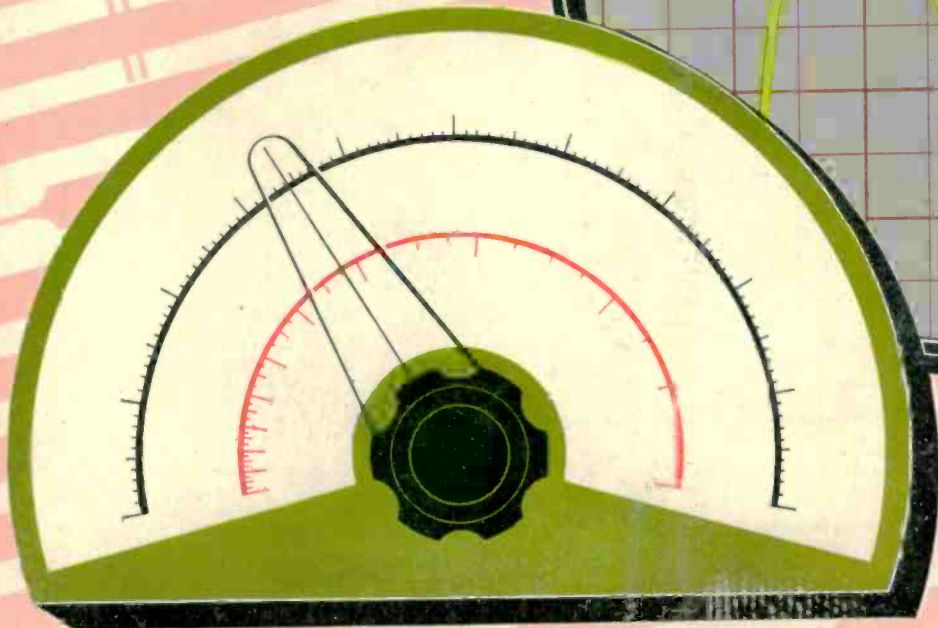
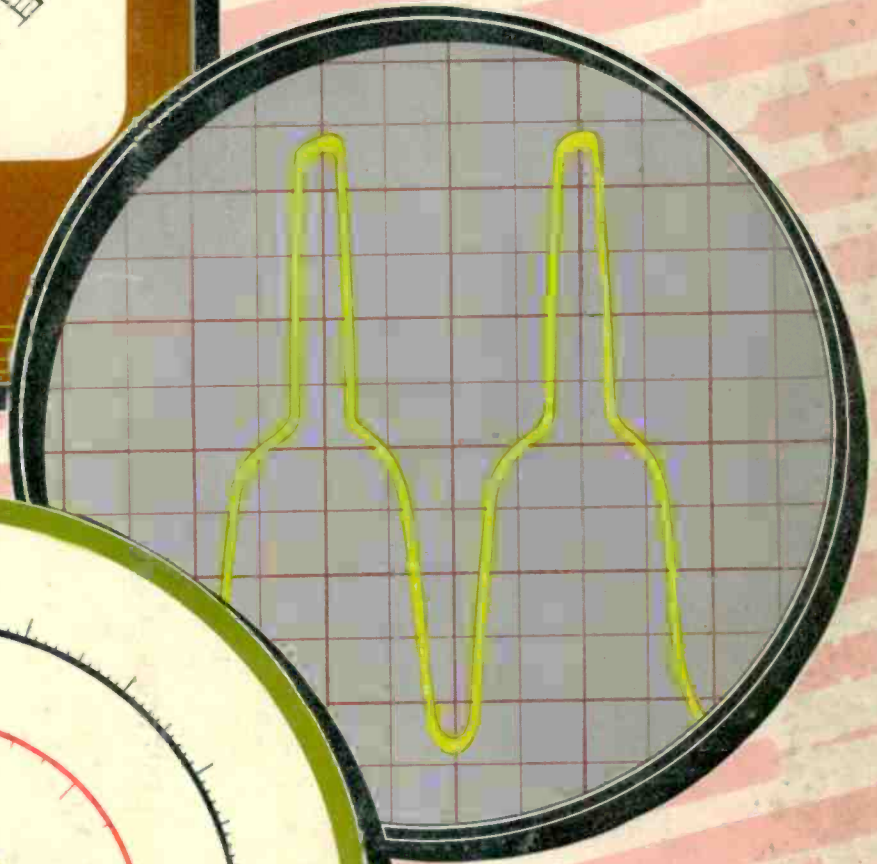
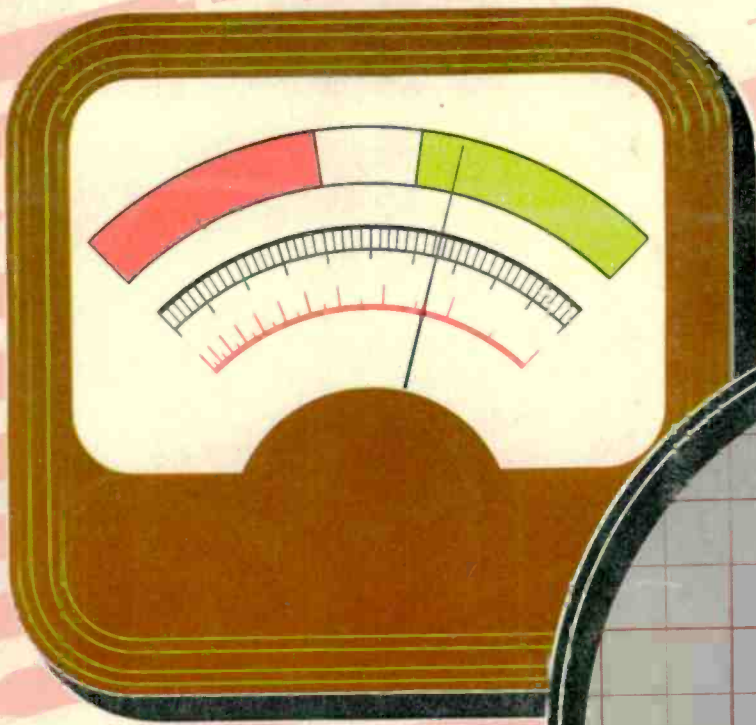


