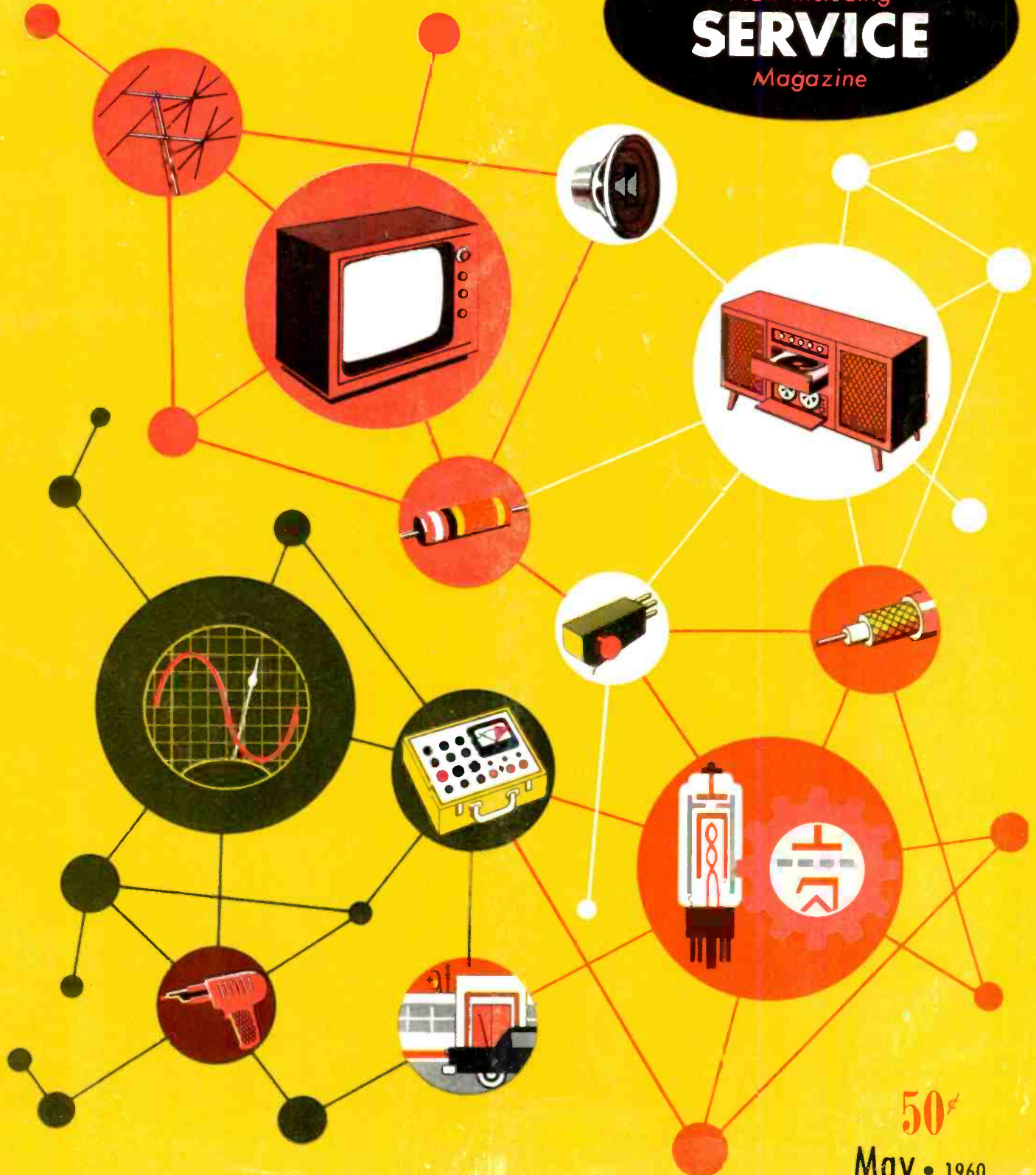


# ELECTRONIC TECHNICIAN

New Including  
**SERVICE**  
Magazine



50¢  
May • 1960

dealer-serviceman's fuse rack . . .

. . . for wall mounting

most  
needed



most  
wanted

. . . **the FUSEMASTER!**



dealer-serviceman's fuse  
requirements at a glance

# ELECTRONIC TECHNICIAN

Including  
**SERVICE**  
Magazine

World's Largest Electronic Trade Circulation

May, 1960

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**FRONT COVER** A wide variety of electronic parts and equipment—symbolized by an atomic structure—will be displayed this month at the Electronic Parts Distributors Show (see p. 44). The manufacturers, schools and associations constituting the electronic industry are listed in ET's annual directory (see p. 46).

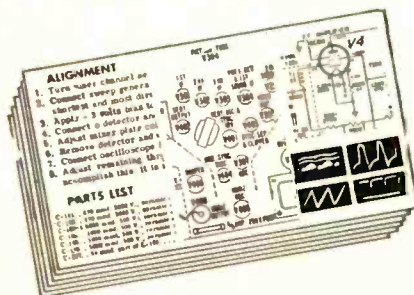
## FEATURES and ARTICLES

Showdown at Distributor Gulch (Editorial) .....	31
"Tuning in the Picture" .....	32
Ringin' & Overshoot in Scopes .....	R. G. Middleton 34
Adjusting Tape Recorders .....	Herman Burstein 36
Guide to Citizens Band Radio .....	Allan Lytel 38
"Tough Dog" Corner .....	I. C. Tilman, W. C. Sappington 39
Mobile Radio Accessories .....	Leo Sands 40
TV Troubleshooters—This Could Happen to You! .....	A. Kinckiner, J. Dorr 42
Free Literature .....	43
1960 Parts Show Preview .....	44
Shop Hints .....	W. Pier, G. Stillwell, R. Martel, B. Cornthwaite 45
1960 ELECTRONIC TECHNICIAN DIRECTORY .....	46
Technician Associations • Societies • Manufacturers Schools	
The Winners—Shop Hint & Tough Dog Contest .....	92

## DEPARTMENTS

Editor's Memo .....	4	New Products .....	25
Letters to the Editor .....	9	Audio Newsletter .....	66
News of the Industry .....	18	Association News .....	76
Reps. & Dists. ....	21	New Books .....	96

**CIRCUIT DIGESTS**..... Preceding Back Cover  
Includes cumulative index of all schematics published to date



## IN THIS ISSUE

(16 pp. latest schematics & data)  
**CUMULATIVE INDEX: 1952-1960**  
DELCO: Auto Radio, Chevrolet Corvair Model 988062  
MONTGOMERY WARD: TV Models WG-4082A, 4092A, 4182A, 4192A, 5082A, 5086A-5088A, 5092A, 5097A, 5182A, 5186A-5188A, 5192A, 5197A  
PHILCO: TV Chassis 10N41

← For more data, circle 5-C2-1 on coupon, p. 43

# Build new

ADVERTISED IN  
**LIFE**

They all sound  
better, longer,  
with Mallory  
Mercury Batteries



Choose any of today's stylish, compact transistor radios... and you'll enjoy a wonderful world of sound wherever you go.

But remember... there's a big difference in the batteries you can put in your transistor radio. To get the most enjoyment from your set, be sure to use Mallory Mercury Batteries. These remarkable energy packages developed by Mallory give you extra value:

- Several times longer life than ordinary batteries.
- Steady, full strength power month after month... no gradual fading.
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No wonder leading radio-manufacturers recommend them! Always ask for Mallory Mercury Batteries. A dealer near you has them in sizes to fit all popular transistor radios.

New folder tells you how to get the best listening pleasure from your transistor radio. Write to us for your copy.

In Canada, Mallory Products Company of Canada, Limited, Toronto 18, Ontario



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**P. R. MALLORY & CO. INC.**  
**MALLORY**

Battery systems for hearing aids, flashlights, cordless clocks, lanterns, instruments, military electronics.

**REACHING 32 MILLION READERS OF LIFE**

Here's the kickoff of our promotion program: a full-page ad reaching over 32 million readers of LIFE on May 9... ten million more people when it appears in the May 16 issue of TIME.

# service profits

with Mallory Mercury Radio Batteries  
... fast selling ... high profit per sale

The 30 million portable radios in use today represent a *giant* service market for \$40 million yearly sales in battery replacement. And it's growing leaps and bounds ... over 10 million transistor portables being used now, and 8 million more forecast for this year.

Here's how you can get your share of this booming business. It's the Mallory 1960 Radio Battery Program, that puts you on top of the market with—

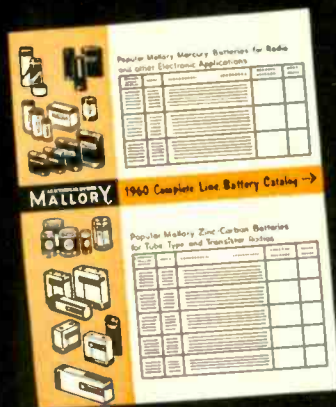
**A really different battery** ... the Mallory Mercury Battery ... that gives unequalled customer satisfaction.

**Powerful consumer advertising** ... reaching 32 million readers of LIFE, 10 million readers of TIME.

**High profit per sale** ... each battery brings you several times as much profit as an ordinary battery.

**No "dead" inventory** ... unique Mallory Mercury Batteries stay fresh on your shelf.

**The only complete line of batteries for all portable radios.**



#### NEW BATTERY CATALOG

Complete line of Mallory Mercury and Zinc-Carbon Batteries ... sizes, weights, applications.



#### A BATTERY SALESMAN SITTING ON YOUR COUNTER

New counter dispenser gives you a line of Mallory Mercury Batteries in popular sizes to fit all transistor radios ... and zinc-carbon batteries for other portable radios.



#### CONSUMER FOLDER

Colorful folder tells your customer how to "Get More FUN" from his transistor radio with Mallory Mercury Batteries.

Cash in on the big profits. Write us, or ask your Mallory distributor about Mallory's 1960 Radio Battery Merchandising Program ... and stock a full line of fast-moving, big-selling Mallory Batteries, for the sales that go hand-in-hand with your portable radio service.

Distributor Division  
Indianapolis 6, Indiana

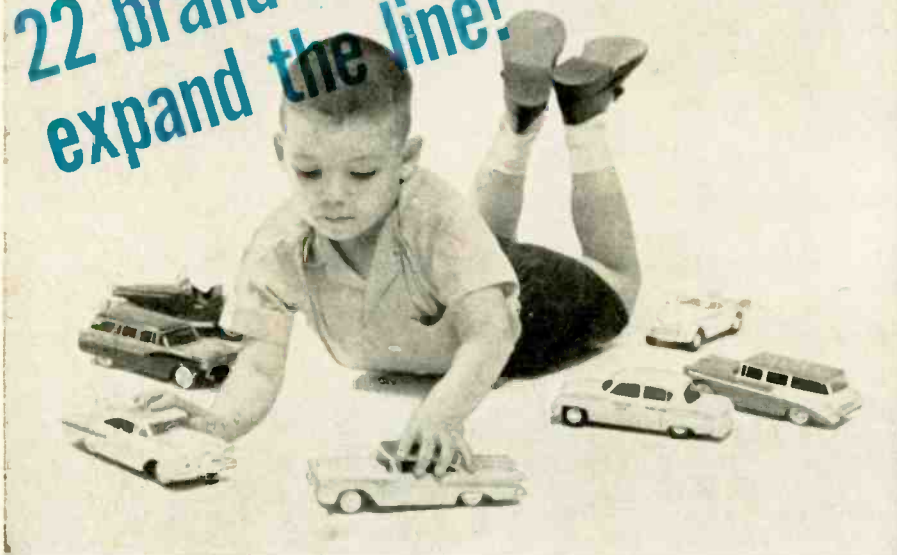
P. R. MALLORY & CO. Inc  
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## Auto Radio Control Replacement is Child's Play

with new **Centralab**®

### Exact Replacement Controls

22 brand new units  
expand the line!



Now more than ever, one source fills all your needs for auto radio replacement controls. Twenty-two new units expand the CENTRALAB line of exact replacements—give you full coverage of every popular radio in use today, including radios used in foreign cars.

But there's more to it than quality! It's more *convenient* to buy from your electronic parts distributor. Auto radio repair business is easier and more profitable when you don't have to make special trips to the auto parts distributor. Your CENTRALAB distributor will have it!

What about on-off switches for push-button radios? CENTRALAB has the most complete line (SP Series) for Plymouth, Dodge, DeSoto, Chrysler, Ford, Mercury, Lincoln, and Hudson.

A complete control replacement guide for TV and auto radios has been prepared by Howard W. Sams & Co., Inc. Order one from your distributor, and see the wide coverage of exact replacement auto radio controls you get from CENTRALAB.

B-6005

# Centralab

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CONTROLS • ROTARY SWITCHES • CERAMIC CAPACITORS  
PACKAGED ELECTRONIC CIRCUITS • ENGINEERED CERAMICS

For more data, circle 5-4-1 on coupon, p. 43

## Editor's Memo



There is a kind of unspoken agreement among magazine editors not to take pot shots at each other. It isn't gentlemanly to do so.

I hope we will be forgiven for taking off the kid gloves to state without qualification that the March 1960 issue of *Audio Magazine* contains some of the most asinine statements published in any electronics magazine for some time.

That magazine's leap-before-you-look writer, Edward Tatnall Canby, has decided that the source of many audio ills rests with the electronic service technician. Here is a sample: "Servicing of component hi-fi is a problem almost anywhere and we could do better. But repairs on "ordinary" home phonographs are absolutely outrageous. It seems as though nine times out of ten, the way I hear it, service men carefully and expensively replace parts that don't need replacing and fail to fix what is really wrong. Often they do more harm than good."

His experience is so limited, that by his own admission, he has never heard of one of those old phonos being repaired the way it ought to be.

To Mr. Canby, I can only say—Audio-ophile heal thine own distortions.

If I seem on the irascible side this month, it may be due in part to a study we have been making of distributor practices—and malpractices—across the country.

We are not looking to pick a fight, but we cannot remain timidly silent in the face of some of the problems which confront our readers.

This month's editorial discusses the distributor-dealer problem.

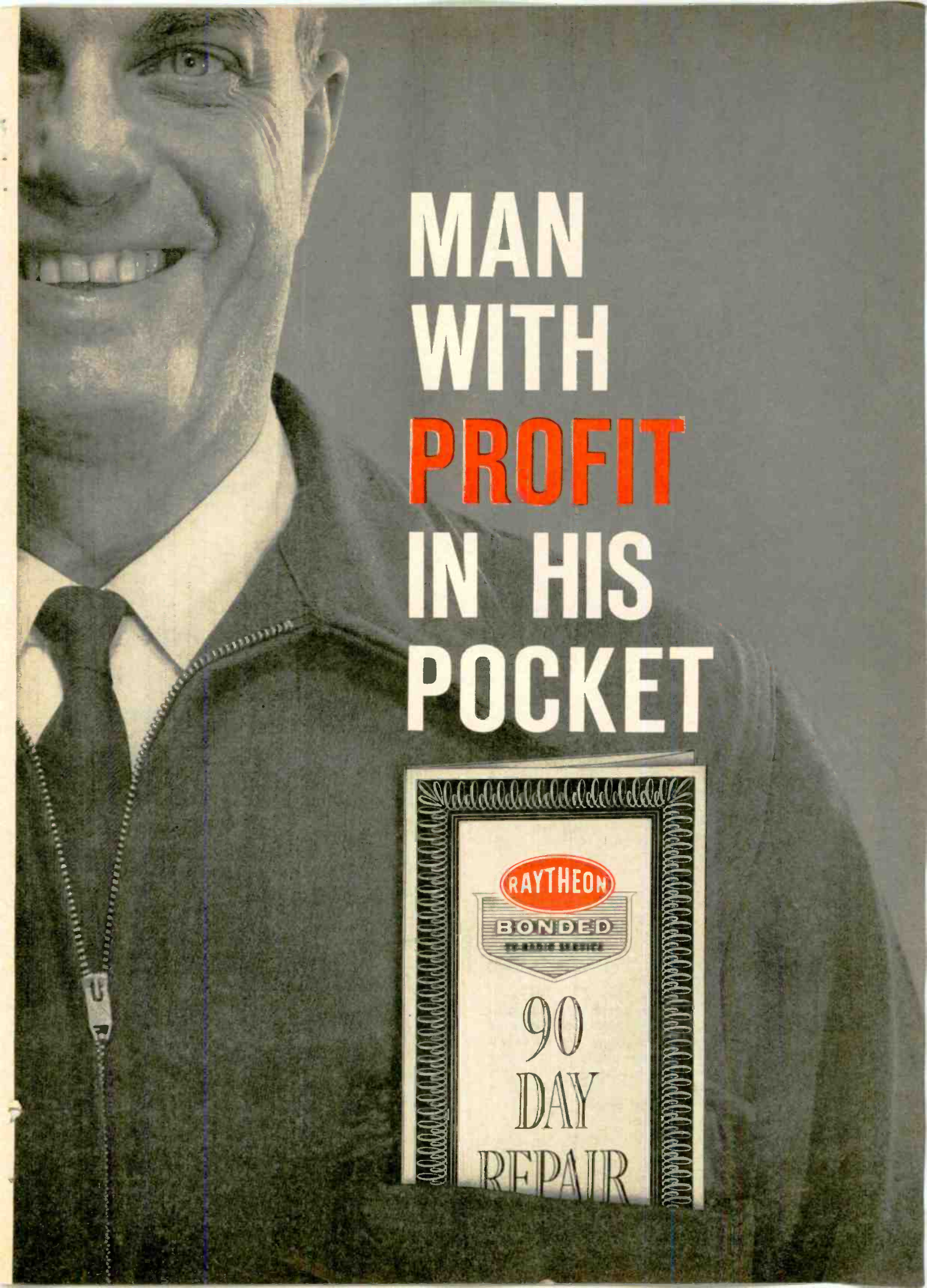
I don't think that we are picking on the wrong people—like the man who walked up behind another fellow, slammed him on the back with a mighty blow and said, "How are you Sam old boy? I haven't seen you for years."

Still visibly shaken from the blow, the fellow replied, "First of all, I am not Sam. Secondly, you have a devil of a nerve smacking me on the back like that. I ought to punch you in the nose."

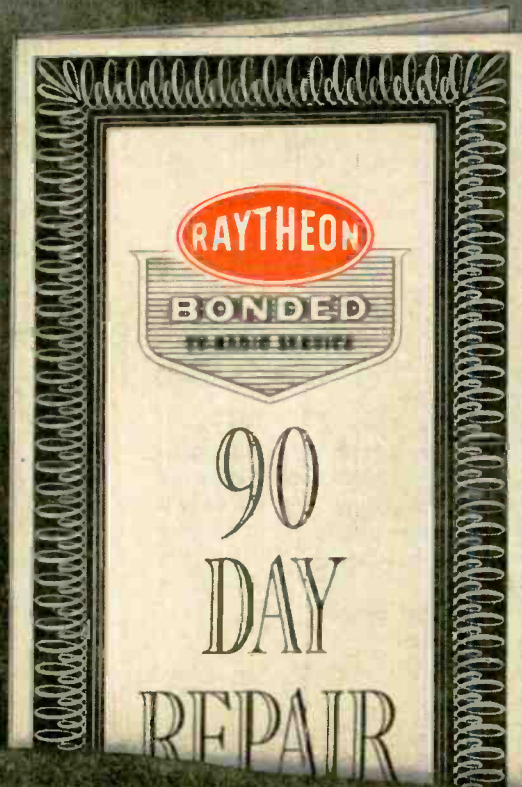
To which the back-slapper replied, "What business is it of yours if I want to smack Sam on the back!"

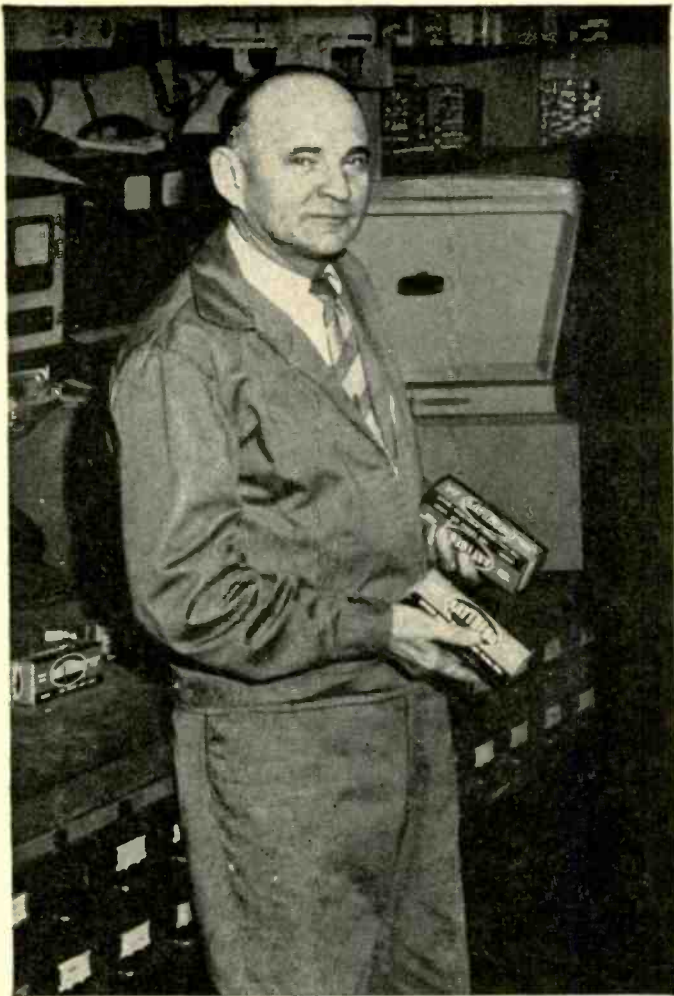
*Al Forman*

ELECTRONIC TECHNICIAN • May, 1960



**MAN  
WITH  
PROFIT  
IN HIS  
POCKET**





# HE'S MR. ...ONE OF 10,372

Mr. Van Akkeren, President of Van's Radio and Television Service, Sheboygan, Wisconsin, who has been in the servicing business since 1924 says, "We average about 1,000 calls per month. With that many calls we must keep our call-backs to a very minimum and maintain good customer relations. We are doing that by using dependable Raytheon tubes and operating as-a Raytheon Bonded Dealer."

*Here's how you,*



### NATIONAL ADVERTISING:

A year-round customer build-up for Bonded TV Service. Every month a powerful ad in TV Guide, number one weekly magazine in the U.S.A. with over 7,500,000 circulation.



### MERCHANDISING KIT:

Every Bonded Dealer gets a Merchandising Kit. It's a complete advertising and promotion program that includes your Bonded Dealer Certificate, Identification Card, Creed Display, Newspaper ad mats and 90-day Repair Bonds, everything you need to start you on the way to more profits.



### LOCAL TIE-IN WITH NATIONAL ADS:

Raytheon Bonded Dealer ads appear in each local program listing section of TV Guide. This gives you the opportunity to list your name in the TV Guide edition covering your area.



### BUSINESS BUILDERS:

Your local Raytheon Distributor is ready to provide many other promotion and merchandising extras. Your name in the Classified Telephone book, outdoor and transportation advertising, and a whole program of business and shop aids for your store.

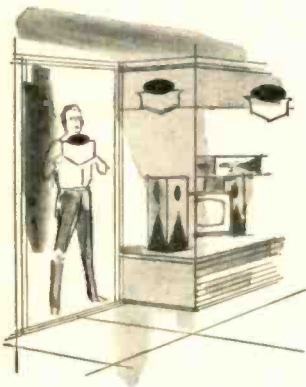


# CLARENCE J. VAN AKKEREN RAYTHEON BONDED DEALERS!

The Raytheon Bonded Dealer Program is an exclusive program limited to qualified independent TV service technicians with adequate service facilities. You get all the benefits and advantages of a nationwide service program, prestige of the nationally respected Raytheon name and the exclusive competitive advantage of being local headquarters for Bonded

TV-Radio Service. The Raytheon Bonded Dealer Program is backed by top-quality Raytheon products, technical service, sales aids, promotion materials, business-building advertising materials and much more. It's a complete program designed to pay off in customer confidence and in more business and more profits for you.

***too, can benefit as a Raytheon Bonded Dealer!***



## STORE IDENTIFICATION:

Eye-catching red and gold window valance, smart looking outdoor signs, truck and door decals and colorful window displays make your entire place of business more attractive.

## EXCLUSIVE 90-DAY REPAIR BOND:

Here is the most dynamic goodwill builder in TV servicing history! As a Raytheon Bonded Dealer, you will have working for you the salespower of an official 90-day Repair Bond. Proof that you *and* Raytheon stand behind your superior workmanship. Each bond provides space for your itemized bill listing all parts and service, along with the Bonded Dealer Code of Ethics.

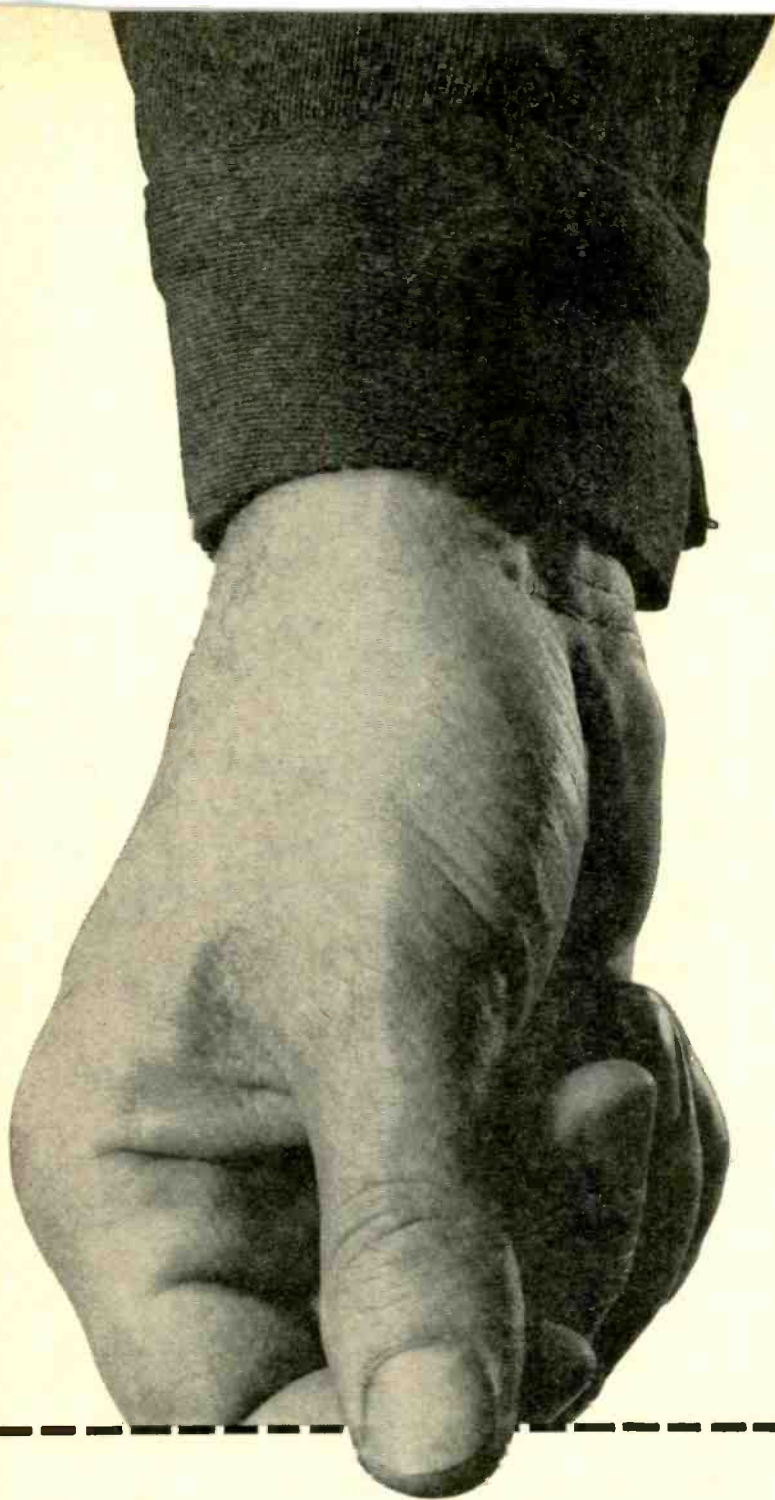


## NEW, OFFICIAL BONDED DEALER MAGAZINE:

The Raytheon Bond is the official magazine for Bonded Dealers only. In it is summarized the latest merchandising and advertising plans, technical articles and other material available to Bonded Dealers.



For more data, circle 5-7-1 on coupon, p. 43



# IF YOU WANT TO PUT A PROFIT PLAN IN YOUR POCKET

Raytheon Company, Distributor Products Division  
P.O. Box 200, Westwood, Massachusetts

I'm interested in becoming a Raytheon Bonded Dealer and taking advantage of the nationally advertised program and the exclusive use of the 90-day Repair Bond. I understand that this program is limited to full-time, independent TV-Radio Service Dealers.

Firm Name \_\_\_\_\_

Business Address \_\_\_\_\_

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

Telephone Number \_\_\_\_\_

Your Signature & Title \_\_\_\_\_

B

Fill out and mail in this coupon today. The Raytheon Bonded Dealer Program is the outstanding profit plan for independent dealers like you. No dues! No fees! No gimmicks! It's open to all top independent dealers.



Raytheon Company, Distributor Products  
Division, Westwood, Massachusetts

# LETTERS

## To the Editor

### Sears' Policy

Editor, ELECTRONIC TECHNICIAN:

Regarding your March Editor's Memo on Sears' service policy, I was employed by Sears for about 6 months, which is about as long as anyone can stand. The boss practically stands behind you with a blacksnake whip, and there is not even a stool to sit on. The schematic states no substitution of parts, and you must replace with Sears' own parts. On a set like Ward's, you can bridge a filter and get results, but that Silvertone paste board vertical printed circuit is for the birds. When you pull a tube, the socket comes out with it. They never farm out a little business to an independent, while Montgomery Ward will let you contract work. I don't expect that this will be printed, but I'm glad the Editor has spoken his piece.

RAY CRAMER

Ray's T. V. Service  
Kewanee, Illinois

... I have no connection with Sears other than as a rather poor customer and a technician who has to service one of their sets from time to time. You claim they don't furnish the serviceman with schematics. Did you ever look at a Silvertone TV? Every one I ever saw has a schematic and service notes glued in the cabinet where it cannot be lost by the customer or stolen by the dealer. You state that Sears demanded you publish all the current schematics of the entire Silvertone line or none at all. They may have the embryo of a great idea. Why not publish the schematics for all the manufacturers? I imagine the publication of these service manuals is a pain to them anyway.

JULES ELKISH

Philadelphia, Pa.

... Quite a few sets in this area are sold on price alone. As soon as they are out of warranty, I invariably get them for service. Most owners are happy with the results, but for sets that need a transformer, I tell them that they have to take them back to where they were bought. I have received, in trade, quite a few Silvertones, and have told the owners as frankly as I could what the Sears service setup was. I applaud your stand on the situation.

JACK P. GOLDEN

Portville TV & Radio  
Portville, N.Y.

... Your quote of Commodore Vanderbilt, "The public be damned," regarding

Sears policy, caught my eye. Around 1905, J. D. Rockefeller raised the price of kerosene. His utterance, "The public be damned," appeared in four inch block letters at the top of U.S. newspapers. I think that Nero beat him to it.

E. J. FAGAN

Rochester, New York

● *Vanderbilt merits the dubious honor of originating this phrase—Ed.*

... Your Memo gave me a great deal of amusement. In 1958, I wrote to you

about the difficulties I was having with the Volkswagen organization. I was not able to buy a shop manual from them. I assume that you had not seen the VW service books you recommended, because if you had, you would realize they were incomplete. I would like to ask you if the difficulties you have had with Sears are not similar to the problems I have had with VW. The VW captive service policy is just as selfish. Yet you would not devote one paragraph in your magazine to this attitude.

EDWARD JONES

Rahway, New Jersey

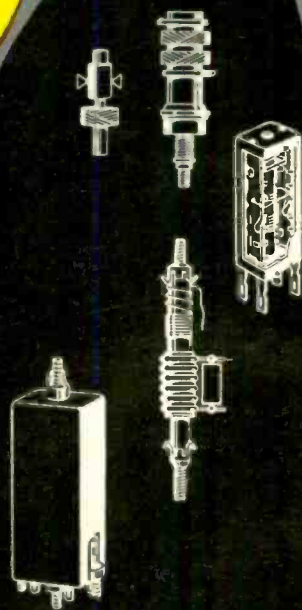
(Continued on following page)

yes

## STANCOR<sup>®</sup>

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

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



**CHICAGO STANDARD TRANSFORMER CORPORATION**

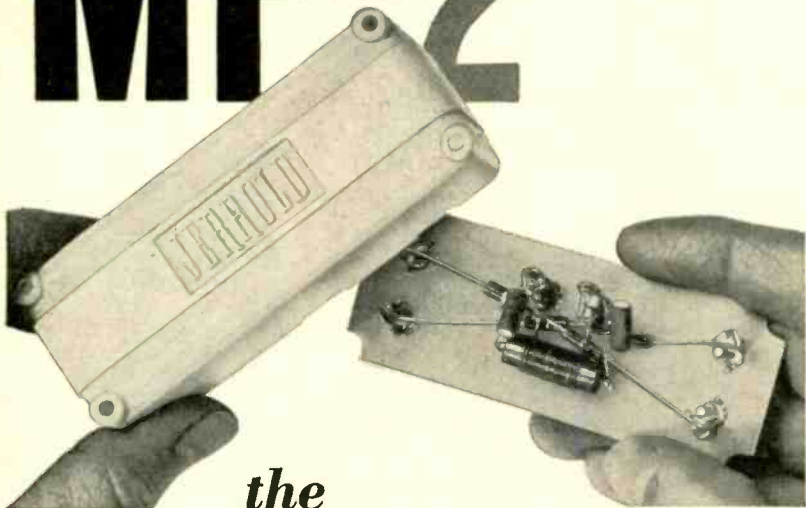
3513 ADDISON STREET

CHICAGO 18, ILLINOIS

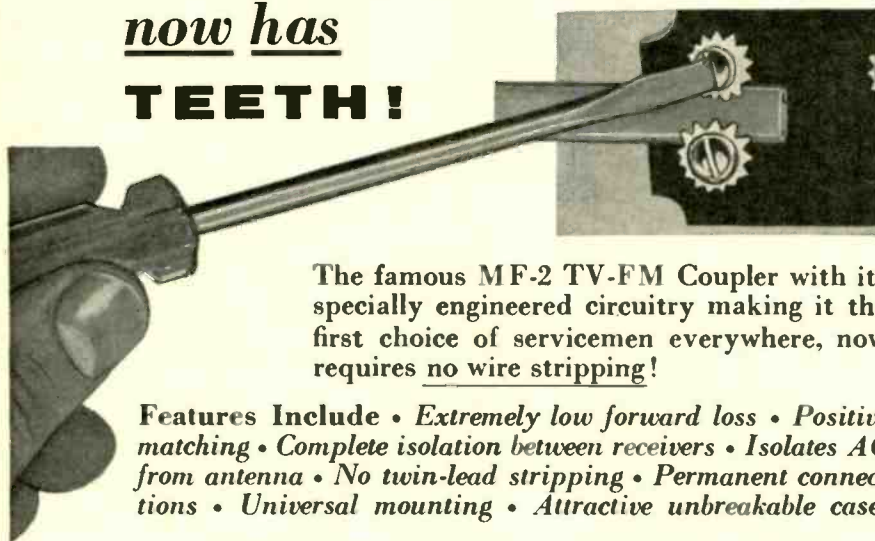
For more data, circle 5-9-1 on coupon, p. 43

# JERROLD

# MF-2



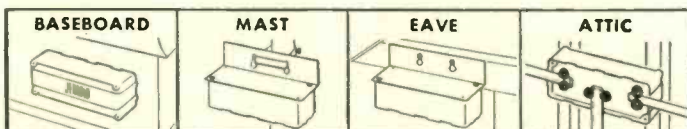
the  
**2 Set Coupler with GUTS...**  
now has  
**TEETH!**



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

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

**Mounts  
anywhere**



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

# JERROLD

Order from your Jerrold distributor or write  
**ELECTRONICS CORPORATION, Distributor Sales Division**  
Dept. 1DS-24 The Jerrold Building, Philadelphia 32, Pa.

Jerrold Electronics (Canada) Ltd., Toronto

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

## Texas Law

Editor, **ELECTRONIC TECHNICIAN**:

I am sending you a copy of a law which has been in effect in our state since September 1959. Frank Moch reprinted copies of it. It was the end result of a terrific amount of under cover work by Texas service associations, both NATESA and non-NATESA. The net result? Individual identity of each "part-timer" or as we would say, "fringe operator." It is unlawful for a distributor to sell to anyone without a Permit and Bond, unless he secures Permit and Bond himself. Many do not want to be so identified. Therefore, anyone desiring to service electronic equipment must be licensed to collect taxes and bonded to assure payment of same to the state.

Now when this individual secures Bond and Permit, he leaves his name, address, and Permit number in the State Comptrollers office (for public scrutiny). The name can then be taken to his home area, and with local directory, his "regular" occupation can be determined! Meanwhile, the phone company wants to install his business phone; the city zoning commission wants to "relocate" him (if necessary); the fire commission wants to assure themselves of proper fire conditions; the city, county, and state tax people assure themselves of proper tax rendition and collection; insurance coverage soon becomes a factor; and of course the Internal Revenue Service is interested in his "extra income." All of these things put him "in business"! It is then up to him to stay in business (if he can!).

I am curious as to why your publication has failed to pick up this story.

F. B. KOEPNICK,  
Director

TESA of Houston, Inc.  
Houston, Texas

• The passage of this important law was reported in our October 1959 issue. For additional comments on distributor sales, see "Showdown at Distributor Gulch" in this issue.—Ed.

## Little Boo-Boo

Editor, **ELECTRONIC TECHNICIAN**:

Love that ET Magazine! But where did you get the information on page 77 of the March issue, placing TSDA in New Jersey? If you got it from the Vanguard, our official Tri-State Council Publication, there are four—count 'em—references to TSDA Delaware Co. (Pa.), not Pennsauken, N.J., the editor's address. I still think you are great though, and except for that little boo-boo, I'll say keep up the good work.

TONY DE FRANCO,  
Editor

The Vanguard  
Tri-State Council of TV Service Assocs.  
Camden, New Jersey

(Continued on page 12)

For more data, circle 5-11-1 on coupon, p. 43 ➤  
**ELECTRONIC TECHNICIAN • May, 1960**

For more data, circle 5-10-1 on coupon, p. 43

# HICKOK

...WORLD LEADER IN  
ELECTRONIC TEST EQUIPMENT

The unexcelled quality, accuracy and dependability of Hickok electronic test equipment is recognized the world over... a reputation that has been earned through fifty years of specialization in this field.



MODEL 121  
\$329.50 NET

### HIGH-SPEED CARDMATIC

A modern tube tester for modern tube applications... not only makes critical "fringe" tests, but actually tests such types as 6SN7 and 6BQ6 for pulse operation... exclusive Hickok card-programmed switch - the key to its rapid automatic tests - positively and automatically sets up exact conditions.



MODEL 455A \$74.50 NET

### BURNOUT-PROOF VOLT-OHM-MILLIAMMETER

Exclusive Hickok overload cut-out and protection system provides complete safety against accidental burnouts not only for the meter but for all resistors, shunts and other components... any high voltage may be applied directly across any function without danger.



MODEL 123A \$530.00 NET

### LAB-ACCURATE CARDMATIC

For fast, accurate and complete testing of complex industrial electronic tubes, including VR and computer tubes... patented Card Reader Mechanism permits over 10 trillion switching circuits... can program special tube tests at any point on characteristic curve.



MODEL 470 \$94.75 NET

### ELECTRONIC VOLT-OHMMETER

Specifically designed with an 0 to 0.5 volt DC range for high-sensitivity transistor bias testing... large 7 inch Hickok-built meter gives excellent visibility... in high impact molded phenolic case, complete with time-saving single unit probe.



MODEL 6000  
\$197.50 NET

### HIGH-SPEED DYNAMIC MUTUAL CONDUCTANCE

Popular small portable tube tester... features the original Hickok developed Mutual Conductance Circuit - the Gm method, long accepted as the industry standard, and instantaneous shorts test... snap-in master socket panel is replaceable to prevent obsolescence.



MODEL 209A \$157.00 NET

### TRUE VTVM & CAPACITANCE TESTER

Permits measurements as low as 1 uuf and as high as 1000 uf... 9" indicating meter for high visibility... AC response to 200 MC... ideal for measuring wide ranges of resistance, current and voltage.



MODEL 800  
\$169.50 NET

### LOW-COST DYNAMIC MUTUAL CONDUCTANCE

Tube and transistor-diode tester... new leakage and shorts test and new grid current (gas) test feature... low in cost, this tester features the famous Hickok Mutual Conductance Circuit. Lowest cost tester in its completeness and accuracy range.



MODEL 675A \$299.90 NET

### TV OSCILLOSCOPE

Wide band, high sensitivity... 5-inch scope permits unusual accuracy... features an illuminated calibrated screen... vertical amplifier response within 3 db, DC to 4.5 MC, flat through 3.58 MC color burst frequency... astigmatic control circuit provides a new standard of undistorted trace detail.

**THE HICKOK ELECTRICAL INSTRUMENT CO.**

10523 DUPONT AVENUE  
CLEVELAND 8, OHIO



*Now at your Distributor's!*

A complete guide, by equipment brand and model number, to Sylvania direct replacement transistors and diodes. Interchangeability information is included for rectifiers, too. Gives Sylvania equivalents of foreign transistor-types. Helps you find the right replacement unit . . . fast! Get your copy from your SYLVANIA SEMICONDUCTOR DISTRIBUTOR or write Sylvania, P. O. Box 212, Buffalo 9, N. Y. Only 50¢ for this valuable booklet!

Check your semiconductor stock. Fill in with top-quality Sylvania transistors, diodes and rectifiers. Your Sylvania distributor has the best! Sylvania Semiconductor Division, Woburn, Mass.

# SYLVANIA

Subsidiary of GENERAL TELEPHONE & ELECTRONICS



## The Sum of the Parts is More Than the Whole

Editor, ELECTRONIC TECHNICIAN:

One of the many problems plaguing the service shop is the high cost of replacement parts. The number of instances where the estimated repair exceeds the set value is increasing. One brand, chosen at random, listed new at \$139.95. If bought in a discount house, it was less. The manufacturer's parts list showed the list price of parts to be as follows:

Tuner	\$ 50.00
CRT	35.00
Cabinet, glass, speaker and parts	50.00
16 tubes and selenium rectifier	40.00
yoke and flyback	20.00
67 capacitors	18.00
85 resistors	17.00
16 coils	8.00
10 transformers	15.00
<b>Total</b>	<b>\$253.00</b>

Not shown is the cost of the chassis, labor, alignment, troubleshooting, overhead, etc. Although this model is a few years old, prices of tubes and parts have risen faster than the prices of finished sets. Because the serviceman must face the customer's resistance, he is caught in a squeeze and cannot raise his labor charges proportionately to a profitable level.

HAROLD N. HOROWITZ

Sombrero Television Co.  
Phoenix, Arizona

## Cut Out the Appliance Articles

Editor, ELECTRONIC TECHNICIAN:

Having just finished reading your March article on toasters, I have an urge to sound off. I may be in the minority, but I feel that ET should publish articles on TV, audio, etc. You can buy a fix-it book on appliances for 50¢ on the newsstand. I, for one, would gladly buy one of these books and save the space in your magazine for articles more closely related to servicing more complicated electronic devices. I think your magazine is wonderful. Incidentally, we service toasters.

R. H. HANCHETT

J. H. Gilbo & Sons  
Port Henry, New York

## TV Station Is On the Ball

Editor, ELECTRONIC TECHNICIAN:

For many years our radio and TV station has invited all the servicemen to the station to discuss the many transmitting and receiving problems of the broadcasting industry. We feel the serviceman is a very important part of this business, and on TV Technicians Week, we honor them.

T. O. JORGENSON,  
Chief Engr.

WEAU  
Eau Claire, Wisconsin

(Continued on page 16)

*"Well I'll be a -----,  
it really eliminates ghosts!"*

...The exact words used by  
**TORRIE APPLIANCE CO.**  
Astoria, N. Y.

after testing the  
*"Unbelievable"*

**REMBRANDT**  
ELECTRIC

**TV GHOST ELIMINATOR**  
with built-in picture booster

Another RESEARCH FIRST from ALL-CHANNEL PRODUCTS CORP.

U.S. Patented—  
U.L. Approved



**\$7<sup>95</sup>**

RETAIL,  
Fair Traded  
Individually Boxed  
Mahogany Finish

Here's the secret: The "Rembrandt" rotates polar-receiving pattern of the existing antenna and phases the ground wave picked up through the electrical system with the sky wave picked up by the antenna.

Not a cure-all...but, in 8 out of 10 locations, will either completely or substantially eliminate all ghosts! Works with any existing antenna: indoor, outdoor, master or built-in!

**SOLVES** the #1 cause of TV customer complaints—builds customer good will. Helps move TV Sets—especially color!

**SAVES** "no charge" call-backs...gets the chronic complainer "off your back."

**STEPS UP** your volume—opens old and new doors for profitable summer business. An "add-on" sale to go with every installation! Attaches in just 60 seconds!

And here are other, actual, "on-the-scene" comments, made "before" and "after," by other TV servicemen and dealers who had to be shown:

**BEFORE TEST:** "It looks to me like another Plug-in Antenna."  
**AFTER TEST:** "Wow! This is for me...you should put a \$12.95 selling price on it. In this area, they will pay anything to get a decent picture."  
Kenmar T.V., Bronx, N. Y.

**BEFORE TEST:** "Fellows—it's electronically impossible."  
**AFTER TEST:** "Well, I guess I don't know what I'm talking about—I'm going back to school!"  
Pinehurst T.V., New York, N. Y.

**BEFORE TEST:** "It looks like another gimmick."  
**AFTER TEST:** "Will cause a boom in T.V. sales. I will sell one with every set and antenna installation."  
Harvey Television Co., Astoria, N. Y.

**BEFORE TEST:** "Someone is always trying to beat the public. Where do you guys get your guts?"  
**AFTER TEST:** "My apologies gentlemen. I'm going to take these out on every one of my calls—it will save me a lot of no charge call-backs."  
Guardian Electronics, New York, N. Y.

See it demonstrated at the Chicago Parts Show  
Booth 123

**CALL YOUR DISTRIBUTOR TODAY—  
OR MAIL THIS COUPON!**

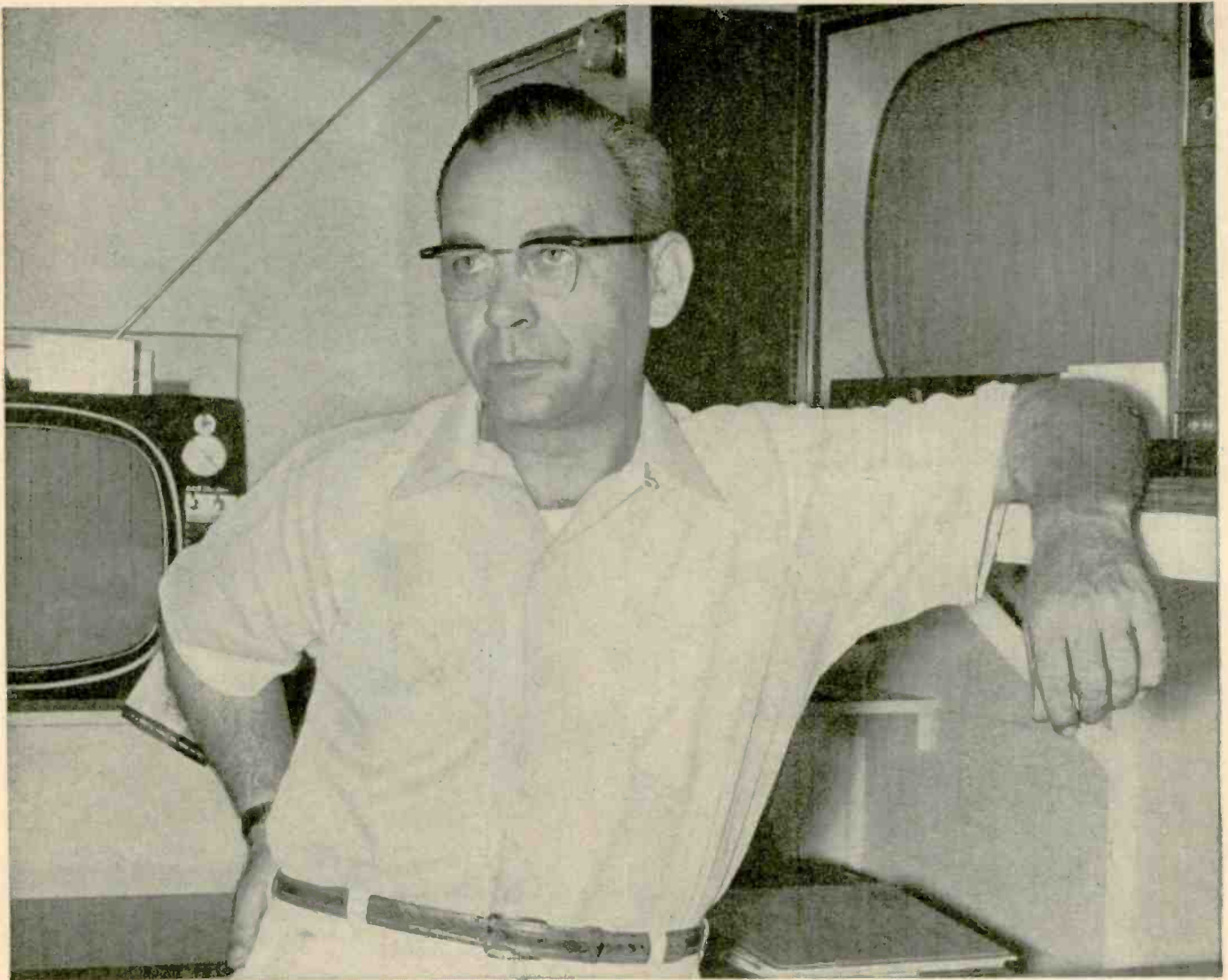
**ALL-CHANNEL PRODUCTS CORP.**  
47-39 49th Street, Woodside 77, New York

Sold on Guaranteed Sale  
**ALL-CHANNEL PRODUCTS CORP.** Dept. ET  
47-39 49th Street, Woodside 77, New York

I still don't believe it! You've got to convince me—send me your literature on the TV Ghost Eliminator and the name of nearest distributor (with no obligation).

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

For more data, circle 5-13-1 on coupon, p. 43



## "Our Yellow Pages advertising pulled so many calls I had to install more phones"

says Horace E. MacQuarrie, Mac's TV Installation & Service Co., Portland, Me.

"For several years now we've been averaging 6,500 service calls annually, most of them through our Yellow Pages advertising. As a result, our telephone lines became overloaded and we had to put in more phones. To me, this proves the pulling power of Yellow Pages.

"One of the important things about service calls is the long-term business they help bring in. If you do a good service job, you usually wind up with a new customer for a TV set or appliance later on. In our business Yellow Pages advertising is by far the best way to get your foot in the door."

Start more business coming your way. Build a better awareness of *what* you offer by advertising in the Yellow Pages. Call the Yellow Pages man at your Bell telephone business office now. He'll gladly outline an AWHERENESS plan best suited to your business.

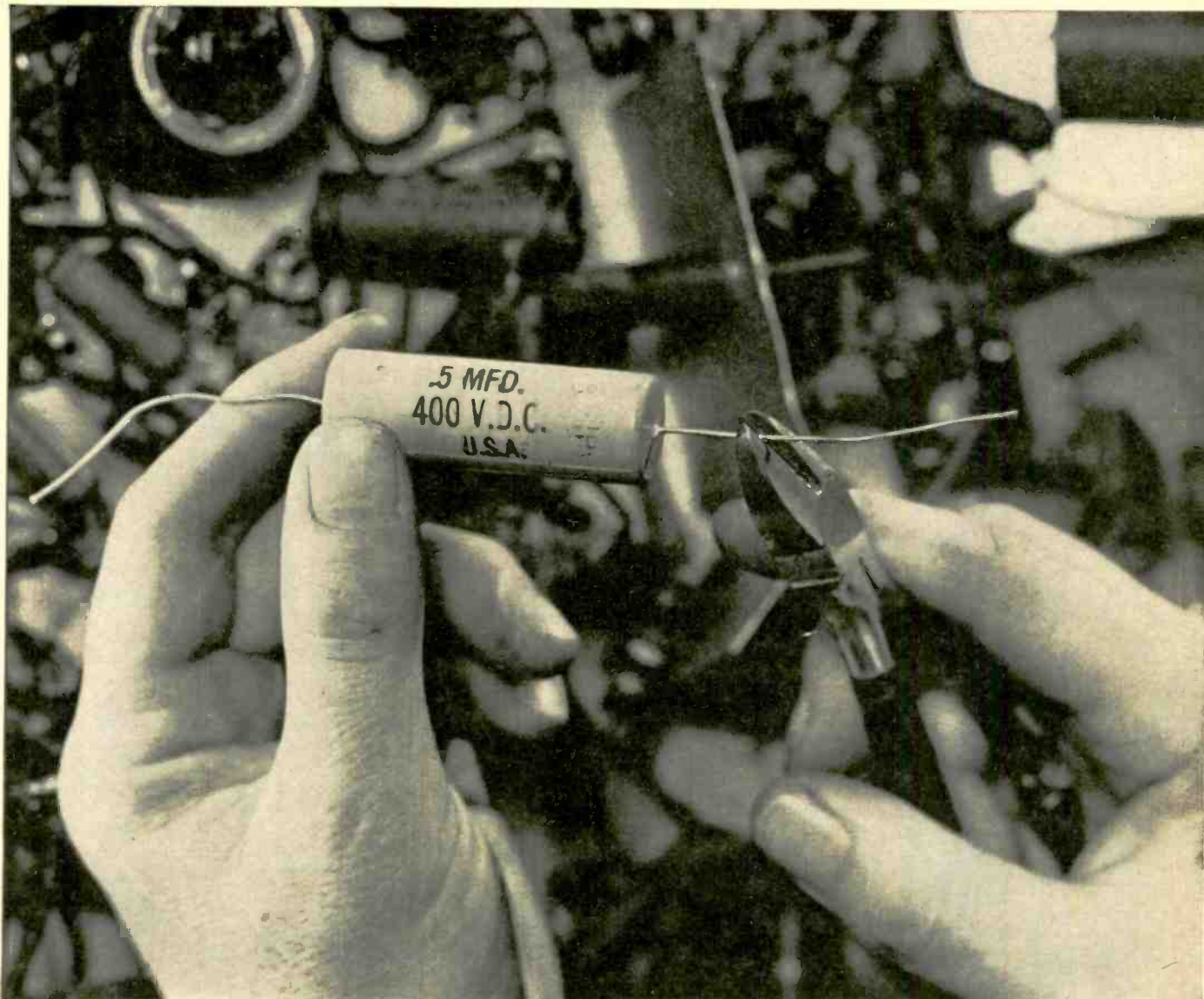
THIS DISPLAY AD (reduced) in the Portland, Me., Yellow Pages features Mac's service trucks and the brands he handles. Installing outdoor antennas is a big part of Mr. MacQuarrie's television service business.

Find Us Fast  
In The  
Yellow Pages

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

For more data, circle 5-14-1 on coupon, p. 43





## This service man is installing insurance against costly call-backs... capacitors made with MYLAR®

You can save money by using capacitors insulated with "Mylar"\* polyester film . . . eliminate wasted call-backs for failure of newly installed capacitors. "Mylar" means superior performance for four important reasons.

**1. High dielectric strength . . .** "Mylar" averages 4,000 volts per mil breakdown strength.

**2. Long life . . .** neither time, temperature nor highest humidities affect the stability of "Mylar".

**3. Size reduction . . .** the high dielectric strength of "Mylar",

coupled with its great physical strength, permits its use in thinnest gauges. Smaller capacitors are ideal for hard-to-get-at jobs . . . save precious space.

**4. Proven value . . .** leading manufacturers make capacitors insulated with "Mylar" for critical military applications, missiles and sensitive electronic computers.

Next time you order, ask your distributor for the extra reliability, long life and economy of trouble-free capacitors made with "Mylar". And for test data that details the basic properties of "Mylar", write for Du Pont's free booklet. E. I. du Pont de Nemours & Co. (Inc.), Film Dept., Room #16, Wilmington 98, Delaware.



\*"Mylar" is Du Pont's registered trademark for its polyester film.

REG. U.S. PAT. OFF.  
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

For more data, circle 5-15-1 on coupon, p. 43

DU PONT

**MYLAR®**  
POLYESTER FILM

### Questions Answered

We have put together in printed form some of the questions about TV that are asked in our shop. Enclosed is a copy. Listed below are some of the questions and answers included:

- Q. If my picture tube goes black, does that mean it is bad?  
A. If your picture tube goes black that does not always mean that it is bad; it could be a small tube or trouble elsewhere in the set.
- Q. Does it hurt to play a television if the picture is out, and you wish to hear the sound?

- A. You could do more harm by playing it. If it should smell or smoke, you should unplug it from the wall outlet immediately.
- Q. How can I know if a business is qualified to perform service on my set?  
A. When you call for service on your set, you should call a business that specializes in television repair. Every business that sells televisions is not qualified to make repairs.
- Q. When my set is taken to the shop for repairs and returned is the complete set guaranteed?  
A. No, due to the hundreds of parts

in a television, only the parts replaced will be guaranteed.

- Q. What adjustments may the set owner make to the set himself?  
A. All controls that can be turned by hand and can be reached by the owner without removing the back of the set can be adjusted by the owner. Never attempt adjustments with a screwdriver, they are for qualified repairmen only.

LAWSON'S TELEVISION & RADIO,  
Tahlequah, Okla.

### Educational

Editor, ELECTRONIC TECHNICIAN:

I certainly enjoy reading ELECTRONIC TECHNICIAN. It's like taking a home study course every month.

ALFRED BOURELL

Steele, Missouri

### Circuit Digest Index

Editor, ELECTRONIC TECHNICIAN:

Your Circuit Digests are very helpful and I use these diagrams constantly. They are published before others make these same schematics available. With so many manufacturers, we need a good index to go along with the diagrams. To scoot through thousands of diagrams takes too much time.

JACK STROBEL

Jack's Radio & T.V.  
Philadelphia, Pa.

● See this month's Circuit Digest for a cumulative index of all schematics published to date.—Ed.

### It's High Time

Editor, ELECTRONIC TECHNICIAN:

Thank you for "Do Newspapermen Take Payola?" [Feb. pg. 68]. It is high time someone dared to go to bat for independent TV service technicians and expose the expositors. It is most unfair for any newspaper to ridicule a whole industry because of the misdeeds of a small minority. One fact that stands out in your write-up is the comparatively low income of members of our profession. The other outstanding fact is that customers are satisfied with the service they are receiving. The last fact disproves the need for captive service and licensing. What we need is an enabling law that would give our industry the right to say who is qualified to service and install electronic equipment. Such a law may have to be kept under government control, but it must be left in the hands of professional servicemen to be administered most effectively. A licensing law can't do this.

JOHN STOLL

Secretary Peoria Chapt.  
Assoc. Radio & Television Servicemen  
Peoria, Ill.

## BUY A DOZEN VU-BRITES



...get the flashlight

# FREE!

Colorful polystyrene unbreakable full-size flashlight—yours free with the purchase of 12 Vu-Brites!

### WHAT A DEAL!

For a limited time, Perma-Power is offering you this wonderful gift absolutely free with the purchase of 12 Vu-Brites at the regular price. Vu-Brites are the brighteners that really do a job—on series or parallel sets (Model C401 for parallel; Model C402 for series). They come colorfully packaged in individual boxes . . . and are priced at \$9.95 the dozen, net.

Hurry—this special gift offer will end when current stocks are gone. Call your distributor today.

**Perma-Power**® COMPANY  
3104 N. ELSTON AVENUE • CHICAGO 18, ILLINOIS

For more data, circle 5-16-1 on coupon, p. 43

For more data, circle 5-17-1 on coupon, p. 43 ➤  
ELECTRONIC TECHNICIAN • May, 1960

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

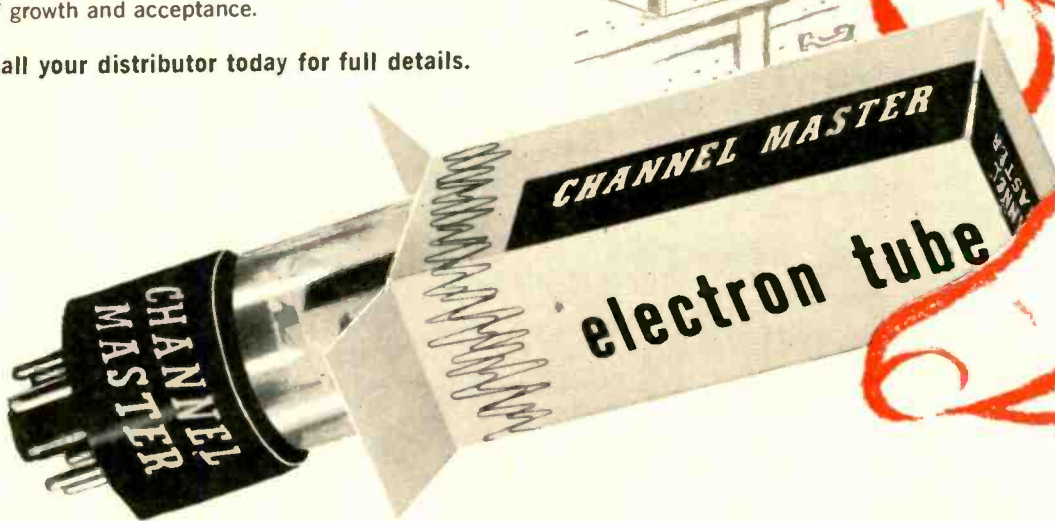
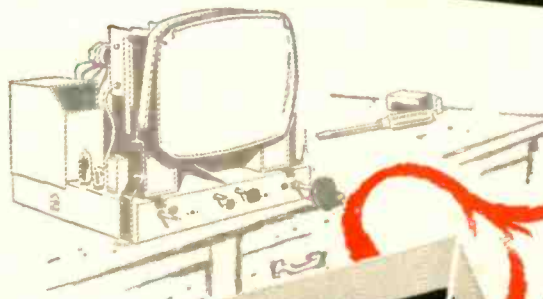


Are you satisfied with your mark-ups on transistor radios? Channel Master dealers work on large margins, even on price leaders. Are you selling the brand that does the big volume? Channel Master radio sales are in the top "Big 3". Are you building customer confidence? Channel Master's spectacular Free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

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

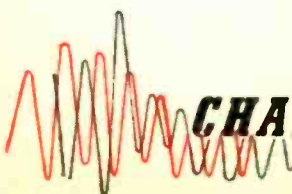
... today's fastest-growing favorite in replacement tubes comes in the red, white, and blue Channel Master carton. Each premium-quality tube meets Channel Master's new, higher standards for uniformity, long-life, and performance. Dealers are gladly breaking old habits and making Channel Master their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

Call your distributor today for full details.



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

Copyright 1960 Channel Master Corp.



**CHANNEL MASTER** works wonders in Sight and Sound  
ELLENVILLE, N. Y.

# What's the latest score on cartridges?

✓	<b>1<sup>ST</sup></b>	ceramic cartridge was invented by Sonotone...
✓	<b>13</b>	years ago. Today, over...
✓	<b>65</b>	different manufacturers have specified Sonotone for...
✓	<b>662</b>	models of high-quality phonographs. Altogether over...
✓	<b>9,000,000</b>	Sonotone Ceramic Cartridges have been used for original and replacement purposes. ('Nuff said!)

**Sonotone** ® P. R. O. C.

Electronic Applications Division, Dept. C9-50

**ELMSFORD, NEW YORK**

In Canada, contact Atlas Radio Corp., Ltd., Toronto

Leading makers of fine ceramic cartridges, speakers, microphones, electronic tubes.

For more data, circle 5-18-1 on coupon, p. 43

## News of the Industry

**CENTRALAB** has appointed **STRAL ADVERTISING CO.** as Public Relations Counsel.

**RAYTHEON** Semiconductor Div. has promoted **HENRY F. SCHUNK** to the position of Div. Sales Mgr.

**GENERAL ELECTRIC** has announced the election of **L. BERKLEY DAVIS**, Gen. Mgr. of the Electronic Components Div., to the post of Vice Pres.

**STROMBERG-CARLSON** Electronics Div. reports the appointment of **WILLIAM LAWRENCE** as Director of Operations.

**AMPEREX ELECTRONIC** has announced the following two promotions: **GEORGE ELLIOT**, Mgr. Distributor Sales; and **JOSEPH VIVIANI**, Mgr., Export Sales.

**ADMIRAL SALES** National Service Div. headquarters and electronic parts and accessories dept. have been moved to 903 Morrissey Dr., P.O. Box 845, Bloomington, Ill.

**B&K MFG.** reports their new 65,000 sq. ft. plant at 1801 W. Belle Plaine, Chicago, provides enlarged facilities for laboratory research, engineering and manufacturing.

**SHURE BROTHERS** announced the appointment of **ROUHOLAH ZARGARPUR** as Mgr. of Manufacturing Engineering and **ROBERT NORDIN** as Mgr. of the Design and Specification Section.

