

# ELECTRONIC TECHNICIAN

Including 16 pages of  
**Circuit Digests**

A J DIGLIO  
94 SLEEPING GIANT DR  
HAMDEN 18 CONN  
TNE-59N A1 7C458

**THERMISTORS**  
*for Control & Testing*

**50¢**

February • 1958

# You are more apt to get the volume control you need from **your IRC distributor** than from any other source

Whether you need a special exact duplicate control or a standard replacement carbon or wire-wound control, you are almost sure to find it at your IRC Distributor.

He carries the most versatile line of controls in the industry. He offers you better, more complete replacement coverage. He can supply an almost endless variety of combinations of resistance elements and shafts.

He can take care of your needs far more frequently than any other source.

And you can depend upon IRC quality and dependable performance. Exact duplicate TV and Auto Set controls (over 850 of them) are specified to manufacturers' procurement prints—they will fit and operate without modification.

Make your IRC Distributor Your Volume Control Headquarters.

## FINGERTIP COVERAGE OF 3704 MANUFACTURERS' PARTS!



From basic parts, you can now assemble any of 809 different IRC Controls covering 3704 Manufacturers' parts. IRC Dealer Parts Stock No. 22 offers this amazing coverage for only \$93.00. If you already own Parts Stock No. 21, you can get the same coverage simply by adding IRC Conversion Stock No. 21S. Only \$50.00.

Wherever the Circuit Says



**INTERNATIONAL RESISTANCE CO.**

Dept. 574, 401 N. Broad St., Phila. 8, Pa.

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Toronto, Licensee

# ELECTRONIC TECHNICIAN

Including  
**Circuit Digests**

TELEVISION • ELECTRONIC • RADIO • INDUSTRIAL

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February, 1958

**FRONT COVER** Thermistors, a ceramic-like semi-conductor element, have electrical characteristics which make them suitable for application in the field of industry, medicine, home appliances and electronic servicing. See "Thermistors for Control and Testing" on Page 28.

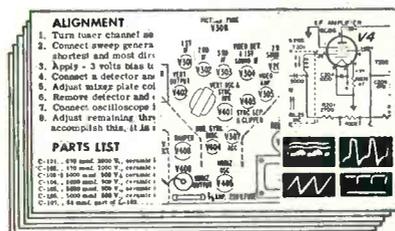
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## CIRCUIT DIGESTS



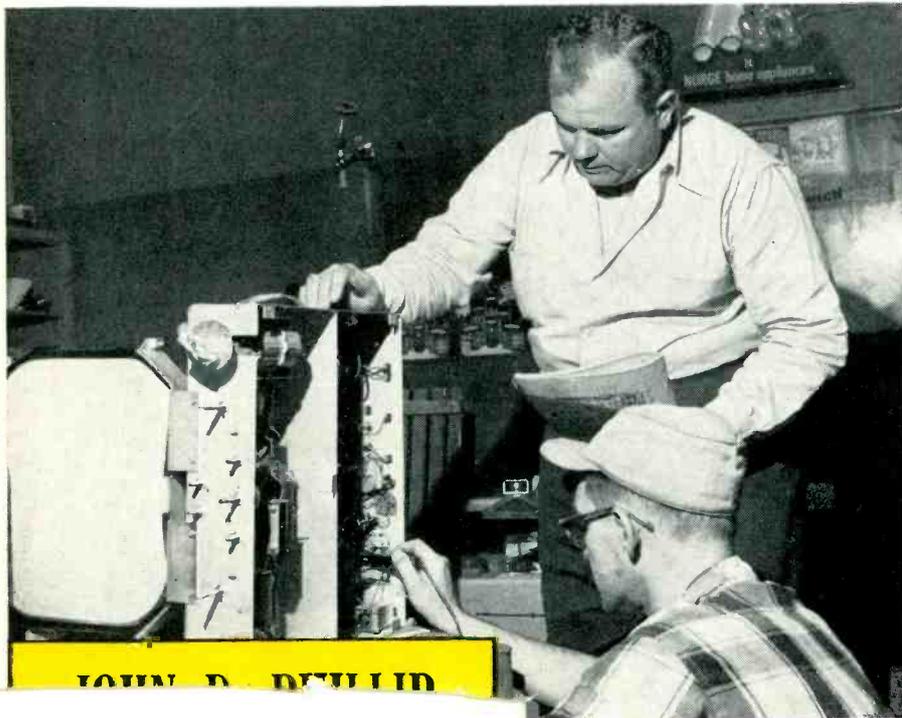
# "THE YELLOW PAGES BRING US ALMOST ALL OF OUR SERVICE BUSINESS"

says JOHN D. PHILLIP, Bethlehem, Pa.

"We can trace almost all of our service business and 50% of our appliance sales to the Yellow Pages of the telephone directory.

"Just the other day we sold a \$349 freezer to a new family in town who found us through our Norge trade-mark listing in the classified. And that sale led to a dryer installation as well. Lots of the service business brought by our Yellow Pages ads leads to replacement sales," says Mr. Phillip.

More and more people use the Yellow Pages as their local shopping guide to nationally advertised products and reliable service. That's why it makes sound sales sense for you to advertise under appropriate headings and manufacturers' trade-marks and to include full buying information in your display ads in the Yellow Pages. Call your telephone business office for details.



JOHN D. PHILLIP has been advertising in the Yellow Pages for twelve years. He says, "They are terrific for developing new business for both sales and service."

**YELLOW PAGES DISPLAY ADS** like this (shown actual size), under Television Dealers & Service and Radio Dealers & Service, plus 19 listings under manufacturers' trade-mark headings, bring in sales and service business from a wide area.

## LETTERS

To the Editor

### Factory Service

Editor, ELECTRONIC TECHNICIAN:

Through factory service, TV manufacturers are anxious to gobble up all the profits. Let them try. They'll be slitting their own throats. You can bet my customers won't wait days for the return of their sets. And a ban on their products by service technicians would nip their plans in the bud. Like your "rag" well, and hope you continue its splendid contents.

GLENN F. DEPOE  
Waynesburg, Pa.

### Tech's Gal Speaks Up

Editor, ELECTRONIC TECHNICIAN:

Your timely letter to *Time* magazine (Nov. 1957 issue) was wonderful. What a pity the general public does not subscribe to your publication. While I am only an office girl employed by a repair firm, and am not a technician, I do come in contact with the customer who reads the trash published by people who have no knowledge of TV repairmen. The customer expects to be "taken" by every repairman because *Time* told them to expect it. Though I work for an honest firm which often takes a loss on a second repair to keep uninformed people happy, I get cussed at least once a day and called a crook by someone I do not know.

BONNIE RUSSELL  
Houston, Texas

### Prices Wanted

Editor, ELECTRONIC TECHNICIAN:

I find your magazine very profitable, and truly the greatest of its kind. However, I do have one complaint. Being a technician, I am always interested in new instruments and other products which you describe. Many of them do not carry prices, and the reader must write to the firm to inquire. If you quoted the price with each article this would not be necessary.

EUGENE J. WILLIAMS  
Washington, D.C.

• Sometimes the manufacturers do not release their prices when they send us an advance announcement, but by the time the item is published this information is available. To save you the trouble of writing to manufacturers individually, you can write one letter to our Reader Service Dept., noting all the item code numbers and companies, and month of issue. Reader Service will route all the requests to the proper people.—Ed.

(Continued on page 9)

FOR ORIGINAL  
INSTALLATION  
AND REPLACEMENT  
THREE  
GREAT NEW  
CHANGERS FROM  
*Collaro*



THE COLLARO CONTINENTAL  
MODEL TC-540

*Featuring the revolutionary new transcription type tone arm. Here, for the first time, is professional quality at a moderate price.*  
\$46.50 list



THE COLLARO CORONATION  
MODEL RC-440

*Combines the custom qualities of the Continental with the flexibility of a standard plug-in arm and universal head shell. Will accept all standard high fidelity cartridges.*  
\$41.50 list



THE COLLARO CONQUEST  
MODEL TC-340

*A radically new, simplified changer with a tone arm that automatically changes and finds the record to be played. Incorporates the new Collaro dynamically balanced transcription type tone arm.*  
\$37.50 list

*Prices slightly higher west of the Mississippi*

Here's a new line of changers from Collaro designed to satisfy high fidelity standards — at a price within the range of every consumer who wants a changer. And at a handsome profit to you).

*When you sell Collaro — you sell the changer tested and accepted by leading American console manufacturers.*

*When you sell Collaro — you sell the changer more and more servicemen throughout America are recommending and installing.*

That's because Collaro quality and Collaro price—backed up by aggressive sales promotion and national advertising campaigns — make Collaro an attractive item for the consumer market.

And this year, Collaro changers feature the revolutionary new transcription-type tone arm. This is a one-piece, counter-balanced unit which takes any standard high fidelity cartridge. It is free of audio spectrum resonances and it permits the last record to be played with the same low stylus pressure as the first record. Between the top and bottom of a stack of records there's a difference of less than a gram in tracking pressure as compared with 4 to 8 grams on conventional changers.

All three models feature: heavy-duty 4-pole, shaded pole induction motors; rim-weighted, balanced turntable for fly-wheel action; 4 speeds plus manual switch for turntable operation; automatic shut-off after last record — and many other exclusive features.

Make your next installation or replacement job — a Collaro. You'll wind up with more satisfied customers that way. (Not to mention your own profit.)

*Write for complete specifications and distributor details to:*



Rockbar Corporation, Dept. C-014  
Mamaroneck, New York

Make extra over-the-counter sales easily with this

# TURNER tape recorder mike replacement package



**T**HIS colorful, attractive microphone display board really turns the trick in selling tape recorder mikes. Instead of just displaying them, it sells them. And it sells the complete unit . . . mike, cable, plug, plug adapter all in one package. (The adapter unit makes the mike fit any make of tape recorder.) All mikes are packaged in superclear plastic bags.

You sell right from the board. Your customer can see the variety you offer in color and style. He sees what he gets with each package. Important,

too, you can give him the mike he wants, when he wants it. No delays while you order from your jobber.

There's no work on your part to keep the display board filled. When your jobber salesman calls, he can see at a glance the exact stock you need. Makes it easy for him to keep your stock of Turner Tape Recorder mikes current.

The Turner merchandising display board is strongly made. Measures 14" x 22". Fits neatly on your counter in a minimum of space or hangs on wall.

Ask your Authorized Turner jobber how you can get one of these Turner display boards today. He has all the details.



IN CANADA: CANADIAN MARCONI CO.,  
Toronto, Ontario and Branches  
EXPORT: . . . AD AURIEMA, INC.  
89 Broad St., New York 4, N. Y.

... for bigger sales,  
the big new

# Super "8"

It's brand new! Extra heavy. The King-size "8" Ball, for today's king-size market . . . but at a regular price! Popular, proved ball mount . . . adjusts up to 35°. Sleek and modern for today's cars. Triple chrome plated. 4 sections extend to 57". 54" lead cable. Outside, one-man installation. Boost your profits with this King of new antennas. Order the Model TCF-4 Super "8" today!

watch



**WARD  
PRODUCTS  
CORP.**

1148 Euclid Avenue, Cleveland 15, Ohio  
Division of The Gabriel Company  
In Canada: Atlas Radio Corp., Ltd.,  
50 Wingold Ave., Toronto, Ontario

# You get a lot to like with SERVICE SAVERS



Improve Reception! Speed Installation!  
Insure Satisfaction!



TELEVISION

**SERVICE-SAVER**

JFD ELECTRONICS CORP. BROOKLYN 4, N.Y.



## PACKAGE!

Look for the bright new red and black box that's tops in TV accessory protection and identification.

## PERFORMANCE!

Forty—count 'em—forty labor-saving, time-saving TV accessories . . . for every reception need! outdoor and indoor set couplers • wave traps • attenuators • antenna switches • voltage regulators • baluns • antenna couplers • lightning arrestors • isolators *Write for literature.*

## PROFITS!

Service-Savers pick up extra profits on practically every installation. Want to couple 2 antennas to 1 lead?—there's a JFD Service-Saver for it! Want to couple 2 TV sets to 1 antenna (indoors or outdoor)?—there's a JFD Service-Saver for it! Want to operate both a TV and Hi-Fi FM set from the same antenna?—there's a JFD Service-Saver for it! Want to cut out interference?—there's a JFD Service-Saver for it!

*Look for the new Service-Saver Dispenser at your JFD distributor.*

Pioneers in electronics since 1929

**JFD ELECTRONICS CORP.**  
Brooklyn 4, N. Y.

JFD Canada Ltd., 51 McCormack St., Toronto, Ontario, Canada  
JFD International, 15 Moore Street, New York, New York



## Editor's Memo



Politeness pays. It pays in terms of higher income and more comfortable personal relations. When you sprinkle your conversation with words like please, thanks, may I, pardon me, and sir, you've taken a big step toward getting the customer to like and respect you.

Sometimes the mechanics of being polite present complications. For example, back in my military days I could remember male enlisted men answering Wac, Wave or Waf officers with: "Yes sir, m'am." Other fellows twisted it around to say: "Yes m'am, sir." It's not always easy to be polite, even when you want to.

There are times when you don't feel like being polite. When Mrs. Complainer accuses you of sabotaging her set, you feel like telling her: "I don't know what I'd do without you . . . but I'd rather." Ah, but that's a time of challenge, a time to look for her sympathetic soft spot, a time to find the words to reach her.

There are several ills which detract from a polite and pleasing impression. To start the list, there's Heavy Thumb, which covers long or repeated ringing of bells or chimes. There's a variation of this for doors with knockers. Bells can be jarring on the nerves, so make your ring short and sweet.

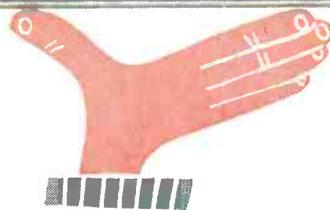
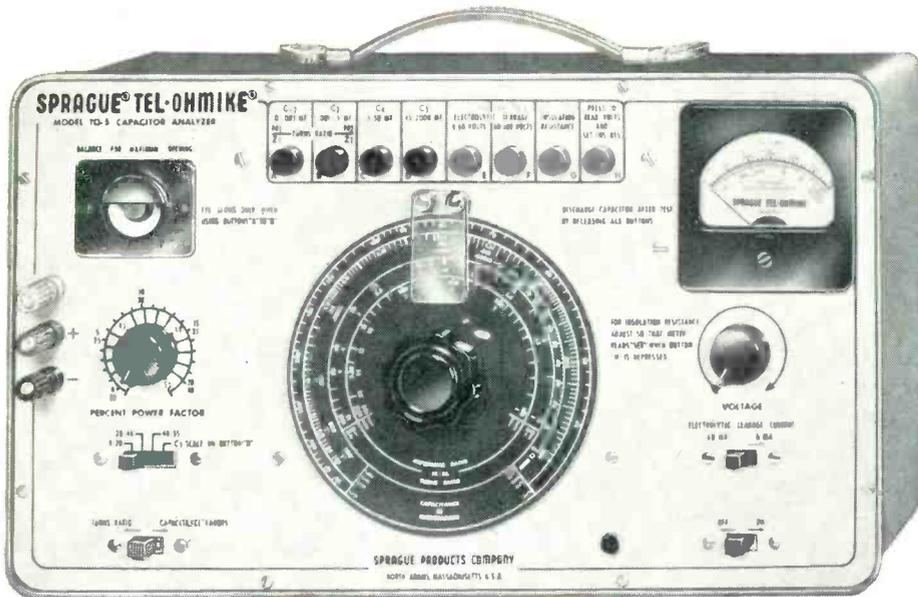
Then there's Trail Blazer, most common on rainy and snowy days. Mrs. Spotless has just spent a half day cleaning the 9 by 12 rug. You're playing with fire when you track the great outdoors into her home.

We can't forget Poker Puss. That's the technician who's afraid his face will crack if he smiles. He'd do better as an undertaker.

Lest you get the wrong idea, I think that impolite or thoughtless technicians constitute a tiny minority, outnumbered by equivalent customers by 10,000 to 1.

If you should ever fall prey to the impossible customer who refuses to respond to any of your polite and charming pleadings, before you tell him where to go, think of this one last comment to toss in his direction: "Sir, I wish I had 50 customers like you." (Under no circumstances should you let him know that you wish this because you actually have 300 like him!)

*Al Forman*



**NEW TO-5 TEL-OHMIKE®  
capacitor analyzer**

**measures all 4 . . . plus**

1 CAPACITANCE	2 POWER FACTOR	3 LEAKAGE CURRENT	4 INSULATION RESISTANCE	extra feature TURNS RATIO
Measures up to 2000 $\mu$ f in five overlapping ranges . . . including an accurate 1 to 100 $\mu$ mf range, exclusive with Sprague.	Power factor of electrolytic capacitors is measured by the highly accurate bridge method. Reads up to 55% in three ranges for convenience in measurement.	Leakage current of electrolytics is measured directly on the meter, with exact rated voltage up to 600 v. applied from continuously adjustable power supply. Two ranges — 0-6-60 ma.	Insulation resistance of paper, ceramic, and mica capacitors is read directly on meter . . . up to 20,000 megohms.	In addition to its function as a complete capacitor analyzer, the TO-5 also measures the turns ratio of power and audio transformers.

The NEW TO-5 TEL-OHMIKE Capacitor Analyzer is one of the fastest and surest ways of measuring . . . capacitance, power factor, leakage current, insulation resistance, and turns ratio. This compact, easy-to-use instrument has the highest accuracy of any instrument of its type available to the service trade.

New jumbo dial makes meter reading easy. Special color-keyed pushbuttons permit instant range selection . . . and allow automatic safety discharge of capacitors after testing. Magic-eye tube simplifies bridge balancing for capacitance and power factor measurements.

**SEE THE NEW TO-5 TEL-OHMIKE IN ACTION . . . AT YOUR DISTRIBUTOR!**

This 4-in-1 test instrument is only 8 $\frac{3}{8}$ " high, 14 $\frac{5}{8}$ " wide, and 6 $\frac{1}{8}$ " deep . . . weighs a mere 12 $\frac{1}{2}$  pounds. The complete price for . . .

MODEL TO-5 (115 VAC/50-60 cy) . . . Only **\$83<sup>90</sup><sub>net</sub>**

Also available: Model TO-5X for 115-230 V/25-60 cy. . . . \$89.90 net  
Model TP-5RM for rack mounting . . . . \$93.90 net



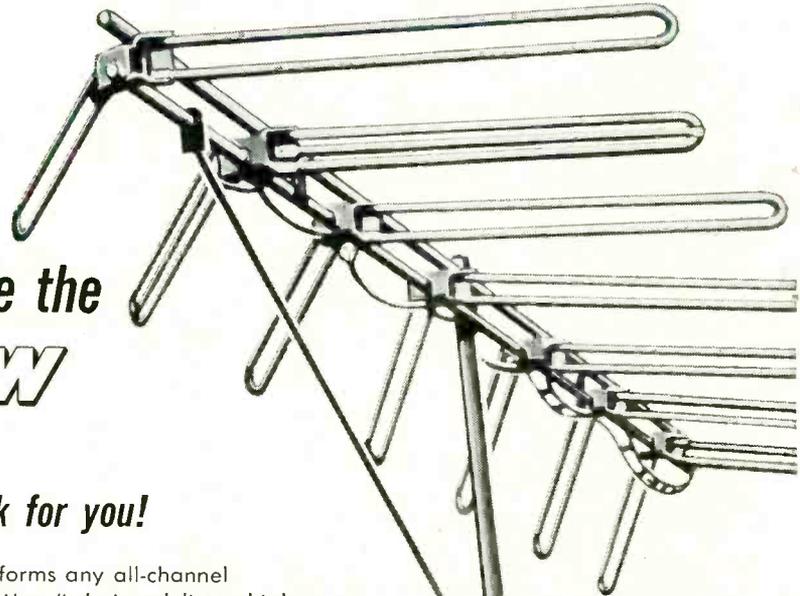
SPRAGUE PRODUCTS COMPANY, DISTRIBUTORS' DIVISION OF SPRAGUE ELECTRIC COMPANY, NORTH ADAMS, MASS.

## YOUR INSTALLATION VOLUME CAN BE GREATER!

If you're *not* a Channel Master Dealer you are probably not getting your share of the *really profitable* antenna installation business. Hundreds of dealers have doubled and even tripled their antenna sales *in less than one year* when they

switched to Channel Master and featured the famous T-W antenna. In fact, far more T-W antennas are bought than any other fringe area antenna. There must be good reasons for this. Below are listed but a few of them.

*How much installation business are you losing every week? ... because you don't feature the CHANNEL MASTER® T-W*



**Put these extra selling advantages to work for you!**

**Superior PERFORMANCE!** Outperforms any all-channel antenna ever made! Revolutionary "Traveling Wave" design delivers highest front-to-back ratios (better than 10:1) — top gain over the entire VHF range.

**Stronger CONSTRUCTION!** Super-strong in every detail of construction: Twin-Boom — the only antenna with 2 full length crossarms; 2 Super-Nests — the most powerful grip that ever held an antenna to the mast; Line-Lok — absorbs all transmission line tension; 7/16" dia. elements.

**Bigger NATIONAL ADVERTISING!** More than 75,000,000 advertising messages in America's leading national magazines. Now saturation coverage with big-space ads blanketing 173 prime outdoor antenna markets.

**LIVE LEADS galore!** Tens of thousands have already responded to Channel Master's Free "Antenna Check-Up Kit" offer — repeated in new national ads. Based on experience, 50% — and more — of these leads are converted into actual sales.

**Local CO-OP ADVERTISING!** The most liberal advertising allowance in the industry — so you can run your own local promotions. Channel Master dealers have the widest array of mats, radio and TV spots, and display materials.

**Promoting ANTENNA REPLACEMENTS!** Channel Master's national advertising hammers home the theme of antenna obsolescence — opening new markets for you!

**7-element**  
model no. 350  
**5-element**  
model no. 351  
**3-element**  
model no. 352

**Call your Channel Master distributor now!**

© Reg. U.S. Pat. Office and Canada

**model no.  
354-1**

including: • 2-element T-W  
• Combination 4 ft. x 1 1/4" aluminum mast and Universal Tripod Mount • 3 Mounting Nails with Neoprene sealing washers • 50' 80 mil wire  
• 6 - 3/4" Standouts • 1 Standout Strap.

**A COMPLETE  
ANTENNA**

**IN ATTRACTIVE  
3-COLOR  
DISPLAY CARTON**

### **NEW "INSTALL-IT-YOURSELF" ANTENNA KIT featuring new 2 ELEMENT T-W ANTENNA**

Designed for top performance in suburban and metropolitan areas. Powerful "Traveling Wave" principle provides the 2-element T-W with better all around performance than a stacked conical.

**Promotionally Priced at \$29<sup>95</sup> list**



**CHANNEL MASTER CORP.**

ELLENVILLE, N. Y.

© Copyright 1957 Channel Master Corp.

WORLD'S LARGEST MANUFACTURER OF TV ANTENNAS AND ACCESSORIES



(Letters, Continued from page 2)

### Short on Circuits

Editor, ELECTRONIC TECHNICIAN:

I find that Circuit Digests include many but not all the TV manufacturers diagrams. Could you print all of the new circuits from all of the set makers in the future?

HAROLD F. DIETER

Long Beach, N.Y.

Is it possible to print your Circuit Digests with one model of one manufacturer on one sheet? You see, I carry the schematics with me on house calls. With your present printing method it is impossible to know that a Motorola schematic is filed with RCA.

T. PETRA

Petra TV Service  
N. Babylon, N.Y.

• There's the rub . . . you can't have full coverage and still print one model per sheet. Most readers prefer us to continue publishing as many circuits as possible; it saves them the several dollars they would have to spend for the circuit at their jobber. Descriptions of systems for filing Circuit Digests are available from us for the asking. Also, we can send you a beauty of a binder to handle 24 issues for only \$2.95 post-paid, add 50¢ in Canada.—Ed.

### It's the Job that Counts

Editor, ELECTRONIC TECHNICIAN:

I have read quite a few letters against the part time technician, or night-crawler as some techs put it. Let me tell them that full time or part time, if you do not do a satisfactory job you will soon know about it. Every electronic technician has a great responsibility to his customer. I think that your magazine is the most informative in the field, and the only one I know of that gives you the latest in new circuits every month.

TED HINKEL

Downers Grove, Ill.

### Disillusioned Technician

Editor, ELECTRONIC TECHNICIAN:

With reference to the government's sudden and frantic effort to train more people for technical fields, my idea is to take better care of the technicians that we now have. I am an electronic technician, and I think a good one. Since 1953 I have been a constant victim of business reductions. Eager to enter the electronic field, I invested 3¼ years of night school and about \$3000. Most of my past employers liked my work. The best wages I was ever able to earn was \$2.15 per hour for 3 months. People get better wages digging ditches.

RUDOLF WEIL

Philadelphia, Pa.



# Unidyne? OR Slendyne?

UNI-DIRECTIONAL DYNAMIC

OMNI-DIRECTIONAL DYNAMIC

## HOW TO CHOOSE THE RIGHT MICROPHONE FOR YOUR APPLICATION

**SHURE**

engineers recommend Unidynes for best performance and Slendynes where versatility is essential.

In selecting a microphone, you must be careful to analyze your needs very carefully. Microphones are highly specialized equipment, and for full satisfaction it is important that you consider, in advance, the uses to which your microphone will be put. Otherwise, you may be paying for features you don't need, and losing advantages your microphone should have.

Wherever feedback is a problem, the choice of a directional microphone is virtually automatic. Only the directional pickup pattern can effectively reduce or eliminate feedback. Furthermore this pickup pattern greatly reduces the pickup of distracting random noises. For floor stand usage, the directional microphone, with its ultra-cardioid pickup pattern, provides far greater freedom for the performer. In the moderate price range, the UNIDYNE is the perfect microphone choice among directional microphones. It is a uni-directional dynamic microphone, and it reduces the pickup of random noise energy by 67%. It is the ideal selection for use with fine-quality public address systems, and its high output permits its use even with low gain public address systems and tape recorders. It has a smooth frequency response from 50 to 15,000 cps.

For applications where versatility is important, the omni-directional probe microphone is the recommended choice. A night club performer, for example, who roams around a large area while he performs, would find such a unit more convenient. The SLENDYNE, for example, can be used in the hand, on a floor or desk stand, or worn around the neck, and can easily be changed—in seconds—from one application to another. Its unobtrusive design permits it to be held close, yet it remains in the background, leaving the spotlight to the performer. It offers a choice of impedance, an optional on-off switch, and a frequency range from 60 to 13,500 cps.

UNIDYNE or SLENDYNE? Choose the one that best suits your particular purpose. Both are fine quality microphones, similar in price, and the choice between them is conditioned by the circumstances in which the microphone will be used. Your Shure dealer will help you evaluate your needs . . . or further information may be had by writing Shure Brothers, Inc.

UNIDYNE Model 55S, List Price . . . . . \$83.00

SLENDYNE Model 535, List Price . . . . . \$72.50

**SHURE**

*The Mark of Quality*

IN ELECTRONICS SINCE 1925

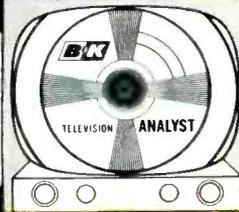
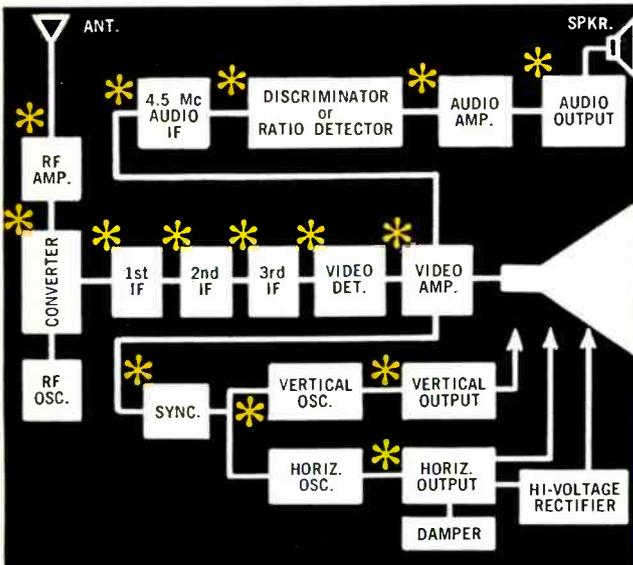
SHURE BROTHERS, INC., 208 HARTREY AVE., EVANSTON, ILL.

**NEW  
COMPLETE**

**DIRECT  
VIEWING**

# TELEVISION ANALYST

**test each stage  
SEPARATELY**



and watch the  
← result on the  
TV set itself

**UNIQUE NEW SIGNAL-INJECTION TECHNIQUE  
Saves TV Trouble-Shooting Time and Work**

- R.F.** Supplies complete r.f. and i.f. signals with video and audio modulation to quickly trouble-shoot each stage in each of the sections of the TV receiver. Enables you to check the r.f. sensitivity and AGC settings of TV receivers.
- I.F.** Reproduces a complete test pattern on the screen of the TV picture tube and injects signals into each video stage of the TV receiver for fast, visual trouble-shooting and correction—anywhere, anytime. Makes it easy to check bandwidth, resolution, shading and contrast capabilities of the TV set.
- VIDEO** Provides composite signal, sync positive and negative.
- SYNC** Provides separate vertical and horizontal driving pulses for trouble-shooting deflection circuits.
- SWEEP CIRCUIT DRIVING PULSES** Provides separate vertical and horizontal driving pulses for trouble-shooting deflection circuits.
- INTERMITTENTS** Test signal injection also aids in locating intermittent troubles.
- AUDIO** Provides a 4.5 mc sound channel, FM modulated with approximately 25 kc deviation. (This audio carrier is modulated either from a built-in 400 cycle tone generator, or from your own external audio source.) Injection of the 400 cycle tone signal simplifies trouble-shooting of the audio section.
- COLOR** Enables you to trouble-shoot and signal trace color circuits in color TV sets.  
Generates white dot and crosshatch patterns on the TV screen for color TV convergence adjustments.  
Generates full color rainbow pattern of orange, red, magenta, blue, cyan, green to test color sync circuits, check range of hue control, align color demodulators, etc.
- SET ADJUSTMENT** Enables you to check and adjust the vertical and horizontal linearity, size and aspect ratio of television receivers.