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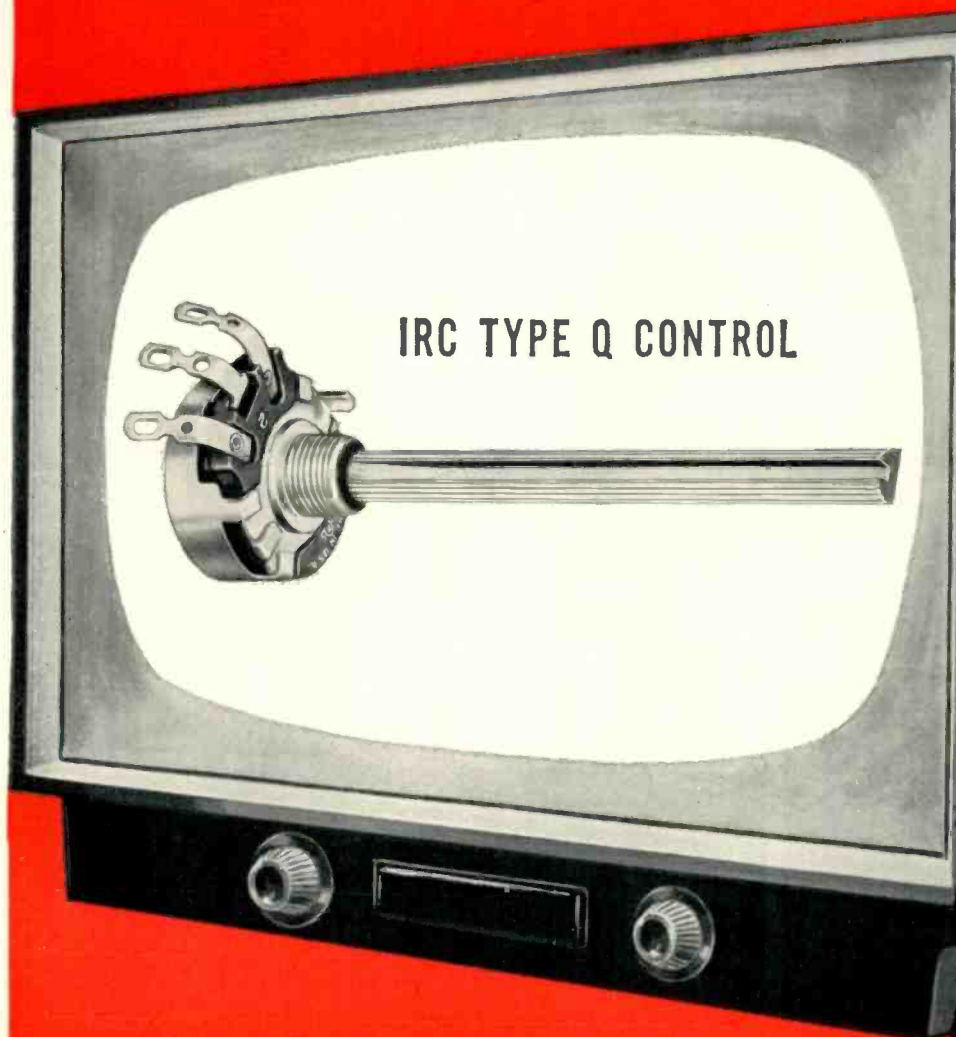
& *Circuit Digests*