**ELECTRONIC TRANSISTORS** reports a line of 412 different Germanium transistor types is now available from the newly-formed company. The transistors are being manufactured under a patent license agreement with the **WESTERN-ELECTRIC CO.**

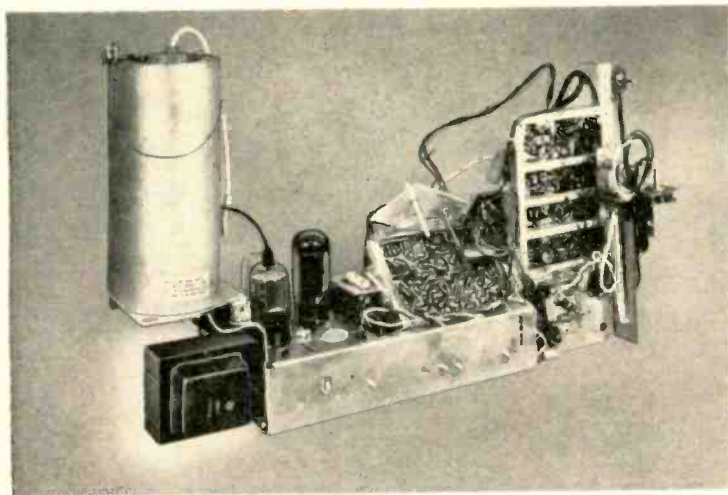
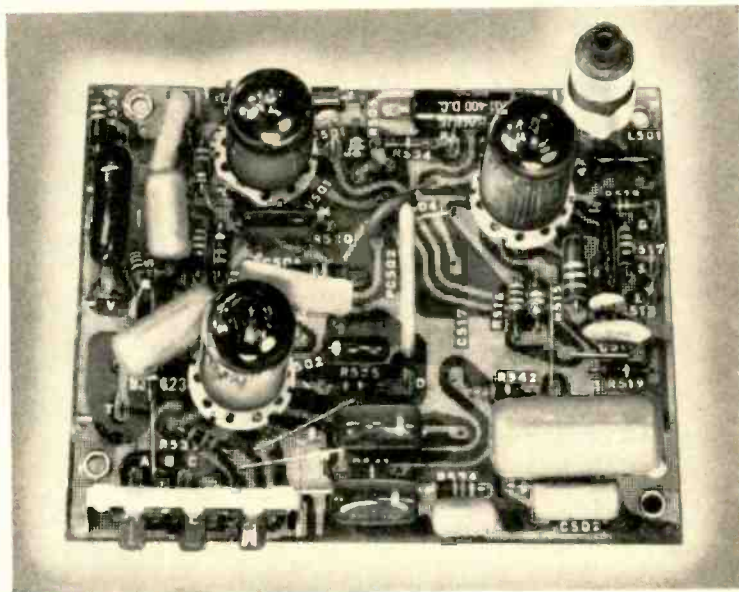
**CHANNEL MASTER** announces the appointment of two new District Sales Mgrs. to service distributor accounts: **NORMAN STANFORD**, Me., Vt., Central and Northern N.H., Eastern Mass., Quebec, Eastern Ont., and Maritime Provinces in Canada; and **PAUL MYHAND**, Okla., N.M., Ark. and West Tex. "A Promise of Performance" is the title of a new store display provided dealers to dramatize the company's free replacement warranty on its transistor radio line.

(Continued on page 21)

Now setting new industry standards  
for performance and reliability—

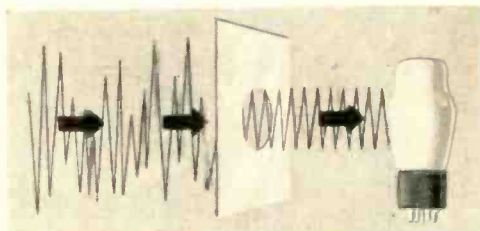
# Every new RCA VICTOR TV set has all these quality features:

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



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

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



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



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



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



THE MOST TRUSTED NAME IN TELEVISION

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

...and here's a New  
**Amperex®**



# AMPLIFRAME\*

for improved TV tuner performance... **Triode Type 6FY5**

## You'll Find Amperex Ampliframe Tubes in the Best TV Sets You Handle

ONE YEAR AGO, Amperex made the AMPLIFRAME type 6ES8 available to the TV industry for their highest quality cascode tuners. By virtue of its high transconductance, low noise and exceptional reliability, the type 6ES8 is now accepted as the standard of the industry. NOW, to establish another new industry standard —

in this case for less expensive tuners—Amperex presents the AMPLIFRAME triode Type 6FY5, an improved version of the now famous AMPLIFRAME type 6ER5, offering 1 db lower noise and 2 db higher gain. The extraordinary uniformity of this tube is the result of the special Amperex techniques utilized in its mass production.

Here are some of the outstanding features of the new type 6FY5:

- extreme tube-to-tube uniformity almost invariably eliminates necessity for re-alignment when changing tubes.
- extremely high transconductance and input impedance provide very high gain-bandwidth factor.
- internal screening-shields reduce plate-to-grid capacitance.
- newly designed tongue-mica clamp on cathode eliminates microphonics.
- remote characteristics insure low intermodulation distortion.
- operational at lower supply voltage for greater design flexibility.

### \*AMPLIFRAME



a new concept in electron tubes, designed and mass produced exclusively by Amperex, incorporates the unique **FRAME GRID**... the closest approach to the ideal "Physicists' grid"—electrical characteristics but no physical dimensions. The **FRAME GRID** results in: • higher transconductance per milliamperere • tighter Gm and plate current tolerance • low transit time • low capacitance • lower microphonics • rugged construction

**AMPLIFRAME TYPE 6FY5**  
 remote cut-off triode for TV tuners  
 transconductance ..... 13,000 micromhos at 11 mA  
 amplification factor ..... 70  
 capacitances: input ..... 4.75  $\mu\text{f}$   
 output ..... 3.3  $\mu\text{f}$   
 plate-to-grid ..... 0.50  $\mu\text{f}$   
 plate voltage ..... typical 135V  
 heater current & heater voltage ..... 200 mA, 6.3V

**AMPLIFRAME TYPE 2FY5**  
 controlled heater warm-up version  
 heater current & heater voltage ..... 600 mA, 2.4V

**AMPLIFRAME TYPE 3FY5**  
 controlled heater warm-up version  
 heater current & heater voltage ..... 450 mA, 3.1V



**ask Amperex**

about Ampliframe tubes for  
 TV and other entertainment applications

Amperex Electronic Corporation, 230 Duffy Ave., Hicksville, L. I., N. Y.

(Continued from page 18)

**XCELITE** has named **ARLIE J. HOLMES** to the new post of Distributor Sales Mgr.

**RCA INTERNATIONAL** has made an agreement with the **ISTITUTO PER LA RICOSTRUZIONE INDUSTRIALE (I.R.I.)** to direct an international development program for the creation in Southern Italy of an electronics manufacturing complex, calling for an initial investment of \$25,000,000.

## Reps & Distributors

**ADMIRAL** has named the **OTT-HEISKELL CO.** distributor of all the company products in a newly-created Wheeling, W. Va. territory.

**WESTINGHOUSE** announces the appointment of **THE BURT PORTER CO.** as manufacturers rep for the electronic tube div. in the Pacific Northwest.

**DE JARNATT WHOLESALE RADIO**, headed by **BEN DE JARNATT**, is celebrating its 25th year as a distributor of **CORNELL-DUBILIER** electronic components.

**COLMAN ELECTRONIC PRODUCTS** has appointed two new reps: **MARSHANK SALES CO.**, S. Calif., and S. Nev.; and **RAY R. HUTMACHER ASSOC.**, Ill. and Eastern Wisc.

**VIS-U-ALL PRODUCTS** has announced the appointment of **MIKE BERMANN** as sales rep for its full line of tube testers in the states of Ill. and Wisc.

(Continued on page 23)



"I invented it myself."

← For more data, circle 5-20-1 on coupon, p. 43  
ELECTRONIC TECHNICIAN • May, 1960

# A TUBE TESTER FOR EVERY PURPOSE

Here's how easy it is to test all tube types with a **MERCURY TUBE TESTER** — completely, accurately — **IN JUST SECONDS**  
**JUST SET FILAMENT AND LOAD CONTROLS...INSERT TUBE...  
PRESS QUALITY BUTTON AND READ EMISSION ON METER**

**IMPORTANT!** Mercury Tube Testers positively cannot become obsolete as they are engineered to accommodate all new tube types as introduced. New tube listings are furnished periodically to all registered owners.

## Model 101 Portable Tube Tester THE SPEED AND ACCURACY OF A MULTIPLE SOCKET TUBE TESTER AT A FABULOUSLY LOW PRICE

Checks emission of over 700 tube types... Checks inter-element shorts, leakage and gas content... Checks all sections of multi-purpose tubes... Housed in sturdy gray hammertone steel case... Handy tube chart contained in special back compartment...  
Size, 9 x 8½ x 2¾".

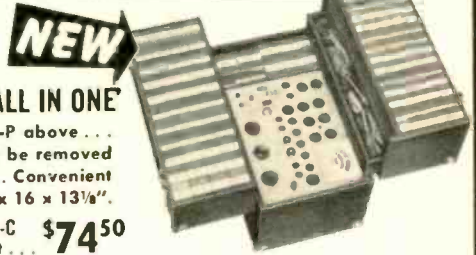
Model 101 \$39<sup>95</sup>  
Dealer Net ...



## Model 102-C Caddy Tube Tester A TUBE TESTER AND TUBE CADDY 'ALL IN ONE'

Includes the specifications of the Model 102-P above... Tester fits securely on guiders but can easily be removed... Tube caddy will hold over 125 tubes... Convenient drawer stores tools and test leads. Size, 9¾ x 16 x 13¼".

Model 102-C \$74<sup>50</sup>  
Dealer Net ...



## Model 102-P Portable Tube Tester A DELUXE TESTER AT A SENSIBLE PRICE

Checks emission of over 700 tube types... Checks inter-element shorts, leakage and gas content... Checks all sections of multi-purpose tubes... Checks diodes, filament and external continuity, power rectifiers, pilot lamps, auto and TV fuses... Housed in handsome oak carrying case with compartment for all test leads... Size, 11¼ x 12 x 4½".

Model 102-P \$59<sup>50</sup>  
Dealer Net ...

**Model AD-1 CRT Adapter** available... makes Mercury Tube Testers highly accurate picture tube testers of all black and white picture tubes (including the new \$3<sup>95</sup> short neck 110 degree RCA type) for emission, shorts and gas content. Dealer Net ...

## Model 201 Self-Service Tube Tester A VALUABLE MONEY-MAKING ASSISTANT IN YOUR SHOP



Model 201-C (Counter Model) \$109<sup>50</sup>  
Dealer Net ...

Model 201-F (Floor Model) \$158<sup>50</sup>  
Dealer Net ...

Checks quality (emission, shorts and gas) of over 800 tube types... Checks each section of multi-purpose tubes... Tests all 6 and 12 volt standard auto radio vibrators... Handy push button fuse can be reset manually—never needs replacement... Tube compartment with own lock holds over 400 tubes... Tube storage drawers with tube carton dividers and drawer sheets provide for automatic inventory control... Etched aluminum panel always retains its handsome appearance... Takes only 19" x 19" of floor space. Stands 6'1" high... Illuminated colorful plastic display tops the cabinet... Colorful window streamers supplied with each tester to attract customers.



SEE YOUR LOCAL ELECTRONICS PARTS DISTRIBUTOR

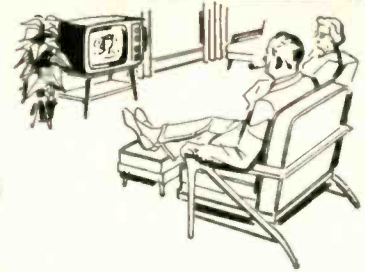
**Mercury**

**ELECTRONICS CORP.**  
manufacturers of quality electronic products

77 Searing Ave., Mineola, N. Y.

For more data, circle 5-21-1 on coupon, p. 43

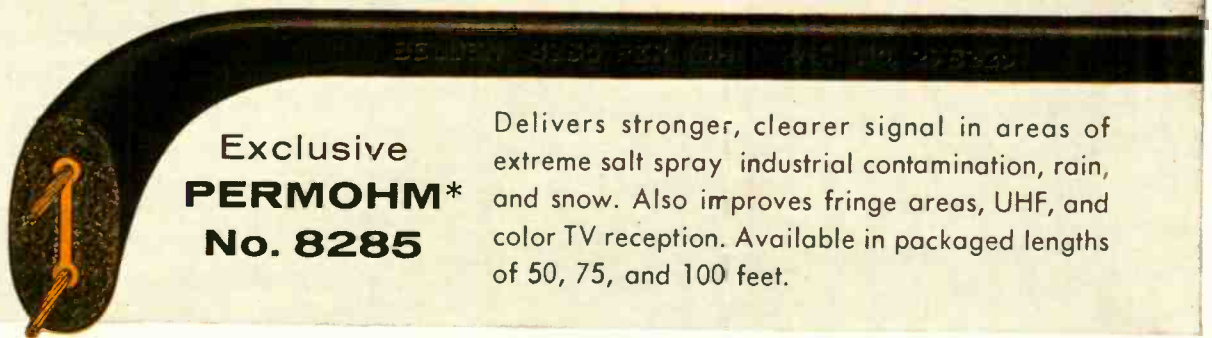
# New Decorator TV Lead-In Cable



To be introduced at the  
Electronics Parts Distributors  
Show, May 16-18, Chicago

**For interiors only.** This NEW Belden 300-ohm lead-in cable, No. 8226, replaces unsightly lead-in cable in modern homes. Its neutral color harmonizes and blends into

any room's decorative theme. Available in lengths of 25, 50, 75, and 100 feet. Packaged in pancake coils for easy handling and display.



## Exclusive PERMOHM\* No. 8285

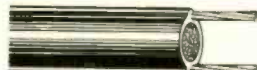
Delivers stronger, clearer signal in areas of extreme salt spray industrial contamination, rain, and snow. Also improves fringe areas, UHF, and color TV reception. Available in packaged lengths of 50, 75, and 100 feet.



**STANDARD 300-OHM LINE**  
—NO. 8225 Offers low losses at high frequencies. For use with TV and FM receiving antennas. 25-, 50-, 75-, and 100-foot coils; 500- and 1000-foot spools.



**WELDOHM\* 300-OHM LINE**  
—NO. 8230 2½ times flex-life and 1½ times breaking strength of ordinary lead-in. 25-, 50-, 75-, and 100-foot coils; 500- and 1000-foot spools.



**CELLULINE\* 300-OHM LINE**  
—NO. 8275 Resists abrasion, sun, and wind. Provides strong UHF and VHF TV pictures. 50-, 75-, and 100-foot coils; 500- and 1000-foot spools.



**STANDARD 72-OHM LINE**  
—NO. 8222 For use with all types of receiving antennas at high frequencies. 100- and 500-foot spools.



**STANDARD 150-OHM LINE**  
—NO. 8224 For receiving antennas, matching transformers, and experimental applications. 100- and 500-foot spools.

\* Belden Trademark and  
Belden Patent . . . U.S.  
Patent No. 2782251



Ask your  
Belden jobber  
about this  
complete line.

CONVENIENTLY  
PACKAGED FOR  
DISPLAY AND  
HANDLING



Power Supply Cords, Cord Sets and Portable Cordage • Electrical Household Cords • Magnet Wire • Lead Wire • Automotive Wire and Cable • Aircraft Wires • Welding Cable

8-3-0



(Continued from page 21)

**ELECTRONIC PUBLISHING** has appointed **GRANT SHAFFER CO.** as rep in the state of Michigan.

**THOMAS ELECTRONICS** has appointed three new sales reps: **INSTRUMENT ASSOC.**, New England area; **DANNEMILLER-SMITH, INC.**, Tex., La., Okla. and Ark. area; and **HYTRONIC MEASUREMENTS INC.**, Rocky Mountain area.

**KLAUS RADIO & ELECTRONIC** published a new 240 pg. catalog of product listings on a wide range of electronics parts and equipment. The book was prepared by **ELECTRONIC PUBLISHING CO.** and may be obtained by writing to Klaus.

**AMERICAN GELOSO** appointed the following reps: **FRED WAMBLE SALES CO.**, Ala., Ga., Miss., N.C., Tenn.; **ROBERT S. REISS ASSOC.**, Me., N.H., Vt., R.I., Mass., Conn.; **J. F. ANDERSON** and **E. L. PARK**, Dela., E. Pa., So. N.J., Md., Va., and Dist. of Columbia.

**MARTY BETTAN SALES CO.** has conducted 13 distributor salesmen buffet dinner meetings, sponsored by the manufacturers represented by the Bettan firm. Individual problems of the distributor and his salesmen were handled, as well as technical questions.

**U. S. TRANSISTOR** reports the appointment of the following three distributors: **SUN RADIO & ELECTRONICS CO., INC.**, N.Y.C. and Conn.; **PAGE ELECTRONICS**, Chicago area; and **MOORE'S RADIO SUPPLY**, Utah and Colo.

**STACKPOLE CARBON** Electronic Components Div. announces the appointment of **SAMUEL C. HOOKER, INC.** as manufacturers rep for New England. **KARL CORNISH** will now devote full time as New England rep. for the Carbon Div.



"Can't you just ring the doorbell? Must you make a production out of everything?"



SRB40



SRB20



RC412

**pick the power that fits the need  
...without giving up quality!**

## **BOGEN STEREO RECEIVERS**

Combined FM and AM Tuners, Control Preamps and Power Amplifiers on Single Chassis

SRB40	40 watts	\$269.50
SRB20	20 watts	219.50
RC412	12 watts	179.50

PRICES SLIGHTLY HIGHER IN THE WEST

You wouldn't drive a tack with a sledgehammer. And just as you wouldn't think of using a 12 watt amplifier where 40 watts are needed, there's no point to using 40 watts where 12 will do. When you're buying more power than the application calls for, you're paying for features you can't use.

Quality is quite another story. There's never justification for sacrificing quality regardless of price. Power differences can provide substantial economies without compromising quality. That is why Bogen makes three stereo receivers. The power outputs vary, the prices vary but the circuitry and performance measure up to the same high quality of engineering that is traditional with all Bogen Presto equipment.

For example, you are planning stereo-monophonic high fidelity installation, and you intend to use the new type, low efficiency loudspeakers. It may be best to select the new SRB40 stereo receiver with its 40 watts of power. On the other hand, the SRB20 with 20 watts will handle most available speaker systems of reasonable efficiency . . . with power to spare. In fact, power output is the only difference between the SRB40 and the SRB20. In every other respect, they're identical.

Also, some systems require even less power output. The installation may be intended for low level background music in a commercial establishment or for a small-room, music system. Here's where the RC412 shines. Its 12 watts provides all the power you need, all the features, the controls, and the same quality that distinguish the SRB40 and SFB20.

See these stereo receivers at your hi-fi distributor, or write for complete details. Chassis enclosures and legs are optional—at slight extra cost.

### **BOGEN-PRESTO**

SERVES THE NATION WITH BETTER SOUND IN INDUSTRY,  
EDUCATION, IN THE STUDIO AND IN THE HOME.

Bogen-Presto • Box 500, Paramus, New Jersey • A Division of The Siegler Corporation

For more data, circle 5-23-1 on coupon, p. 43

Look for the label that looks out for you



**Golden Symbol of Service...**

# The most reliable tubes ever for every set you service

The circuit tubes that "couldn't be built" are at your service . . . Motorola Premium Rated Golden "M"® Tubes. Golden "M" Tubes are tested to TWICE MAXIMUM PUBLISHED EIA RATINGS.

Zooming sales indicate that service technicians everywhere are experiencing far fewer call backs and winning increased customer good will by stocking and selling Golden "M" Tubes. They're Premium Rated . . . at no premium cost to you.

Contact your Motorola distributor today for further details on fabulous Golden "M" Receiver Tubes . . . and Golden "M" Picture Tubes as well.

**SPECIAL OFFER** *for limited time only*  
**PORCH 'N' PATIO ENSEMBLE**



Now you can obtain any one or all of these deluxe units simply by ordering a supply of Golden "M" Picture/Receiving Tubes. Contact your Motorola Distributor today for details.



# MOTOROLA



PARTS AND ACCESSORIES, FRANKLIN PARK, ILLINOIS

For more data, circle 5-24-1 on coupon, p. 43

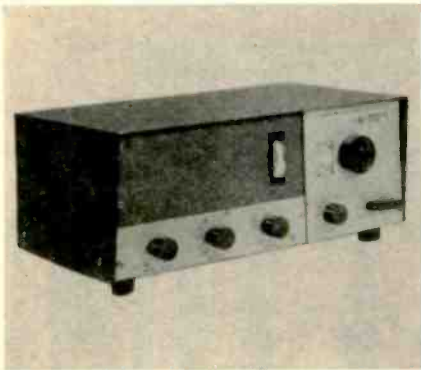
# NEW PRODUCTS

For More Information On  
NEW PRODUCTS

Circle Code Numbers, p. 43

## Browning CITIZENS BAND RECEIVER

Model R-2700 citizens band communications receiver, is provided with 5 crystal-controlled receiving channels, and adjustable squelch circuitry to silence the receiver in the absence of a signal. An automatic noise limiter mini-



mizes interference from all sources. A delayed automatic volume control is used to assure full output from weak signals. Front panel features a vertical, edge-type illuminated signal strength meter. \$149.00. Browning Labs., 100 Union Ave., Laconia, N. H.

For more data, circle 5-25-2 on coupon, p. 43

## Vocaline WIRELESS INTERCOM

Installation of the new Vocatron CC-60 can be made without conventional wiring and installation procedures. Each Vocatron is a self-contained master unit capable of originating and receiving calls. Features include the exclusive, patented "silent-aire" squelch circuit to filter out unwanted noise, thereby



assuring complete silence in stand-by, and a press-to-talk switch which can be locked in place, permitting the user to speak over the unit without the necessity of holding the switch down for an extended period of time. Measures 3"x8"x6". \$109.00 for a pair. Additional units \$54.50 each. Vocaline Co. of America, Old Saybrook, Conn.

For more data, circle 5-25-3 on coupon, p. 43

# "SERVICE-ENGINEERED"

## TEST EQUIPMENT

helps you make more profit

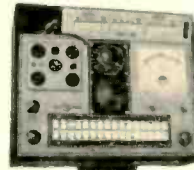


All Jackson test equipment is "Service-Engineered" for service work. It is designed to give you the accuracy you need, combined with speedy, profitable operation. That's why smart servicemen are switching to Jackson. Your distributor will be glad to demonstrate Jackson equipment to you to prove the point.

### DYNAMIC® TUBE TESTING



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



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



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

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

### ALIGNMENT



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



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

### TEST AND MEASURING



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



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



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

See your distributor or write: **THE JACKSON ELECTRICAL INSTRUMENT COMPANY**

124 McDonough Street, Dayton 2, Ohio

In Canada: The Canadian Marconi Co.

For more data, circle 5-25-1 on coupon, p. 43



the people who brought you the



### THE LIFETIME GUARANTEE

Utah will renew or replace free this loudspeaker due to any performance failure at any time during the lifetime of the owner. No charge will be made for handling, inspection, labor, materials or servicing for any repair or replacement. Customer pays postage only.



**MORE POWER  
PER POUND  
SPEAKER** now offer  
**MORE SOUND  
PER LIFE**

in the revolutionary

*Utah*

# LIFETIME SPEAKER

**guaranteed**

**for the life of the owner**

24 hours a day, we lay our reputation (and our profits) on the block! We *guarantee* perfection of performance for a lifetime. To do this, we *have* to make the speakers of our lifetime . . . and we do!

Order a Utah Lifetime for your next replacement and see! (All popular sizes and shapes).

**Utah**  
LIFETIME  
SPEAKERS 

Utah Radio & Electronic Corp., Huntington, Ind.

**Tele-Rad**  
**CITIZEN BAND 2-WAY RADIO**

Tele-Rad, designed for operation on citizens band frequencies, is a compact, simple to use, radio telephone. Characteristics include an over-water range of approximately 15 miles, an over-land range of 6 to 8 miles. Set up for sending or receiving on three channels by the flip of a switch, and all 22 citizens band channels can be reached by changing crystals. 5-watt power, interchangeable

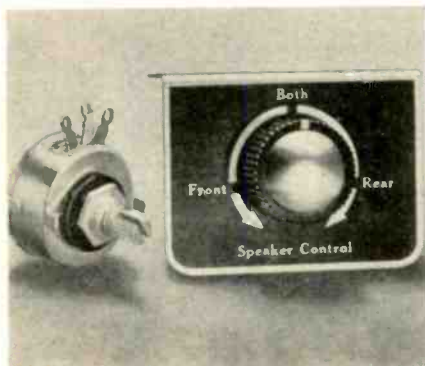


for operation on 115v a-c or 6 or 12v d-c with low current drainage. Slightly larger than a standard telephone, Tele-Rad has a built-in loudspeaker. A switch makes possible private conversation through use of the hand set. Other features include squelch control and easy access for maintenance, which can be provided by any radio or TV repairman. Available in six decorator colors. Telephone & Electronics Corp., 7 E. 42nd St., New York 17, N.Y.

For more data, circle 5-27-2 on coupon, p. 43

**Centralab CONTROL SHAFT**

A 0.235" diameter aluminum replacement shaft, AK-29, has been designed for use with model AB control applications in foreign radios, tape recorders, and hi-fi equipment where the standard



1/4" shaft will not fit. This aluminum shaft is full round and measures 2 9/16" in length from the bushing. Centralab Div., Globe-Union Inc., 900 E. Keefe Ave., Milwaukee 1, Wis.

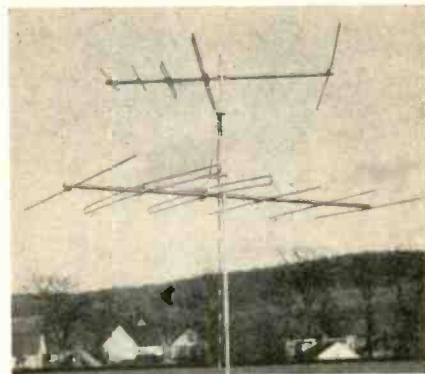
For more data, circle 5-27-3 on coupon, p. 43

◀ For more data, circle 5-26-1 on coupon, p. 43

**Taco ANTENNAS**

Specifically designed to meet requirements and overcome problems inherent to the area between the Quad Cities and Waterloo, in eastern Iowa, the "Hawkeye State Special," catalog #1934, has been developed. The array comprises two antennas, designed for individual orientation, and is said to permit accurate focusing to all channels in the area, by matching and phasing into a single transmission line. Array is shipped with factory matched phasing line. Technical Appliance Corp., Sherburne, N.Y.

For more data, circle 5-27-4 on coupon, p. 43



**COMPLETELY RELIABLE**  
**AUTOMATIC MONEY-MAKER**



**B&K** MODEL 675  
**AUTOMATIC**  
**DYNA-QUIK**

**DYNAMIC MUTUAL CONDUCTANCE**  
**TUBE AND TRANSISTOR TESTER**

Here is automation that combines both speed and accuracy for profitable professional servicing. Pre-tested and field proved. Keeps paying you dividends day after day. *Measures true dynamic mutual conductance.* Makes complete tube test in seconds under actual operating conditions of the set. Checks average set in a few minutes. Provides instantaneous heater continuity test. Shows true tube condition on "Good-Bad" scale and in micromhos. Patented automatic line compensation. Tests transistors, diodes, and rectifiers, too. Net, **\$169<sup>95</sup>**

See Your B&K Distributor or Send for Bulletin ST24 T

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

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

**SIMPLIFIED AUTOMATIC**  
**DYNA-CARD SYSTEM**

Only 60 indexed phenolic Dyna-Cards test over 600 tube types. Dyna-Card automatically sets socket connections.

**MORE ACCURATE TESTS FOR**  
**PROFESSIONAL SERVICING**

Tests each section of multiple tubes separately for true Gm, Shorts, Gas, Grid Emission and Life.

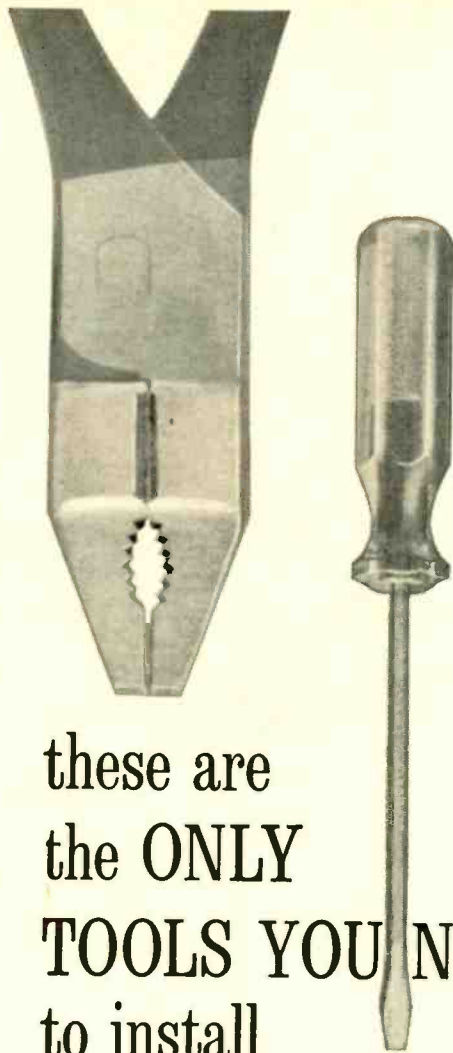
**MINIMIZES OBSOLESCENCE**

Easily kept up-to-date with extra cards and punch supplied with every unit.

By checking all tubes in the set, you can Sell More Tubes Per Call  
**INCREASE YOUR INCOME**  
Save Call-Backs and Satisfy More Customers.



For more data, circle 5-27-1 on coupon, p. 43



these are  
the ONLY  
TOOLS YOU NEED  
to install

**SIGNET  
SOUND**  
by Stromberg-Carlson



... so doesn't it make sense to get into the clean, profitable sound business now?

There's "no sweat," no fuss with Signet Sound. Installation is so simple, it takes just a screwdriver and a pair of pliers. Signet Sound\* package assemblies satisfy any sound reinforcement need. Complete flexibility of components means you can arrange them in countless ways to

suit any application.

Look around your own neighborhood. You'll find dozens of potential Signet customers: restaurants, taverns, clubrooms, schools, churches and many more.

Wire or write for equipment details and "where-to-buy-it" information. The address is Commercial Products Division, 1461-05 North Goodman Street, Rochester 3, N. Y.

*\*Trademark*

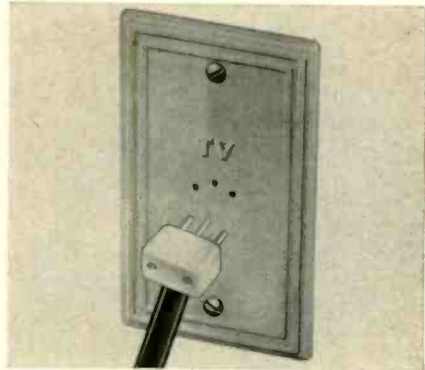
*"There is nothing finer than a Stromberg-Carlson"*

**STROMBERG-CARLSON**  
A DIVISION OF **GENERAL DYNAMICS**

For more data, circle 5-28-1 on coupon, p. 43

#### Mosley TV / FM OUTLET

TV/FM antenna outlets can be wired in tandem without loss of efficiency due to stub effect, using the new Mosley FD-1PK outlet, a recent addition to the firm's line of TV/FM antenna wiring accessories. When a polarized plug is inserted in the outlet, a silver-plated spring leaf switch opens the circuit beyond the outlet in use, preventing the

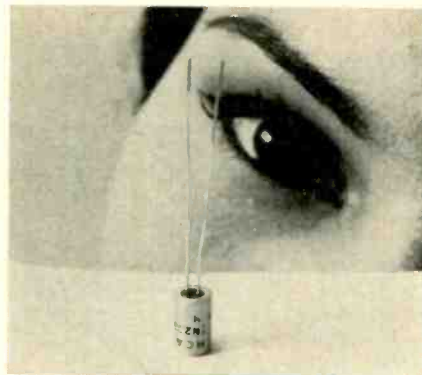


stub effect of unused line. Ideal for new or existing homes, and new or already installed antenna wiring, the outlet is supplied complete with plug, mounting brackets and flush-mounting wall plate precision molded in either brown or ivory polystyrene. Mosley Electronics, Inc., 4610 N. Lindbergh Blvd., Bridgeton, Mo.

For more data, circle 5-28-2 on coupon, p. 43

#### RCA COMPENSATING DIODE

A germanium device, designed to bring about a substantial reduction in audio frequency distortion caused by temperature variations, is the new diode RCA-1N2326. It resembles a transistor in appearance and prolongs useful battery life. Its temperature and voltage compensating characteristics are matched to transistor types 2N217,



2N270, 2N408 and similar types. In class B push-pull audio amplifiers, the 1N2326 can maintain a virtually constant quiescent operating point for the output stage over supply-voltage variations up to  $\pm 40\%$  and ambient temperature variations from  $-20^\circ$  to  $+70^\circ$ . RCA Electron Tube Div., Harrison, N.J.

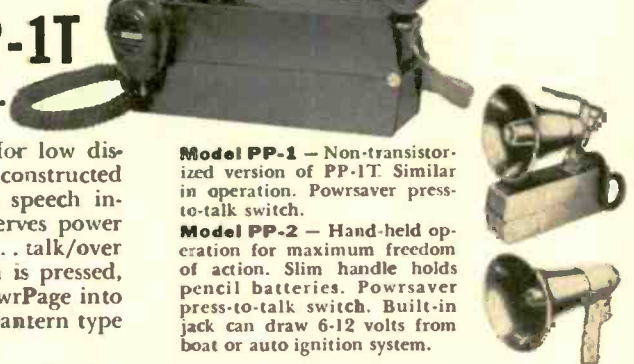
For more data, circle 5-28-3 on coupon, p. 43

**UNIVERSITY POWRPAGE®**  
powerful, ultra-compact  
soundcasting systems



**NEW...TRANSISTORIZED Model PP-1T**  
*tops for every portable use... police, fire, sports, etc.*

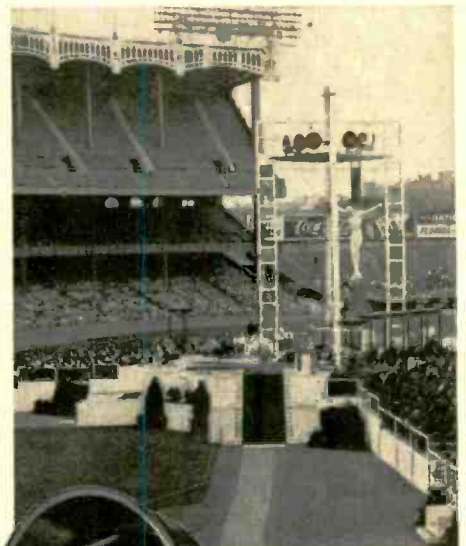
Features fully transistorized 25 watt amplifier especially designed for low distortion and high stability in any operating conditions. Ruggedly constructed dynamic microphone has controlled response curve for maximum speech intelligibility. Press-to-talk switch gives instantaneous operation, conserves power supply. Special input jack for record player, tuner, or tape recorder... talk/over feature reduces music program level 6 db when microphone button is pressed, allowing voice to be heard over music. Talk/listen switch converts PowrPage into highly directional, sensitive listening device. Powered from standard lantern type batteries. Includes leather carrying strap.



**Model PP-1** — Non-transistorized version of PP-1T. Similar in operation. Powersaver press-to-talk switch.

**Model PP-2** — Hand-held operation for maximum freedom of action. Slim handle holds pencil batteries. Powersaver press-to-talk switch. Built-in jack can draw 6-12 volts from boat or auto ignition system.

**UNIVERSITY LC SERIES**  
for real high fidelity in  
weatherproof speakers



**MODEL BLC ... For General Applications**  
A sensation ever since its introduction... continues to set new standards in high quality p.a. work. Light in weight, shallow in depth, easy to transport. Diameter: 22 3/4". Depth: 9 1/4".



**MODEL MLC ... Compact Version for Music and Voice**  
Especially suited for coverage of moderate-size crowds or areas. Operates easily off existing high fidelity systems for outdoor music at low cost. 12 3/4" w. x 9 1/4" h. x 10 3/8" d.



**MODEL WLC ... Heavy Duty System**  
Known throughout the world's stadiums, concert halls, auditoriums and parade grounds for its exceptional full-range performance at higher output levels. Diameter: 33 1/2". Depth: 20".

• horn-loaded • high efficiency • for fixed or mobile applications  
**ONLY UNIVERSITY OFFERS 3 GENUINE DUAL-RANGE SYSTEMS...with separate bass and treble drivers**

For further information and specifications, write Desk Z-1,  
University Loudspeakers, Inc., White Plains, N. Y. A subsidiary of Ling-Altec Electronics, Inc.

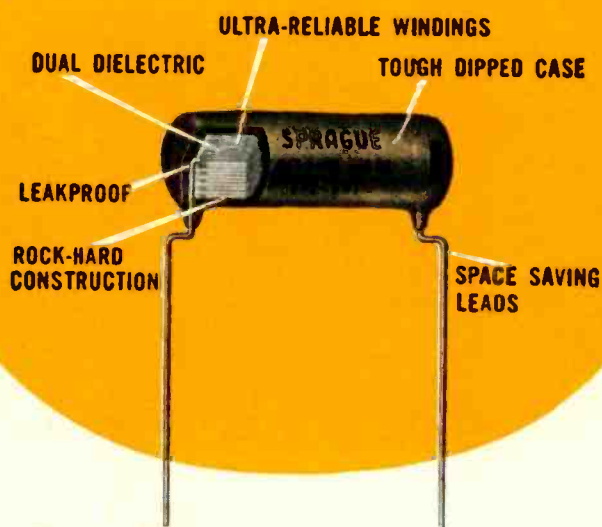
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# NEW

# ORANGE-DROP<sup>®</sup>

## DIPPED DIFILM<sup>®</sup> CAPACITORS FOR EXACT ORIGINAL REPLACEMENT



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

±10% CAPACITANCE TOLERANCE  
IS STANDARD.

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

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

### WHY ORANGE-DROPS BEAT HEAT AND HUMIDITY

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

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

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

\*Du Pont Trademark

**don't be vague—insist on**

# SPRAGUE<sup>®</sup>

the mark of reliability

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

For more data, circle 5-30-1 on coupon, p. 43



# ELECTRONIC TECHNICIAN

Including  
**SERVICE**  
Magazine

## *Showdown At Distributor Gulch*

The make believe world of the Western on TV has entertained many of us. The showdown on a deserted street, the rootin', tootin' cowboys facing each other, a blaze of gunfire, and then the commercials are always good for a chuckle.

However, there may be a showdown developing between TV-electronic service dealers and parts distributors. This one may be in earnest, affecting the lives and businesses of people in the industry.

To quote a service association leader, "the most offensive thing that has faced service in my opinion, is not captive service, or the part-timer. It is the selling by the parts distributor to every Tom, Dick, and Harry."

There is a question of the dealer's survival when a distributor sells retail, particularly at a discount price. Not only does the dealer lose a profitable sale that he might expect, but when the dealer charges the normal retail price, the consumer thinks he is being overcharged.

There is a very real ethical problem in a distributor by-passing and competing with his own dealer customers. Moreover, a distributor has the unfair advantage of getting the most favorable price from the factory. In certain areas, dealers are fighting back through selective buying. No doubt this has contributed to the prosperity of many wholesale-only distributors. However, either because of geography or credit, many dealers are not in a position to exercise this option.

Some dealers have met the challenge by setting up a wholesale distributorship of their own, and are doing quite well at it. The trials and tribulations of these enterprising dealers, and the alarming pressures brought to bear by existing distributors to cut off important lines, would make a hair-raising story by itself.

There is even a legal question involved. On a state level, there is the Texas sales tax law which prevents a distributor from selling to any person not holding a valid retail permit. If the distributor does sell to anyone who is not qualified, that distributor becomes a retailer by law, and is liable for all tax due. This should plug

the tax loophole of indiscriminate selling. In Pennsylvania, a bill has been proposed to define a wholesaler. If passed, it would restrict a distributor's retail activities.

Even on a federal level, the question has been raised whether a retailing distributor is not receiving an illegal preferential discount to the disadvantage of the small dealer.

### *Head 'Em Off At The Pass*

We hope that something can be done to prevent a business and legal showdown which will pit distributors and dealers against one another. Bitterness is mounting, and we hope it does not become entrenched in a conflict which can be most destructive to the entire industry.

We believe that distributors who sell wholesale to service dealers and technicians, along conventional channels, are an effective means of getting the manufacturer's products to the public. It is up to dealers to make the extra effort to patronize distributors catering to dealer needs.

At the same time, other distributors should recognize that they cannot go on indefinitely reaping rewards from both sides. A distributor wishing to be a retailer has a perfect right to do so, as long as he competes fairly. Buying products at low cost to sell to consumers at wholesale prices is not fair competition.

Just as dealers have a right to set up a distributing company, we believe that distributors have a right to set up a retailing establishment which sells to the public at the same price that a dealer is forced to use.

The seriousness of the dealer-distributor conflict is becoming sufficiently intense that we would like to propose a national conference representing distributor, service dealer, and manufacturer associations. The industry will benefit from a major effort to correct grievances and head off a showdown.

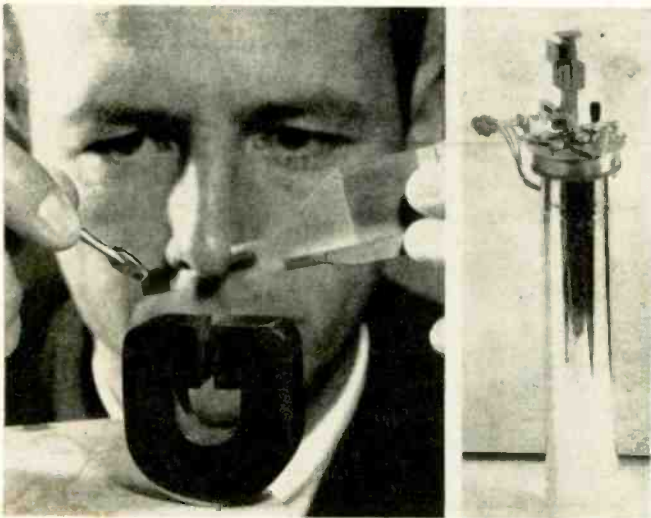
Let's not draw—podner. Let's see how we can overcome our problems together.

# Tuning In the

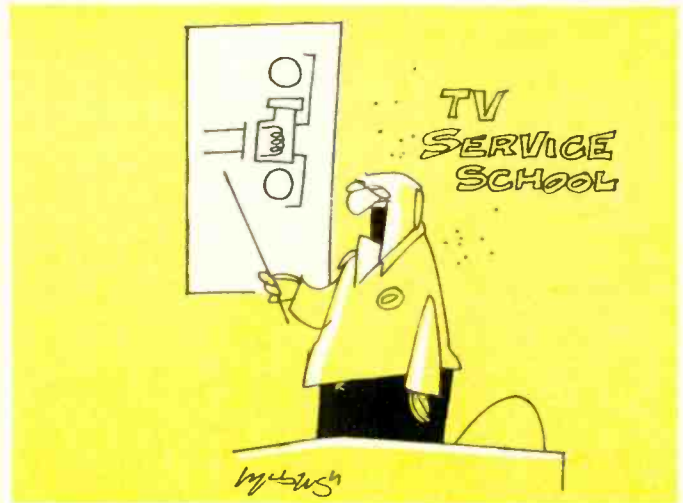
**RADAR SPEED METERS**, commonly used by the police to control traffic and trap speeders, are not considered accurate in many circumstances. At least that's the decision of a New York judge who dismissed a speeding charge based on this type of radar evidence. His basis for the dismissal was the testimony of a Connecticut electronics engineer who explained that police radar was not really radar at all. Instead of operating on the radar reflection principle, it functions on the Doppler principle of increasing and decreasing frequencies for moving bodies. It was pointed out that the presence of another car on the road, or even a flurry of leaves, would make the measurement undependable. Military Doppler systems, selling for about \$25,000 are said to be accurate, but the \$2,000 traffic systems were said to have many limitations.

**OUTDOOR COLOR TELECASTING** of the Mardi Gras in New Orleans was aided by a new super sensitive camera tube developed by General Electric. Though skies were cloudy, no additional lighting was needed. At night only one-tenth of the light needed by a conventional image orthicon was required.

## MEET MR. MASER



Hughes Aircraft scientist holds synthetic ruby crystal and copper section which form heart of ruby maser amplifier at right. This maser (Microwave Amplification by Stimulated Emission of Radiation) is a super detector capable of picking up the faintest radio signals from missiles millions of miles away. It operates at  $-452^{\circ}$  F in liquid helium to minimize internal noise. The 12 oz. magnet shown, costing \$10.00, replaces the \$4,000 500 lb. magnet used in conventional masers.



"Oh the coil bone's connected to the capacitor bone, the capacitor . . ."

**GREAT INVENTIONS** come at the most unexpected times in the least anticipated places. Edward McBride, a patient recovering from an appendix operation at Southside Hospital, Bay Shore, N.Y., pressed the spray can button of an air freshener container—and lo and behold the channel changed on his remote control TV receiver. The news spread, and the spray can was tried on 15 sets, 10 of which changed channel on release of the deodorant spray. There was said to be no relationship between contents of the spray can and the program quality.

**TIROS**, the new U.S. weather satellite designed by RCA, is considered the most elaborate electronics package yet sent into orbit. It contains miniature TV cameras, video tape recorders, transmitters, 9000 solar cells, batteries, and an array of control and communications equipment. The west-to-east path of the satellite at a 400 mile altitude transmits cloud formation pictures to a network of receiving stations. Tiros circles the globe every 90 minutes, and has an operating lifetime of 90 days.

**THOSE PLUG-IN ANTENNAS** which "turn house wiring into a giant radar antenna" have boomeranged on one manufacturer. Moto-Matic Co. has agreed in New York Supreme Court to place \$10,000 in escrow to assure refunds to dissatisfied buyers. Certain misleading advertising claims will also be discontinued.

# Picture .....



**NEW TV SETS** are offering some interesting features. Admiral's recently announced 19" set uses a 114° tube with 172 sq. in. of viewing area, which is 10% more than its 17" predecessor. Two 19" Thin Man portables have cabinets only 12¼" deep. RCA introduces a new remote control portable with what is called the first "complete-off" control. Said to be a boon for late night bedroom viewers, the new Wireless Wizard changes channels, turns picture and sound off and on, and even turns off the receiver's remote control circuit.

*THE SUN* one day may be used as a huge reflector to relay radio signals between distant points on earth, predict communication engineers. This will be particularly useful when the moon is not available. Reflection would take place from the sun's corona. A megawatt 40 mc transmitter and 120 ft. parabolic antenna could be used.

**CRUSADE AGAINST CALL-BACKS** has been launched by Raytheon in the form of a technician poll at the company's distributors to determine the 10 most troublesome receiving tubes, regardless of brand. Closing date is May 10th, and the returns will be announced at the Parts Show. Though manufacturers guarantee to replace bad tubes during warranty, callbacks still cost the service dealer the labor involved in replacing the tube.

## CALENDAR OF COMING EVENTS

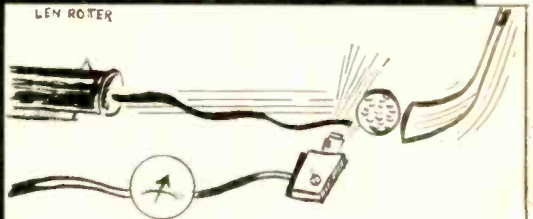
- May 16-18: Electronic Parts Distributors Show, Conrad Hilton Hotel, Chicago, Ill.
- May 23-25: National Telemetering Conference, Miramar Hotel, Santa Monica, Calif.
- May 23-26: Design Engineering Show, American Society of Mechanical Engineers, New York Coliseum, New York, N.Y.
- May 24-26: IRE-ISA Joint Technical Exhibit, Olympic Hotel and National Guard Armory, Seattle, Wash.
- June 20-24: American Institute of Electrical Engrs. Summer General Meeting, Chalfont-Madden Hall Hotel, Atlantic City, N.J.
- June 22-24: 1960 Conference on Standards & Electronic Measurements, NBS Boulder Labs., Boulder, Colo.
- June 24-26: Electronic Service Industry's 1960 Tele-Rama, Shelburne Hotel, Atlantic City, N.J.
- June 27-29: Fourth National Convention on Military Electronics, Sheraton-Park Hotel, Washington, D.C.
- Aug. 1-3: Fourth Global Communications Symposium, Statler Hilton Hotel, Chicago, Ill.
- Aug. 6-9: National Audio-Visual Association Convention & Exhibit, Morrison Hotel, Chicago, Ill.

**GROUND BREAKING.** electronic style, utilized a 23 oz. transistorized radio garage door control to actuate a 25 ton bulldozer at the Delco Radio Division in Kokomo. And so, another tradition of yore—the manual shovel full of dirt—bites the dust.

## RANDOM NOISE

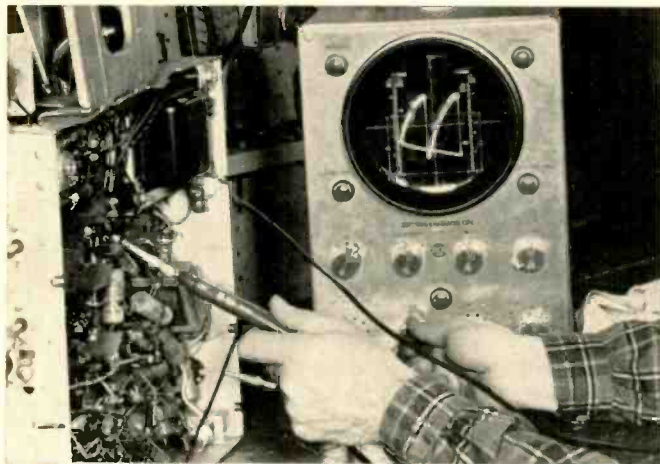


**COMING -**  
PORTABLE ROADSIDE  
"TRANSMITTER AND CAR  
RECEIVER" SYSTEM TO ALERT DRIVERS TO  
ROAD CONDITIONS AHEAD. UNIT USES MAGNETIC  
INDUCTION FIELD TO RESTRICT RECEIVING AREA.



ELECTRONIC MEASUREMENT  
OF GOLF BALL  
RESILIENCY  
PREVENTS  
"SOUPED UP"  
BALLS.  
PHOTO-  
COMPUTER  
SYSTEM  
IS USED.

"HOW MANY  
TUBES IN  
A TV SET?"  
THE AVERAGE  
POPULAR TV  
SET HAS 16½ TUBES.



# Ringings & Overshoot In Scopes

## Knowing Your Scope's Attributes—Whether Good Or Bad—Will Simplify Interpreting Its Waveforms

ROBERT G. MIDDLETON

• The service oscilloscope is generally used without any consideration regarding its accuracy, whether as a visual voltmeter or waveform displayer. The operation of a scope—how it works, and why—is justifiably important to service technicians. Understanding the reasons for distortion may initiate compensation for it when interpreting readings. Also, it may lead to the realization that the scope is either inadequate or defective.

A prime distortion in scope displays is caused by ringing and overshoot. Ringing and overshoot in a vertical amplifier distorts waveforms having a fast rise time. For example,

Fig. 1—Square wave distortion from ringing and overshoot in scope's vertical amplifier.

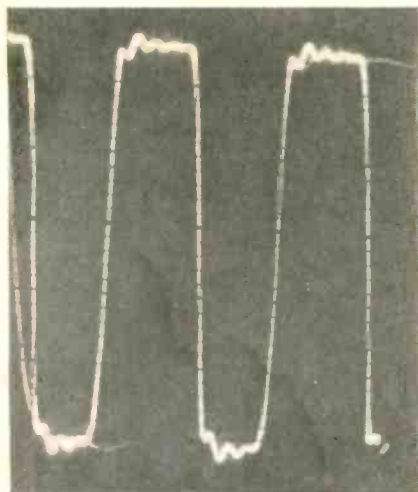


Fig. 1 shows how the top of a square wave becomes distorted when ringing and overshoot occur.

Overshoot sometimes is unaccompanied by ringing, as seen in Fig. 2. However, you will usually find that if a scope amplifier overshoots, it also rings. Another amplifier defect shows up in Fig. 2; note that the overshoot is larger on the trailing edge than on the leading edge. This shows amplifier unbalance. Unsymmetrical overshoot can be caused by an incorrect operating point of a push-pull tube—the amplifier starts to saturate on one half-cycle. Unsymmetrical overshoot can also be caused by unbalanced plate loads in a push-pull amplifier. (See Fig. 3.)

An incorrect operating point in a circuit such as shown in Fig. 3 is usually caused by a leaky coupling capacitor. This bleeds a positive bias from the preceding stage to the grid of one of the push-pull tubes, and causes it to saturate early as the signal level rises.

An unbalanced plate load in a push-pull stage causes unequal amplifier response on positive and negative half cycles, as shown in Fig. 4. Unbalanced peaking coils or damping resistors cause unsymmetrical response at high frequencies. Unbalanced load resistors cause unsymmetrical response at low frequencies. Coupling between peaking coils, or signal leads dressed close to the chassis (adding to stray capacitance) can cause unsymmetrical high-frequency response. Coupling capaci-

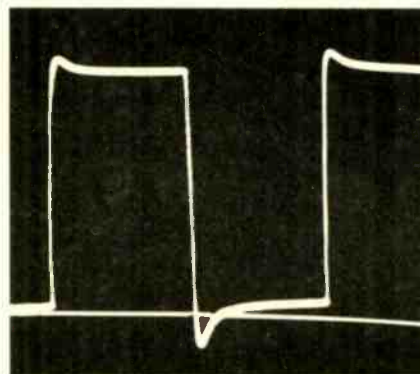
tors and load resistors should be supported on tie lugs, and spaced at least ½ inch from chassis metal.

Load resistors and peaking coils in scopes used for color-TV service are adjusted to give as flat a frequency response as possible. This is required to avoid distortion of reproduced chroma waveforms. As is evident from Fig. 5, chroma waveforms have fundamental components at both low and high frequencies. These must be reproduced uniformly to avoid waveform distortion.

### Ringings/Overshoot VS Frequency Response

It is sometimes stated that an amplifier with flat frequency response does not cause ringing and overshoot. This is true, if all the har-

Fig. 2—Overshoot is more severe on trailing edge of square wave, indicating unbalance in the scope's vertical amplifier. Note that the overshoot is not accompanied by ringing.



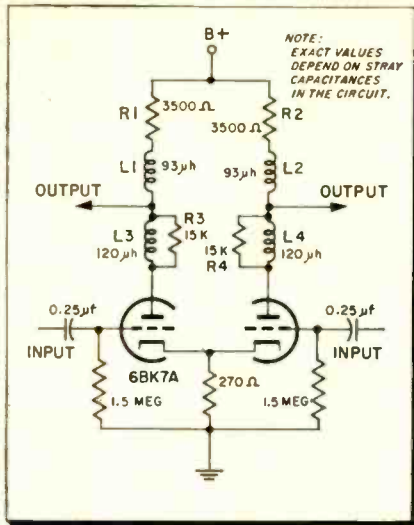


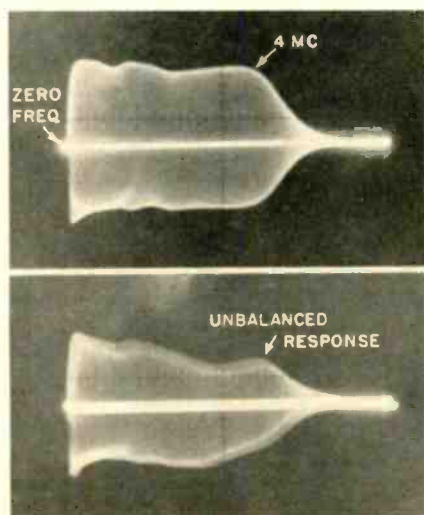
Fig. 3—Push-pull stages must be balanced for good transient response. Components in both plate loads should be equal as well as the transconductance of each triode section.

monics of the waveform fall within the flat region of amplifier response. On the other hand, when harmonics of the waveform fall on the drooping portion of the frequency response, ringing and overshoot often occur.

Whether or not the amplifier overshoots and rings depends upon the steepness of the cut-off region. This is illustrated in Fig. 6. An amplifier which has all possible high-frequency compensating circuits, also has a sharp high-frequency cut-off. It gives maximum gain and bandwidth for the number of tubes used, but its sharp cut-off is also conducive to overshoot and ringing.

A vertical amplifier has a more gradual cut-off when the maximum amount of high-frequency compen-

Fig. 4—Lower photo illustrates unbalanced frequency response in a scope's vertical amplifier. Both low and high frequencies can be affected by component unbalance on either side of tube's plate circuit.



sation is not used. The gradual cut-off provides a more linear phase characteristic, avoiding overshoot and ringing if the cut-off is made quite gradual. When maximum compensation is not used, more tubes are required to obtain the same gain and bandwidth.

The most usual methods of high-frequency compensation are shown in Fig. 7. There are other methods also available, such as screen compensation, and plate-grid capacitive coupling. However, these are much less common than the circuits illustrated.

A vertical-amplifier tube may be operated in a circuit having both series-shunt peaking in the plate circuit, and capacitive peaking in the cathode branch. In this case, the stage has a sharp high-frequency cut-off, and it will ring and overshoot if harmonics in the signal fall outside the region of flat frequency response.

A stage may use only series peaking in the plate circuit (or only shunt peaking). Flat frequency response is then obtained by using a lower value of plate-load resistance. The stage gain is less, and an additional stage must be used to obtain the same gain, compared with a maximum compensated stage. With the use of limited high-frequency compensation, the stage has a gradual high-frequency cut-off, and the problem of ringing and overshoot is not troublesome.

A test set-up to make a frequency check of a scope's vertical amplifier is shown in Fig. 8.

### Cascading

Of course, we use more than one stage of vertical amplification. A CRT requires approximately 400 p-p volts for full-screen deflection, de-

Fig. 5—Chroma waveform has fundamental components at low and high frequencies. This requires flat frequency response in the scope's vertical amplifier.

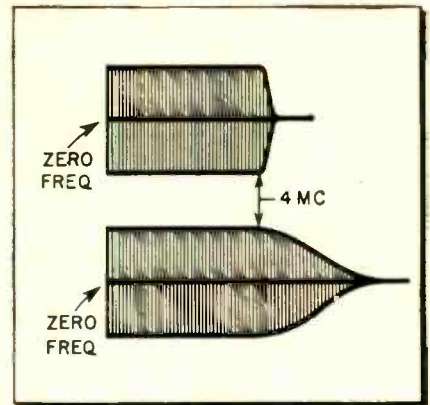
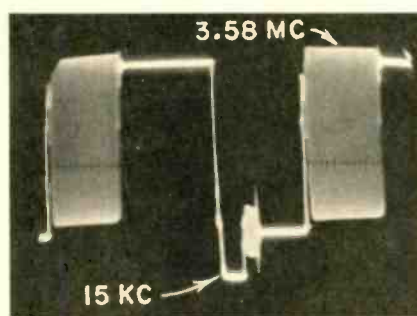
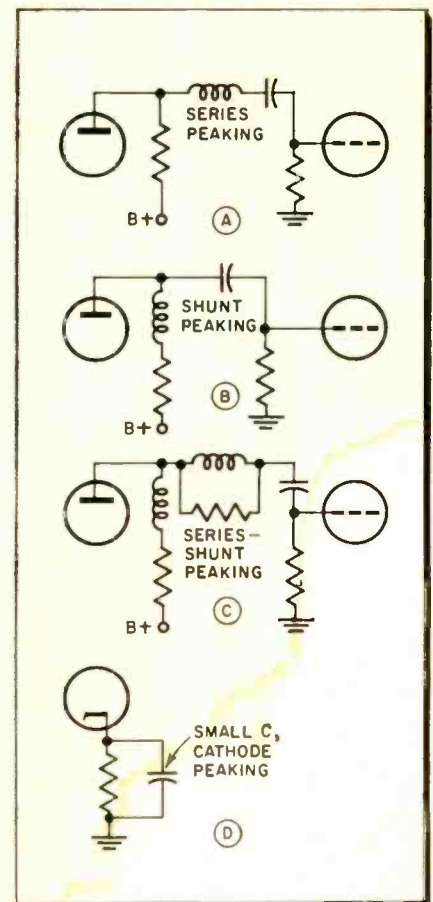


Fig. 6—A scope with sharp high-frequency cut-off is conducive to overshoot and ringing. Gradual cut-off minimizes this fault.

pending upon the accelerating voltage used. A much brighter pattern is obtained with 2,000 volts than with 1,000 volts, but more drive is required to deflect the CRT when operating at 2,000 volts.

Practical troubleshooting requires high sensitivity for tests in low-level circuits. A sensitivity of 10 p-p millivolts is desirable. This corresponds to a vertical-amplifier gain of 40,000. To obtain this gain with tubes hav-

Fig. 7—Various networks used in scope vertical amplifiers for obtaining different degrees of high-frequency compensation.



# Adjusting Tape Recorders

*Achieve Top Tape Performance By Checking:  
Azimuth & Head Height Alignment,  
Bias Current, Tape Speed, S/N Ratio*

HERMAN BURSTEIN

• Tape recorder adjustment ease falls into a "middle of the road" category among consumer electronic products. What makes it *seem* more formidable, though, is the general unfamiliarity of many technicians with this type of work. For example, checking the azimuth alignment of a tape head doesn't present any unusual difficulties—if you own an azimuth alignment tape, and know how to use it.

## Azimuth Alignment

Azimuth, the degrees east or west of the north pole, is referenced to tape recorders by the angular relationship of the tape head gap to the recording tape. The tape head gap should be at a 90° angle to the laterally traversing recording tape, as shown in Fig. 1. Any gap deviation from the vertical will normally result in high frequency response losses in playback.

This high frequency loss will not be evident on most low to medium priced tape recorders if the tape played back is *recorded* on the same machine because a single record-playback head is generally used. *Pre-recorded* tape, however, will

Fig. 1—Azimuth alignment of tape heads require 90° angle between gap and tape.

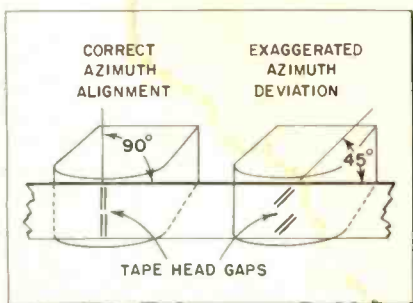


exhibit a high frequency loss during playback if the azimuth alignment is incorrect, since it is recorded with the correct azimuth alignment. Therefore, azimuth alignment adjusting should be done with pre-recorded tape.

The standard procedure is to use an azimuth alignment tape, which usually contains a high frequency tone such as 7,500, or 10,000, or 15,000 cps. Connecting a VTVM to the output of the tape recorder, the alignment tape is played and the head mechanically adjusted for maximum output. Beware of false peaks, that

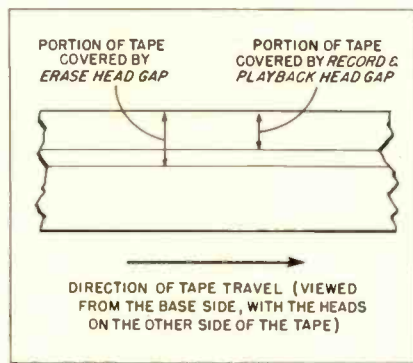


Fig. 2—Normal tape-head position is shown. Improper erase-head vertical position may partially erase recorded material.

is, minor output peaks on either side of the major peak that occurs at correct azimuth alignment.

Some azimuth alignment tapes contain two or more frequencies. A coarse alignment is made on the basis of the lowest frequency. A fine touchup is then made on the higher frequency.

Most tape machines permit easy azimuth adjustment by turning one of the screws that fasten the head to the tape deck. Determine from the manufacturer's service manual which screw or screws may be turned.

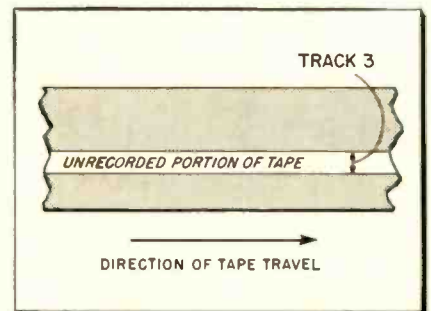


Fig. 3—RCA test tape, #12-5-64T, is used to check height alignment of 1/4 track heads.

(Turning the wrong one may tilt the head forward or backward, causing poor tape-to-head contact.)

If the tape recorder employs separate record and playback heads, the playback head is aligned first in the manner described. Next, the record head is aligned by simultaneously recording and playing a high frequency signal, meanwhile adjusting the record head for maximum output in playback.

## Head Height

The erase, record, and playback heads must be positioned vertically so that their gaps span the same portion of the tape, as illustrated in Fig. 2, for a half-track recording. The principle is the same for two-track and four-track stereo heads.

An erase head that is vertically misaligned results in incomplete erasure. If the tape recorder has separate record and playback heads and these are vertically misaligned with respect to each other, two problems occur: (1) reduced output in playback and therefore, a lower signal to noise ratio; (2) crosstalk as the result of the playback head coming too close to an adjacent track.

Height adjustment is usually accomplished by turning the mounting

screws in one direction or the other. After the adjustment is made (if found necessary), it is important to recheck the azimuth alignment.

In the case of half-track heads, visual alignment can often be satisfactory. That is, align by eye the edge of the tape with the edge of the gap. Best results can be obtained with the tape in the "dynamic" state, namely, in the same position relative to the head as in normal operation. Therefore, place the transport in motion, and shut off the power so that the tape is at rest against the heads. Then check the relationship between the edge of the gap and the edge of the tape.

Height adjustment of the playback head can be checked by playing a test tape and adjusting the head for maximum output as indicated by a VTM connected to the output of the machine. It is advisable to play a low frequency signal, such as 400 cps, so that slight changes in azimuth, as the head is moved, do not significantly affect output.

If there is a separate record head, this can be aligned with respect to the playback head by simultaneously recording and playing a low frequency signal and adjusting the record head for maximum output signal as measured by a VTM. The erase head can then be adjusted for maximum erasure.

Vertical positioning is more critical for two-track and four-track stereo heads, which contain two gaps, one above the other. It is obviously difficult to rely upon visual alignment in this case. The other techniques described can be used instead.

A further check can be made on the basis of crosstalk. If the playback head is improperly positioned so that it is too close to an adjacent track, it will pick up some signal from this track. If it actually spans part of the adjacent track, the crosstalk signal will have full frequency content. If it only comes close to the adjacent track, the crosstalk signal will have principally low frequency content. On the other hand, a crosstalk signal that sounds tinny is due to crosstalk within the head itself rather than to improper vertical positioning.

There are test tapes specifically designed for checking and adjusting head height. One of these is RCA No. 12-5-64T for four-track heads. As shown in Fig. 3, the entire width of Part 1 of the tape is recorded, except

for a .043" band corresponding to track 3. The recorded signal is 1,000 cps at 3.75 ips and 2,000 cps at 7.5 ips. With a VTVM connected to the output of the tape machine for track 3, the head is moved up or down until a zero or minimum reading is obtained.

Another technique of checking head height employs the product called Magna-See, made by Reeves Soundcraft Corp. The recorded tape is immersed in a bath of Magna-See solution, and the recorded tracks become visible when the tape dries out. After the record head is adjusted so that the recorded tracks appear in proper position, the playback head can be aligned with respect to the record head (in the case of a machine using separate heads) by simultaneously recording and playing a low frequency signal and adjusting the playback head for maximum output. The erase head can be aligned by viewing the results of erasure.

#### Bias Current

The tape recorder's a-c bias oscillator has three basic duties: maintain a linear response from the recording head, high signal strength, and erasure of recorded material. A-c bias is generally provided through an L-C circuit with a tuned grid or plate. The oscillator frequency is in the ultrasonic range, generally around five times the highest audio frequency produced by the recorder. The selection of a bias frequency

(Continued on page 58)

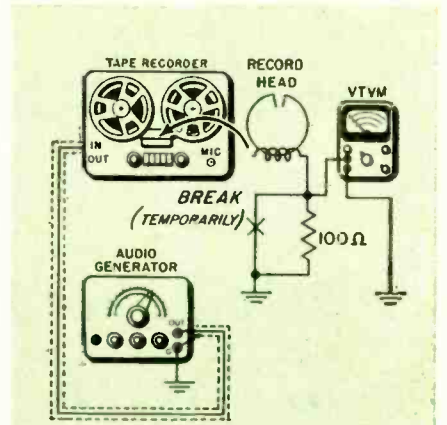


Fig. 4—Bias current value may be determined by using illustrated test set-up & Ohms Law.