**NEW**  
**B&K**  
**MODEL 1075**



**QUICK, DIRECT, COMPLETE TV TROUBLE-SHOOTING**

Now, by point-to-point signal injection and test pattern reproduction, you can easily trouble-shoot and signal trace *any stage throughout the video, audio and sweep sections* of black & white and color TV receivers. With the remarkable new Model 1075 B&K TELEVISION ANALYST, you can quickly isolate and diagnose TV troubles (including intermittents). By use of the generated test pattern, you can *actually see* the condition directly on the picture tube of the television set itself. No external scope is needed. The TELEVISION ANALYST is practically a *complete TV service shop in one instrument!* Net, \$25995

**B&K**

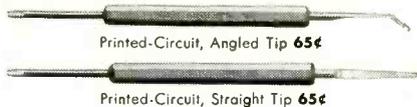
See your B&K Distributor or write for Bulletin 1075-T

**B & K MANUFACTURING CO.**  
3726 N. Southport Ave. • Chicago 13, Illinois

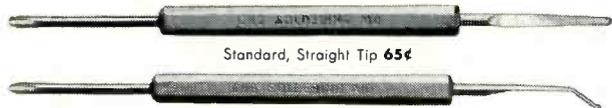
Canada: Atlas Radio Corp., 50 Wingold, Toronto 10, Ont. Export: Empire Exporters, 458 Broadway, New York 13, U.S.A.



7-pin 98¢      Twin \$1.15      9-pin 98¢  
PIN STRAIGHTENERS



Printed-Circuit, Angled Tip 65¢  
Printed-Circuit, Straight Tip 65¢



Standard, Straight Tip 65¢  
Standard, Angled Tip 65¢

SOLDERING AIDS



TUBE TAPPER 10¢



TUBE PULLER 75¢



TUBE LIFTER 30¢



PROBING TWEEZERS 35¢



SOLDER DISPENSER REFILLS 49¢



SOLDER DISPENSER \$1.15



PICK-UP STICK 10¢



4-WAY TOOL \$1.15



7-pin min. \$1.65



8-pin octal \$1.55



9-pin min. \$1.85

TEST ADAPTERS

# These tools can make your work easier



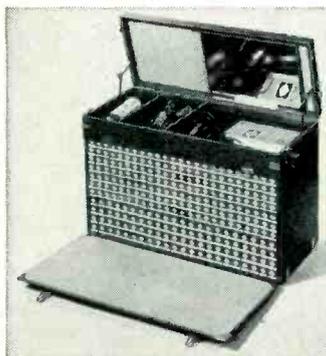
Are you using all eighteen of these tools? Designed by and for the electronic service-dealer, each can save you energy, money . . . and time.

And as you well know, a service-dealer has two major things to sell: his time and know-how. Because CBS tools save precious time, it is not surprising that over 2.5 million have been sold. Service-dealers, engineers and technicians use them habitually. The Soldering Aid, for example, has become a standard.

Many of the tools grew out of a CBS contest. All are time-tested, painstakingly developed and manufactured to give you helpful, foolproof tools. Their quality is tops, yet they are priced most economically.

Order the tools you still need from your CBS Tube distributor — particularly the new Printed-Circuit Soldering Aids. Ask to see the bigger yet handier new Tube-and-Tool Caddy. Or write today for CBS Tool Catalog, PA-6.

Let *all* the CBS tools help make *your* work easier, faster; more profitable.



NEW TUBE-AND-TOOL CADDY \$18.80



**CBS-HYTRON**, Danvers, Massachusetts  
A Division of Columbia Broadcasting System, Inc.

For the best in entertainment tune to CBS

# Focus on Profits

with  
**Centralab**  
**Model B**  
**Controls**



Enlarge your income and develop a long list of satisfied customers. It's easy with Centralab Model B Radiohms in the picture.

This is a replacement carbon control that adapts readily to virtually any application. Universal, fluted, knurled-type shaft fits all knobs—split knurl, shallow flat, deep flat, half-round, round, etc.

AC Line switches snap on, to convert control to switch-type unit.

There's nothing negative about Model B's . . . and you'll get a double exposure of profits. Order today from your Centralab distributor.

Centralab products are listed in COUNTERFACTS and PHOTOFACETS.

# Centralab

B-5806

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**CONTROLS • SWITCHES • PACKAGED ELECTRONIC CIRCUITS**  
**CERAMIC CAPACITORS • SEMI-CONDUCTOR PRODUCTS**

## News of the Industry

**AMPEREX ELECTRONIC CORP.** announces the promotion of **FRANK RANDALL** to President from Vice President and General Sales Manager.

**INTERNATIONAL TELEPHONE & TELEGRAPH CORP.** announced the appointment of **K. O. PRITZLAFF** to West Coast Sales Engineering Manager for vacuum tube products.

**CHANNEL MASTER CORP.** and **KAY-TOWNES ANTENNA CO.** report that a license agreement has been worked out between the companies for the manufacture of conical-yagi TV antennas.

**GENERAL ELECTRIC CO.** reports that in reorganizing transistor and rectifier management, the position of plant manager has been created for each of the Department's three manufacturing plant locations. **THEODORE E. JAMRO** has been appointed Manager of the Buffalo transistor plant and Acting Manager of the Clyde, N. Y. semiconductor rectifier plant. **GEORGE F. PLATTS** was named Manager of the Syracuse semiconductor plant.

**RADIO CORP. OF AMERICA** has awarded thirty undergraduate scholarships and one graduate fellowship in a new program to encourage students to prepare for science teaching careers, according to Dr. C. B. Jolliffe, RCA Vice President and Chairman of the RCA Education Committee.

**MOTOROLA INC.** has announced the following appointments to the firm's Semiconductor Division at Phoenix, Arizona: **H. STEVEN BERCK**, Manager of Distributor and Export Sales, and **JOSEPH A. GENTILE**, Manager of Marketing Administration.

**RAYTHEON MFG. CO.** states that it will discontinue production at its Quincy, Mass. plant of picture tubes manufactured there since 1953, principally for use by TV set manufacturers, although they will continue to supply TV picture tubes to distributors for the replacement market. At the same time, the firm announced plans for a major capital improvement program in their tube and semiconductor plants in Quincy, Newton, and Brighton, Mass., and improvements in existing warehouse facilities for better service to all areas.

(Continued on page 14)

*NOW! Mr. Service Dealer...*

# THE INSTRUMENT YOU ASKED US FOR!

## Brand New **PHILCO** Vacuum Tube Volt Ohm Meter WIDE RANGE PRECISION CALIBRATED

The new Philco Model 6110 Vacuum Tube Volt Ohm Meter was designed to answer numerous requests from servicemen everywhere. A universal AC-DC probe permits quick changes from a-c to d-c measurements simply by flicking a switch. The big, easy-to-read wide angle meter face is easy to read under every service condition. Compact and light-weight it is designed for greater accuracy and as an aid in building your profits.

### LOOK AT THESE SUPERIOR FEATURES

- Extra large, wide angle 5½" meter. D'Arsonval meter movement with 2% accuracy.
- Five DC voltage ranges (Positive and Negative) at 13⅓ megohms input resistance.
- Five High Impedance AC RMS Ranges
- Five Peak to Peak AC Ranges: 0-8-32-160-800-3200 volts P-P.



PHILCO 6110

- Four RF Voltage Ranges with Philco High Frequency Probe (Part # 425-0039). 0-3-12-30-120-RF (RMS)
- 10 X Multiplier Range
- Galvanometer
- Tube complement of 2 type 6AL5; 1 type 12AU7.
- Furnished with AC-DC probe.
- 7¾" high, 5⅝" wide, 4" deep: weight 5 lbs.

For further information see your Philco Distributor or mail this coupon.



WORLD'S LARGEST DISTRIBUTOR OF

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



Philco Corporation  
Accessory Division  
Attention: Carl Areschoug  
Philadelphia 34, Penna.

I would like more information on Philco's new Vacuum Tube Volt Ohm Meter.

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ADDRESS \_\_\_\_\_

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

# SUCCESSFUL TECHNICIANS RELY ON RIDER SERVICE 'AIDS'

## BOOKS • MANUALS • SDO

(News, Continued from page 12)

### FABULOUS "picture-book" COURSE

**BASIC TELEVISION**, by Alexander Schure. This new 5 volume addition to the famous "picture book" courses is the most understandable presentation of black and white television receiver theory at the basic level ever published. It starts with the transmitter and discusses in detail the following subjects: Volume 1, the transmitter; the handling and the operation of the camera; formation of the picture signal and the general content of the transmitter. Volume 2 covers the organization of the entire TV receiver treating each section individually from antenna to picture tube. Volumes 3, 4 and 5 treat with TV receiver circuit explanations. Each volume covers a specific number of sections in the receiver. #198—soft cover, 5 vols. 590 pages (approx.) \$10.00 per set. #198-H all 5 volumes in a single cloth covered binding, \$11.50.

**3rd SUPPLEMENT to the RECEIVING TUBE SUBSTITUTION GUIDEBOOK**, by H. A. Middleton. A must for every technician! Contains more than 830 latest receiving tube substitutions • more than 200 picture tube substitutions • more than 230 American to European tube substitutions • more than 200 European to American tube substitutions • a cumulative index listing the tube types treated in the basic book and all 3 supplements. It pays for itself almost immediately! #139-3—Soft cover, 72 pp., 8½ x 11", illus. Only \$1.35.

**RECEIVING TUBE SUBSTITUTION GUIDEBOOK**, by H. A. Middleton. #135—Soft cover, 224 pp., 8½ x 11", illus., \$3.00.

**FIRST SUPPLEMENT**, #139—Soft cover, 48 pp., 8½ x 11", illus., \$ .99.

**SECOND SUPPLEMENT**, #139-2—Soft cover, 48 pp., 8½ x 11", illus., \$ .99.

**ADVANCED TV SERVICING TECHNIQUES**, by Zbar and Schildkraut. A complete advanced TV servicing course, developed by the Radio-Electronics-Television Manufacturers Association. Shows how to use every conceivable type of test equipment, how to service every part of a TV receiver. Explains latest techniques. Soft cover, 8½ x 11".

**MAIN TEXT**, 192 pp., illus. #161, \$3.60.

**LABORATORY WORKBOOK**, 32 pp. #161-2, \$ .95.

**TV PICTURE TUBE-CHASSIS GUIDE**, by Rider Lab Staff. No busy service technician can afford to be without this easy-to-use TV tube type chassis guide. It covers all picture tube types used in TV receiver production from 1946 to February 1957—over 7,000 listings. This reference guide is organized by chassis number, and in some cases, by models so that the technician can immediately locate the correct picture tube type simply by knowing the chassis number. #204, Only \$1.35.

**REPAIRING TELEVISION RECEIVERS**, by Cyrus Glieckstein. The most modern completely practical book, written by an expert with long experience in television receiver repair. Devoted to trouble-shooting and repair techniques which are modern, yet down-to-earth. Covers the use of simple as well as elaborate test equipment of all kinds. Profusely illustrated. Soft cover, 212 pp., 5½ x 8½", illus. #191, Only \$4.40.

**HOW TO READ SCHEMATIC DIAGRAMS**, by David Mark. Covering the symbols and abbreviations used in schematic diagrams related to the electronics field, this book starts with individual components and carries through to receivers and similar equipment. Components and circuits are identified, explained. 160 pp., illus. #208, \$3.50.

**VACUUM TUBE RECTIFIERS**, by Dr. Alex. Schure. The latest addition to the famous Rider Electronic Technology Series is an encyclopedia on rectifiers. It includes over 25 illustrations diagramming the function of rectifiers and establishing their relationship within the circuits. Tables show comparisons of the products of the major manufacturers. The text on each device or concept, is supplemented by examples. #166-21, \$1.50.

**BASICS OF DIGITAL COMPUTERS**, by John S. Murphy. Written by John S. Murphy, an outstanding personality in the computer field, this three volume "Picture-Text" course covers the fascinating and ever-expanding field of electronic digital computers. With its many branches of programming, maintenance, design, sales, estimating customer-requirements, etc., the technician or the electronics hobbyist will find it of great value. Coming soon.

Finest TV service information available anywhere

### RIDER TV MANUALS



# TV 22

## NOW AVAILABLE

The most successful technicians have always used and relied upon Rider Television Manuals. The reason—they are the only bound source of unbridged, accurate TV receiver servicing information prepared by receiver manufacturers.

Completely Current with TV Production

TV 22 includes the latest color TV sets, portables and 110" slim sets. The factory-approved and factory-authorized data of 19 TV set manufacturers are covered in this 1600 page manual. Also covered are latest VHF-UHF tuner data; production runs and changes; cumulative index—volumes 1 to 22; manufacturers' circuit descriptions; current information on private label brands; printed circuit layouts and other valuable data.

Makes TV Servicing Easy

Rider Manuals have proven themselves to be best by test among leading service technicians. They are designed for easy use, already bound—completely indexed. TV 22 contains this valuable and easy-to-use information: installation data; signal waveforms for troubleshooting; alignment; voltage charts; test equipment set-ups; tube layouts; printed circuit bottom views and frequent component call outs; tuners and boosters.

Rider TV Manuals furnish the same information that the original TV receiver manufacturer and his distributor use for servicing. This means accuracy, authenticity and completeness of detail—the finest TV service information available anywhere.

Rider's TV 22 is available now at your local parts jobber. If your jobber doesn't handle Rider TV Manuals, write direct. Order TV 22 today—limited printing. **Only \$24.00**

**REPAIRING HI-FI SYSTEMS**, by David Fidelman. This book deals with finding the troubles and repairing faults in hi-fi equipment with no test instruments—simple equipment—and elaborate equipment. Typical troubles are analyzed and repaired through a system of logical steps. Soft cover, 212 pp., illus. # 205, \$3.90.

**INDUSTRIAL CONTROL CIRCUITS**, by Sidney Platt. Control circuits are responsible for the rigid regulation and control of countless industrial processes. They constitute the core of industrial electronics. This book covers those control applications most frequently encountered in industrial electronics. The uses of industrial control circuits are discussed and described in detail, showing how basic electronics is applied to these circuits.

### RIDER'S NEW SDO SERVICE

("single diagram only")

ONLY 50¢ PER CHASSIS AT YOUR LOCAL JOBBER

MUST READING FOR EVERY TECHNICIAN

**HOW TO INSTALL & SERVICE INTERCOMMUNICATION SYSTEMS**, by Jack Darr. #189, 152 pp., \$3.00. **SERVICING TV AFC SYSTEMS**, by John Russell, Jr. #192, 128 pp., \$2.70. **SERVICING TV VERTICAL & HORIZONTAL OUTPUT SYSTEMS**, by Harry Thomas. #150, 176 pp., \$2.40. **TV TUBE LOCATION & TROUBLE GUIDE (RCA)**, by Rider Lab Staff. #194, 56 pp., \$1.25. **HANDBOOK OF 630-TYPE TV RECEIVERS**, by Miller & Bierman. #174, 200 pp., \$3.50. **HOW TO USE METERS**, by John F. Rider. #144, 144 pp., \$2.40. **HOW TO USE TEST PROBES**, by A. Ghiradi & R. Middleton. #165, 176 pp., \$2.90. **HOW TO SERVICE TAPE RECORDERS**, by C. A. Tuthill. #167, 160 pp., \$2.90.

Rider books, manuals, SDO are available at your Parts Jobber. Look for the Rider Bookseller. If these books are not available, order direct. T-2

**THE PHILCO CORP.** reports that WILLIAM BALDERSTON, Chairman of the Board of Directors, is retiring from the Company after twenty-six years of service.

**CENTRALAB**, a Division of Globe Union Inc. has appointed EDWARD WAGONER as Sales Assistant in the variable resistor division.

**INTERNATIONAL RECTIFIER CORP.** announces that LOWELL S. PELFREY has been named Director of Research and Development.

**GENERAL ELECTRIC CO.** announces the appointment of DONALD R. KINGDON as District Sales Manager for receiving tubes and other components sold through distributors in a portion of metropolitan Los Angeles, all of San Diego, and throughout Arizona.

**ALLEN B. DU MONT LABORATORIES, INC.** reports that an exclusive license to manufacture and sell Du Mont TV receivers, hi-fi phonographs, and radios in Canada has been executed with Electrical Products Mfg. Co. Ltd., Mount Royal, Quebec.

**WELLER ELECTRIC CORP.** will complete their new and consolidated headquarters in Easton, Pa., early this year. The firm states that the new 52,000 sq. ft., one-story, building will house executive, sales, manufacturing, engineering, research and design operations, and provide additional warehouse facilities.

**WESTINGHOUSE ELECTRIC CORP.** has named HENRY F. FRAILEY Operations Manager for power and special purpose tubes at the Elmira, N. Y. plant. WALTER FLECK has been named Manager in charge of all operations of the Bath, N. Y. receiving tube plant, replacing B. W. SAUTER recently named General Manager of this division.

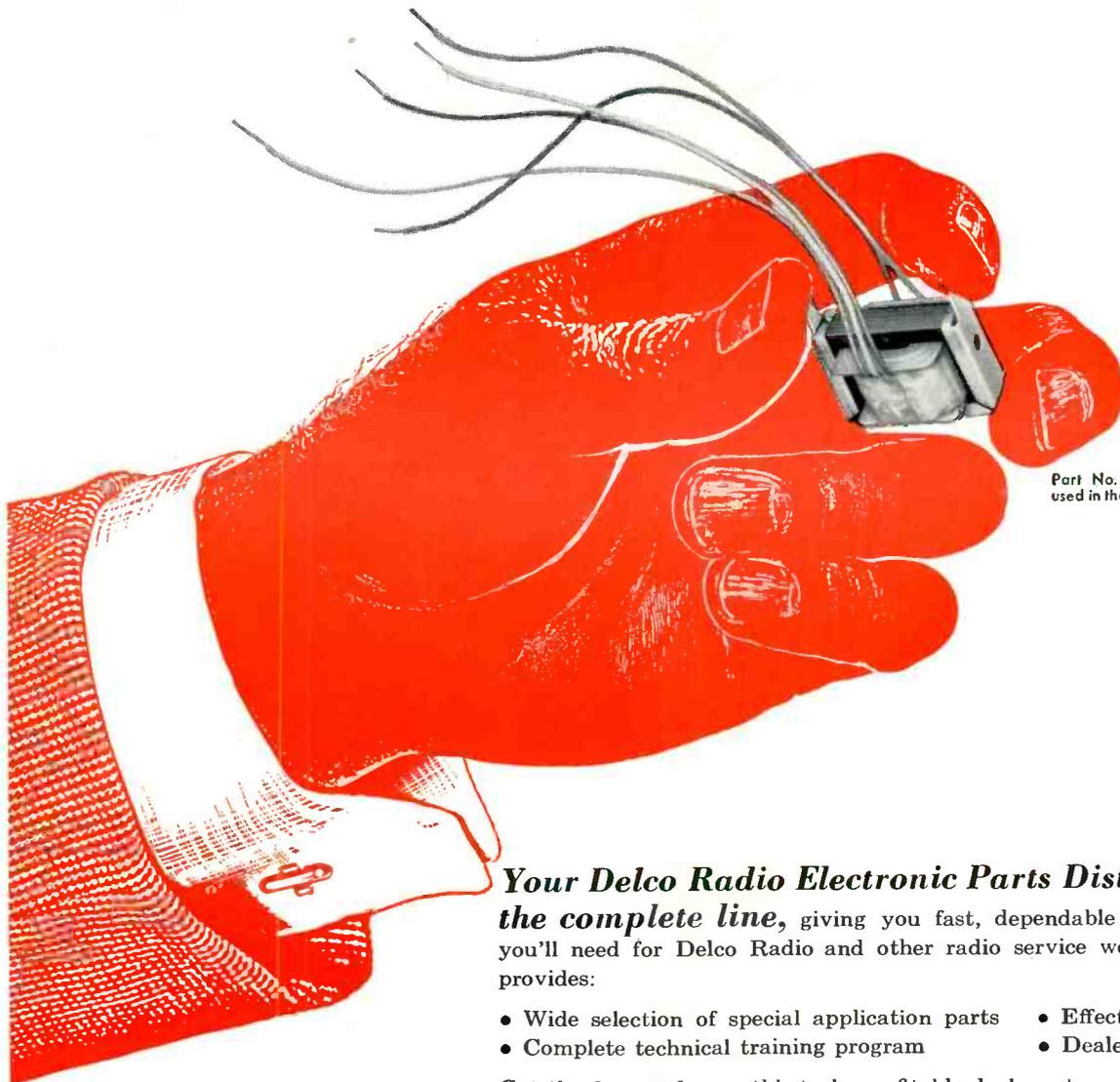


**JOHN F. RIDER PUBLISHER, INC.**

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# Use Delco Radio Service Parts!



Part No. 7270804—output transformer used in the new Delco Portable Car Radio.

*Your Delco Radio Electronic Parts Distributor carries the complete line,* giving you fast, dependable service on the items you'll need for Delco Radio and other radio service work. Delco Radio also provides:

- Wide selection of special application parts
- Complete technical training program
- Effective warranty program
- Dealer identification signs

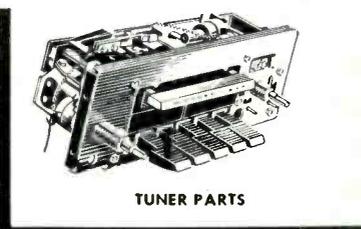
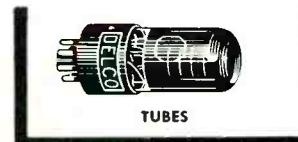
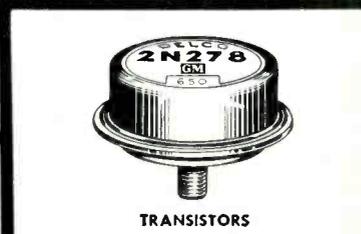
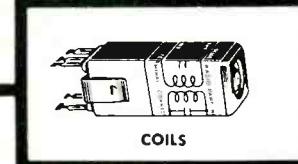
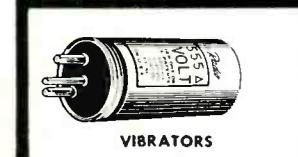
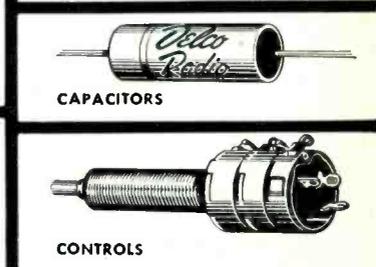
Get the facts today on this truly profitable dealer setup, and grow with General Motors!

Available everywhere through Electronic Distributors associated with . . .

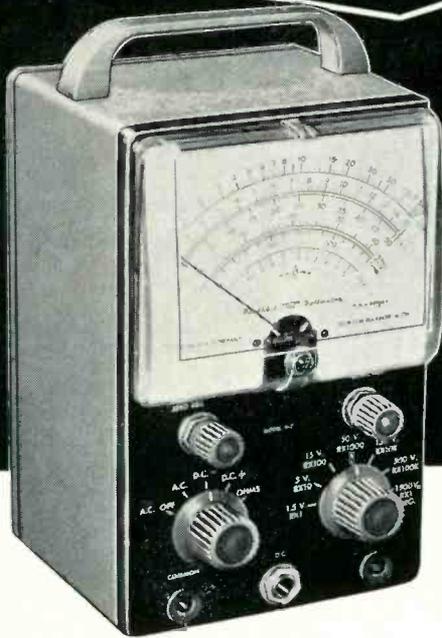


## DELCO RADIO

DIVISION OF GENERAL MOTORS, KOKOMO, INDIANA

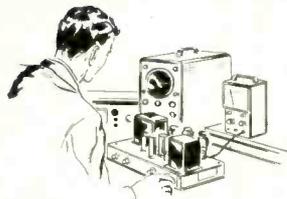
 <p>SPEAKERS</p>	 <p>TUNER PARTS</p>	 <p>TUBES</p>	 <p>IRON CORES</p>
	 <p>TRANSISTORS</p>	 <p>COILS</p>	 <p>RESISTORS</p>
		 <p>VIBRATORS</p>	 <p>CONTROLS</p>

look what **\$24<sup>50</sup>** buys  
in test equipment!



**HEATHKITS  
GIVE YOU  
TWICE AS MUCH  
equipment for  
every dollar  
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The famous model V-7A Vacuum-Tube-Voltmeter is a perfect example of the High-quality Instruments available from Heath at 1/2 the price you would expect to pay! Complete, only **\$24<sup>50</sup>**



Get the most out of your test equipment budget by utilizing HEATHKIT instruments in your laboratory or on your production line. Get high quality equipment, without paying the usual premium price, by dealing directly with the manufacturer, and by letting engineers or technicians assemble Heathkits between rush periods. Comprehensive instructions insure minimum construction time. You'll get more equipment for the same investment, and be able to fill your needs by choosing from the more than 100 different electronic kits by Heath. These are the most popular "do-it-yourself" kits in the world, so why not investigate their possibilities in your particular area of activity! Write for the free Heathkit catalog now!



Contains detailed descriptions of Heathkit models available, including VTVM's, scopes, generators, testers, bridges, power supplies, etc.



Also describes Heathkit ham gear and hi-fi equipment in kit form. 100 interesting and profitable "do-it-yourself" projects!

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BENTON HARBOR 18, MICHIGAN

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Address \_\_\_\_\_  
City & Zone \_\_\_\_\_  
State \_\_\_\_\_

**Reps & Distributors**

TOBE DEUTSCHMANN CORP. announces the appointment of the Hoemig Sales Co., Ft. Wayne, Ind. as representative for Indiana and Kentucky.

WINSTON ELECTRONICS, INC. announces the appointment of A. FRIEDMAN & ASSOCIATES as their representative for New York City, Long Island and northern New Jersey.

WESTINGHOUSE APPLIANCE SALES CORP. reports that wholesale distribution in metropolitan New York, New Jersey and lower Conn. of that firm's TV and high fidelity products is to be consolidated under one New York distributor.

ART CERF & CO., reports the addition of WM. C. McDONOUGH to this "rep" firm's industrial sales division. This marks a further step in expanding their two recently separated jobber and industrial divisions.

PERMA-POWER CO. reports that the BERTHOLD SALES CO., Dallas Texas, will also represent the firm in the state of Oklahoma. This is in addition to the states of Texas, Arkansas, and Louisiana.

RADIO RECEPTOR CO. names MCDOWELL REDLINGSHAFFER SALES CO., Kansas City, Mo., as distributor sales representative for Mo., Iowa, Kansas, southern Ill. and eastern Nebraska.

IT&T COMPONENTS DIV. announces the appointment of DON H. BURCHAM CO. Portland, Ore., as its northwestern sales representative for semiconductor products throughout Ore., Wash., northern Idaho, northern Montana, Alaska, and Br. Columbia.

JERROLD ELECTRONICS CORP. has appointed the following representatives: GERALD G. LEEDS CO., Great Neck, N. Y., to cover New England, New York, eastern Penna., Va., and Washington D. C.; ARVA, Seattle, Wash., for Wash., Ore., Mont., and Idaho; and INSTRUMENTS FOR MEASUREMENTS, Hollywood, Calif., for southern Calif. and southern Nevada.

STANDARD COMPONENTS, INC. state that the following representatives are being appointed for the firm's new deflection component line: JACK JACOBS, Brooklyn, N. Y., to cover Delaware, Penna., southern New Jersey, and Maryland; BERLIANT ASSOCIATES, Baldwin, N. Y., for upper New York state; EASTERN ELECTRONIC SALES CORP., Brookline, Mass., for New England; BEN-JAY ASSOCIATES, Mt. Vernon, N. Y., for metropolitan New York and northern New Jersey. F. A. ROSENWASSER, Cleveland, for Ohio, Mich., and western Penna.

# ROHN TOWERS cover 3 fields

*Bigger Profits for You!*

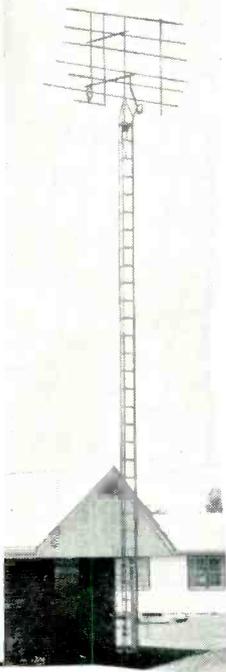


Rohn Manufacturing Company is the largest *exclusive* manufacturer of home television towers! Thousands of distributors, dealers and servicemen have handled, sold and installed Rohn Towers for years! They've proved to themselves that *there's more money in Rohn Towers and accessories than any other line!* Rohn Towers now *dominate the field* and profits for those handling this line are better than ever. Why? Because Rohn offers profits in all 3 major tower fields:

# 1

## HOME TV

By far the biggest usage of Rohn products has been and still is for home TV installations. In addition to finest of self-supporting towers, the Rohn line includes telescoping masts, tubing, roof towers and all other types of accessories for installations of all kinds. Wise dealers and servicemen rely *entirely* on the Rohn line for *all* installation requirements. This means **BIGGER PROFITS.**



# 2

## COMMUNICATIONS

Many distributors, dealers and servicemen are making **EXTRA PROFITS** by stocking or handling the heavier type Rohn Towers that are suitable for communications purposes. There is a demand in *every area* for radio communications towers, micro-wave towers, radio telephone towers and industrial towers. You can supply this need in your area. Special new literature is available for your use.



# 3

## AMATEUR USE

Another major field of usage for Rohn Towers is in the field of amateurs and experimenters. The especially designed "fold-over" tower is the *best in the field* for the amateur because it allows working on the antenna *on the ground*. Thousands of amateurs use Rohn Towers with a tremendous demand still to be sold. You can supply this demand in your area and capture **BIG PROFITS** for yourself.



Send the coupon or write or phone today for the field that you are neglecting or those that interest you the most. ➔

## ROHN Manufacturing Company

116 LIMESTONE, BELLEVUE  
PEORIA, ILLINOIS Phone 4-9156

## look at these ROHN exclusives

- HOT DIPPED GALVANIZED**

The finest, most durable finish is available for ROHN Towers and accessories... all done entirely on the ROHN premises under careful ROHN supervision.

- UNEQUALLED DESIGN AND ENGINEERING**

ROHN is the only design that has stood up over the years. ROHN has been first and foremost... and always the leader in new products to meet the changing demands.

- MASS PRODUCTION FOR LOW COSTS**

ROHN was the first to utilize mass production techniques to build a superior tower at the most competitive prices. This means no sacrifice in quality yet far greater profits for you.

- UNIVERSAL CUSTOMER ACCEPTANCE**

Thousands and thousands of installations prove the ROHN line first in customer satisfaction.

- PIONEER MANUFACTURERS**

Pioneers in tower manufacturing—and today one of the world's largest manufacturers of this type equipment. The ROHN Company was built on satisfaction on the part of distributor, dealer and customer alike.

- COMPLETE LINE**

Only ROHN offers a full line—one dependable one-stop source for all TV installation equipment. Save headaches, save shipping costs, save time... use ROHN unequalled service *exclusively*.