KNOW YOUR
TEST EQUIPMENT

August • 1955

Preferred for modern set servicing



IRC TYPE Q CONTROL

Service technicians get greater coverage with less investment; more practical service features; and easier, faster installation with the IRC Type Q Control. Here's a dependable, basic control that is directly designed for modern set servicing. For appearance, performance and price . . . there's none better. So why settle for less? Tell your Distributor you want Q Controls . . . most servicemen do.



This 8 page catalog gives you all the facts . . . Send for your free copy now—

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Q Control standard shaft is knurled, flatted and slotted —fits most knobs without alteration.

INTERCHANGEABLE FIXED SHAFTS

Exclusive IRC convenience feature—provides fast conversion to "specials", with FIXED shaft security. 15 types available.

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Either of two type IRC switches attached as quickly and easily as a control cover—meets all your requirements.



Wherever the Circuit Says 

TECHNICIAN & Circuit Digests

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AUGUST, 1955

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FRONT COVER

Modern test equipment—an absolute must if you want efficient servicing—is represented by three basic instrument faces against a background pattern of probes. At top is the typical meter face employed in multi-testers, VTVM's, ammeters, testers for tubes and components, and similar instruments. At center is the oscilloscope. The bottom face represents such test equipment as audio, r-f, sweep and marker generators, oscillators and RC bridges.

FEATURES AND ARTICLES

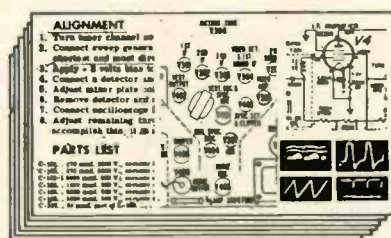
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 TRAVLER: TV Chassis 412E4, etc.
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DELCO ELECTRONIC PARTS

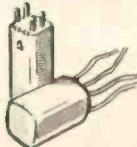
A GENERAL MOTORS VALUE



SPEAKERS



VIBRATORS



COILS



RECEIVING TUBES



CONDENSERS



AUTO RADIO AERIALS



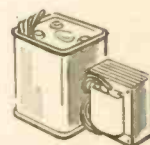
CONTROLS



CAPACITORS



PICTURE TUBES



TRANSFORMERS

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Well-Known Names
that want to
work for you!*

References? These well-known names—Delco and General Motors—have long been a symbol of business integrity, customer assistance and fine products. They can add a degree of prestige to your electronics business that is unexcelled in the industry.