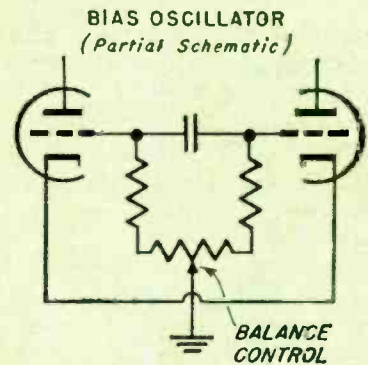
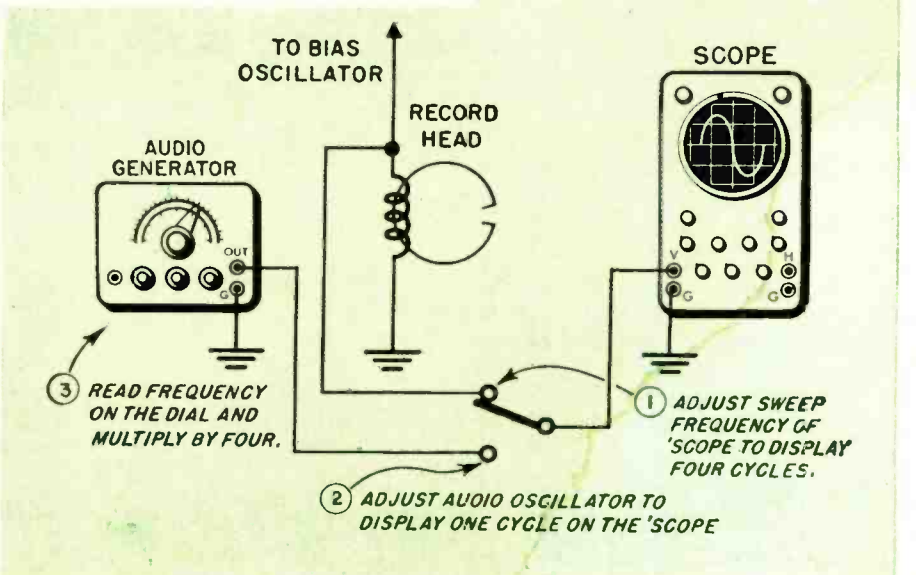


Fig. 5—Balance control circuit used to minimize noise in bias oscillator.

Fig. 6—Bias frequency is measured by using the illustrated audio oscillator-scope set-up.



# Guide to Citizens Band Radio

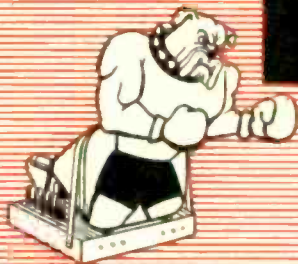
## Master List of Manufacturers, Models and Retail Prices.

Compiled By  
ALLAN LYTEL and ET RESEARCH DEPT.

Company	Model	Price	Company	Model	Price	Company	Model	Price
Acton Laboratories, Inc. 533 Main St. Acton, Mass.	TCV-271 TCV-272 TCV-273	\$179.95 \$189.95 \$189.95	Electronic Instrument Co. (EICO) 33-00 Northern Blvd. Long Island City 1, N.Y.	760 Kit 760 Wired 761 Kit 761 Wired 762 Kit 762 Wired	\$ 59.95 \$ 89.95 \$ 69.95 \$ 99.95 \$ 69.95 \$ 99.95	Maxwell Electronics Corp. 229 Garvon St. Garland, Texas	27C-1A 27C-1B 27C-1C	\$159.50 \$159.50 \$159.50
Allied Radio Corp. 100 N. Western Ave. Chicago 80, Ill.	C-11 C-27	\$ 39.95 \$ 79.95	Electronics Design Co. 400 E. Cornell St. Enid, Okla.	100-C	\$235.00	Morrow Radio Mfg. Co. 2794 Market St. Salem, Oreg.	5W3 5W1 CBFL	\$179.50 \$169.50 \$215.00
Applied Electronics Co. 213 E. Grand Ave. S. San Francisco, Calif.	AR-9	\$169.50	Globe Electronics 41 So. 34th St. Council Bluffs, Iowa	CB-100 CB-200 Pocketphone	\$129.95 \$179.95 \$125.00	Multi-Products Co. 21470 Coolidge Highway Oak Park, Michigan	CD-5/6 CD-5/12	\$124.50 \$124.50
Arkey International, Inc. 88-06 Van Wyck Expressway Richmond Hill 18, N.Y.	SQ-9 Kit SQ-9 Wired	\$ 79.95 \$119.95	Gonset (Div. Young Spring & Wire Corp.) 801 S. Main St. Burbank, Calif.	3303/G-11 3304/G-11 3305/G-11 3316/G-12 3329/G-12	\$124.50 \$124.50 \$124.50 \$149.95 \$149.95	Pearce-Simpson, Inc. 2295 N.W. 14th St. Miami, Fla.	CBD-1	\$159.50
Berger Communications 109-01 72nd Rd. Forest Hills, N.Y.	CBR-1000	\$ 69.50	Grove Electronics Mfg. Co. 4103 W. Belmont Chicago 41, Illinois	G110 Wired G110 Kit G6 Wired G6 Kit G12 Wired G12 Kit	\$ 59.95 \$ 39.95 \$ 59.95 \$ 39.95 \$ 59.95 \$ 39.95	Philmore Mfg. Co., Inc. 130-01 Jamaica Ave. Richmond Hill 18, N.Y.	TC-11 TC-612	\$ 39.95 \$ 44.49
Browning Labs. 100 Union Ave. Laconia, N.H.	R-2700	\$149.00	Hallicrafters 4401 W. Fifth Ave. Chicago 24, Ill.	CB-1	\$129.00	Polytronics Laboratories 253 Crooks Ave. Clifton, N.J.	PC-11-6 PC-11-12	\$179.50 \$179.50
Chickasha Electronics, Inc. Chickasha, Okla.	Custom Dispatcher, Kit Custom Dispatcher, Wired 1000-D Kit 1000-D Wired	\$ 69.95 \$ 89.95 \$ 59.95 \$ 79.95	Heath Co. 305 Territorial Rd. Benton Harbor, Mich.	CB-1 Wired CB-1 Kit	\$ 60.95 \$ 42.95	RME (Radio Mfg. Engineers, Inc.) Washington, Ill.	4303	\$129.50
Citizens Electronics P.O. Box 433 Laurelton, N.J.	Model A Model A	\$ 54.95 \$ 74.90	Hershel Radio Co. 5249 Grand River Detroit 8, Mich.	22-110 22-110-6 22-110-12	\$ 39.95 \$ 49.95 \$ 49.95	RCA Industrial Electronics Camden 2, N.J.	CRM-P2B-5 CRM-P2A-5 CRM-P3A-5	\$159.95 \$ 99.50 \$189.95
Dixon Electronics Co. 13444 W. McNichols Rd. Detroit 35, Mich.	CB-5 Kit CB-5 Wired	\$ 34.95 \$ 49.95	International Crystal Mfg. 18 N. Lee St. Oklahoma City, Okla.	Traveler (Bat.) Traveler (115) Executive KB-1 Kit	\$249.50 \$199.50 \$169.95 \$ 90.00	Radio Shack Corp. 730 Commonwealth Ave. Boston 17, Mass.	CBK-1 Kit	\$ 42.50
Dunlap Electronics, Inc. 764 Ninth St. Des Moines 14, Iowa	SCBT-1 Wired SCBT-1 Kit DCBT-1 Wired DCBT-1 Kit CCBT-1 Wired CCBT-1 Kit	\$114.50 \$ 72.50 \$124.50 \$ 79.50 \$152.50 \$120.00	E. F. Johnson Co. Waseca, Minn.	242-126 242-127 242-128	\$129.75 \$139.75 \$139.75	Radson Engineering Macon, Ill.	RT-70 RT-75	\$149.95 \$159.95
Electronics Development Co. 125 E. 46th St. New York 17, N.Y.	K-101 K-102	\$179.50 \$199.50	Kaar Engineering Corp. 2995 Middlefield Rd. Palo Alto, Calif.	6TR326 12TR326 117TR326	\$179.00 \$179.00 \$179.00	Ray Jefferson, Inc. 40 E. Merrick Rd. Freeport, L.I., N.Y.	905	\$ 99.50
			Lafayette Radio Corp. 165-08 Liberty Ave. Jamaica 33, N.Y.	HE-15	\$ 64.50	Raytheon Co. Ind. App. Div. 100 River St. Waltham, Mass.	Raycom	\$179.50
						Raytheon Co. Disb. Prod. Div. 411 Providence Turnpike Westwood, Mass.	Ray-Tel	\$169.95
						Regency (Div. I.D.E.A., Inc.) 7900 Pendleton Pike Indianapolis 26, Ind.	CB-27 CBM-27 CBM-27-12 CBM-27-6	\$124.95 \$124.95 \$124.95 \$124.95

(Continued on page 56)





# "Tough Dog"

## Corner



### Difficult Service Jobs Described by Readers

#### Shorting Width Shim

Recently, a supposedly routine service repair on a Raytheon TV model 21T39 developed into a puzzler. The customer complained of no raster, although adequate sound was confirmed. I proceeded to replace the horizontal oscillator and output tubes, damper and high voltage rectifier tubes with no change. I then checked the set for high voltage by arcing the 2nd anode lead momentarily. The resulting spark was far below normal.

After informing my customer his set required shop repair, I removed the yoke and chassis. The picture tube was mounted separately in the cabinet. As I intended using my shop test CRT, I left the CRT in the cabinet.

Placing the chassis on the bench in my shop, I removed the high voltage rectifier to eliminate shock hazard. With a VTVM, I then proceeded to check the receiver. The grid of the horizontal output tube showed proper negative voltage, the screen grid voltage was also normal. The damper, flyback and deflection yoke thereby became prime suspects. I replaced the high voltage rectifier tube, previously removed, and to my amazement, a healthy  $\frac{1}{2}$  inch arc could be drawn from the second anode lead.

Looking inside the high voltage cage I saw a few blobs of solder lying at the bottom. I assumed these blobs of solder had shorted out the high voltage, concluding they had been fortunately dislodged when carrying the set to the shop. I consequently returned the set to my customer. Replacing the chassis in the cabinet, I turned the set on. To my embarrassment, the same trouble was

present—no raster. Completely baffled, I took the entire set, chassis and cabinet, on my dolly and brought it back to the shop.

I decided to test every suspected component in the set. Using a CRT checker, I found the picture tube normal. After removing the yoke and chassis from the cabinet and substituting a CRT, I turned the set on. Once again, I could draw a  $\frac{1}{2}$  inch arc from the 2nd anode lead. Confused, I put the chassis into the cabinet to see if the raster still appeared. While slipping the yoke on

strip, it was shorting out the yoke to the yoke housing. In the shop, using my own CRT, the set would return to normal operation.

Insulating the width shim with celluloid tamed this tough dog.—*Irwin C. Tilman, Tarentum, Pa.*

• In instances where a width shim is used, it is often additionally protected by a cardboard or fiber covering. Technicians should not unthinkingly destroy this protective covering.—*Ed.*

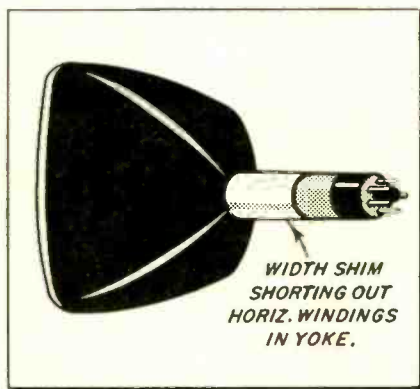


Fig. 1—Width shim insulation break causes loss of raster.

the CRT neck, I spotted my trouble. Wrapped around the CRT neck was a strip of brass (width shim). Upon close examination, I noticed a plastic coating which had deteriorated, obviously from yoke heat (Fig. 1). Removing the brass strip I then replaced the yoke, returning the set to normal operation.

I now realized what was happening to the high voltage. Since the insulation was broken on this metal

#### Sound Buzz

A Motorola TS60 chassis was brought into the shop after unsuccessful efforts were made in the customer's home to eliminate a heavy sound buzz. It was determined, by varying the vertical hold control, that the buzz was feeding into the sound from the vertical section.

Decoupling capacitors in the vertical section were substituted, without results. The vertical output transformer was also changed—with the buzz remaining.

All B+ voltages checked out normal on a VOM. Since this set has a "floating ground," (B- is connected to chassis through a 470k resistor) all voltage measurements were made from B-.

(Continued on page 89)

#### TOUGH DOGS WANTED!

\$10 for acceptable items. Use drawings to illustrate whenever necessary. A rough sketch will do. Photos are desirable. Unacceptable items will be returned. Send your choice entries to "Tough Dogs" Editor, ELECTRONIC TECHNICIAN, 480 Lexington Ave., New York 17, N. Y.

# Mobile Radio Accessories



A mobile radio unit equipped with a dial-type selective calling system provides the convenience of private signaling.

LEO G. SANDS

• The income of the service dealer in the two-way radio business who does not generally participate in the sale of equipment is limited to service and installation fees. There is a growing trend among mobile radio equipment manufacturers, however, to permit the sale of their equipment through service dealers, often on an exclusive territorial basis. On the other hand, the typical two-way radio service dealer is not well enough financed to stock equipment. He is often too busy servicing to do a diligent selling job.

The sale and installation of accessories for existing mobile radio systems, though, is right up the service dealer's alley. Among the products readily sold through these channels are: improved antennas, lower-loss antenna transmission lines, antenna towers, Conelrad monitors and selective calling equipment. These products are available from several independent manufacturers as well as those who build basic mobile radio equipment.

## Antenna Improvements

The performance of many of the existing mobile radio systems can be improved by replacing the base station antenna with one which has higher gain or a directional radiation

pattern. Communicating range and solidity of coverage can be enhanced by installing a modern antenna that meets the unique requirements of specific locations. See Fig. 1.

Coaxial transmission lines may deteriorate and cause significant power losses. Replacement of the cable with hollow transmission line or a lower-loss coaxial cable can result in more power being delivered to the antenna.

Several manufacturers offer reasonably priced antenna towers which can be sold and installed by the service dealer. Since the range of a mobile radio system is determined to a great extent by the effective elevation of the base station antenna, the replacement of an antenna support with one of greater height can result in increased range and more solid coverage.

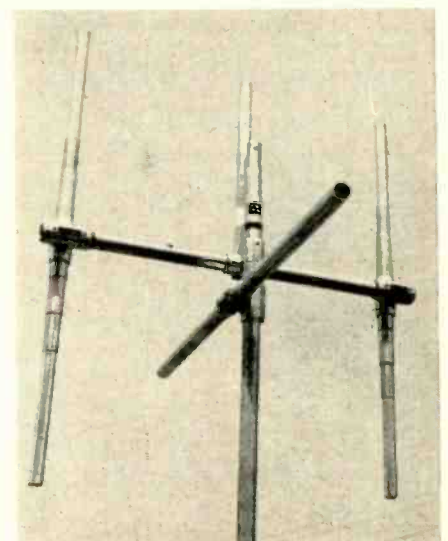
## Conelrad

F.C.C. regulations require that base stations of mobile radio systems be equipped with means for monitoring Conelrad alerts. While an ordinary broadcast receiver can be used, this requires continuous aural monitoring by the base station operator, which can be tedious and distracting. Several manufacturers offer Conelrad monitors which are radio receivers designed to monitor Conelrad alerts

silently, actuating an alarm in the event of an alert.

One manufacturer has a unit that can be set to monitor any of three pre-selected AM broadcast stations as well as for reception of civil defense broadcasts on 640 kc or 1240 kc. When the monitored carrier is interrupted for 2.5 seconds or more, a red warning lamp glows and the normally-muted loudspeaker is turned on so that the Conelrad message can be heard. The operator then sets the unit

Fig. 1—Transmissions from the base station can be improved by the installation of a modern high gain antenna, type-selected to meet the particular local requirement.



# Increase 2-Way Radio Income With Antenna Improvements, Conelrad & Selective Calling Equipment

to either 640 kc or 1240 kc to receive civil defense broadcasts. In addition to the red warning lamp, the instrument can be used to actuate external alarms and its audio output can be fed to external loudspeakers or into a sound system.

Manufacturers of Conelrad monitors include Kaar, RCA, Dumont and Motorola. Several manufacturers offer outboard Conelrad attachments which can be used with conventional receivers. These devices function with the receiver loudspeaker muted under normal conditions, actuating an alarm when an alert is intercepted.

Another market has been opened up for Conelrad monitoring equipment. The F.C.C., U. S. Weather Bureau and U. S. Air Force are behind a movement to use Conelrad alerting signals for emergency weather warning broadcasts.

The Weather Bureau contacts cooperating broadcast stations who cut off their transmitter carriers and transmit a 1000-cycle tone to actuate automatic monitor receivers and to call attention to the emergency message.

However, instead of switching to 640 kc or 1240 kc, as is the case when a military alert exists, the cooperating stations continue to transmit on their regularly assigned frequencies.

## Selective Calling

Since many existing mobile radio systems are not yet equipped for selective calling there is an opportunity for the service dealer to sell, install and service selective calling equipment. Vehicles are ordinarily signaled aurally by the base station operator who calls out the name of the desired driver or the number assigned to the mobile unit. The call is heard at all mobile units.

In large cities, particularly in the Taxicab Radio Service where several taxi firms share the same radio channel, it is annoying to drivers and passengers alike to listen to a cacophony of voices.

Taxi dispatchers too must monitor their radio receivers continuously and try to sift out their own calls from the melange of voices on the air. Since taxi radio systems operate on a duplex basis with mobile units transmitting on one frequency and base stations on another, neither drivers nor dispatchers know if their own transmitting channel is clear before they initiate a call and possibly add to the congestion.

## Tone Squelch

This problem can be alleviated by adding what is known as "tone" squelch. Using this technique, each voice transmission is preceded or accompanied by a tone which unlocks the squelch of the associated receivers. Radio signals which do not include a tone of matching frequency will not be accepted by receivers equipped with tone squelch.

Some manufacturers build mobile radio equipment with built-in tone squelch. Users of this equipment may

share the same channel with others, but hear only communications from their own stations. Tone squelch also eliminates skip interference from distant stations operating on the same channel.

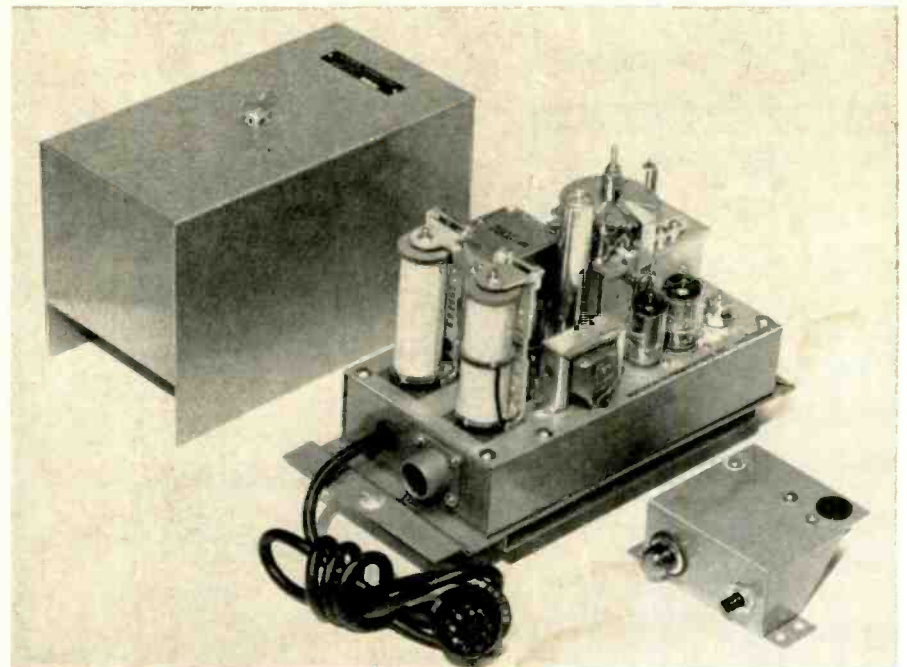
While tone squelch eliminates reception of unwanted signals from other mobile radio systems operating on the same channel, all mobile units within a system overhear all communications from the associated base station.

The requirement for continuous monitoring of the radio receiver in order to intercept calls can be eliminated by adding selective calling. There are two basic types of selective calling systems, the frequency-selective or tone system and the digital system.

## Tone-Type Selective Calling

Tone-type selective calling systems are fast-operating, but limited in capacity. The base station operator,  
*(Continued on page 85)*

Fig. 2—A Secode out-board type mobile decoder unit for attaching to any make mobile receiver, provides reception of private calls. At right is the call indicator head.



# TV Troubleshooters— This Could Happen To You!

*Correct Interpretations & Servicing Methods Notwithstanding,  
Even The Pro's Are Delayed By Assumptions*

ALLAN KINCKINER

A Motorola TS 30 with burned out 5U4's was bench checked and a very low resistance was measured on the high B line. Further trouble shooting revealed that T-6, listed as a Horizontal Isolation Transformer by the manufacturer, had a grounded winding (red to blue winding as shown on the accompanying diagram). This particular type of transformer is only used by Motorola and therefore a replacement had to be ordered from them.

The circuit in the set (Fig. 1) is not commonly used, so a brief description is given here. A horizontal pulse is fed to parallel 6BQ6's wherein it is amplified and applied directly to the yoke. At this hot side of the yoke the cathode of a 35Z5 is connected as a damper. The cathode is also connected to the tap of the 35Z5 filament which is heated by a special winding of the power trans-

former. In series with the filament leads to the damper is a three winding transformer, the previously mentioned T-6. Two of the windings are in series with the filament legs and the third winding couples the pulse in the transformer to the grid of a 6BG6 which develops a high voltage pulse in the high voltage transformer feeding the 6BG6 plate. Transformer action builds the pulse up still higher and feeds the 1B3 high voltage rectifier.

In due time a replacement transformer was obtained and installed, along with R-124 and the 35Z5 which were burned out. No trouble was met in replacing T-6, as the leads were color coded exactly like those of the old transformer. After assuring that there was no further short in the set, it was turned on. A scope check showed a healthy 200 volt positive pulse at the grid of the 6BG6, but no high voltage developed. After much more time was spent checking the



Fig. 2—Vertical "lock-in" was firm on this set—but with the blanking bar a few inches higher than normal. Soldering a coupling capacitor on the wrong terminal caused the picture to lock at an incorrect position.

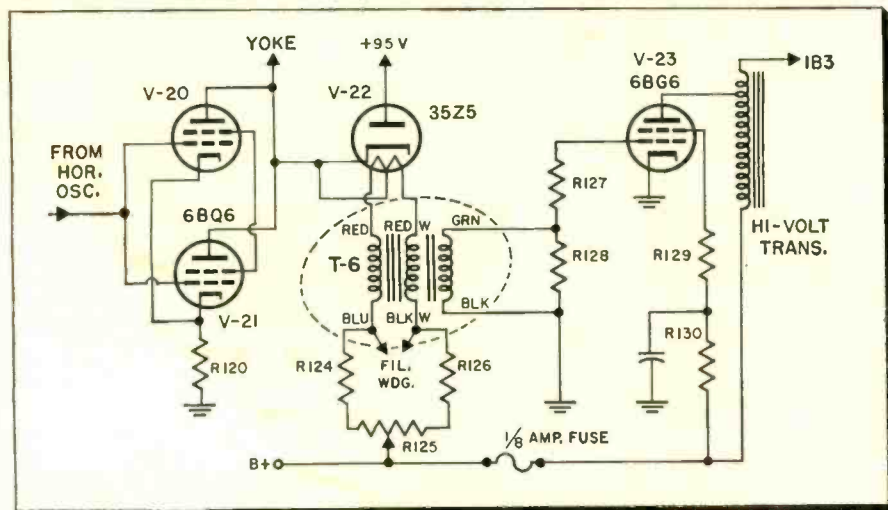
voltages, etc. on the 6BG6, and finding them all correct, it was considered that possibly the high voltage transformer was also bad.

Before condemning the transformer one last thorough check was made. Again, starting at the grid of the 6BG6 the scope still showed 200 volt positive pulse. . . . WHOA! Positive pulse? It should be negative. Comparing the wiring of the replaced transformer to make sure that I hadn't reversed any of the leads, which I had not, I now decided to purposely reverse the green and black leads of the pick off winding which, if theory is correct, should give the desired negative pulse.

Now, with the green lead to ground and the black to the 6BG6 grid, high voltage developed immediately. I don't know whether the replacement transformer had one winding wound backward or what, but I do know that without the scope to indicate pulse polarity this job would certainly have wasted more time.

(Continued on page 90)

Fig. 1—After reversing the green and black leads on this transformer, contrary to manufacturer's instructions, the set resumed normal operation.



# FREE LITERATURE

To receive the literature below without charge, simply circle the numbers on the coupon.  
Cut out and mail to ELECTRONIC TECHNICIAN, 480 Lexington Ave., New York 17, N.Y.

**1 FM Monitor Receiver:** Colorful literature provides description of features with comparison chart, list of tube compliment, prices and illustrations of the unit's many applications. Acton Labs.

For more data, circle 5-43-1 on coupon.

**2 Transistors:** 4-page multi-color catalog lists 412 germanium transistor types for applications in computers, aircraft, missiles, military, marine, entertainment and general industry. All are manufactured to registered EIA specifications. Electronic Transistors Corp.

For more data, circle 5-43-2 on coupon.

**3 Rectifier Systems:** An 8-page technical newsletter contains a 5-page article entitled "Properties of Rectifier Systems and Means to Improve Voltage Division." Voltage distribution and various methods to achieve equality are discussed and recommendations made for the solution of specific problems. International Rectifier Corp.

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**4 Connectors, Plugs, etc.:** A two-color 52-page, pocket size, catalog covers the imported Hirschmann line of connectors, plugs, sockets, couplers, leads and terminals now available through Rye Sound Corp.

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**5 Electronic Components:** A catalog of 32 pages of industrial electronic components has been made available in 7 parts for ease of reference. Jacks, connectors, plugs, and switches are covered. Switchcraft.

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**7 Capacitors:** Complete catalog includes twist prong capacitors especially designed for TV replacement. Illinois Condenser Co.

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For more data, circle 5-43-8 on coupon.

**9 Antenna:** The Taco T-Bird, a new TV antenna, designed to provide peak reception for TV sets everywhere, is described in literature. Technical Appliance Corp.

For more data, circle 5-43-9 on coupon.

**10 Public Address:** New transistorized Powrpage model PP-IT, for portable use, features 25 watt amplifier designed for low distortion and high stability, covered in literature. University Loudspeakers.

For more data, circle 5-43-10 on coupon.

**11 Antenna:** For foreign, sports and American compact cars, model M-182-D installs completely from the top without brackets, and disappears when collapsed. Ward Products Corp.

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----- CUT HERE -----

Use this coupon, or your letterhead, before June 20, 1960

Please send me literature of companies whose code numbers I have circled below (includes editorial and advertised items):  
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5-10-1	5-27-2	5-43-10	5-69-1	5-78-1	5-84-1	5-91-2	5-96-2
5-11-1	5-27-3	5-43-11	5-70-1	5-78-2	5-84-2	5-91-3	5-96-3
5-13-1	5-27-4	5-55-1	5-70-2	5-78-3	5-84-3	5-91-4	5-97-1
5-14-1	5-28-1	5-56-1	5-71-1	5-79-1	5-84-4	5-91-5	5-97-2
5-15-1	5-28-2	5-56-2	5-72-1	5-80-1	5-85-1	5-92-1	5-98-1
5-16-1	5-28-3	5-57-1	5-72-2	5-80-2	5-85-2	5-92-2	5-98-2
5-17-1	5-29-1	5-58-1	5-72-3	5-80-3	5-86-1	5-93-1	5-98-3
5-18-1	5-30-1	5-60-1	5-72-4	5-80-4	5-87-1	5-93-2	5-98-4
5-20-1	5-43-1	5-61-1	5-73-1	5-81-1	5-87-2	5-94-1	5-98-5
5-21-1	5-43-2	5-62-1	5-74-1	5-82-1	5-88-1	5-94-2	5-98-6
5-23-1	5-43-3	5-63-1	5-74-2	5-82-2	5-88-2	5-94-3	5-99-1
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# 1960 Parts Show Preview

13,000 Industry Visitors To See Latest Products On Display

• Once again, the annual Electronic Parts Distributors Show will serve as the market place for manufacturers to show their wares to distributors from all parts of the country. These distributors will carry product data from 300 exhibitors back to their home towns, informing service technician customers of the latest components and equipment available.

The Parts Show will be held in Chicago's Conrad Hilton Hotel, May 16-18. Some 13,000 visitors are expected. Registration is in advance of the Show, and admission is by badge only, issued in the following categories:

Exhibitors; Distributors; Commercial Sound & Hi-Fi Specialists; Sales Representatives; Government Personnel; Advertising & Export Agencies; and Industrial Accounts.

## Show Sponsors

The five trade associations sponsoring the non-profit operator of the Show, the Electronic Industry Show Corp., are:

Electronic Industries Assoc. (EIA)  
National Electronic Distributors Assoc. (NEDA)

Assoc. of Electronic Parts & Equipment Mfrs. (EP&EM)

West Coast Electronic Mfrs. Assoc. (WCEMA)

Producers of Associated Components for Electronics (PACE)

Of notable interest at the 1960 Parts Show is the establishment of a Workshop Conference Program to educate distributors on improved business techniques. This is accomplished through a series of morning seminars, 8-10:30 AM, during the first two days of the show. •

**1960 Parts Show**  
**Date: May 16-18, 1960**  
**TIME: 9AM to 6PM**  
**PLACE: Conrad Hilton Hotel,**  
**Chicago, Ill.**

## LIST OF EXHIBITORS

Company	Booth	Room
Advance Relays	208	
Aerovox Corp.	410	
Akro-Mills, Inc.	782	
All Channel Products Corp.	123	
Alliance Mfg. Co.	225	
Alpha Wire Corp.	317	
Altec Lansing Corp.		619A
Alto Fonic Corp.		536A
American Electrical Heater	4	
American Electronics (N.Y.)	113	633A
American Gelsolo Electronics		664A
American Radio Relay League		616
American Television & Radio	414	
Amperex Electronic Corp.	682	
Amperite Company, Inc.	585	
Ampex Corporation		534A/535A
Amphenol-Borg Electronics		605 /607
Antenna Designs, Inc.		653
Antenna Specialists	122	
Antronic Corp.	108	
Applied Electronics Co.	786	
Arco Electronics, Inc.	401	
Argos Products Co.		537A
Arkay International, Inc.		626A
Astatic Corp.	779	602/604
Astron Corp.	775	
Atlas Sound Corp.	421	
Audio Devices, Inc.		556A
Audio Empire Div.	25	
Audiogersh Corp.		526A
Audiotex Mfg. Co.		620A
B & K Manufacturing Co.		547
Belden Manufacturing Co.	878	
Bell Sound Division		629A/631A
Birnbach Radio Co., Inc.	205	
Blonder-Tongue Laboratories	314	
Bogen-Presto		519A/520A
British Industries Corp.	578	509A
Bud Radio, Inc.		522
Burgess Battery Co.	216	
Bussmann Manufacturing Div.	311	

Company	Booth	Room
CBS Electronics Sales Corp.	304	657A
Campro Products	11	
Cannon Electric Co.	681	
Centralab	790	
Central Electronics, Inc.		620
Channel Master Corp.		513A
Chicago Standard Transformer	407	
Cinch Jones Sales	675	
Clarostat Mfg. Co.	689	
Clear Beam Antenna Corp.	406	
Cletron, Inc.		553A
Clevite-Walco, Inc.	219	
Collins Radio Co.		617
Colman Electronic Products	9	
Columbia Wire & Supply Co.	210	
Comfort Lines, Inc.	112	
Conrac, Inc.		637A
Consolidated Wire	310	
Cowan Publishing Corp.		649
Crown Records, Inc.	884	
Delco Radio Div.	201	
De Wald Radio		643A
Doss Electronic Research		625
Drake Electric Works	130	
Drake Manufacturing Co.	571	
Allen B. Du Mont Labs.	581	
Dunwell Manufacturing	120	
Duotone Co.		609A
Dynaco, Inc.		612A
Eastern Jewel Corp.	2	
Eby Sales Company		611
Elco Sales Company		521
Electronic Instrument Co.	202	515A

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**at the Parts Show**  
**Booth 584**

Electronic Periodicals	213	
Electronic Publishing Co.		623/624
Electronic Technician Magazine	584	
Electrophono & Parts Corp.		604A
Electro-Products, Inc.	127	
Electro-Products Labs.	309	
Electro-Voice, Inc.		605A/607A
Equipto Div.	680	
Ercona Corp.		533A
Eric Engineering		668
Erie Resistor Corp.	580	

(Continued on page 93)

# SHOP HINTS



## Tips for Home and Bench Service

### PC Desoldering

I recently found myself struggling with the removal of a defective six-connection oscillator coil from a radio's printed circuit board. Trying to remove a connection only resulted in the solder cooling-off before I could complete removal from its mounting hole. After spending a considerable amount of time and patience before successfully pulling out one connection, I hit upon an idea. Using an air compressor that I keep at my bench, I applied air through a fine nozzle, from the opposite side of the board, while I heated a connection. The air prevented overheating and each lead came out quickly and easily. In addition, unlike various PC soldering tips I have used, it cleaned the holes of excess solder—facilitating mounting of the new oscillator coil.—*Wilbur Pier, Peru, Indiana.*

### Tape Head Cleaner

Small cotton-tipped sticks, sometimes called Q-tips or quills, are extremely useful for cleaning and oiling tape recorder and record changer mechanisms. They are especially



Fig. 1—Q-tips are used to clean delicate tape recorder heads.

handy for cleaning delicate tape recorder heads. The Q-tips may be dipped in alcohol or special solvent and used on the tape head, as shown in Fig. 1.—*Glen F. Stillwell, Manhattan Beach, Calif.*

### Shaft Repair

I recently received a clock radio, Westinghouse Model H477T5, which had a broken "alarm-set" shaft. A gear assembly is attached to this shaft and to replace the entire unit would considerably raise the customer's bill.

Using an empty ball point pen cartridge, I repaired and extended the shaft by soldering this piece of tubing directly over the broken end,

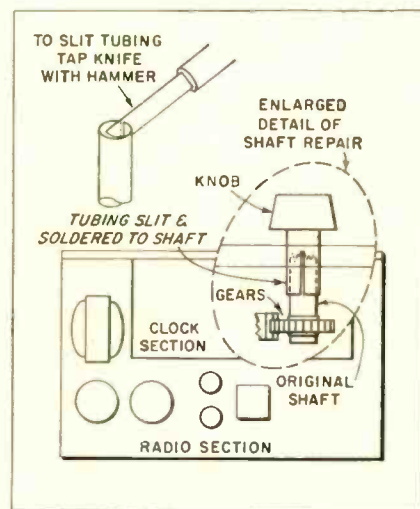


Fig. 2—Soldering an empty ball point pen cartridge to a broken clock radio shaft saves time and reduces cost of repair.

as shown in Fig. 2. I found the shaft to be slightly larger in diameter than the tubing, but made a small slit in one end of the tubing with a knife and small hammer. The tubing was placed over the broken end tightly by a few light taps with hammer, and then soldered to the shaft at the seam in the tubing.

The knob end of the extended shaft was pinched and heated with an iron while the plastic knob was pushed on.

The job required only a few minutes, circumvented ordering the entire assembly, and eliminated the necessity of having to present the

customer with a relatively high repair estimate.—*Richard I. Martel, Sr., Baltimore, Md.*

### Scope Graticule Retainer

While visiting several technician friends, I noticed they were encountering a problem that previously troubled me for a while. The calibrated grid screen or graticule, in front of the scope CRT, frequently becomes tilted and even falls out at times.

Purchase a 5" wooden embroidery hoop (about 15¢ in a sewing shop) and fit the ring against the graticule,

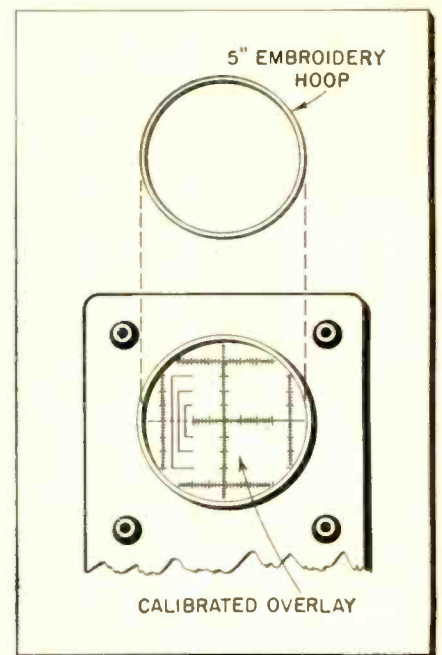


Fig. 3—A wooden embroidery hoop fits snugly against scope graticule and prevents its shifting or falling out completely.

as illustrated in Fig. 3. It fits snugly, and retains the graticule firmly in place. This suggestion should aid anyone who owns a Heathkit O-11, O-12, or similar type scope.—*Bob Cornthwaite, Towson, Md.*

# Technician Associations—1960 Roster

List of groups who have verified activities, with name of secretary unless otherwise noted

## ALABAMA

GADSDEN—Radio & TV Technician's Guild 404 N 16 St—Guy Brooks

## ARIZONA

PHOENIX—Better Electronic Service Technicians PO Box 1284—Jim Kennedy

## ARKANSAS

FT SMITH—TESA—Ft Smith PO Box 807—Don Humphrey  
N LITTLE ROCK—TESA—GLR PO Box 542—W D Todd

## CALIFORNIA

ARLINGTON—Calif State Electronics Assn Riverside Chapter Box 74—G D Robbins  
GLENDALE—Society of Radio-TV Technicians PO Box 4012 No Glendale Sta—Gene Sheppard  
LONG BEACH—Long Beach Radio-TV Technicians Assn PO Box 4085—Lloyd Peterson  
LOS ANGELES—Appliance Profession Assn 5107 W 1st St—G D Ribnick Managing Dir  
LOS ANGELES—Independent TV Service Dealers Assn of Los Angeles County 213 S Coronado St—Abe Bowers  
OAKLAND—Alameda County TV & Radio Assn 5585 Thomas Ave—F W Rock  
PASADENA—RTA—Pasadena Area Chapter PO Box 1143—Robert Kealey  
SAN FRANCISCO—San Francisco TV Service Assn 391 Sutter St—R L Faverty  
SAN JOSE—Calif State Electronics Assn Santa Clara Valley & Santa Cruz Chapter 467A Porter Bldg—J C Murphy  
SOUTH GATE—Radio TV Technicians Assn San Antonio Chapter PO Box 626—F J Bowerman  
VAN NUYS—Society of Radio & TV Technicians PO Box 126—Ernest Larsen

## CONNECTICUT

SPRINGDALE—TV Service Guild Woodbrook Drive—B Smolin  
WATERBURY—TELSA of Conn 9 Woodtick Rd—Deane Gould

## DISTRICT OF COLUMBIA

WASHINGTON—TV Service Assn of Metropolitan Washington 852 Washington Bldg 16th & N Y Ave—Hymie Nussbaum

## FLORIDA

FT LAUDERDALE—Electronic Service Assn of Broward County 901 N W 4th Ave—Hamilton Boyd  
MIAMI—TESA—Miami 4895 S W 8th St—Sam Kessler

## GEORGIA

MACON—TV Electronic Assn of Macon PO Box 2033—James Moore

## IDAHO

BOISE—TESA of Boise 2516 Main St—Horrace Collins  
CALDWELL—TESA of Canyon County 1811 Wyoming—R E Flagg

## ILLINOIS

BERWYN—Professional TV Servicemen's Assn 2137 S Euclid Ave—Fred Jenke  
CHICAGO—Associated Radio & TV Servicemen—Illinois 433 S Wabash Ave—Yuki Mlnaga  
CHICAGO—Electronic Service Guild 55 E Washington St Pittfield Bldg—L T Green  
CHICAGO—NATESA National Alliance TV Service Associations 5908 S Troy St—Frank J. Moch Executive Director  
CHICAGO—TESA Television's Electronic Service Assn of Chicago—land 5908 S Troy St—Angelo Chrysoyelos  
JOLIET—TESA of Will County 240 E Washington St—L R McAllister  
PEORIA—Associated Radio & TV Servicemen Peoria Chapter 706 Wayne St—J F Stoll  
ROCKFORD—Greater Rockford Appliance Dealers Assn 815 E State St—H L Berry

## INDIANA

BEDFORD—Lawrence County Electronic Technicians Assn 910 7 St—Carl Porter  
BLOOMINGTON—Bloomington TV & Radio Service Assn 304 W 2 St—Jesse Bourff  
ELKHART—TV Bureau of Elkhart 1017 S Main St—Wayne Clem  
FORT WAYNE—Bureau of Professional Technicians 804 E Jefferson—C Hostettler

HAMMOND—Radio TV Service Assn 5807 Calumet Ave—Tom Leeney  
HARTFORD CITY—Grant County Radio & TV Technicians Assn 600 W Kickapoo St—C R Schwark Pres  
INDIANAPOLIS—Indianapolis TV Technicians Assn PO Box 23125—Harold Joergens  
KOKOMO—Radio TV Service Engineers Assn 1136 W McCann St—C A Conwell  
LOGANSPORT—Radio & TV Service Engineers Assn 319 Michael St—Don Hyman  
VINCENNES—TESA—Vincennes 408 N 7th St—John Davis

## IOWA

DAVENPORT—TESA—Quint-Cities 532 Brady St—L A Gregson  
DES MOINES—TESA of Des Moines 4025 Walker Ave—Howard Cox  
OTTUMWA—TSA of Ottumwa 840 W 2 St—Carl Jennings

## KANSAS

ELLINWOOD—TV Electronic Service Assn P O Box 335—E A Redmon  
LEAVENWORTH—TESA of Leavenworth 1000 N 7th St Ralph Moore  
TOPEKA—TESA of Topeka 1321 Harrison St—Thane Wiltmer

## KENTUCKY

LOUISVILLE—Kentuckian TV & Radio Technicians Assn 2206 Wingfield Court—Charles Simmons

## LOUISIANA

BATON ROUGE—TV Electronic Service Assn 1290 Main St—J F Burnette  
BOGALUSA—TESA of Bogalusa 209 Louisiana Ave—J P Morgan  
HOUMA—TESA of South Central La 807 Mey St—J P Authement  
LAFAYETTE—Lafayette Electronic Assn 713 Stevenson St—C K Olivier  
LAKE CHARLES—TESA of Calcasieu 3426 Ryan St—Ed Nevils  
NEW ORLEANS—TESA of the South 4210 Eagle St—R R Hogan Recording Secy  
OPELOUSAS—TESA of the Evangeline County 336 W Union St—L Edward Castille

## MAINE

PORTLAND—Electronic Technicians Service Assn of Maine 146 Washington Ave—P S Davis

## MARYLAND

BALTIMORE—Maryland Electronic & TV Assn 3724 Elterslie Ave—Edward Kernan

## MASSACHUSETTS

LOWELL—Electronic Technicians Guild of Mass Lowell Chapter 145 Bellevue St—Conrad Rondeau  
NEW BEDFORD—Radio & TV Technicians Guild of Greater New Bedford 110 Topham St—J L Shepley  
WOBURN—Electronic Technicians Guild of Mass Boston Chapter 236 Main St—James Kelley  
WORCESTER—Worcester County Assn of TV Technicians P O Box 1155—C A Daignault

## MICHIGAN

DETROIT—Electronic Service Assn 8510 McGraw—J F McCulloch  
DETROIT—TV Service Assn of Mich 8225 Woodward Ave—M T Graham  
GRAND RAPIDS—TV Service Dealers Assn 49 40th St S W—C G Lamoreaux  
MOUNT CLEMENS—Macomb Electronics Assn 225 Mt Clemens Savings Bank Bldg—Frank Wilson  
ROYAL OAK—South Oakland County TV Assn Box 341—John Palmer

## MINNESOTA

LITTLE FALLS—Mid-Minnesota TV Servicemen's Assn Box 102—Gerry Lesmelster  
MINNEAPOLIS—Minnesota TV Service Engineers P O Box 4429—Warren Schel  
MINNEAPOLIS—Radio TV Service Assn 6613 50th Ave N—C R Bocklund  
ST PAUL—TESA of St Paul 485 S Griggs St—Peter George

## MISSOURI

GREENFIELD—TESA—Southwest Mo—G W Scott  
KANSAS CITY—National Appliance Service Assn 2201 Grand Ave—J S McDermott  
KANSAS CITY—TV Service Engineers 2114 E 39th St—James White

MOREHOUSE—TESA of Semo—Alton Bahannon  
MOUNTAIN GROVE—TESA of South Central Mo 217 N Main St—W A Pryer  
ST JOSEPH—Electronic Technicians Assn of N W Mo P O Box 102 Sta A—T L Childs  
ST LOUIS—TEAM—Electronic Assn of Mo 718 Goodfellow—J P McMillian Director  
ST LOUIS—TESA—St Louis 2804 Chippewa—Martin Singer  
SPRINGFIELD—TESA of the Ozarks 1057 Mt Vernon—Wilford Stone

## NEBRASKA

OMAHA—CERTA 5008 Military—Ralph Reeves

## NEW HAMPSHIRE

MANCHESTER—Radio & TV Assn of N H 334 Mitchell St—E R Gellnas

## NEW JERSEY

GLOUCESTER CITY—Allied Electronic Technicians of N J Box 15—Robert Tames  
TRENTON—Radio Servicemen's Assn 343 William St—M E Toth  
WEST ORANGE—Electronic Guild of N J 583 Valley Rd—Salvatore Rleca  
WESTVILLE—Tri-State Council of TV Service Assns 216 Broadway, Leon Skallish

## NEW YORK

ALBANY—TSA 112 Central Ave—Warren Baker  
BROOKLYN—Citizens Band Radio Relay League 5003 4th Ave—Eugene Hurkin  
BUFFALO—Radio Technicians Assn 694 Broadway—R A Wutz  
BUFFALO—TESA of Greater Buffalo 694 Broadway—N T Telaak  
BUFFALO—Western N Y Electronic Guild 2326 Main St—Elmore Bement  
CLINTON—Mohawk Valley Radio-TV Technicians Guild 10 W Park Row—Geoffrey May  
FOREST HILLS—Forest Radio & TV Assn 109-01 72nd Rd—G E Berger  
HUDSON FALLS—Empire State Federation of Electronic Technicians RD #1—Melvin Cohen Corr Sec'y  
KINGSTON—Ulster Electronic Technicians Assn 94 Furnace St—C A Kohl  
NEW HARTFORD—Mohawk Valley Radio & TV Technicians Guild 20 Allman Place—Geoffrey May  
NEW YORK—Alumni Assn of RCA Institute 350 W 4th St—Patsy M Genduso Vice Pres  
NEW YORK—Certified Electronic Technicians Assn 304 E 67 St—Robert Cornell Pres  
NEW YORK—Electronic Technician Assn 125 E 46th St  
PEARL RIVER—Rockland Assn of TV & Electronic Services (RATES) 55 E Central Ave—Larry Critchlow  
PORTVILLE—Tri-County Electronic Assn 28 S Main St—Jack Golden  
PORT WASHINGTON—Radio TV Guild of LI c/o Port Electric Co—Arthur Cyr  
POTSDAM—St Lawrence County Electronic Servicemen's Assn 30 Water St—Robert Selleck  
SYRACUSE—Syracuse TV Technicians Assn 742 Butternut St—Bert Desmarits

## NORTH CAROLINA

CHARLOTTE—North Carolina Federation of Electronic Assns 2726 Remount Ave—Ray Stanley  
EAST DURHAM—Radio & TV Service Assn of Durham P O Box 222—Norman Schultz  
FAYETTEVILLE—Cumberland County Radio & TV Assn 2731 Bragg Blvd—E F Barbour Jr  
NEW BERN—The Electronic Servicemen's Assn of Coastal Carolina 503 Contentnea Ave—I C Wyatt

## OHIO

CINCINNATI—TV & Electronics Assn of Cincinnati 1404 First National Bank Bldg—H S Stone  
CLEVELAND—TV & Electronic Service Assn of Greater Cleveland 825 E 143 St—E L Kotrba  
COLUMBUS—Associated Radio & TV Service Dealers 2552 N High St—Ed Brownfield Recording Sec'y  
COLUMBUS—TV & Electronic Service Assn of Ohio 2552 N High St—J P Graham  
DAYTON—TV Electronic Service Assn 2027 E 5th St Jay Welker  
ELYRIA—TESA of Lorain County 92 E Broad St—R A Standen  
FRANKLIN—TESA of Middletown 2nd & High Sts—O D Burge  
HILLSBORO—Southern Ohio Radio & TV Technicians Assn Box 54—F O Miller  
SANDUSKY—TESA of Sandusky P O Box 811—M Williams  
SPRINGFIELD—TESA of Springfield Box 851—Wade Campbell  
TOLEDO—Electronic Technicians Assn of Toledo 1952 Sylvania Ave—Quentin Hannan  
WARREN—Western Reserve Electronic Assn PO Box 966—A S Hronchek



## OKLAHOMA

OKLAHOMA CITY—TESA of Oklahoma 2321 S Robinson—Roy Allen

## OREGON

PORTLAND—Portland Electronic College (Student Body)—1017 S W Washington—Jack Muth

## PENNSYLVANIA

CARBONDALE—Federation of TV-Radio Service Assns 67 S Main St—L J Melk  
EPHRATA—Electronic Technicians Assn of Lancaster County P O Box 264—Gilbert Sweigart  
MAHONNY CITY—Mahonny City Electronic Technicians Assn 128 E Center St—J T Noller  
PHILADELPHIA—TV Service Assn of Delaware Valley 4710 Old York Rd—John Madfield  
PITTSBURGH—Electronic Service Dealers Assn of Western Penna 6026 Station St—Joseph Smandl  
PITTSBURGH—Radio & TV Servicemen's Assn of Pittsburgh 3239 Ashlyn St—Tom Ging  
STATE COLLEGE—TV Service Assn of Centre County 232 S Allen St—C H Smith  
WILKES-BARRE—Radio & TV Servicemen's Assn of Luzerne P O Box 309—M J Krupa

WILLIAMSPORT—Radio-TV Technicians of Central Penna 1643 Memorial Ave—Lee Smith

## RHODE ISLAND

RIVERSIDE—R I Radlomen's Business Assn 425 Willett Ave—E J Oliver

## SOUTH CAROLINA

CHARLESTON—Charleston TV & Appliance Dealers Assn Box 214—W T Kennedy

## TENNESSEE

MEMPHIS—TV Electronics Service Assn of Memphis 421 N Watkins—Hank Duffel

## TEXAS

BORGER—TV & Electronic Service Assn of Borger 1027 S Main St—R F Dietz  
HOUSTON—TESA-Houston 1822 Berry Rd—F B Koepnick  
SAN ANTONIO—TEA of San Antonio 810 E Commerce St—Douglas Anderson Jr  
TYLER—Tyler Radio & TV Assn P O Box 3302—John Neves

## UTAH

OGDEN—Ogden Electronic Technicians Assn 456 27th St—Clark Ross

## WASHINGTON

SEATTLE—King County TV Service Assn 500 E Pine St—J O Humphrey  
SEATTLE—Northwest Appliance & TV Assn 512 1st Ave N—R L Thompson

## WISCONSIN

EAU CLAIRE—Indian Head Radio TV Servicemen's Assn 414 Talmadge St—Vern Christian  
GREEN BAY—TESA of Green Bay 1153 Main St—Oliver Davis  
MILWAUKEE—TESA of Milwaukee 2401 N Weil St—Daniel Smith  
SHEBOYGAN—TESA of Sheboygan County 1125 Indiana Ave—J O Bruder

## CANADA

WINNIPEG MANITOBA—Radio Electronic Technician Assn P O Box 391—Christian Harder  
HAMILTON ONTARIO—Radio Electronic Technician Assn 40 Westminster Ave—Gerry Leeks

# Electronic Schools

BASIC TV-Radio Servicing	1
Advanced TV-radio servicing	2
Color TV servicing	3
Communications, FCC licenses	4
Industrial electronics	5
Hi-Fi & Audio	6
Military electronics	7
Appliance servicing	8
Business Management	9
Electronic Engineering Technology	10

All have both Correspondence and Resident Courses, except those followed by R for Resident Courses or C for Correspondence Courses.

## CALIFORNIA

HOLLYWOOD—Grantham School of Electronics 1505 N Western Ave-4  
HOLLYWOOD—Hollywood Radio & TV Institute 7078 Hollywood Blvd-1-2  
HOLLYWOOD—Pacific Int'l College of Arts & Sciences 5719 Santa Monica Blvd-10  
LOS ANGELES—National Technical Schools 4000 S Figueroa St-1-2-3-4-5-6-7-8  
LOS ANGELES—RCA Institutes 610 S Main St-1-2-3-4-5-6-10  
LOS ANGELES—Western Electronics Institute 5119 Sunset Blvd-1-2-3-4-5-6-R  
SOUTH GATE—Video Specialties 8956 Atlantic Blvd-1-2-3-4-5-R

## CONNECTICUT

HARTFORD—Ward School of Electronics of the University of Hartford 44 Niles St-1-2-3-4-5-6-10-R  
STAMFORD—Lincoln Institute 170 Atlantic Square-1-2-3-6-C

## DISTRICT OF COLUMBIA

WASHINGTON—Capitol Radio Engineering Institute 3224 16 St N W-5-10  
WASHINGTON—Grantham School of Electronics 821 19 St N W-4  
WASHINGTON—National Radio Institute 3939 Wisconsin Ave N W-1-2-3-4-5-7-8-C

## ILLINOIS

BELLWOOD—E-1 Electrical School Box 87-1-8-C  
CHICAGO—American Technical Society 850 E 58 St-5-10-R  
CHICAGO—Christy Trades School 3214 W Lawrence Ave-1-2-3-8-R  
CHICAGO—Commercial Trades Institute 1400 W Greenleaf Ave-1-2-3-5-6-C  
CHICAGO—Coyne Electrical School 1501 W Congress Parkway-1-2-3-5-6-B  
CHICAGO—DeVry Technical Institute 4141 Belmont Ave-1-2-3-4-5-6-7-10  
CHICAGO—Industrial Training Institute 2150 W Lawrence Ave-1-5-C  
CHICAGO—Sprayberry Academy of Radio-Television 1512 W Jarvis Ave-1-2-C

## INDIANA

INDIANAPOLIS—Indianapolis Electronic School 633 N Pennsylvania St-1-2-3-4-5-R

VALPARAISO—Valparaiso Technical Institute Box 490 1-2-3-4-5-6-10-R

## KENTUCKY

LOUISVILLE—United Electronics Laboratories 3947 Park Dr-1-2-3-4-5-7-10

## MARYLAND

BALTIMORE—Baltimore Technical Institute 1425 Eutaw Place-1-2-3-4-10-C

## MINNESOTA

MINNEAPOLIS—Chicago Vocational Training Corp 3330 University Ave S E-1-2-5  
MINNEAPOLIS—Northwestern TV & Electronics Institute 3800 Minnehaha Ave-1-2-3-4-5-R

## MISSOURI

KANSAS CITY—Central Technical Institute 1644 Wyandotte-1-2-3-4-5-6-7-10  
KANSAS CITY—Electronics Institute 4600 Troost Ave-1-2-3-4-5-6  
KANSAS CITY—Grantham School of Electronics 3123 Gillham Rd-4

## NEW YORK

NEW YORK—Board of Education of the City of New York Manhattan Trades Center 45 Rivington St-1-2-3-4-6-8-10-R  
NEW YORK—Delahanty Institute—School of Radio Electronics & TV 117 E 11 St-1-2-3-4-8-R  
NEW YORK—Electronic Development Institute 125 E 46 St-1-2-3-4-5-6-7-10  
NEW YORK—Lincoln School of Radio & Television 1851 Broadway-1-2-4-6-R  
NEW YORK—New York Institute of Technology 135-145 W 70 St-1-2-3-5-7-9-R  
NEW YORK—New York Trade School 304-326 E 67 St 2-5  
NEW YORK—Pierce School of Radio & Television 50 E 19 St-1-R  
NEW YORK—Radio-TV Training of America 52 E 19 St 1-3-9-C  
NEW YORK—RCA Institutes 350 W 4 St-1-2-3-4-5-6-10

## OHIO

CLEVELAND—Cleveland Institute of Electronics 4900 Euclid Ave-4-5-10

## PENNSYLVANIA

ALLENTOWN—Electronics Training Center Div Radio Television Technical School 29 N 7 St-1-2-3  
PHILADELPHIA—Philadelphia Wireless Technical Institute 1533 Pine St-1-2-3-4-5-10  
SCRANTON—International Correspondence Schools Oak & Pawnee-1-2-3-4-5-6-8-9-10-C

## RHODE ISLAND

PROVIDENCE—New England Technical Institute 486 Broad St-1-3-4-6-10

## TEXAS

PORT ARTHUR—Port Arthur College PO Box 310 1-2-3-4-5-6-7-10-R

## WASHINGTON

SEATTLE—Grantham School of Electronics 408 Marlon St-4

## CANADA

TORONTO ONTARIO—DeVry Technical Institute of Canada Ltd 970 Lawrence Ave-1-2-3-4-5-6

# Technical Societies & Industry Associations

with name of secretary unless otherwise noted

Acoustical Society of America 335 E 45 St New York 17 NY—Wallace Waterfall  
American Institute of Electrical Engineers 33 W 39 St New York 18 NY—N S Hibshman Executive Secy  
American Institute of Physics 335 E 45 St New York 33 NY—Wallace Waterfall  
American Physical Society Pupin Physics Labs Columbia University New York 27 NY—Dr Karl K Darrow  
American Radio Importers Assn 276 4 Ave New York 10 NY—Samuel Frankel Pres  
American Radio Relay League 38 LaSalle Rd West Hartford 7 Conn—A L Dudley  
American Society for Quality Control 161 W Wisconsin Ave Milwaukee 3 Wis—William P Youngclaus Jr Adm Secy  
American Standards Assn 10 E 40 St New York 16 NY—G F Hussen Managing Dir  
Armed Forces Communications & Electronics Assn 1624 Eye St N W Washington 6 DC—Colonel F T Osterberg Acting Secy  
Assn of Electronic Parts & Equipment Mfrs 11 S La Salle St Suite 1500 Chicago 3 Ill—Kenneth C Prince  
Assn for Computing Machinery 2 E 63 St New York 21 NY—Dr Jack Mockman  
Audio Engineering Society PO Box 12 Old Chelsea Station New York 11 NY—C J LeBel

Electronic Industries Assn 1721 DeSales N W Washington 6 DC—James O Seerest Executive V P & Secy  
Electronic Representatives Assn 600 S Michigan Ave Chicago 5 Ill—William C Weber Jr Executive Director

Institute of High Fidelity Mfrs 125 E 23 St New York 10 NY—Abraham Schwartzman  
Institute of Radio Engineers 1 E 79 St New York 21 NY—Dr George W Bailey  
Int'l Municipal Signal Assn 130 W 42 St New York 36 NY—Irvin Shulsinger

Joint Technical Advisory Committee 1 E 79 St New York 21 NY—L G Cumming

National Appliance & Radio-TV Dealers Assn 1141 Merchandise Mart Chicago 54 Ill—Upton Zeisler  
National Association of Broadcasters 1771 N St N W Washington 6 DC—Everett E Revercomb  
National Association of FM Broadcasters 1 Park Ave New York 26 NY—Frank Knorr Jr  
National Assn of Electrical Distributors 290 Madison Ave New York 17 NY—Arthur W Hooper Executive Dir  
National Assn of Music Merchants 222 W Adams St Chicago 6 Ill—William R Gard Executive Secy  
National Assn of Relay Mfrs PO Box 6 Stillwater Okla—R P McAllister  
National Audio-Visual Assn Box 337 Fairfax Va—Don White Executive Vice Pres  
National Electrical Mfrs Assn 155 E 44 St New York 17 NY—Joseph F Miller Managing Dir  
National Electronic Distributors Assn 343 S Dearborn St Suite 1414 Chicago 14 Ill—Gall S Carter Executive Officer  
National Electronics Conference 228 N La Salle St Chicago 1 Ill—James H Kogen

(Continued on page 56)

# 1960 ELECTRONIC TECHNICIAN DIRECTORY

## Alphabetical Listing of Manufacturers

A master listing of the names and addresses of manufacturers of replacement products, component parts, equipment, instruments and materials, as well as technical publishers.