### ROHN MANUFACTURING COMPANY

116 Limestone, Bellevue  
Peoria, Illinois

GENTLEMEN: Please send me the catalog and information on the following:

TV Towers  Amateur Towers  
 Communications Towers  Full line of Rohn products

NAME \_\_\_\_\_

FIRM \_\_\_\_\_

ADDRESS \_\_\_\_\_

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



INTRODUCING

# the new SCOTCHMAN line of TV Antennas by WINEGARD

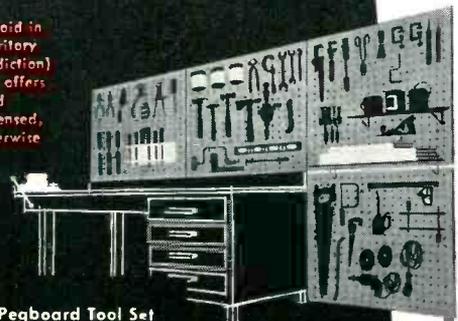
Gives you all three!... performance... adaptability... low cost

MAN! These Scotch Stamps Are Worth Money to You! Get Free Antennas, tool sets and other valuable nationally advertised merchandise.



The thrifty way to buy your merchandise! With every Scotchman antenna you buy, you get valuable Scotch Stamps which you can turn in for useful premiums or for more antennas! Start saving Scotch Stamps now! Ask your distributor for free Scotch Stamp Saver.

This offer is void in any state (territory or other jurisdiction) in which such offers are prohibited, restricted, licensed, taxed or otherwise regulated.



This Free Pegboard Tool Set is yours with Scotch Stamps—Start Saving Scotch Stamps Now!

There's a Winegard Scotchman antenna for every signal area... for every installation... for every budget! With just four basic Scotchman models (priced as low as \$6.95 list) you can now solve just about any reception problem you run into.

In most of your installations, you will find that one or a stack of the four basic antennas is all you need. But for those tough reception problems, where you need more gain—or have severe interference, you can tailor-make a special Scotchman as needed, simply by using the new plug-in attachments shown on the opposite page. And you can do this at no more cost than your competitors charge for ordinary, less effective antennas.

Economy and adaptability are not all you get in the Scotchman! You get quality, too... the kind of quality features you are proud to point out to your customer... like: unbreakable TDM styrene insulators, special fatigue-resisting aluminum tubing, closed element and boom ends to eliminate windwhistle and vibration, precision die-cut elements... features usually found only in the highest priced antennas.

And, of course, all Winegard Scotchmen are completely factory pre-assembled. Elements lock into place automatically when you unfold them. Absolutely no antenna installs easier or quicker... and they're wonderfully compact and rugged.

On your next installation, do this: Try a Scotchman antenna in the only place it really counts... on one of your own customer's homes. See for yourself that the Scotchman can't be beat for performance and adaptability at such low cost!

### A NOTE FROM JOHN WINEGARD

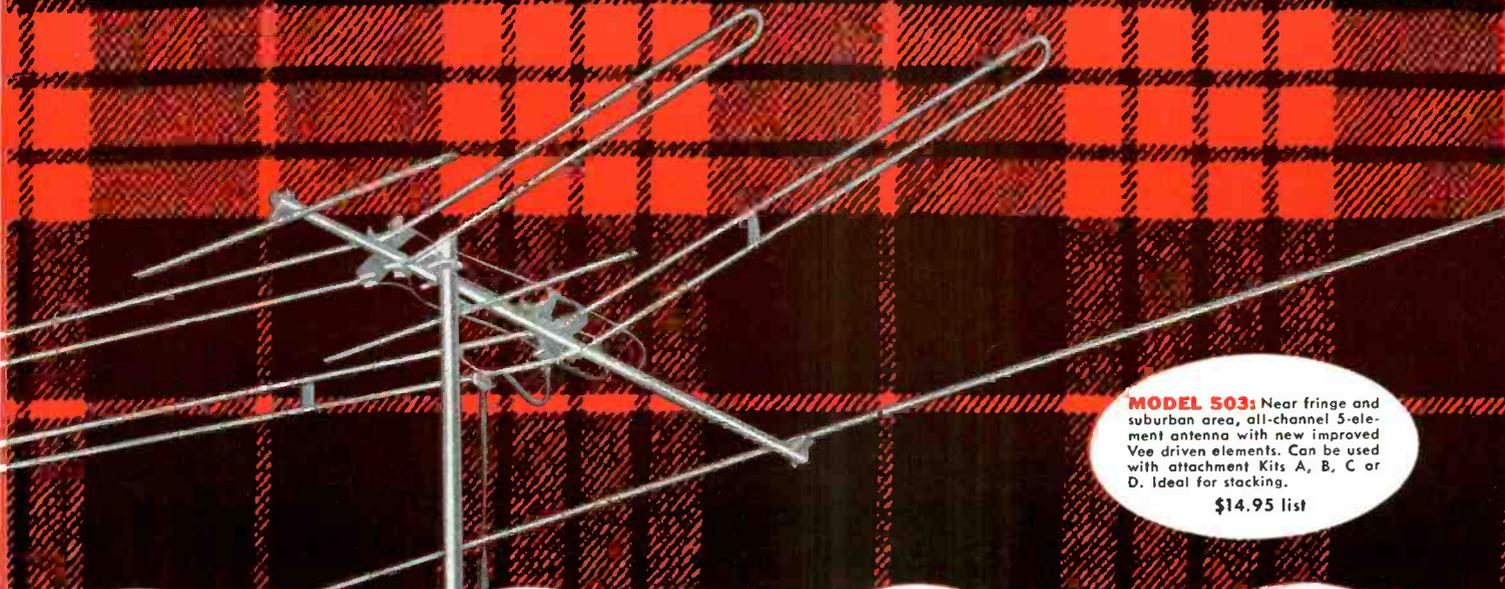
As an addition to our popular line of gold anodized Colorceptors and Twilights, I am pleased to announce this new Scotchman series to give you a complete price range of quality all-channel Winegard antennas. You'll find valuable Scotch Stamps in each Scotchman carton which we will redeem for free antennas and other valuable premiums. This is our way of saying "thank you" for your business.

Sincerely,

John R. Winegard



John R. Winegard  
President, Winegard Co.



Priced  
as low as  
**\$6.95**  
LIST



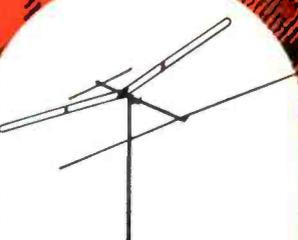
**MODEL 504:** All-channel, high performance, 7-element fringe area antenna. Exclusive impedance-compensated Vee driven elements and patented\* Electro-Lens design. Easily converted to 13 element antenna for tough reception areas with Kit A.

\$19.95 list



**MODEL 502:** 4-element with new improved Vee driven element design for city and suburban areas. Exceptionally good reception on the high channels . . . almost bi-directional on low channels. Higher gain and better ghost rejection than conicals. A natural with Kit D.

\$9.95 list



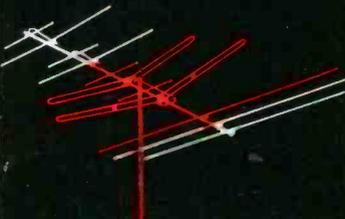
**MODEL 501:** 3-element antenna recommended for use in place of conicals. New Vee driven element design. Smooth forward response lobes and accurate impedance match on both high and low bands. Cuts ghosts. No finer antenna for city and suburban areas at this low price.

\$6.95 list

**MODEL 503:** Near fringe and suburban area, all-channel 5-element antenna with new improved Vee driven elements. Can be used with attachment Kits A, B, C or D. Ideal for stacking.

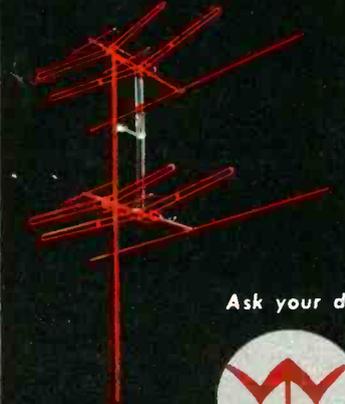
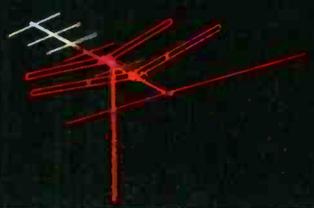
\$14.95 list

**4 BASIC SCOTCHMAN TV ANTENNAS AND 4 ATTACHMENT KITS COMBINE TO MAKE MORE THAN 30 DIFFERENT COMBINATIONS! YOU CAN INCREASE THE GAIN OR FRONT-TO-BACK RATIO OF ANY MODEL**



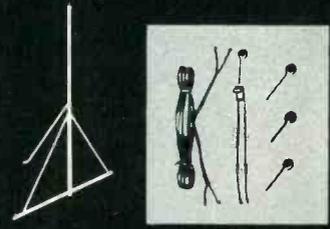
**KIT A: HI-LO BOOST** for higher gain and co-channel suppression. Adds two reflectors for extremely high front to back ratio. Adds 4-element patented\* Electro-Lens director for increased gain on all channels. Use with models 503 (illus.), 501 and 504. Gives up to 22% more gain.

**KIT B: HI-BAND BOOST** for peaked gain on channels 7 through 13. Gives antenna sharper directivity. Reduces ghosts. Adds 3 high band director elements to front of antenna. Fits all Scotchman models 501, 502, 503 (illus.) and 504.



**KIT C: STACKING BAR KIT** consists of two stacking bars, heavy duty support bracket and terminal insulator. Stacking two antennas of the same model increases sensitivity up to 40%. Can be used with all Scotchman models 501, 502, 503 (illus.) and 504.

**KIT D: INSTALLATION KIT** (pat. pend.). Universal tripod mount fits any gable, pitched or flat roof. All aluminum. Can't stain roof. No guy wires. 5 1/2 ft. tall. One man can install. Includes, mount, mast, lead-in wire, stand-offs and lightning arrestor. Can be used with rotor. Works well with all Scotchman models.



Ask your distributor or write for details on the money-making Winegard Scotchman line.



**Winegard Co.**

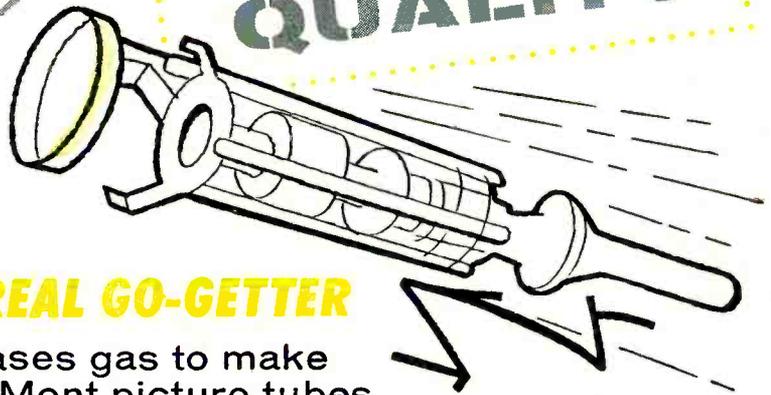
\*U. S. Patent 2,700,105

3000 SCOTTEN BLVD.

BURLINGTON, IOWA

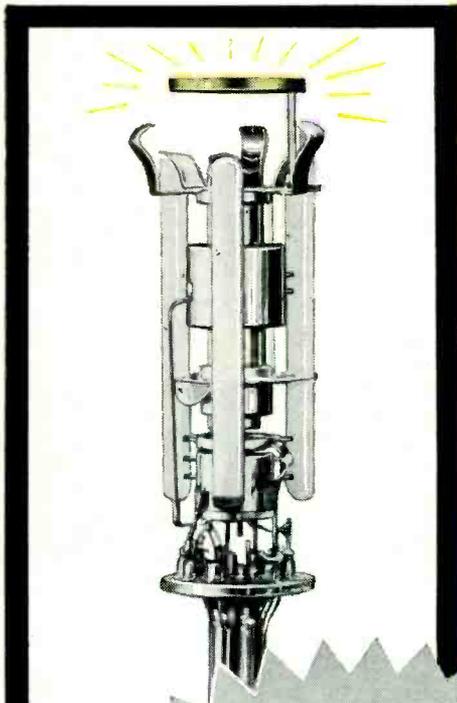
Copyright 1958

**DU MONT  
POSITIVE  
QUALITY**



**A REAL GO-GETTER**

Chases gas to make  
Du Mont picture tubes  
sharper and to assure  
longer life



**400%  
BETTER!\***

Another positive fact about Du Mont positive quality . . .

Du Mont picture tubes are 400% better when it comes to gas, and the less gas, the better the tube.

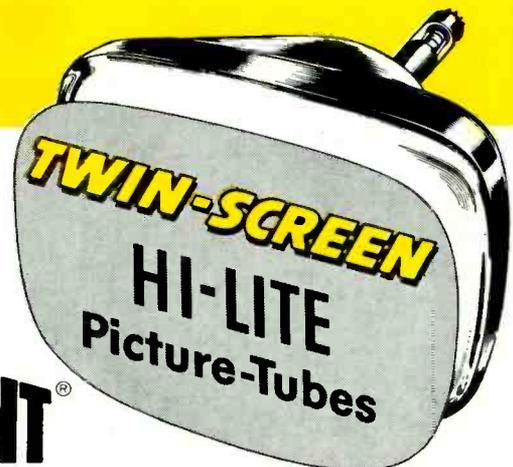
A gassy picture tube produces a "soft" picture, lacking the snap and sparkle customers like. Furthermore, gas in a tube greatly reduces its life.

So, for the sake of your service and profits—make that next picture tube a Du Mont!

**OUR HERO!**

The famous Du Mont Electron Gun, heart of the picture gun, crowned with the most advanced "getter" in the industry. In the production of the tube, the "getter" is flashed to coat the inside of the envelope with materials that absorb gases in the tube. The Du Mont "getter" is unsurpassed for efficiency in this operation.

\*Based on Quality Control figures



**DU MONT®**

TELEVISION TUBE DIVISION, ALLEN B. DU MONT LABORATORIES, INC., CLIFTON, N. J.



WESTINGHOUSE has come out with an extension speaker and record storage cabinet for the first time. The unit, with 12" speaker, matches other phonos.

ATLAS SOUND has introduced the HR-3 super tweeter, with 2000-17,500 cps response. The program capacity power is 35 watts. It lists at \$27.50.

CONTINENTAL MANUFACTURING, Omaha, has appointed Graybar Electric as national distributor for the company's line of Harmony intercoms.

STEPHENS TRU-SONIC has introduced a new series of speaker enclosures called bass-plane types. Prices with free cone speaker range from \$79.50 to \$147.50 net.

HARMAN-KARDON has acquired a building at 110 Hopper St., Westbury, N. Y. It is twice the size of the one ruined by fire Thanksgiving Eve. Total company employment is now over 350 people.

WEBCOR is promoting a "Hi-Fi Value Fair" theme to boost dealer sales of the company's phonos and recorders during the first quarter of 1958. Over \$500,000 is being put behind this campaign.

1958 LOS ANGELES HIGH FIDELITY MUSIC SHOW will be held Feb. 26 through March 2 at the Biltmore Hotel. This Institute sponsored show will be open to all hi-fi manufacturers. Over 30,000 paid attendance, 1957 figure, is expected during the five days open to the public. Room rentals range from \$250 to \$595.

(Continued on page 22)

## CORNELL-DUBILIER CAPACITORS



### The extra values are "on the house"

Want more capacitor for your dollar? Here's how: Cornell-Dubilier has originated a "preferred-type" program on twist-prong electrolytics. Now, a relatively few types fill over 90% of all replacement requirements. You need less — to do more. Fewer types means improved production efficiency, lowered costs — savings to you. How is it done? Instead of producing hundreds of types with odd and critical capacitance and voltage ratings, each "preferred type" carries the *highest* value and rating called for in each category. In most cases you get *more* capacitor *at lower cost* — plus added safety factor, improved performance and "call-back" protection. It's on the house! To get more capacitor for *your* dollar, ask your C-D Distributor about Preferred Type Twist-Prong Electrolytics or write Cornell-Dubilier Electric Corporation, South Plainfield, New Jersey.



## CORNELL-DUBILIER CAPACITORS

Consistently Dependable



## Name the great new CDR TR-16 Rotor

*Your name can win the Plymouth Station Wagon*

### Here Are the Features to Help You Pick a Name

- Entirely new with features never before available in the popular price range.
- Quick-mounting mast collet permits speedy installation (no loose parts to assemble).
- Self-centering sawtooth clamps take masts up to 1½" in diameter.
- Instant locking prevents drift.
- Mechanical brake releases magnetically.
- Direction of rotation is instantly reversible.
- Rotor makes complete 360° revolution in 45 seconds.
- Completely weather-sealed, rotor meets rigid JAN salt water test.
- Fits standard towers.
- Streamlined to reduce wind resistance.
- Streamlined control box, non-breakable, impact-resistant case. *Better still visit your jobber today and try it.*

CORNELL-DUBILIER ELECTRIC CORP.  
South Plainfield, New Jersey

THE RADIART CORPORATION  
Indianapolis, Indiana

# CDR Rotors



*Old Hands at Dependability*

ALTEC LANSING has four new speakers in bass reflex cabinets in its 1958 line. The Laguna, Model 830A, consists of a pair of 15" 803A bass speakers, 802 HF driver, 511B horn and 500D divider. The Capistrana, Model 831A, offers one less woofer. The Corona, Model 832A, is a corner version of the 831A. The Verde is a small unit with 602B duplex speaker.

PHILCO's two new hi-fi console phonos offer electrostatic high frequency speakers, 10" woofers, ceramic cartridges and 20-watt amplifiers. Prices are \$239.95 in French Provincial, \$249.95 in modern. AM/FM tuners are optional at \$90.

DYNAMIC ELECTRONICS has introduced the PA-110 pre-amp designed to allow use of variable reluctance pickups or tape recorder with existing hi-fi system. Specs show gain 34 db, hum and noise 60 db below 10 mv, and 11-25,000 cps response within 1.5 db. List price is \$12.95.

PICKERING has unveiled the Stanton 45x45 stereo cartridge, designed for use with the Westrex stereo disc. Stylus force is 2 to 4 grams in professional arms with 1/2 mil stylus, 4 to 6 grams in changers with 1 mil stylus. It is "compatible" with conventional records. Walter Stanton states that broad commercial use of stereo discs is not just around the corner despite publicized expectations.

ELECTRONIC COMPONENTS has completed engineering on a cartridge loaded continuous tape message repeater, soon to be released. It employs the Cousino tape cartridge and a transistorized circuit. Unit will play tapes up to 60 minutes continuously or intermittently.

BOGEN-PRESTO appoints the following reps: Fred B. Hill, Minn., Dakotas, W. Wis.; Ralph Stevenson, Rocky Mountain; Forristal-Young, Neb., S. Ill.; Charles L. Thompson, W. Canada.

UNIVERSITY LOUDSPEAKERS has published a 4-page brochure of its hi-fi speaker systems and assembled enclosures. Each is shown in a room setting to point up the decor features.

ALTEC LANSING has elevated Exec VP A. A. Ward to presidency. C. S. Perkins, General Manager of Altec Service Co., has been elected VP of the parent firm.

ROCKBAR Pres. Syd Wimpie announces the appointment of Stanley Neufeld to the newly created position of national jobber sales manager. He will handle COLLARO changers and GOODMANS speakers.

TURNER COMPANY jobber sales manager Douglas Batin announces the appointment of 4 new reps: Royal J. Higgins, Kentucky; Land-C-Air, Virginia; Langhaus-Levy, Illinois; James H. Podolny, W. Va. & W. Penna.

WASHINGTON, D. C. HIGH FIDELITY MUSIC SHOW at the Shoreham Hotel, March 14-16, 1958 has made provisions for special motor freight of exhibits from the Los Angeles show (Feb. 26-Mar. 2), which follows the San Francisco show (Feb. 14-16). The Washington show reports 15,000 visitors attended in 1956.

AUDIO ENGINEERING SOCIETY will present a series of 15 weekly lectures on advanced tape and disc recording techniques, starting Feb. 20. Lectures will be given on successive Thursdays at 7:15 PM at RCA Institutes, 350 W. 4 St., NYC. Total fee is \$35 for AES members, \$50 to others. Individual lectures are \$3 and \$4.50.

ELECTRONIC TECHNICIAN • February, 1958

# WIN THIS PLYMOUTH STATION WAGON



**The name you pick may win**

*this beautiful 1958 Plymouth Station Wagon*

**Here's all you do...** There's not a thing to buy. Just visit your local CDR Distributor and look over the new TR-16 Rotor — then ask the Counter Man for an Official Entry Blank. Select a name, fill in the blank and mail... that's all there is to it!

This contest is open to any person over 21 years of age, and residing in the continental U. S. Officers, employees and members of the sponsoring organization and advertising agency are not eligible. Contest is subject to Federal, State and local regulations.

No entries will be returned, and the decisions of the Judges will be final. Contest closes April 30, 1958.

CORNELL-DUBILIER ELECTRIC CORP. THE RADIART CORPORATION  
South Plainfield, New Jersey Indianapolis, Indiana



## CDR Rotors

*Old Hands at Dependability*

Mr. Service Dealer:



Helps you to maintain a profitable, **INDEPENDENT** position in the Servicing Industry



Raytheon makes available to you all the Technical Data, Shop Helps, Signs, Sales Builders, and Advertising Aids you need for a successful TV-Radio Service operation. This, plus a most complete line of finest quality TV and Radio Tubes, makes Raytheon first choice of Independent Service Dealers.

**NEW!**

1958 Edition of the Raytheon Receiving Tube Data book. 1000 types — 600 individual basing diagrams — all you need to know about Receiving Tubes.

**DISPLAYS**



Displays — Counter, Window, Transparent Banners, and Window Streamers, Decals.

**SHOP AIDS**



Shop Aids — Uniforms, Tube Carrying Cases, Triplicate Invoice Sets and Pocket Cases, Job Repair Tags, Clocks, Tape and Dispensers, Stationery, Matches, Labels and Holders, Rubber Stamps and Pads, Drop Cloths, TV Screen Polishing Cloths, Tube Shelf Labels, Phone Call Registers.

All these profit building items are available through your Raytheon Tube Distributor. Ask him for a free copy of Raytheon Business Builders booklet that describes them in detail.



**TECHNICAL DATA**



Technical Data — Receiving Tube Data Book; Semiconductor Products Books; Picture Tube Books

**SIGNS**



Signs — Indoor, outdoor, illuminated, metal, thermometers, "Will Return" Signs, clocks.

**ADVERTISING HELPS**



Advertising Helps — Advertising Mats and Post Card Mailers — Television and Radio Spots, Dummy Tube Cartons, Door Knob Hangers.

**RAYTHEON MANUFACTURING COMPANY**

Receiving and Cathode Ray Tube Operations

NEWTON 58, MASS.      CHICAGO, ILL.      ATLANTA 6, GA.      LOS ANGELES 7, CALIF.  
55 Chapel Street      9501 Grand Ave. (Franklin Park)      1150 Zonolite Rd. N.E.      2419 So. Grand Ave.

Raytheon makes all these } Receiving and Picture Tubes, Reliable Subminiature and Miniature Tubes, Semiconductor Diodes and Transistors, Nucleonic Tubes, Microwave Tubes.



*Excellence in Electronics*

# ELECTRONIC TECHNICIAN

Including  
**Circuit Digests**

## *Do-ers and Wishers*

Homespun philosophers often divide people into two groups: Do-ers and Wishers. The do-ers take constructive action to better their lives and the world about them. The wishers hope for improvements, but never do anything substantial to make their wishes come true.

The electronic maintenance field has its share of both. The do-ers justifiably reap most of the rewards. We need more of them.

Are the results of doing worth the effort? Well, consider that some \$2.5 billion in parts and labor will be spent in 1958 for maintaining electronic equipment. Consider the constant introduction of new electronic devices, the growth of industrial electronics and audio in addition to TV-radio repair, and you can see a dynamic industry growing every year.

And don't forget: Electronic repair is a direct function of the increasing total number of tubes and semi-conductors in use. This cumulative growth for servicing continues even though production may decrease in any year. This remains true as long as production exceeds scrappage, which has been the case for many years.

Despite the manifold opportunities for electronic technicians today, and the still greater potential for the future, electronic maintenance is beset by many serious problems. Interchange of technical information, educating the public to understand the technician's service, constructively opposing abuses by sensation seekers . . . these are a bare few of the undertakings which demand more effective doing.

Only through united action can your individual situation and your service to the public be improved. This is not a theoretical concept. Practical avenues for united action exist in the form of service technician associations.

Associations are a vital element in our industry, as they are in many other industries. They provide a springboard for increasing your technical competence and financial security; they provide a path toward greater prestige; they provide a central organization to serve the community; they provide a voice that can be heard by one and all.

If you are already an association member, take an active part in the group's activities. If you are not yet a member, we strongly urge you to join now.

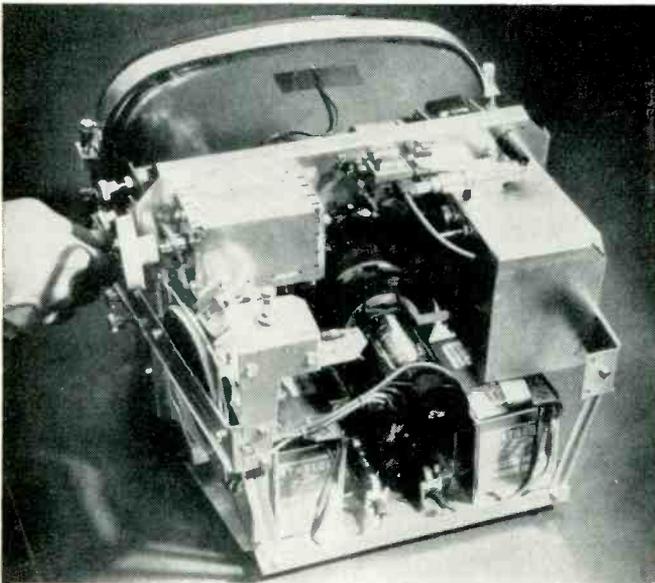
Be a do-er, not a wisher!

# Tuning In the

MARCH 24-29, 1958 marks the fourth annual National Television Servicemen's Week, designed to gain greater public recognition for technicians. The week is being heavily promoted by RCA through the use of national advertising, shop promotion kits and other aids. A traffic-building part of the program is a "Count the RCA Tubes Contest" for the purpose of attracting more customers to the technician's place of business, a variation on the "guess the beans in the jar" game. Another feature of the Servicemen's Week program is a mystery shopper contest in which technicians can win a sports car, color TV and other prizes.

MYSTERY AND CONFUSION reigned when New York City police picked up a radio call to look for a roving "bull walking in someone's petunias." Winter is not the best time for petunias to bloom in New York. Besides, whoever heard of a bull roaming the city? The messages persisted "I'm going for my horse now." Then later: "You can call the whole thing off. He's on Government property now." It turned out the calls were coming from Albuquerque, N.M., where the police radio operates on 39.9 mc, the same as in Queens, N.Y. Atmospheric skip condition was the culprit.

## TRANSISTORIZED TV



This truly portable, 31-transistorized TV set developed by Motorola is expected to be marketed at a practical price around 1960. It weighs about 32 lbs., consumes only 12 watts, and uses a 14-in. picture tube. Two nickel-cadmium batteries are the power source, each 5 x 5 x 5 in. The set will operate for 6 hours on one 2-hour charge. The battery is capable of at least 2000 charge cycles.



"I'm not your 'sweet little lambie pie' until this bill is paid, Ma'am!"

ELECTRONIC INDUSTRIES ASSOCIATION replied to *Time* magazine's article on U.S. repairmen after *Electronic Technician's* open letter to that publication was published (see Nov. 1957, p. 45). Here are excerpts from the EIA letter:

"The manufacturers represented were pleased that the article recognized the importance of the serviceman in modern living and that 'the great majority of repairmen are honest enough.' However, they were sorry the article emphasized the comparatively rare but more sensational examples of unethical practice, instead of praising the less newsworthy but vast majority of competent, honest service; and that the article failed to describe the work which service associations and industry have done and are doing to help improve the competency, ethics and business practices of servicemen. We feel it would be unfair to servicemen and to our industry if we failed to protest the quite distorted picture you have presented in describing service as 'buttonhook service in the pushbutton age.' We can, of course, speak only for the radio-television-electronics industry, but we know other industries are also spending tremendous effort, time and money to improve servicing competency.

"We know that, as is usual in many professions, it is the few who have given the bad name to the entire TV servicing industry. The vast majority of these people are sound, ethical businessmen and are technically competent. Obviously this is so, for if there were not great numbers of competent servicemen, the millions of TV receivers of America would not be providing the entertainment and educational value as they have for the past eleven years, since TV does require periodic service and adjustment. Quite apparently, the public (or at least those who write for the public) does not understand the service needs of modern automatic washers, automobiles, TV receivers, and the many other exceedingly complex equipments in general use. Mass production of such equipment at prices which permit purchase and use by great numbers of families, necessarily results in the need for occasional service. Your observation—'The perfect, unbreakable machine is many long years away'—is obviously true. Can you name one in *any* field? The public must be taught to understand this fact.

"You are correct in warning the TV public away from the 'cut-rate TV repairman whose siren lure is only \$2 (or sometimes \$1) for a service call.' This repairman is definitely suspect, for extensive industry surveys have shown that legitimate business costs do not permit an ethical serviceman to make a service call to a home for less than \$5 to \$7. A bargain-hunting owner of a TV receiver is 'asking for it' if he tries to pinch pennies by inviting the \$2 (or \$1) repairman into his home. Subterfuge and outright dishonesty must be the manner in which such a repairman covers his cost of business and living. Such advertising is normally the sign of

# Picture .....



the technically incompetent, as well as the morally bankrupt, for underselling is the only means by which the incompetent and poorly equipped repairman can lure work from the service businessman who has invested in expensive equipment and training in order to rapidly, effectively and honestly service complicated devices. Actually, it is less expensive to pay higher rates for the thoroughly trained, well equipped, ethical serviceman, because his work is done more rapidly and more conclusively. He also stands behind his services with established business principles such as guarantees.

"Service Associations, with the cooperation of manufacturers, constantly conduct meetings, conferences, lectures, conventions, workshops and schools to provide information on how to quickly, efficiently, and competently service and adjust television and radio receivers. Service Associations have adopted rigid codes of ethics, designed to protect the public from just such sensational cases of incompetency and dishonesty as your article has cited. Investigation of complaints and enforcement of these Codes by these Associations are honest and sincere.

"Manufacturers of radio and TV conduct thousands of service lectures, workshops and schools each year. Hundreds of thousands of service manuals and other technical helps to the servicing of radio-TV equipment are provided to servicemen annually by manufacturers. In addition, technical publishers of the industry make available to servicemen, service data, books on servicing, training texts in both theory and practice, and other technical and business aids. The competent TV serviceman must study constantly to keep up to date! The extensive distribution of manufacturers' service manuals, excellent attendance at manufacturers' and service association technical lectures and the sales of technical and business books, prove that the serviceman is anxious to improve his servicing competency."