Delco also has a unique service to offer you. Delco is the sole source for that vital group of special application parts used for original equipment replacement in Delco auto radios. This represents a ready-made market of well over 13 million car radios! In addition,

Delco is an important and reliable source for the most used universal replacement parts for electronic equipment.

AND sales assistance doesn't stop here. Delco also issues current bulletins and maintains field schools to keep you posted on the latest developments in the electronics industry. Check your Delco Electronics Parts Distributor today and get all the details on how these two great names can help you and your electronics business—then, put 'em to work!

A GENERAL MOTORS PRODUCT



A UNITED MOTORS LINE

**GOODBYE
TO SYNC
PROBLEMS**



**HYCON MODEL 622
5" OSCILLOSCOPE**

Now, Hycon brings you a really *new* oscilloscope, particularly adapted to random signals or low duty cycle pulses. Its unique *automatic triggered sweep* reduces adjustments, makes synchronization positive, protects phosphors in the absence of signal.

See and operate the new Model 622 at your local electronic parts jobber.

THE NEW 622 OFFERS...

- preset TV sweep frequencies
- 6 mc (± 3 db) vertical bandpass
- 5" flat face CRT... undistorted edge to edge
- illuminated graticule with dimmer
- electronically regulated power supplies
- unusually light weight and
- **AUTOMATIC TRIGGERED SWEEP**

- 1** No signal... a stable sweep condition provides reference trace
- 2** Signal on Y-axis... monostable sweep mode automatically assumed
- 3** Triggered sweep (square-wave input) obtained by simply turning sync-level control
- 4** Typical TV signal (off-air pickup by receiver) across full CRT screen. Can be expanded across X-axis if desired.

BASIC SPECIFICATIONS

VERTICAL AMPLIFIER

Frequency Response: 6 cps to 6 mc ± 3 db; down less than 0.5 db @ 4 mc
Sensitivity: 10 mv rms (28 mv peak-to-peak) per inch
Input Impedance: 1 megohm, 40 mmf (± 2 mmf) over entire attenuator range

Ranges...

- a. 10 cps to 300 kc
- b. Preset H & V television @ 7875 and 30 cps
- c. 60 cps, variable phase line Type... automatic triggered or straight triggered (by switching)

HORIZONTAL AMPLIFIER

Frequency Response: 1.5 cps to 500 kc ± 3 db
Sensitivity: 75 mv rms (210 mv peak-to-peak) per inch
Input impedance: 100k, 25 mmf

SYNCHRONIZATION

Internal, external, positive, negative or AC line

CALIBRATION

Internal 60 cps square-wave .05 volts peak-to-peak $\pm 3\%$

POWER REQUIREMENTS

115 volts, 60 cycles, 175 watts

SWEEP CHARACTERISTICS

Usable writing speed... 0.03 sec/in to .3 μ sec/in

SIZE... WEIGHT

13 $\frac{3}{8}$ " x 10 $\frac{1}{2}$ " x 18 $\frac{3}{4}$ "... 32 lbs.

HYCON also brings you these test instruments... ready for color TV servicing



Model 617
3" Oscilloscope

High deflection sensitivity (.01 v/in rms); 4.5 mc vertical bandpass ± 1 db; internal 5% calibrating voltage. Flat face 3" CRT for usable trace edge to edge.



Model 614
VTVM

Has 21 ranges (28 with peak-to-peak scales); 6 $\frac{1}{2}$ " meter; 3% accuracy on DC and ohms, 5% on AC; response with auxiliary probe to 250 mc. Test probes stow inside case, ready to use.



Model 615
DIGITAL
VTVM

Reads out in numerical form... no interpolation, no reading wrong scale. Has 12 ranges; 1% accuracy DC and ohms, 2% on AC. You CAN'T read this meter incorrectly.