- Abrams Instrument Corp 606 E Shawnee Lansing Mich  
 Accurate Electronics Corp 169 S Abbe Rd Elyria Ohio  
 Ace Coil & Electronics 914 Lincoln Hwy Metuchen NJ  
 Ace Eng'g & Machine Huntingdon Valley Pa  
 ACF Industries Avion Div 11 Park Pl Paramus NJ  
 Acme Electric Corp 31 Water St Cuba NY  
 Acme Model Eng'g Co 6224 15 Ave Brooklyn NY  
 Acme Wire Co 1255 Dixwell Ave New Haven Conn  
 Acoustica Associates 26 Windsor Ave Mineola NY  
 Acoustica Research 24 Thorndike St Cambridge Mass  
 Acromark Co Morrell St Elizabeth 4 NJ  
 Aero Products Co 369 Shurs Lane Philadelphia Pa  
 Actloncraft Products 2 Yennick Ave Port Washington NY  
 Acton Labs 533 Main St Acton Mass  
 AC Transformer Corp 89 Madison St Newark NJ  
 Actuator Products PO Box 247 Woburn Mass  
 Adams & Westlake 1025 N Michigan Elkhart Ind  
 Adler Electronics 1 LeFevre Lane New Rochelle NY  
 Admiral Corp 3800 W Cortland St Chicago Ill  
 Advance Electric & Relay (See Elgin-Advance Relays)  
 Advance Electronics 8510 North End Ave Oak Park Mich  
 Advanced Acoustics 67 E Centre Nutley NJ  
 Ad-Yu Electronics 249 Terhune Ave Passaic NJ  
 Aerolite Electronics 2207 Summit Ave Union City NJ  
 Aeromet Co 638 E 60 St Los Angeles Calif  
 Aeronautcal Electronics Raleigh-Durham Airport Raleigh NC  
 Aero Research Instrument 315 N Aberdeen St Chicago Ill  
 Aerotron Assoc PO Box 419 Concord NH  
 Aerovox Corp 740 Belleville Ave New Bedford Mass  
 Airborne Instruments 160 Old Country Rd Mineola NY  
 Aircom 139 E 1st Ave Roselle NJ  
 Aircraft Radio Boonton NJ  
 Airflyte Electronics 535 Ave A Bayonne NJ  
 Air-Marine Motors 369 Bayview Ave Amityville LI NY  
 Airpax Electronics PO Box 8448 Ft Lauderdale Fla  
 Airtron Inc 200 Hanover Ave Morris Plains NJ  
 Airtronics Int'l 6900 West Rd Ft Lauderdale Fla  
 Akro-Mils 820 Market St Akron 9 Ohio  
 Aladdin Electronics Murfreesboro Rd Nashville Tenn  
 Aldo Electronics 3 Wolcott Ave Lawrence Mass  
 Alden Products 117 N Main St Brockton Mass  
 Alford Mfg 299 Atlantic Ave Boston Mass  
 Alfred Electronics 897 Commercial St Palo Alto Calif  
 Allard Instrument 146 E 2 St Mineola LI NY  
 All Channel Products Co 47-39 49 St Woodside NY  
 Allegany Instrument 1091 Willis Mountain Cumberland Md  
 Allen-Bradley 136 W. Greenfield Milwaukee Wis  
 Allen Electronics 92 Branch St Pontiac Mich  
 Alliance Mfg Alliance Ohio  
 Allied Control 2 East End Ave New York NY  
 Allied Radio Corp 100 Northwestern Ave Chicago Ill  
 All Weather Antennas 350 S Egg Harbor Hammonont NJ  
 Alonge Products 163 W 23 St New York NY  
 Alpha Instrument 43 Hempstead St New London Conn  
 Alpha Metals 56 Water St Jersey City NJ  
 Alpha Wire 200 Varick New York NY  
 Altee Lansing Anaheim Calif  
 Alto Fontc Corp 935 Commercial Palo Alto Calif  
 Alto Scientific 855 Commercial Palo Alto Calif  
 Amatone Electronic Hdw 88 Drake New Rochelle NY  
 American Concertone 9449 W Jefferson Culver City Calif  
 American Electrical Heater 6110 Cass Ave Detroit Mich  
 American Electronic Labs 121 N 7 St Philadelphia Pa  
 American Electronics 178 Herricks Rd Mineola LI NY  
 American Elite 48-50 34 St Long Island City NY  
 American Geloso Electronics 251 4 Ave New York NY  
 American Instrument 8050 Georgia Ave Silver Spring Md  
 American Lava Corp Chattanooga Tenn  
 American Machine & Fdry 261 Madison New York NY  
 American Measurement & Control 240 Calvary Waltham Mass  
 American Meter Co Box 309 Garland Texas  
 American Microphone Co Rockford Ill  
 American Optical Instrument Buffalo NY  
 American Pamcor Ind 181 Hillcrest Havertown Pa  
 American Research & Mfg 920 Halpine Rockville Md  
 American Solder & Flux 19 & Willard Philadelphia Pa  
 American Super-Temperature Wires Winooski Vt  
 American Tel & Tel 195 Bdw New York NY  
 American Time Products 580 5 Ave New York NY  
 American Translor Prods 1540 Cassil Hollywood Calif  
 American TV & Radio 300 E 4 St Paul Minn  
 Amerlay Corp 130 County Courthouse Rd New Hyde Park NY  
 Amglo Corp 4333 Ravenswood Chicago Ill  
 Amp Inc 155 Park Ave Elizabethtown Pa  
 Amperex Electronic 230 Duffy Ave Hicksville NY  
 Amperite Co 561 Bdw New York NY  
 Ampex Audio Inc Sunnysvale Calif  
 Ampex Corp 934 Charter St Redwood City Calif  
 Amphenol-Borg Electronics 2801 S 25 Ave Broadview Ill  
 Amplifier Corp of America 398 Bdw New York NY  
 Amplitel Inc 342 W 40 St New York NY  
 Amthor Testing Instrument 45-53 Van Sinderen Brooklyn NY  
 Amtron Co 17 Felton Waltham Mass  
 Anadex Instruments 14734 Armita Van Nuys Calif  
 Analogue Controls 200 Frank Rd Hicksville NY  
 Anchor Metal 966 Meeker Brooklyn NY  
 Anchor Products 2712 Montrose Chicago Ill  
 Anchor Specialty 300 Hollister Teterboro NJ  
 Anchor Wire 183-16 Jamaica Ave Jamaica NY  
 Anderson Controls 9959 Pacific Franklin Park Ill  
 Andrea Radio 27-01 Bridge Plaza N Long Island City NY  
 Andrew Corp 363 E 75 St Chicago Ill  
 Anko Mfg 5025 N 124 St Milwaukee Wis  
 Ansonia Wire & Cable 111 Martin St Ashton RI  
 Antenna Designs Box 110 Burlington Iowa  
 Antenna Products 3753 Clark Chicago Ill  
 Antenna Specialists 12435 Euclid Ave Cleveland Ohio  
 Antlab Inc 6330 Proprietors Rd Worthington Ohio  
 Anton Electronics 1226 Flushing Brooklyn NY  
 Antronc Corp 2712 W Montrose Chicago Ill  
 Apex Wire & Cable 237 37 St Brooklyn NY  
 Apparatus Development Wethersfield Conn  
 Applied Electronics E Grand Ave San Francisco Calif  
 Applied Radiation 2404 N Main St Walnut Creek Calif  
 Applied Research P O Box 1710 Glendale 8 Calif  
 Applied Science Corp Wallace Rd Princeton NJ  
 Arco Electronics 64 White St New York NY  
 Arco Transformer 1602 S Hanna St Ft Wayne Ind  
 Arenberg Ultrasonic Lab 94 Green St Jamaica Plain Mass  
 ARF Products 7627 Lake St River Forest Ill  
 Argonne Electronics 165-11 South Rd Jamaica NY  
 Argos Products 6514 W Higgins Rd Chicago Ill  
 Arkay Int'l 88-06 Van Wyck Expressway Richmond Hill LI NY  
 Ark-les Switch Corp 51 Water St Watertown Mass  
 Armo Steel 703 Curtis St Middletown Ohio  
 Arnel Electronics 840 5 Ave Brooklyn NY  
 Armour Electronics 4201 Redwood Los Angeles Calif  
 Arnold Ceramics 1 E 57 St New York NY  
 Arnold Magnetics 4613 W Jefferson Blvd Los Angeles Calif  
 Arnoux Corp 11924 W Washington Blvd Los Angeles Calif  
 Arrow Fastener 1 Junius Ave Brooklyn NY  
 Arrow-Hart & Hegeman 103 Hawthorn Hartford Conn  
 AR&T Electronics 1101 McAlmont Little Rock Ark  
 Artisan Electronics 171 Ridgedale Morrisstown NJ  
 Arvin Industries Columbus Ind  
 Asco Wire & Cable 2 Burroughs St Bridgeport Conn  
 Ashland Electric Products 32-02 Queens Blvd Long Island City NY  
 Assembly Products Wilson Mills Rd Chesterland Ohio  
 Associated Eng'g 65 Kent St Brookline Mass  
 Associated Eng'g & Mfg 210 Stonehouse Glen Ridge NJ  
 Associated Research 3777 W Belmont Chicago Ill  
 Astatic Corp Jackson & Harbor Sts Connecat Ohio  
 Astron Corp 255 Grant Ave East Newark NJ  
 Atlantic Transformer Corp 30 Hynes Groton Conn  
 Atlas Coil 63 Main Ansonia Conn  
 Atlas E-E 47 Prospect Woburn Mass  
 Atlas Electric Products PO Box 1591 Erie Pa  
 Atlas Eng'g 176 Blue Hill Roxbury Mass  
 Atlas Sound 1449 39 St Brooklyn NY  
 Atmosphere Control 5315 Chester Ave Philadelphia Pa  
 Atohm Electronics 7648 San Fernando Sun Valley Calif  
 Atronic Products 1 Bala Ave Bala Cynwood Pa  
 Audax Inc 38-19 108 St Corona NY  
 Audel Co Theo 49 W 23 St New York NY  
 Audio Development 2833 13 Ave Minneapolis Minn  
 Audio Devices 620 E Dyer Rd Santa Ana Calif  
 Audio Devices 444 Madison New York NY  
 Audio-Empire Div Dyna-Empire 1075 Stewart Garden City NY  
 Audio Equipment 75 Harbor Rd Port Washington NY  
 Audiogersh Corp 514 Bdw New York NY  
 Audio Instrument 135 W 14 St New York NY  
 Audiotex Mfg 3225 Exposition Pl Los Angeles Calif  
 Auerbach & Co Leon 15 E 40 St New York NY  
 Autoatrat Electronics 5024 Elm St Skokie Ill  
 Automatic Coil 199 Sackett St Brooklyn NY  
 Automatic Electric North Lake Ill  
 Automatic Mfg 65 Gouverneur St Newark NJ  
 Automatic Radio Mfg 122 Brookline Ave Boston Mass  
 Automatic Switch 50 Hanover Rd Florham Park NJ  
 Automatic Timing & Controls King of Prussia Pa  
 Automation Dynamics Corp 255 County Rd Tenafly NJ  
 Automation Labs 7230 Clinton Rd Upper Darby Pa  
 Autonetics Div North American Aviation 9150 E Imperial Hwy Downey Calif  
 Autotron 3629 N Vermillion Danville Ill  
 Autotronics PO Box 208 Florissant Mo  
 Aviation Electric 140 Green Lane Bedford Hills NY  
 Avnet Electronics 70 State St Westbury NY  
 Babcock Relays 1640 Monrovia Ave Costa Mesa Calif  
 Bache & Co Semon 636 Greenwich New York NY  
 Bailey Meter 105D Ivanhoe Cleveland Ohio  
 Baird-Atomic 33 University Rd Cambridge Mass  
 Balco Research Labs 49-53 Edison Pl Newark NJ  
 Baldwin-Llma-Hamilton 42 4 Ave Waltham Mass  
 Ballantine Labs Boonton NJ  
 Band-It Co 48 & Dahlia Sts Denver Colo  
 Barber-Colman Co Rockford, Ill  
 Barker Sales 350 5 Ave New York NY  
 Barker Products River St West Bridgewater Mass  
 Barker & Williamson Canal & Beaver Sts Bristol Pa  
 Barry Controls Watertown Mass  
 Barry Electronics 512 Bdw New York NY  
 Barwood Electronics 921 E Bdw Glendale Calif  
 Basic Controls 4023 Irving Pl Culver City Calif  
 Baumker Mfg 3826 Summit St Toledo Ohio  
 Bausch & Lomb 879 St Paul St Rochester NY  
 B&B Electric Motor 206 Lafayette New York NY  
 Beattie-Coleman 1000 N Olive Anaheim Calif  
 Beckman Instruments Berkeley Div 2200 Wright Ave Richmond Calif  
 Beckman Instruments Scientific & Process Instr Div 2500 Fullerton Rd Fullerton Calif  
 Beckman Instruments Helipot Div 2500 Fullerton Rd Fullerton Calif  
 Beede Electrical Instruments Penacook NH  
 Dehman Eng'g 2911 Winona Ave Burbank Calif  
 Belden Mfg 4647 W Van Buren St Chicago Ill  
 Bel Fuse Inc 198 Van Vorst Jersey City NJ  
 Bell Inc F W 1356 Norton Columbus Ohio  
 Bell & Howell 7100 McCormick Chicago Ill  
 Bell Sound Systems 555 Marlon Columbus Ohio  
 Bellaire Electronics 62 White St Red Bank NJ  
 Bell Telephone Labs 463 West St New York NY  
 Belock Instrument 112-03 14 Ave College Point NY  
 Bendix Computer Div 5630 Arbor Vitae Los Angeles Calif  
 Bendix Eclipse Pioneer Div Teterboro NJ  
 Bendix Industrial Comm & Electr Prods Baltimore Md  
 Bendix Pacific Div 11600 Sherman Way N Hollywood Calif  
 Bendix Radio Div E Joppa Rd Towson 4 Md  
 Bendix Red Bank Div Eatontown NJ  
 Bendix Scientific Div Sidney NY  
 Bendix Semiconductor Products Westwood Ave Long Branch NJ  
 Benson Electronics PO Box 122 Rockville Conn  
 Bergen Labs 247 Crooks Ave Clifton NJ  
 Bergen Wire Rope Co 456 Gregg St Lodi NJ  
 Berger Communications 109-01 72nd Rd Forest Hills NY  
 Berkshire Labs 692 Bank Village Greenville NH  
 B&F Instruments 3644 N Lawrence Philadelphia Pa  
 B&H Instrument 3479 W Vickory Ft Worth Texas  
 Biddle Co James G 1316 Arch Philadelphia Pa  
 Biophysical Instruments 20 Herman Philadelphia Pa  
 Bio-Rad Labs 1257 S 32 St Richmond Calif  
 Bird Electronic 303 Aurora St Solon Ohio  
 Birnbach Radio 145 Hudson St New York NY  
 Birther Corp 4371 Valley Los Angeles Calif  
 Bittermann Electric Canaan Conn  
 BJ Electronics 3300 Newport Santa Ana Calif  
 B&K Mfg 3731 N Southport Chicago Ill  
 Black & Decker E Penna Ave Towson Md  
 Black Light Products 53 W Jackson Chicago Ill  
 Blaine Electronics 14757 Keswick Van Nuys Calif  
 Billie Electric Union Station Bldg Erie Pa  
 Bliss Electronic Box 366 Sussex NJ  
 Blonder-Tongue Labs 9-25 Ailing St Newark NJ  
 B&M Electric Corp 168 7 St Brooklyn NY  
 B&M Electronic Mfg 2516 Dodge Ave Ft Wayne Ind  
 BNK Instruments 3028 W 106 St Cleveland Ohio  
 Bodine Electric 2500 W Bradley Chicago Ill  
 Boehm Industries 238 Huguenot New Rochelle NY  
 Boesch Mfg 45 River St Danbury Conn  
 Bogart Mfg 315 Seigel St Brooklyn NY  
 Boque-Presto PO Box 500 Paramus NY  
 Boque Electric Mfg 52 Iowa Ave Paterson NJ  
 Bohn Sound Eng'g Lincoln Hwy E Ft Wayne Ind  
 Boma Labs Salem Rd Beverly Mass  
 Boodner Electronics 738 Speedwell Ave Morris Plains NJ  
 Boonton Radio Intervals Rd Boonton NJ  
 Borg Equip Div Amphenol-Borg 120 S Main Janesville Wis  
 Bosch Corp Robert 40-25 Crescent Long Island City NY  
 Boston Insulated Wire & Cable 65 Bay Boston Mass  
 Bourns Labs Box 2122 Riverside Calif  
 Bowmar Instrument 8000 Bluffton Rd Ft Wayne Ind  
 Bozak Sales R T Box 966 Darlen Conn  
 Brach Mfg 200 Central Ave Newark 3 NJ  
 Bradford Components 65 South Ave Salamanca NY  
 Brady Co W H 727 W Glendale Ave Milwaukee 9 Wis  
 Bradley Semiconductor 275 Welton St New Haven Conn  
 Brand & Co Wm North & Valley Sts Willimantice Conn  
 Brand Products 39 W 55 St New York NY  
 Branson Ultrasonic 15 Brown House Rd Stamford Conn  
 Bright Star Industries 600 Getty Clifton NJ  
 Bristol Co 145 Bristol Rd Waterbury Conn  
 British Electronic Sales Dakland Gardens Sta Flushing NY  
 British Industries 80 Shore Rd Port Washington NY  
 British Radio Electronics 1833 Jefferson Pl N W Washington DC  
 Broadcast Equip Specialties PO Box 149 Beacon NY  
 Brooks & Perkins 1950 W Fort St Detroit Mich  
 Browning Labs 100 Union Ave Laconia NH  
 Bruno-NY Industries 460 W 34 St New York NY  
 Brunswick Instruments PO Box 813 New Brunswick NJ  
 Brush Instruments Div Clevite Corp 37 & Perkins Cleveland Ohio  
 Budelman Radio 375 Fairfield Ave Stamford Conn  
 Bud Radio 2118 E 55 St Cleveland Ohio  
 Buggie Inc H H PO Box 817 Toledo Ohio  
 Bulldog Electric 7610 Joseph Campeau Detroit Mich



Electronic Coils PO Box 1665 Springfield Mass  
Electronic Communications 1501 72 St N Petersburg Fla  
Electronic Components 2655 W 19 St Chicago Ill  
Electronic Computer 618 Maple Conshohocken Pa  
Electronic Control 1573 E Forest Detroit Mich  
Electronic Devel Assoc 125 E 46 St New York 17 NY  
Electronic Devel Corp 423 W Broadway Boston Mass  
Electronic Devices 429 12 2d Brooklyn NY  
Electronic Enterprises 65 7 Ave Newark NJ  
Electronic Fabricators 682 Bdw New York NY  
Electronic Instrument (EIC) 33-00 Northern Blvd Long Island City NY  
Electronic Measurements 625 Bdw New York NY  
Electronic Measurements Lewis St & Maple Ave Eaton-town NJ  
Electronic Processes 436 Bryant St San Francisco Calif  
Electronic Production & Devel 138 Nevada El Segundo Calif  
Electronic Publishing 180 N Wacker Dr Chicago Ill  
Electronic Research Assoc 67 Factory Pl Cedar Grove NJ  
Electric Soldering Iron 3852 W Elm Deep River Conn  
Electronic Solvents 170 N Park East Orange NJ  
Electronic Specialties 52 Chandler Worcester Mass  
Electronic Specialty 5121 San Fernando Los Angeles Calif  
Electronic Systems 903 Cravens Oklahoma City Okla  
Electronic Technician 480 Lexington Ave New York 17 NY  
Electronic Test Instrument Wixom Mich  
Electronic Transformer 720 Washington Brooklyn NY  
Electronic Transistors 9226 Hudson North Bergen NJ  
Electronic Tube 1200 E Mermaid Lane Philadelphia Pa  
Electronic Utilities 2244 S Western Chicago Ill  
Electronics Corp 1 Memorial Dr Cambridge Mass  
Electronics Int'l 145 W Magnolia Burbank Calif  
Electron Products 430 N Halstead Pasadena Calif  
Electron-Radar Prods 4806 W Chicago Chicago Ill  
Electrons Inc 127 Sussex Newark NJ  
Electrophono & Parts 11 W 42 St New York NY  
Electro Products Labs 4501 N Ravenswood Chicago Ill  
Electro-Products Inc 15050 Schaefer Hwy Detroit Mich  
Electro-Pulse 11861 Teale Culver City Calif  
Electrosnap Corp 4218 W Lake Chicago Ill  
Electro-Sonic Lab 36-54 36 St Long Island City NY  
Electro Switch King Ave Weymouth Mass  
Electro-Switch & Controls 5755 Camille Culver City Calif  
Electro-Tech 10 Romanelli South Hackensack NJ  
Electro-Tech Equip 308 Canal New York NY  
Electro-Technical Div Sun Chemical 113 E Centre Nutley NJ  
Electro-Voice Inc Buchanan Mich  
Elektra Corp 361 Bleeker New York NY  
Elgin-Advance Relays 2435 N Naomi Burbank Calif  
Elgin Metalformers 630 Congdon Elgin Ill  
Elk Electronics 333 W 52 St New York NY  
Elsin Electronics Elleen Way Syosset NY  
EMC Recordings 806 E 7 St St Paul Minn  
Emerson & Cumling 869 Washington Canton Mass  
Emerson Electric 8100 Florissant St Louis Mo  
Emerson Radio & Phono 14 & Coles Sts Jersey City NJ  
Empire Devices 37 Prospect Amsterdam NY  
Empire Electronics 166 River Paterson NJ  
Engelhard Industries 113 Astor Newark NJ  
Engineered Electronics 506 E 1 St Santa Ana Calif  
Engineered Magnetics Div Gulton Industries 13030 Cerise Hawthorne Calif  
Engineering Assoc 434 Patterson Dayton Ohio  
Ensign Coil 2520 S Pulaski Chicago Ill  
Enron Inc 4902 Lawrence Bladensburg Md  
Epo Products 2500 Atlantic Brooklyn NY  
Esco Inc 588 Commonwealth Boston Mass  
Equipco Div Aurora Equip 675 Prairie Aurora Ill  
Ereona Corp 16 W 46 St New York NY  
Ergo Eng'g Corp Addison Ill  
Eric Eng'g 1823 Colorado Ave Santa Monica Calif  
Eric Resistor 644 W 12 St Erie Pa  
Essex Electronics 550 Springfield Berkeley Heights NJ  
Essex Wire 1601 Wall St Ft Wayne 6 Ind  
Esterline-Angus PO Box 596 Indianapolis Ind  
Eureka X-Ray Tube 3250 N Kilpatrick Chicago Ill  
Ewald Instruments Kent Conn  
Excellex Electronics 335 Van Siclen Brooklyn NY  
E-Z Hook Test Prods 1536 Woodburn Covington Ky  
E-Z Way Towers PO Box 5491 Tampa Fla

Fairchild Camera & Instrument 5 Aerial Way Syosset NY  
Fairchild Controls 225 Park Ave Hicksville LI NY  
Fairchild Recording Equip 10-40 45 Ave Long Island City NY  
Fairchild Semiconductor 844 Charleston Rd Palo Alto Calif  
Falstrom Co 44 Falstrom Ct Passaic NJ  
Fanon Electric 98 Berriman Brooklyn 8 NY  
Fansteel Metallurgical 2200 Sheridan Rd N Chicago Ill  
Farmer Electric 2300 Washington Newton Lower Falls Mass  
Fasco Industries 255 N Union Rochester 2 NY  
Federal Anti Capacity Switch 24 Brunck Rd Lancaster NY  
Federal Mfg & Eng'g 1055 Stewart Garden City NY  
Federal Products 1144 Eddy St Providence RI  
Federal Shockmount 1060 Washington Ave New York NY  
Federated Industries 4477 N Elston Chicago Ill  
Federated TV Mart 513 Rogers Brooklyn 25 NY  
Fedtro Inc Federal Electronics Bldg Rockville Centre NY  
Feedback Controls 899 Main St Waltham 54 Mass  
Feller Eng'g & Mfg 8026 N Monticello Skokie Ill  
Fen-Tone Corp 106 5 Ave New York 5 NY  
Fenwal Electronics 51 Mellen Framington Mass  
Ferranti Electric 95 Madison Ave Hempstead LI NY  
Ferrodynamics Corp Gregg St Rte 17 Lodi NJ  
Fidelitone Inc 6415 Ravenswood Chicago 26 Ill  
Fidelity Amplifier 1633 N Halsted Chicago 14 Ill  
Fidelity Instr 1000 E Boundary York Pa  
Film Capacitors 3400 Park Ave New York 56 NY  
Filters Inc 30 Sagamore Hill Dr Port Washington NY  
Filtron Co 131-15 Fowler Ave Flushing 55 NY  
Finney Co 34 W Interstate St Bedford Ohio  
Fischer & Porter 478 Warminster Rd Harbor Pa  
Fisher-Berkeley 4224 Holden Emeryville 8 Calif  
Fisher-Pierce 170 Pearl St S Braintree Mass

Fisher Radio 21-21 44 Dr Long Island City 1 NY  
Fleetwood Labs 300 Victory Blvd New Rochelle NY  
Flexo Int'l 3720 N Milwaukee Chicago 41 Ill  
Flow Corp 85 Mystic Arlington Mass  
Fluke Mfg John PO Box 7161 Seattle 33 Wash  
Flush Wall Radio 1012 Cleveland Clearwater Fla  
Ford Instrument 31-10 Thomson Long Island City 1 NY  
Ford Radio & Mica 536 63 St Brooklyn 20 NY  
Foredom Electric Bethel Conn  
Forest Electric 7216 Circle Forest Park Ill  
Formica Metal Products Medford 55 Mass  
Foster Transformer 3820 Colerain Cincinnati Ohio  
Foto-Video Labs 36 Commerce Rd Cedar Grove NJ  
FourJay Industries 2360 W Dorothy Lane Dayton O  
Foxboro Co Foxboro Mass  
Franklin Electronics East 4 St Bridgeport Pa  
Freed Transformer 1718 Welfield Brooklyn 27 NY  
Fringe Beam Antenna PO Box 376 Huntsville Ala  
Fusite Corp 6000 Fernview Cincinnati Ohio  
Gabriel Electronics 135 Crescent Rd Needham Heights Mass  
Gahagan Inc Waterman Ave Esmond RI  
Garde Mfg 53 John Cumberland RI  
Gardner Electronics 2545 E Indian School Rd Phoenix Ariz  
Garlock Electronic Prods 443 Main St Palmyra NY  
Garrard Sales 80 Shore Rd Port Washington NY  
Garrett Corp 9851 Sepulveda Los Angeles Calif  
Gates Electronics 1705 Taylor Ave Bronx NY  
Gates Radio 123 Hampshire Quincy Ill  
Gavitt Wire & Cable Brookfield Mass  
GB Electronics Hook Creek Blvd Valley Stream NY  
GC Electronics 400 S Wyman Rockford Ill  
Gee-Lar Mfg 400 S Wyman Rockford Ill  
General Automatic 12 Carlton Ave Wayne NJ  
General Cement Mfg 400 S Wyman St Rockford Ill  
General Coil Products 147-12 Liberty Ave Jamaica 35 NY  
General Communication 677 Beacon Boston Mass  
General Control 1200 Soldiers Field Rd Boston Mass  
General Controls 801 Allen Ave Glendale 1 Calif  
General Crystal PO Box 9 Burlington Wis  
General Electric Audio Components 1285 Boston Ave Bridgeport 2 Conn  
General Electric Commercial Equip Syracuse NY  
General Electric Communications Products Lynchburg Va  
General Electric Lamp Div Nela Park Cleveland Ohio  
General Electric Radio Receivers Bridgeport Conn  
General Electric Rectifier Components Syracuse NY  
General Electric Semiconductors Syracuse NY  
General Electric TV Receivers Syracuse NY  
General Electric Reel's Tubes Owensboro Ky  
General Electrodynamics 4430 Forest Lane Garland Tex  
General Industries Olive & Taylor Sts Elyria Ohio  
General Instrument Distr Div Radio Receptor Corp 240 Wythe Ave Brooklyn 11 NY  
General Instrument 65 Gouverneur Newark NJ  
General Insulated Wire 69 Gordon Providence RI  
General Kinetics 555 23 St S Arlington Va  
General Magnetics 135 Bloomfield Ave Bloomfield NJ  
General Mills 1620 Central Minneapolis Minn  
General Photo Products 15 Summit Ave Chatham NY  
General Precision Lab 63 Bedford Rd Pleasantville NJ  
General Radio 22 Baker Ave West Concord Mass  
General Resistance 577 E 156 St New York NY  
General RF Fittings 702 Beacon Boston Mass  
General Transformer 18240 Harwood Homewood Ill  
General Transistor 91-27 138 Pl Jamaica NY  
General Ultrasonics 67 Mulberry St Hartford 3 Conn  
Genisco Inc 2233 Federal Ave Los Angeles Calif  
Geotechnical Corp 3401 Shiloh Rd Garland Tex  
Geotronic Labs 1314 Cedar Hill Ave Dallas Tex  
Gernsback Library 154 W 14 St New York 11 NY  
Gertsch Products 3211 La Cienega Blvd Los Angeles Calif  
Giannini Controls 918 E Green St Pasadena Calif  
GiantView TV Network 901 Livernols Ferdnate Mich  
Girard-Hopkins 1000 40 Ave Oakland 1 Calif  
Glaser-Steers 155 Oraton St Newark 2 NJ  
Globe Electronics 41 S 34 St Council Bluffs Iowa  
Godfrey Mfg 1633 N Halsted Chicago Ill  
Gonset Div Young Spring & Wire PO Box 791 Burbank Calif  
Good-All Electric Mfg Ogallala Nebr  
Good Electronics PO Box 2406 W Palm Beach Fla  
Goodman (see Rockbar Corp)  
Goodrich Industrial Products 8 F Akron 18 Ohio  
Gordos Corp 250 Glenwood Bloomfield NJ  
Gorn Electric 845 Main Stamford Conn  
Gotham Audio 2 West 46 St New York NY  
Gould-National Batteries Industrial Div Trenton 7 NJ  
Grado Labs 4614 7 Ave Brooklyn 20 NY  
Graflex (see General Precision)  
Gramercy Sound Assoc 175 5 Ave New York NY  
Gramer-Halldorson 2734 N Pulaski Chicago Ill  
Granco Products 36-07 20 Ave Long Island City NY  
Grand Transformers Beechtree & Marlon Grand Haven Mich  
Grant Pulley & Hdw 23 High St W Nyack NY  
Gray High Fidelity Div 16 Arbor Hartford Conn  
Gray Instrument 200 E Church Lane Philadelphia Pa  
Grayhill Inc 559 Hillgrove Ave La Grange Ill  
Gray Mfg 16 Arbor Hartford Conn  
Great Eastern Mfg 165 Remsen Brooklyn 12 NY  
Great Lakes Electric 17 S Desplaines Chicago Ill  
Greenlee Bros 2136 12 St Rockford Ill  
Green Rectifier 1-10 30 St Fairhawn NJ  
Gregg Electric 620 Essex St Lawrence Mass  
Gregory Sales 316 Marlon Bldg Cleveland Ohio  
Greibach Instruments 315 North Ave New Rochelle NY  
Greyhound Corp 5600 Jarvis Chicago Ill  
Grommes Div Precision Electronics 9101 King St Franklin Park Ill  
Grove Electronic 4103 W Belmont Chicago Ill  
Guardian Electric 1627 Walnut Chicago Ill  
Gudeman Co 340 W Huron Chicago Ill  
Guide Lamp Div GMC 2915 Pendleton Ave Anderson Ind  
Gullid Radio & TV 460 N Eucalyptus Inglewood Calif

Gulton Industries 212 Durham Ave Metuchen NJ  
G-V Controls 83 Ocker Pkwy Livingston NJ  
Gyra Electronics PO Box 184 La Grange Park Ill  
Hackensack Cable 110 Orchard Hackensack NJ  
Hagan Chemical & Controls Box 1346 Pittsburgh Pa  
Haley Electronics 57 William St New York NY  
Hallamore Electronics 714 N Brookhurst Anaheim Calif  
Hallett Mfg 5910 Bowcraft Los Angeles Calif  
Hallcrafters Co 4401 W 5 Ave Chicago Ill  
Halogen Insulating 10123 Franklin Ave Franklin Park Ill  
Hamilton-Hall Resistor 227 N Water Milwaukee Wis  
Hamilton Watch Co Columbia Ave Lancaster Pa  
Hamlin Inc 1316 Sherman Evanston Ill  
Hammarlund Mfg 460 W 34 New York 1 NY  
Hammer Electronics PO Box 531 Princeton NJ  
Handicraft Tools 48-41 Van Dam St Long Island City NY  
Handley Inc 12960 Panama St Los Angeles Calif  
Handy & Harmon 82 Fulton New York NY  
Hardwick Hindle 40 Hermon Newark NJ  
Harman-Kardon 520 Main Westbury LI NY  
Harrison Labs 45 Industrial Rd Berkeley Heights NJ  
Hartley Products 521 E 162 St Bronx NY  
Harvey-Wells North St Southbridge Mass  
Harworth Mfg 409 El Camino Real Menlo Park Calif  
Hastings Products 171 Newbury St Boston Mass  
Hastings-Raydist Hampton Va  
Hatfield Wire & Cable Co Hillside 5 NJ  
Hathaway Instrument 5800 E Jewell Denver Colo  
Havng Industries 900 Greenbank Rd Wilmington 8 Del  
Haydon Co A W 232 N Elm Waterbury Conn  
Haydon Div General Time 245 E Elm Torrington Conn  
Haydon Instrument 165 W Liberty Waterbury Conn  
Haydon Switch 536 S Leonard Waterbury Conn  
Haydu Industries 1426 W Front Plainfield NJ  
Heath Co 305 Territorial Rd Benton Harbor Mich  
Heatron Co 333 Eberts York Pa  
Holland Div Minn-Honeywell 5200 E Evans Ave Denver Colo  
Heinemann Electric PO Box 299 Trenton NJ  
Heinz Mueller Eng'g 1906 N Cicero Chicago Ill  
Heinze Electric 685 Lawrence Lowell Mass  
Hell-Coll Corp Shelter Rock Lane Danbury Conn  
Heminyaw & Bartlett 500 5 Ave New York NY  
Hepco 75 Varick St New York 13 NY  
Hepner Mfg PO Box 612 Round Lake Ill  
Hermetic Seal Corp 31 S 6 St Newark NJ  
Hermetic Seal Transformer 555 N 5 St Garland Tex  
Hetherington Inc 1420 Delmar Dr Folcroft Pa  
Hevi-Duty Electric 2040 W Wisconsin Milwaukee 1 Wis  
Hewlett-Packard 275 Page Mill Rd Palo Alto Calif  
Hexacon Electric 180 W Clay Roselle Park NJ  
Hickok Electrical Instrument 10514 Dupont Ave Cleveland Ohio  
High Fidelity Recordings 7803 Sunset Blvd Hollywood Calif  
High Voltage Eng'g Burlington Mass  
Hillburn Electronic Products 55 Nassau Ave Brooklyn NY  
Hill Electronics 300 N Chestnut Mechanicsburg Pa  
Hi-Lo Mfg 1122 W Newport Chicago Ill  
Hindle Transformer Woods Church Rd Flemington NJ  
Hi-Par Products 347 Lundenburg Fitchburg Mass  
HiTemp Wires 1200 Shames Dr Westbury NY  
Hoffman Electronics 3761 S Hill St Los Angeles 7 Calif  
Hoffman Electronics Semi-Conductor Div 1001 Arden Dr El Monte Calif  
Hogan Labs 155 Perry New York NY  
Hollan Transformer 2954 N Sheffield Chicago Ill  
Holland Electronics 772 E 53 Brooklyn NY  
Holloway Electronics Broward City Int'l Airport Ft Lauderdale Fla  
Holt Instrument Lab Oconto Wis  
Holub Industries 413 DeKalb Sycamore Ill  
Holyoke Wire & Cable 720 Main Holyoke Mass  
Home Music Systems 646 Madison Memphis Tenn  
Hoover Electric 2100 S Stoner Los Angeles Calif  
Hoover Electronics Timonium Md  
Hopkins Eng'g 12900 Foothill Blvd San Fernando Calif  
Hoskins Mfg 4445 Lawton Detroit Mich  
Houghton Labs Olean NY  
Houston Fearless 11801 W Olympic Blvd Los Angeles Calif  
Hoyt Electrical Instruments 42 Carleton Cambridge Mass  
Hubbell Inc Harvey State & Boston Bridgeport Conn  
Hudson Lamp 528 Elm Kearny NJ  
Huggins Labs 999 E Arques Sunnyvale Calif  
Hughes Aircraft Tube Div 11101 S Hindry Inglewood Calif  
Hughes Aircraft Semiconductor Div Int'l Airport Sta Los Angeles Calif  
Hughes Vacuum Prods 2020 Short St Oceanside Calif  
Hughey & Phillips 3200 N San Fernando Burbank Calif  
Hunter Tools 8951 Alhurbis Santa Fe Springs Calif  
H-V Associates 28 E Sunrise Hwy Lindenhurst NY  
Hycon Eastern 75 Cambridge Pkwy Cambridge Mass  
Hy-Gain Antenna Prods 1135 North 22 Lincoln Nebr  
Hymac Corp 1717 N Potrero S El Monte Calif  
Ideal Electric 300 E 1 St Mansfield Ohio  
Ideal Industries 5106 Park Ave Sycamore Ill  
IE Mfg 325 N Hoyne Chicago Ill  
IH Mfg 121 Greene St New York 12 NY  
Illinois Condenser 1612 N Throop St Chicago Ill  
Ilumitronic Eng'g 680 E Taylor St Sunnyvale Calif  
I-L-S Instrument 4525 W 160 St Cleveland Ohio  
Imperial Electronic Sales 250 Montgomery St Shreveport La  
Induction Heating 181 Whyte Ave Brooklyn 11 NY  
Induction Motors 570 Main St Westbury NY  
Industrial Condenser 3243 N California Chicago 18 Ill  
Industrial Control 605 Albin Ave Lindenhurst LI NY  
Industrial Development Labs 982 River Rd Edgewater NJ  
Industrial Devices 982 River Rd Edgewater NJ  
Industrial Electronic Engineers 3973 Lankershim N Hollywood Calif  
Industrial Electronic Publications 480 Lexington New York 17 NY  
Industrial Hdw 109 Prince St New York 12 NY  
Industrial Instruments 89 Commerce Rd Cedar Grove NJ  
Industrial Radio 454 N Parkside Chicago Ill

Industrial Test Equip 55 E 11 St New York 3 NY  
 Industrial Timer 1407 McCarter Hwy Newark 4 NJ  
 Industrial Transformer Gouldsboro Pa  
 Industrial Tubes 321 Stevens St Geneva III  
 Industro Transistors 35-10 36 Ave LIC 6 NY  
 Inertia Switch 311 W 43 St New York 36 NY  
 Injectorall Co 2081 Shore Pkwy Brooklyn NY  
 Inland Electronics 500 Rathbone Ave Aurora III  
 Inso Electronic 1200 Commerce Ave Union NJ  
 Instrument Devel Labs 67 Mechanic St Attleboro Mass  
 Instrument Labs 315 W Walton Pl Chicago III  
 Instrument Resistors 1036 Commerce Ave Union NJ  
 Instrumentation Assoc 17 W 60 St New York NY  
 Instruments Publishing Co 845 Ridge Ave Pittsburgh Pa  
 Instruments for Industry 101 New South Rd Hicksville LI NY  
 Intellex Systems 67 Broad St New York NY  
 Interlab Inc 437 5 Ave New York NY  
 Int'l Business Machines Kingston NY  
 Int'l Crystal Mfg 18 N Lee Oklahoma City Okla  
 Int'l Electronic Industries Box 1368 Nashville Tenn  
 Int'l Electronic Research 145 W Magnolia Burbank Calif  
 Int'l Electronics Annapolis Md  
 Int'l Electronics 81 Spring St New York NY  
 Int'l Electronics PO Box 13302 Dallas 23 Tex  
 Int'l Instruments PO Box 2954 New Haven 15 Conn  
 Int'l Pacific Recording 854 N Vine Hollywood Calif  
 Int'l Radiant 111 New York Ave Westbury NY  
 Int'l Radio & Electronics S 17 St & Mishawaka Rd Elkhart Ind  
 Int'l Rectifier 233 Kansas St El Segundo Calif  
 Int'l Register 2620 W Washington Blvd Chicago III  
 Int'l Research Assoc 2221 Warwick Santa Monica Calif  
 Int'l Resistance 401 N Broad Philadelphia Pa  
 Int'l Wire & Cable 1665 N Milwaukee Chicago III  
 Int'l Wire Prods Greenwood Ave Midland Park NJ  
 Interstate Electronics 707 E Vermont Anaheim Calif  
 Ipp Fireman 2838 S E 9 Ave Portland Ore  
 Isolantite Mfg Warren Ave Stirling NJ  
 Isophon (see Arnhold Ceramics)  
 I-T-E Circuit Breaker 601 E Erie Ave Philadelphia Pa  
 Itek Corp 1605 Trapelo Rd Waltham Mass  
 ITT Components Div 100 Kingsland Rd Clifton NJ

Jackson Electrical Instr 18 S Patterson Dayton Ohio  
 James Electronics Co 4050 N Rockwell Chicago III  
 Janco Corp 3111 Winona Burbank Calif  
 Jan Hdw Mfg 38-D1 Queens Blvd Long Island City NY  
 JanZen (see Neshaminy Electronic Corp)  
 Javex Electronics PO Box 646 Redlands Calif  
 J-B-T Instruments 61 Hamilton New Haven Conn  
 Jefferson Electronic Prods 322 State Santa Barbara Calif  
 Jefferson Inc Ray 40 E Merrick Freeport NY  
 Jefferson Wire & Cable Pleasant Valley Rd Sutton Mass  
 Jennings Radio PO Box 1278 San Jose Calif  
 Jenwin Industries 7333 W Harrison Forest Park III  
 Jensen Mfg 6601 S Laramie Chicago III  
 Jerrold Electronics 15 St & Lehigh Philadelphia Pa  
 Jersey Specialty PO Box 576 Mountain View NJ  
 Jettron Prods 56 Rte 10 Hanover NJ  
 JFD Mfg 6101 16 Ave Brooklyn NY  
 Johnson Co E F Waseca Minn  
 Johnson Electronics PO Box 1675 Casselberry Fla  
 Jones Electronics M C 185 N Main Bristol Conn  
 Jones & Laughlin Steel 3 Gateway Center Pittsburgh Pa  
 Jordan Electronics 3025 W Mission Alhambra Calif  
 Joy Mfg Oliver Bldg Pittsburgh Pa  
 Judd Wire Turner Falls Mass  
 Julie Research Labs 556 W 168 St New York NY  
 JVM Microwave 9300 W 47 St Brookfield III  
 JW Electronics 1538 W Jarvis Chicago III

Kaar Eng'g 2998 Middlefield Rd Palo Alto Calif  
 Kahle Eng'g 3322 Hudson Ave Union City NJ  
 Kalbfell 3434 Midway Dr San Diego Calif  
 Karg Labs 30 Meadow South Norwalk Conn  
 Karlson Assoc 433 Hempstead Ave W Hempstead NY  
 Katlight Co Chestnut at 1 Ave Mankato Minn  
 Kay Electric 14 Maple Ave Pinebrook NJ  
 Kay-Townes Antenna 1511 Dean Ave Rome Ga  
 Kearfott Co 1500 Main Ave Clifton NJ  
 Kearfott Microwave Div 14844 Oxnard Van Nuys Calif  
 Keidman Co 233 S 5 W Salt Lake City 1 Utah  
 Keithley Instruments 12415 Euclid Cleveland Ohio  
 Kellogg Switchboard & Supply 6650 S Cicero Chicago III  
 Kelsey-Hayes 3600 Military Detroit Mich  
 Kelvin Electric 5907 Noble Van Nuys Calif  
 Kemtron Electron Prods 14 Prince Pl Newburyport Mass  
 Kenwood Eng'g 265 Colfax Kenilworth NJ  
 Kenyon Transformer 1057 Summit Jersey City NJ  
 Kepece Inc 131-38 Sanford Ave Flushing 55 NY  
 Kester Soldier 4201 Wrightwood Chicago III  
 Keystone Electronics 65 7 Ave Newark NJ  
 Keystone Electronics 49 Blecker St New York NY  
 Keystone Products 904 23 St Union City NJ  
 K-G Electronics 2738 N Sheffield Chicago III  
 Klidde & Co Walter 675 Main Belleville NJ  
 Klieriff Electronics 820 W Olympic Los Angeles Calif  
 Klovolt Corp 2 Manor House Sq Yonkers NY  
 Kingdom Products 514 Bldw New York NY  
 Kings Electronics 40 Marbledale Rd Tuckahoe NY  
 Kingston Electronic Medfield Mass  
 Kin Tel 5725 Kearny Villa Rd San Diego 11 Calif  
 Kinney Mfg Div NY Air Brake 3530 Washington Boston Mass  
 Kip Electronics 29 Holly Pl Stamford Conn  
 Kirsch Music 349 W 48 St New York NY  
 Kistler Instrument 15 Webster North Tonawanda NY  
 Kit-Tronics 2315 Hendola Dr NE Albuquerque NM  
 Kleer-Vue Mfg PO Box 10304 Pittsburgh Pa  
 Klein & Sons Mathias 7200 McCormick Chicago III  
 Kleinschmidt Div Smith-Corona-Marchant County Line Rd Deerfield III

KLH Research & Devel 30 Cross Cambridge Mass  
 Klipsch & Assoc PO Drawer 96 Hope Ark  
 Knights Co James Church & Wells St Sandwich III  
 Kollmorgen Optical Corp Northampton Mass  
 Koltan Electric 123 NJ RR Ave Newark NJ  
 Kooltronic Fan Carter Rd & Rosedale Princeton NJ  
 Krauter & Co 583 18 Ave Newark NJ  
 Kriss Electronics 191 Oratou St Newark NJ  
 Krohn-Hite 580 Mass Ave Cambridge Mass  
 Krylon Inc 18 W Airy Norristown Pa  
 KTV Tower & Comm Equip PO Box 294 Sullivan III  
 Kuhn Electronics 20 Glenwood Ave Cincinnati 17 Ohio  
 Kulka Electric 633 S Fulton Mt Vernon NY  
 Kupfrlan Mfg 395 State St Binghamton NY  
 Kurman Electric 191 Newell Brooklyn NY  
 K-V Transformer 20 E Franklin Danbury Conn  
 K-W Eng'g 15920 Pin Oak Ct Butler Wis  
 Kwikheat Mfg 3732 San Fernando Rd Glendale Calif

Lab-Tronics 3656 N Lincoln Chicago III  
 Lafayette Radio 165-08 Liberty Jamaica NY  
 La Grange Welding Moores Mills Pleasant Valley NY  
 Lake Mfg 2828 Chestnut Oakland Calif  
 Lamb Electric Lake St Kent Ohio  
 Lampkin Labs RDF 1 Bradenton Fla  
 Lance Antenna 1802 1 Ave San Fernando Calif  
 Land-Air Instr & Electronics Div 2133 Adams Ave San Leandro Calif  
 Landis & Gry 45 W 45 St New York NY  
 Landsverk Electrometer 641 Sonora Glendale Calif  
 Langevin Div W L Maxson 475 10 Ave New York NY  
 Lansdale Tube Lansdale Pa  
 Lansing Sound James B 3249 Casitas Los Angeles Calif  
 LaPointe Industries 155 W Main Rockville Conn  
 Lapp Insulator Le Roy NY  
 Larson Instrument 24 Orchard Tarrytown NY  
 Lavoie Labs Morganville NJ  
 Leach Corp Inet Div 18435 Susana Rd Compton Calif  
 Leach Corp Relay Div 5915 Avalon Los Angeles Calif  
 Lear Inc 3171 S Bundy Dr Santa Monica Calif  
 Lear Romec Div Lear Inc Elyria Ohio  
 Ledex Inc 123 Webster Dayton Ohio  
 LEE Inc 625 NY Ave NW Washington DC  
 Leeds & Northrup 4934 Stenton Philadelphia Pa  
 Leemath Inc Oak Dr Syoset NY  
 Leetronics 30 Main Brooklyn NY  
 Lehigh Valley Electronics 215 S 3 St Allentown Pa  
 Lei Inc 380 Oak St Copiague NY  
 Leind Airborne Products PO Box 128 Vandalia Ohio  
 Lenk Mfg Franklin Ky  
 Lenkurt Electric 1105 County Rd San Carlos Calif  
 Lenz Electric 1751 N Western Chicago III  
 Lepel High Frequency Labs 55 St & 37 Ave Woodside NY  
 Lercio Electronics 501 S Varney St Burbank Calif  
 Lettine Radio 62 Berkley Valley Stream NY  
 Levinthal Electronic 3180 Hanover Palo Alto Calif  
 Lewis & Kaufman PO Box 337 Los Gatos Calif  
 Lewyt Mfg 43-22 Queens Long Island City NY  
 Librascope Inc 808 Western Glendale Calif  
 Lion Switch & Control 6606 W Dankin St Chicago III  
 Lico Inc 3610 Oceanstate Oceanstate NY  
 Life Instrument 200 Brook Franklin Mass  
 Lindberg Eng'g 2450 W Hubbard Chicago III  
 Linde Div Union Carbide 30 E 42 St New York NY  
 Lindgren & Assoc E A 4515 N Ravenswood Chicago III  
 Line Electric 271 S 6 St Newark NJ  
 Ling-Altec Electronics Anaheim Calif  
 Ling Electronics 9937 Jefferson Culver City Calif  
 Link Aviation Binghamton NY  
 Lipps Eng'g Edwin A 1511 Colorado Santa Monica Calif  
 Liquidometer Corp 41-03 36 St Long Island City NY  
 Littelfuse Inc 1865 Milner Des Plaines III  
 Litton Eng'g PO Box 949 Grass Valley Calif  
 Litton Industries 336 N Foothill Beverly Hills Calif  
 Litton Industries Electron Tube Div 960 Industrial Rd San Carlos Calif  
 Litton Industries (Md Div) 4900 Calvert Rd College Park Md  
 Litton Industries Potentiometer Div 215 S Fulton Mt Vernon NY  
 Livingston Audio Prods PO Box 202 Caldwell NJ  
 Lockheed Electronics Rte 22 Plainfield NJ  
 Loge Sound Engrs JM 2171 W Washington Los Angeles Calif  
 London Records 539 W 25 St New York NY  
 Long Island Electro Labs 1186 Bldw Hewlett NY  
 Lowell Mfg 3030 Laclade Sta Rd St Louis Mo  
 Lumatron 68 Urban Ave Westbury NY  
 Lumite Div Chicopee Mills 47 Worth St New York NY  
 Luxo Lamp Dock St Portchester NY  
 Lynch Carrier Systems 695 Bryant San Francisco Calif

McCabe-Powers Body Co 5900 N Bldw St Louis Mo  
 McCoy Electronics Mt Holly Spring Pa  
 McDowell Electronics PO Box 342 Metuchen NJ  
 McGraw-Hill Book Co 330 W 42 New York NY  
 McGregor Electronic 132 1 St McGregor Iowa  
 McIntosh Labs 2 Chambers Binghamton NY  
 McKee Door 85 Hanks Aurora III  
 McLean Eng'g Box 228 Princeton NJ

Macdonald & Co 1324 Ethel St Glendale Calif  
 Machlett Labs 1063 Hope Springdale Conn  
 Mackay Research Labs PO Box 738 Benson Ariz  
 Macmillan Co 60 5 Ave New York NY  
 Madison Fielding 5 Lorimer Brooklyn NY  
 Magnadyne Corp 84 S Water St Port Chester NY  
 MagnaRux Corp 7300 W Lawrence Chicago III  
 Magnavox Mfg 5546 Satsuma Ave Hollywood Calif  
 Magnavox Co 2131 Bueter Rd Ft Wayne Ind  
 Magnecessories Box 6960 Washington DC  
 Magnecord Div Midwestern Instruments PO Box 7186 Tulsa Okla

Magnecraft Electric 3352 W Grand Ave Chicago III  
 Magnetic Amplifiers 632 Tinton Ave New York NY  
 Magnetic Instrument 546 Commerce Thornwood NY  
 Magnetic Research 3160 W Segundo Hawthorne Calif  
 Magnetic Shield Div Perfection Mica Co 1322 N Elston Ave Chicago 22 III  
 Magnetic Winding Inc Easton Pa  
 Magnetics Inc PO Box 391 Butler Pa  
 Magtrol Inc 240 Seneca Buffalo NY  
 Maico Electronics 21 N 3 St Minneapolis Minn  
 Maida Development 214 Academy Hampton Va  
 Major Electronics 762 Wythe Ave Brooklyn NY  
 Mallory & Co P R 3029 E Washington Indianapolis Ind  
 Manufacturers Eng'g York Rd & Sunset Lane Hatboro Pa  
 Marantz 25-14 Bldw Long Island City NY  
 Marathon Electric Wausau Wis  
 Marconi Instruments 111 Cedar Lane Englewood NJ  
 Marion Electrical Instrument Manchester NH  
 Marjo Technical Prods 1148 E Henry Linden NJ  
 Markell Assoc Jeff 754 6 Ave New York NY  
 Markite Products 155 Waverly Pl New York NY  
 Massa Div Cohn Electronics 5 Fottler Rd Hingham Mass  
 Mast Development 2212 E 12 St Davenport Iowa  
 Master Mobile Mounts 1306 Bond Los Angeles Calif  
 Mastra Co 2104 Superior Cleveland Ohio  
 Mathes Mfg Curtis 2220 Young Dallas Tex  
 Matthew Stuart & Co 353 W 54 St New York NY  
 Measurements Corp Broomfield Colo  
 Measurements Research Castor & Kensington Phila Pa  
 Medal Mfg 330 Vine St Sharon Pa  
 Mellotron Inc 1220 Bldw New York NY  
 Melosoles Corp 249 E 49 St New York NY  
 Melpar Inc 3000 Arlington Blvd Falls Church Va  
 Mercury Electronics 77 Searing Ave Mineola NY  
 Mercury Record Corp 35 E Wacker Dr Chicago III  
 Merit Coil & Transformer Box 2872 Hollywood Fla  
 Merix Chemical 2234 E 75 St Chicago III  
 Metal Fabricators 63 Pond St Waltham Mass  
 Meters Inc 5353 N Keystone Indianapolis Ind  
 Methode Mfg 7447 W Wilson Chicago III  
 Metron Instruments 432 Lincoln Denver Colo  
 Metronix Inc 75 Wilson Mills Chesterland Ohio  
 Metropolitan Supply 1133 Bldw New York 10 NY  
 Metzner Eng'g 1041 N Sycamore Hollywood Calif  
 MF Electronics 122 E 25 St New York NY  
 MGM Records 1540 Bldw New York NY  
 Mica Fabricating 53 Central Ave Rochelle Park NJ  
 Mica Insulator 797 Bldw Schenectady NY  
 Micamold Electronics 65 Gouverneur St Newark NJ  
 Michigan Magnetics Vermontville Mich  
 Mico Instrument 80 Townbridge Cambridge Mass  
 Micro-Circuits New Buffalo Mich  
 Microdot Inc 220 Pasadena Ave South Pasadena Calif  
 Microlab 71 Onker Pkwy Livingston NJ  
 Micro Switch Div Minn-Honeywell Freeport III  
 Micro-Tech Inc 1718 21 St Santa Monica Calif  
 Microtran Co 145 E Mineola Ave Valley Stream NY  
 Microwave Associates Burlington Mass  
 Microwave Eng'g Labs 943 Industrial Palo Alto Calif  
 Mid-Century Instrumental 611 Bldw New York NY  
 Mid-Eastern Electronics 32 Commerce Springfield NJ  
 Midland Mfg 3155 Fiberglass Rd Kansas City Kans  
 Mid-West Coil & Transformer 1642 N Halsted Chicago III  
 Midwestern Instruments PO Box 7186 Tulsa Okla  
 Miles Reproducer 812 Bldw New York NY  
 Milgo Electronic 7601 NW 37 Ave Miami Fla  
 Milken Mfg James 150 Exchange Malden Mass  
 Miller Co JW 5917 S Main Los Angeles Calif  
 Miller Mfg MA Church & 4 St Libertyville III  
 Millitest Corp 88 Madison Hempstead NY  
 Millivue Instruments 2315 2 Ave Schenectady NY  
 Milwaukee Resistor 700 W Virginia St Milwaukee Wis  
 Minifraun Corp 5 Oliver Newark NJ  
 Minn-Honeywell Davies Labs Div 10721 Hanna St Beltsville Md  
 Minn-Honeywell Rubicon Instruments Ridge Ave & 35 St Philadelphia Pa  
 Minneapolis-Honeywell Transistor Div 2753 4 Ave S Minneapolis Minn  
 Minn Mining & Mfg 900 Fauquier St St Paul Minn  
 Minnesota Mining & Mfg Mincom Div 2049 S Barrington Los Angeles Calif  
 Miratel Inc 1080 Dionne St Paul Minn  
 Missella Infra-Red E 73 & Grand Cleveland Ohio  
 Mitchell Industries PO Box 17 Municipal Airport Mineral Wells Tex  
 Mitronics Inc 1290 Central Hillsdale NJ  
 Mobil Electronics 1111 State Rd 67 E Anderson Ind  
 Modelectric Prods 1500 Bangs Ave Asbury Park NJ  
 Model Rectifier 1675 Utica Brooklyn NY  
 Modern Wire 39-30 Review Long Island City NY  
 Modline Mfg 1500 DeKoven Racine Wis  
 Moeller Instrument 132 St & 89 Ave Richmond Hill NY  
 Mohawk Wire & Cable 320 River Fitchburg Mass  
 Moloney Electric 5390 Bircher St Louis Mo  
 Monarch Int'l 7035 Laurel Canyon N Hollywood Calif  
 Montgomery Ward 618 W Chicago Chicago III  
 Monitoradio 7900 Pendleton Pike Indianapolis Ind  
 Monument Eng'g 1625 Bellefontaine Indianapolis Ind  
 Mooradian High Frequency 13 E Fort Lee Bogota NJ  
 Moran Instrument 170 E Orange Grove Pasadena Calif  
 Moran Products 2925 E 55 St Cleveland Ohio  
 Morrow Radio Mfg 2794 Market St Salem Ore  
 Moseley Co FL 409 N Fair Oaks Pasadena Calif  
 Mosley Electronics 4610 N Lindbergh Bridgeport Mo  
 Moss Electronic 3849 10 Ave New York NY  
 Motorola Comm & Electronics Div 4545 W Augusta Chicago III  
 Motorola Semiconductor Prods 5005 E McDowell Phoenix Ariz  
 MP Eng'g Co Fairfield Conn  
 Mucron Corp 9 St Francis Newark NJ  
 Mueller Electric 1581 E 31 St Cleveland Ohio  
 Muirhead Instruments 441 Lexington New York NY  
 Multicore Sales (see British Industries)  
 Multi-Products 21470 Coolidge Hwy Oak Park Mich  
 Munston Mfg & Service Beech St Islip LI NY  
 Murray Mfg 1250 Atlantic Brooklyn NY  
 Muscill Corp 4512 W Jefferson Los Angeles Calif  
 Muter 1255 S Michigan Ave Chicago III  
 Mystic Transformers 114 West St Wilmington Mass

Narda Microwave 118-160 Herricks Mineola NY  
Narda Ultrasonics 625 Main St Westbury NY  
Nat'l Carbon 535 5 Ave New York NY  
Nat'l Cash Register Main & K Sts Dayton Ohio  
Nat'l Co 61 Sherman St Malden Mass  
Nat'l Coll PO Box 1237 Sheridan Wyo  
Nat'l Electronics 628 North St Geneva Ill  
Nat'l Radio 37 Washington Melrose Mass  
Nat'l Spectrographic Labs 6300 Euclid Cleveland Ohio  
Nat'l Tel Tronics 52 St Casimir Yonkers NY  
Nat'l TV Tube Route 46 Saddle Brook NJ  
Nat'l Ultrasonic III Montegomery Irvington NY  
Nat'l Union Electric 1201 E Bell Bloomington Ill  
Nat'l Video 4300 W 47 St Chicago Ill  
Neff Instrument 2211 E Foothill Pasadena Calif  
Neshaminy Electronics Neshaminy Pa  
Networks Electronic 14806 Oxnard Van Nuys Calif  
Neutronic Assoc 93-14 101 Ave Ozone Park NY  
Newcastle Fabrics 80 Wythe Brooklyn NY  
Newcomb Audio Prods 6824 Lexington Hollywood Calif  
Newcomb Electronics 6824 Lexington Hollywood Calif  
New England Electrical 365 Main Lisbon NH  
New England Electronic 717 Main Holyoke Mass  
New London Instrument 82 Union St New London Conn  
New York Transformer 3 Ave Alpha NJ  
Nichols Wire & Aluminum 1725 Rockingham Davenport Iowa  
Nielsen Inc 575 Hope St Stamford Conn  
Nielsen Mfg Addison Ill  
Nilsson Electrical 103 Lafayette New York NY  
NJE Corp 345 Carnegie Kenilworth NJ  
Non-Linear Systems Del Mar Airport Del Mar Calif  
Norden Div United Aircraft Kettay Div Commack NY  
North American Philips 230 Duffy Ave Hicksville NY  
North Atlantic Industries 603 Main St Westbury NY  
Northeast Electronics Box 425 Concord NH  
Northeastern Eng'g 25 S Bedford Manchester NH  
North Electric 355 S Market Gallon Ohio  
North Hills Electric 402 Sagamore Mineola NY  
North Shore Nameplate 214-27 Northern Bayside NY  
Nortronics Corp 1015 S 6 St Minneapolis Minn  
Norwood Controls Unit 934 Washington Norwood Mass  
Nuclear-Chicago 223 W Erie Chicago Ill  
Nuclear Corp of America 2 Richmond Pl Denyville NJ  
Nucleonic Corp of America 196 Degraw St Brooklyn NY  
Nucleonic Prods 1601 Grande Vista Los Angeles Calif  
Nugent Electronics 802 E 8 St New Albany Ind  
Nutron Mfg 67 Monroe State Island NY  
Nylok Corp 611 Industrial Paramus NJ

Oak Mfg 1260 Clybourn Chicago Ill  
Oaktron Electric 17368 S 68 Ct Tinley Park Ill  
O'Brien Electric 6514 Santa Monica Hollywood Calif  
Oelrich Publications 4308 Milwaukee Ave Chicago Ill  
Ohio Carbon 12508 Berea Cleveland Ohio  
Ohio Semiconductors 1035 W 3 Ave Columbus Ohio  
Ohmart Corp 2236 Bogen Cincinnati Ohio  
Ohmrite Mfg 3601 Howard Skokie Ill  
Okonite Co 220 Passaic Passaic NJ  
Olson Radio 500 S Forge St Akron Ohio  
Olympic Radio & TV 34-01 38 Ave Long Island City NY  
Onondaga Pottery 1858 W Fayette Syracuse NY  
Orbitron Co 11487 Woodside Lakeside Calif  
Oregon Electronics 2105 SE 6 Ave Portland Ore  
ORRadio Industries Opelika Ala  
Ortho Filter 196 Albion Paterson NJ  
Ortho-Sonic Instruments 66 Mechanic St New Rochelle NY  
Ortron Electronics 29 Lincoln Orange NJ  
Oryx Co 9015 Willshire Beverly Hills Calif  
Osborne Electronics 712 SE Hawthorne Portland Ore  
Oster Mfg 1 Main Racine Wis  
Owen Labs 55 Beacon Pl Pasadena Calif  
Oxford Components 556 W Monroe St Chicago Ill  
Oxford Electric 3911 S Michigan Chicago Ill

Pace Electrical Instr 70-31 84 St Glendale LI NY  
Pacific Scientific PO Box 22019 Los Angeles Calif  
Pacific Semiconductors 10451 W Jefferson Culver City Calif  
Pacific Transducer 11836 W Pico Los Angeles Calif  
Pacific Universal Prods 168 Vista Pasadena Calif  
Packard Bell Electronics 12333 W Olympic Blvd Los Angeles 64 Calif  
Paco Electronics 70-31 84 St Glendale 27 LI NY  
Palo Alto Eng'g 620 Page Mill Rd Palo Alto Calif  
Panoramic Radio Prods 514 S Fulton Mount Vernon NY  
Paragon Electric 1600 12 St Two Rivers Wis  
Parker Electronics 375 Fairfield Stamford Conn  
Parker Metal Goods 85 Prescott Worcester Mass  
Partridge Transformers 258 Bdw New York NY  
Paxton Prods 929 Olympic Santa Monica Calif  
PCA Electronics 16799 Schoenborn St Sepulveda Calif  
Pearce Simpson Inc 2295 NW 14 St Miami Fla  
Peerless Products 812 N Pulaski Chicago Ill  
Peerless Radio 92-32 Merrick Jamaica NY  
Pegasus Labs 3690 W 11 Mile Rd Berkeley Mich  
Pelice Dictation Systems 5900 N Northwest Hwy Chicago Ill  
Pendar Inc PO Box 3355 Van Nuys Calif  
Penn TV Products 1835 Ruan Philadelphia Pa  
Penn-Tran Corp PO Box 149 Bellefonte Pa  
Pennwood Numechron 7249 Frankstown Pittsburgh Pa  
Penta Labs 312 N Nopal Santa Barbara, Calif  
Pentron Corp 777 S Tripp Chicago Ill  
Perfection Mica Magnetic Shield Div 1322 N Elston Ave Chicago Ill  
Perkin Eng'g 345 Kansas El Segundo Calif  
Perkin-Elmer Vernistat Div Norwalk Conn  
Perma-Tape US Hwy 1 New Brunswick NJ  
Perma-Power Co 3100 N Elston Chicago Ill  
Permo Inc 6415 Ravenswood Chicago Ill  
Permotux Prods 4101 San Fernando Rd Glendale Calif  
Peschel Electronics RFO #1 Patterson NY  
Pfanstiel Chemical 104 Lakeview Waukegan Ill  
Phalo Plastics 530 Boston Tpke Shrewsbury Mass  
Phaestron Instr & Electronic 151 Pasadena Ave South Pasadena Calif

Philcom Labs 90 Hopper Westbury NY  
Phillips Corp 'C' & Toga Sts Philadelphia Pa  
Phillips Corp Lansdale Div Lansdale Pa  
Phillips Electronics Electrical Industries Div Murray Hill NJ  
Phillips Electronics Instr Div 750 S Fulton Mt Vernon NY  
Phillips Controls Corp 59 W Washington Joliet Ill  
Phillips Mfg 3475 W Touhy Chicago Ill  
Phillmore Mfg 130-01 Jamaica Richmond Hill NY  
Philosophical Library 45 E 40 St New York NY  
Philson Mfg 60 Sackett Brooklyn NY  
Photobell Co 43 Vesey New York NY  
Photodiscs Corp 31 Sea Cliff Glen Cove NY  
Photocon Research Prods 421 N Altadena Dr Pasadena Calif  
Photo Crystals 15 S J St Geneva Ill  
Photomation Inc 96 S Washington Ave Bergenfield NJ  
Photon Instrument 6516 Detroit Cleveland Ohio  
PIC Design 477 Atlantic East Rockaway LI NY  
Pickens & Co N 31 E 14 St New York NY  
Pickering & Co Plainville NY  
Piezo Crystal 265 E Pomfret Carlisle Pa  
Piezo Prods Whitney St Sherburn Mass  
Pilot Radio 37-06 36 St Long Island City NY  
Pioneer Electronics 2235 S Carmelina Los Angeles Calif  
Pitman Publishing 2 W 45 St New York NY  
Planet Sales 225 Belleville Bloomfield NJ  
Planist Capacitors 2620 N Clybourn Chicago Ill  
Plastic Wire & Cable Jewett City Conn  
Plastoid Corp 42-61 24 St Long Island City NY  
Polarad Electronics 43-20 34 St Long Island City NY  
Polymer Corp 2140 Fairmont Reading Pa  
Polyphase Instrument E 4 St Bridgeport Pa  
Polytechnic Research & Development 202 Tillary Brooklyn NY  
Polytron Eng'g 32 W Biddle St Baltimore Md  
Polytronics Lab 253 Crooks Ave Clifton NJ  
Pomona Electronics 1126 W 5 Ave Pomona Calif  
Porcelain Products 224 N Patterson Carey Ohio  
Portable Electric Tools 320 W 83 St Chicago Ill  
Post Machinery 159 Elliott Beverly Mass  
Potter & Brumfield Princeton Ind  
Potter Instrument Sunnyside Blvd Plainville NY  
Power Sources Burlington Mass  
Power Supplies Box 269 Highland Ill  
Precision Development 2 Nell Ct Oceanide LI NY  
Precision Measurements RD 1 Millbrook Rd Flemington NJ  
Precision Apparatus 70-31 84 St Glendale LI NY  
Precision Electronics 9101 King Franklin Park Ill  
Precision Inc 4748 France N Minneapolis Minn  
Precision Line 63 Main Maynard Mass  
Precision Radiation Instr 5810 S Normandie Los Angeles Calif  
Precision Tube Church Rd & Wissahickon North Wales Pa  
Precision Turner Service 601 N College Bloomington Ill  
Premax Products Div Chisholm-Ryder Niagara Falls NY  
Premier Instrument 33 New Broad Port Chester NY  
Premier Metal Prods 337 Manida St New York 59 NY  
Prentice-Hall Inc 70 5 Ave New York NY  
Presto (see Bogen-Presto)  
Price Electric E Church & 2 St Frederick Md  
Proboscope Co 8 Sagamore Hill Dr Port Washington NY  
Process & Instruments 15 Stone Brooklyn NY  
Prodelin Inc 305 Bergen Kearny NJ  
Products for Industry Div Western Litho PO Box 2980 Terminal Annex Los Angeles Calif  
Progress Mfg. Castor Ave & Tulip St Phila Pa  
Proto Tool 2209 S Santa Fe Los Angeles Calif  
Pulse Eng'g 560 Robert Santa Clara Calif  
Pyramid Electric 507 26 St Union City NJ  
Pyrofilm Resistor US Highway 46 Parsippany NJ

Qualitone Industries 102 Columbus Tuckahoe NY  
Quality Components St Mary's Pa  
Quality Electronics 319 Church New York NY  
Quam-Nichols Marquette Rd & Prairie Chicago Ill  
Quantametric Devices Box 1107 Binghamton NY  
Quan-Tech Labs Box 505 Morristown NJ  
Quick Mount Mfg 481 Sterling Pl Brooklyn NY  
Quiretore Co 395 St John Spartanburg SC  
Quik-Chek Corp 5212 Pulaski Philadelphia  
Qutronic Transformer 525 Bdw New York NY

Racon Electric 1261 Bdw New York NY  
Radar Design PO Box 38 Syracuse NY  
Radar Measurements 190 Duffy Hicksville NY  
Radar Relay 2322 Michigan Santa Monica Calif  
Radex Corp 2076 Elston Chicago Ill  
Radiant Corp 2900 Columbia Indianapolis Ind  
Radiation Counter Labs 5121 W Grove Skokie Ill  
Radiation Instrument 5737 S Halstead Chicago Ill  
Radiation Research 1114 1 Ave New York NY  
Radio City Prods Centre & Glendale Easton Pa  
Radio Condenser Davis & Copewood St Camden NJ  
Radio Craftsmen 4223 W Jefferson Los Angeles Calif  
Radio-Electronic Master 60 Madison Hempstead LI NY  
Radio Eng'g Labs 29-01 Borden Ave Long Island City NY  
Radio Frequency 44 Park Medfield Mass  
Radio Frequency Labs Banting NJ  
Radio Industries 666 Garland Pl Des Plaines Ill  
Radio Materials Corp 3325 N California Chicago Ill  
Radio Merchandise Sales 2016 Bronxdale New York NY  
Radio Music Corp 84 S Water Port Chester NY  
Radion Corp 345 Terra Cotta Crystal Ill  
Radionics Inc 76 Cambridge St Burlington Mass  
Radio Products 1421 S Hill Los Angeles Calif  
Radio Receptor Co 240 Wythe Brooklyn NY  
Radio Specialty Mfg 2023 SE 6 Ave Portland Ore  
Radix Wire 26262 Lakeland Cleveland Ohio  
Rad-Tel Tube 115 Coit Irvington NJ  
Rahm Instruments 62 Rushmore Westbury NY  
Railway Communications 9351 E 59 St Raytown Mo  
Ram Electronics 600 Industrial Paramus NJ  
Ram Meter 1100 Hilton Rd Detroit Mich