**EMPLOYEE EARNINGS** in household appliance and radio stores during Oct. 1956 have recently been released by the Dept. of Labor. The study covered non-supervisory people, including repairmen, salesmen, clerks, drivers and porters. The average pay was \$1.63 per hour excluding overtime. Men earned 44% more per hour than women, and worked much longer hours, 36% working 48 hours or more. 13% of the men earned at least \$2.50 per hour. Geographically, the breakdown for both sexes was Northeast, \$1.70; South, \$1.36; North Central, \$1.72; West, \$1.81.

## CALENDAR OF COMING EVENTS

- Feb. 8-11: Television Service Ass'n Midwest Electronic Forum, Detroit, Mich.
- Feb. 14-15: 5th Annual Cleveland Electronics Conference, Masonic Auditorium, Cleveland, Ohio
- Mar. 17-21: Atomfair & Nuclear Congress, Int'l Amphitheatre, Chicago, Ill.
- Mar. 24-27: IRE National Convention, New York, N.Y.
- Mar. 27-29: Ninth Biennial Electrical Industry Show, sponsored by Electrical Maintenance Engineers Association of Southern California, Shrine Exposition Hall, Los Angeles.
- Apr. 10-12: Southwest Regional Conference & Electronic Show, Municipal Auditorium, San Antonio, Texas.
- Apr. 22-24: 1958 Electronic Components Conference, Ambassador Hotel, Los Angeles, Calif.
- Apr. 28- May 2: National Ass'n of Radio & TV Broadcasters Annual Convention, Hotels Baltimore & Statler, Los Angeles, Calif.
- May 7-9: Spring Meeting of The Acoustical Society of America, Washington, D. C.
- May 13-15: Spring Assembly Meeting of The Radio Technical Commission for Marine Service, Benjamin Franklin Hotel, Philadelphia, Pa.
- May 19-21: 1958 Electronic Parts Distributors Show, Conrad Hilton Hotel, Chicago, Ill.

**MARCO SOLTOGGIO**, Italian movie theatre owner, felt wretched about the inroads Tirano's popular TV programs were making, reports Television Digest. So he took steps to bring back his customers. Police investigating a sudden blackout at the TV station reported that Soltoggio and a friend had tried to restore the theatre's popularity by cutting the coaxial cable with an axe.

**COLOR TV THE EASY WAY.** Sunsent House, Hollywood, accepted a Federal Trade Commission consent order to stop advertising their colored plastic sheets as being capable of causing objects on TV screens to appear in their natural colors.

## RANDOM NOISE

**EVEN SOME OF YOUR BEST FRIENDS MAY NOT BE ABLE TO TELL YOU WHAT THE NUMBERS IN VARIOUS TUBE TYPES REPRESENT—SURE THE FIRST 6 IN 6CB6 STANDS FOR 6.3 V. HEATER VOLTAGE, BUT WHAT DOES THE 2<sup>nd</sup> 6 MEAN? (SEE BELOW, TURN PAGE)**

Last number of tube stands for total number of active elements, including the heater, connected to the tube-base pins. Add one to the above if the tube is a metal octal or glass lockal type, or if pin 1 is not used, or if an off-center filament is employed. There are exceptions of course.

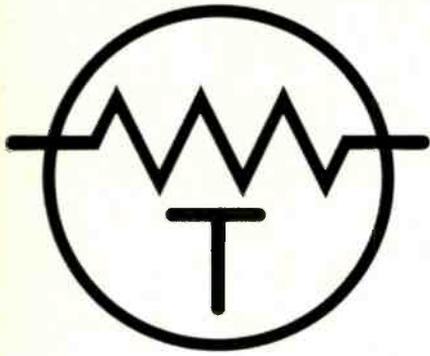


TOM HIGGINS JR.

**ENOUGH RECORDING TAPE WILL BE SOLD IN 1958 TO SPAN THE 230,000-MILE SPACE BETWEEN EARTH AND (ORIGINAL) MOON 10 TIMES**



**IN 1947 THERE WERE 35,000 MOBILE AND BASE 2-WAY RADIO STATIONS IN OPERATION—IN 1957 IT WAS 630,000. BY 1967 IT SHOULD REACH 2,600,000**



A. W. TURNER

### THERMISTORS

#### Special Characteristics:

**Temperature—Resistance**  
**Current—Time**  
**Voltage—Current**

#### Typical Applications:

##### Testing Devices

Liquid Level  
 Anemometer  
 Flow Meter  
 Gas Analyzer  
 Vacuum Gauge  
 Temperature Measurement

##### Switching Devices

Lock-in  
 Lock-out

##### Time Delay

Voltage Regulation  
 Temperature Control

• The sense of touch has served mankind well and within certain limited applications it is all that is needed to predict temperature. The baker can tell how hot an oven is by counting slowly until his fingernails tingle. The lower the count the hotter the oven. The housewife can test her iron by wetting a finger and making a quick pass at the soleplate. At best this system is accurate to plus or minus 50° F., and at worst it is unreliable, unpredictable and subject to gross error. The common glass encased alcohol or mercury thermometers are more dependable and are capable of a high degree of accuracy. Where thermal lag, readout to a fraction of a degree, wide temperature range, remote and electronic applications are factors, some device other than an ordinary thermometer would have to be used. However, it isn't likely that the sense of touch or the household

# Thermistors For

## Characteristics And Operating Principles Of A

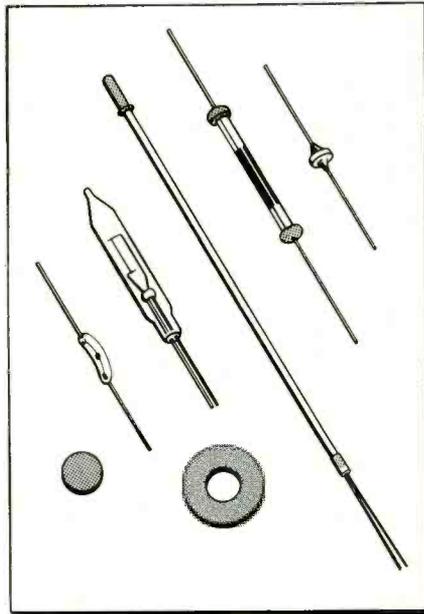


Fig. 1—Form of thermistor construction and method of mounting depend upon mechanical, electrical, and thermal requirements.

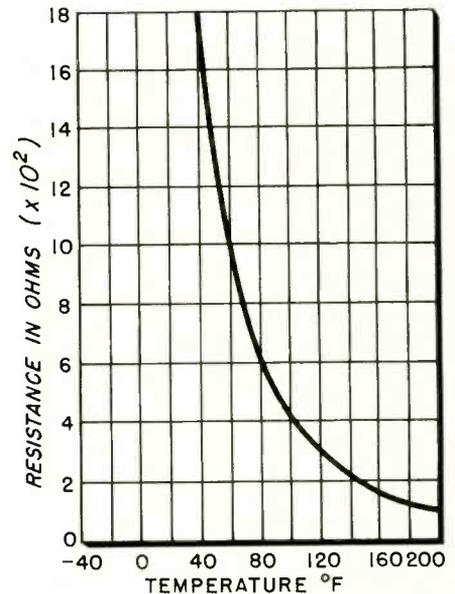


Fig. 2—Large change in resistance caused by a small temperature change enables heat measurements within a fraction of a degree.

thermometer will become obsolete. Bimetallic elements have their share of useful applications and are much easier to use to trigger electronic circuits, and it is true that an electric eye can indicate the height of a mercury column in a thermometer, but the need for a device that is more compatible with electronic applications is apparent.

Thermistors display none of the above deficiencies and offer additional advantageous and new application possibilities. They consist of a tiny semi-conductor element having a large negative temperature coefficient. The resistance of the ceramic-like material used decreases greatly as the temperature is increased. On the other hand most regular resistors have a slight positive temperature coefficient. Thermistors may be used in just about any temperature sensitive device found in the home, industry, or military service. They may be readily employed in remote installations and readout taken at a distance. In addition to their ability to facilitate temperature measurement,

and temperature control, they can be used in liquid level gauges, time delay devices, current surge protectors, switching devices, power measurement and in test instruments. They are manufactured in different forms, beads, discs, washers and rods, as shown in Fig. 1, and may be mounted in many different ways depending upon mechanical, electrical and thermal requirements.

They can be made small enough for hypodermic needle applications to determine blood temperature, special fluids and other subcutaneous measurements.

#### Temperature-Resistance

Thermistors are inexpensive, readily available and simple to hook up. They may be connected directly to a VOM and put to work. Since the resistance varies indirectly with temperature change, current varies directly. Therefore, it is possible to predict temperature by measuring resistance with an ohmmeter, or by using an ammeter and a voltage

# Control And Testing

Versatile, All-Electronic Device Which Has Many Applications.

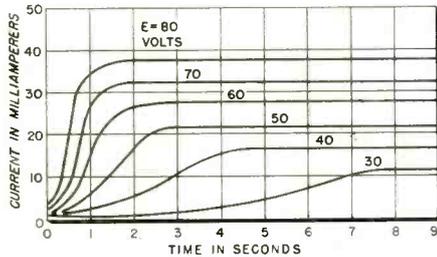


Fig. 3—Change in current rate for different voltage levels at various time intervals.

source to measure the amount of current flow through the thermistor. It is possible to ascertain temperature within a small fraction of a degree depending upon the type of thermistor used. The relationship of resistance and temperature for one type of thermistor is shown in Fig. 2. For example, it can be seen that from 60° to 80° F. the resistance varies from 600 to 1,000 ohms or approximately 20 ohms-per-degree.

### Current-Time

Thermal lag characteristics while relatively small should be considered. A large thermistor will take much longer to increase its temperature with a given power dissipation than a small unit. The family of curves in Fig. 3 shows current flow at different time intervals at different voltage levels. Current flow increases until the thermistor reaches the maximum heat it can attain with the amount of power available.

### Voltage-Current

An interesting phenomenon can be

Fig. 4—Ability to predict power level depends upon voltage-current characteristics.

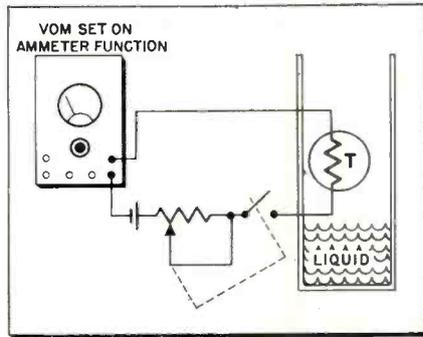
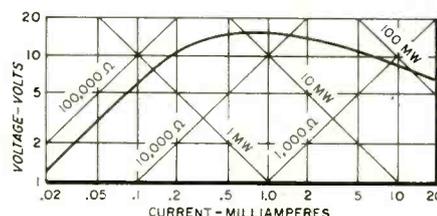


Fig. 5—Liquid-level indicator suitable for remote indication and control. Heated thermistor is cooled by rising liquid level.

observed when examining the voltage-current characteristic curve in Fig. 4. It can be seen that if a small potential is applied to the thermistor, the current which flows will be proportional to the applied voltage. As the current is increased and enough heat is generated within the thermistor to raise its temperature the resistance will decrease and more current will flow. As the current is increased still more, the resistance continues to decrease. The voltage across the thermistor increases as the current flow builds up, but after a certain point the voltage will start to drop even though the current flow is still increasing. The curve now displays a negative resistance characteristic. The amount of heating that takes place is a function of power and it is the sensitivity to

Fig. 6—Depending upon application, this arrangement may be used as an anemometer, flow meter, gas analyzer and vacuum gauge.

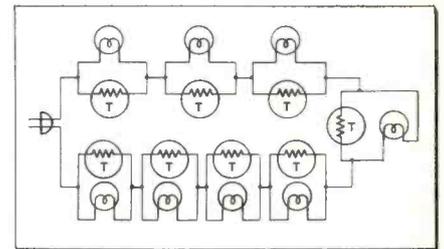
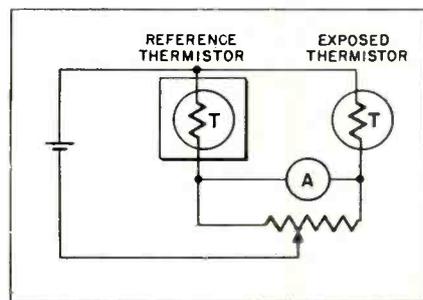


Fig. 7—Series lamp circuit continues to function even after one or more filament failures.

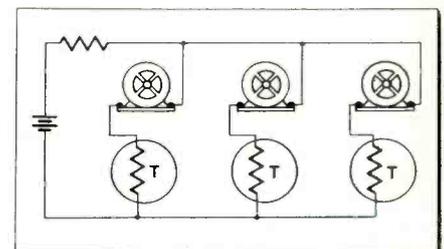
heat that enables the thermistor to be used for power measurements.

### Testing Devices

The arrangement in Fig. 5 is used as a liquid level gauge. The thermistor is heated above the temperature of the liquid by the current flow in the circuit. The potentiometer can control operation and compensate for different temperature conditions and changes in voltage source, and obtain a suitable meter reading. As the liquid level increases, it cools the thermistor and causes the resistance to increase considerably. Additional levels may be determined by connecting several thermistors in series and mounting them vertically, one above the other inside the tank. This arrangement is suitable for remote indication and control.

When a thermistor is directly  
(Continued on page 60)

Fig. 8—Thermistor used as a lock-out switch. Once a load is switched in, all other loads remain idle even though their respective switches are closed. Disconnecting the energized load will allow another load to function.



# Servicing Color TV

## Simple Switch Assures Positive Color Killer Action.

JAMES E. WEDDLE

• The presence of color TV sets in the fringe areas promises to open up an entirely new field of profitable business for the technician who can successfully cope with the problems involved. In essence, these problems are an extension of those encountered in monochrome work, and are best dealt with from the same practical viewpoint, which brought black and white TV into these theoretically impossible areas some years ago. As a working basis, the following premise is valid:

Assuming that the antenna response at the subcarrier frequency of 3.58 megacycles is adequate, the same signal strength which produces a satisfactory monochrome picture on a given color receiver will also provide satisfactory color reception on the same set.

The fundamental problem is to obtain good b&w reception on the color set. This is complicated by the fact that the necessarily broadband characteristics of the color receiver's

r-f and i-f stages reduce its overall gain in comparison with the b&w receiver. Hence, a signal which produces passable results in a monochrome receiver may yield very poor results in a color set. This means that many presently satisfactory antenna installations must be replaced when a color set is installed; presenting a tremendous potential for new antenna sales. Fortunately, most of the better present day antennas are engineered for color reception (although it pays to check before buying). The choice would then be made on the basis of gain and directivity to suit the particular installation. From this point on, the difference between a b&w installation and a color installation is largely a matter of degree rather than principle.

### Reflections

Particular attention must be paid to the elimination of reflected signals. It is entirely possible for a reflected signal to cancel the color subcarrier and have only a negligible effect on monochrome reception. Common sources of antenna line loss, such as proximity to metal surfaces and power lines, should be meticu-

lously avoided. Impedance matching is doubly important as the subcarrier can be seriously attenuated or completely lost in an unmatched line.

With regard to what may be considered satisfactory monochrome reception on a color set, it is well to remember that thermal and shot effect noise which reaches the CRT to produce the familiar fringe area snow is amplified twice when the color circuits (which also add their own noise) are operating. Thus, a degree of snow which might not be too objectionable in the monochrome picture becomes very large flakes of vari-colored "confetti" when color is being received, and is quite objectionable. Overall standards, then, must be higher, and a noticeably snowy picture which might be considered barely acceptable on a b&w set cannot be accepted as satisfactory reception on a color set.

### AGC Adjustments

Just as with conventional receivers under weak signal conditions, optimum results will be obtained if setup adjustments are made with an eye to the special conditions involved. Amplification of the sub-

Fig. 1—A typical color killer and chrominance amplifier circuit.

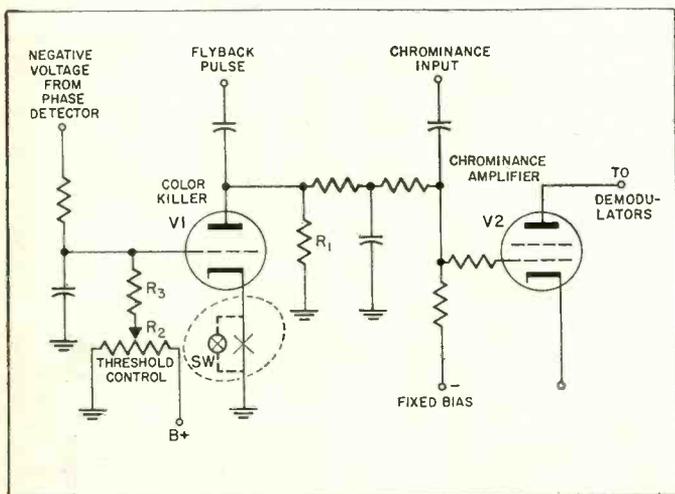
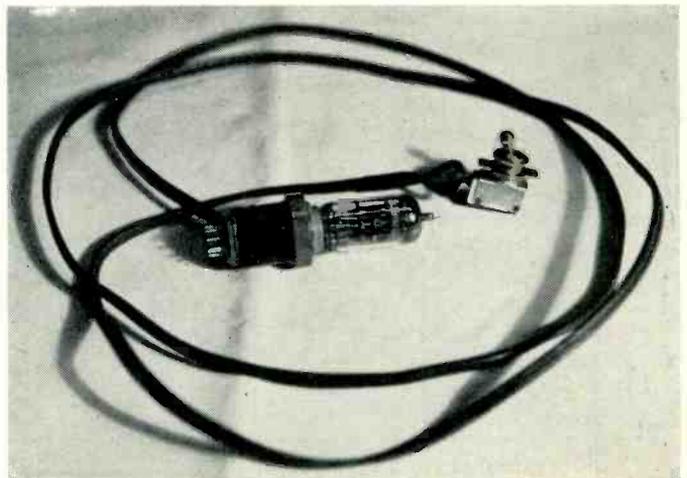


Fig. 2—Color killer switch and socket provide simple modification.



# In Fringe Areas

## Degaussing Removes Stray Magnetic Fields Caused By Lightning.

carrier frequency in the r-f and i-f stages may be determined to a large degree by the setting of the agc threshold control. This adjustment is best made while receiving a color signal, and in a borderline case may mean the difference between no color and good color.

This sensitivity to agc bias is also the key to many a toughdog case of intermittent color, wherein the b&w picture appears unaffected and the chrominance circuits check out satisfactorily. Such troubles can often be traced to cold-solder joints or loose connections in the agc line going to the tuner or i-f strip. In the field, a color-bar generator may be used to check agc action when the station's signal is insufficient to do so.

### Color-Killer

Another adjustment which may be critical under fringe-area conditions is the color-killer threshold adjustment. Color-killer circuits vary a great deal, and are undergoing continual revision. Fig. 1 illustrates the principle, and the action is, briefly, as follows:

V1 is a grid-controlled rectifier, gated by flyback pulses from the horizontal-output transformer, and

biased by negative voltage from the burst-phase detector. During a monochrome transmission, there is no burst signal to be rectified by the phase detector, and little or no negative voltage is developed for application to the grid of V1. Therefore, V1 conducts, producing a large negative voltage across R1 which is fed to the grid of the chrominance amplifier, V2, biasing the tube to cutoff. The chrominance amplifier is thus prevented from passing spurious signals and noise pulses to the color demodulators during monochrome transmissions. During a color transmission, the phase detector rectifies the burst signal, develops a negative voltage which is applied to the grid of the killer tube V1 and biases it to cutoff. The bias on the grid of V2 is reduced and permits V2 to conduct, passing the color information to the demodulators.

Note that the grid of the killer tube is returned to a source of high positive voltage through variable resistor R2. This is the killer-threshold control, and its setting determines the level of negative voltage required from the phase detector to cut off the killer tube. The threshold control must be adjusted to hold the

killer tube at a level of conduction just sufficient to keep the chrominance amplifier cut off during monochrome reception. If, under weak signal conditions, the control is adjusted to apply excessive positive voltage to the killer grid, the burst signal may be too weak to develop sufficient voltage in the phase detector to cut off the killer tube. Thus, the chrominance amplifier remains overbiased, and operates below peak efficiency, or not at all, causing poor or no color response.

The threshold control is adjusted in the following manner.

Tune in a monochrome signal on the weakest channel, turn the threshold control to the extreme position which applies minimum positive voltage to the killer grid (counterclockwise in most cases), and then turn the color saturation control clockwise until colored interference just begins to show in the picture. Leaving the saturation control at this setting, rotate the threshold control until color just leaves the picture. The chrominance amplifier is now being held just below cutoff, and will be brought into operation by even the weakest burst signal.

Some of the older models lack a  
(Continued on page 54)

Fig. 3—Degaussing to remove stray magnetic fields created by static and lightning discharges. The coil can be made in the shop.

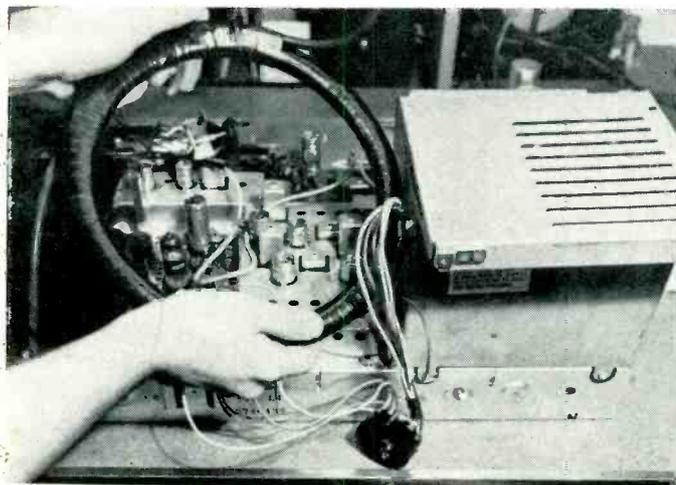
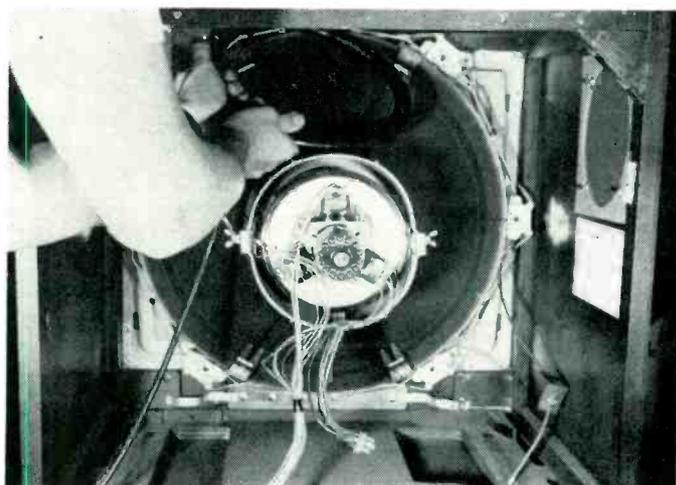
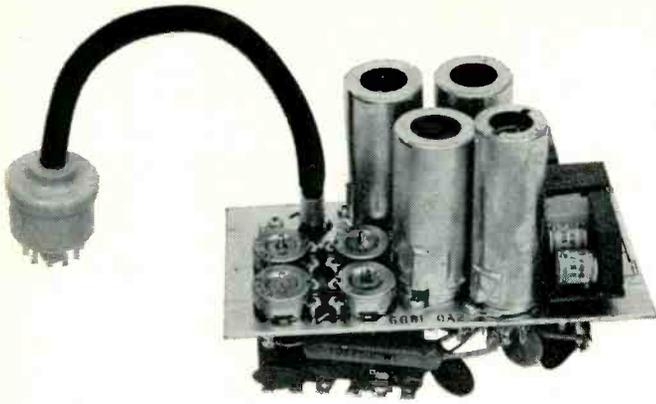


Fig. 4—Withdraw all magnets or remove before degaussing the metal cone on the CRT to avoid partial demagnetizing these components.



# Double-Barreled

## Tone And Noise Squelch



JACK NAJORK  
Communication Products Dept.,  
General Electric Company

• Two-way radio manufacturers have made substantial progress in solving the problem of "nuisance chatter" with which mobile radio users must often contend with in urban areas where two or more licenses share the same channel. These new communications devices eliminate much of the distraction which faces a radio operator who listens not only to messages from his own system but also to those of others using the same channel.

Before examining tone squelch it might be well to review, briefly, the conventional or noise squelch system which keeps the communications receiver muted until a carrier is received. Muting is accomplished by amplifying and rectifying noise energy and using this voltage to bias

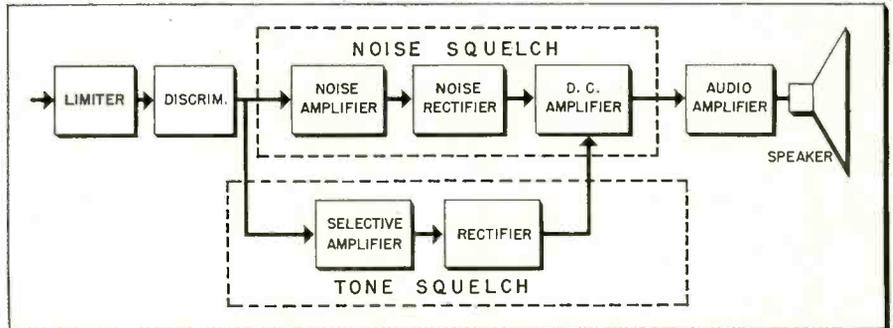


Fig. 2—Tone and noise squelch connected in parallel minimizes interference and chatter.

off the first audio stage. When a carrier is received, the noise diminishes, the bias voltage changes and the receiver's audio system is opened. The familiar squelch control permits the operator to adjust the circuit to the "threshold"—that is, to the operating point where a weak carrier will open the squelch.

Now let's add tone squelch—but in doing so, it is important that the conventional squelch, just discussed,

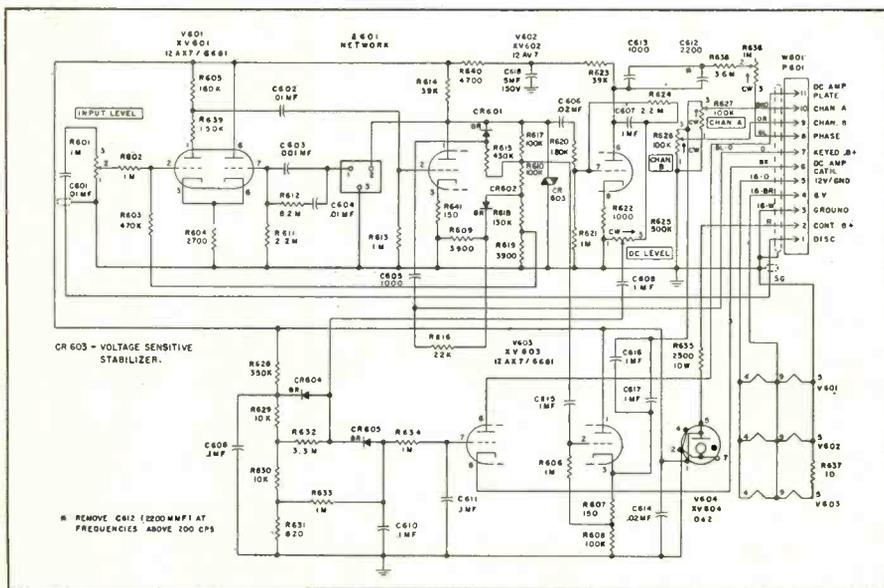
is not disturbed. With tone squelch the receiver is equipped with a second squelch circuit which responds only to a selected low frequency audio tone. When the transmitted carrier is continuously modulated by this tone, the receiver's tone squelch circuit unmutes the audio amplifiers and the message is heard. Transmissions on the same channel not tone-modulated will not be heard. The receiver, in effect, turns a "deaf-ear" to non-coded transmissions and thereby provides protection against unwanted calls and noise.

Fig. 2 shows in block form how the tone squelch circuit is added to the receiver. The received tone signal is amplified by the selective amplifier, rectified, and then applied to the existing d-c amplifier. The high selectivity of this amplifier together with special limiting circuits insure that only the desired tone signal transmitted at the proper level will actuate the tone squelch circuit.

### Double-Barreled Approach

One of the early arguments against this form of tone protection was that the receiving operator heard only correctly tone-coded signals and therefore could not monitor the channel to determine if it was clear of other signals before transmitting. Obviously then, some means of disabling the tone squelch at the re-

Fig. 1—Schematic of the GE tone squelch circuit which may be added to existing equipment.



# Squelch In Two-Way Radios

*Solves Interference And Chatter Problems.*

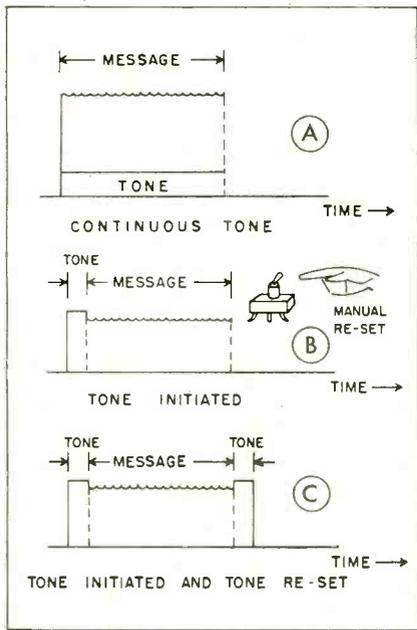
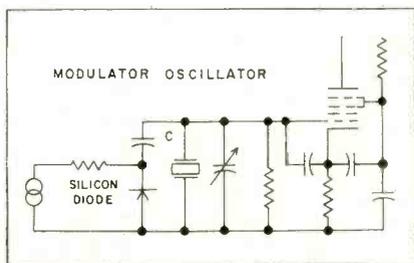


Fig. 3—Tone squelch requires a continuous low frequency audio tone as in A. Not to be confused with pulsed tone signalling as in B & C.

ceiving end is required so that the operator can hear all transmissions on the channel and thereby exercise common courtesy by not interrupting transmissions in progress. Newly-designed equipment effectively answers this problem by including an automatic monitoring feature in the form of a special connection on the microphone hookswitch. When the operator lifts his microphone from the hookswitch, the tone

Fig. 4—By varying the voltage across the diode, it will modulate the transmitter.



squelch circuit is automatically disabled and all transmissions are heard. Equally important, however, is the fact that normal noise squelch is still in operation when tone squelch is disabled. Thus, if the channel is clear, nothing will be heard.