Hycon Mfg. Company

2961 East Colorado Street • Pasadena 8, California

"Where accuracy counts"

ORDNANCE • ELECTRONIC TEST INSTRUMENTS • AERIAL CAMERAS • GO NO-GO MISSILE TEST SYSTEMS • AERIAL SURVEYS • BASIC ELECTRONIC RESEARCH • ELECTRONIC SYSTEMS

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APPROVED PRECISION PRODUCTS

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Here's the **NEW** Standard of Performance in Selenium Rectifiers

A completely new line of Mallory selenium rectifier stacks now gives you *performance that equals or surpasses* original equipment specifications to a degree of uniformity never before attained.

The secret is new Mallory designs and manufacturing methods developed to produce superior characteristics... and to maintain these standards on *every* stack.

The new Mallory stacks are noted for unusually long service. Exceptionally low forward voltage drop gives them high efficiency throughout their long, dependable life.

Make sure you use these new rectifiers on all your replacement jobs. You can connect them and forget them... with the assurance that *every* stack will turn in long, reliable service.

A complete selection of values, all conservatively rated, is available to fit every possible application. Ask your Mallory distributor to send you the stock you need.

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MALLORY
APPROVED PRECISION PRODUCTS

P. R. MALLORY & CO. INC.
MALLORY

CAPACITORS • CONTROLS • VIBRATORS • SWITCHES • RESISTORS
RECTIFIERS • POWER SUPPLIES • FILTERS • MERCURY BATTERIES

APPROVED PRECISION PRODUCTS

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NOW... 3 models to choose from!

C·D·R automatic Rotors
 a type for every need
 ... ALL 40% SHARPER TUNING
 than any other automatic rotor

the famous
 TR-2 now
 available as a
 fully automatic
 model also..

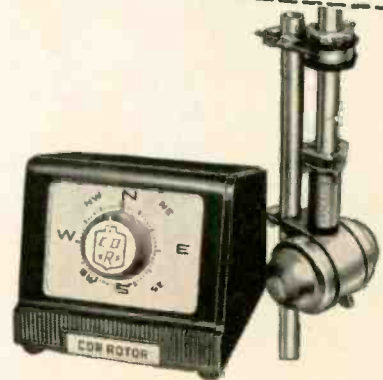
AR-22

Here is the **HEAVY DUTY** rotor that is so popular everywhere... **NOW COMPLETELY AUTOMATIC!** Powerful beyond any TV need... it is tested and proven as the giant of the industry. Uses 4 wire cable.



AR-2

The complete, **AUTOMATIC** rotor with **THRUST BEARING**. Handsome modern design cabinet, uses 4 wire cable. Tested and proven by thousands and thousands of satisfied users, it has everything that could be asked for in a popular rotor.



*and Pre-Sold
 for you on TV
 announcements
 across the country*

AR-1

Same as the AR-2 without the thrust bearing.



CORNELL-DUBILIER
 SOUTH PLAINFIELD, N. J.



THE RADIART CORP.
 CLEVELAND 13, OHIO

LETTERS

To the Editors

Tube Racket

EDITORS, TECHNICIAN:

I am very much interested in and disturbed by your report (July issue) of deceptive practices in the advertising and selling of receiving tubes for radio and television. We will want to assist in helping to protect all concerned from the fraudulent aspects of this business. You are to be commended for focusing attention upon this serious problem. I am sure that you can count on the support of the Better Business Bureaus in lending every assistance toward bringing it under control.

KENNETH B. WILSON
PRESIDENT

National Better Business Bureau, Inc.
New York, N.Y.

EDITORS, TECHNICIAN:

The reprocessed tube racket has plagued the industry for a long time and is a subject of continuing concern to RETMA. District Attorney Silver's successful prosecution in Brooklyn has been a source of real encouragement, and I hope that further successful prosecutions can be achieved. I am sending your materials to the new Chairman of the RETMA Tube Division, for discussion at the next meeting.

GLEN McDANIEL
GENERAL COUNSEL

Radio-Electronic-TV Mfrs. Assoc.
New York, N.Y.

EDITORS, TECHNICIAN:

... in connection with the tube racket ... it was well done.

EDWARD S. SILVER
DISTRICT ATTORNEY

Kings County, N.Y.