Ramo-Wooldrige PO Box 45215 Los Angeles Calif  
Rangerone Inc 73 Winthrop St Newark NJ  
Rapid Electric 2881 Middleton Bronx NY  
Rapid Electric 12838 Fenkel Ave Detroit Mich  
Rauland-Borg 3515 W Addison Chicago Ill  
Rauland Corp 4245 N Knox Chicago Ill  
Raven Electronics 2130 W Carroll Chicago Ill  
Rawson Electrical Instr 116 Potter Cambridge Mass  
Ray-O-Vac Co 212 E Washington St Madison Wis  
Ray-Par Inc 7810 W Addison St Chicago Ill  
Raytheon Distr Prods Div 411 Providence Tpk Westwood Mass  
Raytheon Mfg 100 River St Waltham Mass  
Raytherm Corp Oaksdale & Northside Redwood City Calif  
RBM Div Essex Wire 131 Godfrey Loganport Ind  
RCA 30 Rockefeller Center New York NY  
RCA Components Div Front & Cooper Camden NJ  
RCA Electron Tube Div Harrison NJ  
RCA Institutes 154 W 14 St New York NY  
RCA Records Div 155 E 24 St New York NY  
RCA Semiconductor Div Somerville NJ  
RCA Service Corp Cherry Hill NJ  
RCA Missile Test Equipment Mail Unit 114 Patrick Air Force Base Fla  
R-Columbia Prods 305 Waukegan Highwood Ill  
Recordio Corp 603 W Seminary Charlotte Mich  
Reedman Corp 52-35 Barnett Ave Long Island City NY  
Redman Electronics PO Box 72 Thompsonville Conn  
Reeve Electronics 609 W Lake Chicago Ill  
Reeves Instrument Roosevelt Field Garden City NY  
Reeves Soundcraft Great Pasture Rd Danbury Conn  
Regency Div 7900 Pendleton Pike Indianapolis Ind  
Rego Insulated Wire 830 Monroe Hoboken NJ  
Reiner Electronics Centre & Glendale Sts Easton Pa  
Rek-O-Kut Co 38-19 108 St Corona NY  
Relay Sales PO Box 186 West Chicago Ill  
Remier Co 2101 Bryant San Francisco Calif  
Remington Rand 315 Park Ave S New York NY  
Reon Resistor 117 Stanley Yonkers NY  
Republic Aviation Farmdale LI NY  
Resdel Eng'g 330 S Fair Oaks Pasadena Calif  
Rese Eng'g 731 Arch Philadelphia Pa  
Research Devel 429 E Collom Philadelphia Pa  
Research Industrial Lab Electronics Roslyn Pa  
Resistance Products 914 S 13 St Harrisburg Pa  
Resistors Inc 5226 W 26 St Cleiro Ill  
Reuter Stokes Electronic Components 2149 Hamilton Cleveland Ohio  
Revere Camera 320 E 21 St Chicago Ill  
Revere Corp of America N Colony Rd Wallingford Conn  
Rex Corp 100 Hayward Rd West Acton Mass  
Reynolds Electric 3000 River River Grove Ill  
Reynolds Metals Co 3rd & Grace Richmond Va  
Rheem Electronics Div 777 Industry Rivera Calif  
Rhombic Assoc 60 W 45 St New York NY  
Richards-Wilcox 4007 3 St Aurora Ill  
Rider Publisher John F 116 W 14 St New York NY  
Riemer Co David 601 W 26 St New York NY  
Rinehart Books 232 Madison New York NY  
Riverbank Labs PO Box 65 Geneva Ill  
Rixon Electronics 2414 Reddie Dr Silver Springs Md  
Roanwell Corp 180 Varick New York NY  
Roberts Electronics 829 N Highland Los Angeles Calif  
Robins Industries 36-27 Prince St Flushing NY  
Robertshaw-Fulton Controls 2920 N 4 St Philadelphia Pa  
Robertshaw-Fulton Aero Div Columbus Ohio  
Robotron Corp 21300 W 8 Mile Rd Detroit Mich  
Rockbar Corp 650 Halstead Mamaroneck NY  
Rockwell Eng'g 2143 E 45 St Indianapolis Ind  
Rogers Electronic 43 Bleeker New York NY  
Rogers Mfg 25 N Main Lindsey Ohio  
Rohn Mfg 116 Limestone St Bellevue Peoria Ill  
Rollan Electric 8233 S Princeton Chicago Ill  
Rome Cable Rome NY  
Ronette Acoustical 190 Earle Ave Lynbrook NY  
Rosemount Eng'g 4900 W 78 St Minneapolis Minn  
Rotating Components 267 Green Brooklyn NY  
Rotron Mfg Schoonmaker Lane Woodstock NY  
Rowan Controller 2313 Homewood Baltimore Md  
Rowe Industries 1702 Wayne Toledo Ohio  
Royal Electric 301 Saratoga Ave Pawtucket RI  
Royal-McBee Westchester Ave Port Chester NY  
RS Electronics 435 Portage Palo Alto Calif  
Rubicon Instr Div Minn-Honeywell Ridge Ave & 35 St Philadelphia Pa  
Rutherford Electronics 8944 Lindblade Culver City Calif  
Rye Sound 145 Elm Mamaroneck NY

S & A Electronics 1025 Nevada Toledo Ohio  
Saine Equip Lab RT 2 Box 407 E Main Morgan Hill Calif  
Samco Div Sampson Co 2244 S Western Chicago Ill  
Sams & Co Howard W 2201 E 46 St Indianapolis 5 Ind  
Sarnborn Co 175 Wyman Waltham Mass  
Sanders Assoc 95 Canal Nashua NH  
San Fernando Electric 1509 1 St San Fernando Calif  
Sangamo Electric 130 N 11 St Springfield Ill  
Saratoga Industries Ballston Ave Saratoga Springs NY  
Sargent Electric 630 Herrick Rd Lynbrook NY  
Sargent-Raymont 4926 E 12 St Oakland Calif  
Sarkis Tarzian (see Tarzian, Sarkis)  
Saxton Products 4320 Park Ave New York NY  
Scale Controls PO Box 41 Delanco NJ  
Scala Radio 2814 19 St San Francisco Calif  
Seantlin Electronics 2215 Colby Los Angeles Calif  
Schaevitz Eng'g US Rte 130 & Schaevitz Blvd Camden NJ  
Schauer Mfg 4500 Alpine Cincinnati Ohio  
Schmelting Electronics 20 1 St Keyport NJ  
Schober Organ 2248 Bdw New York NY  
Schweber Electronics 60 Herricks Rd Mineola LI NY  
Scientific-Atlanta 2162 Piedmont NE Atlanta Ga  
Scientific Eng'g Lab 1510 G St Berkeley Calif  
Scopes Co Box 56 Monsey NY  
Scott H H 111 Powder Mill Rd Maynard Mass  
Seatt Instrument Labs 17 E 48 St New York NY  
Seatelect Switch & Relay 6025 N Keystone Chicago Ill  
Sealectro Corp 610 Fayette Mamaroneck NY  
Seco Mfg 5015 Penn Ave Minneapolis Minn

Secode Corp 555 Minnesota San Francisco Calif  
Security Controls 503 Franklin Buffalo NY  
Seeburg Corp 1500 N Dayton Chicago Ill  
Seg Electronics 1778 Flatbush Brooklyn NY  
Selsco Div Selsmograph Service Corp PO Box 1590  
Tulsa Okla  
Semicon Inc 258 East St Lexington Mass  
Semi-Elements Saxonburg Blvd Saxonburg Pa  
Sencore Addition 2 Ill  
Sensitive Research Instr 310 Main New Rochelle NY  
Sequoia Wire & Cable Co 2201 Bay Rd Redwood City Calif  
Service Instruments Co (See Sencore)  
Service Parts Systems PO Box 243 East Detroit Mich  
Service Promotions Ambler Pa  
Servo Corp of America 2020 Jericho Tpk New Hyde  
Park NY  
Servo Dynamics Main St Somerworth NH  
Servomechanisms Inc 12500 Aviation Blvd Hawthorne Calif  
Servonic Instruments 640 Terminal Way Costa Mesa Calif  
Servo Systems 14 Carmer Belleville NJ  
Servo-Tek Prods 1085 Goffie Hawthorne NJ  
Setchell-Carlson New Brighton St Paul Minn  
Shakeproof Div Illinois Tool Egin Ill  
Shallcross Mfg Preston St Selma NC  
Sheffield Corp Box 893 Dayton Ohio  
Shell Chemical 50 W 50 St New York NY  
Shell Electronic 112 State St Westbury NY  
Shepard Labs Broad & Park Summit NJ  
Sherwood Electronic Labs 4300 N California Chicago Ill  
Sherman Industrial Electronics PO Box 813 State  
College Pa  
Shielding Inc N Road Riverton NJ  
Shure Brothers 222 Hartrey Evanston Ill  
Sickles Co F W 165 Front Chicopee Mass  
SIDCO (see Ungar Co Sid)  
Sierra Electronic 3885 Bohannon Dr Menlo Park Calif  
Sightmaster Corp 50 Aleppo Providence RI  
Sigma Instruments 70 Pearl St S Braintree Mass  
Signalite Inc 37 Neptune Hwy Neptune NJ  
Signal Transformer 1661 McDonald Brooklyn NY  
Sihlon Transistor 150 Glen Cove Rd Carle Place LI NY  
Simplatrol Prods 24 Sallsburg Worcester Mass  
Simpson Electric 5200 W Kinzie Chicago Ill  
Simpson Mfg Mark 32-29 49 St Long Island City NY  
Sincelar Mfg PO Box 398 Chartley Mass  
Sittler Corp 18 N Ada St Chicago Ill  
Sklatron Electronics & TV 180 Varlek St New York NY  
Skinner Electric Valve Div 95 Edgewood New Britain Conn  
Skottle Electronics 204 Britege St Peckville Pa  
Sky Ray Mfg McLeansboro Ill  
Skysweeper Inc PO Box 92 McHenry Ill  
Slater Electric 45 Sea Cliff Glen Cove NY  
Small Motors Inc 2076 Elston Chicago Ill  
Smith H H 2326 Nostrand Brooklyn NY  
Smolin Labs Woodbrook Dr Springdale Conn  
Snap-on Tools Kenosha Wis  
Snyder Mfg 22nd & Ontario Philadelphia Pa  
Sola Electric 4633 W 16 St Chicago Ill  
Solar Mfg 4553 Seville Los Angeles Calif  
Solid State Prods 1 Pinegrove Salem Mass  
Sonec Inc 73 S State Rd Upper Darby Pa  
Sonic Industries 19 Wilbur Lynbrook NY  
Sonogart Electric 37 E 28 St New York NY  
Sonotone Corp Elmsford NY  
Sony Corp of America 514 Bdw New York NY  
Sorensen & Co Richards Ave South Norwalk Conn  
Sorensen Industrial Electronic Rt 10 Dover NJ  
Soroban Eng's Kissimmee Hwy Melbourne Fla  
Soundex Radio 959 Commonwealth Boston Mass  
Sound Foyer Div Radio Products Sales 1421 S Hill  
Los Angeles Calif  
Soundoller Inc Manchester & Barrett Station Rd  
St Louis Mo  
Soundserber Corp 6 Middletown New Haven Conn  
Southern Electronics 150 W Cypress Burbank Calif  
South River Metal Prods 377 Turnpike Rd South River NJ  
Southern Picture Tube 192 S Dudley Memphis Tenn  
Southwestern Industrial Electronics 10201 Westheimer Rd  
Houston Tex  
Sparta Mfg Dover Ohio  
Spaulding Fibre 310 Wheeler Tonawanda NY  
Spaulding Prods 550 W Barner Frankfurt Ind  
Specialty Eng'g & Electronics 79 Clifton Pl Brooklyn NY  
Specialties Inc Skunks Misery Rd Syosset LI NY  
Spectra Electronics 250 E 3 St Mt Vernon NY  
Spectra-Strip Wire & Cable 10052 Larson Garden  
Grove Calif  
Spectral Electronics Corp 1074 S Del Mar San Gabriel  
Calif  
Speer Resistor Div Speer Carbon Co Bradford Pa  
Spellman High Voltage 3029 Webster Bronx NY  
Spencer Kennedy Labs 1320 Soldiers Field Boston Mass  
Sperry Gyroscope Electron Tube Div Great Neck NY  
Sperry Microwave Electronics Clearwater Fla  
Sperry Semiconductor Div South Norwalk Conn  
Sperry Products Shelter Rock Rd Danbury Conn  
Spirling Products PO Box 411 Hicksville NY  
Sprague Products North Adams Mass  
Square D Co 4041 N Richard Milwaukee Wis  
Stackpole Carbon Stackpole St Marys Pa  
Stainless Inc 3 St North Wales Pa  
Stancil-Hoffman 921 N Highland Hollywood Calif  
Standard Coil 2085 N Hawthorne Melrose Park Ill  
Standard Components 519 S 5 Ave Mt Vernon NY  
Standard Electric Time 89 Logan Springfield Mass  
Standard Electrical Mfg Haddon Ave West Berlin NJ  
Standard Electromagnetics PO Box 679 Frederick Md  
Standard Electronics 2240 E 3 St Dayton Ohio  
Standard Electronics Research 2 East End Ave New  
York NY  
Standard Instrument 657 Bdw New York NY  
Standard Pressed Steel Box 394 Jenkintown Pa  
Standard Rectifier 620 E Dyer Rd Santa Ana Calif  
Standard Winding 44 Johns St Newburgh NY  
Standard Wire & Cable 3434 Overland Los Angeles Calif  
Stanley Aviation 2501 Dallas Denver Colo  
Stanley Transformer 31-23 Vernon Blvd Long Island  
City NY  
Stanwyck Winding 137 Walsh Newburgh NY  
Star-A Electric 269 Meserol Brooklyn NY  
Starbeam Co PO Box 5087 Waco Tex

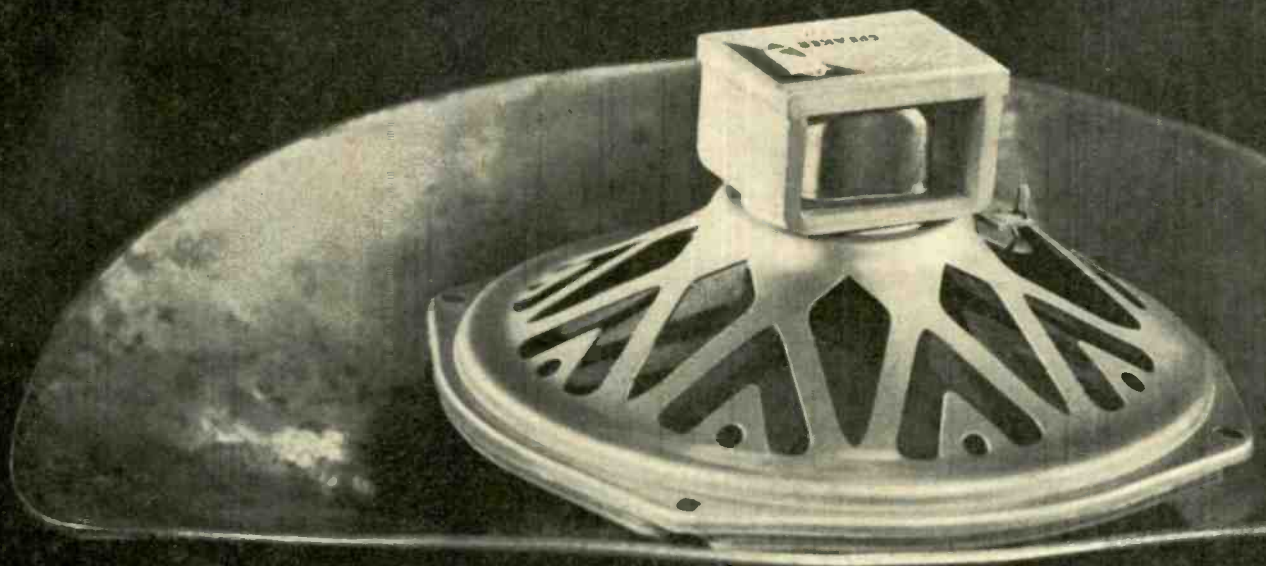
Star Porcelain 21 Mulhrend Trenton NJ  
State Labs 215 Park Ave S New York NY  
Statham Instruments 12401 W Olympic Los Angeles Calif  
Stavid Eng'g US Hwy #22 Plainfield NJ  
Steelman Phonographs 2-30 Anderson Mt Vernon NY  
Stevens Tru-Sonic 8538 Warner Dr Calver City Calif  
Stere-O-Craft Jiv Craft Recording 1650 Bdw New  
York NY  
Stereo-Ette 4908 N Lincoln Chicago Ill  
Sterophony Inc 8101 University Des Moines Iowa  
Stereo Sound Studios 238 E 26 St New York NY  
Sterling Hi-Fidelity 22-20 40 Ave Long Island City NY  
Sterling Mfg 7201 Wentworth Cleveland Ohio  
Sterling Precision 17 Matinecock Ave Port Washington NY  
Sterling Transformer 297 N 7 St Brooklyn NY  
Stevens Inc Assoc of Commerce Bldg Grand Rapids Mich  
Stevens Mfg George 6022 N Rodgers Chicago Ill  
Stevens Products 86 Main East Orange NJ  
Stevens Mfg PO Box 1007 Mansfield Ohio  
Stevens Walden 467 Shrewsbury Worcester Mass  
Stevens Bros 110 Race Philadelphia Pa  
Stoddart Aircraft Radio 6644 Santa Monica Hollywood  
Calif  
Stokes Corp F J 5500 Tabor Philadelphia Pa  
Strandberg Eng'g 416 W Market Greensboro NC  
Stratocoon Corp PO Box 10 Morrissett NJ  
Streeter-Amel Grayslake Ill  
Stretch Wire PO Box 893 New Rochelle NY  
Stromberg-Carlson 1400 N Goodman Rochester NY  
Struthers-Dunn Lambs Rd Pitman NJ  
Sturupp Inc 50 Silver Middletown Conn  
Summit Coil 4 Claremont Bernardsville NJ  
Sunair Electronics Broward Int'l Airport Ft Lauderdale Fla  
Sunmaster Products 169 Commercial Sunwayvale Calif  
Super Electronics Corp 125 S Ave New York NY  
Superex Electronics 4-6 Radford Pl Yonkers NY  
Superior Electric 83 Laurel St Bristol Conn  
Superior Instruments 2435 White Plains Rd New York NY  
Superior Insulated Wire Washburn's Lane Stony Point NY  
Superior Seatite & Ceramic 83-91 W Forest Englewood NJ  
Superior Switch 1001 W Broad Richmond Va  
Superscope Inc 8520 Tujunga Ave Sun Valley Calif  
Supreme Publications 1760 Balsam Rd Highland Park Ill  
Suprenant Mfg 172 Sterling Clinton Mass  
Sutton Electronic PO Box 259 Lexington Ky  
Swedgal Electronics MS 258 Bdw New York NY  
Sylvan Electric 5555 N Elston Chicago Ill  
Sylvan Electronics Goodrich Mich  
Sylvania Electric Electron Tube Div 1740 Bdw New  
York NY  
Sylvania Electric Rev'g Tube Div Emporium Pa  
Sylvania Electric TV Tube & Cathode Ray Tube Div  
Seneca Falls NY  
Sylvania Electric Special Tube Operations 500 Evelyn Ave  
Mountain View Calif  
Sylvania Electric Semiconductor Div Woburn Mass  
Sylvania Electric Home Electronics Div 70 Eilcott St  
Batavia NY  
Sylvania Electric Radio & TV Receiver Div 254 Rano St  
Buffalo NY  
Sylvania Electric Lighting Prods 60 Boston St Salem Mass  
Sylvania Electric Parts Div Warren Pa  
Symphony Electronics 925 S Western Los Angeles Calif  
Synthane Corp Oaks Pa  
Syntron Co Homer City Pa  
Syntronic Instr 100 Industrial Rd Addison Ill  
Sytron Corp 950 Galindo Concord Calif

Taber Instrument 107 Goundry St North Tonawanda NY  
TACO (See Technical Appliance Corp)  
Tafel Radio & TV 27-05 Brooklyn Queens Expressway  
Woodside NY  
Talk-A-Phone Co 1512 S Pulaski Rd Chicago 23 Ill  
Taller & Cooper 75 Front Brooklyn NY  
Tamar Electronics 2339 Cotner Los Angeles Calif  
Tandberg of America 10 E 52 St New York NY  
Tannoy-America 38 Pearl New York NY  
Tapeo Group Thompson Ramo Wooldridge 23555 Euclid  
Cleveland Ohio  
Tape Cable 790 Linden Rochester NY  
Tapedcode Box 31 Langhorne Pa  
Tarc Electronics 48 Urban Westbury NY  
Tarzlan Sarkes Inc Rectifier Div 415 N College  
Bloomington Ind  
Tarzlan Sarkes Inc Tuner Div E Hillside Dr  
Bloomington Ind  
Taylorel Corp 185 Murray Rochester NY  
Tech Labs Bergen & Edsall Palisades Park NJ  
Tech-Master Corp 75 Front Brooklyn NY  
Technibilt 905 Air Way Glendale Calif  
Technic Inc 39 Snow Providence RI  
Technical Appliance Corp Sherburne NY  
Technical Devlps 2340 Centinela Los Angeles Calif  
Technical Electronics 4066 Ince Culver City Calif  
Technical Material Corp 700 Fenmore Mamaroneck NY  
Technical Service 1404 W Market Louisville Ky  
Technical Wire 48 Brown Springfield NJ  
Technigraph Eng'g 1952 E Allegheny Philadelphia Pa  
Technigraph Printed Electronics Inc 920 Northwest Blvd  
Winston-Salem NC  
Technology Instrument Newbury Park Calif  
Tech-Ohm Resistor 36-11 33 St Long Island City NY  
Telatron Inc PO Box 831 Portland Ore  
Telegraph Corp 8700 Ballantrae Los Angeles Calif  
Telco Electronics Div General Cement 400 S Wyman St  
Rockford Ill  
Telephone Mfg 28 Ranick Dr Amityville NY  
Tele-Coil Co 2733 Saunders Camden NJ  
Telera Industries 37-18 37 St Long Island City NY  
Telotron Co 3991 SW 12 Terr Ft Lauderdale Fla  
Telectronic Corp 37-18 37 St Long Island City NY  
Tele-Dynamics 5000 Parkside Philadelphia Pa  
Telemarine Communications 140 W Bdw New York NY  
Telematic Industries 16-18 Howard Brooklyn NY  
Telemeter Magnetics 2245 Pontius Los Angeles Calif  
Telephone & Electronics Corp 7 E 42 St New York NY  
Telephones Corp Park Ave Huntington NY  
Telerad Mfg 1440 Bdw New York NY

Telephone Co of America 1668 Webster New York NY  
Teletronics Lab 54 Kinkel Westbury NY  
Telwex Co 46 Lakewood Yonkers NY  
Television Labs Wauconda Ill  
Television Specialty 350 31 St New York NY  
Telex Inc 1633 Eustis St Paul Minn  
Tel-Instrument Electronics 728 Garden Carlsstadt NJ  
Tel-Labs Inc 1050 2 St Manchester NH  
Telonic Industries 73 N 2 Ave Beech Grove Ind  
Telrex Labs Asbury Park NJ  
Telfron Electric 428 Harrison Harrison NJ  
Temperature Eng'g US Hwy 130 Riverton NJ  
Tempo Instrument PO Box 338 Hicksville NY  
Tenztronics Ltd 1011 Power Cleveland Ohio  
Tennalab 10th & State Quincy Ill  
Tenna Mfg 7580 Garfield Cleveland Ohio  
Tensitron Inc PO Box 185 Harvard Mass  
Tensolite Insulated Wire W Main Tarrytown NY  
Terado Co 1068 Raymond St Paul Minn  
Tetrad Corp 62 St Marys Yonkers NY  
Teveco Insulated Wire 108 E Prospect Ave Burbank Calif  
Texas Capacitor 922 S 75 St Houston Tex  
Texas Crystals Div Westronix Corp 8538 W Grand River  
Grove Ill  
Texas Instr Semiconductor-Components PO Box 312  
Dallas Tex  
Textran Corp PO Box 9207 Austin Tex  
Thermador Electrical 715 S Raymond Alhambra Calif  
Thermal Wire of America South Hero Vt  
Thermocal Inc 1631 Colorado Santa Monica Calif  
Thermo Electric Saddle Brook NJ  
Thermosen Inc 375 Fairfield Stamford Conn  
Theta Instrument 48 Pine East Paterson NJ  
Thomas & Betts 36 Butler Elizabeth NJ  
Thomas Electronics 118 9 St Passaic NJ  
Thordanson-Melissner 2734 N Pulaski Chicago Ill  
Thomson Co Atlantic & Stewart New Hyde Park LI NY  
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Tinerman Prod PO Box 6688 Cleveland Ohio  
Tippo Mfg 14734 Calvert Van Nuys Calif  
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Topp Industries 5221 W 102 St Los Angeles Calif  
Tork Time Controls 32 Grove St Mt Vernon NY  
Torocoll Co 2615 Bristol Columbus Ohio  
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Transistor Electronics 3357 Republic Minneapolis Minn  
Transistor Specialties Terminal Dr Plainville NY  
Transitron Electronic 168 Albion Wakefield Mass  
Tranzone Inc 808 16 St Bakersfield Calif  
Transval Electronics 10401 W Jefferson Culver City Calif  
Trav-Ler Radio 571 W Jackson Chicago Ill  
Trenton Transformer PO Box 5688 Trenton NJ  
Tresco Inc 3824 Terrace Philadelphia Pa  
Triad Transformer 4055 Redwood Venice Calif  
Tri-Dex Electronics PO Box 1207 Lindsay Calif  
Tri-Ex Tower 127 E Inyo Tulare Calif  
Trim Inc 400 W Lake Libertyville Ill  
Trimant Instrument 3119 W Lake St Chicago Ill  
Trio Labs Plainville NY  
Trio Mfg Griggsville Ill  
Triplet & Barton 831 N Lake St Burbank Calif  
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Tru-Connector Corp 416 Union Lynn Mass  
Tru-Ohm Prods Div Model Eng'g & Mfg 2800 N Mil-  
waukee Chicago Ill  
Trutone Electronics 6912 Santa Monica Los Angeles Calif  
Tullamore Electronics 6055 S Ashland Chicago Ill  
Tung Sol Electric 1 Summer Ave Newark NJ  
Turner Co 909 17 St NE Cedar Rapids Iowa  
TV Development 469 Jericho Tpk Mineola NY  
TV Hardware Mfg Div General Cement 939 Taylor Ave  
Rockford Ill

Uertz Co Glenn R 92 Auburn Ave Utica NY  
Ultrafine Inc PO Box 3308 Albuquerque NM  
Ultra Hi TV Mfg 69 Hammond Worcester Mass  
Ultrasonic Industries 141 Albertson Ave Albertson LI NY  
Ultravision Mfg 185 Goffie Hawthorne NJ  
Ultratron Inc 111 E 20 Ave San Mateo Calif  
Ungar Co Sid PO Box 192 Venice Calif  
Ungar Electronic Tools 4101 Redwood Los Angeles Calif  
Unimax Switch Div W L Maxson Co Wallingford Conn  
Union Switch & Signal Div Westinghouse Air Brake  
Swissvale Pa  
United Audio Prods 12 W 18 St New York NY  
United Catalog Publ 60 Madison Hempstead NY  
United Control 4540 Union Bay Pl Seattle Wash  
United Electric Controls 85 School Westtown Mass  
United Electro-dynamics 200 Allendale Pasadena Calif  
United Electronic Mfg 542 39 St Union City NJ  
United Electronics 42 Spring Newark NJ  
United Motor Service Div GMC Detroit Mich  
United Scientific Labs 35-15 37 Ave LI City NY  
United Sensor & Control Glastonbury Conn  
United Speaker Systems 80 Holmes Belleville NJ  
United Transformer 150 Varlek New York NY  
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Universal Condenser 3535 N Kimball Chicago Ill  
Universal Electric 300 E Main Dossos Mich  
Universal Mfg 1168 Grove Irvington NJ  
Universal Products 4100 Taylor Racine Wis

(Continued on page 56)



## ARE YOU STILL BUYING

Lots of people, people who buy them as well as sell them, still judge a speaker by the weight of its magnet. "The heavier the magnet, the better the speaker," so the old rule of thumb goes. And when speakers were all pretty much alike, that was probably as good a way as any to grade them.

But speakers, like everything else in electronics, have changed enormously over the past few years. Magnet manufacturers know so much more today about making magnets. The magnets used by Delco have more highly oriented grain structures. They're premium grade, more efficient.

And Delco has improved every other speaker part—from basket to gasket, voice coil to cone. All these parts are now made with new, stronger materials. They work better together. They stand up longer. And Delco Radio's precision engineering

makes possible better magnetic circuits. The result is a greater range of rich, deep, distortion-free sound—sound that you once could get only from more expensive speakers with far heavier magnets.

Delco Radio sells speakers by the *sound* instead of by the pound. May we suggest you contact your Distributor soon.

*Here's why Delco speakers give more sound per pound:* Quality controlled premium magnets • Efficient pot design provides extremely short magnetic path with minimum magnetic air gap to minimize stray flux • High quality steel in magnetic circuit • Exacting ratio of cross section area of magnetic air gap to length of air gap gives optimum energy from magnet • Precision manufacture and assembly of parts make possible greater efficiency from magnetic circuit.



# SPEAKERS BY THE POUND?



A

Delco gives you a complete line of Hi-Fi speakers. Illustration A is the 8" Model No. 8007. It offers the most highs, the most lows, the most watts in a medium-priced speaker. Designed for replacement use and high fidelity audio systems.



B

Delco's most popular auto radio speakers: (B)—Model No. 6112, 6" x 9", and (C)—Model No. 6109, Delco's exclusive 4" x 10". All Delco auto radio speakers are life tested to perform under severest climatic conditions. All, including our full line of rear seat speakers, are equipped with quality controlled, premium Alnico magnets.



C

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**RADIO**  
RELIABILITY

Division of General Motors  
Kokomo, Indiana

Delco speakers, transistors, transformers and other parts for radios, television and Hi-Fi are available everywhere through Delco Electronic Distributors associated with



(Continued from page 53)

Universal Relay 42 White New York NY  
 Universal Electronics 8 Gary Syosset NY  
 Universal Toroid Coil Winding 171 Colt Irvington NJ  
 Universal Transistor Prods 17 Brooklyn Westbury NY  
 University Loudspeakers 80 S Kensington White Plains NY  
 Universal Woodcrafters 1302 State La Porte Ind  
 Univox Corp 102 Warren New York NY  
 U S Components 454 E 148 St New York NY  
 U S Dynamics 1250 Columbus Boston Mass  
 U S Electrical Motors 200 E Slauson Los Angeles Calif  
 U S Electronic Publications 480 Lexington Ave New York NY  
 U S Eng'g 5873 Rodeo Rd Los Angeles Calif  
 U S Instrument PO Box 1191 Charlottesville Va  
 U S Recording 1121 Vermont Ave NW Washington DC  
 U S Relay 717 N Coney Ave Azusa Calif  
 U S Semiconductor Prods 3540 W Osborn Phoenix Ariz  
 U S Steel 525 Wm Penn Pl Pittsburgh Pa  
 U S Time Waterbury Conn  
 U S Transistor Corp Syosset LI NY  
 Urania Records 625 8 Ave New York NY  
 Utah Radio & Electronic 1123 E Franklin Huntington Ind  
 U-Test-M Mfg 4325 W Lincoln Milwaukee Wis  
 Utica Communications 19 S LaSalle St Chicago 1 Ill  
 Utica Drop Forge & Tool 2415 Whitesboro Utica NY  
 Utilities Service 1 Pine Allentown Pa  
 Utrad Corp 305 N Briant Huntington Ind

Vaco Products 317 E Ontario Chicago Ill  
 Vacuum Specialties 34 Linden Somerville Mass  
 Valor Electronics 13214 Grenshaw Gardena Calif  
 Valpey Crystal 1244 Highland Holliston Mass  
 Vanguard Recording 256 W 55 St New York NY  
 Van Norman Industries Electronics Div 186 Granite Manchester NH  
 Van Nostrand Co D 120 Alexander Princeton NJ  
 Varian Associates Palo Alto Calif  
 Vari-L 432 Fairfield Stamford Conn  
 Vario Mfg 2201 Walnut Garland Tex  
 Vectrol Eng'g PO Box 1089 Stamford Conn  
 Vector Electronic 1100 Flower Glendale Calif  
 Veeder Root 70 Sargeant St Hartford Conn  
 Vemco Mfg 8101 University Des Moines Iowa  
 Vernitron Corp 136 Church New York NY  
 Victor Adding Machine 3900 N Rockwell Chicago Ill  
 Victor Electric Wire & Cable 618 Main West Warwick RI  
 Victor RF & Microwave 36 W Water Wakefield Mass  
 Victoreen Instrument 5806 Hough Cleveland Ohio  
 Victory Eng'g Box 373 Union NJ  
 Vidale Electronics 44 Church Baldwin LI NY  
 Video Accessory Mfg PO Box 223 Tulsa Okla  
 Video Instr 3002 Penna Santa Monica Calif  
 Videon Electronic 902 E Michigan Indianapolis Ind  
 Viking of Minn 9600 Aldrich Minneapolis Minn

Virginia Electronics River Rd & B&O RR Washington DC  
 Vis-U-All Prods 640 Eastern SE Grand Rapids Mich  
 Vitramon Inc Box 544 Bridgeport Conn  
 V-M Corp 4th & Park Benton Harbor Mich  
 Vocaline Co of America Coulter St Old Saybrook Conn  
 Vokar Products 201 Catherine Ann Arbor Mich  
 Volkswagen of America 476 Hudson Terr Englewood Cliffs NJ  
 Vuicac Electric 88 Holton Danvers Mass  
 Vulcan T V Mast & Tower 1224 National St Tarrant Birmingham Ala

Waber Electronics 105 Heatherwood Havertown Pa  
 Walco (see Clevite-Walco)  
 Waldom Electronics 4625 W 53 St Chicago Ill  
 Walkirt Co 141 W Hazel Inglewood Calif  
 Wall Mfg P Grove City Pa  
 Wallace Telalides (see H V Associates)  
 Walco Electronics 3225 Exposition Pl Los Angeles Calif  
 Waltham Electronics 751 Main Waltham Mass  
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 Wang Labs 37 Hurley Cambridge Mass  
 Ward Leonard Electric 115 McQueston Parkway Mt Vernon NY  
 Ward Products Edson St Amsterdam NY  
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 Warrick Co C F 1964 W 11 Mile Rd Berkley Mich  
 Wasco Electric Prods 2032 2 Ave S St Petersburg Fla  
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 Waveforms Inc 333 6 Ave New York NY  
 Waveline Inc PO 718 Caldwell NJ  
 Wayne-Kerr Corp 1633 Race St Philadelphia Pa  
 Weathers Industries 66 E Gloucester Pke Barrington NJ  
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 Webster Electric Co 1900 Clark Racine Wis  
 Webster Electronics 176 Johnson Brooklyn NY  
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 Weiss Assoc Warren 346 W 44 St New York NY  
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 Westinghouse Electric Electron Tubes Elmira NY  
 Westinghouse Electric Box 2278 Gateway Center Pittsburgh Pa  
 Westinghouse Electric Semiconductor Div Youngwood Pa  
 West Instrument 4363 W Montrose Chicago Ill  
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 Westminster Recording 275 7 Ave New York NY  
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 Westronics Inc 3605 McCart Ft Worth Tex  
 Wharfedale (see British Industries)  
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 Wheelock Signals 273 Branchport Long Branch NJ  
 Whitaker Cable 1301 Burlington St N Kansas City Mo  
 White Eng'g 238 Grand Ave Rutherford NJ  
 White Industrial Div SS 10 E 40 St New York NY  
 Whitley Electronics 43 S Main Andrews Ind  
 Wilcox-Gay Corp 743 N LaSalle Chicago Ill  
 Wiley & Sons John 440 4 Ave New York NY  
 Willard Storage Battery 246 E 131 St Cleveland Ohio  
 Willtec Electronic 53 Water South Norwalk Conn  
 Wincharger Corp E 7 & Division Sioux City Iowa  
 Winchester Electronics Willard Rd Norwalk Conn  
 Winegard Co 3000 Scotten Burlington Iowa  
 Winpower Mfg 1207 1 Ave E Newton Iowa  
 Winslow Co 707 Lehigh Union NJ  
 Winston Electronics 4000 N W 28 St Miami Fla  
 Wintress Inc 20 Vandam New York NY  
 Wireco Electronics 11680 McBean Dr El Monte Calif  
 Wirecraft Products 10 Lake West Brookfield Mass  
 Wirt Co 5221 Green Philadelphia Pa  
 Wood Counter Lab N 1525 E 53 St Chicago Ill  
 Workman TV Box 5397 Sarasota Fla  
 World Radio Labs 3415 W Bdwy Council Bluffs Iowa  
 Worner Electronic Rankin Ill  
 Wright Steel & Wire 243 Stafford Worcester Mass  
 Wright-Zimmerman New Brighton St Paul Minn  
 Wuerth Tube Saver 9125 Livernois Detroit Mich  
 Wyco Metal Prods 6918 Beck Ave N Hollywood Calif

X-acto Inc 48-41 Van Dam Long Island City NY  
 Xcellite Thorne Ave & Bank Orchard Park NY

Yardney Electric 40 Leonard New York NY  
 Yeats Appliance Dolly 2124 N 12 St Milwaukee Wis  
 Yellow Springs Instr PO Box 106 Yellow Springs Ohio  
 Young Brothers 1831 Columbus Rd Cleveland Ohio

Zalytron Tube 220 W 42 St New York NY  
 Zenith Electric 152 W Walton Chicago Ill  
 Zenith Radio 6001 Dickens Chicago Ill  
 Ziff-Davis Publ 1 Park Ave New York NY  
 Zipper Tubing Co 752 S San Pedro Los Angeles Calif

## Citizens Band Radio

(Continued from page 38)

Company	Model	Price
Shell Electronic Mfg. Corp. 112 State St. Westbury, L.I., N.Y.	CB-12	\$ 79.95
Tecraft Sales Corp. Box 116 River Edge, N.J.	Falcon	\$144.95
Telephone & Electronics Corp. 7 E. 42nd St. New York 17, N.Y.	Tele-Rad	\$179.00
Transpace Inc. 12902 Foothill Blvd. San Fernando, Calif.	C-27A	\$169.50
United Scientific Labs. 35-15 37th Ave. Long Island City, N.Y.	TR-800	\$ 99.95
Utica Communications Corp. 19 S. La Salle St. Chicago 3, Ill.	PT27	\$159.50
Vocaline Co. of Amer., Inc. Old Saybrook, Conn.	ED-27 ED-27M	\$179.50 \$189.50

Wightman Electronic Eng. Co.  
Easton, Md. WE-PT1 \$149.50

World Radio Laboratories  
3415 W. Broadway  
Council Bluffs, Iowa ECBK Kit \$ 37.50

## Technical Societies

(Continued from page 47)

Phonograph Mfrs Assn 37 W 53 St New York 19 NY—A D Adams  
 Producers of Associated Components for Electronics (PACE) 261 Broadway New York 7 NY—Walter Jablon  
 Purchasing Agents of the Radio Television & Electronic Industry Box 62 Rosedale 22 NY—B Trimboli

Radio Club of America 11 W 42 St New York 36 NY—James Morelock  
 Radio Technical Commission for Aeronautics Room 1072 Bldg T-5 16 & Constitution N W Washington 25 DC—Lewis M Sherer Executive Secy  
 Radio Technical Commission for Marine Services c/o Federal Communications Commission Washington 25 DC—Robert T Brown  
 Record Industry Assn of America 1 E 57 St New York 22 NY—John W Griffin

Scientific Apparatus Makers Assn 20 N Wacker Dr Chicago 6 Ill—Kenneth Andersen  
 Society of Motion Picture & Television Engineers 55 W 42 St New York 36 NY—Wilton R Holm  
 Special Industrial Radio Service Assn 711 14 St N W Washington 5 DC—G Kenneth Adams

Ultrasonic Mfrs Assn 271 North Ave New Rochelle NY—C E Herington

Veteran Wireless Operators Assn 247-49 90 Ave Bellerose Manor NY—William C Simon

Western Electronic Mfrs Assn 1435 S La Clenega Blvd Los Angeles 35 Calif—Gouli Hunter

## US TRANSISTOR KIT

A new 6-transistor radio kit for radio service technicians is announced. Price \$3.70. The firm has also added to its production line a number of transistor types that are included in the Defense Department's new official catalog of transistors to be used in the guided missile program. These transistors include types 2N404, 2N396, 2N393, 2N1135, 2N1104, 2N501 and 2N559. U.S. Transistor Corp., Syosset, L.I., N.Y.

For more data, circle 5-56-1 on coupon, p. 43

## Utah SPEAKER

Featuring a slim profile which is provided by removing the pot and magnet assembly from the back of the speaker and placing it inside the cone, the "Magni-Magic" inverted speaker is made in 8" and 6" x 9" types. The magnetic circuit utilizes a dual diameter Alnico V magnet in conjunction with a pure iron magnetic return circuit, plus a self-centering pole assembly. The design is said to eliminate the hazard of voice coil rubbing from poorly aligned or shifting magnetic components. Utah Radio & Electronic Corp., 1224 E. Franklin St., Huntington, Ind.

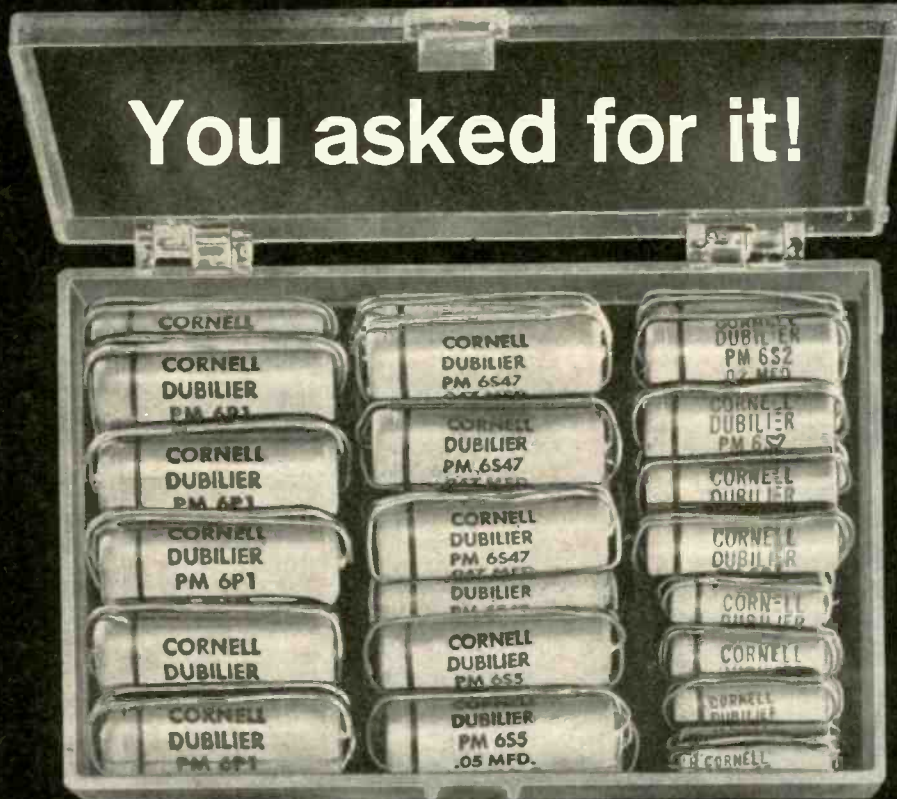
For more data, circle 5-56-2 on coupon, p. 43

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## Adjusting Tape Recorders

(Continued from page 37)

naturally varies with the individual manufacturer. The choice, however, is always made to eliminate possible audible frequency beats, which may result if too low a bias frequency is used.

Although a number of recorders do not incorporate adjustable bias, the majority of better units do. Consequently, the better units offer an opportunity to achieve optimum bias.

It is vital that bias current be set at the correct value, as recommended by the manufacturer, in order to achieve the best combination of good treble response and low distortion. To check bias current, the technique employed in Fig. 4 may be used (same as measuring record equalization).

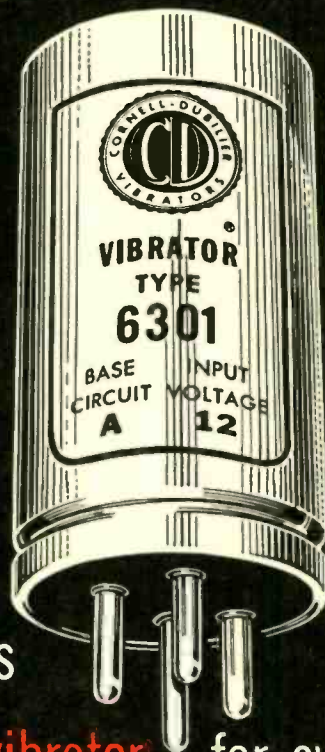
Given the voltage across the 100 ohm resistor, bias current may be calculated through Ohm's Law, that is, by dividing the voltage reading by 100. If the VTVM does not have sufficient sensitivity to produce an adequate reading, a 1,000 ohm resistor can usually be used instead of the 100 ohm one.

It is desirable to measure bias current after allowing a warmup time of at least 10 minutes. Components in the bias circuit tend to change value somewhat as they warm up, with a corresponding change in the frequency and magnitude of the bias current.

For machines having separate record and playback heads, permitting simultaneous record and playback for monitoring, an alternative technique of adjusting bias current is often used. A given frequency, commonly specified as 1,000 cps by the manufacturer, is recorded and played back, and at the same time bias is adjusted for maximum signal output.

It has been recommended that instead of adjusting bias current for peak output, it should be set for "½ db above peak." This means increasing bias beyond the point of maximum signal output, until output falls ½ db. Accordingly slight changes in bias current tend to have minimum effect upon distortion and frequency response.

As bias current is increased (up to a point), distortion falls. Unfortu-



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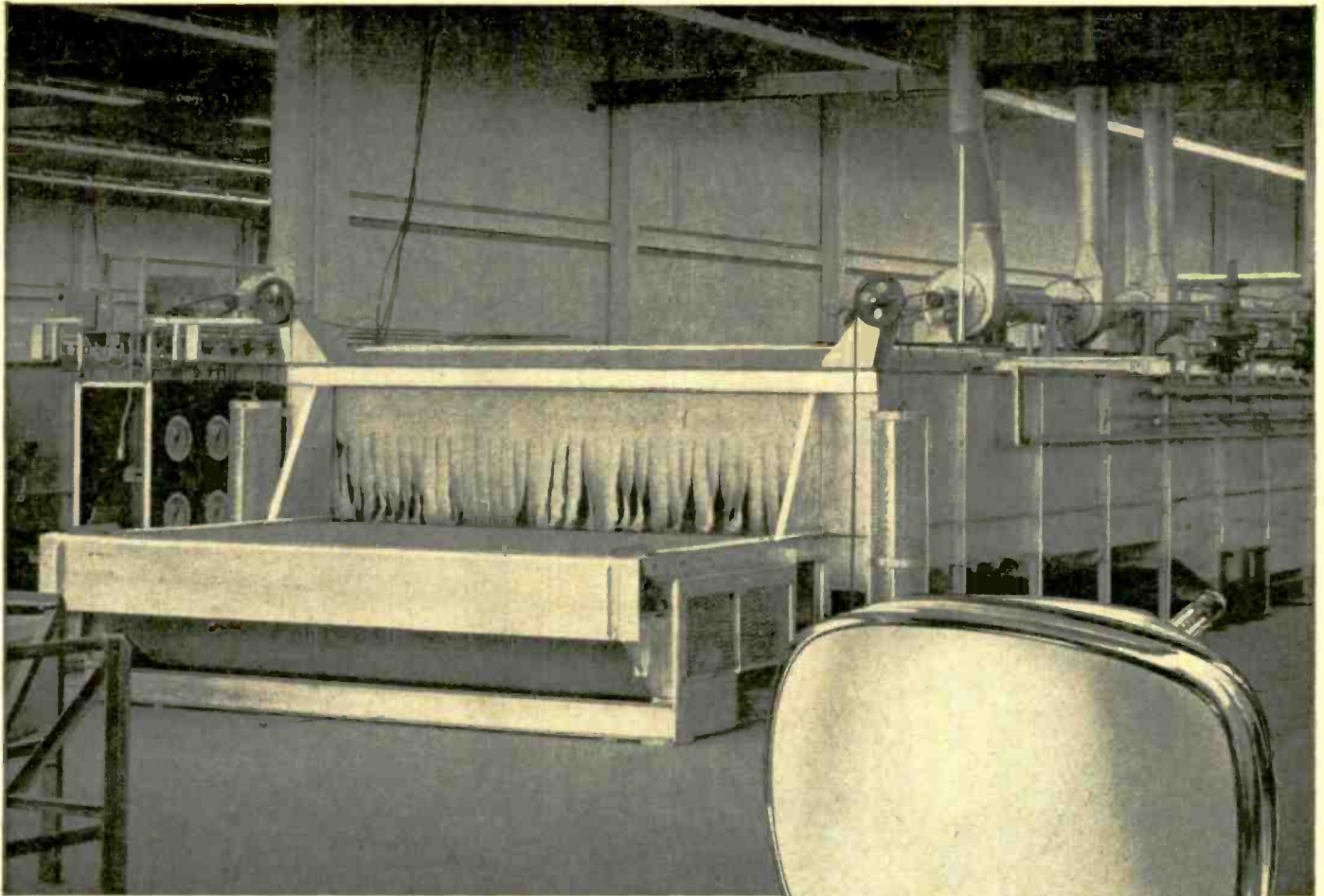
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## Have you ever seen the SYLVANIA "Bakery"?

"Bakery"? An "Oven"? Yes, but not for bread. For Silver Screen 85 Picture Tubes! Giant ovens (Lehrs)—each about one-third the length of a football field—"bake in" the big differences that make Sylvania Silver Screen 85 the finest replacement TV picture tube... *second to none!*

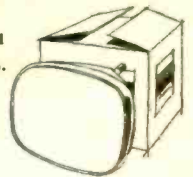
The giant ovens heat-treat the glass and bake the phosphor screen and other internal coatings. Important, too—this process removes residual volatile materials such as lacquer and water used in applying the phosphor screen.

This treatment must be done slowly, under careful controls and is very essential to the proper processing of the bulb. This process also assures "stronger" glass,

free of undesired strains. It extends picture tube life by ridding the bulb of contaminants that could later cause inter-element leakage, gassing and loss of emission. The manufacturer who employs expensive equipment such as this can assure you of a consistently top-quality product.

So, when you recommend a replacement picture tube, recommend the finest... a Sylvania Silver Screen 85. It gives your customers what they want: better pictures for a longer time. Gives you what you need: profitable TV service calls.

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

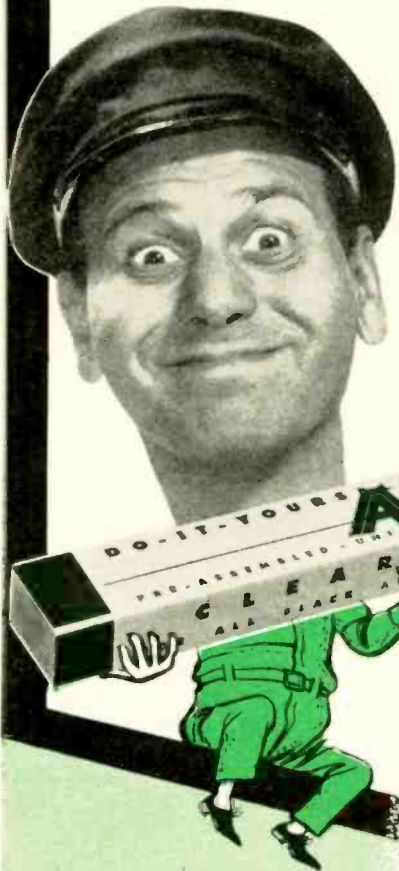


# SYLVANIA

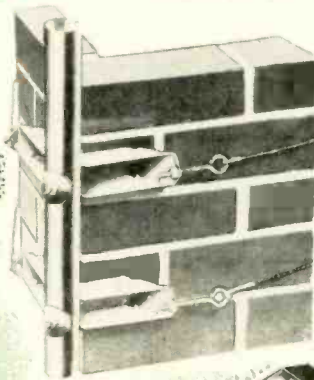
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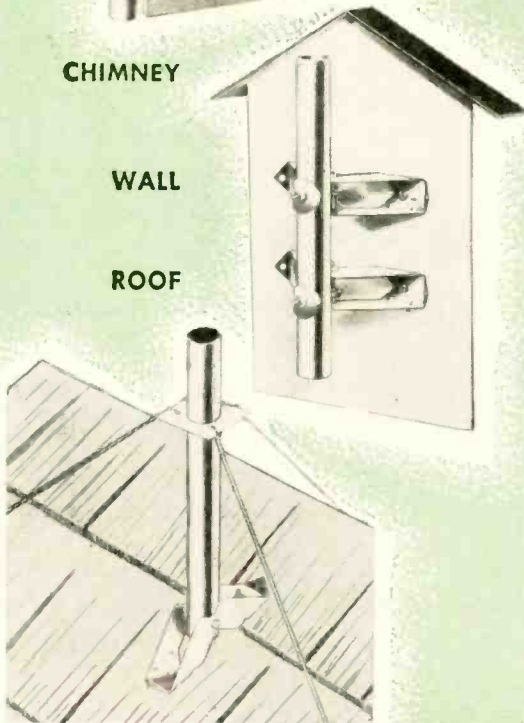
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nately, treble losses also go up with an increase in bias.

When adjusting bias on the basis of signal output or distortion, it is desirable to use the same brand and kind of tape that the owner ordinarily uses, because optimum bias tends to vary somewhat among tapes.

An ideal bias waveform is a perfect sine wave. Harmonics in the waveform will produce noise in recording. Therefore, it is desirable to check the bias waveform, by means of an oscilloscope connected across the record head, to visually check any obvious distortion. Harmonic distortion in excess of 5% will usually be apparent to the eye. If gross distortion is apparent, the oscillator circuit should be inspected for faulty components.

Some tape machines include a control for balancing the oscillator tube, thereby reducing bias distortion to a minimum, as illustrated in Fig. 5.

A substantial departure of the bias frequency from the frequency recommended by the manufacturer tends to have the following adverse effects: (1) Too low a frequency will cause beat notes between the bias frequency and upper harmonics of the audio frequencies. (2) Too high a

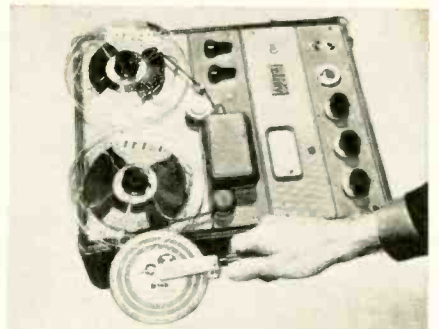


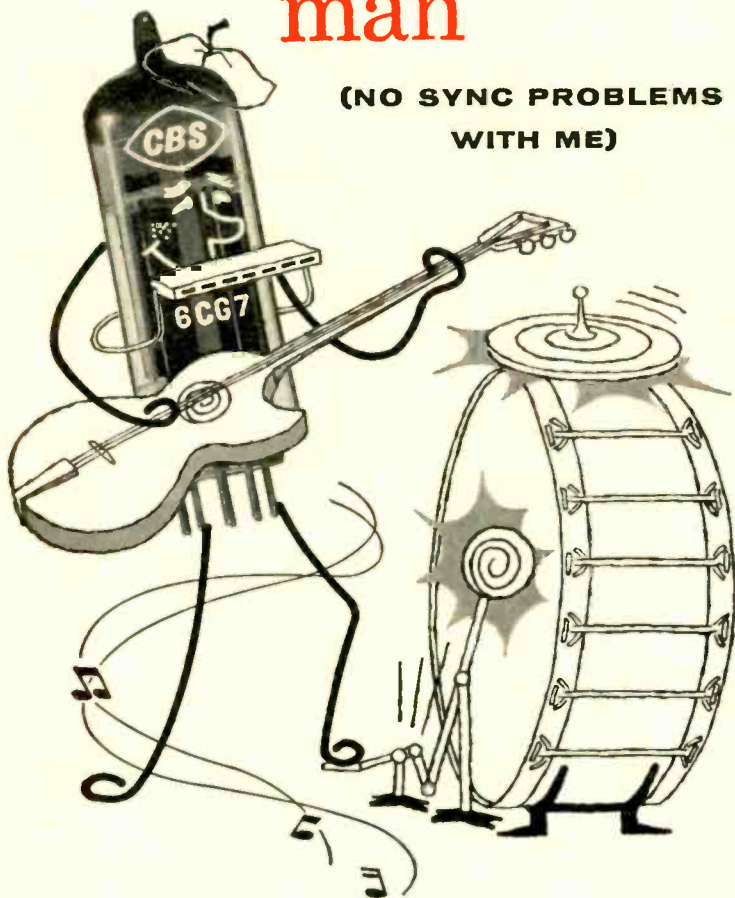
Fig. 7—Strobe wheel by "Irish" is held against moving tape spindle to check speed.

frequency reduces the effectiveness of the erase head, which is powered by the bias oscillator. (3) A change in bias frequency tends to change the amount of bias current reaching the record head, with consequent changes in distortion and treble response.

A sufficiently accurate check of the bias frequency can be made with an audio oscillator and an oscilloscope, as shown in Fig. 6. Connect the scope to the record head to produce a display of four cycles of the bias fre-

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The CBS 6CG7 is a premium-performance tube. Hum-free coil heaters assure long life. And combined with a ring getter and pinched cathodes, they virtually eliminate heater-cathode leakage . . . notorious for causing loss of horizontal sync. Twin top micas and semi-automated precision assembly minimize microphonism. Truly the CBS 6CG7 . . . best in the industry . . . has advanced-engineered features found only in premium-performance tubes.



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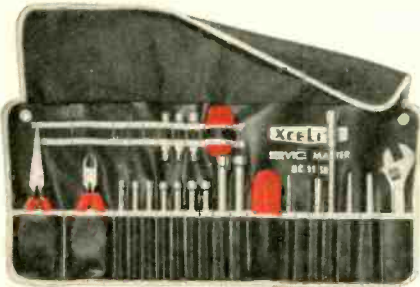
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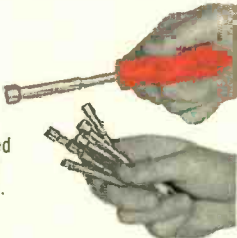
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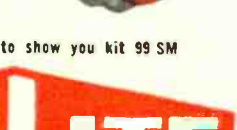
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quency. Connect the scope to the oscillator and adjust the latter's frequency to produce one cycle. The bias frequency is generally around four times the frequency indicated on the dial of the oscillator. If the audio oscillator happens to go as high as 100,000 cps, the scope may be adjusted to display one cycle when connected to either the record head or the oscillator.

Distortion in tape recording is ordinarily measured on the basis of harmonic rather than IM distortion. A signal of 400 cps or lower is fed into the recorder, and the output is measured for distortion content. A relatively low frequency in the vicinity of 400 cps is desirable because peak audio energy of most sound sources occur in this neighborhood.

## Tape Speed

Although considerable concern has been exhibited concerning speed accuracy in record players, as evidenced by the incorporation of strobes and speed adjusting devices, tape manufacturers have ignored this check/adjust facility. Speed accuracy is certainly as important with tape recorders as record players.

Accessory measuring devices, however, are available. Figs. 7, 8, and 9, illustrate three devices used to measure tape speed. Fig. 7 consists of a strobe wheel that is pressed against the moving tape, turning at the same speed as the tape. The wheel has markings along its circumference and, as with other speed measuring devices, is viewed under a 60-cycle fluorescent or neon lamp source.

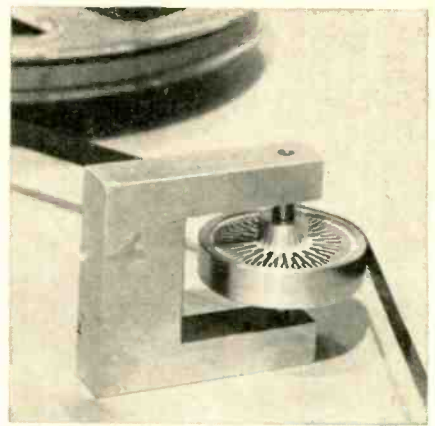


Fig. 8—Scott Instrument Lab's "Tapeprobe" checks accuracy of tape recorder speed. Strobe bars are viewed under fluorescent.

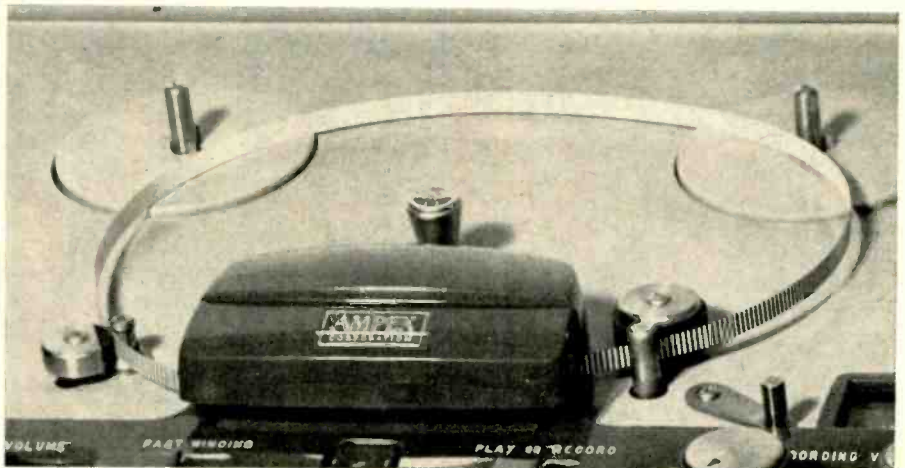
Fig. 8 shows a device that is attached to the tape deck. The tape presses against the wheel, causing it to revolve at the tape speed.

A recently introduced tape speed measuring device, shown in Fig. 9, is both simple and effective. It is an endless loop of tape with strobe markings that simply drops into the head slot, substituting for recording tape. The tape moves, as does ordinary recording tape, and the strobe markings are viewed to determine speed error.

When the tape speed is correct, the markings, in the form of bars, appear to stand still. If speed is fast, the bars appear to move in the same direction as the tape; if slow, the bars appear to move in the opposite direction.

The speed error can be computed by counting bars that move past a given point within a minute. Apparatus  
(Continued on page 68)

Fig. 9—Endless loop of Techni-Part's strobe tape substitutes for recording tape during speed test. Strobe devices also indicate wow and flutter by start-stop motion of the strobe bars.







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Smeared Picture



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## Scopes

(Continued from page 35)

ing a  $G_m$  of 10,000 micromhos, for example, requires several stages.

Vertical-amplifier stages work in cascade. Gain is not additive. The gain of the amplifier is equal to the product of the stage gains. For example, if a stage having a gain of 35 is followed by a similar stage, the gain of the two stages is 1,225.

Since gain is multiplicative, it increases the sharpness of cut-off. To illustrate this fact, consider three stages, with individual gains of 35. The three stages in cascade give a total gain of 42,875 times. But, the portion of the frequency response beyond the point of flat response now drops off three times as fast. The three stages have a much sharper cut-off than the individual stages. The bandwidth of the flat portion is the same, but the three-stage amplifier now rings and overshoots

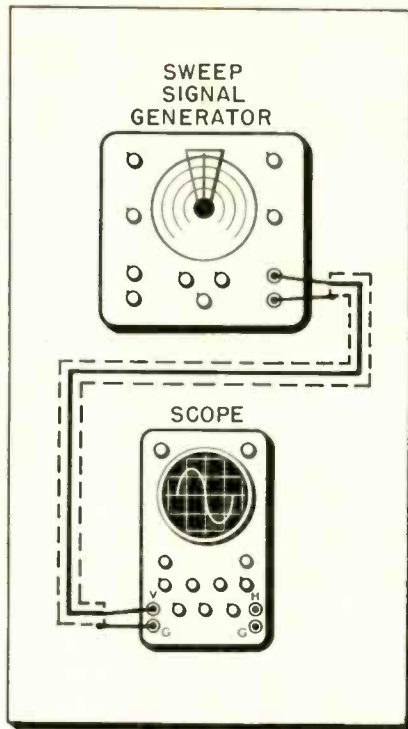


Fig. 8—Set-up with sweep signal generator for checking a scope's band width and frequency response characteristics.

more readily for harmonics falling beyond the flat portion.

It is apparent that sharpness of high-frequency cut-off can be disregarded in service applications, provided ample bandwidth is provided. For example, if a scope has flat frequency response to at least 4 mc, we need not be concerned with the cut-off characteristics because a TV receiver is limited to 4-mc bandpass video circuits. Hence, waveforms obtained from the receiver circuits have no harmonics higher than 4 mc. All the harmonics fall within the flat portion of the scope's response. The scope does not overshoot or ring, no matter how steep the high-frequency cut-off may be.

However, if a scope has a flat frequency response to 3 mc, and a drooping high-frequency response beyond this point, we can expect that waveforms from 4-mc receiver circuits may tend to ring and overshoot. The sharper the drop-off, the greater is the tendency to produce transient distortion in such case. •

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ALLIED RADIO announces the Knight 12" KN-600HC 2-way speaker @\$59.95. Response is 25-18,000 cps; power 50 watts of program material.

ATLAS SOUND breaks ground for new adjoining factory annex.

BELL SOUND introduces two PA amplifiers. Models 5660 & PM-75 are rated at 75 watts, less than 5% distortion. 5660 response is 20-15,000 cps ±1.5 db.

CBS develops 1-7/8 ips 3-track tape cartridge measuring 3.5 in. sq. in cooperation with MINNESOTA MINING. Equipment will be produced by ZENITH. Tape is 1/7" wide. Response to 15 kc is claimed. Change mechanism will allow 5 cartridges to be stacked for 5 hours of consecutive play.

ELECTRO-VOICE introduces a new Wolverine series speaker, the 15" Model LS 15. Ratings are 35-13,000 cps, EIA sensitivity 46 db, program power 20 watts, resonance 35-45 cps, mechanical crossover 4500 cps.

FAIRCHILD will be repped in the mid-Atlantic area by Wilfred Graham, and in E. Penna. by Dahl H. Mack.

HARMAN-KARDON announces a new Stereo Recital receiver @\$199.95; metal enclosure is \$11.95, wood \$29.95. This model TA224 has the firm's FM tuner cartridge. Power is 12 watts/channel.

HARTLEY PRODUCTS has filed suit in Bronx County (N.Y.) Supreme Court against Consumers Union. The two basic claims made that CU's tests do not reflect actual conditions of speaker use, and that CU's statements about a 1957 model tested were false and defamatory.

PACO adds a 2-way semi-kit speaker to its hi-fi line. The cabinet is factory built. This Model L-2 comes with 10" Jensen woofer & tweeter @\$59.95 unfinished, \$69.95 walnut finished. Response is 45-14,000 cps.

PICKERING receives patent 2,917,590 on its Fluxvalve stereo cartridge.

PILOT RADIO names Stickel-McAllister, Los Angeles, as S. Calif.-Ariz. rep.

RCA publishes a new amplifier "Select-a-Guide" covering 21 units ranging from 1 watt broadcast to 75 watt pa types. Copies of this Form 3R 3833 are available from Audio Products Dept., RCA, Bldg. 15-1, Camden 2, N. J.