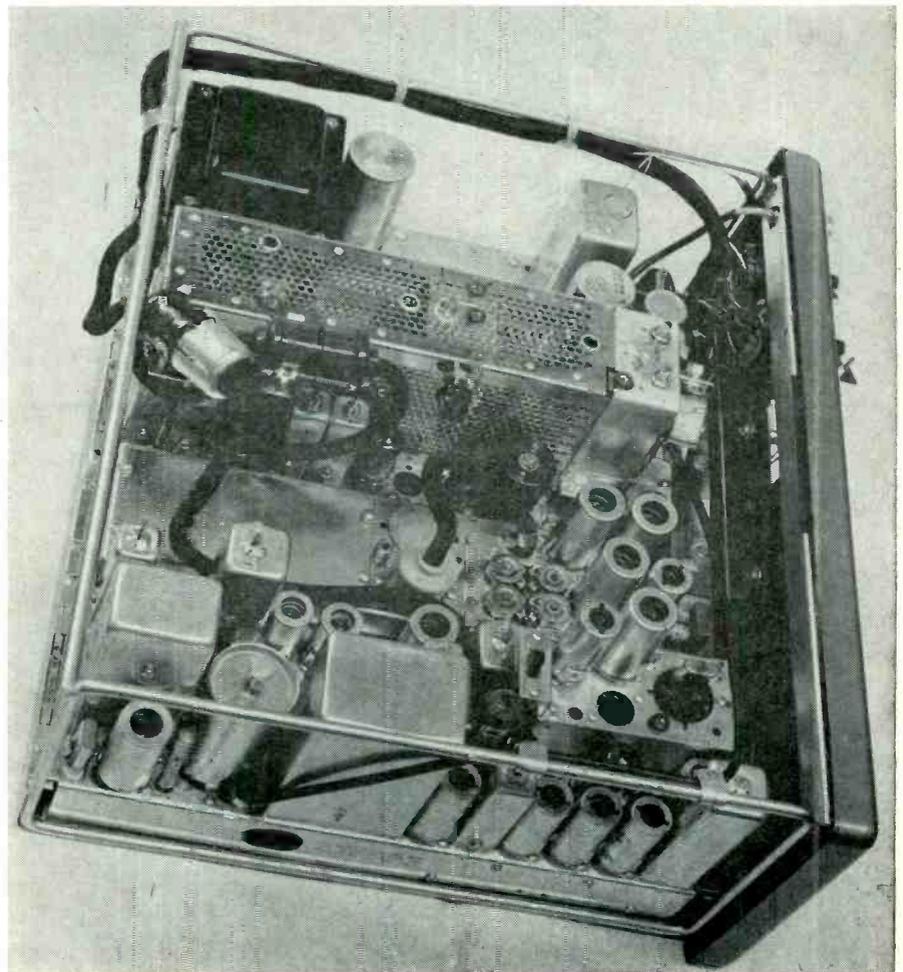
Some of the older designs utilizing tone squelch do not include noise squelch, consequently when tone squelch is disabled in such a system the operator must listen to the usual

noise roar which is heard on a clear channel. Monitoring under such conditions becomes a nerve-wracking procedure. Backing up tone squelch with regular noise squelch is termed the "double-barreled" approach and is the latest answer to operating in a shared-channel system.

### Tone Transmission

Tone squelch requires that the transmitter be continuously modu-  
(Continued on page 58)

Fig. 5—Tone squelch unit shown on opposite page, installed in the center portion of a GE two-way radio, is the latest answer to operating in a shared-channel.



# Wear On Tape Recorder Heads

## How To Recognize Improper Tape Alignment Against Heads.

A. R. CLAWSON

• Proper vertical alignment of the tape and heads is important from reproduction quality considerations. Even more important is damage to a precious tape recording and eventual damage to the head itself.

The photograph, Fig. 1, shows a worn head. The darker area on top has been worn excessively. More pressure against the top portion of the tape than against the bottom was responsible. The spring was out of vertical alignment and produced a gap at the bottom, as shown in Fig.

2. Forming the pressure pad removed the complaint of poor erase, as evidenced by the presence of residual background from a previous recording.

Excessive wear is caused by all the pressure being applied to a smaller area. A properly aligned pressure pad has its force distributed over a larger space, thus reducing the pounds per square inch figure. In certain severe cases the head itself will have to be replaced in order to restore quality reproduction.

The complaint of poor reproduction on previously recorded tapes

could not be rectified especially where the active material on the upper edge had been worn off. Proper alignment of the pressure pad corrected the trouble for subsequent recordings, and helped preserve the tapes.

Tape guides should also be inspected for proper alignment. Dirt and other foreign matter should be removed.

Visual inspection with a magnifier will help reveal this type of trouble. Unevenly worn areas on the head definitely indicate alignment trouble. •

Fig. 1—Uneven wear of tape recorder head indicates improper alignment of pressure pads. Loss of quality reproduction and excessive tape wear can be blamed on this condition.

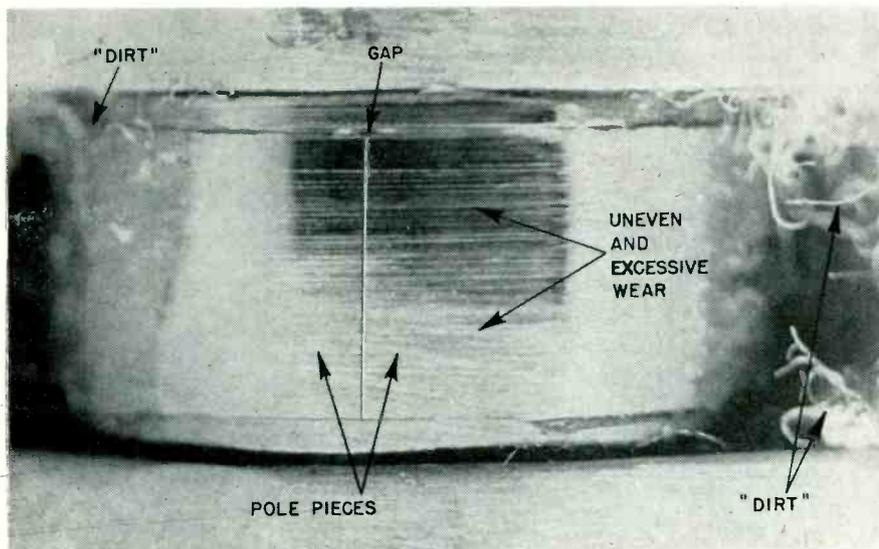
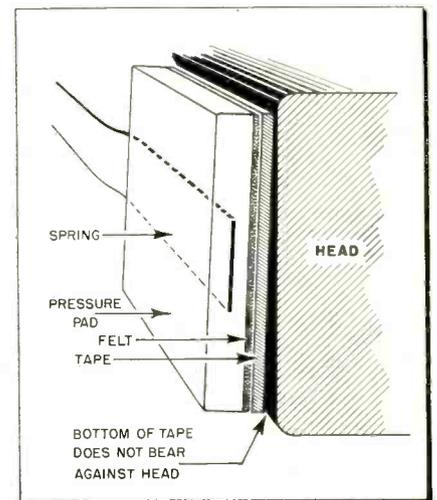


Fig. 2—Cross sectional view shows misalignment of pressure pad. Correction may be accomplished by bending or replacement.



## Even Good Electrolytic Capacitors

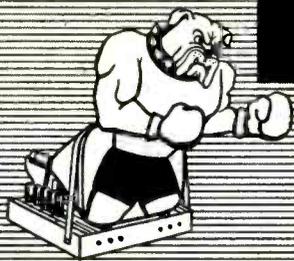
# May Ruin Transistors

WARREN J. SMITH

• Unlike vacuum-tube circuits, bantam electrolytic capacitors usually serve as coupling devices in low frequency transistor amplifiers. A transistorized audio amplifier illustrating a typical coupling circuit is shown in Fig. 1. An electrolytic capacitor C2 couples the signal to V1 and another electrolytic C3 couples the output signal of V1 to the input of V2. This

circuit is not too different from the more familiar conventional vacuum-tube circuit except for the electrolytic coupling capacitors. These capacitors are not capacitive alone; they are also effectively resistive. The shunt leakage is shown as  $R_c$  in the equivalent circuit. In transistor-coupling circuits the d-c leakage qualities can mean far more than capacity in determining the

behavior of the circuit. For instance, if we were to take the circuit of Fig. 1 and redraw the coupling circuit with its leakage resistance as shown in Fig. 2, we would have an additional resistor,  $R_c$ , to contend with. To understand the effect of this leakage, examine Fig. 2 closely. The collector potential of V1 is  $-8$  volts, close to the battery potential (Continued on page 53)



# "Tough Dog"

## Corner



### Difficult Service Jobs Described by Readers

#### Excessive Gain

A Motorola Model TS-114 TV set was causing quite a furor in the shop. The contrast control adjustment was very critical and would tend to overload the video. With optimum setting, horizontal sync was critical, and vertical sync was absent. Examination of the vertical blanking bar in the CRT revealed the presence of sync pulse. This caused one of the boys to suspect trouble in the sync takeoff section, and he painstakingly replaced just about every component in this area including the coupling capacitors and vertical integrator circuit. In spite of all this activity, the trouble remained.

At this point, I decided to lend a hand. I decided that the overloading that was present when the contrast was increased was probably due to a fault in the agc network. After spending a day pursuing my theory and probing the agc circuit, I decided that perhaps I wasn't as smart as I thought. After rechecking the integrator and voltages all over the

set, without finding the trouble, out came the oscilloscope.

Because vertical sync was non-existent, I placed the scope's low-capacitance probe at the output of the vertical integrator and sure enough there was no sync pulse. This condition existed clear back to the input of the sync clipper, which is also the output of the video amplifier. Video was present, and so was the blanking pedestals, but the sync pulse was clipped. The input waveform to the amplifier was normal except that it read 14 volts peak-to-peak instead of 8 volts. Once again I investigated the agc buss, and once again the results were negative.

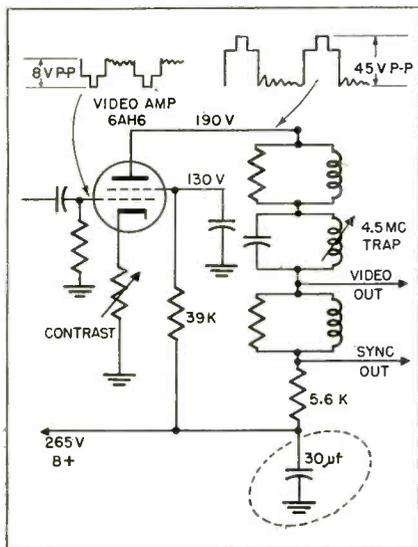
According to the diagram the output of the video amplifier was supposed to have a 45-volt peak-to-peak signal representing a gain figure of approximately six. A scope check at this point showed a ten times gain. I was getting warm in more ways than one. The voltages around the video amplifier were normal. In desperation, the plate resistors and peaking coils were checked; they also were normal. All that remained to be checked was the 30  $\mu$ f capacitor. If it were leaky or shorted, it would have affected the B+, but if it were open, the plate load might go up and cause increased gain. Hopefully I bridged another capacitor across the one in the circuit, and that was it. The misleading clues, the presence of sync on the CRT and high grid signal on the video amplifier influenced my thinking cap and turned a puppy into a tough dog.—*Alfred Consiglio, Bronx, N. Y.*

horizontal-frequency adjustments were made in the customer's home. The following day the same customer called and reported the same trouble. The set was brought to the shop and all parts in the afc and horizontal-oscillator circuits were checked.

On the bench the set would not act up and all parts checked were good. Perhaps the trouble was caused by the extra heat when the set was in the cabinet. So on went the heat lamp. In about 10 minutes, the picture went out of horizontal sync.

Since the heat applied covered a relatively large area, I still had the problem of finding the defective component. A VTVM on the grid of the horizontal oscillator showed a positive increase in voltage as the temperature was increased. I then sprayed each part, one at a time, with a refrigerant spray. When I got to C75 a 0.0047  $\mu$ f capacitor, the picture came back into sync. Inspection of this component, while hot, showed a 20-megohm leak. A new quality capacitor removed the trouble.—*Paul Wolf, Menlo Park, Calif.*

Open capacitor clips vertical sync pulse.

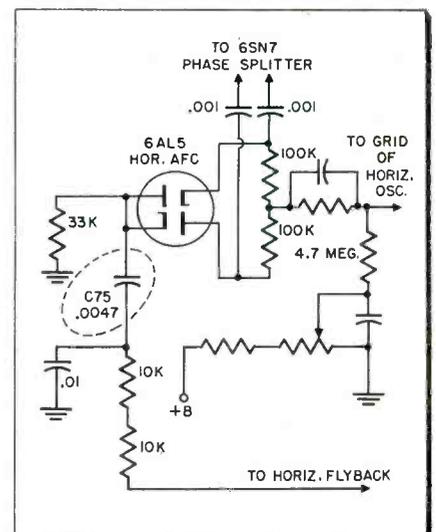


#### Hot & Cold Sync

The following trouble on a Stromberg Carlson TV set, Model 417C5-M caused me quite a headache.

The customer complained that the set went out of horizontal sync after about an hour. A new 6SN7 horizontal-oscillator tube was installed and

Refrigerant corrected horizontal frequency.



# Do You Appreciate The Dilemma Of Depreciation?

IRVING ELBAUM  
Certified Public Accountant

**Q.** The word "depreciation" seems to have different meanings to different people. What does it mean to the technician with respect to the accountant and tax collector?

**A.** The accountant (and the income tax agent) understands depreciation to be a reasonable allowance for the wear and tear of property used in a business. In this way it differs from the ordinary concept of the term which is generally accepted to mean a decline in the market value. One

other point—generally the factor of obsolescence is also included in any estimate for depreciation. This is understandable when one stops to consider that the probable useful life of a piece of equipment can be appreciably shortened by changes in economic conditions, loss of trade, new inventions, prohibitory laws, etc.

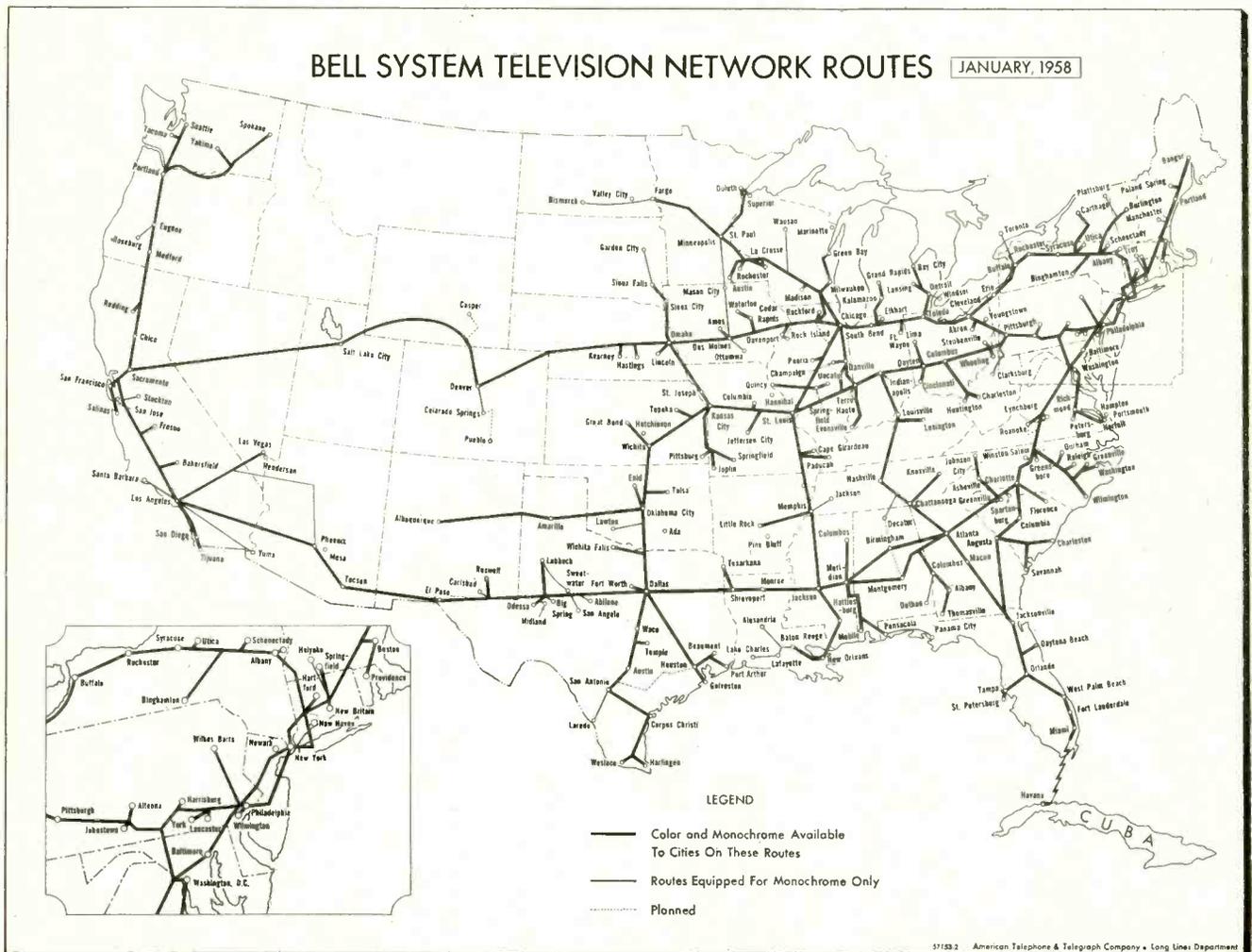
**Q.** Since no cash outlay is involved in depreciation isn't it in effect just a bookkeeping entry?

**A.** True, it is a bookkeeping entry. However, it is an extremely impor-

tant one. Even though no cash outlay is involved for any given year's depreciation it is vital to realize that unless the records of the business provide for depreciation for each of the years in the estimated life of the oscilloscope, for example, the day will come when it will have to be replaced and there may not be enough cash left over from the profits of the business to buy a new one. It is therefore important to recognize that although this item of depreciation in a sense may be considered to be invisible in any

(Continued on page 50)

Routes of Bell System microwave relay and coaxial routes for sending TV programs across the country.



# SHOP HINTS



## Tips for Home and Bench Service

### Agitation Or Snow

These two conditions are closely associated in appearance but stem from very different causes. Snow is probably the more common and is due to a very weak signal. Picture agitation, sometimes called graininess or background noise, is the result of transmitted noise being reproduced on high quality, high resolution receivers and is not evident on receivers with poor video response or smeared picture. One way to distinguish picture agitation from snow is to observe a program until the station removes the video modulation (usually between programs). Turn the brightness control up sufficiently to observe the blank screen. If the condition disappears during this brief interval it is agitation; if it remains on the blank screen, it is snow.

A condition of snow can be considered normal in a fringe reception area, but, in a strong signal area, a common cause may be a defective r-f amplifier tube, a transmission line break, or an upset in the age circuit.

A high fidelity audio amplifier is not at fault when it reproduces noise from a worn record. Likewise, picture agitation cannot be classified as a receiver fault. However, the condition can be eliminated, if desired, by modification of the video amplifier circuit. The following list gives the modifications that can be made: KCS107 Series—Change L307 to 120  $\mu$ h. KCS108 Series—Change L401 to 120  $\mu$ h; C408 (1000  $\mu$ mf) to

330  $\mu$ mf. KCS109 and KCS111 Series—Change L208 to 120  $\mu$ h. KCS113 Series—Change L401 to 120  $\mu$ h; C106 (1000  $\mu$ mf) to 330  $\mu$ mf. KCS116 Series—Change L201 to 120  $\mu$ h; C224 (1000  $\mu$ mf) to 330  $\mu$ mf.—*RCA TV Service Tips, Camden, N. J.*

### Hot Shot

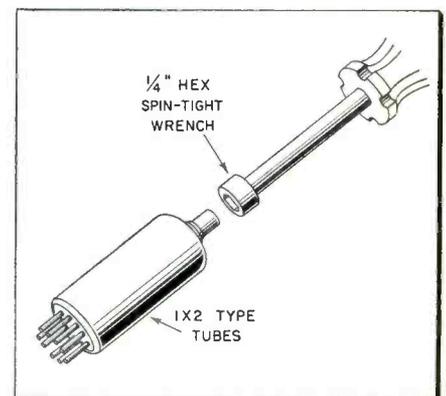
Elusive and troublesome intermittents in sync and video sections, plus buzz and many other difficulties have been caused by poor ground connections on some of the GE dip-soldered chassis. Riveted ground connectors, in time, develop high resistance joints due to electrolytic or corrosive action. Spurious signals sometimes develop across these high resistance ground joints and inject themselves into TV circuits causing all sorts of weird effects. In some cases even the filament string will decide to dim a bit and really cause a few gray hairs. Soldering these eyelet ground connections is the simple solution, but it requires more heat than some of the soldering equipment is capable of producing.

One very effective way to eliminate these poor grounds is to build up a bank of 300 or 400-volt electrolytic capacitors to about 500  $\mu$ f or more, then charge them up on a 300-volt B+ power supply, and then discharge them between the eyelet and chassis. The heavy current surge will effectively spot weld the eyelet to the chassis. All the ground eyelets can be treated in this manner in a matter of minutes. To prevent accidental discharge to other parts, contact the eyelet first, with one lead, and then the chassis with the other lead. It is advisable to use a separate fused power supply to charge up the capacitors to avoid drawing excessive current and damaging the set's rectifiers. An alternative is to charge the capacitors through a resistor and thus limit the current surge. Safety first, discharge the capacitors before putting them away, and avoid contact with the hot wires.—*Richard Prestia, Pittsburgh, Pa.*

### Remove & Replace Tubes

Some of the new portable TV sets house the 1X2 high-voltage rectifier tube in almost inaccessible places. To avoid cramped fingers, scraped skin and loss of temper, I insert the cap end of the 1X2 into a  $\frac{1}{4}$  inch spin-tight nut wrench. If the tube fits too loosely, use tape to build up the area to form a snug fit. When in a hurry to pull a red hot tube instead of burning the fingers or troubling the housewife for one of her pot holders, use an empty tube carton. Place the open end over the tube, squeeze adequately and pull. When removing or replacing a tube from a printed circuit board, use a rotary motion and avoid excessive pressure to avoid embarrassing breaks. A pin straightener will make life easier, and increase the useful life of a tube socket especially in a tube tester. Seven and nine pin indexing tabs will cut down some of the time and patience required to install miniature tubes in out-of-the-way and out of the line-of-sight locations. To avoid short circuits when replacing subminiature tubes, avoid excessive length of tube leads. When removing tight top cap connectors from an old horizontal output tube use a screwdriver as a wedge between the cap and connector and avoid any pressure between the glass and cap.—*Al Bimstein, Brooklyn, N. Y.*

A spin-tight wrench may be used to position the 1X2 tube type in difficult locations.



### \$\$ FOR YOUR IDEAS!

Shop Hints wanted. ELECTRONIC TECHNICIAN will pay from \$3 to \$10 for acceptable items. Use drawings to illustrate whenever necessary. A rough sketch will do as long as it can be followed. Photos are desirable. The amount paid will depend upon how original and practical the idea is. Unacceptable items will be returned. Send to "Shop Hints" Editor, ELECTRONIC TECHNICIAN, 480 Lexington Ave., New York 17, N. Y.

**Should You Cater To**

# The Do-It-Yourself Antenna Trade?

HOWARD SHAVELSON  
CHANNEL MASTER CORP.

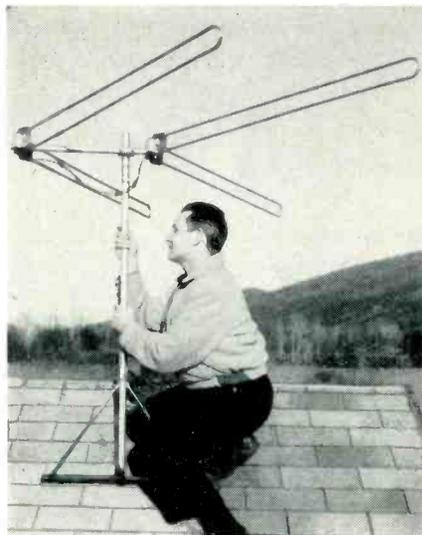
• Caught in the squeeze of rising costs and more intense competition for the consumer's dollar, TV dealers and technicians are seeking new ways of bringing home more legal tender for their labors. One very obvious method has been available for some time. But some dealers have not fully exploited its potential, or have ignored it completely. This new stimulant is a completely packaged, consumer-installed antenna kit.

Raise the question "Should I cater to the do-it-yourself trade?" and you're sure to start the pot boiling at any gathering of the antenna installation fraternity. Some take the view: "There are many people who do things for themselves because they enjoy it or because they want to save money. I would be foolish to let them take their business elsewhere." Others say: "I'm not going to cut my own throat. My biggest profit comes from making the installation, not selling the antenna."

Both arguments are valid. However, consider the fact that there is a very big do-it-yourself market; wishing it did not exist would not make it vanish. The annual dollar volume of over-the-counter outdoor antenna sales is in the millions. Somebody is making these sales. Why not you? With a market of this size available, it is important to consider the facts and act accordingly.

## Market

The pre-package market encompasses a large group of viewers who are situated between a metropolitan and fringe area, plus a smaller group who are within these areas. Many fringe area installations are much too involved for the layman both from the technical and structural point of view. Subscribers to a master-antenna system can be



Pre-packaged antenna kit contains necessary material to simplify and speed installation.

ruled out of this market too, although every now and then some staunch city dweller who thinks he can do better, and if he can get the landlord's permission will strike out on his own and either put up his own antenna, or call in the local repair shop. This activity may grow if these master antennas are not properly maintained and as more color receivers are put into use. While it may be believed that pre-packaging is not an item that will sell in a highly built-up area having a fairly strong signal, many shop owners will find their customers looking for antennas and accessories in an effort to circumvent labor charges. There are many other reasons that will drive a metropolitanite to your store. It may be far-fetched to think in terms of neighborly competition, such as who has a bigger car, newer hat or better antenna, it isn't amiss to promote a properly designed system having matched components and which is likely to give better performance over a longer period of time.

The pre-packaged antennas are

usually the manufacturer's top quality line and are capable of satisfying the needs of most viewers particularly a very large group of suburban home owners. As many technicians know, the sale of a TV set or an antenna is only the beginning. The chances of future service calls to repair or solve some problem is pretty much enhanced with each sale. You can profit by catering to the customer's desires.

## Advantages

As any smart merchant who is always on the lookout for new products to sell, and who has the ability to size up his potential sales, a TV shop owner should consider these specific advantages:

### 1. Opens New Markets

In locations where the indoor antennas can not provide good reception, some families may prefer to keep their indoor antenna rather than pay the cost of a dealer-installed system. A modestly-priced consumer kit may solve this problem.

### 2. You Can Sell-Up

A consumer kit is a natural sell-up item over an indoor antenna. Better reception is also a form of insurance that the new TV set will stay sold.

### 3. Extra Business

If a customer insists on installing his own antenna you are not competing against yourself if you sell it to him. Rather you are making the sale you would have lost if you didn't carry a kit.

### 4. More time

No time spent installing the antenna especially during peak seasons; leaves your truck and crew free for calls, also saves over-the-counter time by not having to assemble an assortment of material, and billing each item.

### 5. Branded Product

Heavy national and local advertising has conditioned the public to

(Continued on page 61)

# FREE LITERATURE

Listed below are informative brochures prepared for you by manufacturers. To receive this literature without charge, simply circle the numbers on the coupon corresponding to the items of interest. Cut out and mail to ELECTRONIC TECHNICIAN.

**1** Tube and semiconductor manual: Condensed catalog contains specifications and typical operations for communications, industrial use, rectification, radiation detection, electromedical, amateur and special purpose. (Amperex Electronic Corp.)

**2** Test Instruments: A colorful, illustrated 4-page bulletin on scanners, tube checkers, and specialized instruments such as a test equipment calibrator, transistor tester, shorted turns indicator, etc., for industrial and service shop use. (B&K Manufacturing Co.)

**3** PEC Guide: Guide contains schematics and specifications on all 96 types of packaged electronic circuits. Lists 130 radio and TV manufacturers' parts numbers on all packaged circuits since 1949, and corresponding replacement. (Centralab, a Division of Globe-Union Inc.)

**4** Power Supplies: Catalog sheets describe 2 new continuously variable dual range d-c power supplies, Models EFB and D612T. Low ripple voltages permits servicing transistor radios and other circuits. (Electro Products Labs.)

**5** Antennas: These pieces of literature include valuable data to assist the technician in selecting the proper type of antenna under all reception problems. Finco's patented Fidelity Phasing is explained and the new Golden Anodized antennas are described. (The Finney Co.)

**6** Printed Circuits: Manual tells how to service and repair printed circuits. Also included is an 80-page profusely-illustrated catalog showing chemicals, tools, hardware, phono parts, speaker-grille cloth, etc. (General Cement Mfg. Co.)

**7** Automatic Tube Tester: Brochure illustrates and describes the new, low-price, lightweight, portable, Cardmatic Model 121 tube tester. (Hickok Electrical Instrument Co.)

**8** Antenna Cable Systems: Two booklets crammed full of frequency data, cable attenuation information, isolation networks, charts, nomographs, db calculations and the

theory of operation of a neighborhood cable system. (Jerrold Electronics Corp.)

**9** Electrical Tapes: The motto on the colorful Big 4 Electrical Tapes catalog is, "Tool Up With Tapes." Over 50 pictures illustrate the different uses of Dutch Brand tape. (Johns-Manville Sales Corp.)

**10** Transformers, Coils & Chokes: Just off the press, an expensive 56 page catalog. It is a "How-To" book, full of illustrations, product description and application. Included is an attractive illustrated wall chart which shows how to order by part number. Special premiums are also described. (Merit Coil & Transformer Corp.)

**11** Speakers & Enclosures: Folder illustrates and describes technical specifications for the Norelco Full Response Speakers with dual cones. Also includes a blue print which shows construction detail and dimensions for an improved bass-reflex enclosure for these speakers. (North American Philips Co.)

**12** Acoustical Resistance Unit: A rectangular unit (Goodmans ARU) approximately two-inches deep, can be fitted into a loudspeaker enclosure of the correct volume to accomplish acoustic loading in a new system designed to produce better results in an enclosure smaller than a bass-reflex cabinet. (Rockbar Corp.)

**13** Microphones & Cartridges: Illustrated catalog includes a quick-reference guide, cross-refer-

ence chart, and technical data for microphones and cartridges. Tone arms and replacement styli are also included. (Ronette Sales Corp.)

**14** Phonos & Tape-Recorders: Recording heads and pickup cartridges replacement manual No. 57 contains technical data, replacement charts and cross-reference guide. Also includes information on phono needles. 34 pages. (Shure Brothers, Inc.)

**15** Antennas: Complete 1958 catalog features all models for FM and TV including coupling devices. Lobe patterns are included. Also available is a brochure on the TACO Golden Topliner antenna which is included in a special introductory Treasure Chest Promotion offer. (Technical Appliance Corp.)

**16** Microphones: Technical data, applications, and method of connecting the slender microphones using a sensitive yet blast-proof Dynaflex diaphragm are described in these pages. (The Turner Co.)

**17** Loudspeakers: Entire line of high fidelity, commercial-industrial loudspeakers, systems and accessories are described and illustrated in this catalog. Contains information on applications, characteristics and list prices. (University Loudspeakers, Inc.)