"Whipping Boys"

EDITORS, TECHNICIAN:

I hope many technicians read the July editorial ("Why Service Technicians are Whipping Boys") as well as the last one; and I hope the manufacturers read and take note of your paragraph on Manufacturer Policy; they are inclined to forget that the technician entering the home is one of their best (or worst) advertisers. Editorials such as these are inductive to arousing the technician from his resignation to conditions as they exist, and encourage him to join with his fellow technicians in association activity.

JOHN A. WHEATON
PRESIDENT

Empire State Federation of
Electronic Technicians Assoc., Inc.
Mineola, N.Y.

(Continued on page 31)



\$55.80

No extra charge for metal cabinet (suggested net price)

The P.E.C. you need is at your fingertips

— in this handy, four-drawer

Centralab Metal Shop-Pak No. PCK-110

It's easy to find the P.E.C. you're looking for, when you have a Centralab PCK-110 Kit. There, within easy reach, you have 110 Centralab Printed Electronic Circuits* — five each of 22 widely used types.

All are packaged in air-tight, sealed plastic envelopes — clearly marked. They are arranged in neat, businesslike order in a four-drawer metal cabinet. So there's no fumbling around to find just the P.E.C. you need.

This handy Centralab assortment is equivalent to a stock of 255 ceramic-based resistors and 305 ceramic capacitors. You have fewer parts to carry — and have less money tied up in inventory.

So save time — and cut your parts investment. Get a Centralab Shop-Pak No. PCK-110 from your Centralab distributor now.

Send coupon for Centralab Printed Electronic Circuit Guide No. 3. It shows circuit schematics to help you install P.E.C.'s.



One single Centralab P.E.C. replaces several old-style individual components

Trying to locate a shorted or intermittent component in an old-style circuit? Quit wasting your valuable time — replace an entire section with a single Centralab P.E.C. You not only replace the one, worn-out component — you replace all the components of the same age. That way, you make another set-owner happy in the long run and save yourself a costly call-back.

Centralab

*Trademark

A Division of Globe-Union Inc.
902H E. Keefe Ave., Milwaukee 1, Wisconsin

Send me free copy of Centralab
Printed Electronic Circuit Guide No. 3.

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Company

Address

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**PHILCO SPONSORS
INDUSTRY'S FIRST**

Tube Racket-Smashing Campaign

THIS IS IT!

Service dealers are fed up with tube racketeers who have been siphoning off profits through illegal operations and now Philco steps in to do something about it!

Technician, in the July issue, exposes this sordid business. The SATURDAY EVENING POST, July 9th, in an article "Do You Know What You Are Buying?" by Stanley Frank has this to say,

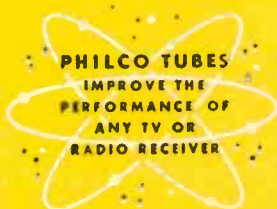
"In the last year, phony radio and TV tubes have shot up into second place behind drugs as the biggest counterfeit swindle . . . estimated that 3,000,000 reconditioned tubes represented as new brand name products had been sold in New York alone, over a three-month period."

Do you realize what these "fast buck" artists are doing to your business? Profits shrink, public confidence disappears and the entire legitimate service business receives a black eye.

Now Philco Steps in to Stop It.

We will credit you with 5c for every old, worn out, worthless tube you bring in against the purchase of new Philco receiving tubes. Your old tubes will be smashed right before your eyes . . . eliminated from circulation forever! We invite you to join the Tube Racket-Smashing Campaign today . . . for the good of the industry . . . for extra profits for you!

See your Philco Distributor today!