REEVES SOUNDCRAFT introduces a new magnetic tape designed for 4-track stereo. Known as FA-4, it has a "Frequency Adjusted" oxide formulation. All Soundcraft tapes will contain FA-4 at no extra cost.

ROBINS INDUSTRIES publishes a 16-page tape recording head guide containing specs and cross-reference replacement data on over 25 recorder brands. Book price is 50¢, but is available free with certain purchases.

RCA Electron Tube Div. announces that its Vibrant series of magnetic tape will be available in 5" and 7" reels, 600', 900', 1200', and 1800'.

SWITCHCRAFT introduces speaker accessories: 666 volume control @\$6.50 list; 667 selector @\$4.25; 668 stereo selector @\$6.25; 669 control @\$6.50.

STROMBERG-CARLSON reorganizes hi-fi sales operations with four regional managers under sales manager Leon Knize; N.E., Roy Raymond; S.E., L. J. Ulrich, Jr.; Midwest, Eugene Feeney; West Coast, Donald Carroll.

SHERWOOD appoints D. J. Bacher Co., San Francisco, as N. Calif. rep.

TELECTROSONIC introduces a "building block" line of 5 tape decks from \$89.95 to \$139. A 6-model preamp line ranges from \$29 to \$124.95.

TURNER announces the 304X crystal mike @\$16.50 list, featuring -50 db output, 60-10,000 cps response. Ceramic version is 304C. Also, 202D dynamic mike @\$41 offers -53 db output, 60-10,000 cps response.

UNIVERSITY LOUDSPEAKERS Pres. Haskel A. Blair has appointed Charles Ray to the position of General Sales and Merchandising Manager.

UTAH RADIO announces a lifetime guarantee on replacement speakers, providing free replacement during the owner's life. There is no service charge; the only cost is return postage from the plant.

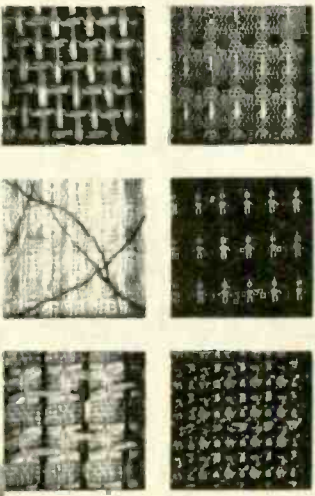
FCC appears prepared to propose rules for FM stereo broadcasting. It will be recalled that EIA's National Stereophonic Radio Committee was terminated when FCC failed to give it the official status which would prevent future antitrust actions. Nevertheless, an EIA stereo report is expected to be the foundation of the FCC proposal.

1960 NEW YORK HIGH FIDELITY MUSIC SHOW will be held in the Trade Show Building, Sept. 6-11. The 6th will be Dealer Day all day. Walter O. Stanton, Pickering president, has been elected vice president of IHFM.

CONSUMER REPORTS, March, finds one-piece "stereo" phonographs show no "stereo" effect when the two speakers are mounted in the same cabinet.

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(Continued from page 62)

ent motion of 72 bars per minute denotes an error of 1%. Other errors are proportional; for example, 36 bars per minute indicates an error of 5%. Professional tape recorders usually have speed errors of not more than 2%; semiprofessional machines, not over 5%. Good to excellent home machines, generally have speed errors near 1%, while fair to good home machines do not exceed 2%.

### Wow and Flutter

While audio oscillators, oscilloscopes, and VTVM's are in the class of everyday equipment, wow and flutter bridges are in the luxury instrument class. Fortunately, the ear can serve as a good instrument for detecting wow and flutter. The ear is highly sensitive to speed aberrations in the vicinity of 3,000 cps. Therefore, a simple and effective test consists of recording and playing back a tone of about 3,000 cps. Wow will be apparent as a quavering effect or a "sou" quality. Flutter will manifest itself as graininess or coarseness of the tone.

To check "playback-only" tape machines, test tapes are available that incorporate a frequency in the range of 2,000 to 5,000 cps.

Tape speed devices can also check wow and flutter. If the strobe bars move and then stop, or move in the opposite direction, inconsistent speed is indicated.

Erase head effectiveness can be checked by recording program material (from a record or a broadcast) a maximum permissible recording level; erasing, and then playing the tape back without signal input. An effective head will erase the signal to the extent that it cannot be heard at a high playback level.

However, if the tape has been recorded at excessively high level, sufficient to produce a large amount of distortion, even a very good erase head may not erase adequately. It is then necessary either to repeat the erase procedure or to use a bulk eraser.

If the erase head does not function properly at normal recording level, this may be due to one or more of the following factors:

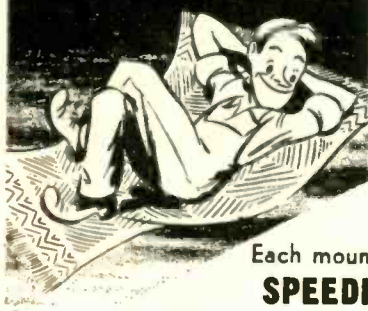
1. Insufficient erase current. Current through the erase head can be meas-

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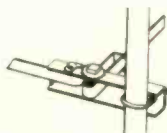
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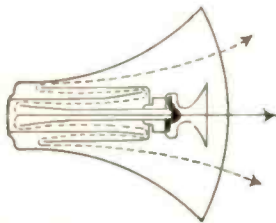
# The Sounding Board



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The Compound Diffraction Horn was created initially by Electro-Voice to handle the extremely difficult sound

dispersion problems encountered by the U. S. Navy on flight decks of aircraft carriers. Maximum dispersion was achieved by designing a compact horn which would provide optimum diffraction of sound waves — and replace the inefficient, bulky horns formerly used for this application.

Lower frequencies disperse easily. High frequencies, because their wave lengths are usually smaller than the radiator dimensions, are directional. In the Compound Diffraction Projector, Electro-Voice has narrowed the horizontal dimension to less than the wave length of the most important frequencies to be reproduced and extended the vertical dimension to preserve the area necessary for loading efficiency. This results in wide lateral dispersion and reduction of unneeded vertical dispersion.

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There are E-V Compound Diffraction Projectors designed specifically for hard-to-handle public address situations whatever they might be. Greater audio range makes them the ideal PA speakers for music as well as speech (as much as 2½ octaves wider response). Because each speaker is capable of delivering uniform spread at all frequencies, intensity and intelligibility are assured without the expense of adding speakers.

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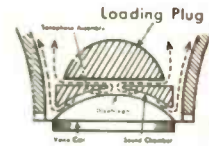
## PASSES THE TOUGHEST TEST OF ALL

An interesting story lies behind the recent performance testing of the first RME 6900 Communications Receiver. After final inspection of the first unit, one of the RME executives (W9IOP), decided to use this new receiver in the 1960 Radio Amateur Sweepstakes. This contest, sponsored each year by the Amateur Radio Relay League, de-

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termines which amateur operator can establish the most radio contacts in a given 40 hour period.

The receiver was delivered to W9IOP only three hours before the contest began. In spite of his lack of familiarity with the receiver, W9IOP not only won the contest, but logged a record-breaking 1,369 contacts to establish a new national Sweepstakes record.



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## CLARITY WITHOUT DISTORTION

Electro-Voice Tweeters are noted for clarity and low distortion. But obtaining that clarity was a critical problem until E-V's development of the Avedon Sonophase Throat Design.

VHF tweeters handle the widest range of response — from 3500 to 20,000 cps. E-V tweeters function as a true piston in the lower range, but at the critical point (about 12 kc) sound must be taken from the center of the diaphragm and from the periphery at the same time. Without some way to prevent it, sound cancellation occurs because of diaphragm deformation at and above this critical frequency. This deformation causes phase shift to occur between the center and periphery of the diaphragm. Increasingly higher frequencies cause the phase shift to be more pronounced because of an ever increasing deformation of the diaphragm. The Avedon Sonophase Throat Design accomplishes the vital restoration of phase relationship and level by incorporating a compression driver with unique loading plugs which properly phase upper frequencies while leaving lower frequencies unaffected. The loading plugs force the sound to travel a circuitous path, producing in-phase sound regardless of the frequency of the signal.

Coupled to the Avedon Sonophase Throat Design is the Hoodwin Diffraction Horn, designed to insure sound dispersion throughout the listening area. This is especially important in stereo application to prevent the "beamed" or directional nature of most high frequencies.

Want more information on any of the items mentioned in the Sounding Board? Simply check the appropriate boxes below and mail the coupon to Dept. 50T, Electro-Voice, Inc., Buchanan, Michigan.

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- RME 6900
- Horn-loaded Tweeters
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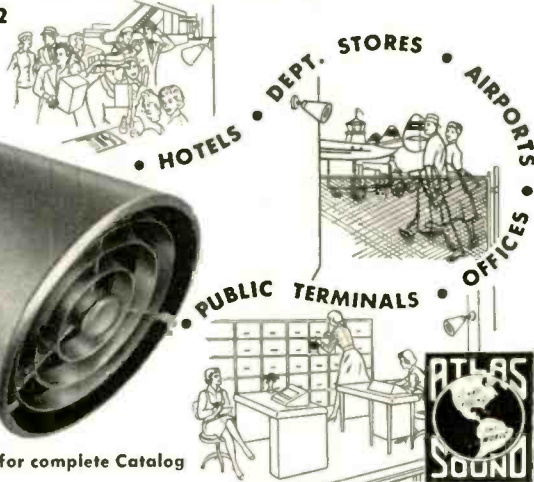
The New Atlas DU-12 Perfect for the Most Discriminating Applications. For the first time here's a loudspeaker that doesn't look like one. Modeled along the sleek, straight lines of a modern lighting fixture, and finished in brushed satin aluminum, the Atlas DU-12 is styled to harmonize and enhance the most ultra of modern décors.

Acoustically, the Atlas DU-12 offers high intelligibility, efficiency and directivity — features that mark it as a fine quality loudspeaker. The frequency response of the DU-12 is "tailored" to reproduce speech with clean, crisp articulation. Its horn type construction and universal mounting bracket provide complete directional control, confining the sound coverage to the required service areas. And, there's no wiring exposed to mar its appearance because all connections and line matching transformer are completely hidden behind the mounting canopy. Canopy is equipped with adapter strap for mounting on any flat surface or for use on standard electrical outlet box. In commercial installations where both décor and true acoustical quality are important, the Atlas DU-12 is the only answer. Investigate the profit opportunities for yourself. Write for information on the complete line of Atlas P.A. speakers, mike stands and accessories.



Décor-Projector DU-12

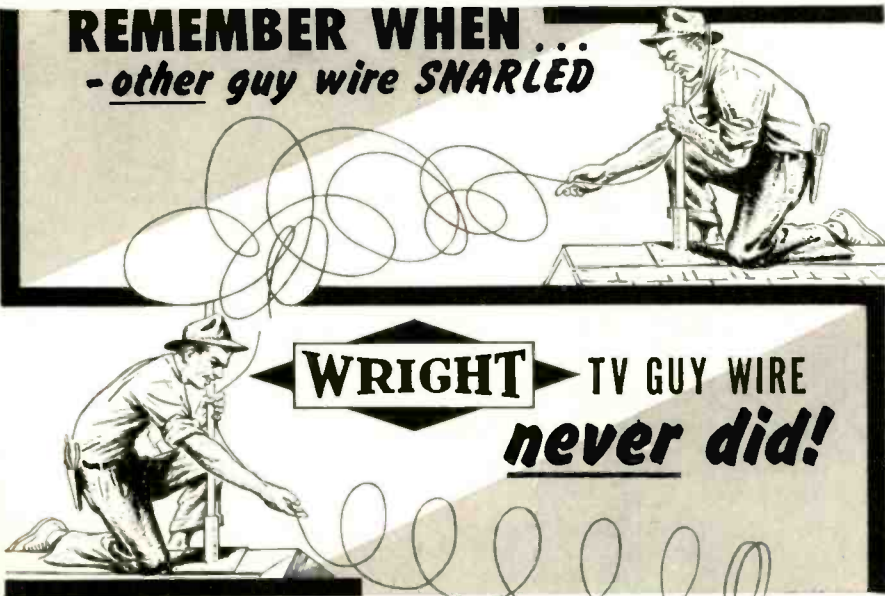
List \$35.00  
Net \$21.00



Write for complete Catalog

**ATLAS** Sound Corp. Dept. ET-5, 1449 39th Street, Brooklyn 18, N. Y.  
In Canada: Atlas Radio Corp., Ltd., Toronto, Ont.  
For more data, circle 5-70-1 on coupon, p. 43

**REMEMBER WHEN ...**  
**- other guy wire SNARLED**



**WRIGHT** TV GUY WIRE  
**never did!**

**WRIGHT TV GUY WIRE ...**

- Comes in 50' connected coils
- Has bright, long-lasting galvanized finish

Four strand No. 20 • Six strand No. 20 • Six strand No. 18 • No. 3 — Cushion center  
Seven strand — No. 18 Aluminum • All in 50' connected coils

Also on metal  
and wooden reels

Wholesalers —  
Stocks nearby

**G. F. WRIGHT**

STEEL & WIRE COMPANY

WORCESTER, MASS.

For more data, circle 5-70-2 on coupon, p. 43

ured by the same technique used to measure bias current through the record head (Fig. 4). In many home machines the erase heads typically employ between 10 and 15 ma. of high frequency current. Some, however, require a good deal more current.

2. Improper vertical positioning of the erase head, so that it does not fully span the recorded area. If the remaining signal has full frequency content, vertical positioning is indicated as the cause.

3. Improper azimuth alignment of the erase head. A slight azimuth error, however, usually has little effect.

4. Erase current frequency. Too high a frequency renders the head ineffective.

5. A defective head, possibly due to shorted turns.

## S/N Ratio

The signal-to-noise ratio of a tape recorder system is the ratio between its amplifier's maximum output, without distortion, and the noise inherent in the system itself.

Some tape recorder manufacturers state this ratio allowing an output with 3% harmonic distortion. Some use 5%, which corresponds to a recording level about 6 db higher. The latter manufacturer can quote a signal to noise ratio about 6 db higher than those allowing 3% distortion. Some tape recorder signal-to-noise ratio's are rated on the basis of 1% harmonic distortion; about 6 db below those rated on the basis of 3% harmonic distortion.

The technique of measuring signal-to-noise ratio is as follows. Record a frequency between 250 and 1,000 cps (usually 400 cycles) at maximum permissible level as indicated by the record level indicator. Measure the playback signal with a VTVM. Erase and rewind the tape and repeat the measurement. The measured output is now due to noise and hum of the record and playback amplifiers, tape hiss, imperfect erasure by the erase head, and noise resulting from distortion in the bias waveform. The ratio of the first playback signal (with audio signal input) to the second playback signal (without audio signal input) is the signal to noise ratio.

Based on 3% harmonic distortion, a high quality machine may yield a signal-to-noise ratio of 55 db or greater for a half-track recording at 7.5 ips. Quarter-track heads give a signal about 3 db less than half-track heads, with corresponding lower s/n ratio. •

For more data, circle 5-71-1 on coupon, p. 43 →

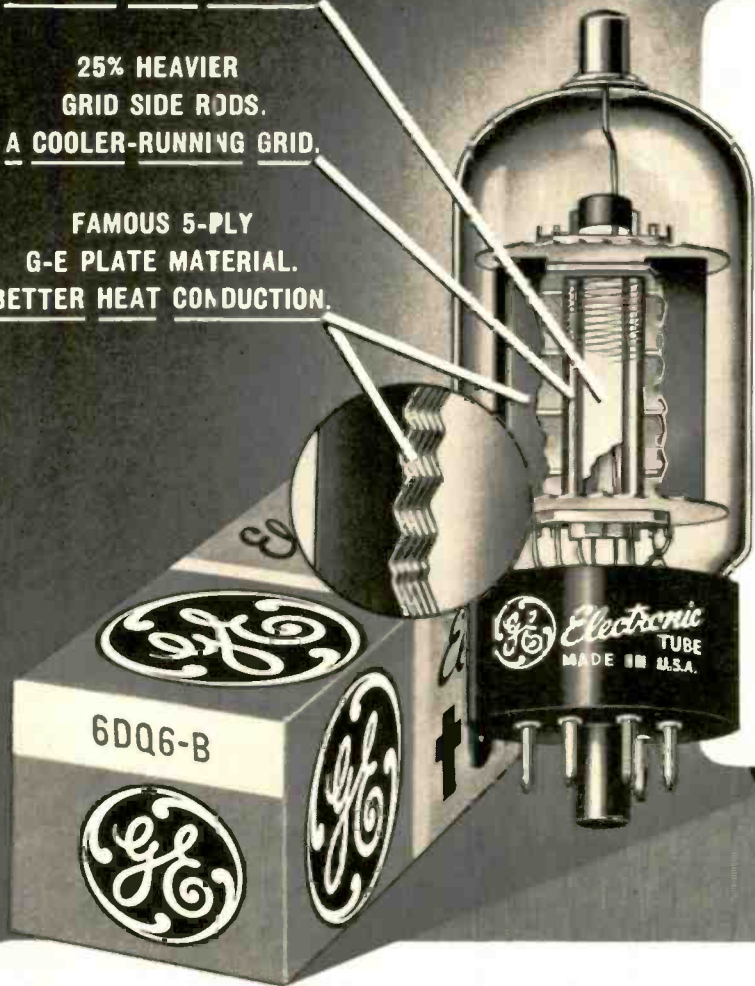
ELECTRONIC TECHNICIAN • May, 1960



**20% LARGER CATHODE.  
HANDLES MORE CURRENT.**

**25% HEAVIER  
GRID SIDE RODS.  
A COOLER-RUNNING GRID.**

**FAMOUS 5-PLY  
G-E PLATE MATERIAL.  
BETTER HEAT CONDUCTION.**



**HIGHER ELECTRICAL RATINGS.  
MORE TUBE IN EVERY RESPECT!**

- ✦ 17% higher max plate dissipation than the 6DQ6-A—17.5 w vs. 15 w.
- ✦ 17% higher max screen dissipation—3.5 w vs. 3 w.
- ✦ 25% higher avg DC cathode current—175 ma vs. 140 ma.
- ✦ 25% higher peak cathode current—550 ma vs. 440 ma.
- ✦ 15% higher zero-bias plate current (typ. operation)—345 ma vs. 300 ma.

## Your Big **NEW** Business-BUILDER: G-E 6DQ6-B!

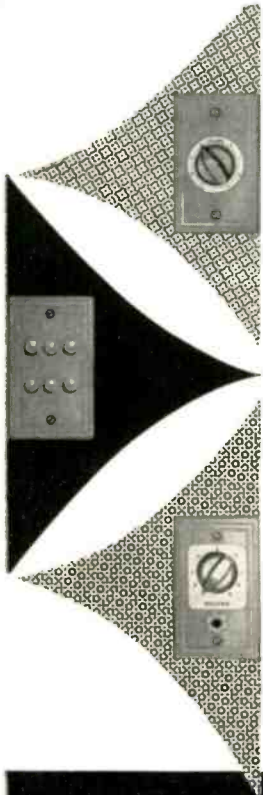
Hand-tailored for servicing the new 23" television sets...  
gives you better-than-ever performance in older TV's!

The Service-Designed 6DQ6-B is General Electric's brand-new horizontal-sweep tube with big performance *designed in*. Example: the 15% higher zero-bias plate-current characteristic gives ample sweep in the new 23" TV sets with their high sweep angles. It also means extra sweep capability in other television sets, for extra safety factor, fewer complaints and service callbacks.

Type 6DQ6-B is more dependable in every way...huskier, runs cooler. Check the construction features above! Same improvements apply to new G-E companion types 12DQ6-B and 17DQ6-B. Fully interchangeable with prototypes. See your G-E tube distributor! *Distributor Sales, Electronic Components Division, General Electric Company, Owensboro, Kentucky.*

*Progress is Our Most Important Product*

**GENERAL**  **ELECTRIC**



# NEW! NOW!

## MOSLEY Hi-Fi Accessories

Cash in on Hi-Fi and Stereo accessory sales with Mosley audio accessories. Long identified as the producer of premium quality television antenna accessories, Mosley now offers a full line of speaker switches, attenuator plates and speaker wall outlets.

*A ready-made and profitable market for you through Mosley advertising in leading high fidelity and electronic enthusiast magazines.*

Ask your Mosley Distributor for full details or write

**Mosley Electronics, Inc.**

"The  
Deluxe  
Touch"

4610 N. Lindbergh Blvd. • Bridgeton, Missouri

For more data, circle 5-72-1 on coupon, p. 43

# OXFORD the Leader

## OXFORD SPEAKERS

- ... Preferred for  
Original Equipment
- ... Proven for  
Replacement

### GET IN THE MAJOR LEAGUES!

Oxford is the major supplier of speakers to original equipment manufacturers throughout the world. Our replacement speakers, too, meet the most exacting design requirements. We have a complete line for any application . . . from 2½" to 15". Order Oxford . . . you'll be glad you did!

*Our catalog is available upon request.*



## OXFORD Components,

A Division of Oxford Electric Corp.

556 West Monroe St., Chicago 6, Illinois

*Oxford Speakers are available from recognized electronic parts distributors.*

During MAY PARTS SHOW VISIT Display Room #557A

For more data, circle 5-72-2 on coupon, p. 43

## Jensen NEEDLE-CARTRIDGE

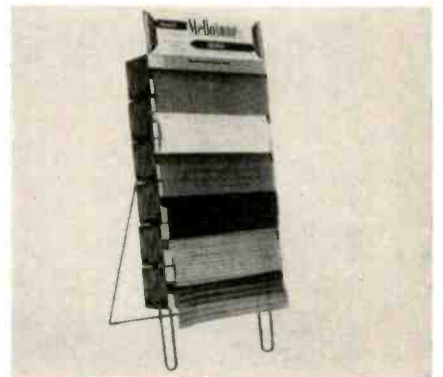
A line of "Dyna-Points" reported to give 20% higher output is being packaged with the regular needle stock and fits into other adapters. Features "Protect-a-Core" bumpers with heavy plastic fingers which partially enclose the



ceramic generating element to prevent injury if the tone arm is dropped on the record. Available in 1 mil sapphire tip for LP and 3 mil sapphire tip for 78 rpm. Also 1 mil diamond and 3 mil sapphire. Sapphire tips, \$3.95. Diamond and sapphire \$10.95. Jensen Industries, 7333 W. Harrison St., Forest Park, Ill. For more data, circle 5-72-3 on coupon, p. 43

## Mellotone GRILLE FABRICS

A service display of Hi-Fi grille cloth is designed to attract impulse sales when used as a floor or wall display in the shop. Each serviceman is provided with sample cards of those fabrics he has in stock. During service calls



the customer is handed a sample card and while the set is being checked the customer selects the fabric of his choice. In addition to its electronic uses, grille fabric is being used for decorative purposes in homes, offices, churches and theaters. Mellotone, Inc., 1220 Broadway, New York 1, N. Y.

For more data, circle 5-72-4 on coupon, p. 43

For More Information On  
NEW PRODUCTS  
Circle Code Numbers, p. 43

# ELECTRONIC TECHNICIANS...

*Add a quick source of extra profits  
with free training in servicing the*

# GUIDE-MATIC POWER HEADLIGHT CONTROL

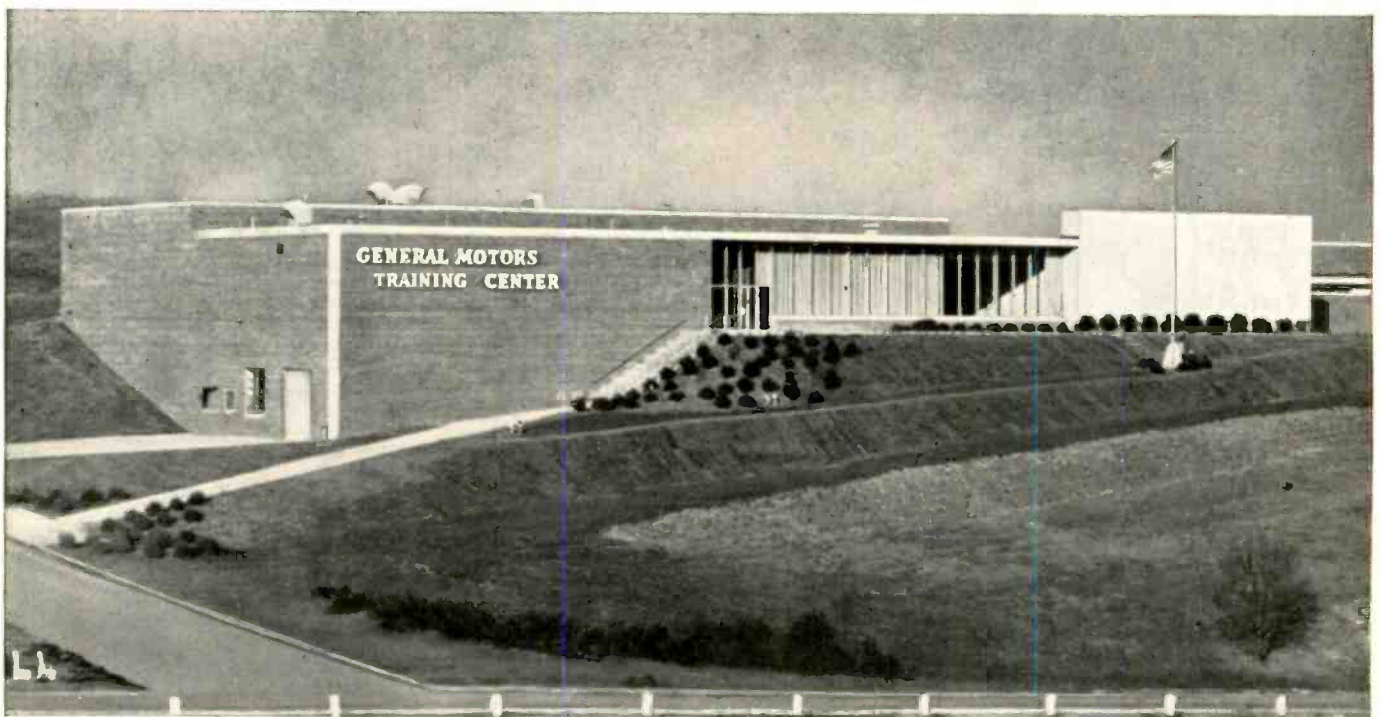
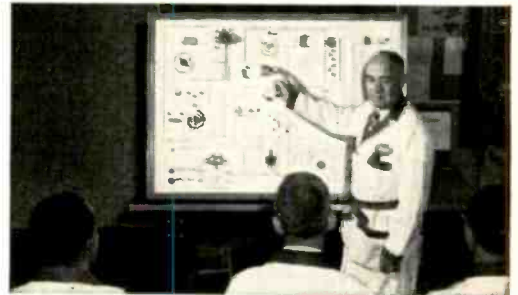
Simple when you know how it works, Guide-Matic could be your fastest growing source of new business for years to come. And it only takes one day of factory-style training to learn the skills of fast, accurate trouble-shooting and quick service to factory specifications.

The course itself won't cost you a cent... it's free to qualified electronic technicians. Your only outlay is for transportation and the usual living expenses. It's worth it to have a Guide Lamp diploma proving that you're fully equipped to give fast, efficient service to all the Guide-Matic and Autronic-Eye owners in your area. Twilight Sentinel automatic light switch training is also included. If you are in the electronics service business, come yourself, or send your technicians. There is one of 30 GM Training Centers near you.

**Do a reliable service job with an approved tester. It is required for fast testing and accurate on-the-car adjustment. For information on testers or training schedules, ask your UMS Distributor or write Guide Lamp Division, General Motors Corp., Anderson, Ind.**



Jumbo-size operational panel of Guide-Matic circuit puts all parts out front for better, more efficient instruction.



## GUIDE LAMP DIVISION

GENERAL MOTORS CORP.  
ANDERSON, INDIANA

For more data, circle 5-73-1 on coupon, p. 43

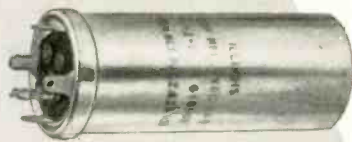
# DOUBLE PROFITS

with these two ILLINOIS "HOT" LINES



You really make extra profits with ILLINOIS UMP Twist Prong Capacitors which are especially designed for TV replacement. Each capacitor is fully guaranteed for one year . . . and is needed and in demand for replacement use NOW!

Time Tested Quality

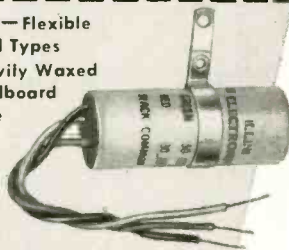


UMP

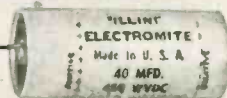
ELECTROMITE

Here are popular, fast moving capacitors which mean repeat business for you. They withstand extreme moisture and temperature conditions. Made of highest quality and unconditionally guaranteed for one year, these attractively-priced capacitors are packaged in eye-appealing boxes.

INTE—Flexible Lead Types  
Heavily Waxed Cardboard Case



IHCE—Tubular Types  
Aluminum Case



ILLINOIS "UMP" and "ELECTROMITE" Capacitors are available from leading electronic parts distributors.

**ILLINOIS**

**CONDENSER COMPANY**  
1616 NORTH THROOP STREET  
CHICAGO 22, ILL. EV 4-1300

Export Department: 15 Moore Street, New York 4, New York

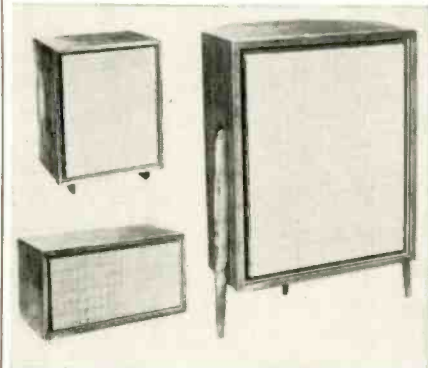
Write for our complete catalog.

During MAY PARTS SHOW VISIT Booth #214

For more data, circle 5-74-1 on coupon, p. 43

## E-V SPEAKER SYSTEMS

Three sound systems known as "Wolverine 100" series, have been introduced. Lancaster 100 contains an LS12 speaker installed in an enclosure 25" high, 20" wide and 14" deep. Linden

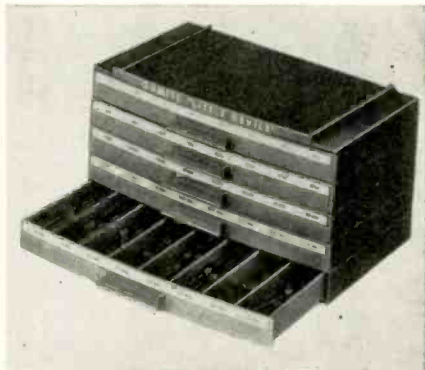


100 has an LS8 speaker in enclosure, 23½"×11"×10". Loraine 100 system has an LS12 speaker in a corner enclosure, 27"×20"×14". Available in walnut, mahogany or limed oak. Electro-Voice Inc., Buchanan, Mich.

For more data, circle 5-74-3 on coupon, p. 43

## Ohmite RESISTORS

Ohmite announces the addition of ¼-watt molded resistors available in the 37 values most frequently demanded by service and laboratory men. They are offered with a handy, 5-drawer, 40-compartment plastic cabinet for the price of the resistors alone. The ¼-watt Little Devil resistors are available in



five sizes (0.1-watt to 2-watts). .250" long by .090" diameter, these units feature Little Devil molded composition construction. Leads are integral with the resistor body which is completely surrounded with insulation. Units meet various stringent tests of MIL-R-11B. Ohmite Mfg. Co., 3694 Howard St., Skokie, Ill.

For more data, circle 5-74-4 on coupon, p. 43

## MORE! FOR THE



DIFFERENCE



FLUXVALVE. "V-GUARD" "T-GUARD" UNIPOISE PAC (TM)

Royal System Wall Cabinets designed by Paul Cadavius.

Here is more for the best of everything in quality record reproduction—the more that makes the difference! more output! . . . more channel separation! . . . more response . . . more record life! In short—more to enjoy because there's more quality for more listening pleasure. Without question, Pickering's Collectors' Series 380 is the finest—with more features and more flexibility than any other stereo pickup in the world.

For example, the 380 is fully encapsulated in radiation-proof precious mu-metal for absolutely hum-free performance in any record player regardless of type—make—model. The only true way to judge a high fidelity component is to compare it with another . . . measure its performance with the most vital instrument of all . . . the ear. For—those who can hear the difference choose PICKERING\*.

COLLECTORS' SERIES 380.

OUTPUT: 15 mv per channel. CHANNEL SEPARATION: 30-35 db. FREQUENCY RESPONSE: + 2 db 20-20,000 cycles. SIGNAL TO NOISE RATIO: -65 db below reference. TRACKING FORCE: "A" type stylus—2.5 grams; "C" type stylus—3-7 grams.

Model 380E Collectors' Ensemble includes the Stanton Stereo FLUXVALVE with 3 "V-GUARD" stylus for stereo, microgroove and 78 rpm records. . . . \$60.00

Model 380A includes Stanton Stereo FLUXVALVE with D3807A "V-GUARD" stylus for transcription arms. . . . \$34.50

Model 380C includes Stanton Stereo FLUXVALVE with D3807C "V-GUARD" stylus for auto-changer arms. . . . \$29.85

\*PICKERING—for more than a decade—the world's most experienced manufacturer of high fidelity pickups



Only the Stanton Stereo FLUXVALVE features the safe, comfortable, easily replaceable stylus assembly.

FOR THOSE WHO CAN HEAR THE DIFFERENCE



**Pickering**

PICKERING & CO., INC., PLAINVIEW, NEW YORK

For more data, circle 5-74-2 on coupon, p. 43

For More Information On

NEW PRODUCTS

Circle Code Numbers, p. 43

Now—more profit from a single sale  
 ...than 20 pairs of single-life "D" cells pay you!



To recharge, just unscrew cap...



and plug overnight into any  
 110-120-volt AC outlet.

## HEAVY-DUTY SONOTONE Rechargeable Flashlight Battery Cartridge

- A new, multi-use adaptation of the patented Sonotone sintered-plate, nickel-cadmium battery used in space missiles and jets.
- Gives at least 3 hours of strong, continuous light from a single charge with PR-6 bulb—or 1½ hours with full-powered PR-2 bulb.
- Dependable in extreme temperature and weather conditions.
- Can be recharged hundreds of times at about ¼¢ per charge.
- Sturdy, leakproof construction — aluminum jacket — electrically shockproof.
- Full-year guarantee under heavy industrial use — backed by Sonotone's leadership of over 30 years in precision engineering and service.

A completely new concept in long-life flashlight power! Replaces and outmodes any two "D" cells, for any purpose, in end-to-end use. Rechargeable overnight simply by plugging into any 110-120-volt AC outlet. Gives users a lifetime of service — gives you more profit than you make from selling 20 pairs of industrial "D" cells! Retail price, Model FC-3, \$9.95. (Also Standard Model FC-2 for home use—light lasts at least 1½ hours with PR-6 bulb — \$7.95 retail.) Order from your supplier now.

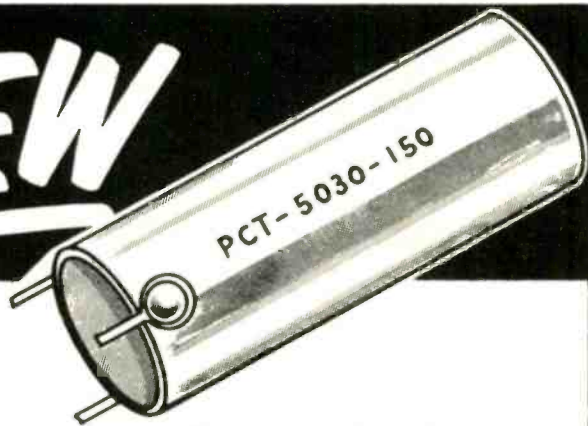
**Sonotone** CORP.

Battery Division, Dept. 89-50  
 ELMSFORD, NEW YORK

Leading makers of fine transistor hearing aids, ceramic phonograph cartridges, speakers, microphones, electronic tubes, sintered-plate, nickel-cadmium batteries.

For more data, circle 5-75-1 on coupon, p. 43

# NEW



Type "PCT" . . . constructed in strong red cardboard tubes, wax impregnated, one end closed, printed circuit board terminals.  
 Type "PCTL" . . . has insulated lead out top providing for low voltage section.  
 For 65°C operation . . . recommended for table and clock radios . . . individually packaged . . . guaranteed for one year.

EXPORT—ROBURN AGENCIES, NEW YORK CITY

Write today for complete information.

**PLANET SALES CORPORATION**  
 225 Belleville Avenue  
 Bloomfield, N. J.

For more data, circle 5-76-1 on coupon, p. 43

## ASSOCIATION NEWS



### Arkansas

TESA, Fort Smith, elected the following officers: Pres., R. D. Feemster; V.P., Bill Gravley; Sec'y., Don Humphrey; Treas., James Crouch.

### California

#### Medical Plan Expanded

TSDA, San Mateo County, announced a supplemental \$5,000 major medical benefit has been added to their four year old Hospital and Medical Plan. The San Francisco association members and their employees are now covered under both plans.

RTA, Santa Clara Valley, reports the most successful anniversary celebration in its four year history when more than 400 attended the official inauguration of Pres., Russel J. Hamm.

### Indiana

RTSEA, Kokomo, elected the following officers. Pres., Jack Waddell; V.P., Joe Martin; Sec'y., Charles Conwell; Treas., Dane Ulrich.

ESTA, Henry County, elected new officers: Pres., Bill Hayworth; V.P., Thornton Dixon; Sec'y., Brent Hay; Treas., Wayne Solomon.

### Kansas

#### State Convention

TESA, Salina, announces its state convention will be held June 18-19 in the Lamer Hotel, Salina, Kansas.

### Missouri

TESA, Springfield, elected the following officers to the state organization: Pres., Earl Steffes; Sec'y., Bill Frasure; Treas., Carl Adcock.

#### License Law Defended

TSE, Kansas City, in answer to a report that a group representing 50 servicemen had filed suit for an injunction to prevent enforcement of the Kansas City TV License Ordinance, said: "This is the latest step in action which has been anticipated by the City and by TSE and for which preparations have been under way for some time. TSE, represented

(Continued on page 78)

For 1960 It's . . .

# "COMPACT"

tools by  
**VACO**

for the  
 Electronic Service Trade

• "Compact" in Size: they fit the pocket

• "Compact" in Price: they fit your pocketbook too

Ask Your  
 Parts Jobber or  
 Your Jobber Salesman



HK-17 Hex Key Set  
 \$1.00 net



ND-141 Combination  
 Screw & Nut Driver  
 \$.79 net



DE-810 Double  
 Nut Driver  
 \$.79 net



SP-19 Probe  
 \$.96 net



AN-2 Tester  
 \$.79 net



A-86 Pencil  
 Type Driver  
 \$.60 net



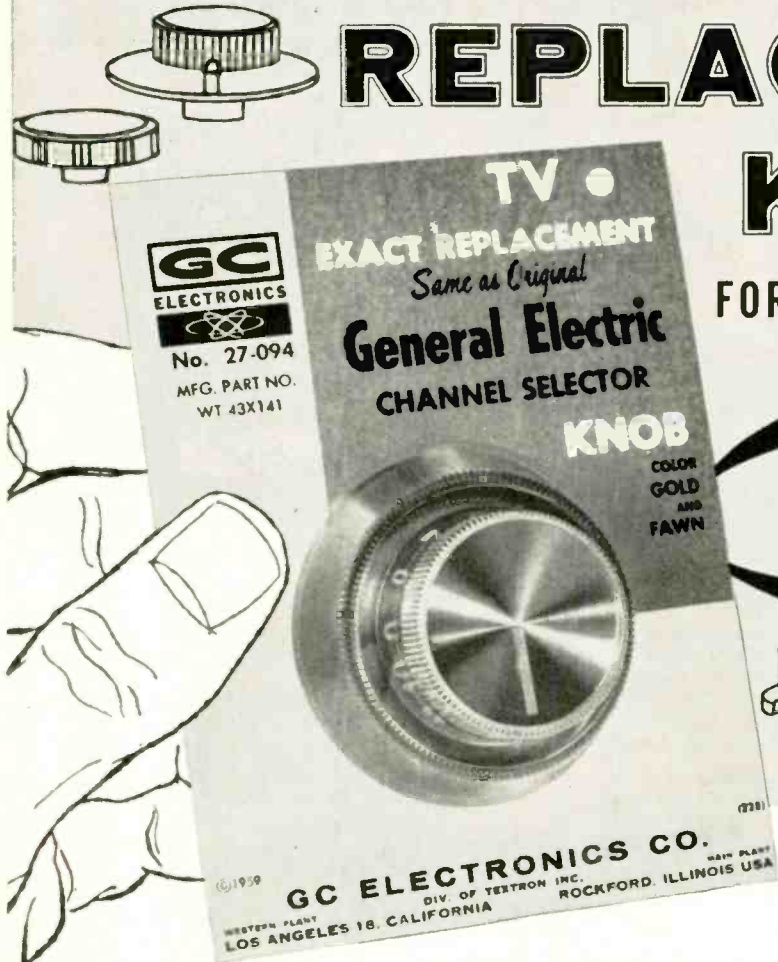
PK-8 Nut Driver  
 \$.48 net

**VACO PRODUCTS COMPANY**  
 317 East Ontario Street, Chicago 11, Illinois  
 In Canada: Atlas Radio Corp., Toronto 19, Ontario

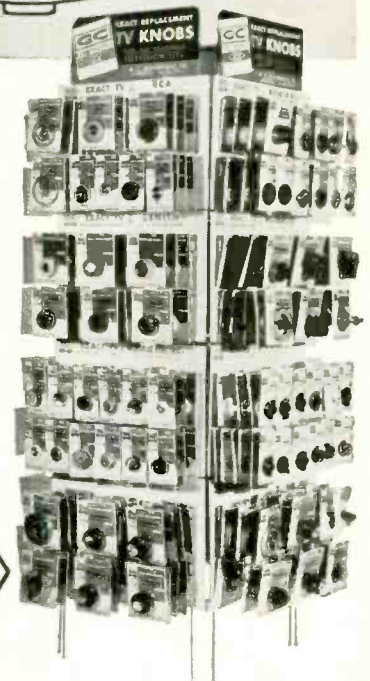
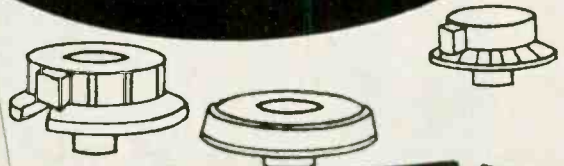
For more data, circle 5-76-2 on coupon, p. 43

# NOW...GET G-C EXACT TV REPLACEMENT KNOBS!

FOR ALL LEADING TV SETS



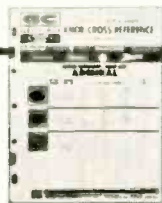
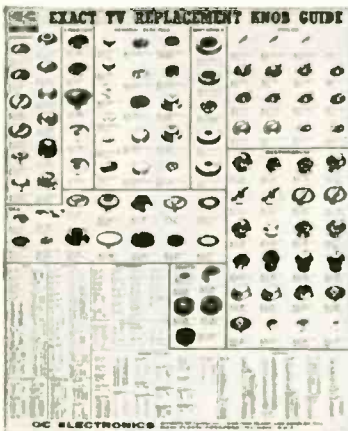
NEW... EACH G-C KNOB NOW IN PROTECTIVE SKIN-PAK ON INDIVIDUAL CARD



## NOW... 235 DIFFERENT KNOBS!

Now's your chance to pick up some extra money on TV set servicing. Choice of 235 different hard-to-get knobs lets you replace all broken or missing knobs. Modern skin-packaging, full identification and list price marking makes it easy and profitable, makes your trade happy too.

**LOOK FOR THIS DISPLAY AT YOUR FAVORITE JOBBER!**



WALL CHART, TOO!

**CROSS-REFERENCE GUIDE** tells you which knob goes with which set. Includes illustrations, set numbers, list prices, etc.

**WRITE TODAY** for complete details and literature, all free. Send postcard now.



# G-C ELECTRONICS CO.

Division of Tetrax Electronics, Inc.  
 West Plant: Los Angeles 18, California      Main Plant: ROCKFORD, ILLINOIS, U.S.A.

For more data, circle 5-77-1 on coupon, p. 43

# two twenty-seven from **4**



Slip this 4-Pak in your kit and you're ready to replace 227 of the most popular cartridges. Webster's new Service Center package consists of 4 plug-in cartridges with sapphire styli — exact replacement for 8 out of 10 most popular models — plus 11 mounting brackets. And, these are high performance cartridges that satisfy every time.

With the new Webster 4-Pak, cartridge servicing couldn't be easier — and you can carry your inventory in your hand! See your distributor.

## NEW WEBSTER **4** PAK

See us at the Electronic Parts Distributors Show—Room 551A, Conrad Hilton Hotel. For more data, circle 5-78-1 on coupon, p. 43

(Continued from page 76)

by legal counsel, will assist the City and the Commission in defense of the bill as a Friend of the Court, having made arrangements and preparations for this and subsequent developments."

### North Carolina

ESA, New Bern, has elected the following officers: Pres., Dr. Charles Barker; V. P. Fred Mills; Sec.-Treas., I. C. Wyatt.

### Ohio

ETAT, Toledo, reports that Carroll D. McMullin, a member of the association, has been elected national president of the National Appliance and Radio TV Dealers Association. He has served on NARDA's board of directors for over two years.

TESA, Springfield, calls attention to a sharp decline in jobber sales to the public as a result of their activities.

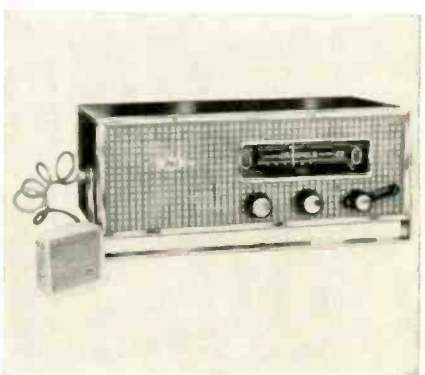
### Pennsylvania

FRTSAP, Harrisburg, is working on its State License Bill to be presented to the Pennsylvania Senate and Legislature in January 1961.

ESDA, Pittsburgh, states it has almost stopped the attempted invasion of one of Pittsburgh's largest distributors into the service field through billboard ads.

### Shell CITIZENS BAND

This two-way radio transmitter operates on any of the 22 Class D Citizens Band channels. Transmitter power is 5 watts. AM plate modulation has automatic limiting. Antenna impedance is 50 to 75 ohms. Super-regen receiver with



1  $\mu$ v usable signal sensitivity tunes continuously from 26.965 to 27.255 mc. Power requirements are 12 vdc @ 1.9 amps or 117 vac @ 37 watts. Shell Electronics Mfg. Co., 112 State St., Westbury, L.I., N.Y.

For more data, circle 5-78-3 on coupon, p. 43

Superior's New Model 77

## VACUUM TUBE VOLTMETER WITH NEW 6" FULL-VIEW METER

Compare it to any peak-to-peak V. T. V. M made by any other manufacturer at any price!



- Extra large meter scale enables us to print all calibrations in large easy-to-read type.
- Employs a 12AU7 as D. C. amplifier and two 9006's as peak-to-peak voltage rectifiers to assure maximum stability.
- Meter is virtually burn-out proof. The sensitive 400 micro-ampere meter is isolated from the measuring circuit by a balanced push-pull amplifier.
- Uses selected 1% zero temperature coefficient resistors as multipliers. This assures unchanging accurate readings on all ranges.

### SPECIFICATIONS

- DC VOLTS—0 to 3/15/75/150/300/750/1,500 volts at 11 megohms input resistance.
- AC VOLTS (RMS)—0 to 3/15/75/150/300/750/1,500 volts.
- AC VOLTS (Peak to Peak)—0 to 8/40/200/400/800/2,000 volts.
- ELECTRONIC OHMMETER—0 to 1,000 ohms/10,000 ohms/100,000 ohms/1 megohm/10 megohms/100 megohms/1,000 megohms.
- DECIBELS: —10 db to +18 db, +10 db to +38 db, +30 db to +58 db. All based on 0 db = .006 watts (6 mw) into a 500 ohm line (1.73v).
- ZERO CENTER METER—For discriminator alignment with full scale range of 0 to 1.5/7.5/37.5/75/150/375/750 volts at 11 megohms input resistance.

**AS AN ELECTRONIC OHM-METER:** Because of its wide range of measurement leaky capacitors show up glaringly. Because of its sensitivity and low loading, intermittents are easily found, isolated and repaired.

**AS A DC VOLTMETER:** The Model 77 is indispensable in Hi-Fi Amplifier servicing and a must for Black and White and color TV Receiver servicing where circuit loading cannot be tolerated.

**AS AN AC VOLTMETER:** Measures RMS values if sine wave, and peak-to-peak value if complex wave. Pedestal voltages that determine the "black" level in TV receivers are easily read.

Comes complete with operating instructions, probe, leads, and streamlined carrying case. Operates on 110-120 volt 60 cycle. Only \$4250 NET

## SHIPPED ON APPROVAL NO MONEY WITH ORDER — NO C. O. D.

Try it for 10 days before you buy. If completely satisfied send \$12.50 and pay balance at rate of \$6.00 per month for 5 months. —No Interest or Finance Charges Added. If not completely satisfied, return to us, no explanation necessary.

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Dept. D-759, 3849 Tenth Ave., New York 34, N. Y.  
Please rush one Model 77. I agree to pay \$12.50 within 10 days after receipt and \$6.00 per month thereafter. Otherwise I may return, cancelling all further obligation.

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CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_  
All prices net, F.O.B., N.Y.C.

For more data, circle 5-78-2 on coupon, p. 43





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

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560

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

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

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

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

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### C-D CAPACITOR KIT

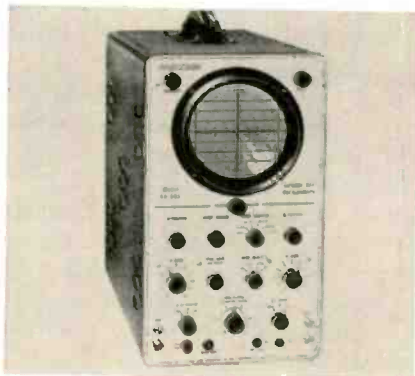
Kit consisting of 35 popular "PM" capacitors, in seven most-used values packed in a sturdy plastic box that can double as a spare parts or jewelry box is being featured in a contest for jobber salesmen and professional servicemen. Details of the contest with entry card



are also packed in the kits along with a free newspaper mat (carrying the baseball theme) for local dealer use. The capacitors with the plastic box are offered for the price of the capacitors alone—\$6.87. Cornell-Dubilier Electronic Corp., South Plainfield, N.J. For more data, circle 5-80-3 on coupon, p. 43

### Precision OSCILLOSCOPE

Model ES-525 oscilloscope is a general purpose instrument for industrial testing; laboratory applications; radio, TV and hi-fi servicing. Equipped with push-pull vertical amplifier, response: 3 db from 10 cps to 500 kc. 6 db to 700 kc. 20 mv per inch sensitivity. Input: 3.3 megohms and 40 µf. 3 position ver-



tical step attenuator-frequency compensated: x100, x10, x1. Push-pull horizontal amplifier, response: 3db from 10cps to 150 kc (at full gain). 60 mv per inch sensitivity. Input: 2.2 megohms and 30 µf. Complete with all tubes including the CRT, and a comprehensive technical manual. Price: \$179.95. Precision Apparatus Co., 70-31 84 St., Glendale, L.I., N.Y.

For more data, circle 5-80-4 on coupon, p. 43

by every test



is BEST!



## ATR AUTO RADIO VIBRATORS

Have Ceramic Stack Spacers

### A COMPLETE LINE OF VIBRATORS

Designed for Use in Standard Vibrator-Operated Auto Radio Receivers. Built with Precision Construction, featuring Ceramic Stack Spacers for longer lasting life. Backed by more than 28 years of experience in Vibrator Design, Development, and Manufacturing.



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Quality Products Since 1931

SAINT PAUL 1, MINNESOTA—U. S. A.

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ELECTRONIC TECHNICIAN • May, 1960

**Firefighting is for  
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Customers really burn when they have to call you back because of a premature failure. And while you're playing fireman, the profit on your next three service calls goes up in smoke. Tung-Sol tube quality is good insurance against callbacks. They're made to the highest specs of leading radio, tv and hi-fi set manufacturers. You'll find it good policy to keep that caddy full of Tung-Sol tubes. Tung-Sol Electric Inc., Newark 4, N. J.

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*Blue Chip Quality*

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For more data, circle 5-81-1 on coupon, p. 43

# TV TUNERS OVERHAULED

**ALL** MAKES AND MODELS **\$9.95** NET

90 DAYS WARRANTY  
UHF/VHF \$19.90

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ON POPULAR TYPES — 48 HOURS ALL OTHERS

Overhaul charge includes labor and minor parts; tubes and major parts are extra at net prices. Tuner to be overhauled should be shipped complete; include tubes, shield cover and any damaged parts. Quote model and state complaint. Pack well & insure.

WE WILL SHIP C.O.D. — F.O.B. CHICAGO OR TORONTO

*Castle TV Tuner Service*

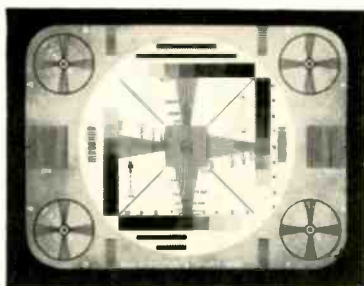
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136 MAIN ST.  
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CANADA

For more data, circle 5-82-1 on coupon, p. 43



## TV TIPS FROM TRIAD

NO. 7 IN A SERIES

**SENIOR PTM:** "The squawk on this one was that it would operate for several hours, then lose vertical. What puzzled me was that even when it was running it didn't quite fill vertically; and when I cranked up the height and vertical linearity—it started cramping on the bottom. Well, when the raster collapsed I subbed in the big 18:1 from the shelf and it restored the vertical, but the picture was just the same size as before. I could just see the customer's face if I told her that she would have to have a new vertical, plus new rectifiers, filter capacitors, output tube, and coupling; needless to say, I wasn't too happy."

**JUNIOR PTM:** "What causes that?"

**SENIOR PTM:** "I expect it's just old age on a set with very little vertical reserve. When B+ drops a little, couplers and bypasses lose a little, the picture shortens up. Since the customer is very sensitive to black area on top and bottom—it has to be fixed."

**JUNIOR PTM:** "What happened on this one?"

**SENIOR PTM:** "My sub unit was too big so I ordered one of those new small transformers. After I installed it I suddenly realized I could crank down on lin and still have a better than full picture. The vertical output cooled off a little from the lower plate current, so I was off the hook."

**JUNIOR PTM:** "It's hard to believe that a little job would do better than a big one."

**SENIOR PTM:** "Well, seeing is believing, isn't it? I've heard that the Triple-X steel they use in those new transformers makes the difference, and it certainly does."

\* \* \*

**MORAL:** Triple-X steel will not cure leaky couplers or bad rectifiers, but it can provide an extra reserve to offset component aging. Not all Triad components use Triple-X yet, but the new, small vertical outputs and powers do, and you can find your requirements in TV-60, available from your Triad Distributor or by writing to us. **Triad Transformer Corporation**, 4055 Redwood Avenue, Venice, California.

For more data, circle 5-82-2 on coupon, p. 43

## NEW PRODUCTS

For More Information On  
NEW PRODUCTS  
Circle Code Numbers, p. 43

### EICO STEREO AMPLIFIER

The HF-89 power amplifier is rated at 50 watts/channel and employs a cathode-coupled phase inverter-driven circuit, preceded by a direct-coupled voltage amplifier. Push pull EL34's are used in the output stage. IM distortion (60 & 7,000 cps at 4:1), 0.5% at 100 watts. Harmonic distortion, 0.25% from



30 to 15,000 cps. 1% from 20 to 20,000 cps within 1 db of 100 watts. Frequency response,  $\pm 0.5$  db 5 cps to 100 kc. Inverse feedback, 18 db. Stability margin, 13 db. Channel separation, 60 db. Sensitivity, 0.55v for full output. Hum, better than 90 db below full output. Kit, \$99.50. Wired, \$139.50. Electronic Instrument Co., 33-00 Northern Blvd., Long Island City 1, N.Y.

For more data, circle 5-82-3 on coupon, p. 43

### Chemtronics TV-RADIO CEMENT

A TV-radio cement, catalog #502-2, is especially prepared for repairing speakers or replacing cones on dynamic speakers. It can also be used for ce-



menting bakelite or glass, such as loose tube bases, repairing plastic cabinets and cementing parts to chassis. It dries clear, and is said to set quickly. Two ounce bottle with applicator brush \$5.50. Chemtronics, Inc., 122 Montgomery St., Brooklyn 25, N. Y.

For more data, circle 5-82-4 on coupon, p. 43

**Sencore  
RECTIFIER TROUBLESHOOTER**

Announced is the RS106, a rectifier substitution box used for detecting suspected faulty rectifiers or diodes. It saves time, guesswork, and eliminates all soldering mess which occurs when rectifiers and diodes are removed for testing and replaced. Provides instant, direct substitution for selenium and silicon rectifiers, single and dual diodes. Has full controls for selection of proper values in testing and is protected by a ½ amp. slow-blow fuse. \$12.75. Sencore, Addison, Ill.

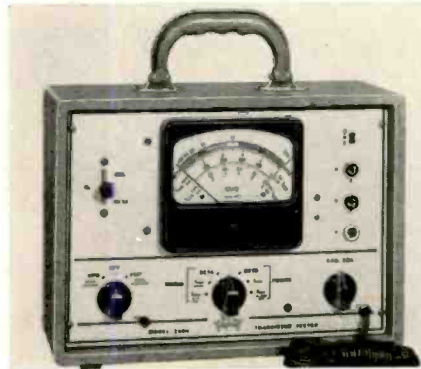
For more data, circle 5-83-2 on coupon, p. 43



**Triplet Transistor Tester**

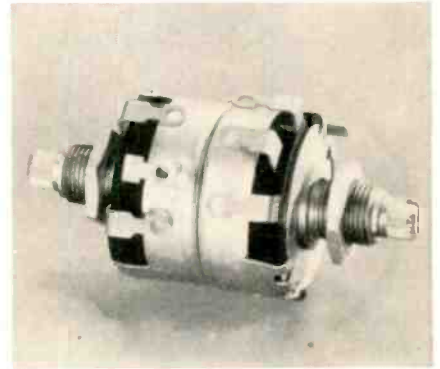
Model 2590 transistor tester quickly, easily and accurately tests power and signal transistors under simulated operating conditions. Provides for testing  $I_{CEO}$  (at 9.5v),  $I_{CBO}$  (at 9.5v), and Beta amplification (at 3v) on both NPN and PNP transistors. The tester also checks leakage and forward currents of diodes. An unusual feature is a transistor socket and a set of external leads which permits use of the tester with any type basing arrangement. It has a handsome gray leatherette covered case, with a recessed panel. Triplet Electrical Instrument Co., Bluffton, Ohio.

For more data, circle 5-83-3 on coupon, p. 43



**Clarostat CONTROLS**

Two potentiometer controls, welded back-to-back, are available in various sizes, wattages, and winding arrangements. ½ to 2 watt composition element controls are available in resistance ranges from 500 ohms to 10 megohms.



Wire-wound element controls are available in 2 watt to 4 watt ratings from 1 ohm to 100,000 ohms. The back-to-back arrangement makes possible positioning of the terminals of each control to each other in any desired position. Clarostat Mfg. Co., Inc., Dover, N. H.

For more data, circle 5-83-4 on coupon p. 43

**SPECIFY**



**For Master Antenna Systems**

**ANTENNA FILTER AND FILTER BASE**

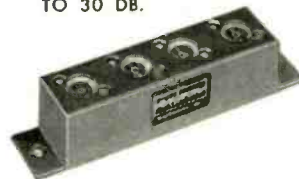
- Sharp Selectivity for Antenna Multiplexing
- Single Channel Preadjustment Eliminates Field Adjustments
- TUG-PLUG\* Quick-Disconnect Fittings and Built-In Connecting Cable Simplify Installation



Years of EXPERIENCE in the television transmission field, plus the MOST ADVANCED RESEARCH AND DEVELOPMENT FACILITIES have made ENTRON the watchword in quality, precision-built master television antenna equipment.

Modular design of the entire Entron system assures ease and rapidity of installation, inspection, and maintenance. Each component also features the Entron TUG-PLUG\*, a revolutionary, time-saving, quick-disconnect fitting.

**COMPLETE LINE OF OUTLETS IN ALL ATTENUATIONS FROM 10 TO 30 DB.**

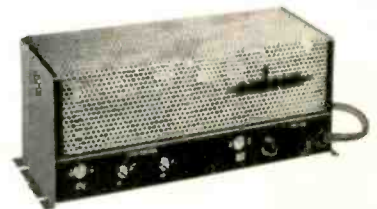


- Easily Installed—No Special Tools Required
- OF Series (Flush Mounting)—OE Series (Surface Mounting)
- DK Series with Two Outlets (Both Flush and Surface Mounting)
- New TUG-PLUG\* Quick-Disconnect Fittings
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**SA-23 AMPLIFIER**

- High Power Output—High Gain
- 10,000 Hour, Type 6922 Tubes
- Long Life Silicon Rectifiers
- Separate Tilt and Gain Controls for Each Band
- New TUG-PLUG\* Quick-Disconnect Fittings

Plug-in power splitters available to split signal 2 or 4 ways. Ask for ES-2 or ES-4.



\*Trade Mark

For further information, write or phone: **entron** INCORPORATED P. O. Box 287 Dept. A Bladensburg, Md. Phone: APpleton 7-9585

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# CRAFTSMANSHIP

SETS A JEWEL IN  
EVERY  **Ronette**  
STYLUS

... FOR SUPERIOR,  
TROUBLE-FREE PERFORMANCE

The dependable quality of CBS-Ronette cartridges has many facets, of which jeweled styli is an important one. All 27 models are jeweled.

These 27 cartridges replace over 500 others . . . with noticeably improved performance. They also provide exact like-new replacements for six-million-plus CBS-Ronette cartridges now in use in the U. S. A.

A complete catalog and cross-reference chart makes choosing the proper replacement quick, easy and sure. So ask your distributor for catalog PF-285. And be sure to ask him always for CBS-Ronette, the quality cartridge.



## CBS ELECTRONICS

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

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

For more data, circle 5-84-1 on coupon, p. 43

## SERVICEMEN KNOW!

Here they pay less and get the best

### HUSH®

Chemically-Electronically, engineered for Tuners and Switching Mechanisms.

When New HUSH is applied it will wash-away that dirt, leaving clean and positive contacts protected by a lasting lubricant. New HUSH is made from the finest solvents and it contains Electro-Silicone oils.

Also available—2 oz., 8 oz., 32 oz. containers 6 oz. Spray can \$2.25 net

### EVER - QUIET®

Since 1949

VOLUME CONTROL AND CONTACT RESTORER

EVER-QUIET is a free-flowing liquid that leaves no powder residue. Scientifically designed to seep around the shaft and penetrate the control or potentiometer, cleaning the contacts and leaving a safe protecting film. Harmless to metals, wire or carbon.

Also available— 6 oz. Spray can \$1.59 net  
32 oz. containers

2 oz. Bottle & dispenser 79c net

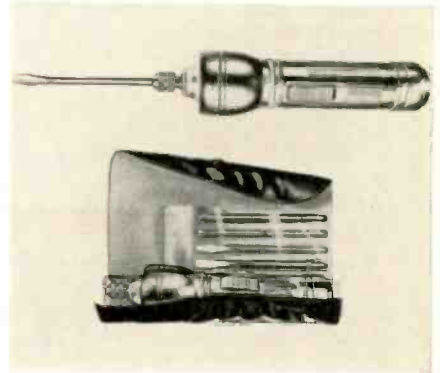
**CHEMICAL ELECTRONIC ENGINEERING, INC. Matawan, New Jersey**

For more data, circle 5-84-2 on coupon, p. 43



## IH LIGHT DRIVER

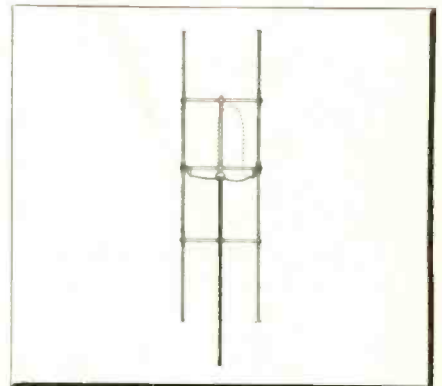
The "Light Driver" consisting of a flashlight, with a special chuck embedded in the patented lucite lens for four interchangeable screwdriver blades, two regular and two phillips-type, is designed to permit the user easy access to poorly lit or hard to get



at areas. The patented lucite lens, which is guaranteed for the life of the unit provides more than 5,000 volts insulation, while the full comfortable handle enables the application of high torque. Fits into the pocket, tool-kit, or glove compartment. \$2.49. I. H. Mfg Co, Inc, 121 Greene St., New York 12, N. Y. For more data, circle 5-84-3 on coupon, p. 43

## Winegard ANTENNA

The new Multibeam citizens band antenna is a vertically polarized model, featuring all-aluminum construction and the firm's exclusive phase control network, with coax connector for 50 ohm coax cable. It increases range by several miles over ground plane types,



and is available in 3 models, all with a nominal impedance of 50 ohms and impedance match of 1 to 1.2. Multibeam omnidirectional model MB27-0, Multibeam bidirectional model MB27-B and Multibeam unidirectional model MB27-U. All models, \$35.55 each. Winegard Co., 3000 Scotten Blvd., Burlington, Iowa.

For more data, circle 5-84-4 on coupon, p. 43

## Mobile Radio

(Continued from page 41)

when pressing a button to signal a specific mobile unit, causes a tone to be transmitted which is of the same frequency that the filter or other frequency-selective device in the decoder unit of the called mobile unit is tuned. To signal another mobile unit, a different button is pressed, causing a tone of a different frequency to be transmitted. A button is generally provided which causes transmission of a tone which is common to all mobile units, thus also permitting signaling of all mobile units simultaneously.

Each mobile unit is provided with a frequency-selective decoder unit, responsive to its own individual assigned tone and, generally, an all-call and group-call tone. The decoder actuates a lamp, buzzer and/or other signals to alert the driver to answer his mobile radiotelephone. The decoder unit, generally an outboard attachment, is fed from the discriminator or one of the audio stages of the associated receiver, ahead of the volume control.

The base station is equipped with a tone sender consisting of a tone generator whose frequency is changed by push-buttons or several tone generators of different frequency which are activated by push-buttons.

Only a small number of different tones can be crammed into the 3 kc band-pass of the audio channel of a mobile radio system without requiring elaborate and costly filters. To increase capacity multiple tones can be used. The corresponding decoder responds only to a specific combination of tones.