**18** Antennas: Colorful, illustrated catalog sheets describe the Color'Ceptor's many features. The twilight kit for color and b&w TV reception and FM antenna are also shown (Winegard Co.)

**PLEASE SEND ME FREE LITERATURE AS NOTED BY CIRCLED NUMBERS**

ELECTRONIC TECHNICIAN, 480 Lexington Ave., New York 17, N. Y.

This coupon must be used before March 10, 1958

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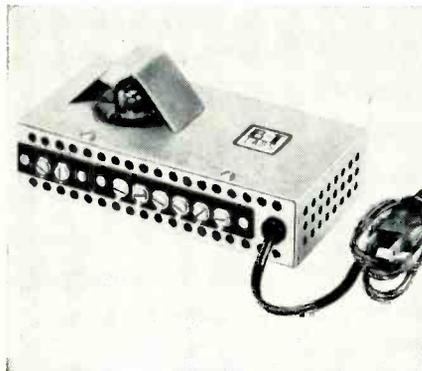
Firm ..... My position .....

City ..... State .....

# New Products for Technicians

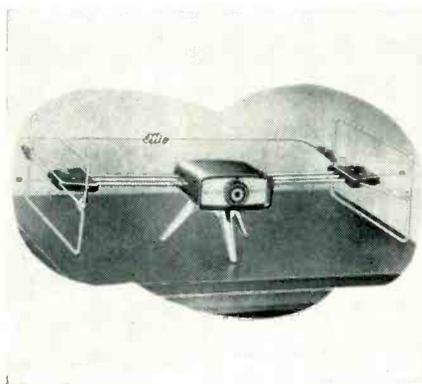
## B-T TWO-SET BOOSTER →

An all channel broadband amplifier is designed to improve TV reception. The Model B-23 permits operation of one, two or three TV receivers from one antenna. The unit amplifies signals even when all sets are in operation at the same time. It is a one-tube amplifier and will bring in sharper, clearer pictures on VHF channels with no interaction between operating receivers. Blonder-Tongue Laboratories Inc., 9-25 Alling St., Newark 2, N.J. (ELECTRONIC TECHNICIAN 2-21)



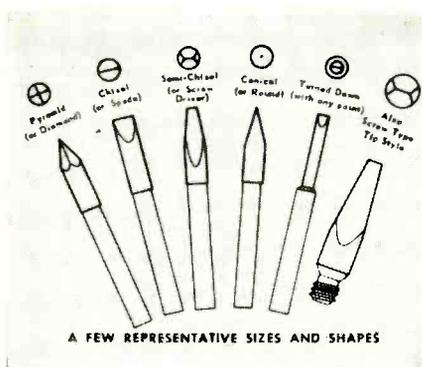
## Channel Master ANTENNA →

The Super Showman indoor TV antenna has 2 new added design features to improve performance. A disappearing dipole boosts the low band and a parasitic reflector delivers extra power to the high band. These new features produce a gain figure above a tuned reference dipole and a front-to-back ratio. The 12-channel Metro-Dyne variable inductance tuning system is turned to the same channel as the TV set for best picture. Channel Master Corp., Ellenville, N.Y. (ELECTRONIC TECHNICIAN 2-22)



## Hexacon SOLDERING TIPS →

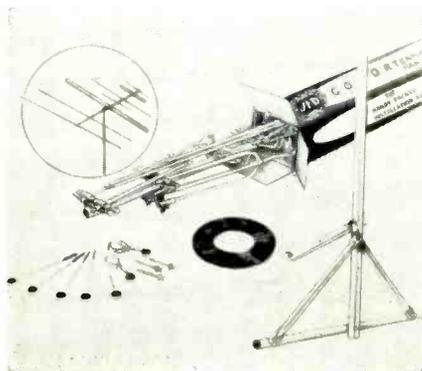
Xtradur tips are multi-coated for extra long wear by a new patented process in such a way that the shank of the tip is immunized from solder, thus preventing creeping and adhering of solder except on the working surface at the end of the tip. They also deliver more uniform heat because the size and shape never change. They are made in 40 stock sizes and many special sizes for all makes of industrial irons. Hexacon Electric Co., 180 W. Clay Ave., Roselle Park, N.J. (ELECTRONIC TECHNICIAN 2-23)



A FEW REPRESENTATIVE SIZES AND SHAPES

## JFD ANTENNA KIT →

The popular Fireball, Junior-Helix and Super-Helix Colortennas are now available in the form of a complete installation kit. Packaged in bold 3-color cartons, each factory assembled antenna is shipped complete with Tri-Mount aluminum mast, 50 feet of twin lead, stand-offs, and self-sealing drive-in nails. The all-angle Tri-Mount facilitates mounting on any part of the home. JFD Electronics Corp., 6101 16th Ave., Brooklyn 4, N. Y. (ELECTRONIC TECHNICIAN 2-24)



## Wen DRILL ACCESSORIES

The Toter Model 80K35 is designed to increase the usefulness of an electric drill and enable the user to keep tools and attachments where needed. It contains an assortment of accessories, including a paint mixer, 3" wire brush, 3" x 3/4" grinding wheel with 1/4" shaft, 3" buffing wheel, 9 twist drills of various sizes in a plastic case, 15-5" sandpaper discs, a 5" rubber pad, a 5 1/2" lambswool polishing bonnet with 1" nap, 3 adapter set and a speed stand. Wen Products, Inc., 5808 Northwest Highway, Chicago 31, Ill. (ELECTRONIC TECHNICIAN 2-25)

## Bresnick CABLE WRAP

The Heli-Tube is a spirally-cut, smooth-surfaced, polyethylene tubing and is ideal for binding electrical wires into cables with full flexibility for wire lead-offs at any point. Newest version, Heli-Tube 275°F, has a softening point of 275° F with no sacrifice of its spring-like quality which makes it tend to return to its original shape to hold wires in a vise-like grip. Available in three diameters: 1/8", 1/4", and 1/2" for bundles of wire ranging in size up to 3 1/2" diameter. Bresnick Co., Inc., 216 Tremont St., Boston 16, Mass. (ELECTRONIC TECHNICIAN 2-26)

## G-C COLOR CODER

The handy gadget will allow anyone to read the carbon resistor color codes immediately. It works on the slide-rule principle. The back side of the coder has scales for EIA 10% standard values and a chart for Ohm's Law formulae, plus the formula for computing parallel resistance. 3" x 3 1/4". L.P. \$0.25. General Cement Mfg. Co., 400 S. Wyman St., Rockford, Ill. (ELECTRONIC TECHNICIAN 2-27)

## Spico ANTENNA

The Viscount represents a combination of three electronic components in a single unit. These component parts are a 12-position phasing switch, an impedance matching inductor, and a variable capacitance control. The unit is long, low-slung, and similar in appearance to a desk radio. Dipoles telescope into the cabinet, disappearing completely when not in use. The 12-position phasing switch changes the circuitry between the dipoles, the impedance matching inductor and the variable capacitance control providing a maximum of 12 different circuit combinations. Spirling Products Co., P. O. Box 411, Hicksville, N. Y. (ELECTRONIC TECHNICIAN 2-28)

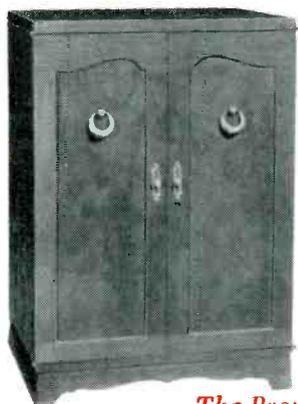
NO STRINGS ATTACHED...NO MONEY TO INVEST...NO SALES QUOTAS TO MEET...EXCLUSIVE FRANCHISES STILL AVAILABLE

# HERE'S NEWS about "EXTRA INCOME" — A TV Sales Plan EXCLUSIVELY for YOU!



*The Biltmore*  
in mahogany

EXPANDED ATR LINE INCLUDES 12 OPEN-FACED MODELS AND 15 FULL DOOR MODELS AUTHENTICALLY STYLED TO BLEND IN WITH ANY INTERIOR DECOR.



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EVERY DESIRABLE TV FEATURE ENGINEERED INTO AUTHENTICALLY DESIGNED FURNITURE CABINETS.

- Beautiful hand rubbed wood Finishes available in Walnut, Mahogany, Maple, Cherry and Blonde Korina
- The thick 3/4" Veneered Panels with tongue and groove construction give clear evidence of the finest in cabinet work.
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- Aluminized Picture Tube

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The entire ATR Plan—distribution of top quality sets by qualified TV Technicians—on a direct line from Manufacturer, to Independent, to the Customer . . . will prove to be a unique opportunity for you.



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A NEW HORIZON IN TECHNICAL EXCELLENCE AND TV PERFORMANCE.

CHECK THIS LIST AND TAKE PRIDE IN WHAT YOU WILL BE OFFERING TO YOUR CUSTOMERS:



SUPER POWERED FULL TRANSFORMER 2600 CHASSIS

- 18,000 volts of quality picture power
- Giant 265 sq. in., 90° aluminized tube, 21" overall diagonal measurement
- Super-powered, full-transformer, 26 tube chassis
- Extended range, permanent magnet speakers of heavy duty-construction
- Automatic gain control
- 4-stage 41 MC IF amplifier
- Interference rejector
- Push-pull, hi-fidelity audio system
- Permanent-magnet focus, regardless of voltage fluctuations
- Higher gain video amplifier
- Wider band width for maximum picture clarity
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- VHF—Continuous UHF Tuner available for UHF Areas on special order

*It's as simple as this.* The ATR TV Receiver is a Technician's Set. It is distributed only through TV-Radio Technicians . . . and is so superior to anything else on the market—that you would recommend it to your service customers, whenever the opportunity arose, with personal whole-hearted approval. And your commissions are extremely generous.

TV has become a regular, daily part of family life. Why should your customers, or anyone else, accept less than the most effective and the most enjoyable? Suggest that they enjoy dependable ATR's clear, crisp viewing and matchless sound reproduction. Let them own the finest in furniture craftsmanship and beauty, authentically styled to grace the decor of their home at prices they can afford.

TV sets by American Television & Radio will give them the highest all-around quality they've ever had. And, of course, every ATR model is available for prompt delivery—in either the Full-Door or Open-Face.

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300 E. 4th St.  
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Yes, I'm interested in "Extra Income." Please forward details about your ATR "Certified" Independent TV Plan.

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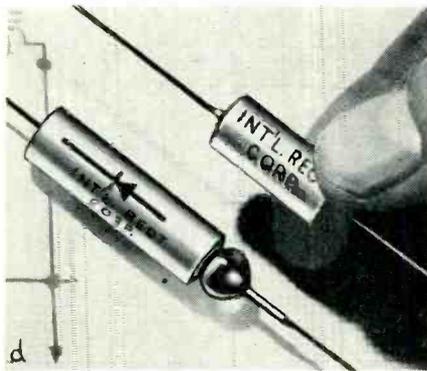
**AMERICAN TELEVISION & RADIO CO.** 300 EAST 4TH ST. ST. PAUL 1, MINN.

# New Components

For more information, fill in coupon, on page 40, mail to ELECTRONIC TECHNICIAN, 480 Lexington Ave., New York 17, N.Y.

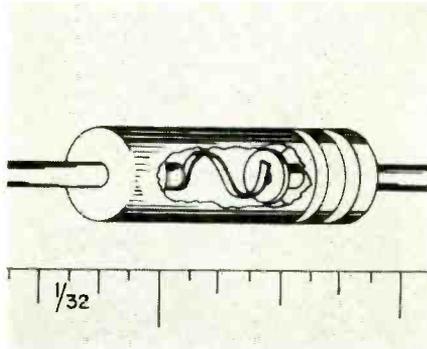
## Int'l Rect. DIODES →

A new series of high voltage silicon cartridge type rectifiers for high voltage power supplies are rated at 100 ma rectified d-c output current. The IN1410, IN1411, IN1412 and the IN1413 have a peak inverse voltage rating of 1500, 1800, 2000 and 2400 volts respectively. They offer space and weight savings, as well as improved mechanical stability over the vacuum tube rectifiers they replace. International Rectifier Corp., 1521 E. Grand Ave., El Segundo, Calif. (ELECTRONIC TECHNICIAN 2-1)



## Radio Recept. DIODES →

Multi-purpose Silicon Diode IN658 is a new, extremely versatile subminiature silicon junction type for computer, communications, and general circuit requirements, as well as for moderate power applications. It will handle an average rectified current of 200 ma and has a power dissipation rating of 200 mw. Forward voltage drop is under 1 volt at 100 ma, and peak inverse voltage is 120 volts. Radio Receptor Company, Inc., 240 Wythe Ave., Brooklyn 11, N.Y. (ELECTRONIC TECHNICIAN 2-2)



## ATR CARTON →

Gone is the drab brown corrugated box, and in its place is a smartly styled white kraft carton, with a bright orange and black insignia. The complete line from inverters to vibrators has undergone a face lifting in so far as packaging is concerned. The outer shipping carton can be used as an attractive window or counter display. The inner packaging is also very attractive. American Television & Radio Co., 300 E. Fourth St., St. Paul 1, Minn. (ELECTRONIC TECHNICIAN 2-3)



## Ohmite TRANSFORMER →

Model VT1R5, is a variable transformer having many distinctive and time-proven features. The brush arm carries no current, a pigtail shunts the current from the brush directly to a large copper graphite slip ring. The arm provides its own contact pressure. An internal stop eliminates possibility of damage due to application of torque at rotation limits. Also has a reversible, direct reading dial. Ohmite Manufacturing Co., 3667 Howard St., Skokie, Ill. (ELECTRONIC TECHNICIAN 2-4)



## RCA TRANSISTORS

The 2N405 and its flexible-lead version, the 2N406, are junction transistors of the germanium p-n-p alloy type, for class A audio-frequency driver service in compact entertainment-type receivers. They have excellent stability throughout life. In a common-emitter type of circuit, these transistors have a typical small-signal current transfer ratio of 35, and a matched-impedance power gain of 43db. Radio Corp. of America, Semiconductor Division, Somerville, N.J. (ELECTRONIC TECHNICIAN 2-5)

## CMS TUBE SHIELD

A new tube shield has been made an integral part of the right angle socket. The shield cannot be lost or misplaced when servicing the socket or installing a new tube. It is self-contained and telescopic with a bayonet locking feature to maintain it in the raised position. With a slight twist, the upper half is disengaged and lowered so that the tube can be removed without difficulty. Cleveland Metal Specialties Co., 1783 E. 21st St., Cleveland 14, Ohio (ELECTRONIC TECHNICIAN 2-6)

## Sargent SWITCHES

Four types are available in SPST and DPDT, with solder or screw terminals, nominally rated at 10 amp 250 v ac and 1/2 hp 125-250 v ac or 3/4 hp 125-250 v ac. They are UL approved and made to stand up under continuous service. This series is specifically designed for small motors, electrical appliances, electronic equipment and aircraft electrical circuits. Sargent Electric Corp., 630 Merrick Rd., Lynbrook, N.Y. (ELECTRONIC TECHNICIAN 2-7)

## Vaco SOLDERLESS TERMINALS

Solderless terminals in a display unit. The No. 1500 display, made of steel, enameled in blue, is 23" high with terminal card, 16" wide, and 7" deep. Includes an assortment of 10 popular numbers packed 100 to the box, with self-pricing tabs and crimping tool. Also has a supply of give-away folders and a 9 x 12 card with sample mounted terminals and pertinent data. May be used on wall or on counter. Vaco Products Co., 317 E. Ontario St., Chicago 11, Ill. (ELECTRONIC TECHNICIAN No. 2-8)

# New Audio Products



## Turner MERCHANDISER →

A colorful, attractive microphone display board will help the service dealer merchandise tape recorder microphone replacements. This board holds five different microphones complete with cable, and plug. A special plug adapter on each microphone makes them fit any tape recorder. The board is strongly made, and fits neatly on any counter. It is easy to keep a full stock of microphones with the use of this board. The Turner Co., Cedar Rapids, Iowa (ELECTRONIC TECHNICIAN 2-11)



## Scott FM TUNER →

The new Model 311C FM Tuner has a sensitivity of 2  $\mu$ v for 20 db quieting. Wide-band design makes this tuner selective and reduces co-channel and adjacent channel interference. A sensitive signal strength meter makes precise tuning easy. The circuit features a wide-band detector, two stages of limiting, 80 db rejection of spurious cross-modulation response, agc, and low impedance output. Also has tape recorder and multiplex facilities. H. H. Scott, 111 Powdermill Road, Maynard, Mass. (ELECTRONIC TECHNICIAN 2-12)



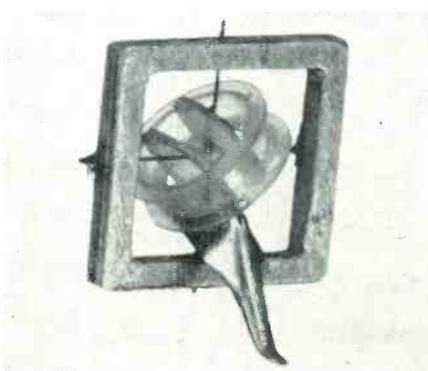
## Jerrold RANGE EXTENDER →

An FM preamplifier which effectively extends the reception range of high-fidelity FM tuners is designed for simple home installation. They are available with either 300 or 75 ohm input. The frequency response of the preamplifiers is flat within  $\pm 1$  db. The amplifiers using only two tubes achieves a minimum gain of 25 db and a maximum undistorted output of 0.5 volts rms. Jerrold Electronics Corp., 23rd and Chestnut Sts., Philadelphia 3, Pa. (ELECTRONIC TECHNICIAN 2-13)



## Fairchild CARTRIDGE →

First view the development of stereo playback equipment for the purpose of playing stereo discs cut by the Westrex system. The heart of the single stylus cartridge consists of two coil forms mounted in a frame at 45° to the vertical axis of the record groove. Each coil form is at 90° to the other with an aluminum stylus arm secured to both members. This cartridge can be used to play back standard recordings. Fairchild Recording Equipment Co., 10-40 45th Ave., Long Island City 1, N.Y. (ELECTRONIC TECHNICIAN 2-14)



## Masco INTERCOM

Five Models for every purpose, wireless if required or wired if convenient, are available in beautiful enamel colors. Models are: Wireless Electronic Nurse; Wire-Less Com; E-Z Talk; Small Talk; and Econofone. Additional remote stations are available for all models except the Wireless Electronic Nurse. Mark Simpson Mfg. Co. Inc., 32-28 49th St., Long Island City 3, N.Y. (ELECTRONIC TECHNICIAN 2-17)

## Irish TAPE

Fortified double-play tape No. 400 reduces the problem of stretching because it is made on DuPont 60-gauge Mylar polyester base. A Ferro-Sheen process bonds the oxide coating on to the tape base so firmly it won't come off. This eliminates shedding of oxide which results in reduced head wear, fewer drop-outs, flatter frequency response and better signal-to-noise ratio. One 7-inch reel can take a four hour recording. ORRadio Industries, Inc., Shamrock Circle, Opelika, Ala. (ELECTRONIC TECHNICIAN 2-18)

## Sherwood AMPLIFIER

A 36-watt high fidelity amplifier is capable of delivering 100-watt instantaneous peak power output from such typical music program sources as FM, records or tape. A special feature of the new S-1000 II is control flexibility and accessibility. The controls on the front panel include a 6 db presence-rise switch, equalizer control for 4 record compensation choices or microphone and tape playback equalization, inverse-feedback type bass and treble controls, center-set loudness control, loudness compensation switch, 12-db/octave scratch and rumble filters, phono level control, tapemonitor switch, and selector for 5 inputs. Outputs: 16, 8, and 4 ohms. Sherwood Electronic Laboratories, Inc., 161 E. Erie St., Chicago 11, Ill. (ELECTRONIC TECHNICIAN 2-16)

## Oxford SPEAKER

The complete line of rear seat hi-fi kits is now available in completely new, multi-colored, highly attractive display packaging. In addition to bright colors and modern design, they have large size lettering for easy identification of model numbers and other pertinent information. Oxford Components, Inc., 556 W. Monroe St., Chicago, Ill. (ELECTRONIC TECHNICIAN 2-15)

# Latest Test Equipment

## Eico ELIMINATOR



New 6v and 12v Battery Eliminator and Charger Model 1060, is suitable for servicing transistorized equipment. Available in both kit and wired form. It has a special heavy-duty choke and filter capacitor. Additional features are: Two dc voltage ranges; continuous voltage adjustment; separate voltmeter and a dual-range ammeter; fused primary; and an automatic reset overload relay for the secondary. Electronic Instrument Co., 33-00 Northern Blvd., Long Island City 1, N. Y. (ELECTRONIC TECHNICIAN 2-31)



## Don Bosco MOSQUITO



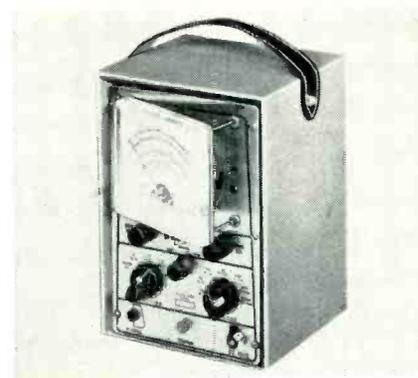
A transistorized signal injector is economically operated by a single 1.5 volt battery and generates from audio to high radio frequencies in harmonics. Light weight and pen-size, the unique instrument can be used to service and test radio and TV a-f & r-f circuits, amplifiers, hearing aid devices, telephones, and other testing work where the cause of trouble can be located by the signal substitution method. Don Bosco Electronics Co., 1099 S. Orange Ave., Newark 6, N. J. (ELECTRONIC TECHNICIAN 2-32)



## Precise VTVM



A printed-circuit, voltage-regulated VTVM Model 904 permits the user to tilt the meter movement to eye level for more accurate readings, and a Magic Lead switch that shorts or opens test leads for zero and infinite ohms adjust without disconnecting them from the circuit under test. Meter reads p-to-p and rms voltages. It has 4 ranges for a-c and 4 for d-c voltage measurements, plus 7 resistance ranges. Available in kit or wired form. Precise Development Corp., 2 Neil Court, Ocean-side, N. Y. (ELECTRONIC TECHNICIAN 2-33)



## Paco OSCILLOSCOPE KIT

Model S-50 cathode ray oscilloscope kit features push-pull vertical and horizontal amplifiers; ultra-modern printed circuit amplifier design; high sensitivity; 1 mc vertical amplifier; built-in 1-volt peak-to-peak self-calibrator; two-color,



easy reading panel; and rugged louvered steel cabinet. Dimensions are 13 $\frac{3}{8}$  x 8 $\frac{3}{4}$  x 17 $\frac{1}{4}$  inches. Priced at \$47.50. Paco Electronics Co., Inc., a division of Precision Apparatus Co., Inc., 70-31 84th St., Glendale 27, L. I., N. Y. (ELECTRONIC TECHNICIAN 2-34)

## Motorola TEST SET

Model TU546 transistorized portable test set, for two-way radio servicing, operates from flashlight cells. Designed to facilitate the aligning and testing of mobile and base station transmitters and receivers. May be used as a voltmeter, milliammeter, r-f power output



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indicator, relative field-strength meter, signal generator and crystal checker. A transistorized electronic A-C voltmeter and a 4", 2% meter have been incorporated in the set. Motorola Communications & Electronics, Inc., 4501 W. Augusta Blvd., Chicago 51, Ill. (ELECTRONIC TECHNICIAN 2-35)

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NEW 315-C  
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15" DIFFAXIAL**

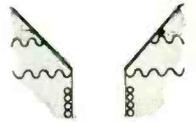


*This speaker protected by U. S. Patent nos. 2,641,325; 2,690,231; 2,751,996 and other patents pending.*



**THESE ARE THE REASONS WHY**

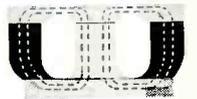
Exclusive self-stabilized woofer cone structure and dual spider construction ensure lifetime centering of moving system for all extreme excursions.



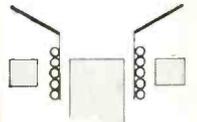
University-controlled processing of imported cone pulps results in consistently uniform, distortion-free response.



Exclusive, massive flux-contoured 6 pound Gold Dot Alnico 5 magnet provides efficient power drive for deepest low frequencies, free of transient distortion.



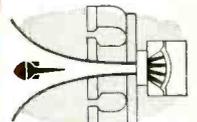
Extra-long voice coil ensures purity of maximum low frequency energy conversion during periods of extreme cone excursion.



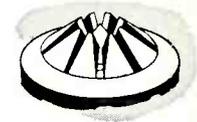
Exclusive University-formulated long polymer lattice permeates rim suspension for effective acousto-mechanical rim damping.



True through-axial construction permits balanced tweeter, mid-range and woofer acoustic integration without design compromise.



Exclusive hypersonic tweeter incorporating radial phasing equalizer automatically balances all high frequencies for smooth, realistic reproduction.



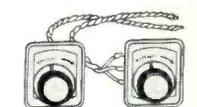
Exclusive "reciprocating-flare" horn now has wave front equalizer for more uniform wide-angle treble coverage.



Exclusive multi-sectional Diffusicone provides controlled diffraction for linear mid-range response and dispersion.



Continuously variable dual control network integrates and blends mid-range and tweeter for concert realism regardless of room acoustics.



Response: 25 cps to inaudibility; Power capacity: 50 watts, integrated program; Total magnet wt.: 6½ lbs. Alnico 5; Impedance: 8-16 ohms; Depth: 12"; User net: \$156.00. UNIVERSITY LOUSPEAKERS, INC., 80 SO. KENSICO AVENUE, WHITE PLAINS, N. Y.

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## Catalogs & Bulletins

**TRANSFORMERS & COILS:** A 244-page loose-leaf replacement guide contains parts list, model index, chassis index and service notes with each manufacturer's listing. Thordarson-Meissner, Mt. Carmel, Ill. (ELECTRONIC TECHNICIAN No. B2-6)

**CERAMICS:** A 16-page, 2-color catalog to help the manufacturer with design problems. Gives typical applications and a physical properties chart. Centralab, a Division of Globe-Union Inc., 900 E. Keefe Ave., Milwaukee 1, Wisc. (ELECTRONIC TECHNICIAN No. B2-5)

**KITS:** A 20-page illustrated catalog lists TV, Hi-Fi, Electronic Instrument and Electronic Photoflash Kits. Includes specifications and prices. Transvision Inc., 460 North Ave., New Rochelle, N. Y. (ELECTRONIC TECHNICIAN No. B2-9)

**TRANSISTORS:** An 8-page illustrated brochure describes the manufacturing operations in the production of germanium alloyed junction transistors. Has 15 photographs and a flow chart. General Transistor Corp., 91-27 138th Place, Jamaica, N. Y. (ELECTRONIC TECHNICIAN No. B2-3)

**DEFLECTION COMPONENTS:** A 4-page, 2-color catalog sheet covers a new line of components. Includes illustrations and prices. Standard Components, Inc., 519 S. 5th Ave., Mount Vernon, N. Y. (ELECTRONIC TECHNICIAN B2-4)

**THERMOSTATS:** A 4-page, 2-color folder, with price sheet and order form covers 6 models with specifications and part numbering system. Chatham Controls Corp., 33 River Rd., Chatham, N. J. (ELECTRONIC TECHNICIAN B2-8)

**POWER SUPPLIES:** A file drawer folder (12 pages) containing catalog sheets on standard line giving specifications, dimensions and other characteristics. Includes power supply requirement sheets. Trans Electronics, Inc., 7349 Canoga Ave., Canoga Park, Calif. (ELECTRONIC TECHNICIAN B2-7)

**CAPACITORS:** A catalog covering polystyrene, polyethylene, teflon and mylar dielectric capacitors and a line of high voltage packaged power supplies. Provides electrical characteristic data and physical specifications, related part numbers and list prices. Film Capacitors, Inc., 3400 Park Ave., New York 56, N. Y. (ELECTRONIC TECHNICIAN No. B2-2)



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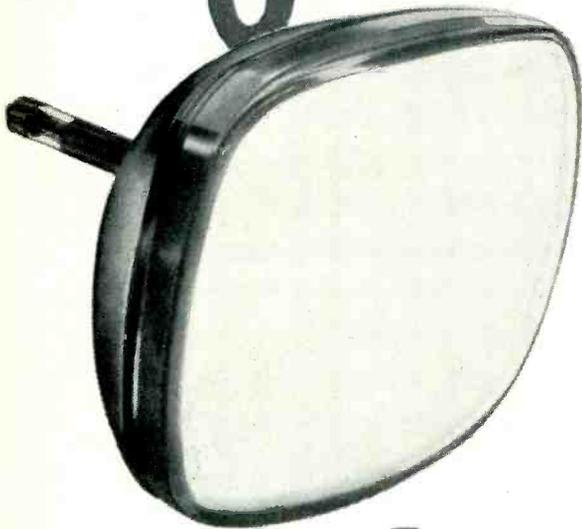
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TUNG-SOL ELECTRIC INC., Newark 4, N. J. Sales Offices: Atlanta, Ga.; Columbus, Ohio; Culver City, Calif.; Dallas, Tex.; Denver, Colo.; Detroit, Mich.; Irvington, N. J.; Melrose Park, Ill.; Newark, N. J.; Seattle, Wash.

## Public Address

# Installation

• There are almost as many factors to consider when installing a public-address system as there are people. Actually no two installations are alike. Even in a given setup which has been performing well for years, modifications will be needed to accommodate different requirements or other acoustical changes. New construction, new interiors, higher ambient noise level, different program material, and different types of audiences are just a few of the many things that can take place which will alter the original specifications. The problem can be divided into two large categories: program in, or source; and program out. Both of these segments are tied together by the amplifier; the requirements of which are predetermined by the job on hand. A mistake made sometimes is the preselection of an amplifier and other pieces of equipment and then juggling them around to make it do. From an economy sense, especially where some of the equipment may already be on hand, an attempt will be made to make it fit by supplementing it with pieces of additional equipment in a patch-quilt arrangement. It is false economy to compromise the installation by using equipment not specifically designed for the purpose.

### Program In

It may seem immaterial which part of the problem is considered first. There is a tendency on the part of some technicians to preselect the loudspeakers and their locations. That this can lead to trouble will soon become evident. The type of program source will, to a large extent dictate the location of the speakers. In the case of a live performance, the sound should seem to come from the direction of the performer or orchestra. On the other hand music or speech that is fed into a system from a record player or tuner could come from any direction. Since it is more economical to transmit sound over wire than through atmosphere, more smaller speakers, strategically located, may be required in a large installation, than using a couple of tremendous horns to retain the sense of direction. A compromise in this case may be justified, but an understanding of the desired effects will help in the proper selection and placement of speakers.

Equipment required for the playing of records or radio programs to feed amplifier input circuits are commercially available for just about every situation. The installation of a radio tuner, record player or tape recorder presents no unique problems. Most amplifiers have proper inputs to handle these units. However, it is important to maintain impedance match and to feed, into the amplifier, a signal of proper amplitude.

If the system is used for paging, or for making announcements from one point, a single microphone may be used and the same considerations apply. Where live program material is presented and from more than one microphone, the technician's acumen and ability will make or break the system. Selection, placement, and method of hookup should be in accordance with accepted standards for good microphone technique.

It is just as important to properly phase the microphones as it is to phase the speakers. This procedure is quite simple. When more than one mike is used at the same time, accept any one of them as a standard to compare with the other mikes. Only the unit being checked and the standard should be on. Compare the total output of

# Tips



both mikes when the wires to the mike under test is connected one way, and then reversed. Proper phase is accomplished when the greater output is realized. The same thing could be done with a bidirectional mike; simply by rotating it 180°. If the volume is larger when the back of the mike is facing the music, reverse the leads and reposition the mike. Sometimes, merely trying to observe polarity or color coded wires can be misleading especially when different manufacturers' products are used. Another important consideration is the length of connecting cable. Short runs for high impedance, and longer runs for low impedance microphones is the general rule. Like all rules, there are times when it can be abridged without any noticeable detrimental effects. Should a borderline situation arise, one quick way of finding out is to temporarily make the connection and listen. The selection of a microphone with proper directional, sensitivity and other characteristics is of course most important. The article "What's A Good Microphone" on page 46 of the March 1957 issue of Electronic Technician should help in the proper selection of a microphone. Manufacturers' literature and their technical staffs are usually available to help solve some particularly difficult problem.

It may be desirable in many instances to have variable input controls centrally located for each microphone and other program source. A program director could then mix, amplify, and fade out any input to satisfy his acoustical tastes. A small local speaker or pair of headphones for monitoring purposes is often most convenient. A mixer or control box has another advantage besides making the input circuitry more flexible, and that is the reduction of the required number of input channels in the amplifier itself. However, it is good practice to have at least one spare position.

## Program Out

Now that the program material has been collected, blended and otherwise edited, the problem becomes one of delivering it to the audience. There are loudspeakers for every occasion and almost as many different ways for connecting them. The three types of sound distribution patterns, source identity, general or all-over effect and compromise should be a guide to the selection and placement of speakers. The selection of speakers must also be made in accordance with sound output requirements, frequency response, directional and mechanical characteristics. While some impedance mismatch may be tolerated, it is best to maintain proper match and load conditions at all times. When speakers are cut in or out of circuits, or where individual speaker level control is desired, it should be done in such a way as to avoid upsetting the impedance match and audio power distribution pattern. Variable pads and resistors properly used will help solve some of these problems. Many of the impedance matching problems are simplified by using a constant-voltage output system available in many amplifiers. So long as the total power drain from the amplifier does not exceed its rating, loads may be plugged in or out in much the same manner as a lamp is used in a house-wiring system.

*(Continued on page 62)*

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You've seen this new switch idea featured in the latest TV sets. Now you can use it on many control replacements to add extra convenience for your customers.

Pull the control shaft and the set turns on; push, and the set turns off. No more "guessing" at volume setting. No more accelerated wear on the low end of the element every time the set is switched on or off.

The new Mallory switch far outlasts conventional switches; never sticks . . . never damaged by overloads. Get controls with this unique new switch from your Mallory distributor, in the ratings you need for any replacement.



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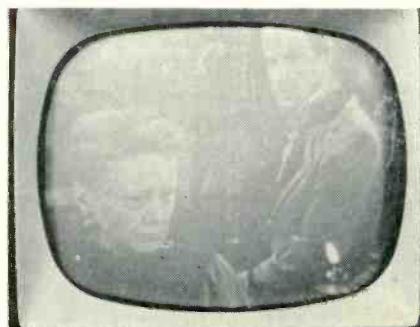
# Honeycomb

• The extreme difficulties normally experienced in viewing TV, oscilloscope or motion picture images under bright ambient light conditions have been surmounted by a new light-directional material now being manufactured by Hexcel Products, Inc., of Oakland, California. The light-directional material, which is in effect an open, multi-cell honeycomb screen, sharply increases the contrast of the visual image by screening ambient light from the image.

Uncontrolled ambient light in the area of CRT or projection screens causes considerable viewing difficulty. Such ambient light, reflected from the viewed surface, often reaches intensity values approaching that of the light areas to be viewed. This has the effect of lowering the contrast between the light and dark tones on the tube or screen, ruining image definition. When a thin honeycomb panel, which is painted black, is placed on the screen a large portion of the ambient light is blocked from the viewing surface.

The honeycomb panel is made of aluminum in the form of hundreds of small hexagonal cells with very thin walls. Each cell of the honeycomb structure functions as a hood or light shield which limits the entrance angle of straight-line light. The frontal angle of vision is also limited at the same time, but this normally is of little importance since CRT's and motion picture screens are usually viewed through a relatively small frontal angle. The arc of the viewing angle, as well as the degree of shielding, is determined by the cell size and depth. The deeper or smaller the cell, the more narrow the viewing angle. At the same time, as the viewing angle narrows, the reflected ambient light diminishes. With proper compromise

Fig. 1—Picture is almost washed-out when viewed in the presence of high ambient light.



# Screen

between cell size and depth, optimum viewing angle and image intensity can be obtained. The optimum viewing angle has been determined to be  $80^\circ$ , or  $40^\circ$  on each side of center. With this construction, the normal  $180^\circ$  exposure to ambient light is reduced to only  $80^\circ$ . This reduction is usually sufficient to allow effective image contrast, even in direct daylight.

Outdoor motion picture theatres are expected to benefit greatly from

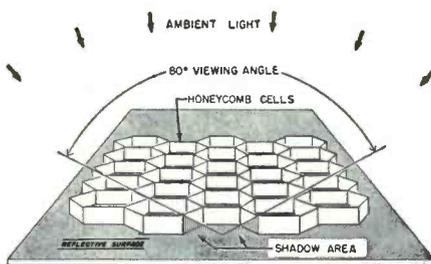


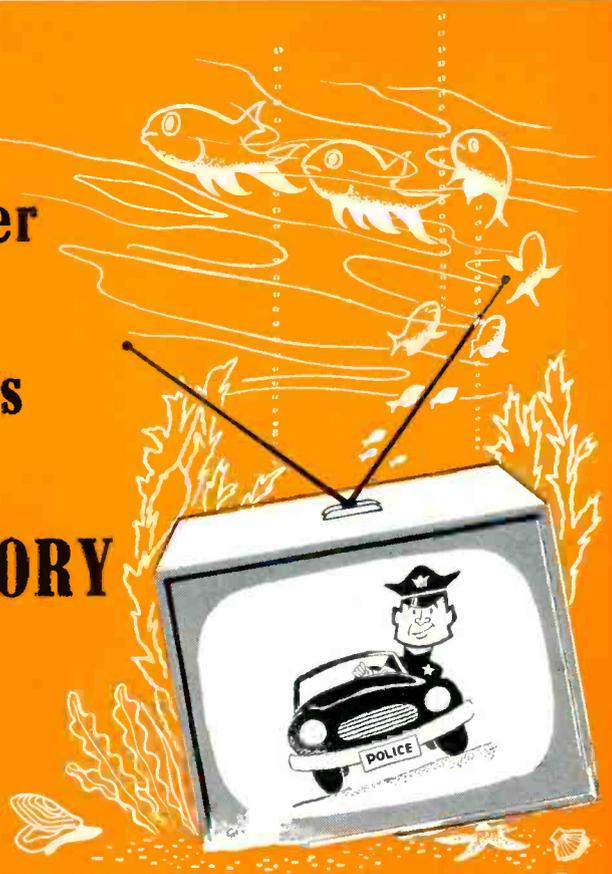
Fig. 2—Open, multi-cell honeycomb screen, increases the contrast of the visual image by blocking a portion of the ambient light. Each cell functions as a small hood.

the use of a honeycomb layer placed across their screens. Until now, these theatres have been unable to operate before sundown and have encountered some difficulty with bright illumination from the moon or nearby city lights. In fact, anywhere that it is necessary to view objects or images on or behind a reflective surface, light-directional honeycomb screens may prove of benefit. Currently, light-directional screens for home TV sets are being tested to determine consumer reaction; screens for oscilloscopes and other laboratory instruments are already being sold. •

Fig. 3—TV shadow screen in place, removes glare and permits normal viewing.



## Wet Weather Never Bothers A MALLORY "GEM"



Run-of-the-mill radio and television equipment may never be called upon for such extreme service as under-water operation . . . but if it were, you could be sure that Mallyory Gem capacitors would continue to deliver excellent performance.

Mallyory "Gems" are tightly sealed in a mica filled bakelite case with epoxy resin that adheres both to case and wires . . . they withstand moisture and exposure without change of capacity or internal resistance. And, they're conservatively rated to assure complete reliability under the most severe conditions.

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- Filters

## Association News

### CSEA Pay TV

Skiatron and the California State Electronics Association seek bids to service pay-TV equipment in Santa Clara Valley. CSEA Pres. H. Lawrence Schmitt announced that applications from Valley independent service men to install pay units

would be solicited. The association is working with Alan Lane, VP-director of Skiatron. The firm plans to make its debut in San Francisco, later extending to Sacramento, then moving down into Santa Clara Valley and over into Fresno and the San Joaquin Valley.

### TESA-SC Mo. Elects

TESA-SC Missouri elected the following officers: Pres., E. Carroll; V.P., James Rathbun; Secy.-Treas., Bill Pryer.

### TSA Mich. Blood Bank

The success and popularity of the Television Service Association's, in Michigan, health and insurance plan has motivated its members to establish a Blood Bank in cooperation with the Red Cross in Detroit.

### RTG of L. I. Elects

The Radio Television Guild of Long Island, N. Y., elected Pres. Robert Larsen; V.P., Bob Barasch; Recording Secy., Bob Henderson; Corresponding Secy., John Holland; Treas., Manny Greene; Sgt.-at-Arms, Fred Strickland; Trustees, Art Cyr, Murray Barlowe, Ralph Milne, George Volkens and Jack Wheaton. The Guild's sponsored Electronic Show's theme for this year was, "Better Business Management." Exhibitors included distributors, and parts, test equipment and consumer lines manufacturers.

### CETA Education Program

In addition to the regularly scheduled technical lectures, which most recently included General Electric, Hotpoint, RCA, and JFD Electronics, a formal program of instruction on Transistor Principles and Transistor Radio Receiver Servicing will commence in February and continue on to June. Paul B. Zbar, Technical Training Director of the Electronic Industries Association and Sid Schildkraut of the EIA teaching staff, will lecture. The lectures are jointly sponsored by the New York Trade School and by CETA. The school is headquarters for the Advanced TV Servicing Techniques Course which is part of an industry sponsored refresher and upgrading program.

### NATESA Growth

In the past 39 consecutive months at least one new affiliate has joined the National Alliance of Television and Electronic Associations. The latest additions include: RTSA of Greater Atlanta, Inc., J. P. Mull Jr., Pres., and Walter Wiebel, Secy.; TESA of Topeka, Inc., George Mills, Pres., and Charles H. Smith, Secy.; Worcester County Associations of TV Technicians (Mass.), Paul V. Messier, Pres., Warren Pease, Jr., Secy., and Al Stark, NATESA Director; Canyon County TV SSA (Nampa, Idaho), Bud Philips, Pres., and Marvin J. Kistler, Secy. The president and secretary of most of these associations also serve as NATESA Director and Alternate respectively. The national association encourages others to join and work towards a bigger and better industry.

## SPECIALY PRICED DURING FEBRUARY!



## REPAIRS ARE EASY! when you use...



# PRINTED CIRCUIT REPAIR KIT

**No. 680X**



### HERE'S WHAT YOU GET

- #14-2 Print-Kote Silicone Resin
- #13-2 Print-Kote Solvent
- #21-1 1/2 oz. Pure Silver Print
- #9093 Solder Probe Tool
- #9094 Stainless Brush & Scraper
- Special Print-Kote Solder
- G-C Printed Circuit Service Manual

It's easy to make printed circuit repairs on radio and TV sets when you have this complete G-C kit. Everything's included, the same items used by set manufacturers. Full instructions, too. Buy now and save!

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## SEND POSTCARD FOR G-C CATALOG!

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# How NOT To Use TRANSISTORS

Perhaps you've heard how indestructible the transistor is. However, with a bit of specialized knowledge you can easily demolish the semiconductor darlings . . . very helpful in building the present 2.5 million-unit annual transistor replacement market. Here, courtesy General Transistor Corp., are some excellent tongue-in-cheek suggestions on How NOT to Use Transistors.

1. TWIST AND YANK THE LEADS EXCESSIVELY WHEN ASSEMBLING INTO EQUIPMENT. IF YOU LISTEN CLOSELY, YOU CAN HEAR THE SNAP.
2. OVERHEAT THE LEADS WITH A BIG SOLDERING IRON. LEADS ARE GOING OUT OF STYLE ANYWAY.
3. IGNORE THE PUBLISHED RATINGS AND EXCEED THEM. THIS WILL CAUSE THE TRANSISTOR TO OVERHEAT.
4. INSERT THE TRANSISTOR INTO THE TEST EQUIPMENT WHILE THE POWER IS ON. MAKING SURE THE ORDER IN WHICH THE LEADS MAKE CONTACT IS SWITCHED AROUND THIS MAY CAUSE IMMEDIATE RUIN.
5. SPREAD THE TRANSISTORS IN AN OPEN AISLE WHEN ASSEMBLING, SO THEY HAVE A BETTER CHANCE OF GETTING STEPPED ON.
6. IF THE TRANSISTOR DOES NOT FIT INTO THE EQUIPMENT PROPERLY, PUT A SCREWDRIVER ONTO THE CASE AND HAMMER IT INTO PLACE.
7. AVOID OVERHEATING TRANSISTOR ON HOT DAYS BY PLACING IN FREEZING COMPARTMENT OF NEAREST REFRIGERATOR. BEING CAREFUL TO AVOID CONTAMINATION FROM THE CHOPPED LIVER NEARBY.
8. FORGET ABOUT THE I.C., ASSUME IT EQUALS ZERO, THEN YOU'LL REALLY END UP WITH NOTHING.
9. IN ORDER TO BURN OUT THE TRANSISTOR THOROUGHLY, BE SURE THERE IS LEAKAGE TO POWER LINE IN SOLDERING IRON.
10. CHECK TRANSISTOR WITH HI VOLTAGE OR HIGH CURRENT OHMMEETER FOR CONTINUITY.
11. IGNORE PARAMETER AND VARIATIONS AS A FUNCTION OF TEMPERATURE, AND JOIN THE F. C. C. (FATAL CIRCUIT CLUB).
12. DIP SOLDERING—IMMERSE COMPLETELY IN SOLDER. BE SURE YOUR SOCKS HAVE BOILFAST COLORS.

## Fanon INTERCOM



Telephone type intercom system is quality engineered for commercial applications and can be used for either desk or wall mounting without conversion. All systems may utilize either a 6-v battery or a 115-v ac power supply. The Model FT-1300 is a 13-station master with a 12 position rotary switch for selective ringing. One private conversation at a time or a conference may be held between two or more stations. Fannon Electric Co. Inc., 98 Berriman St., Brooklyn 8, N.Y. (ELECTRONIC TECHNICIAN 2-19)



No. 2 of a series of questions for progressive technicians

### Can You Handle This Problem?

**The standard transmitted TV signal is 25% sync. A scope on the second detector of a receiver shows more than 25% of the signal to be sync. What is probably wrong?**

(Answer printed below)

Problems like this one often cause extra work. The answer is so simple it appears incorrect. As a result needless time is spent searching for a "better answer". The principles involved in this particular problem are fundamental. However unless fundamentals are thoroughly understood, the problem becomes difficult.

Knowing these principles is your key to getting ahead in today's and tomorrow's new world of electronics. Unless you really know fundamental electronic theory, you can't take advantage of the opportunities that are there right now—waiting for you.

Take Industrial Electronics, for instance. Think of closed circuit television . . . dielectric heaters . . .

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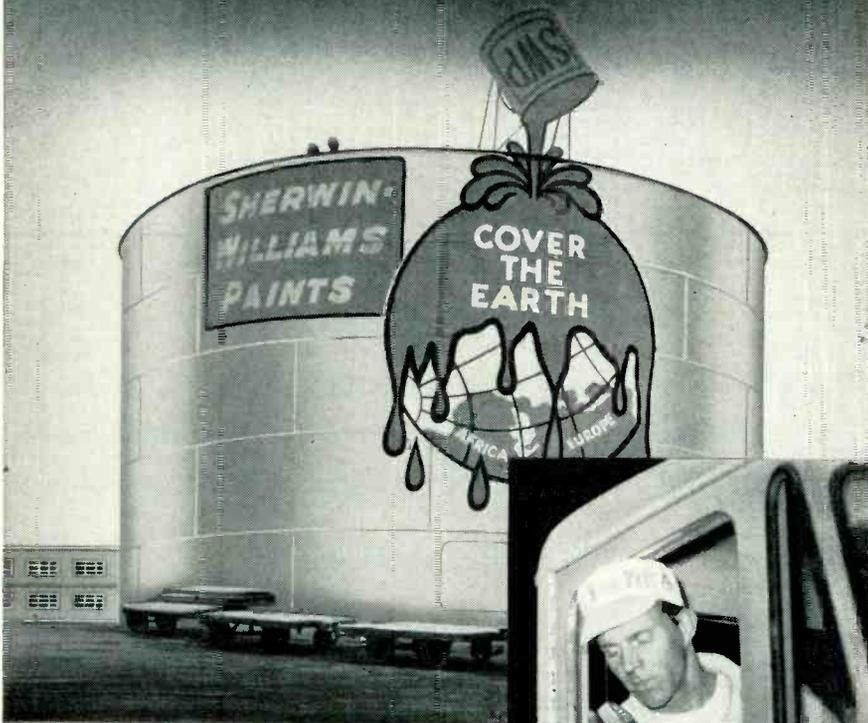
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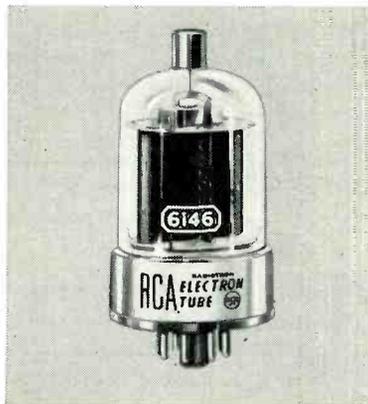
T-11

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The best mobile communications systems rely on the best in power tubes...RCA.



**RADIO CORPORATION OF AMERICA**  
Electron Tube Division

Harrison, N. J.

## Dilemma of Depreciation

(Continued from page 32D)

one year it certainly isn't invisible when the cash has to be laid out for a new scope.

**Q.** How does the entry of depreciation help to provide for the purchase of new test equipment?

**A.** Let us suppose that the business showed a profit of \$10,000.00 for the year 1957, without considering the item of depreciation. You might therefore consider this amount to be the increased net worth, whereas actually the increased net worth is only \$9,000.00, assuming that there was \$1,000.00 depreciation which was not recorded in the books. If you hadn't held back enough cash from the profits of the years during which the original equipment was being depreciated you would be faced with a problem of obtaining sufficient cash to purchase new equipment.

**Q.** How can I determine the life expectancy of a light truck?

**A.** There are a few ways in which this can be done. The manufacturer of the equipment can give you his estimate of the longevity of the truck. Also, the Internal Revenue Service's Bulletin "F" indicates that the expected longevity of a light truck is approximately 4 years.

**Q.** Am I necessarily obligated to use as the estimated longevity of a signal generator the figure that the manufacturer gives me, or the figure that the Internal Revenue suggests?

**A.** No. In the final analysis you are the one who will make the decision as to the number of years over which you feel it is fair and reasonable to write off the cost of the generator, less salvage value, of course. This is so because only you know the exact conditions under which the equipment will be working.

**Q.** What does "salvage value" mean?

**A.** Salvage value is the amount you expect to recover from the sale of the machine at the end of its useful life. Of necessity this has to be a guess, but try to make it an educated guess.

**Q.** What are the basic methods for computing depreciation?

**A.** The ways to compute depreciation are: the straight-line method, the sum-of-the-years-digits method, and the declining-balance method. Let me spend a little time on the

general description of each of these. The straight-line method, which is a fairly popular one, is predicated on the assumption that wear and tear are uniform during the useful life of the equipment. Therefore, the cost of the item less its estimated salvage value is depreciated in equal amounts over the estimated useful life. Both the sum-of-the-years-digits method and the declining-balance method are based on the assumption that the depreciation is higher in the early years and lower in the later years of the life of a piece of equipment. The years-digits method works as follows: different fractions are used each year against the original cost, less salvage

Table 1

Year	Straight-Line	
	Annually	Accumulated
1	2,500	2,500
2	2,500	5,000
3	2,500	7,500
4	2,500	10,000

Year	Sum-Of-Digits	
	Annually	Accumulated
1	4,000	4,000
2	3,000	7,000
3	2,000	9,000
4	1,000	10,000

Year	200% Declining-Balance	
	Annually	Accumulated
1	5,000	5,000
2	2,500	7,500
3	1,250	8,750
4	625	9,375

value. The numerator of the fraction represents the remaining number of years of useful life and the denominator, which always remains the same, represents the sum of the digits of all the years corresponding to the estimated longevity. For example, if the piece of equipment has an estimated life of four years the denominator of the fraction would always be 10, since 4 and 3 and 2 and 1 equal 10. For the first year 4/10 of the cost would be depreciated, 3/10 in the second year, etc. Under the declining balance method of depreciation the depreciation base is lowered each year by the amount of the depreciation deduction and a steady rate is applied to the balances that result. Under federal income tax provisions this declining-balance  
(Continued on page 56)



sharper, clearer pictures on 1, 2 or 3 tv sets with 1 antenna

## NEW B-23 TWO-SET BOOSTER



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## New Books

**HOW TO READ SCHEMATIC DIAGRAMS.** By David Mark. Published by John F. Rider Publisher, Inc., 116 W. 14th St., New York 11, N. Y. 160 pages. Paper cover. \$3.50.

This book is intended for elementary and high-school students becoming interested in electronics, experimenters, hobbyists, beginning technicians and in-

dustrial upgrading programs designed to acquaint personnel with electronic symbols and diagrams. The book presupposes no prior knowledge of electricity or electronics. It explains the basic theory appropriate to the subject, symbolism, technical notations and organization of schematics in pictorial diagrammatic form. Standard I. R. E. and industry accepted symbols are used throughout. Items such as batteries, lamps, switches, relays, fuses, transformers, capacitors, motors, generators and resistor vacuum tubes, metallic rectifiers and a host of other electronic components are explained.

**ELEMENTS OF TAPE RECORDER CIRCUITS.** By Herman Burstein and Henry C. Pollak. Published by Gernsback Library, Inc., 154 W. 14th St., New York 11, N. Y. 223 pages. Paper cover. \$2.90.

Written for both the audiophile and technician, the book answers questions on the how and why of tape recorders, what to expect from a high-quality instrument and how to get best results. Basic design principles, with a minimum of arithmetic, are included so that the reader may modify equipment to suit his particular needs.

**TRANSISTOR ELECTRONICS.** By David Dewitt and Arthur L. Rosoff. Published by McGraw-Hill Book Co. Inc., 330 W. 42nd St., New York 36, N. Y. 381 pages. Hard cover. \$8.00.

The material presented grew out of a highly successful course and has been carefully selected to help develop speed and facility for further progress in this rapidly growing field. It gives a thorough understanding of the properties of the transistor and its underlying physical mechanisms. The book stresses specific prototype circuit uses—rather than comprehensive handbook coverage, and should appeal to a practicing or beginning engineer.

**MOST-OFTEN-NEEDED 1958 TELEVISION SERVICING INFORMATION.** Compiled by M. N. Beitman. Published by Supreme Publications, 1760 Balsam Rd., Highland Park, Ill. 192 pages. Paper cover. \$3.00.

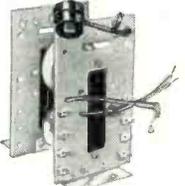
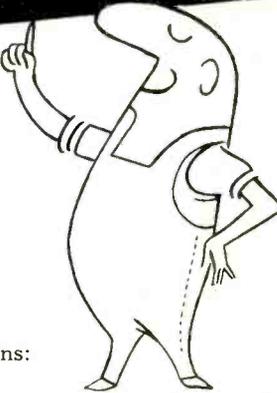
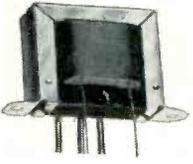
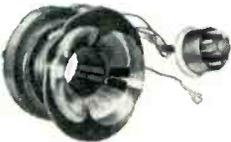
Based on TV set manufacturers' servicing data, this volume presents the circuits and repair data of the major brands. Included are alignment and troubleshooting notes.

**INDUSTRIAL ELECTRONIC CIRCUITS.** By R. Kretzmann. Published by Philosophical Library, Inc., 15 E. 40th St., New York 16, N. Y. 194 pages. Hard cover. \$10.00.

This book is a sequel to the Industrial Electronics Handbook. It deals with the circuitry of industrial electronic apparatus, and includes nearly 200 carefully chosen circuits. Instructive examples are given of photoelectric and motor control, as well as counting, stabilizing, switching, amplifiers, oscillators and rectifying circuits. Numerous photographs are used to illustrate equipment design.

**HIGH FIDELITY SIMPLIFIED.** 3rd Edition. By Harold D. Weiler. Published by John F. Rider Publisher, Inc., 116 W. 14th St., New York 11, N. Y. 216 pages. Paper cover. \$2.50.

A substantial portion of this book has been revised. Many older models of hi-fi equipment have been removed and new ones have been added. Its profusely illustrated chapters discuss the fundamentals of sound, acoustics, electronics and music and describes the various components found in a modern high-fidelity sound system including cabinets and tape recorders.

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<p><b>Exact Replacement for MAGNAVOX</b></p>  <p>HO-279 Replaces 360632-1 in 350 series</p>	<p style="text-align: center;"><b>new STANCOR TRANSFORMERS</b></p> <p style="text-align: center;"><b>to make your job easier</b></p> <p style="text-align: center;">Typical of the new Stancor units are these recent additions:</p> 	
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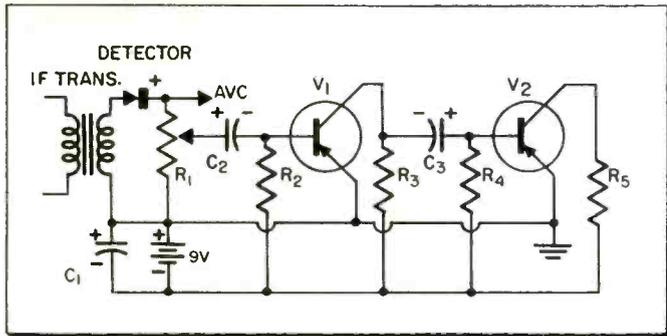


Fig. 1—Electrolytic coupling capacitors in a transistorized audio amplifier.

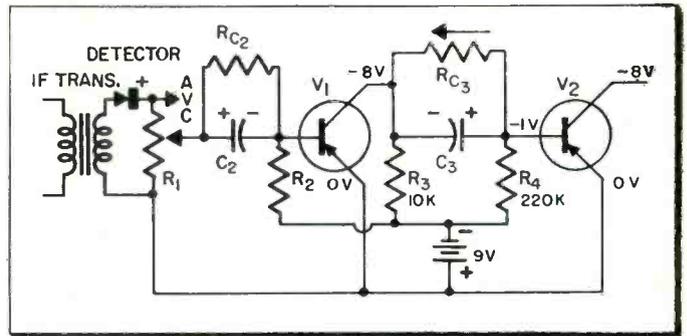


Fig. 2—Equivalent circuit shows leakage across capacitors C2 and C3.

## Electrolytic Capacitors

(Continued from page 32B)

which is  $-9$  volts. The base of V2 is biased to approximately  $-1$  volt, primarily by the action of R4. The leakage resistance  $R_c$  of the electrolytic capacitor, which was calculated in the circuit design, is about 1 megohm. This value is normal or average for a good capacitor. Now, what happens when the leakage resistance drops to 250,000 ohms? the base of V2 now has another bias path; the bias voltage, in this case, rises to approximately  $-2$  volts—twice the value the circuit design calls for. This increase in bias voltage means an increase in collector current, which in turn usually results in peak-clipping or distortion due to the shift in the operating load line of the transistor. Even if distortion does not become a serious problem, battery life will be shortened considerably by the increased collector current through V2.

The negative terminal of C2 is connected to the base of V1, just the reverse of C3 which has its positive terminal connected to the base of V2. The direction of maximum leakage resistance is indicated by the arrow in Fig. 2. What would happen if the leakage resistance of C3 dropped to 250,000 ohms? The base bias voltage on V1 would drop to about one-half its previous value ( $-\frac{1}{2}$  volt in this case). Again the operating load line of the transistor is shifted and distortion results. In addition, if this stage is the output load of a detector supplying agc voltage to r-f or i-f stages of a radio receiver, it may disturb the normal operation of agc, and cause overloading on strong signals.

Excessive leakage of capacitor C1, in Fig. 1, results in shortened battery life. A well formed 50  $\mu$ f., 25-volt bantam electrolytic capacitor may have a leakage current of 3 to 6

(Continued on page 56)



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170-H

## Servicing Color

(Continued from page 31)

killer threshold control, resistor R3 being connected directly to the source of positive voltage. A common complaint with these receivers in fringe areas is "split tuning" with respect to color. That is, the setting of the fine tuning control which produces the best black and white picture produces little or no color. To receive color, the r-f oscillator must be detuned to over emphasize response at the burst frequency, to the detriment of other frequencies. A threshold control may be added to such sets; however, the method used must be tailored to the particular variation of circuitry involved, and can be quite complex. A simpler method is to install an spst switch in the cathode circuit as shown by the dotted lines in Fig. 1. This switch serves to disable the color killer during color transmissions. For a simple installation in the home, without removing the chassis, it can be conveniently wired into a test adaptor socket, as shown in Fig. 2, and installed in an easily accessible spot. Normally, the switch may be left open at all times, unless conditions are extremely bad.

While on the subject of modifications, it should be noted that many alterations commonly employed to improve fringe area reception on b&w receivers, such as r-f and i-f peaking, which result in reduced bandwidth, are not applicable to color receivers, and should not be attempted.

It is often desirable, on a no-color complaint, to determine whether or not the chrominance circuits are operating. If a color signal is not available either from a test instrument on a station, a rough check may be made in the following manner: Tune in a monochrome picture, reduce chrominance amplifier bias slightly by means of the killer threshold control, and advance the saturation control. If the chrominance circuits are operating, colored interference should appear in the picture at a fairly low setting of the saturation control. While this sort of test is necessarily tentative, it may be inferred, in the presence of good monochrome reception and a positive indication from this test, that the antenna is a more likely source of trouble than the set.