### Dial-Type Selective Calling

Digital-type selective calling systems have greater capacity than tone-type frequency-selective systems. The Bell Telephone System utilizes a two-tone digital signaling system for selectively calling mobile telephone subscribers. The central office operator transmits a succession of 600-cps and 1500-cps tone pulses which are intercepted by a Western Electric VS-1 decoder. This system has a capacity of 4000 different 5-digit codes.

While most mobile telephone subscribers lease their radio equipment from their respective telephone com-



# TWO-WAY RADIO

communications equipment



VHF-FM FOR:

MOBILE  
AIRCRAFT  
MARINE  
MOTORCYCLE  
PORTABLE  
BASE

VHF-AM FOR:

AIRPORT VEHICLES  
GROUND STATIONS  
POINT-TO-POINT

VHF

ANTENNAS  
REMOTE CONTROLS  
ACCESSORIES

# COMCO'S ALL NEW "580" FLEETCOM VHF-FM MOBILE RADIO



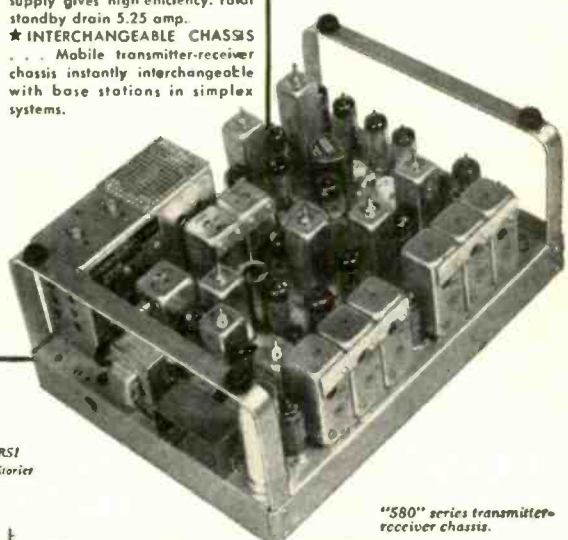
The new "580" is compact, light weight, has high performance, and features an original concept in Mobile equipment packaging by combining the control head, speaker, and transistorized power supply in one small easily mounted case assembly.

### FEATURES

- ★ HIGH PERFORMANCE... meets "split channel" technical requirements, all FCC and FCDA requirements.
- ★ FULL POWER OUTPUT... 35 Watts in 25-50 Mcs. 25 Watts in 144-174 Mcs.
- ★ BUILT-IN RELIABILITY... Preproduction Models field tested in 5 states and 3 foreign countries before starting production.
- ★ SMALL AND LIGHT WEIGHT... Chassis in case 13"x9 1/2"x5 1/2". Central-power Supply-Speaker case 5"x5"x3 3/8". Complete Mobile installations 24 lbs.
- ★ EASY TO INSTALL... "Two-unit" package so small most installations are under dash.
- ★ LOW COST... Complete mobile package

- ★ EFFICIENT... Transistor power supply gives high efficiency. Total standby drain 5.25 amp.
- ★ INTERCHANGEABLE CHASSIS... Mobile transmitter-receiver chassis instantly interchangeable with base stations in simplex systems.

\$398 f.o.b. factory



DESIGNERS AND MANUFACTURERS OF RADIO COMMUNICATIONS EQUIPMENT

## COMMUNICATIONS COMPANY, Inc.

FOUNDED 1938 CORAL GABLES, MIAMI 34, FLORIDA

For more data, circle 5-85-1 on coupon, p. 43

### NEW! REPLACEMENT GUIDE—CONVERT RECORDERS TO 4 TR. STEREO



ROBINS M/M 5Q17 (1/4 track)

ROBINS M/M exact replacement and conversion tape heads now available from your local parts jobber. 75% of all 2 track machines come equipped with M/M "B" series heads. ROBINS M/M 5Q17 (1/4 track) is an exact replacement for these.

Conversion can frequently be made by simply replacing a "B" head with a "Q" head. Send coupon for latest FREE NEW 16-PAGE REPLACEMENT GUIDE & CATALOG. AVAILABLE FROM PARTS JOBBERS

ROBINS Industries Corp. Flushing 54, N.Y.  
 Att: Mr. Andi  
 Please send FREE New Replacement Guide and Catalog to:  
 Name .....  
 Address .....  
 City ..... Zone ..... State .....



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## Transistor Radio Servicing CAN be Highly Profitable



The **ONLY** Complete Transistor Radio Service Lab  
Everything you need for less than \$50



Check Transistors, Diodes, Rectifiers . . .

### SENCORE TRC4 TRANSISTOR CHECKER

Accurately checks all transistors in hearing aids, radios and power transistors in auto radios. Tests for opens, shorts, leakage, current gain. Measures forward-reverse current ratio on all crystal diodes. Measures forward and reverse currents on selenium rectifiers. With set-up chart for accurate checking of each transistor. Size, 5x4½x2½". With batteries. DEALER NET..... 1995



Replace Batteries During Repair . . .

### SENCORE PS103 BATTERY ELIMINATOR

All-new "Transi-Pak," twin to TRC4 Checker above. Provides variable DC voltage to 24 volts; 1.5-volt biasing tap (a "must" for servicing Philco and Sylvania radios). Metered current output, to 100 ma. Handles 200-ma peaks. Two 200-mfd electrolytics provide proper filtering and low output impedance. No hum or feedback problems. Ideal for alignment using station signal; adjust IF slugs for max. current, also ideal for charging nickel-cadmium batteries. Size, 5x4½x2½". DEALER NET..... 1995



Find Defective Stage in a Minute . . .

### SENCORE HG104 HARMONIC GENERATOR

New signal generator designed primarily for fast signal-tracing of transistor radio circuits. No need to unsolder all transistors. Provides RF, IF and audio signals *simultaneously*, drastically cutting service time. Traces from speaker to antenna. Clear 1000 cycle note signal is heard in speaker from all good stages. Signal weakens or stops at defective stage. Equally as effective for testing TV, hi-fi and other audio circuits also. Size, 3½x4½x1¾". With batteries. DEALER NET..... 995



Turn page for other

**SENCORE**

Time Savers



# SENCORE

ADDISON 2, ILLINOIS

For more data circle 5-86-1 on coupon, p. 43

(Continued from preceding page)

panies, in some areas they can furnish their own equipment, provided that the mobile radio equipment also includes a suitable decoder.

Privately operated mobile radio systems can also be equipped for digital-type selective calling. Calls are initiated at the base station by dialing the number assigned to the desired mobile unit. This causes the base station to transmit a continuous carrier modulated by digital tone pulses

which are "counted" by the decoders in the mobile units.

The decoder unit in each radio-equipped vehicle is pre-set to respond to specific sequence and number of tone pulses, rejecting all others. In addition, it can be preset to respond to an all-call and a group-call number.

The mobile decoder unit, shown in Fig. 2, is an outboard attachment which can be used with any make or type of mobile receiver, whether AM or FM. The tuned electronic tone re-

ceiver of the decoder unit, fed from the discriminator or an audio stage of the associated receiver, accepts tone pulses of a specific frequency only, and rejects noise pulses. An electronic gate actuates a pulsing relay which keys the selector.

When a combination of tone pulses is intercepted that matches the setting of the selector, the contacts of the selector close momentarily, actuating the buzzer and a lamp in a call indicator head. After a short interval a release pulse from the originating station unlatches the selector, shutting off the buzzer. The selector returns to stand-by position. The call indicator lamp remains lighted, serving as a "leave word" signal, until the call is acknowledged.

The base station code sender consists of an audio oscillator and a telephone dial. When a dialing sequence is initiated, off-normal contacts in the dial actuate a relay, turning on the audio oscillator and the base station transmitter. A continuous tone is transmitted during the dial "pull" and during the return travel of the dial cam the dial's pulsing springs interrupt the tone to form "break" pulses conforming in number to the dialed digit.

When either tone-type or dial-type selective signaling is used, the volume control can be kept turned down to mute the loudspeaker, except when communication is desired. When a mobile unit is signaled, the driver turns up his volume control and answers the call. Thus, occupants of radio-equipped vehicles need to listen only to communications directed to them individually.

In order to signal personnel not on board, but working in the vicinity of a radio-equipped vehicle, the headlights or horn or other type of signal can be actuated by the decoder unit through an interposing relay.

In a mobile radio system which employs more than one base station or where the base stations are controlled from a remote control point plus one or more dispatch points, personnel near all of these points must ordinarily overhear all communications, even if of concern to only one of them. They must keep the control unit loudspeakers turned on in order to intercept calls.

However, by equipping all control units with decoders, the loudspeakers at all base station control points can be kept muted at all times so that no



communications are overheard except when the volume control is turned up at individual points when originating a call or when a specific control point is signaled.

This enables mobile units to signal specific base station or control point without alerting any of the others. If mobile units are equipped with both senders and decoder units, mobile units can also signal other mobile units. When base station control points are equipped with both senders and decoder units, system-wide two-way selective signaling is possible.

Southern Mobile Communications in Sarasota, Florida, which operates a radio dispatching service, licensed as a miscellaneous common carrier, equipped its mobile radiotelephone system for two-way dialing. Subscribers can be dialed individually without disturbing other subscribers or alerting them to eavesdrop. Subscribers can also dial other subscriber vehicles directly without the aid of the base station operator.

While most selective calling equipment is packaged as add-on out-board units for installation adjacent to the associated radio equipment, in-board equipment is also available for installation inside a mobile radio communications unit housing.

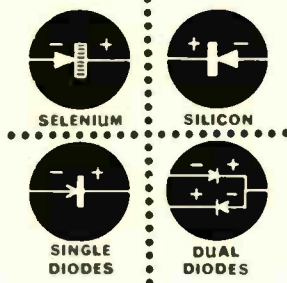
The operational advantages of selective calling are not generally apparent to new users of mobile radio. But after some experience, the convenience and privacy of selective signaling can be easily seen. The elimination of the monotonous drone of voices and the ability to signal one specific station without alerting any of the others are obvious advantages which the two-way radio service dealer can bring to the attention of customers.

Two-way is rapidly becoming a major segment of the service industry. With more than a million mobile units authorized and new equipment sales running at the rate of an estimated \$90,000,000 per year, two-way is big business.

Getting into this field has advantages. For instance, most business is done with other business men and local government officials instead of the "public." Credit is seldom risky and payment is generally prompt. Since mobile equipment requires regular maintenance, income is steady. And, by selling accessories, a nice income boost can be obtained for efforts expended. •



### SENCORE RS106 RECTIFIER TROUBLE-SHOOTER



Instant, Direct Substitution for . . .

**SELENIUM RECTIFIERS.** Substitutes for all types used in Radio, TV and other electronic devices up to 500 ma.

**SILICON RECTIFIERS.** Types found in many new TV sets.

**SINGLE DIODES.** With exception of some used in high frequency circuits.

**DUAL DIODES.** Types used in sync Discriminator circuits. Third test lead is provided for center connection.

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

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

**RS 106**  
DEALER NET. . . **12<sup>75</sup>**

Ask your Distributor to show you the RS106.

ALL PARTS

MADE IN AMERICA

# SENCORE

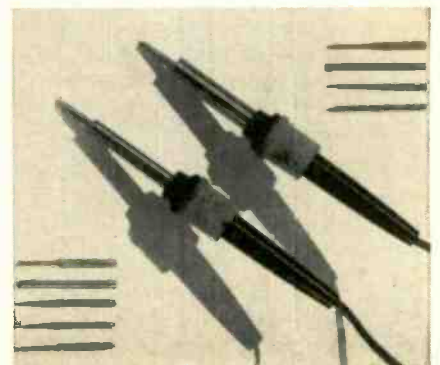
ADDISON 2, ILLINOIS

For more data, circle 5-87-1 on coupon, p. 43

### Kwikheat PENCIL IRONS

Designed for soldering of densely packed electronic circuits and suitable for continuous production or general use, these irons weigh less than two ounces and are 7 1/2" in length. Both units are identical, except that the 35 watt unit has a 3/8" barrel while the 50 watt unit has a 1/2" barrel. It is said normal working temperature is attained in one minute, 10 seconds. Interchangeable tellurium copper, nickel or iron plated tips are available for any soldering need. Kwikheat Mfg. Co., 3732 San Fernando Rd., Glendale 4, Calif.

For more data, circle 5-87-2 on coupon, p. 43



## FIND TUBE TROUBLES OTHERS MISS!



A  
New  
Dynamic  
Approach

Check over  
1300 tubes for

- Cathode Emission
- Grid Emission
- Leakage
- Shorts
- Gas

### SENCORE "MIGHTY MITE" TUBE CHECKER

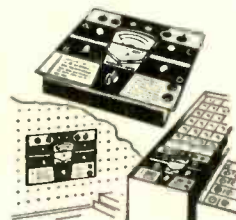
Answers the needs of the fast moving, profit minded serviceman who hates time consuming call backs. A "mite" to carry but a whale of a performer with more efficiency than testers costing much more.

New unique circuitry tests for grid emission and leakage as high as 100 megohms yet checks cathode current at operating levels. Special short test checks for shorts between all elements. The MIGHTY MITE will test every radio and TV tube that you encounter (over 1300!) plus picture tubes. Set up controls as easy as "A B C D" from easy to follow tube chart. New tube charts provided free of charge.

AND check these added Sencore servicing features: • Meter glows in dark for easy reading behind TV set • Stainless steel mirror in cover for TV adjustments • Rugged, all steel carrying case and easy grip handle • Smallest complete tester made.

Model TC109.....DEALER NET \$59<sup>50</sup>

Ask your distributor for the "MIGHTY MITE" with the mirror in the cover



Use it everyday in every way. Especially designed so you can transfer inner chassis to your tube caddy, bench or counter. Only 9" x 8" x 2 1/2".

ALL PARTS

**SENCORE**

MADE IN AMERICA

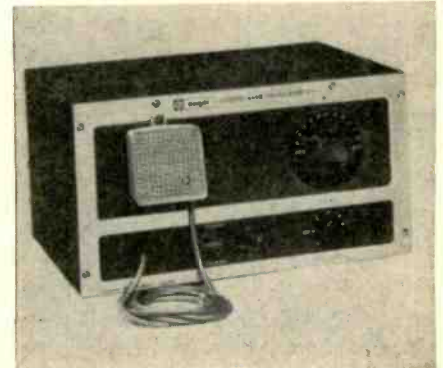
# SENCORE

ADDISON 2, ILLINOIS

For more data, circle 5-88-1 on coupon, p. 43

### Knigh TRANSCEIVER KIT

Model C-11 citizens band transceiver kit contains a super-regenerative receiver and 5-watt transmitter combined into a single unit. Provides short-distance two-way communication on the 11-meter class D citizens band. A single switch permits talk or listen functions. Operates from 105-125v, 60



cycle AC with crystal-controlled transmitter section operating at 5 watts input. An accessory mobile power supply for 6-12v operation, permits the C-11 to be used in almost any type of mobile installation. Size 6"x10"x8". Supplied with one crystal. Price \$39.95. Allied Radio Corp., 100 N. Western Ave., Chicago 80, Ill.

For more data, circle 5-88-3 on coupon, p. 43

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To find out if you qualify, write for a qualification form available from:

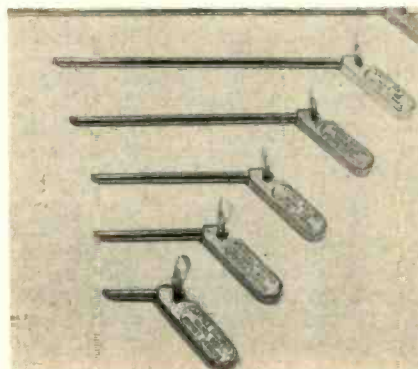
**INDUSTRIAL ELECTRONIC MAINTENANCE**

Qualification Dept.  
430 Lexington Avenue  
New York 17, N.Y.

### Nielsen WIRE CUTTERS

A long nose wire cutter designed for reaching into complex, difficult-to-reach wiring arrangements, is called the "Little Snipper." Models range from 2 to 18" in length and are made of aircraft steel. Has radial cutting action on a pistol-type grip. Applications include construction and maintenance of electrical, electronic, and related products. The long reach provided makes it unnecessary for the operator to reach into the wiring. Prices, from \$3.95 for the 2" size. E. V. Nielsen Inc., 575 Hope St., Stamford, Conn.

For more data, circle 5-88-2 on coupon, p. 43



## Tough Dogs

(Continued from page 39)

To check for vertical sawtooth feed-back into B+, I next turned on the scope, connecting it's ground to B-. Holding the metal direct scope probe in one hand, I touched the a-c switch to turn on the set. Wow! I took a husky jolt—dropping the probe.

Using the VOM again, the chassis now measured 200 volts positive from B-. Scope observations showed a very nice 60 cycle vertical sawtooth waveform between B- and chassis.

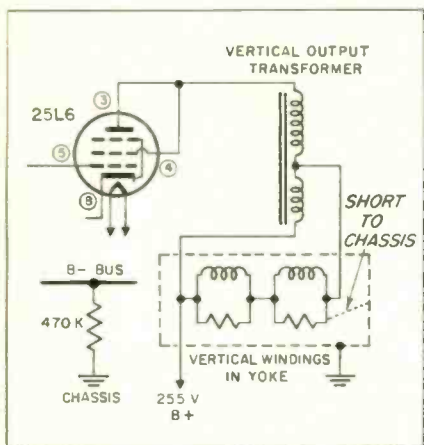


Fig. 2—Missing washer caused yoke wing screw to place abnormal pressure against metal mount around yoke, shorting vertical winding to set's ground return.

A 40  $\mu$ f electrolytic, shunted momentarily across B- and chassis, knocked the buzz out of the sound but upset vertical linearity.

After thinking the matter over for a few minutes and going over the schematic, I decided to make some resistance measurements from the vertical area to chassis. When I finally came to pin 3 of the 25L6, vertical output tube, it read 580 ohms to chassis.

One-by-one I disconnected B+ and other leads from the vertical section. Finally, with everything disconnected except the vertical yoke windings, resistance from the vertical output transformer to chassis, was about 40 ohms. I estimated this to be the approximate resistance of the yoke's vertical windings, (Fig. 2).

Holding the VOM probe on the vertical yoke lead, I loosened the wing screw holding the yoke to the metal housing. The short disappeared! It would come and go by alternately loosening and tightening the wing screw.

# Pinpoint in Seconds...

## HORIZONTAL & VERTICAL SWEEP TROUBLES

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Time Saver

The missing link in TV service . . .

### SENCORE SS105 SWEEP CIRCUIT TROUBLE SHOOTER

IT'S A . . . **UNIVERSAL HORIZONTAL OSCILLATOR.** For direct substitution. No wires to disconnect in most cases. Traces trouble right down to the defective component. Variable output from 0-200 volts, peak-to-peak. Oscillator will sync to TV sync signal giving check on sync circuits.

**HORIZONTAL OUTPUT CATHODE CURRENT CHECKER.** A proven method that quickly checks the condition of the horizontal output tube and associated components. Adaptor socket prevents breaking wires. Easily replaceable Roll Chart gives all necessary pin, current and voltage data. New Roll Charts are Free.

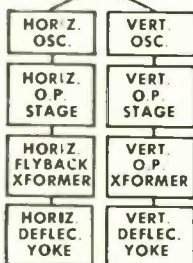
**UNIVERSAL DEFLECTION YOKE.** A new, simple way to determine yoke failure accurately—without removing yoke from picture tube. Merely disconnect one yoke lead and substitute. If high voltage (also bright vertical line) is restored, TV yoke is defective.

**DYNAMIC FLYBACK TRANSFORMER CHECKER.** Merely flip switch to "Flyback Check" and meter will indicate condition of flyback transformer, in degrees of horizontal deflection. Extremely sensitive and accurate; even shows up one shorted turn on flyback.

**VOLTMETER.** For testing bootstrap, screen and other voltages. Direct-reading voltmeter. 0-1000 volts.

**UNIVERSAL VERTICAL OSCILLATOR.** Checks oscillator, output transformer and yoke. Merely touch lead to component and check picture on screen.

**SS105 is completely self-contained, nothing else is needed. New Improved Circuit . . . DEALER NET 42<sup>95</sup>**



# SENCORE

ADDISON 2, ILLINOIS

For more data, circle 5-89-1 on coupon, p. 43

It was now obvious that the yoke windings were shorting to the metal housing and thus to chassis. Since there was no washer under the wing screw, the screw had to be tightened more than normal in order to hold the yoke in position. The screw was placing unnecessary pressure against the metal yoke mount, causing its windings to short against the metal. After placing a washer under the wing screw, the buzz disappeared and the sound was normal.—W. C. Sappington, Memphis, Tenn.

### Solitron SILICON RECTIFIER

A new type of diffused silicon rectifier is pressure molded, under heat and vacuum, by a new method, insuring a true hermetic seal. Values of these miniature rectifiers are from 50v to 1,000v PIV at 100ma to 750ma. These axial type units are only  $\frac{3}{8}$ " long, .200" od,  $1\frac{1}{4}$ " gold plated leads, with the chamfered edge always cathode. Price 40¢ each to \$3.00 according to PIV. Also molded to customer specifications. Solitron Devices, Inc., 67 S. Lexington Ave., White Plains, N.Y.

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## This Could Happen To You

(Continued from page 42)

JACK DARR

The TV set was the type which used a multivibrator vertical oscillator. The sync is fed into the input plate of the tube. In attempting to locate a small distortion in the vertical sweep, several parts were replaced including a slightly leaky input coupling condenser, a .0022 $\mu$ f unit between the integrator and the plate.

Suddenly our pattern would not lock in; correction, it *would* lock very well, but with the blanking bar in the position shown in Fig. 2 (about an inch or so from the bottom of the screen). The picture would "snap" into place just as it should, there and *only* there!

After considering several alternatives to change the position of the picture, a careful recheck of the vertical oscillator circuit was made. Yep.

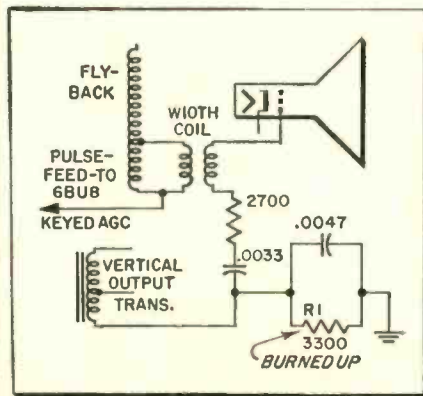


Fig. 3—Inadequate factory testing and inspection, plus a defective resistor hidden beneath a capacitor, caused one technician a series of hair-pulling experiences.

When the coupling condenser was replaced, it was inadvertently connected from the terminal strip to the grid, instead of the plate.

**MORAL:** Always check your own work first.

Another TV set that I had was really the 'doggie in the window.' It was a brand-new set from a dealer-customer. Vertical retrace lines were all over the place. The set was so new that I didn't even have a schematic. On checking the chassis, not a

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Wired \$129.50 Kit \$79.95

Features DC amplifiers; flat from DC to 4.5 mc, usable to 10 mc



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Entirely electronic sweep circuit with accurately biased inductor for excellent linearity. Extremely flat RF output.

**Dynamic Conductance Tube & Transistor Tester #666**

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Tests all receiving tubes (picture tubes with adapter), n-p-n and p-n-p transistors.



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**Peak-to-Peak VTVM #232 & Uni-Probe (pat. pend.)**  
Wired \$49.95 Kit \$29.95

Uni-Probe — exclusive with EICO — only 1 probe performs all functions: half-turn of probe tip selects DC or AC-Ohms.

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**IMPORTANT NOTE:** All EICO kits built according to our instructions, and all EICO factory-assembled equipment, conform to the high standards and specifications published in EICO literature and advertisements. All EICO factory-assembled equipment is completely and meticulously hand-wired throughout — no printed circuitry; each factory-assembled unit is 100% final-tested throughout for each feature and function — no "spot" or "partial" checking. In EICO's final-test techniques, nothing is left to chance.

EICO, 33-00 Northern Blvd., L.I.C. 1, N. Y.

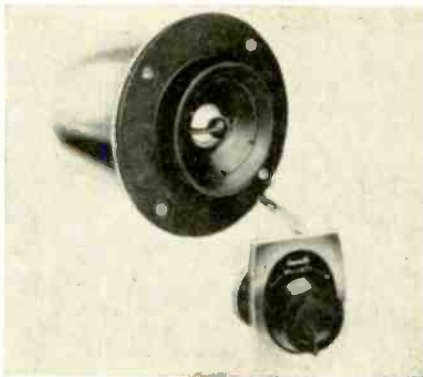
For more data, circle 5-90-2 on coupon, p. 43  
ELECTRONIC TECHNICIAN • May, 1960

sign of a retrace eliminator network could be found! There simply wasn't anything connected from the vertical circuit to the picture tube that could be used as a vertical retrace eliminator. So, in desperation, I made one up and hooked it in. This took care of the lines, and the TV played very nicely.

Some time later, here came Fido again! It had been demonstrated and exhibited age trouble. By this time, we had the schematic and began hunting. Sure enough, there was a retrace network in there, but it was connected as shown in Fig. 3. Also, the little resistor, R-1, was burned beyond recognition! When the cabinet was opened up, we found a slip of paper in the bottom, marked "width coil part no. —". We deduced that the following had happened: the width coil had been defective in original assembly. When the set was first plugged into current, the short had burned out the resistor. The receiver had gone from the assembly line back to service, where the width coil had been replaced. The resistor was probably overlooked for the same reason we overlooked it, it was mounted underneath two fat bypass condensers, and completely invisible! This caused the retrace lines by opening the retrace eliminator network. My new network didn't help matters, either. After replacing the resistor and the age control, which also had a burned spot in it, everything straightened up and played very nicely.

### University TWEETER

The "Sphericon," model T-202, features a response of  $\pm 2$  db from 3,000 to 22,000 cps. With a built-in network for 3,000 cycle crossover and a volume control attached to a 36" long cable for



convenient location, the unit has a nominal impedance of 8 ohms. Power capacity, 30 watts. Diameter, 4 $\frac{5}{8}$ ". Overall, 4". Price, with built-in network and adjustable brilliance control, \$24.94. University Loudspeakers, Inc., 80 S. Kensico Ave., White Plains, N. Y. For more data, circle 5-91-3 on coupon, p. 43

### Centralab "FADER" KIT

Designed primarily for use in rear-seat auto speaker installations, the WK-300 kit permits gradual reduction of volume on one speaker, while increasing volume on the other, or balances both speakers. The kit contains a miniature 5-watt wirewound control, an aluminum bracket and dial plate, finished in black enamel, a black and chrome push-on knob and self-tapping mounting screws. Centralab Div., Globe-Union Inc., 900 E. Keefe Ave., Milwaukee 1, Wis.

For more data, circle 5-91-4 on coupon, p. 43

### Beamco BATTERY & CHARGER

"Master Cell" rechargeable battery, for transistor radios, has an average life of 15,000 hours at approximately 15 hours per charge. It replaces clip-in types of 6, 7, 8, and 9v. Complete with charger, \$6.95. Beamco Associates, Inc., 114B The Benson, Jenkintown, Pa. For more data, circle 5-91-5 on coupon, p. 43





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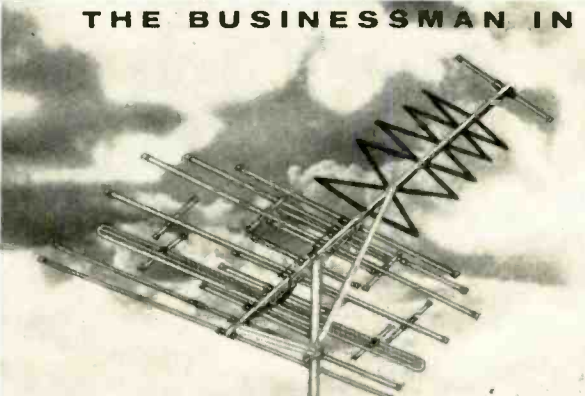
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# Winners — Feb. 1960 Shop Hint & Tough Dog Contest

## SHOP HINT # 5

- Author: **Joseph J. Momeno**, St. Louis, Mo.
- 1st Place: **James F. Parker**, Communication Tech., Pacific Gas & Elec. Co., Santa Rosa, Calif.
- 2nd Place: **Thomas Vigorito**, Owner, TV Service Co., Youngstown, Ohio
- 3rd Place: **James L. Sawyer**, Transmitting Engr. WTVJ, North Miami, Fla.
- 4th Place: **Edward Holman**, Technician, Bohack Co., Middle Village, N. Y.
- 5th Place: **William K. Seaver**, Owner, Seaver's TV Service, Elkhorn, Wis.
- 6th Place: **Jay S. Pastor**, Technician, General Electric Co., Utica, N. Y.
- 7th Place: **A. Edward Kelley**, Ordnance Engr. Watertown Arsenal, Foxboro, Mass.
- 8th Place: **William F. Koch, Jr.**, Owner, Radio-TV Service Co., Haverhill, N. H.
- 9th Place: **Bruno Kiburis**, TV Technician, TV Shop Co., Ingersoll, Ont. Canada
- 10th Place: **Juan E. Bobe**, Owner, Bobe Radio Service Co., Ponce, Puerto Rico

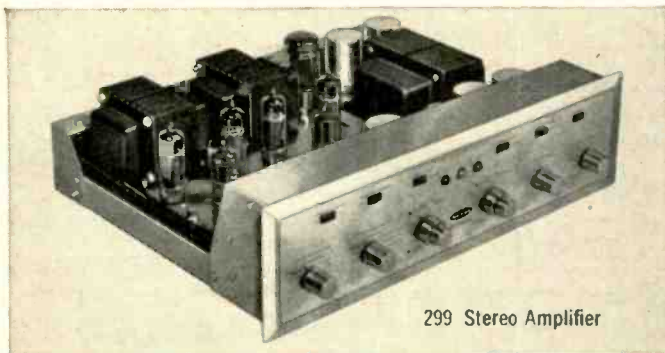
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- 3rd Prize . . . . . \$10.00\* ea.
- 4th-10th Prize . \$ 5.00\* ea.
- Author . . . . . \$50.00\* ea.

\*Prizes given only in equivalent \$ choice of any technical books listed in "Build a Technical Library." See April ET, p. 42.

## TOUGH DOG # 2

- Author: **Howard E. Chace**, Southbridge, Mass.
- 1st Place: **Fritz C. Hoffman**, Owner, Radio-TV Doctor Co., Kewaunee, Wis.
- 2nd Place: **Meyer Geld**, Owner, Geld TV Repair Co., New York, N. Y.
- 3rd Place: **H. J. Brown**, Owner, Brown Electronics Co., Allentown, Pa.
- 4th Place: **Noel O. DeLong**, Ch. Operations Tech., Dept. Public Safety, Shinnston, W. Va.
- 5th Place: **Allan M. Hard**, TV Technician, Randall-Duke Co., Demopolis, Ala.
- 6th Place: **Del J. Kubiak**, Owner, Kubiak's TV Service Co., Grand Rapids, Mich.
- 7th Place: **Leonard DeGulis**, Owner, Lakeville TV Co., Great Neck, N. Y.
- 8th Place: **Francis Leist**, Service Technician, Poneto, Ind.
- 9th Place: **Chris Reinisch**, Owner, Reinisch Radio & TV Co., Garrison, N. Dak.
- 10th Place: **John E. Coleman**, Owner, Johnnies TV Co., Clinton, Iowa



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# Parts Show Preview

(Continued from page 44)

Company	Booth	Room
Fanon Electronic Industries		546A/548A
Federated Industries	787	
Ferrodynamics Corp.		614A/615A
Fidelitone, Inc.	301	
Finney Co.		539/553
Fisher Radio Corp.		624A
G-C Electrocraft Co.		628/629
General Cement Mfg. Co.	422	
General Electric Co.	209	524A
General Industries Co.		637
General Instrument	678	
General Transistor	871	
Glaser-Steers Corp.		644A
Globe Electronics	875	
Gramer Halldorson	307	
Grayhill, Inc.		613/614
Great Eastern Mfg. Co.		639
Guardian Electric Mfg. Co.	305	
Edward E. Gurian & Co.	784	
Hepeo Mfg. Co.	12	
H. I. S. Industries, Inc.	124	
Hallcrafters Co.		505/507
Hammarlund Manufacturing	573	542A
Hardwick, Hindle, Inc.	128	
Harman-Kardon, Inc.		512A
Hickok Electrical Instrument	405	
Hi-Lo Manufacturing Corp.	217	
Hunter Sales Co.	5	
Hy-Gain Antenna Products	877	
IE Manufacturing	23	
I. H. Mfg. Co.	587	
ITT Components Div.	322	
Illinois Condenser Co.	214	
Injectorall Co.	879	
International Electronics	117	
International Rectifier Corp.	1	
International Resistance Co.	22	
J-B-T Instruments	574	
JFD Electronics Corp.	420	
Jackson Electrical Instrument	218	
James Electronics, Inc.	206	
Jensen Industries, Inc.	408	632
Jensen Manufacturing Co.	110	665/666

Company	Booth	Room
Jerrold Electronics Corp.	684	
Jersey Specialty Co.		610
E. F. Johnson Co.	21	549
K-G Electronics	26	
Kester Solder Co.	119	
*Kimberly International		611A
Kurman Electric Co.	887	
Lab-Tronics, Inc.		655A
Lake Manufacturing Co.	873	
Lance Antenna Mfg. Co.	774	
James B. Lansing Sound, Inc.		505A/507A
Lenco Electronics, Inc.	404	
Licon Div.		533
Littelfuse, Inc.	415	
Lowell Manufacturing Co.		650A
Lumite Division	116	
Luxo Lamp Corp.	781	
P. R. Mallory & Co.	676	
Marantz Co.	14	
Mellotone, Inc.	131	
*Mercury Electronics Corp.	776	
Merit Coil & Transformer	222	
Metal Works, Inc.	793	
Microtran Company, Inc.	780	
James Millen Mfg. Co.	221	
J. W. Miller Co.	683	
M. A. Miller Mfg. Co.	412	
Minnesota Mining & Mfg. Co.	788	
Miratel, Inc.	8	
National Radio Co.		655
Newcastle Fabrics Corp.	686	
Newcomb Audio Products Co.		539A
North American Philips Co.		521A
Oaktron Industries, Inc.		646A
Oelrich Publications	672	
Ohmite Manufacturing Co.	308	
Orr Industries		647A
Osborne Electronics	204	
Oxford Components Div.		557A
Parker Metal Goods Co.	101	
Peerless Products Industries	409	
Peerless Products Industries	409	
Pentron Corporation		602A
Perma-Power Company	411	
Philco Corp. Accessory Div.	881	635A/636A
Philmore Manufacturing Co.		621/622
Pickering & Co.		500
Polytronics Labs, Inc.	24	
Potter & Brumfield	313	

Company	Booth	Room
Precise Development	10	
Precision Apparatus Co.	312	
Precision Electronics		544A
Premier Albums, Inc.	6	
Premier Metal Products Co.		634/635
Pyramid Electric Co.	419	
Qualitone Industries	777	
Quam Nichols Co.	413	



### 2 NEW PHONO JACK

- Eliminate rivet mounting.
- Convenient replacement for old style Jacks.

No. 3501FP—Lock Nut back of panel, requires only 1/4" hole.



No. 3501FR—For front of panel mounting, where necessary to assemble Jack through the panel from the back due to lack of space.



### NEW PHONO PLUG

No. 3502—Removable handle—exposed terminals. Nickel plated brass body and handle. Can be used in multiples even where Jacks are on 1/8" centers.



### NEW PHONO EXTENSION JACK

No. 3503—Removable handle. Cable clamp. Shielded. Nickel plated brass.



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Customer confidence is your most important product. This is why more reputation-conscious servicemen rely on Hi-Fi Banshee performance.

Now—there are 16 new, improved Banshees to give you the length and strength to power your

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Please send complete TELEPATH information.

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For more data, circle 5-94-1 on coupon, p. 43

Company	Booth	Room
R-Columbia Products Co.	677	
Radlart Corporation	319	
Radio Corp. of America	874	659/661
Radio Electronics	588	504
Radio Merchandise Sales, Inc.		657
Radio & Television Weekly		612
Radlon Corporation		619
Ram Electronics, Inc.		513
Rauland-Borg Corp.		528A/530A
Rauland Corp.	778	
Raypar, Inc.	890	
Raytheon Co.	671	
Recoton Corp.	212	
Reeves Soundcraft Corp.		501
Rego Insulated Wire Co.	402	
Rek-O-Kut Co.		616A/617A
John F. Rider Publisher	417	
Robins Industries Corp.		613A/656A
Rockbar Corp.		639A/640A
Rogers Electronic Corp.		636
Rohn Manufacturing Co.	109	651/652
Rye Sound Corp.	872	
S & A Electronics, Inc.	791	
Sampson Company	886	644
Howard W. Sams & Co.	576	
Sangamo Electric Co.	303	520
Saxton Products Inc.	673	
Seco Manufacturing Co.		529
Service Instruments Corp.	203	
Shell Electronics Mfg. Corp.	118	504A
Sherwood Electronic Labs.		652A
Shure Brothers, Inc.		550A
Sidco, Inc.		643
Sightmaster Corp.	687	
Sigma Instruments, Inc.		633
Simpson Electric Co.	577	534
Mark Simpson Co.		601
Herman H. Smith, Inc.		509
Snyder Manufacturing Co.	306	
Sola Electric Co.	591	
Sonotone Corp.	688	641A
Soundalier, Inc.	115	
South River Metal Products	318	
Spaulding Products Co.		546
Spirling Products Co.	575	
Sprague Products Co.	583	
Standard Coil Products Co.	691	
Standard Electrical Products	106	
Sterling Precision Corp.	3	
Stevens Walden, Inc.	679	
Matthew Stuart & Co.	674	
Stromberg-Carlson		659A/661A
Superex Electronic Corp.		536
Switchcraft, Inc.	320	
Sylvania Electric Products	135	560/561
TV Development Corp.	785	
Talk-A-Phone Co.	133	600
Tandberg of America		628A
Tape-Athon		634A
Sarkes Tarzian, Inc.	103	
Tech-Master Corp.		654A
Technical Appliance Corp.	685	
Telectrosonic Corp.		666A
Telex, Inc.	121	
Tenatronics, Limited		626
Tenna Manufacturing Co.		523
Terado Company	870	
Tevco Insulated Wire	126	
Texas Crystals	883	
Thordarson-Meissner	572	
Triad Transformer Corp.	586	
Frimm, Inc.	223	
Trio Manufacturing Co.	876	
Triplet Electrical Instrument	590	512
Tru-Ohm Products Div.	102	
Tung-Sol Electric, Inc.	104	
Turner Co.	220	
Ultravision Mfg. Co.	7	
*U. S. Components, Inc.	789	
U. S. Engineering Co.	888	
Ungar Electric Tools, Inc.	589	545
Union Carbide	403	618
United Audio Products		621A/622A



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10 Values

\$720 to \$1440 Dealer Net

Requires no bench space

Contains 10 Handy-Paks with space for 10 more

Wall Brackets Included



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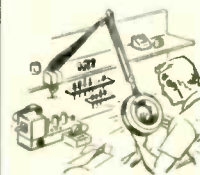
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Luxo's excellent magnification and cool shadow-free light increase precision when working with miniaturized circuits and assemblies, reading parts numbers and making terminal identifications.

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ALL UL approved.

Order from your supplier or write:

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For more data, circle 5-94-3 on coupon, p. 43  
ELECTRONIC TECHNICIAN • May, 1960



Company	Booth	Room	Company	Booth	Room
United Catalog Publishers	207	537	Waters Conley Co.		623A
United Transformer Corp.	302		Weathers Industries		647
University Loudspeakers		560A/561A	Webcor, Inc.	579	532A
Utah Radio & Electronic	315		Webster Electric Co.		551A
V-M Corp.	316		Weller Electric Corp.	582	
Vaco Products Co.	321		Wen Products, Inc.	215	
Vector Electronic Co.	114		Westinghouse Electric Corp.	105	557
Vidair Electronics Mfg. Corp.		658A	Weston Instruments Div.	418	
Vis-U-All Products Co.	880		Winegard Company	211	
Vocaline Co. of America, Inc.		517A	Winston Electronics	125	
			Workman TV Products, Inc.	129	
			Worner Electronic Devices	882	
Waber Electronics	885		X-Acto, Inc.	27	
*Waldom Electronics, Inc.		502	Xcelite, Inc.	592	
P. Wall Manufacturing Co.	107				
Walsco Electronics Mfg. Co.	416		Ziff-Davis Publishing		516
Ward Leonard Electric Co.	111				
Ward Products Corp.		556			
Waterman Products Co.	783				

\*Indicates assignment of space subject to company's admission to membership in a sponsoring association.

### Raytheon TOOL KIT

Kits of imported tools are now being offered to TV and radio service dealers with their purchases of Raytheon tubes. Made especially for Raytheon in West Germany, the kits include many special instruments needed for radio and TV servicing. The 20-piece set is provided with transparent plastic handles, insulation rated at 10,000v, and fit compactly in a special roll-up carrying case. Raytheon Co., 100 River St., Waltham 54, Mass.

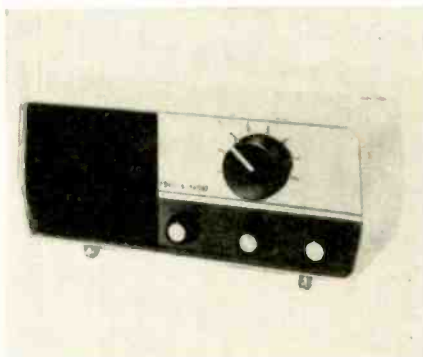
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### Feiler WIRELESS INTERCOM

Two 8 channel wireless intercom systems—"All-Master" and "Master-Staff", feature simultaneous 4 channel operation, avc, noise gate for reduction of line noises, are said to offer complete 8 channel privacy. Comes in mink grey cabinet with harmonizing front panel of black, silver and blue. Feiler Engineering & Mfg., Co., 8026 N. Monticello Ave., Skokie, Ill.

For more data, circle 5-95-4 on coupon, p. 43

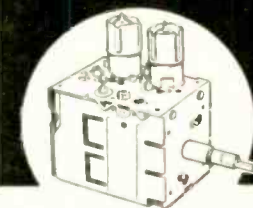


### EMC TUBE TESTER

The model 211 is a flexible emission tube tester said to be designed for octal, loctal, 9 prong and miniature tubes. Checks for shorts, leakages, opens and intermittents as well as emission. Wired \$22.90. Kit \$14.90. Electronic Measurements Corp., 625 B'way, N.Y. 12, N.Y.

For more data circle 5-95-5 on coupon, p. 43

### TARZIAN Offers 48-Hour, Direct Factory Service on Tuner Repairs



only  
**\$8.50**

Price Effective Jan. 1, 1960

That's right. Net, \$8.50 per unit and \$15 for UV combinations, including ALL replacement parts. 90-day warranty against defective workmanship and parts failure. Tuners repaired on approved, open accounts. Replacements offered at these prices\* on tuners not repairable:

VHF 12 position tuner . . . . .	\$22.00
VHF 13 or 16 position . . . . .	23.00
VHF/UHF combination . . . . .	25.00
UHF only . . . . .	15.50

\*Subject to change



Tarzian-made tuners are easily identified by this stamping on the unit.

When inquiring about service or replacements for other than Tarzian-made tuners, always give tube complement . . . shaft length . . . filament voltage . . . series or shunt heater . . . IF frequency, chassis identification and allow a little more time for service. Use this address for fast, 48-hour service:

### SARKES TARZIAN, Inc.

Attn: Service Mgr., Tuner Division  
East Hillside Drive  
Bloomington, Indiana

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Features

## HI-FI FIREBALL

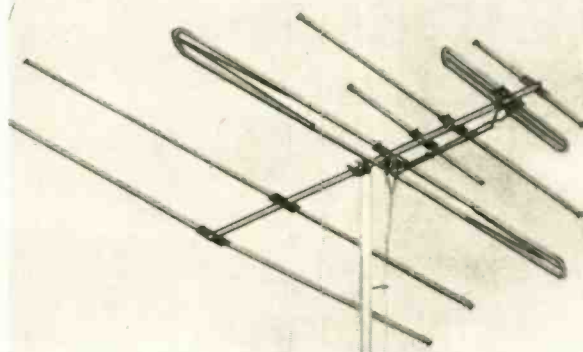
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by

JFD

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course!



Customer confidence in your experience goes up when you install the JFD Hi-Fi Fireball!

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THE BRAND THAT PUTS YOU IN COMMAND OF YOUR MARKET!

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Make the smart move today to Hi-Fi Fireballs at your JFD distributor.

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ONE OF A SERIES

# THE PRACTICAL APPROACH



Robert Cornell\*

## Lumped Circuits

When is a plain piece of wire not just a plain piece of wire? When it is wound as a coil or as a resistor or even as a capacitor. Yes, but this isn't what I have in mind; I mean just a plain piece of wire, not wound, twisted or coiled in any manner. One answer is—when it is used in a high frequency circuit. Just as a coil has capacitance as well as inductance and resistance, a plain piece of wire can take on the characteristics of any number of different components either singly or in combination, and under certain conditions a complete tuned resonant tank circuit may be the result.

This is common knowledge to those of us who have worked with high frequencies. Some of our most sophisticated pieces of electronic gear look like a plumber's nightmare, or an ultra-miniature, potted and printed circuit in hieroglyphics. But even in the most mundane TV receivers, undesirable ultraudion oscillators at times manifest themselves in the most undesirable places. How many times have we run into audio distortion, vertical squelch, ringing and other parasitic oscillations and for no apparent reason, simply because all components check out normal? And when the trouble was finally found, it turned out to be an intangible, such as lead dress, stray capacitance or lumped components? A GOOD REASON WHY LIKE COMPONENTS IN PARALLEL (TO MAKE UP FOR SIZE OR VALUE NOT ON HAND) SHOULD BE AVOIDED WHEN POSSIBLE.

But not all lumped circuits are accidental or undesirable. As a matter of fact, the fewer the actual number of parts used in a very high frequency circuit, the less chance there is of oddball effects to set in, and more exact control of circuit parameters is possible.

So if you look into a cavity resonator, which is a tuned resonant circuit having all the characteristic elements required of a tuned circuit including inductance and capacitance, all you would see is a hole. If you looked into a good two set coupler you would also see next to nothing. The chances are that the components you do see have less effect on overall circuit operation than the components you can't see. So if you're looking for components you can see, forget it, the best way to predict what's in the circuit, is to put a signal in, and see what comes out.

### COUPLER COMPARISON CHART

Blonder-Tongue Two Set Coupler A-102				
Frequency mc	54	88	174	216
* Isolation between TV outlets	Minimum 12 db at the band edges; up to 20 db at band centers			
** Insertion loss between Ant. and TV outlets	3.5	3.5	3.5	3.5
2-set coupler with components you can see				
* Isolation between TV outlets	9	9	9	9
** Insertion loss between Ant. and TV outlets	5.5	5.0	4.5	4.5

\*Higher figure is better. \*\*Lower figure is better.

Do write me and let me know of your unusual experiences. If you have a problem, I'll try to get you some expert advice. Contact me at Blonder-Tongue, Laboratories, 9 Alling Street, Newark 2, New Jersey.

\*Member: IRE, AES, & N. Y. State Attorney General's Committee on Fair Practices in The Radio And TV Supply Industry. President of Certified Electronic Technicians Association. Former Technical Editor, Electronic Technician Magazine. ET-5

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## New Books

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

**\*SERVICING HI-FI AM-FM TUNERS.** Prepared and published by Howard W. Sams & Co., Inc. 160 large pages, soft cover. \$2.95.

Volume 5 in the series, this schematic collection of AM-FM tuners and receivers published in 1958-59, covers 15 brands. Parts lists and chassis layouts are shown. A short section is devoted to speakers. Since this is primarily a circuit book, there is no text devoted to the techniques of servicing tuners.

**\*FUNDAMENTALS OF ELECTRONICS.** By Matthew Mandl. Published by Prentice-Hall. 574 pages, hard cover. \$10.60.

Here is a fine basic text written on an intermediate technical level. Among the many sections are those on circuit elements, series and parallel circuits, measuring devices, magnetism, a-c tubes, transistors, power supplies, amplifiers, oscillators, modulation, receivers, and antennas. A helpful appendix offers some useful reference data.

**FUNDAMENTALS OF ELECTRONICS.** By E. Norman Lurch. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N.Y. 631 pages, hard cover. \$8.25.

This thorough text covers basic electronics on an advanced level, complete with important mathematical derivations. The various types of multi-element tubes are explained in great detail, along with a wide variation of amplifiers, oscillators, and other circuits. Other topics include feedback, modulation, and the oscilloscope. Review questions make it suitable for a school text.

**THE ELECTRONIC GUIDE.** Prepared and published by Electronic Guide Publications 4131 Toluca Lake Ave., Burbank, Calif. 191 pages, soft cover. \$7.50.

This 1959 International Edition lists 4700 different articles published by

various electronic journals. The book is broken down into 10 sections covering such subjects as antennas, audio, automation, instrumentation, power supplies, radar, radio-TV, and ultrasonics. On a month-by-month, magazine-by-magazine basis, article titles are listed.

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# 2-way

## Citizens' Band RADIO

**15 mile range**

- Requires no License Exam
- No Installation
- Receive or send on 3 channels with a flick of a switch. Covers all 22 Citizens' Band Channels by changing crystals.

Slightly larger than a standard telephone, this handsome unit has 5 watt power with low current drain. Interchangeable for 115 v AC or 6 or 12 v DC use, it meets all FCC requirements. Use built-in speaker or have privacy through hand set. Squelch control. No special servicing needed. Available in 6 decorator colors.

Distributorship Inquiries Invited

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**PHONE**  
ED 9-9653

**90 DAY WARRANTY**

**\$7.50**  
plus parts,  
C.O.D. and postage charges

## Precision Tuner Service

ALL TYPES T.V. TUNERS REPAIRED AND ALIGNED TO FACTORY SPECIFICATIONS ON CRYSTAL-CONTROLLED SWEEP GENERATORS  
24-HOUR SERVICE ON MOST TUNERS  
UHF - VHF COMBINATIONS — \$13.50

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State make and model. Send all parts, tubes and shields

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only for those who want the ultimate

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## "TOP RATED" again and again —and NOW AGAIN!



Model S-5000, 20+20 watt "stereo"  
Dual Amplifier-Pre-amplifier, Fair Trade Price—\$189.50



Model S-2200, FM-AM-MX Stereo tuner,  
Fair Trade Price—\$179.50



### AMERICAN AUDIO INSTITUTE

354 EAST 18th ST., PATERSON 4, N. J.

October 27, 1959

Sherwood Electronic Labs., Inc.  
4300 North California Avenue  
Chicago 18, Illinois

Gentlemen:

We find that the incorporation of a center-channel output and a damping factor selector in July, 1959, increases the Summary Rating of the Sherwood S-5000 to the highest of all 18 Stereo Amplifiers tested in the AAI Evaluation Test Reports

Sincerely,

AMERICAN AUDIO INSTITUTE

*Felix R. Brey*  
Felix R. Brey  
Executive Director

The "Most honored of them all" S-5000 stereo amplifier-preamplifier is joined by the S-2200 stereo tuner. As with its "Top Rated" predecessors, the S-2200 features FM "Interchannel Hush" plus push button selector, internal plug-in adaptor for Stereo FM Multiplex, 2 "Acro-beam" tuning indicators, simulcast FM/AM stereo. All Sherwood tuners feature FM sensitivity below 0.95 microvolts and 1/3% distortion @ 100% FM. For further details write: Sherwood Electronic Laboratories, Inc., 4300 N. California Avenue, Chicago 18, Illinois.

For complete specifications write Dept. ET-5  
For more data, circle 5-97-1 on coupon, p. 43  
ELECTRONIC TECHNICIAN • May, 1960

**\*BASIC ULTRASONICS.** By Cyrus Glickstein. Published by John F. Rider Publisher, Inc. 144 pages, soft cover and cloth cover. \$3.50 soft cover, \$4.60 cloth cover.

The rising star of ultrasonics is playing an increasing role in a variety of commercial electronic applications. This excellent book, replete with many easy to understand illustrations, covers the subject from the fundamentals of sound, through the various types of equipment in use, to a wide variation of applications. Among the equipment topics discussed are ultrasonic generators, transducers, pulsed output and transistorized equipment. Some of the most interesting applications include sonar, non-destructive testing, cleaning, drilling, welding, liquid level control, and instrumentation. A noteworthy section on medical-biological effects is included. Not only will electronic technicians find the discussion fascinating, but it will serve as an important background for acquiring more advanced knowledge.

**\*MARINE RADIO FOR PLEASURE CRAFT.** By Harold McKay. Published by Gernsback Library. 160 pages, soft cover. \$2.95.

Users of marine radio are said to be on a giant party line with 60,000 other boats. The prime purpose of marine radio is safety, and we can expect many additional marine craft to install such equipment. The popularity of marine radio offers excellent opportunities for electronic service dealers. The seven sections of this book are operation, receivers, transmitters, power supplies, accessories, depth sounders, and direction finders. There are many photos of commercially available equipment, though there is very little in the way of schematics. An excellent appendix lists marine radio stations, sources of information, Bell System harbor stations, and other useful data.

**\*DIRECT CURRENT ELECTRICITY.** By Alexander Efron. Published by John F. Rider, Publisher, Inc. 100 pages, soft cover. \$2.25.

Another in the publisher's Basic Science Series, this volume covers electrochemistry series, and parallel circuits, measuring instruments, electricity and heat, and induced EMF. Each chapter carries practical experiments and related questions and problems. This is a solid educational text.

**\*BASIC ELECTRONICS.** By Daly & Greenfield. Published by The Macmillan Co. 226 pages, hard cover \$9.00.

Written in England, this text covers a wide range of electronic devices on an intermediate technical level. Subjects include a-c, d-c, magnetism, cold cathode tubes, amplifiers, oscillators, semiconductors, power supplies, input and output devices.

- ▶ save time
- ▶ widen your servicing opportunities
- ▶ advance your career
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Completely rewritten—and up-to-date!

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

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

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

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

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**RIDER COMBINATION**  
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**MANUAL**

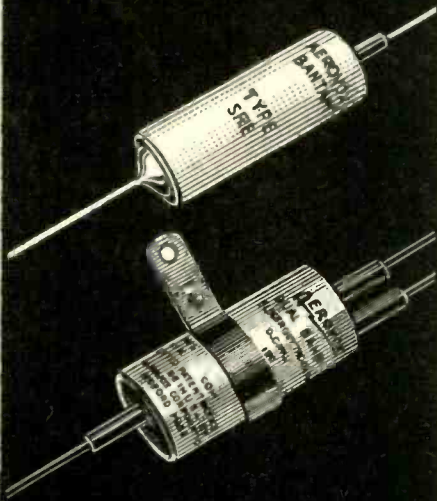
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ET-5

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## AEROVOX TUBULAR ELECTROLYTICS

The most popular 'lytics used in TV and radio service. Long established favorites with all service-technicians, Aerovox electrolytic capacitors can be counted on for dependable performance.

**PRS DANDEES . . .** compact tubular units in aluminum cans with cardboard insulating sleeves. Available in singles, duals, triodes and quads as well as AC rated and non-polarized units. Multiple units are furnished with insulated stranded wire leads 5" long. Available in a wide range of capacity and voltage combinations.

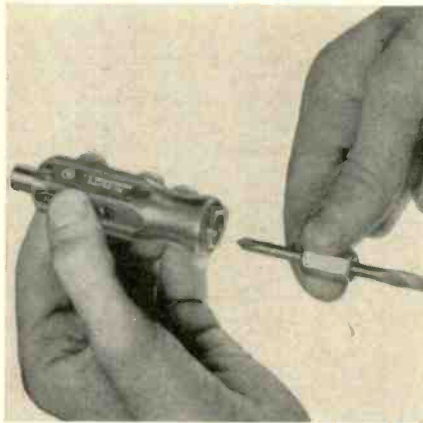
**SRE BANTAMS . . .** smaller than the PRS type but perfectly capable of handling full size loads. Hermetically-sealed in aluminum cans and furnished with cardboard insulating sleeve. Available in voltages of 3, 5, 12, 15, 25, 50, 70 and 150 VDCW in all popular capacities. For "Off-the-shelf" delivery on these and other Aerovox capacitors see your local Aerovox Distributor.

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

For more data, circle 5-98-1 on coupon, p. 43

### Xcelite POCKET TOOL

A 4-way pocket tool, model 600, features a 1/4" nut driver, a 3/16" slotted screwdriver or a No. 1 Phillips screwdriver. It fits Parker-Kalons and all other type of screws commonly applied to the rear panels of TV sets. In a fourth role as a 7/16" nut driver, ideal for fastening antenna fittings. To make it ever-ready for use, a sturdy pocket



clip is provided. Balanced and shaped for working ease, the red plastic handle features a 1/4" socket at one end with a 7/16" socket at the opposite end for driving hex nuts. The double-end blade is inserted in the 7/16" socket to convert the tool to either a slotted or Phillips screwdriver. A patented spring holds it firm. Xcelite, Inc., Orchard Park, N.Y.

For more data, circle 5-98-4 on coupon, p. 43

### EJC REMOVER

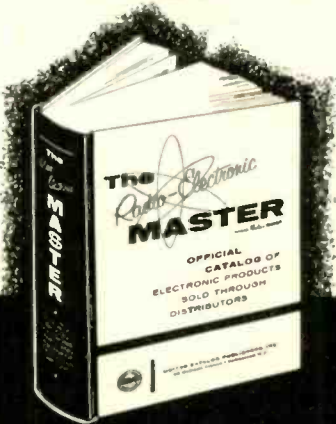
A chemical spray in an aerosol can has been developed to free yokes that are frozen on the neck of picture tubes. Called "FYR" (Frozen Yoke Remover) and designated as catalog number FYR6, is made of a special combination of chemicals said to free any yoke regardless of how hard it may be stuck. Eastern Jewel Corp., 137-21 70 Ave., Flushing, N. Y.

For more data, circle 5-98-5 on coupon, p. 43

### Amperex TUBES

Two tubes, the 6EH7 and 6EJ7, have been designed for TV i-f amplifier applications. Gain-bandwidth product is said to measure 55% higher than some current i-f types. The 6EH7 is a remote cutoff pentode and the 6EJ7 is a sharp cutoff pentode. The larger glass envelope provides better heat dissipation. Another tube, the 6FY5, reported to be an improved version of the 6ER5, has been developed for use in the r-f section of TV tuners. All types are provided with two cathode leads for lower lead inductance. Amperex Electronic Corp., 230 Duffy Ave., Hicksville, N. Y. For more data, circle 5-98-6 on coupon, p. 43

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55T Sewell St., Hempstead, N.Y.

For more data, circle 5-98-2 on coupon, p. 43

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**JW ELECTRONICS** 1538 W. Jarvis Ave., Chicago 26, Illinois  
Telephone Broadway 4-9757

For more data, circle 5-98-3 on coupon, p. 43

ELECTRONIC TECHNICIAN • May, 1960

INDEX TO ADVERTISERS  
May, 1960

Aerovox Corp.	98
Agency: Lescarboursa Advertising, Inc.	
All Channel Products	13
Agency: Picard Advertising, Inc.	
American Telephone and Telegraph Co.	14
Agency: Cunningham & Walsh, Inc.	
American Television and Radio Co.	80
Agency: Firestone Goodman Adv., Inc.	
Amperex Electronic Corp.	20
Agency: Sam Groden, Inc.	
Arrow Fastener Co., Inc.	92
Agency: Thematic Advertising Productions	
Astron Corp.	65
Agency: Conti Adv Agency, Inc.	
Atlas Sound Corp.	70
Agency: Zam & Kirshner, Inc.	
B & K Manufacturing Co.	27, 63
Agency: Henry H. Teplitz Adv Agency	
Belden Manufacturing Co.	22
Agency: The Fensholt Adv Agency	
Blonder-Tongue Laboratories, Inc.	96
Agency: Jack Gilbert Associates	
Bogen-Presto Co.	23
Agency: Jack Gilbert Associates	
British Industries Corp.	64
Agency: Greene-Posner, Inc.	
Bussmann Manufacturing Co.	79
Agency: Henderson Advertising Co.	
Castle TV Tuner Service	82
CBS Electronics	61, 84
Agency: Bennett & Northrop, Inc.	
Centralab Div., Globe-Union, Inc.	4
Agency: Stral Advertising Co.	
Channel Master Corp.	17
Agency: Duso Advertising, Inc.	
Chemical Electronic Engineering, Inc.	84
Agency: Madison Adv Agency	
Chicago Standard Transformer Corp.	9
Agency: Stral Advertising Co.	
Clear Beam Antenna Corp.	60
Agency: Consolidated Advertising Directors	
Communications Co., Inc.	85
Agency: Baxter and Crim, Inc.	
Cornell-Dubillier Electric Corp.	57, 58
Agency: Friend-Reiss Advertising, Inc.	
Delco Radio Div., General Motors	
Corp.	54, 55
Agency: Campbell-Ewald Co.	
Du Pont de Nemours & Co. (Mylar)	15
Agency: Batten, Barton, Durstine & Osborn	
EICO	90
Agency: Zam & Kirshner, Inc.	
Electro-Voice, Inc.	69
Agency: The Jaqua Company	
Entron, Inc.	83
Agency: S. Gunnar Myrbeck & Co., Inc.	
G-C Electronics Co.	77
Agency: Paul J. Steffen Co.	
General Electric Co.—Rec. Tubes	71
Agency: Maxon, Inc.	
General Electric Co.—TV Receivers	100
Agency: Young & Rubicam, Inc.	
Guide Lamp Div.—General Motors	73
Agency: D. P. Brother & Co.	
Hickok Electrical Instrument Co.	11
Agency: Meermans, Inc.	
I-H Manufacturing Co.	68
Agency: Zam & Kirshner, Inc.	
Illinois Condenser Co.	74
Agency: Sander Rodkin Adv. Agency, Ltd.	
International Resistance Co.	94
Agency: Arndt, Preston, Chapin, Lamb & Keen, Inc.	
Jackson Electrical Instrument Co.	25
Agency: R. L. Conhaim Advertising	
Jerrold Electronics Corp.	10
Agency: Irving Gould Advertising	
JFD Electronics Corp.	91, 93, 95
Agency: Delphi Advertising, Inc.	
JW Electronics	98
Littelfuse, Inc.	Cover II
Agency: Burton Browne Advertising	
Luxo Lamp Corp.	94
Agency: David Youner Inc.	
Mallory & Co., Inc., P. R.	2, 3
Agency: The Aitkin-Kynett Co.	

Mellotone, Inc.	67
Agency: Merritt Advertising	
Mercury Electronics Corp.	21
Agency: Nat Kerman Advertising	
Mosley Electronics, Inc.	72
Agency: H. George Bloch, Inc.	
Moss Electronic, Inc.	78
Agency: Bass & Company, Inc.	
Motorola Parts & Accessories	24
Agency: Leo Burnett Co., Inc.	
Motorola Communications & Electronics, Inc.	99
Agency: Kolb & Abraham Advertising	
Multicore Sales Corp.	64
Agency: Greene-Posner, Inc.	
Olson Radio Corp.	91
Agency: Wilson & Wagoner Advertising	
Oxford Components, Inc.	72
Agency: Sander Rodkin Adv Agency, Ltd.	
Perma-Power Co.	16
Agency: Stral Adv Co.	
Pickering & Co.	74
Agency: Greene-Posner, Inc.	
Planet Sales Corp.	76
Agency: Gordon Pihl and Assoc.	
Precision Tuner Service	96
Pyramid Electric Co.	66
Agency: Burton Browne Advertising	
Radio Corporation of America Cover IV	
Agency: Al Paul Lefton Co.	
Radio Corporation of America, RCA Sets Div.	19
Agency: J. Walter Thompson Co.	
Raytheon Co.	5, 6, 7, 8
Agency: Fuller & Smith & Ross, Inc.	
Rider Publisher, Inc., John F.	97
Agency: Jack Gilbert Associates	
Robins Industries Corp.	85
Agency: Post Designs, Inc.	
Scott, Inc., H. H.	92
Agency: Arnold & Co., Inc.	
Seiscor Div., Seismograph Service Corp.	80, 94
Agency: Watts, Payne Advertising, Inc.	
Senore	86, 87, 88, 89
Agency: R. N. Johnson Advertising	
Sherwood Electronic Laboratories, Inc.	97
Agency: Burton Browne Advertising	
Sonotone Corp.	18, 75
Agency: Doherty, Clifford, Steers & Shenfield, Inc.	
South River Metal Products Co., Inc.	68
Agency: South River Advertising & Printing	
Sprague Products Co.	30
Agency: The Harry P. Bridge Co.	
Stromberg-Carlson Co.	28
Agency: The Rumrill Co., Inc.	
Switchcraft, Inc.	93
Agency: Jacobson and Tonne Advertising	
Sylvania Div., General Telephone & Electronics	12, 59
Agency: Kudner Agency, Inc.	
Tarzian, Inc., Sarkes	95
Agency: H. L. Ross Advertising	
Technical Appliance Corp.	Cover III
Agency: Lescarboursa Advertising, Inc.	
Telephone & Electronics Corp.	96
Agency: Rex Ceder Advertising	
Triad Transformer Corp.	82
Agency: Fletcher Richards, Calkins & Holden, Inc.	
Tung-Sol Electric Inc.	81
Agency: E. M. Freystadt Assoc., Inc.	
United Catalog Publishers	98
Agency: Jack Gilbert Associates	
University Loudspeakers, Inc.	29
Agency: Promotion Affiliates	
Utah Radio Products Co.	26
Agency: Wright, Campbell & Suitt, Inc.	
Vaco Products Co.	76
Agency: O'Grady-Andersen-Gray, Inc.	
Webster Electric Co.	78
Agency: Franklin Advertising, Inc.	
Wright Steel & Wire Co., G. F.	70
Agency: H. M. Cutler & Co., Inc.	
Xcelite, Inc.	62
Agency: Harold Worner Co.	

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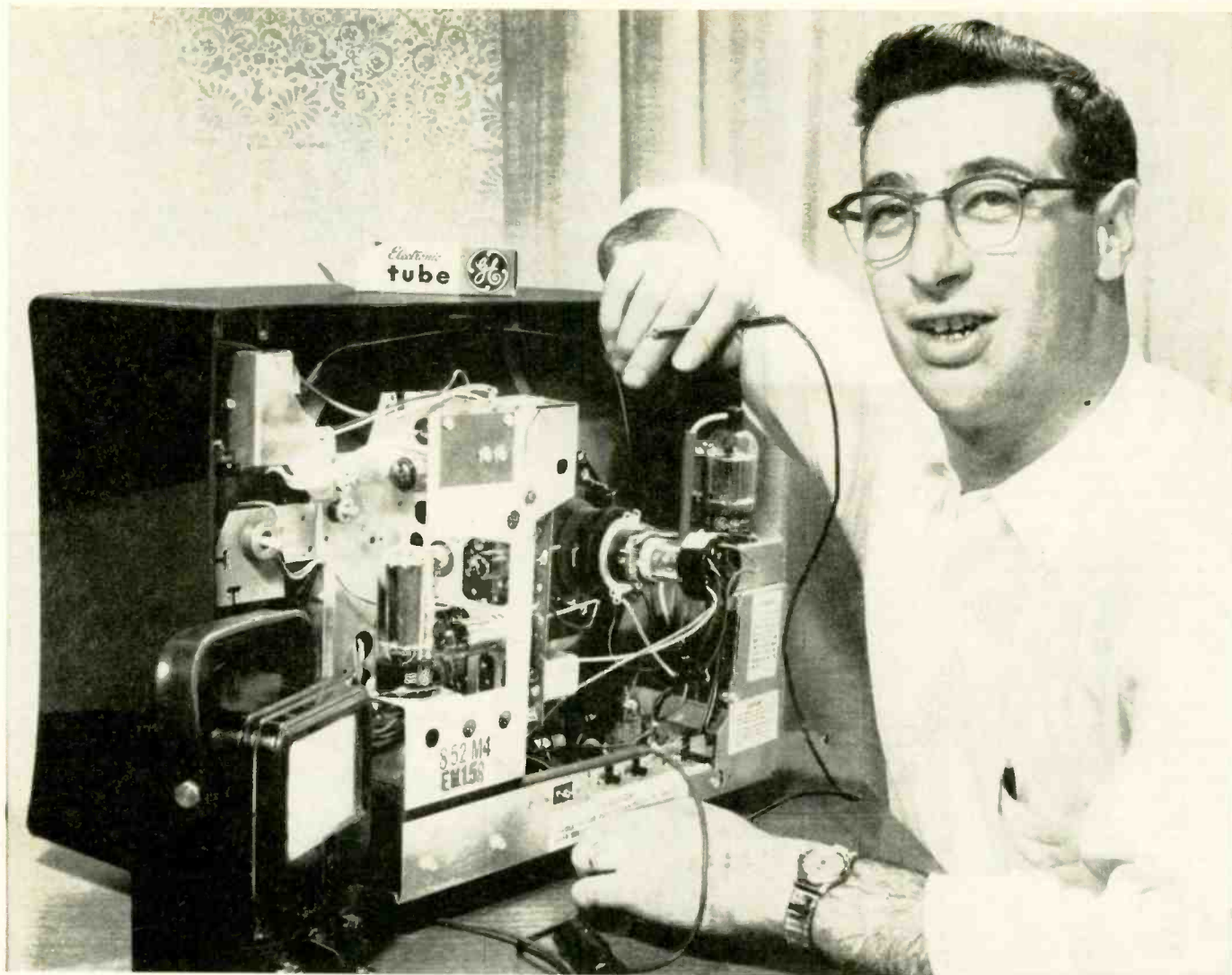
(Please Print)

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ADDRESS \_\_\_\_\_

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

For more data, circle 5-99-1 on coupon, p. 43



# “IT’S A SNAP to get at the chassis in a ‘Designer’”

says Norm Murkoff, Service Manager of Rocket Stores, Inc., Poughkeepsie, N. Y.

“The minute you take the back off any General Electric ‘Designer’ TV receiver the chassis is right in front of you and it’s a snap to get at it,” says Norm Murkoff, Service Manager of Rocket Stores, Inc., in Poughkeepsie, New York.

“Rarely do you ever have to pull the chassis on this set to replace parts or circuit trace so we do 9 out of 10 repairs in the home.

“Because of the higher home completion rate we find we can make more calls and this, of course, means we make more money.

“Another thing we like about the ‘Designer’ is that we can get at both sides of the printed circuitry while the chassis is still in the cabinet.

“Also, the tubes are directly replaceable, fuses are accessible, and you easily get at the key check points. Another thing: the painted schematic on the boards helps us find our way around very quickly.”

**Precision Etched Circuitry** is the name General Electric gives to its circuitry and it is used in all sets. This circuitry is reliable and uniform so that when you’ve serviced one you never have to puzzle over the next one.

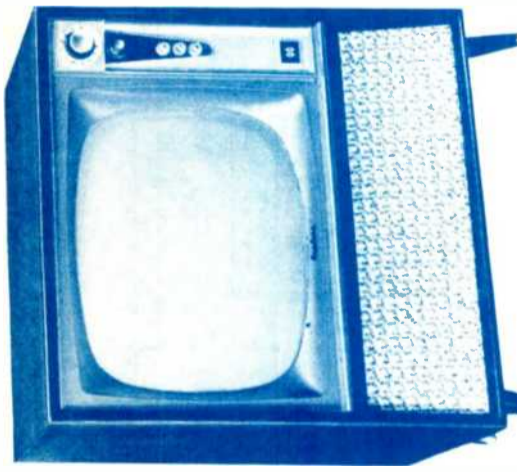
“Designer” TV—called the easiest-to-service set in television! General Electric Company, Television Receiver Department, Syracuse 8, New York.

*Progress Is Our Most Important Product*

**GENERAL  ELECTRIC**

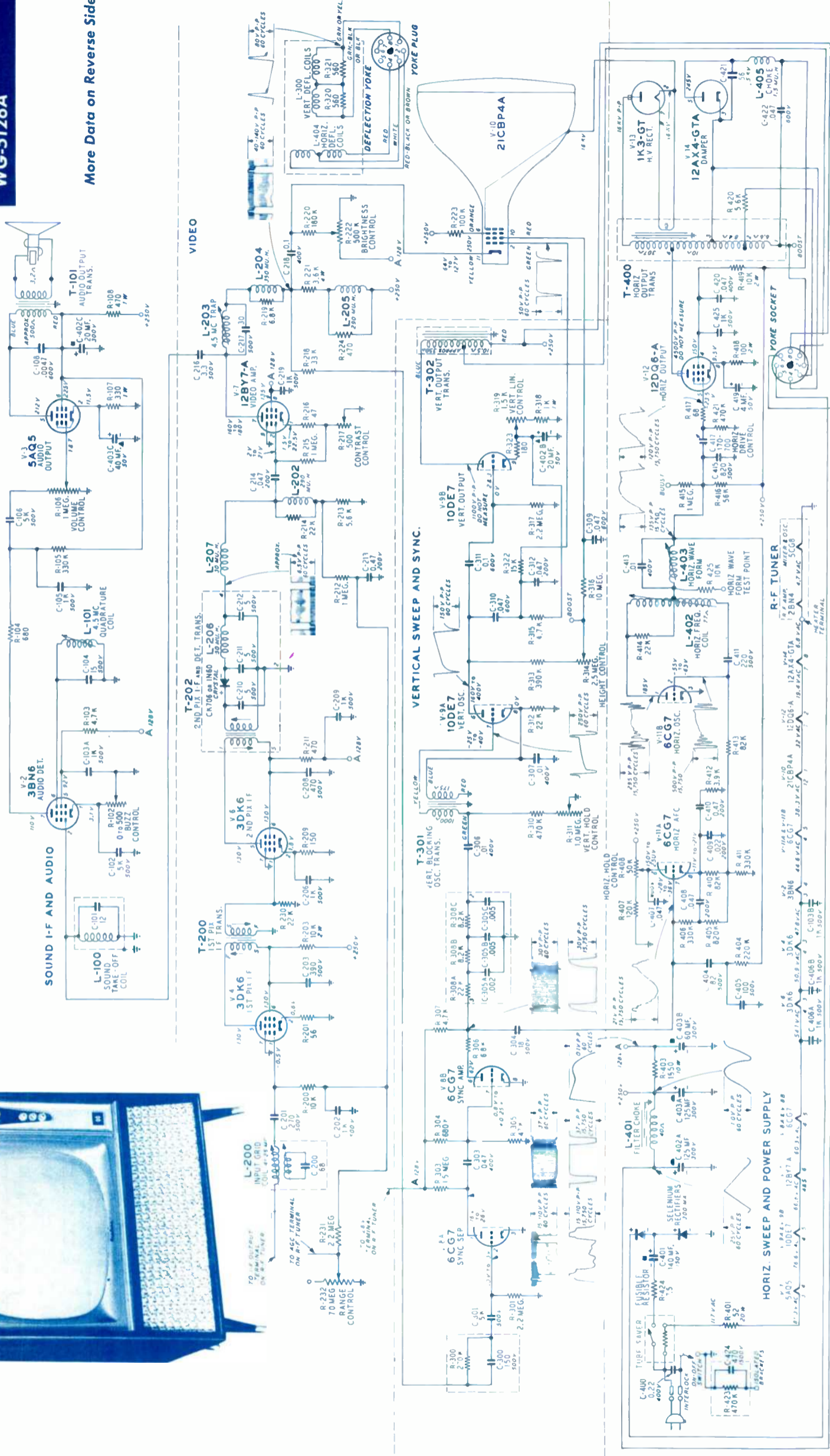


For more data, circle 5-100-1 on coupon, p. 43



**MONTGOMERY WARD**  
(Airline)  
TV Models WG-5025A,  
WG-5026A, WG-5125A,  
WG-5126A

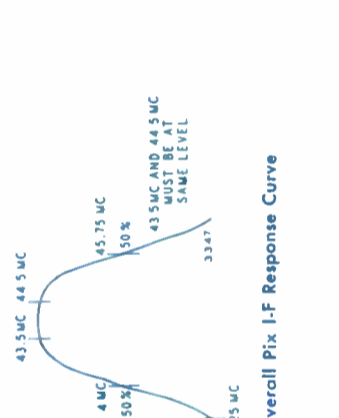
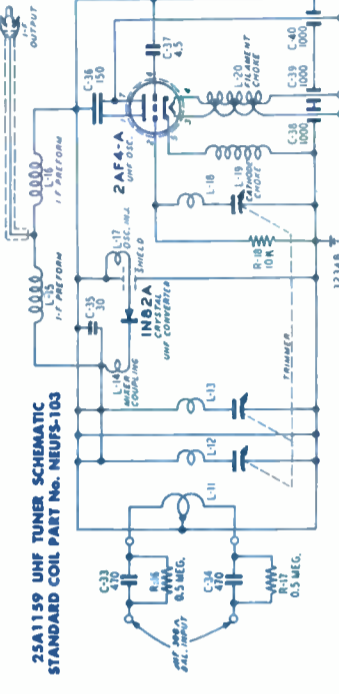
More Data on Reverse Side



NOTE-In UHF receivers the filament voltages in the tuner and above the tuner in the heater string will be slightly greater because of the filament voltages of the tuner tubes

### DC SOCKET VOLTAGES

All DC socket voltages shown on the schematic are measured with a high impedance VTVM and under zero signal conditions.



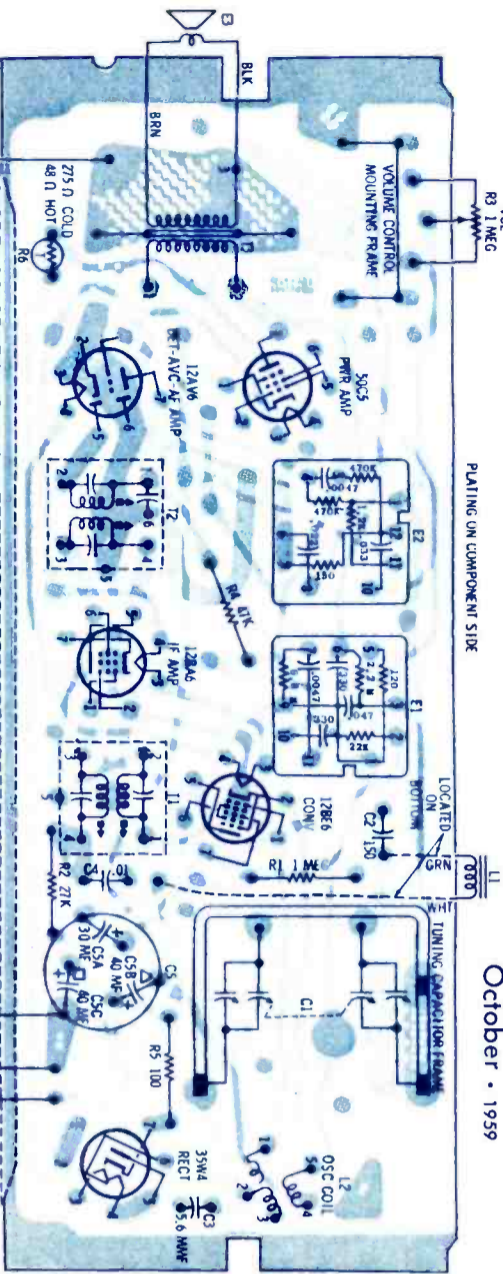
Schematic is divided into four sections with each section having its own series of reference numbers. All resistance values in ohms and 1/2 watt unless otherwise specified. All capacitance values less than 10 in MF, and above 10 in MMF, unless otherwise noted. Coil resistance values less than 10 ohm are not shown. N=1000

Overall Pix I-F Response Curve

# ELECTRONIC TECHNICIAN 526

MOTOROLA  
Home AM-Clock Radio  
Chassis HS-753

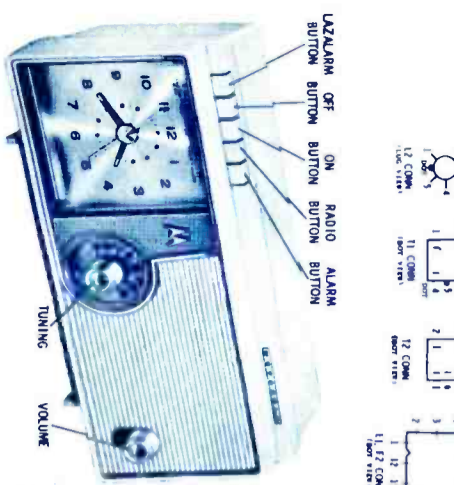
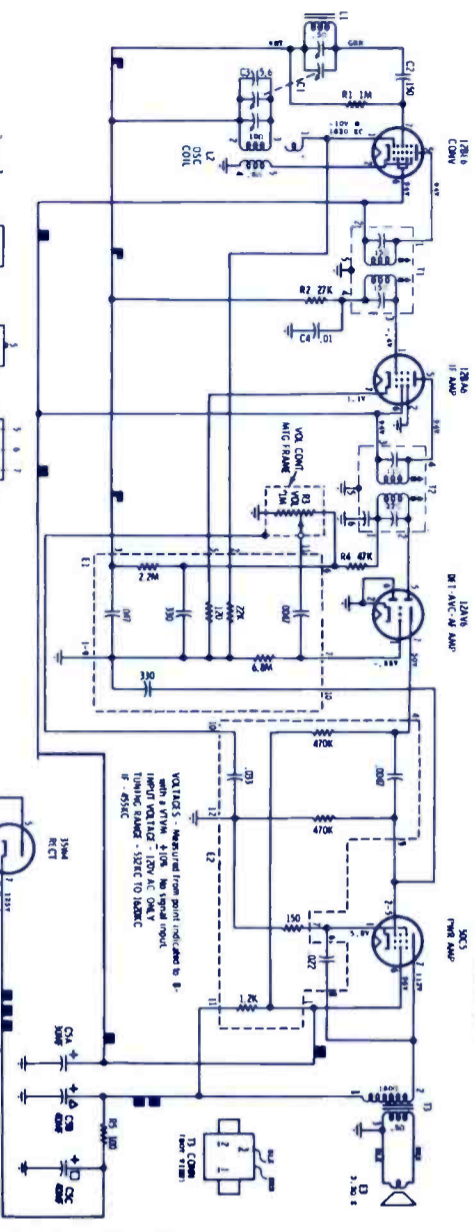
October • 1959



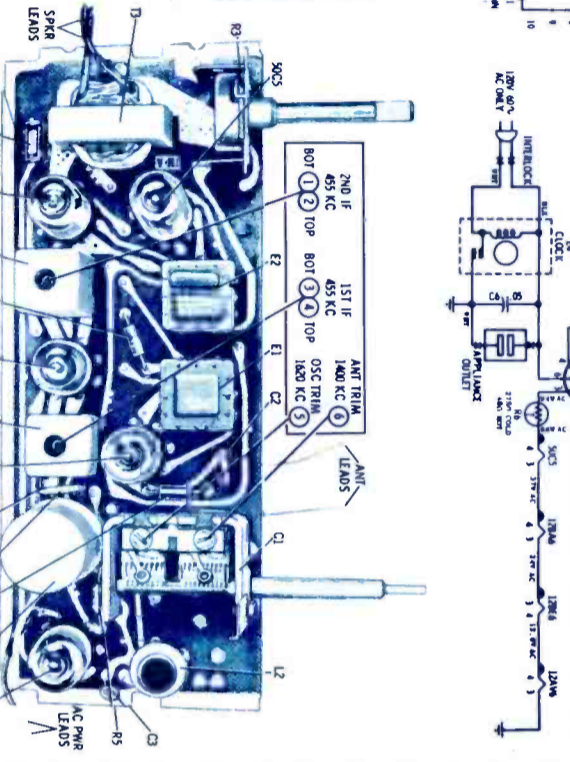
PLATED CHASSIS BOARD WIRING AS VIEWED FROM COMPONENT SIDE

NOTES:  
CAPACITORS - DECIMAL VALUES IN MF. ALL OTHERS IN MMF UNLESS OTHERWISE SPECIFIED.  
PLATED CHASSIS BOARD WIRING LEGEND:  
B = B  
B-8 = B-8  
B-4 = B-4  
FILAMENT = FILAMENT

LOCATED ON COMPONENT SIDE  
TUNING CAPACITOR FRAME  
APPLIANCE CLOCK  
INTERLOCK PLUG  
SUPPORT CHANNEL

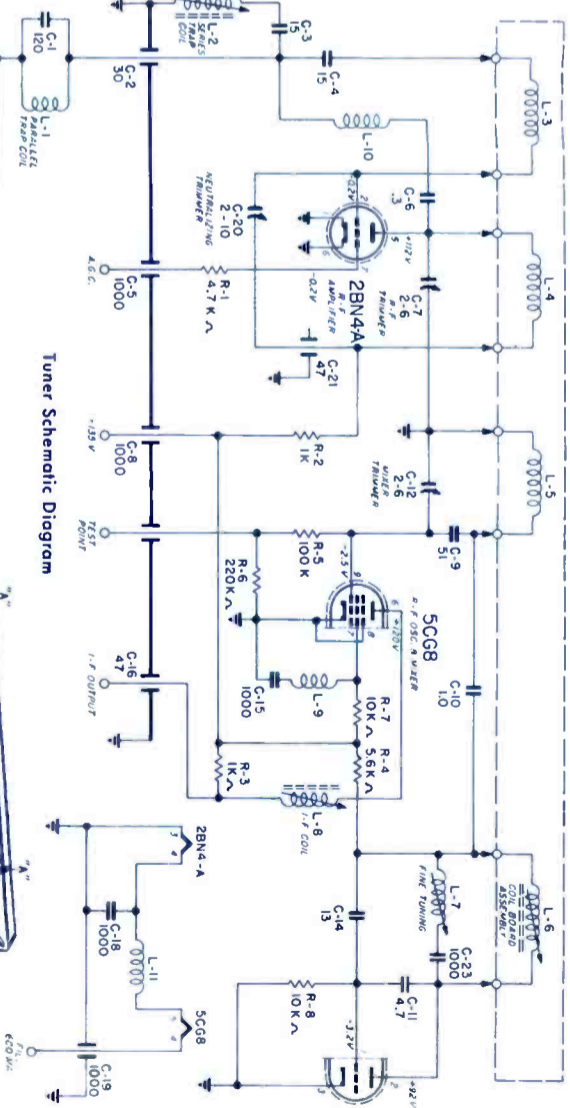


Models CSG, CSS, CSW



## Electronic Technician CIRCUIT DIGEST 526

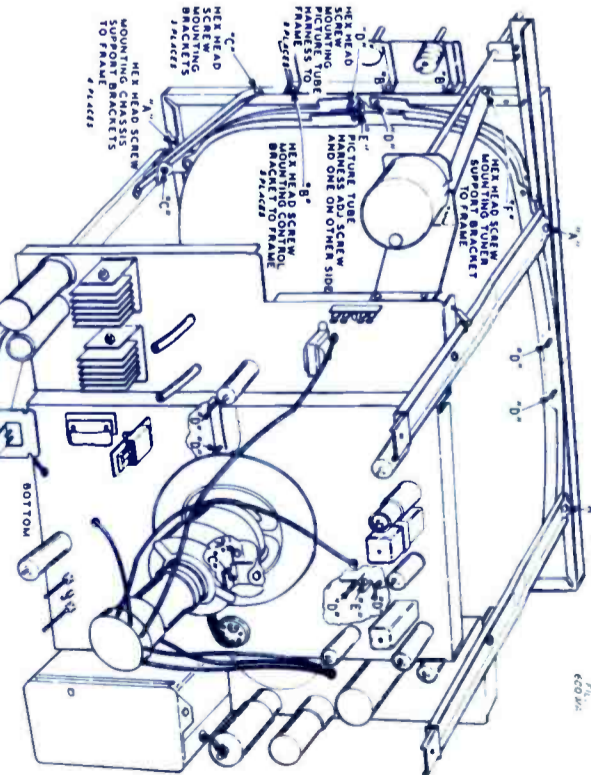
## 25A1178 TUNER INFORMATION STANDARD COIL PART NO. FDNS-110



Tuner Schematic Diagram

## MONTGOMERY WARD (Airline) TV Models WG-5025A, WG-5026A, WG-5125A, WG-5126A

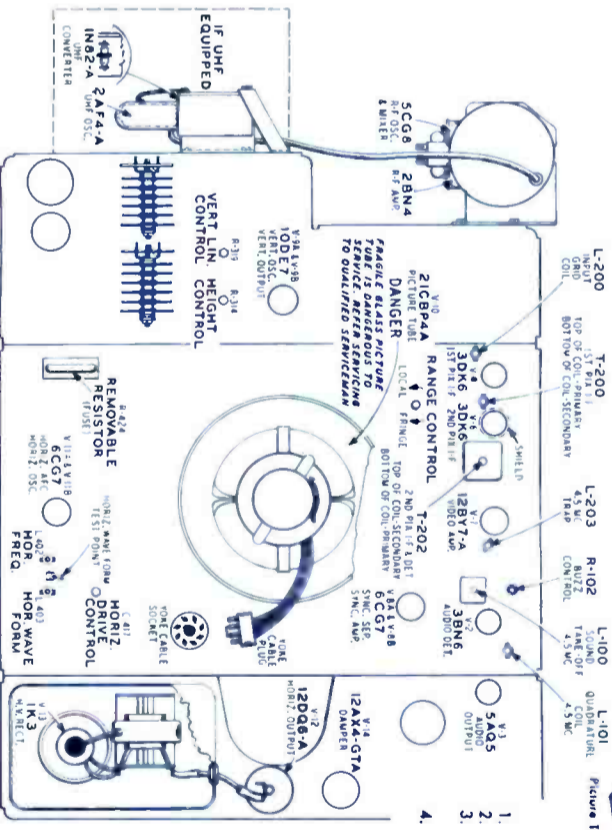
## Electronic Technician CIRCUIT DIGEST 525



PICTURE TUBE REMOVAL (See Fig. 2)

1. Remove 4 screws marked "A".
2. Remove 3 screws marked "B" & 1 screw marked "F".
3. Remove 3 screws marked "C" and lift chassis from Pix Tube Frame Assembly.
4. Loosen 8 screws marked "D" and 2 screws marked "E".

More Data on Reverse Side



Chassis Tube Layout and Trimmers

An Editorial Service of ELECTRONIC TECHNICIAN, INC. ★ 480 Lexington Ave., New York 17, N. Y.

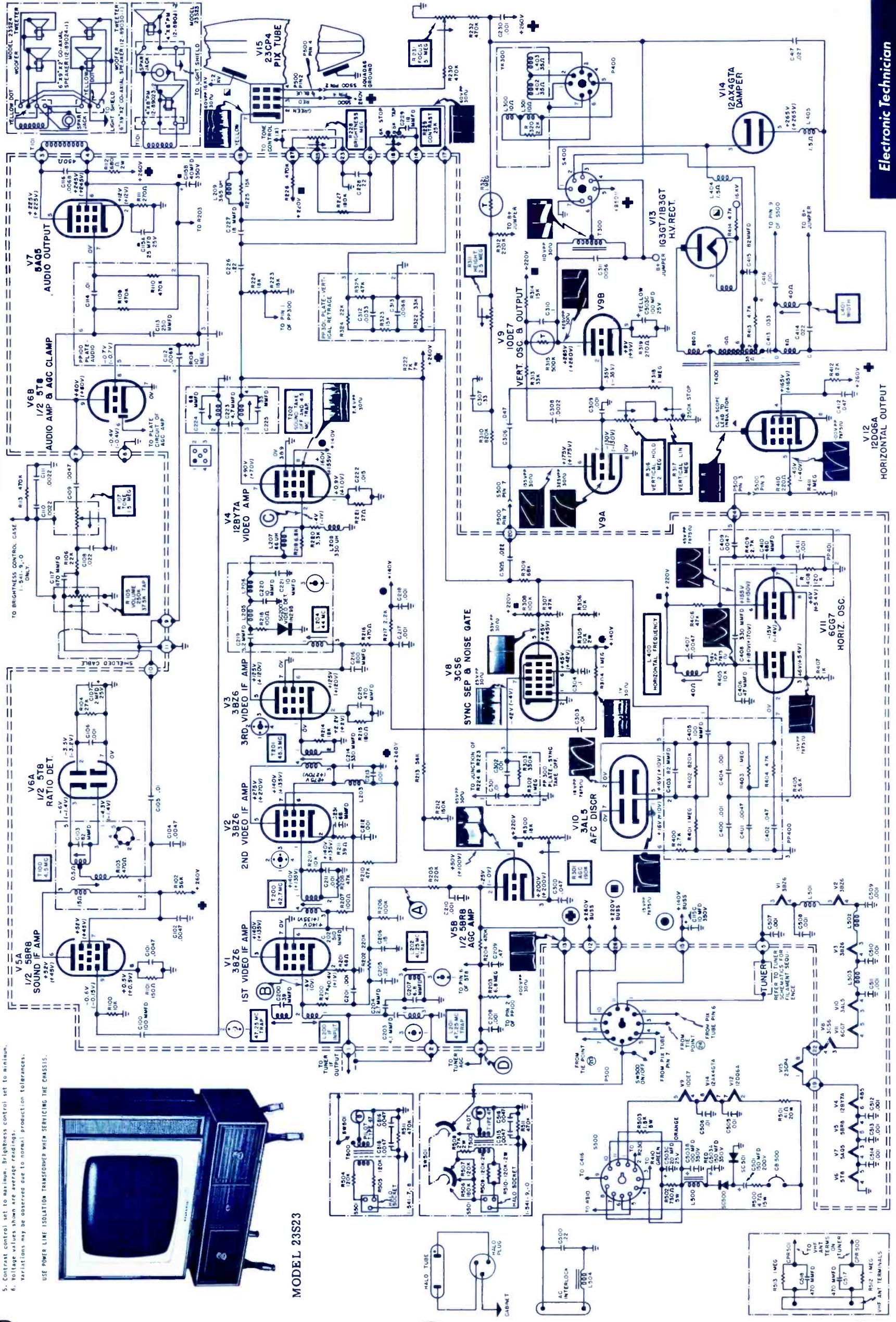


1. Voltages measured to chassis, unless otherwise specified.
2. AC power source 170-60 cycle line.
3. Voltage readings in brackets taken with no signal input; channel selector set to a free channel. Antenna disconnected. Antenna terminals shorted together and grounded to chassis.
4. Voltage readings not in brackets taken with a strong signal input; tuner set to strong local station developing approximately 6 volts on IF AGC buss test point (junction of R205 and R206).
5. Contrast control set to maximum. Brightness control set to minimum.
6. Voltage values shown are average readings. Variations may be observed due to normal production tolerances.

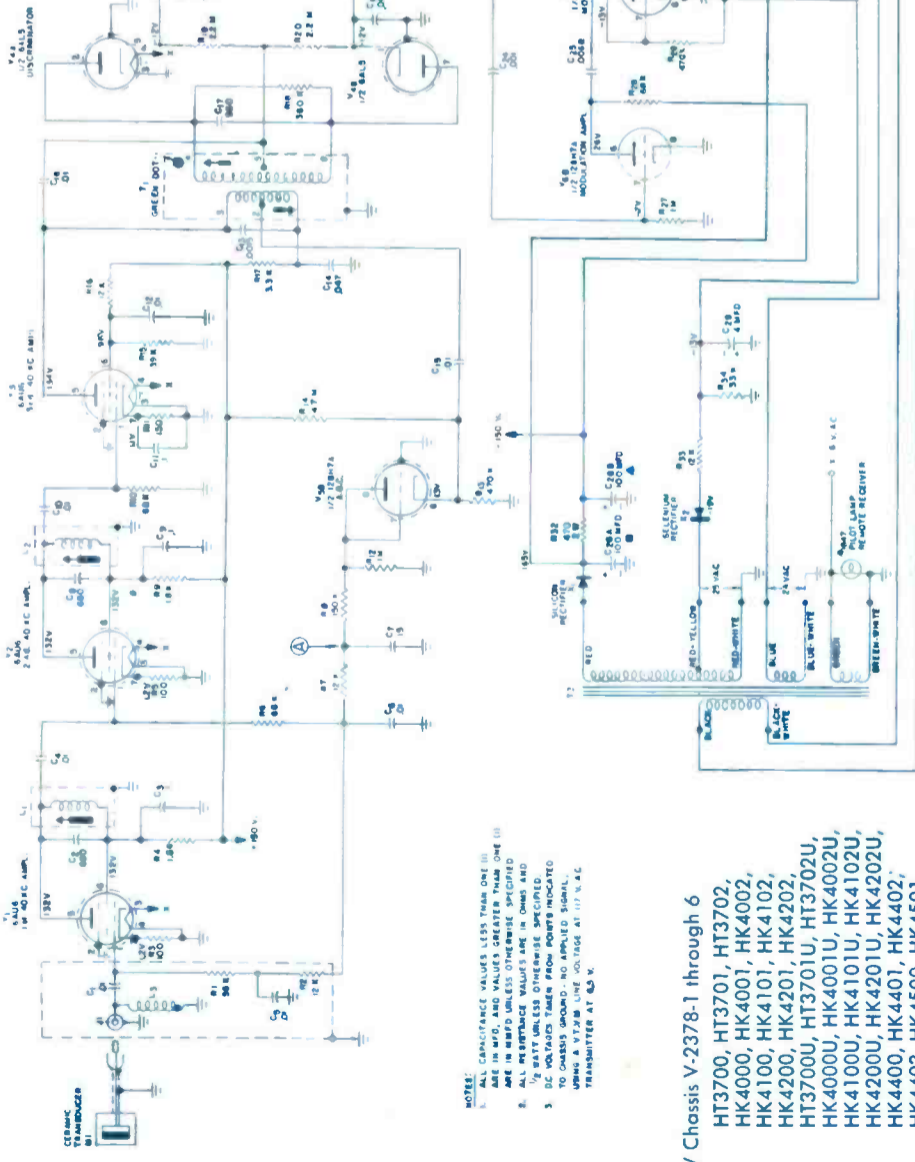
USE POWER LINE ISOLATION TRANSFORMER WHEN SERVICING THE CHASSIS.



MODEL 23S23

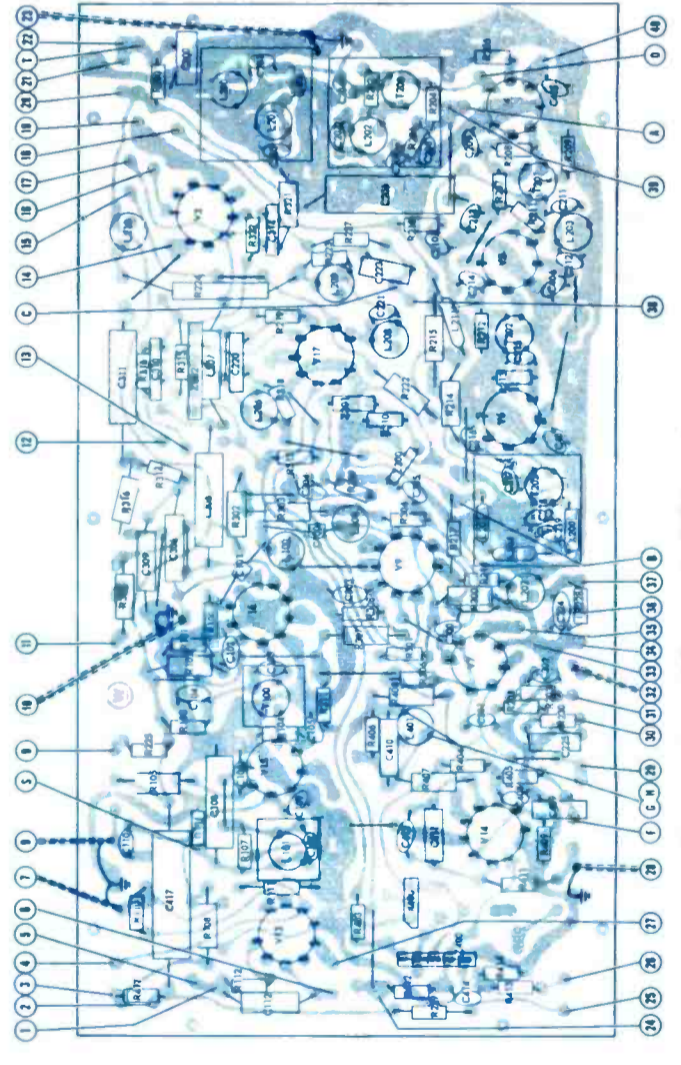






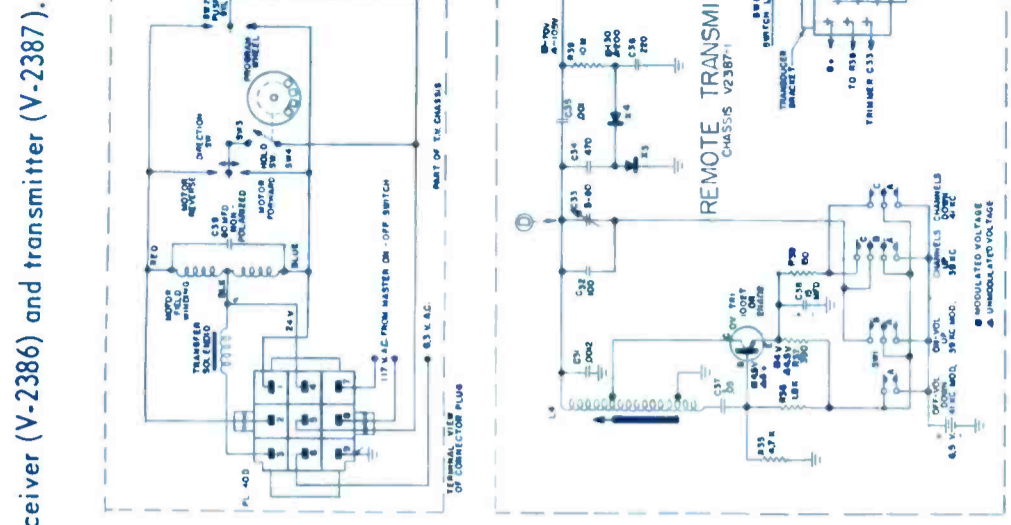
**NOTES:**  
 1. ALL CAPACITANCE VALUES LESS THAN ONE (1) ARE IN PFD, AND VALUES GREATER THAN ONE (1) ARE IN MFD UNLESS OTHERWISE SPECIFIED.  
 2. ALL RESISTANCE VALUES ARE IN OHMS AND UNLESS OTHERWISE SPECIFIED.  
 3. DC VOLTAGE VALUES ARE IN VOLTS.  
 4. TO CHASSIS GROUND; NO UNAMPLIFIED SIGNALS.  
 5. USING A V12M LINE HOLD-TO-TOE AT 117 V. A.C. TRANSMITTER AT 6.3 V. A.C.

**TV Chassis V-2378-1 through 6**  
 HT3700, HT3701, HT3702, HK4000, HK4001, HK4002, HK4100, HK4101, HK4102, HK4200, HK4201, HK4202, HT3700U, HT3701U, HT3702U, HK4000U, HK4001U, HK4002U, HK4100U, HK4101U, HK4102U, HK4200U, HK4201U, HK4202U, HK4400, HK4401, HK4402, HK4403, HK4500, HK4501, HK4502, HK4503, HK4600, HK4601, HK4602

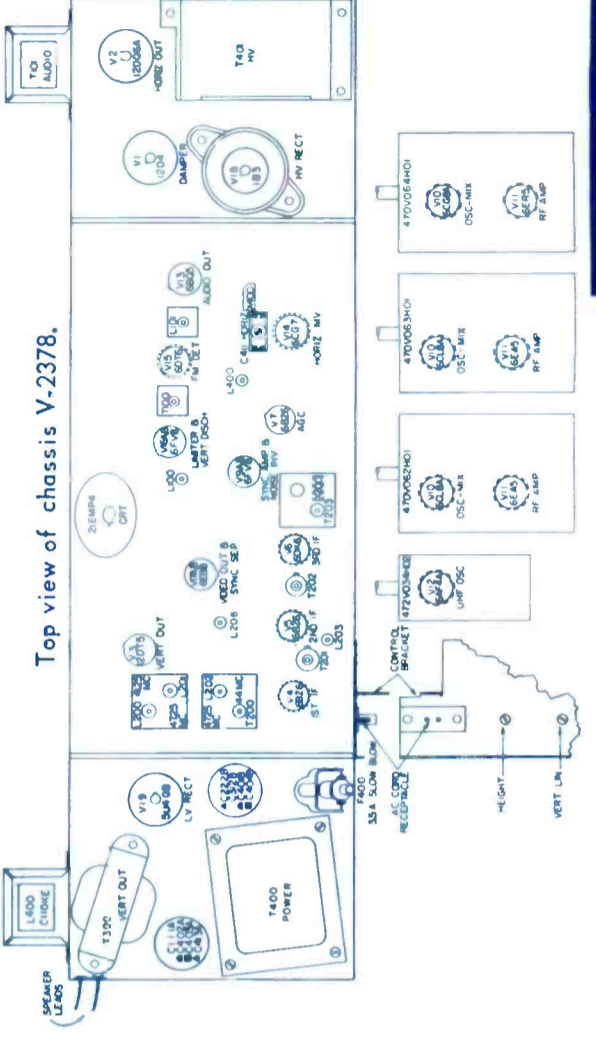


Bottom view of See-matic PC board.

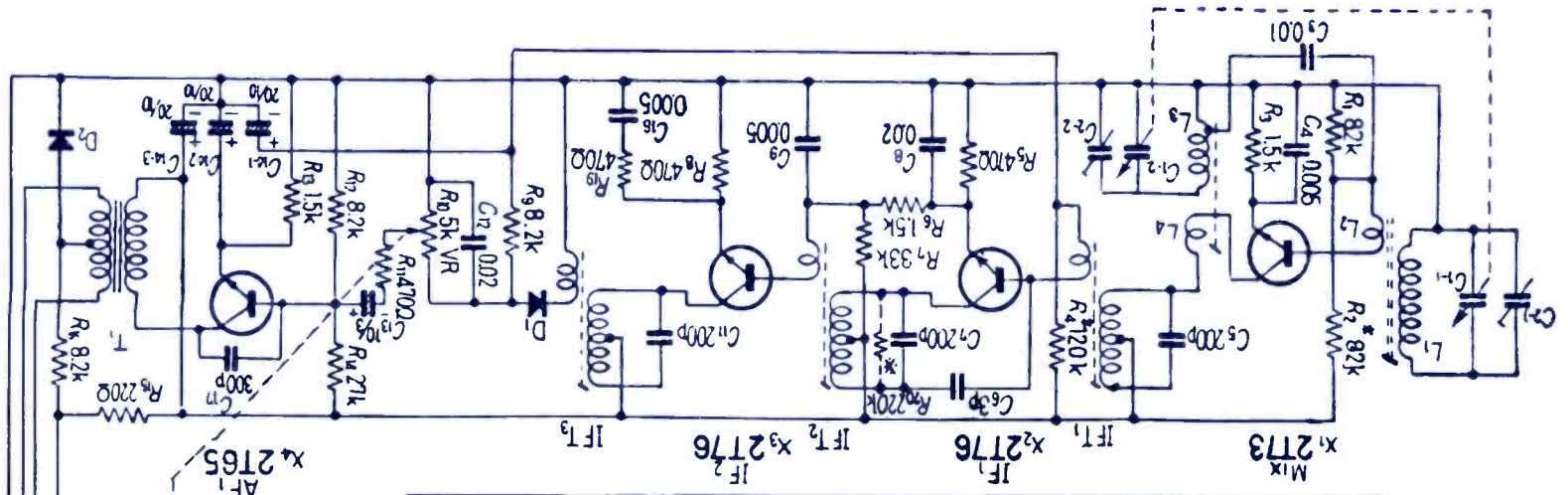
**KEY TO FIGURE**  
 The leads identified by letters and numbers in Figure 1 connect to the following points:  
 1. T101 primary, connect to end wire  
 2. High side of HEIGHT CONTROL  
 3. Junction of C416 & C418  
 4. C111A  
 5. Junction of C404B & R402  
 6. T101 primary, connect to blue wire  
 7. Wiper arm of VOLUME control  
 8. High side of VOLUME control  
 9. High side of BRIGHTNESS control  
 10. High side of VERTICAL HOLD control  
 11. Arm of HEIGHT control  
 12. High side & wiper arm of CONTRAST control  
 13. Wiper arm of VERTICAL LINEARITY control  
 14. T300 primary, connect to plate of V3  
 15. C227B  
 16. Junction C403A & R401  
 17. C312B  
 18. Wiper arm of BRIGHTNESS control  
 19. T300 filament point  
 20. C420A  
 21. Jumper to (3)  
 22. Tuner AGC point  
 23. Tuner IF output point  
 24. C413A  
 25. Pin 2 of V2  
 26. Pin 3 of V2  
 27. Pin 8 of V1  
 28. High side of HORIZONTAL HOLD control  
 29. Junction R415 and L403  
 30. Jumper to (3)  
 31. C401  
 32. C401  
 33. Pin 4 of CRT  
 34. Pin 8 of CRT  
 35. Pin 8 of CRT  
 36. T300 secondary, connect to yellow wire  
 37. Pin 2 of CRT  
 38. Pin 7 of CRT  
 39. Jumper to (3)  
 40. Wiper arm filament wire from T.000 and brown wire



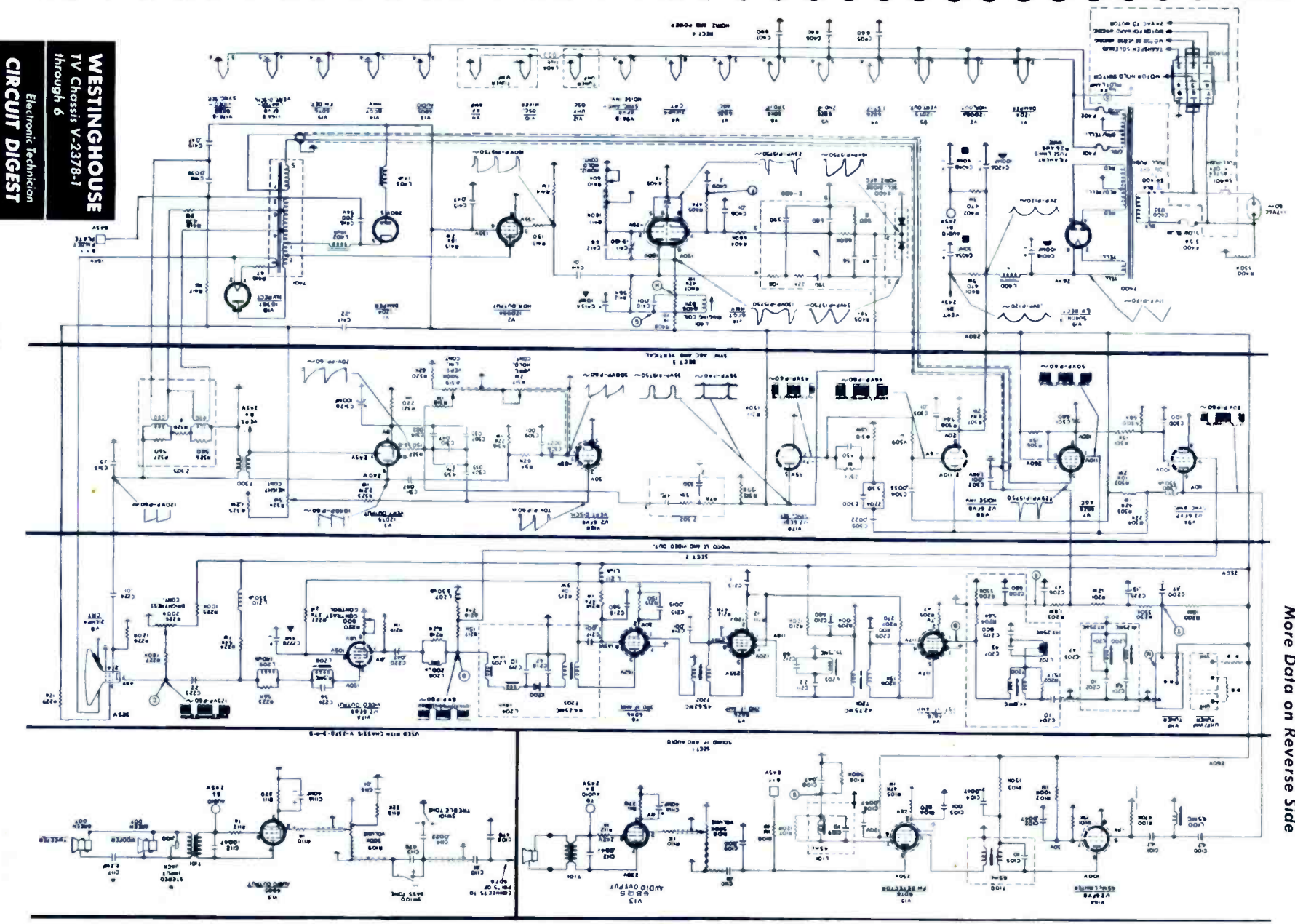
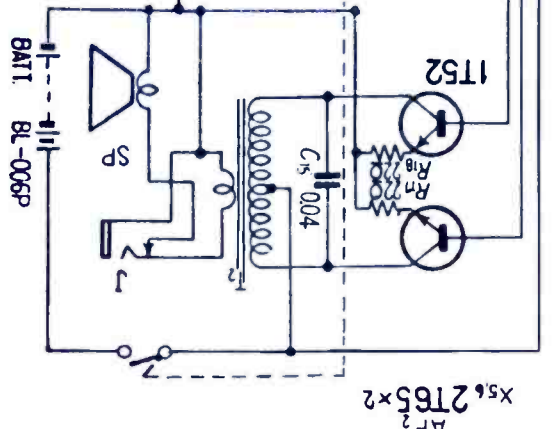
Top view of chassis V-2378.



October • 1959



L1, L2	Ant. coil	R5	470 Ω	C3	0.01 μF
L3, L4	Osc. coil	R6	1.5 K Ω	C4	0.005 μF
I F T1	002-AP	R7	33 K Ω	C5	200 pF
I F T2	002-BP	R8	470 Ω	C6	3 pF
I F T3	002-CP	R9	8.2 K Ω	C7	200 pF
T1	Input Transformer	R10	VR 5 K Ω	C8	0.02 μF
T2	Output Transformer	R11	470 Ω	C9	0.005 μF
J	Earphone Jack	R12	8.2 K Ω	C10	200 pF
S. P.	2 1/4" Dynamic Speaker	R13	1.5 K Ω	C11	200 pF
R1	8.2 K Ω	R14	27 K Ω	C12	0.02 μF
R2	82 K Ω adjust	R15	220 Ω	C13	10 μF 3 V
R3	1.5 K Ω	R16	8.2 K Ω	C14-1	20 μF 10 V
R4	120 K Ω adjust	R17	22 Ω	C14-2	"
C1	Tuning Condenser	R18	22 Ω	C14-3	"
C2	"	R19	470 Ω	C15	0.04 μF
C3	"	R20	220 K Ω	C16	0.005 μF
C4	"	R21	470 Ω	C17	300 pF



More Data on Reverse Side

**WESTINGHOUSE**  
TV Chassis V-2378-1  
through 6

**528**  
CIRCUIT DIGEST

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# ELECTRONIC TECHNICIAN 530

## CIRCUIT DIGEST

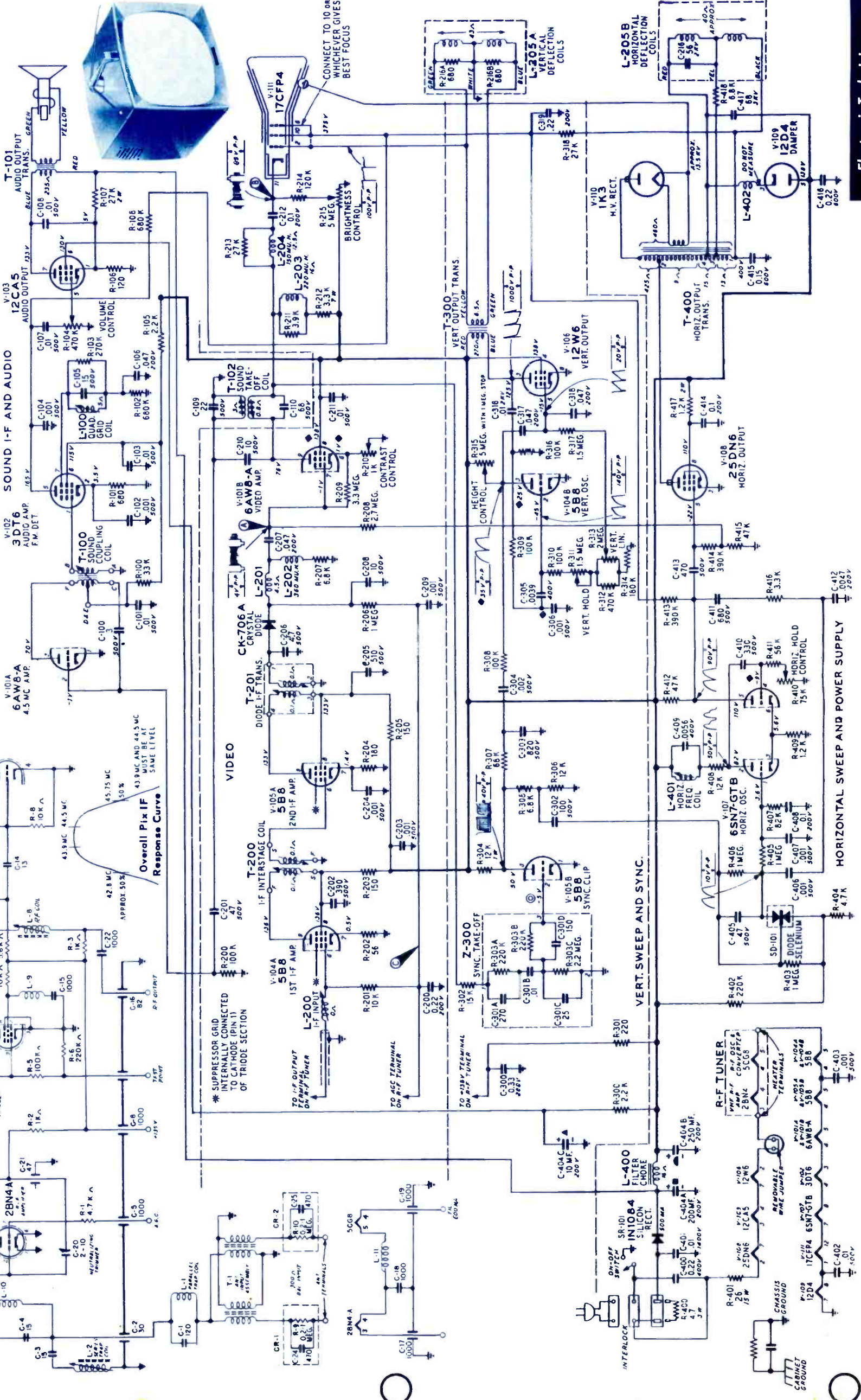
25A1179 TUNER ALIGNMENT STANDARD COIL PART NO. FDNS-107

TRUETONE  
TV Chassis 2DC3030A

October • 1959

◆ VARIES WITH SETTING OF THE ASSOCIATED CONTROLS.  
▲ ALL RESISTANCE VALUES IN OHMS AND  $\frac{1}{2}$  WATT UNLESS OTHERWISE NOTED.  
● VOLTAGE VARIES WITH SIGNAL LEVEL.

SCHEMATIC IS DIVIDED INTO FOUR SECTIONS WITH EACH SECTION HAVING ITS OWN SERIES OF REFERENCE NUMBERS.  
ALL CAPACITANCE VALUES LESS THAN 1.0 IN MMF. AND ABOVE 1.0 IN MF UNLESS OTHERWISE NOTED.



Electronic Technician  
**CIRCUIT 530**  
DIGEST

# ELECTRONIC TECHNICIAN

Trademark

## CIRCUIT DIGESTS

In This Issue (No. 86)

Circuit Digest No.

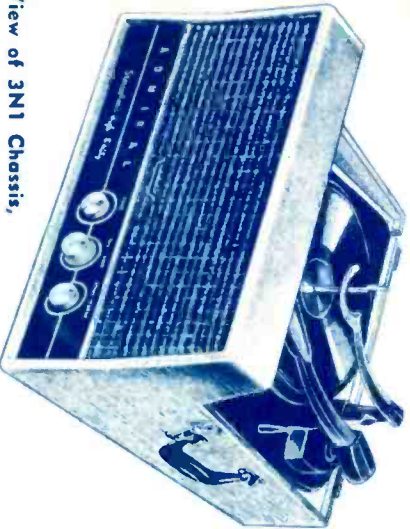
<b>ADMIRAL</b> Stereo Portable Phonograph Chassis 3N1 Models 761, 767	531	<b>TRUESTONE</b> TV Chassis 2DC3030A	530
<b>MONTGOMERY WARD (Airtline)</b> TV Model: WG-5025A, WG-5026A WG-5125A, WG-5126A	525	<b>WESTINGHOUSE</b> TV Chassis V-2378-1 through 6	528
<b>MOTOROLA</b> Home AM-Clock Radio Chassis HS-753 Models C5G, C3S, C5W	526	HT3700, HT3701, HT3702, HK4000, HK4001, HK4002, HK4100, HK4101, HK4102, HK4200, HK4201, HK4202, HT3700U, HT3701U, HT3702U, HK4000U, HK4001U, HK4002U, HK4100U, HK4101U, HK4102U, HK4200U, HK4201U, HK4202U, HK4400, HK4401, HK4402, HK4403, HK4404, HK4405, HK4502, HK4503, HK4600, HK4601, HK4602	529
<b>SONY</b> Transistor Radio Model TR-610	527		
<b>SYLVANIA</b> TV Chassis 1-541, 1-547, 1-548, 1-549, 1-550 Models 23S23, 23S24	527		



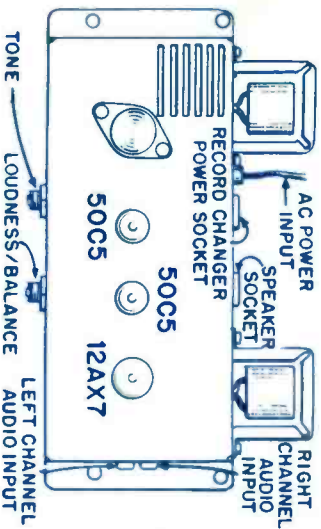
## ELECTRONIC TECHNICIAN 531

CIRCUIT DIGEST

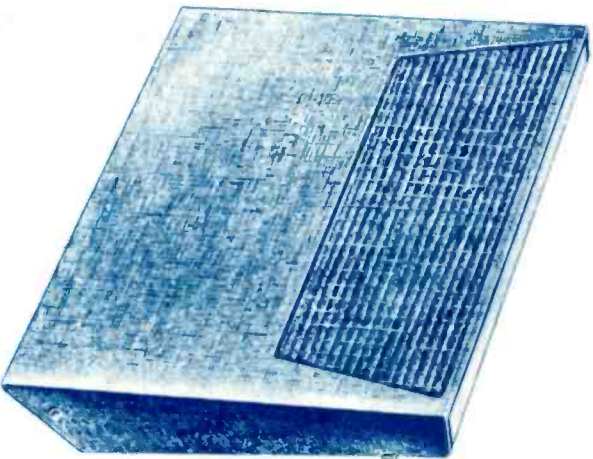
## ADMIRAL Stereo Portable Phonograph Chassis 3N1



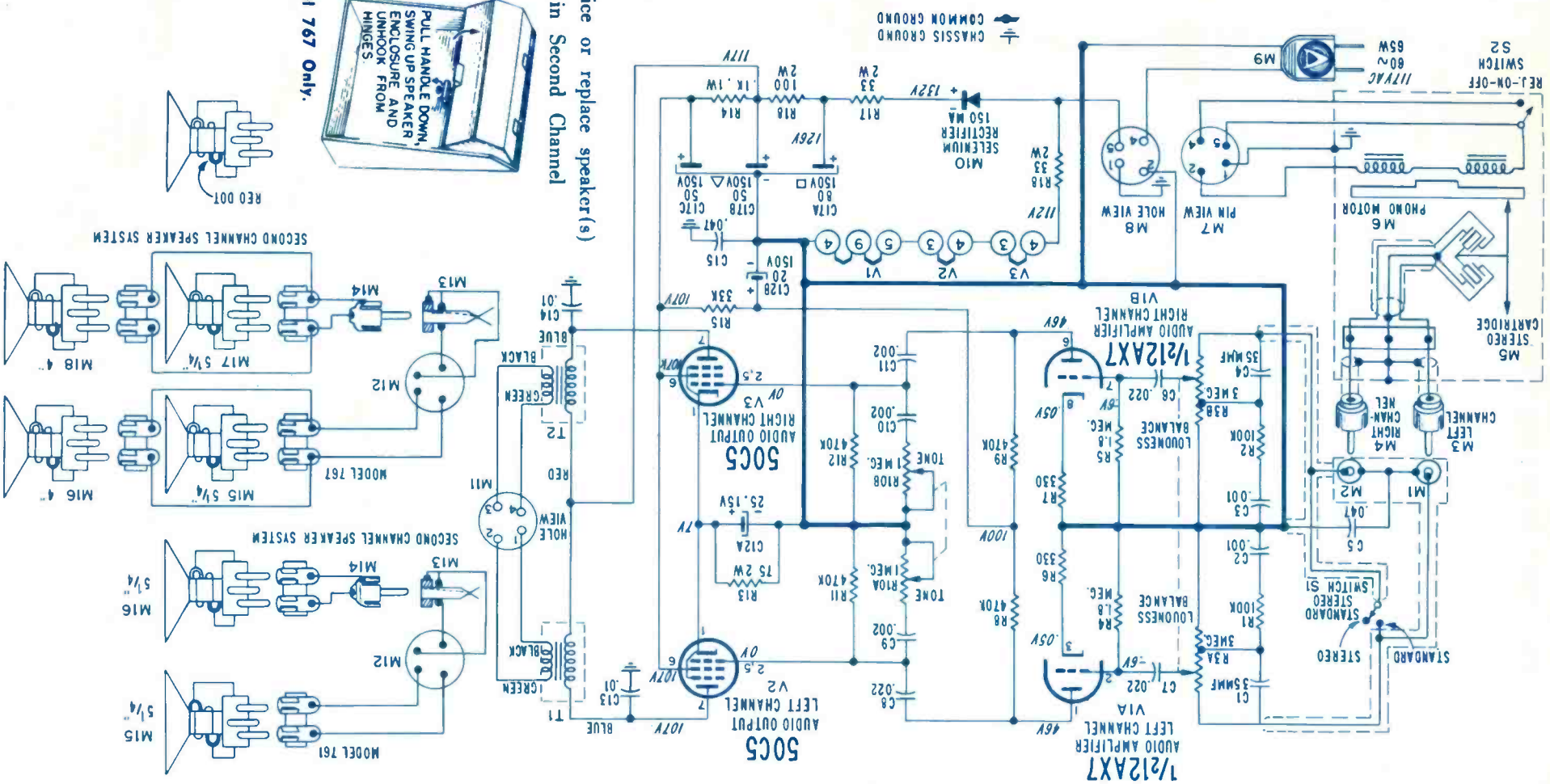
Top View of 3N1 Chassis,  
Tube Locations Shown.



Model 761



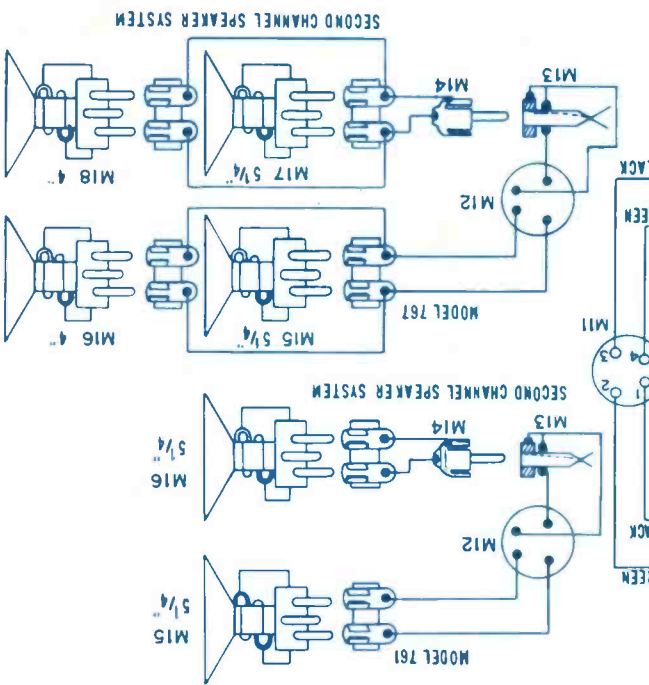
Schematic of 3N1 Stereophonic High Fidelity Amplifier Chassis Stamped Run 10.

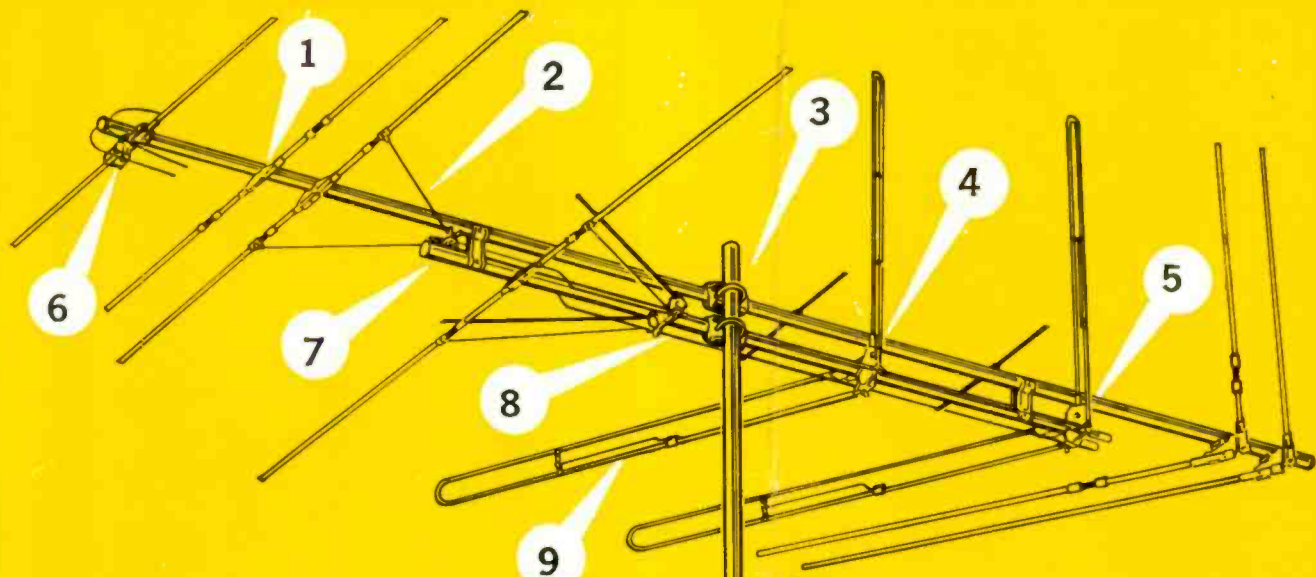


To service or replace speaker(s)  
in Second Channel



Model 767 Only.





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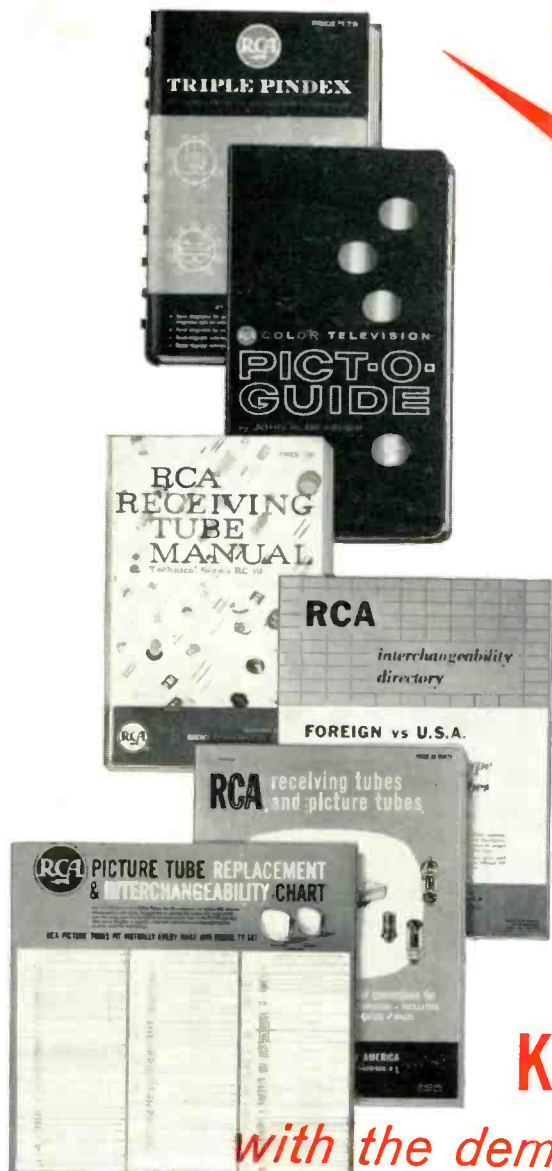
Your distributor T-Bird Man is bringing you the complete T-Bird Story—a profit package like you've never seen before—advertising program, consumer mailings, give-aways, and everything you need for the biggest shot-in-the-arm the antenna industry has ever offered! Watch for him! Ask your distributor for him!

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- 7 TRUSSED BOOM**  
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Positive spacing of elements provides electrical stability throughout VHF range.

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For more data, circle 5-C3-1 on coupon, p. 43



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