One of the more common servicing problems associated with fringe area conditions is that of lightning and static discharge damage, particularly

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in cases of hilltop antenna installations.

Some people may believe the fable that lightning won't strike twice in the same place. This may be true if the place is no longer there after the first shock. Still others may think that since there is no history of lightning damage in their area, no precautions are needed. However, no one can deny the presence of wind passing through the antenna, and static electricity will build up enough to cause damage.

The best method of dealing with this is to supply the customer with a clothespin type of antenna clip with instructions as to its use and value. When damage does occur, the obvious effects are the same as in a b&w set, plus additional troubles. These discharges create relatively strong magnetic fields in the metal shell of the CRT, and in the chassis itself. These magnetic fields play havoc with color purity, and must be eliminated with the degaussing coil. This is the same coil which is used to demagnetize the CRT shell during a regular color purity setup procedure. It can be made by winding approximately 400 turns of #20 enameled wire on a nine to fourteen inch form. Before degaussing a lightning damaged set, the field neutralizing permanent magnets around the rim of the kinescope are withdrawn into their housings, and the p-m speaker, purity ring, and blue lateral convergence magnet are removed. On sets using p-m static convergence, the convergence yoke is also removed. Failure to observe this precaution will result in partially demagnetizing these components.

The degaussing coil is applied closely to all metal surfaces of the picture tube and chassis, as shown in Fig. 3 and 4. The coil is moved slowly and continuously over these surfaces, and must not be turned off while close to the set; otherwise, the coil itself will set up new magnetic fields in the metal. When all surfaces have been covered in this way, the coil is slowly withdrawn to a distance of six feet or more, rotated 90°, and turned off. Once over will usually do the job. The procedure may be repeated as many times as necessary.

All things considered, servicing color TV under fringe area conditions poses relatively fewer problems than did monochrome in the early days of the art. The same precautions and techniques apply. The principle requirements are a solid grounding in theory, good test equipment, and a practical approach •

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## Electrolytic Capacitors

(Continued from page 53)

µa, but if defective it may be many times this value.

Miniature electrolytic capacitors designed for transistor circuits must be formed like any other electrolytic capacitor. In the case of transistor circuits, especially when used as coupling capacitors, electrolytics should be formed just prior to installation. The reason should by now be apparent; the leakage resistance of a new electrolytic capacitor may be near zero for the few seconds it takes to form. This is true even of low leakage (high-resistance) capacitors. Even though the electrolytic may form very rapidly, the result is abnormally high base bias and collector current which can overheat the junction within the transistor, and cause permanent damage. The defective transistor will become apparent only after the circuit fails to function, but meanwhile the electrolytic capacitor has probably formed perfectly. Now what do we have? A good capacitor and a shot transistor! •

## Dilemma of Depreciation

(Continued from page 51)

rate may be as high as 200% of the straight-line rate.

**Q.** Could you show a numerical comparison of these methods?  
**A.** Surely. The tabulation in Table I shows for each of the three methods the annual depreciation charge as well as the accumulated depreciation up to the end of any given year. The basic facts used in the preparation of this table are as follows: It was assumed that a group of equipment cost \$10,000.00 and had a negligible salvage value. It was estimated that the useful life of the items would be four years.

Under the straight-line and sum-of-the-digits methods the accumulated depreciation is \$10,000.00 at the end of the fourth year, whereas under the 200% declining-balance method the accumulated amount is only \$9,375.00. This method sounds complex, but is actually fairly simple. Since depreciation takes place within a four-year period, ¼ of the remaining balance times the declining-balance rate (which in this ex-

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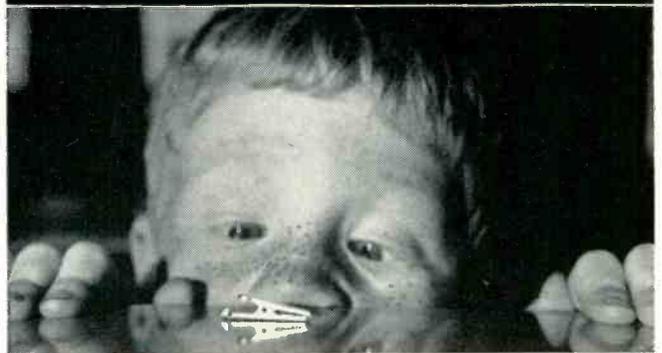
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ample is 200%) is equal to the amount of depreciation. The balance of \$625.00 in the fourth year can be handled in one of two ways. Since the income tax law allows a taxpayer to switch from the declining-balance method to the straight-line method at any time without the consent of the Commissioner of Internal Revenue it would be a wise idea for the taxpayer in this situation to switch from this declining-balance method to the straight-line method after the end of the third year. Another alternative would be to depreciate the group in the amount of \$1,250.00 in the fourth year of the group's life if the assets were abandoned by the end of that year.

**Q.** In addition to serving as documentation in the event of an income tax audit what other useful purposes are served by depreciation records?  
**A.** Records of depreciation are invaluable in cases of loss, when trying to prove to an insurance company what the values of the damaged items were. In addition, personal property tax and sales tax audits are greatly facilitated by bringing into play accurate and up-to-the-minute depreciation records. When either the entire business or an individual piece of equipment is to be sold it is sometimes vital that the prospective purchaser know what the cost, the annual depreciation, the accumulated depreciation, and the salvage value factors are.

**Q.** We have two filing cabinets. Must we use the same depreciation for both, assuming that they are both new, in use with us, and that they have an estimated useful life of 3 years or more?  
**A.** Not at all. You may depreciate one under one depreciation method and you may depreciate the other under an entirely different one.

**Q.** Suppose I had a bad year in my business in 1956 and did not choose to deduct depreciation. Would I therefore be allowed to deduct twice the amount I normally could in the year 1957?  
**A.** No. The law is so worded that the deduction for depreciation is limited to the amount that was allowed or allowable. Since depreciation for 1956 in your case was allowable, even though you chose not to take that deduction, you would never be able to recover the depreciation for that year.

**Q.** Is there anything I can do to guarantee that the depreciation rate I picked for my shop fixtures will  
*(Continued on page 62)*

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EL SEGUNDO, CALIFORNIA

## Double-Barreled Squelch

(Continued from page 32A)

lated by the correct, low frequency audio tone as illustrated in Fig. 3A. (Not to be confused with pulsed tone-signalling shown in Fig. 3B & C). This modulation is accomplished by converting the selective amplifier circuit used for the "receive" function into a stable tone generator. A silicon diode is connected across the transmitter's crystal, as in Fig. 4. By varying the voltage across the diode, it can be made to look like a small variable capacitor. Applying the audio-tone signal across the diode changes this capacity at the audio-tone rate and frequency modulates the transmitted signal. The frequency deviation of the tone modulation is kept at a very low value ( $\pm 1$  kc for wide band and  $\pm 3/4$  kc for narrow band). The actual frequency shift required at the crystal is extremely small and is equal to the desired swing divided by the crystal multiplication factor. Tone deviation is purposely held to small limits because the tone signal is transmitted continuously, along with the voice message. The amplitude of the tone coming out of the loudspeaker should be as small as possible to avoid degradation of the voice message. A second consideration is that all other receivers on the channel not equipped with tone squelch will also hear the tone. If the tone deviation is large it could become annoying to them as well as to the intended receiving operator.

In the new double-barreled tone squelch designs the tone interference factor is further taken care of by using low frequency audio tones ranging in five steps from 100 to 254 cps. This range is below the 300 to 3000 cps optimum audio frequency response of the receiver; some attenuation can be expected for this reason alone. To reduce the speaker tone level still further, an out-of-phase voltage developed in the tone squelch unit and a phasing control is provided to permit cancelling out most of the remaining tone. This phasing circuit together with the reduced low-frequency response of the receiver's audio circuit knock down the tone at least 30 db. Fortunately, the drooping low-frequency response of the human ear helps out too and the end result is that the ever-present tone is barely audible.

Three possible combinations of tone squelch operation are possible in a communications system. These are:

1. Mobile receiver protection only.

Mobiles hear only their own, tone-coded transmitters. Base stations hear all stations on the channel. Useful in taxi systems where constant radio chatter can annoy drivers and customers.

2. Base Station Receiver protection only. Base station hears only his own, tone-coded mobiles. Mobiles hear all stations on the channel. Useful in system where dispatcher has other duties and cannot tolerate "nuisance chatter."

3. Complete two-way protection. The ultimate in "chatter-free" communications. Base and mobile stations hear only their own, tone-coded transmitters.

In considering various forms of tone squelch protection it should be recognized that no tone squelch currently on the market gives a two-way radio user sole use of a channel. The use of tone squelch eliminates the nuisance of listening to other transmitters on the same channel but that is all it can do because the receiver is still "captured" by the strongest carrier. Interference and skip signals will still be present. The tone squelch user will not hear them but he must still contend with them whenever he uses his system. Standard audio trouble-shooting techniques may be used to service these circuits. The usual voltage and resistance checks are recommended for isolation of defective components. The circuits depart from conventional audio practice in the use of selenium diodes for rectification and limiting purposes. Failure of diodes can result in erratic and/or no squelch control; tone oscillator will start slowly, be off frequency, distorted, or will not oscillate.

Tone squelch can be added to existing mobile and base stations already in service and can be obtained factory installed on new equipment. •



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• It's the extra service, the kind customers don't expect, that really pays off in customer good will. That's the conclusion of Frank Haasl, owner of expanding Area Television and Appliance Company of Clearwater, Florida. Haasl should know, for his firm is perhaps the first to offer the new wrinkle of "sanitarizing" the TV and radio sets it services. They first find and fix the trouble, then clean the set with an air hose. As an extra service they use transparent tape to affix a "Gator Roach Hive" within the set.



Roach Hive placed inside TV set prevents infestations. Note damaged speaker cone.

Roaches and other insects find their way into warm TV and radio cabinets where they breed, become electrocuted and cause much damage. Speaker cones have been eaten away; high voltage troubles and other short circuits have been caused by these insects.

Some technicians will hesitate to work on a roach infested set, lest it contaminate their shop and other equipment. Running away from the problem is no solution, and often means loss of income. Finicky customers may be difficult to deal with, but by proper handling everybody benefits. A homeowner aware of this problem or housewife who is embarrassed by some dead insects trapped between the CRT and protective front glass will be most appreciative for any action that will rid them of this menace.

Customers usually do not understand the mechanics of TV repair, but are aware of the extra service. Haasl further reports that word-of-mouth advertising about this service has boosted his business. •



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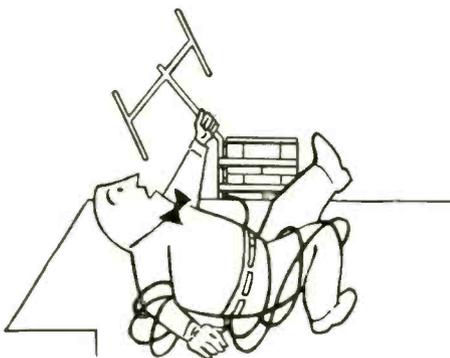
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## Thermistors

(Continued from page 29)

heated by the passage of current through it, its equilibrium condition will be reached when it dissipates heat at the same rate at which it absorbs it. When two thermistors are placed in a bridge circuit, as in Fig. 6, and enough power is applied to heat them far above room temperature, and an equilibrium point is obtained, the bridge circuit be-

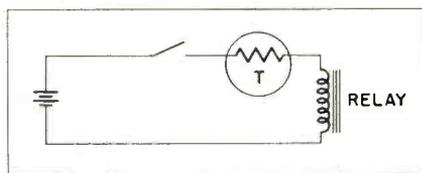


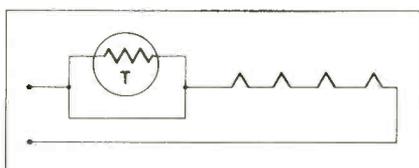
Fig. 9—Thermistor used to introduce a pre-determined time delay up to several minutes.

comes sensitive to the environment of both thermistors. When one of the thermistors is sealed in a reference chamber, and the other is exposed to the open air, the instrument is an anemometer. If the exposed thermistor is in a gas pipeline, the instrument is a flow meter. When different samples of gas are allowed to surround the exposed thermistor, the instrument becomes a thermal conductivity gas analyzer. When the exposed thermistor is sealed in a vacuum system, the instrument becomes a vacuum gauge.

### Switching

The thermistor may be used as a switching device as shown in Fig. 7. It will keep the lights going in the event of a lamp failure. Normally all the lights would go out if a single filament opened up. When the lamps are operating properly, the voltage drop across each bulb is so small that very little current passes through the thermistor, and its resistance remains relatively very high at this time. In the event of a filament burnout, the full line voltage is impressed across the thermistor which is in parallel with the defec-

Fig. 10—Current surge limiting action of thermistors protects cold series filament strings.



tive lamp. A relatively heavy current is forced through this thermistor causing it to heat up rapidly and decrease its resistance. The remaining bulbs in the circuit will then light and continue to operate at approximately normal brilliancy. Finding and replacing the defective bulb in this circuit is no more difficult than if a parallel hookup were used. Other applications include lock-in and lock-out types of switches, which function in much the same manner as a gas-filled tube. In the lock-in version, a thermistor, power source, and load may be connected in series in such a manner that the voltage is just below the self heating point (breakdown point) of the thermistor. An increase in voltage may be momentarily applied to cause the thermistor to conduct, heat up and reduce its resistance enough to permit the regular lower voltage source to keep the circuit going. The lock-out version may consist of several loads and thermistors connected as shown in Fig. 8. Closing any one switch will cause current to flow in its respective circuit, assuming that the voltage source is just sufficient to cause the thermistor to conduct. The subsequent voltage drop developed across the series resistor will prevent any of the other loads to be-

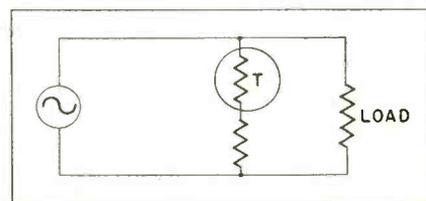


Fig. 11—Simplified version of a voltage regulator which may be used for both ac and dc.

come energized even if the other switches are closed. Opening the switch will now free the circuit, and permit another load to take over.

### Time Delay

The thermistor may be placed in series with a load as shown in Fig. 9 and, depending upon its characteristics, it can delay the action for a definite period of time from a few microseconds up to several minutes. Pretty much the same thing happens when a thermistor is used as a current-surge protector in a series filament string. The circuit shown in Fig. 10 is similar to the series strings found in TV sets before the advent of tubes having controlled warmup heaters. Thermistors

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may be used in circuits employing germanium, selenium, silicon and other solid-state rectifiers as current limiters and surge protectors.

#### Voltage Regulation

Thermistors are also used as voltage regulators and audio volume limiters. Being resistive in nature, distortion is at a minimum. If a suitably chosen value of resistance is placed in series with a thermistor, the voltage across the combination can be maintained almost completely independent of current over a wide range of values. Fig. 11 shows a simplified circuit of a voltage regulator, which may be used in a-c or d-c applications.

Inexpensive kits and individual thermistors are readily available for experimental or actual application. Specifications are usually packaged with the units, and should provide the technician with an interesting and educational diversion. •

ILLUSTRATION CREDITS:  
Victory Engineering Corporation

## Do-It-Yourself

(Continued from page 34)

accept antennas as a packaged brand appliance on the same retail level as toasters, washing machines, etc. As a result, the consumer now expects that TV antennas can be purchased over-the-counter, like other packaged products.

#### 6. Merchandising Features

Many self-installed kits are packed in colorful display cartons and can be sold right off the floor. Their "everything included" packaging make them a handy cash and carry item.

#### 7. Pricing & Profits

Some consumer kits are promotionally priced so you can offer a discount off the printed price and still make a profit. The pricing structure is very favorable to the dealer, and it is relatively easy to maintain a desirable profit margin.

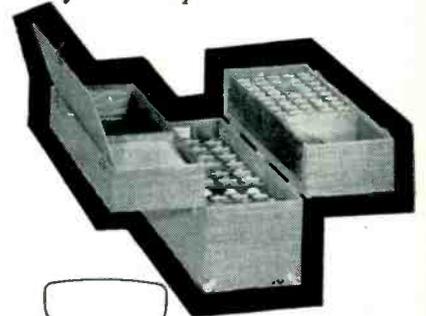
In the light of these facts it is apparent that consumer antenna kits can not be ignored or regarded as a bitter pill reluctantly swallowed but not necessarily enjoyed. Used for the purposes for which they are designed, consumer kits will boost the technician's overall antenna volume. However, they should be treated as a supplement to, not as a replacement of, the regular service-installed antenna line. •

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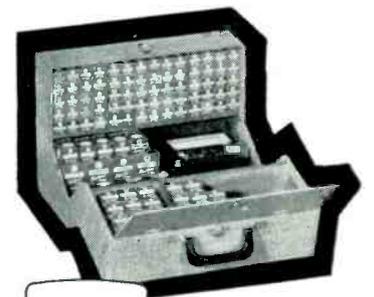
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## Dilemma of Depreciation

(Continued from page 57)

not be upset by the Internal Revenue Service at a later date?

A. Yes. According to the law you can make an agreement with the Commissioner of Internal Revenue to establish the depreciation rate which will apply to either a given piece of equipment or to a group of machines. This works very advantageously in that it helps to avoid future friction between the taxpayer and the Internal Revenue Service.

Q. A competitor told me recently that he figures depreciation on his trucks exactly to the day. Must I, for managerial purposes and/or income tax purposes, do the same thing?

A. Not at all. If you'd like you can do as follows: any equipment bought during the first half of the month can be considered to have been bought as of the first of that month, any equipment bought during the last half of a month can be considered to have been bought as of the first of the next month. Some firms feel a simple way to handle additions and subtractions of equipment that occurred during the year is to assume that they took place as of the mid-point of the taxpayer's year, namely July 1st in the case of a calendar year taxpayer.

Q. Where on the profit and loss statement must the expense for depreciation be shown?

A. There is no one place where the item of depreciation must be shown on a profit and loss statement. Some firms like to show depreciation as part of the regular operating expenses. Others like to show it as a separate item after the normal operating profit. The important thing to remember is that depreciation should be shown somewhere in the profit and loss statement since it is one of the vital cost factors.

Q. Every so often I like to figure my breakeven point. In order for me to be able to figure my overhead, is it really important for me to include depreciation as an item of overhead?

A. Absolutely. Although depreciation is in a sense invisible, it is also insidious. As each page on the calendar is destroyed the depreciation on a piece of equipment becomes greater. If you allow yourself to be deluded by the fact that it is not important to include depreciation as

an item of overhead because no cash outlay is involved you will be fooling yourself to the extent that you will be understating your total overhead. Furthermore, although an immediate cash outlay is not involved with depreciation, obviously money will have to be paid out in the future. Depreciation merely acts as a convenient method for reducing the profit on the books to such a level that when the day comes (as it ultimately must) when a new piece of equipment has to be purchased, there will be enough funds left in the business to be able to do so. •

## P A Installation

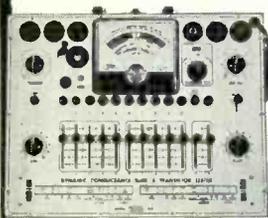
(Continued from page 45)

By this time, if not sooner, you may be wondering about the amplifier, isn't it the heart of the system? It is, but the art has reached such a stage, for the purposes of public address work, that all that has to be done is to specify the minimum requirements and select the unit to fit the job. In some cases minor modifications may be required to suit some unusual situation. Even in these cases many manufacturers will alter their equipment to conform to the customer's requirements. Years ago airplanes were built to fly; today, when they are built, it is assumed that they will fly. They are built to perform a specific task, to carry a load, or to fly fast, and in some cases to do both. So it is with amplifiers. Design the system according to the acoustical needs and then obtain the appropriate equipment. •



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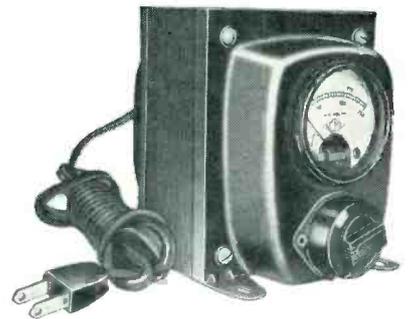
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While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.

**WHEN  
PERFORMANCE  
IS  
AFFECTED BY  
LOW VOLTAGE  
CONDITIONS**



**SELL THIS  
ACME ELECTRIC  
VOLTAGE  
ADJUSTOR**

TV sets are designed to operate best when voltage holds closely to 115-117 volts. Overloaded supply lines (the power industries greatest problem) may result in a voltage drop of 10 to 15% at certain times of day. Usually the TV set will function in a fashion under such low voltage conditions but with a great strain on its components. For example; narrowing of picture, output stage tube life shortened, frequent burn-out of filaments, fuzzy focus have been traced to lack of proper voltage.

These conditions can be corrected with an Acme Electric T-8394M Voltage Adjustor. Simply plug-in to convenient outlet. Plug-in television set cord into female receptacle built into adjustor. Voltmeter indicates output voltage. If voltage is incorrect turn regulating control until proper voltage is reached for best performance. Voltage range 95 to 125 volts. Tell your supply dealer you want the Acme Electric T-8394M. No other so compact, practical, inexpensive.

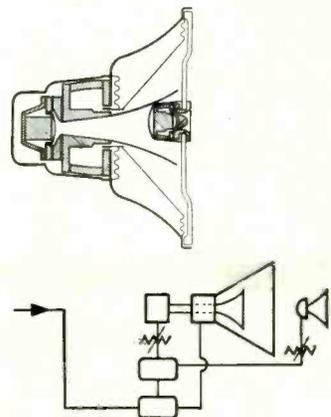
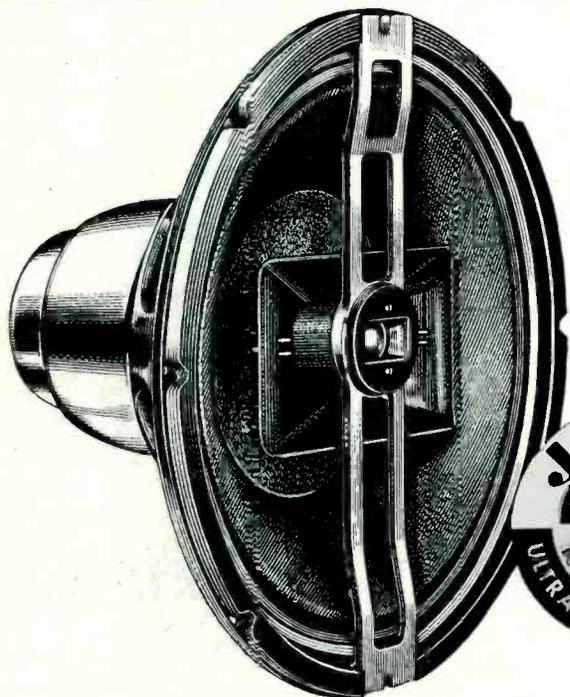
**ACME ELECTRIC CORPORATION**  
 882 WATER STREET CUBA, NEW YORK



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Jensen

TRIAxIAL\*



*Jensen's New True 3-Way  
High Fidelity Loudspeaker  
... With Superb Performance!  
Only \$129.50*

Jensen, the only maker of true 3-way unitary loudspeakers (with 3 separate radiating systems, each independently driven), now brings you the G-600 TRIAX\* at half the cost of the famous G-610A! Now you can enjoy the advantages of a true 3-way speaker . . . solid bass, full middles and smoothly extended highs out to the limits of audibility, with ultra *low* distortion, ultra *high* listening quality . . . at this new low cost.

Lows from 30 to 900 cps are handled by the heavy duty 15" 3½ lb. magnet edge-damped woofer. Midchannel is a compression driver horn-loaded thru-bore unit for 900-4,000 cps. New compression horn supertweeter with phase balancing covers the range from 4,000 cps to limits of audibility (very high indeed by our standards). Power rating is 35 watts. Separate network with MF and HF Controls is included. Write for free Catalog 165-B



**THE FAMOUS TRIAXIAL...JENSEN G-610A.** Easily rated the world's most wanted speaker, the G-610A is "tops" in a unitary 3-way speaker assembly. It has the advantages of higher efficiency, higher power rating (40 watts). Desirable very low first crossover of 600 cycles is achieved by using the entire woofer cone as the final section of the midchannel horn. Priced at \$252.75, complete with crossover network and controls.

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**If it's worth Engineers' time . . .**



**. . . It's worth Engineered Cable**

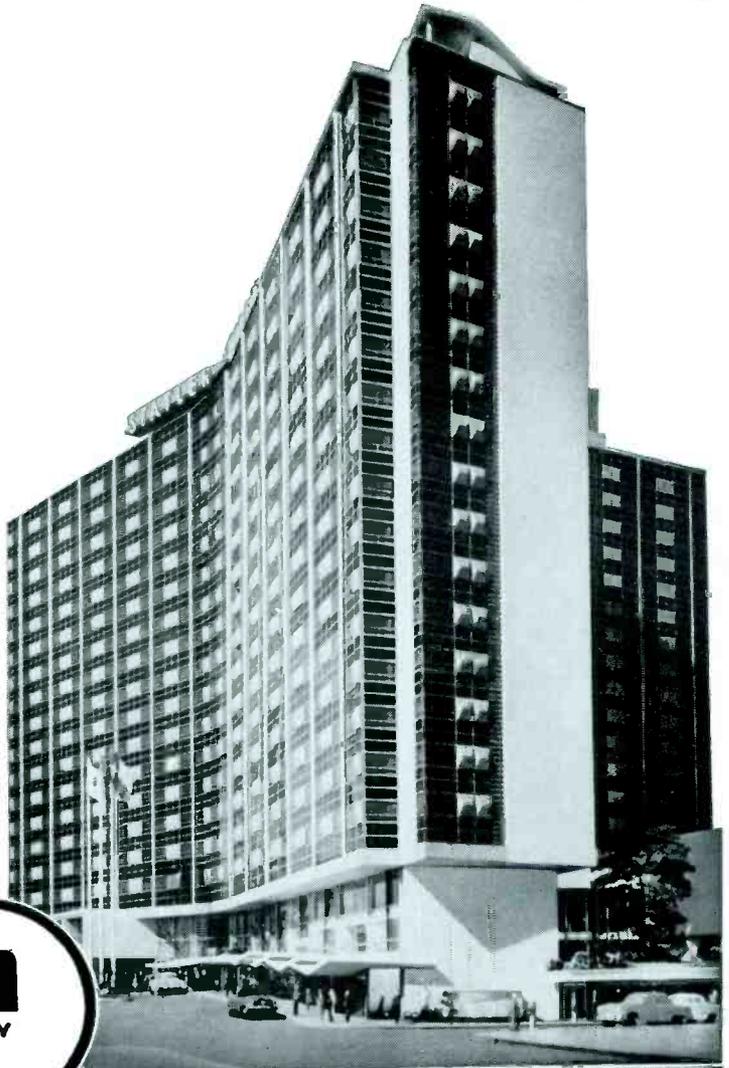


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# ENTER THE EXCITING RCA "MYSTERY SHOPPER" CONTEST!

# You Can Win One Of 192 Big Awards!



- 8 MGA SPORTS ROADSTERS
- 24 COLOR-TV SETS
- 80 HI-FI PHONOGRAPHS
- 80 TRANSISTOR RADIOS

...and every TV service-dealer and technician who enters this exciting "contest" receives a gift—just for entering!

## Here's How:

1. To enter the contest, write a statement of 50 words or less telling how you think RCA's promotion of "National Television Servicemen's Week" benefits the independent TV service industry. The contest is open to all radio-television service dealers and their service employees, in the continental U. S., Alaska, and Hawaii, without any obligation on their part.

2. Your entry must be made on an official entry blank and must be submitted in your own name describing your own opinions in connection with "National Television Servicemen's Week"—March 24th to 29th, 1958. You may prepare your own entry blank, or you can ask your RCA Tube Distributor Salesman to help you prepare your entry blank. If your distributor salesman does help you, be sure to have him countersign your entry blank—he is also eligible for a prize if you win. Official entry blanks are available from your Authorized RCA Tube Distributor and from RCA Electron Tube Division advertisements. Only one entry per person is permitted.

3. Mail your entry, using adequate postage to: RCA Electron Tube Division, P.O. Box 551, New York 46, N. Y.

All entries must be postmarked on or before midnight, March 15, 1958. No general correspondence should be sent to this address.

4. The entries will be judged by Advertising Distributors of America, Inc., an impartial, independent contest judging organization, on the basis of originality, sincerity, and aptness of thought. Decision of the judges is final. All entries become the property of Radio Corporation of America, and none will be returned. Entry in the contest constitutes permission to RCA to use your name and entry in any way it sees fit.

5. The contestants will be ranked in each region, in the order of the merit of their entries, as determined by the judges as provided above. They will be visited in person or phoned, in succession, sometime between the period of April 1, 1958 and April 30, 1958, by a "Mystery Shopper". The "Mystery Shopper" will ask a question about the product features of RCA Silverama Picture Tubes or RCA Receiving Tubes. The first service dealer or service technician in each region who answers the question correctly will be presented with the grand award. The next 3 dealers or their service employees in each region

who answer the question correctly will be awarded one of the beautiful, new RCA Victor color TV sets. An additional 10 contestants in each region who answer the "Mystery Shopper" question correctly will receive one of the exquisite RCA Victor High Fidelity Sets. And 10 additional contestants in each region who answer the question correctly will receive an RCA Victor Transistor Radio. All contestants will receive a token of recognition.

6. The "Mystery Shopper" is the name applied to a group of impartial employees of Advertising Distributors of America, Inc., located throughout the nation. The "Mystery Shopper" will visit or phone contestants in the guise of a consumer, and will not divulge his or her identity unless the contestant supplies the correct answer to the question asked by the "Mystery Shopper".

7. Only one award will be made per person. Duplicate awards will be made in the event of a tie. This contest is subject to state and local regulation. Void if taxed, restricted or forbidden by law. A list of award winners may be obtained after April 30, 1958 by sending a stamped, self-addressed envelope to the address given above.

## OFFICIAL ENTRY FORM

Mail to:

**RCA ELECTRON TUBE DIVISION**  
P.O. Box 551, New York 46, N. Y.

B-46

**ALL ENTRIES MUST BE POSTMARKED ON  
OR BEFORE MIDNIGHT MARCH 15, 1958**

Complete this statement in 50 words or less:

As a service dealer, this is how I think RCA's promotion of "National Television Servicemen's Week" benefits the independent TV service industry:

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SIGNED \_\_\_\_\_  
(Signature of Dealer or Technician)

\_\_\_\_\_ FIRM NAME

\_\_\_\_\_ ADDRESS

\_\_\_\_\_ CITY

\_\_\_\_\_ ZONE

\_\_\_\_\_ STATE



**RADIO CORPORATION OF AMERICA**  
Electron Tube Division Harrison, N. J.

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