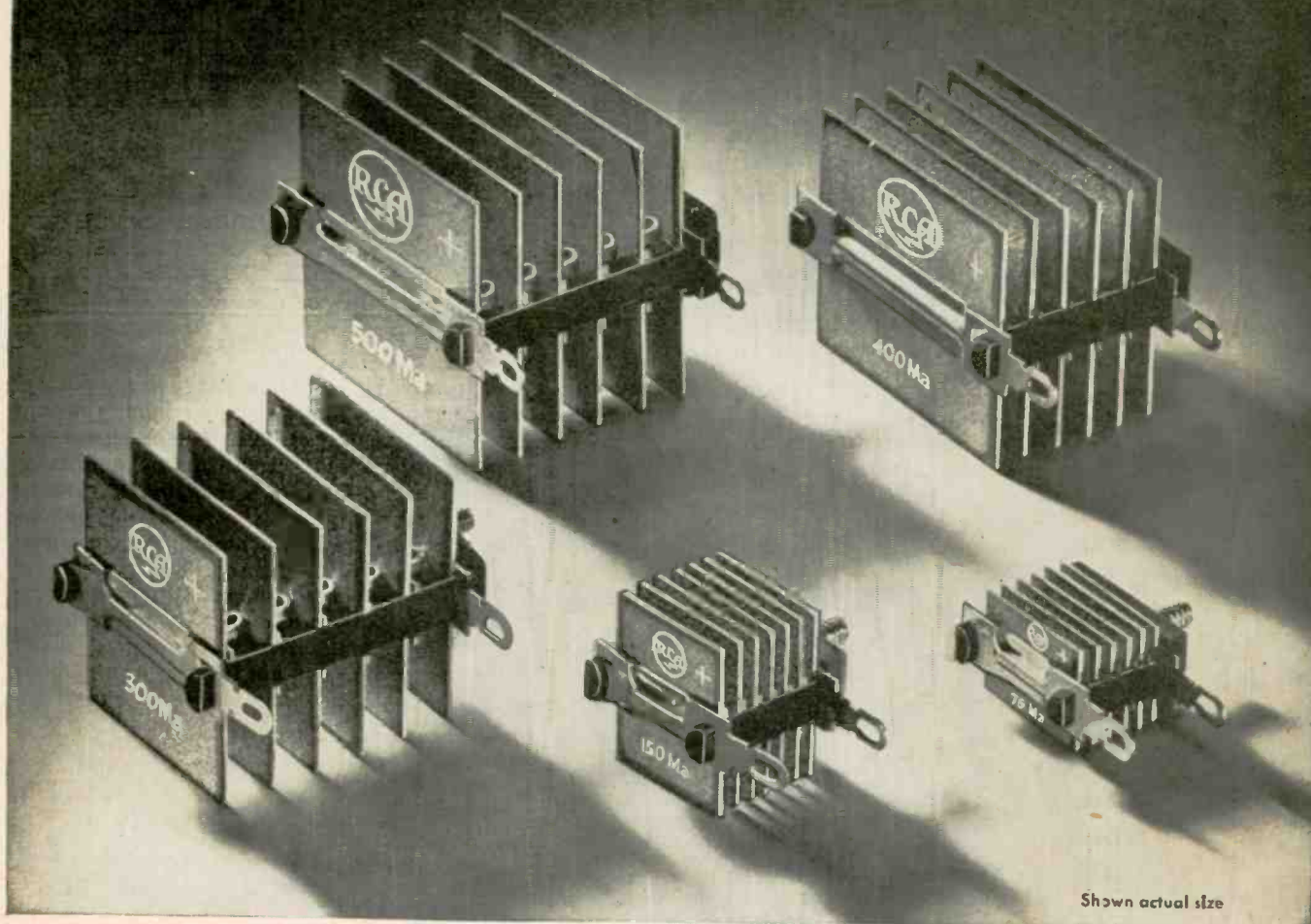


PHILCO CORPORATION
Accessory Division
Philadelphia 34, Pa.



RCA announces a NEW line of...

"UNIVERSAL"-TYPE SELENIUM RECTIFIERS



Shown actual size

**Just 5 types meet virtually all replacement requirements
... in TV, radio receivers, and phonographs!**



Look at the "wide-open" design of RCA Selenium Rectifiers. Benefits: Maximum cooling, dependable performance.

Again, RCA sets the pace — with an *all-new* line of "Universal"-type selenium rectifiers.

NEW—Improved heat dissipation... "Wide-open" design permits maximum air circulation.

NEW—Smaller size... For any given current, they are smaller than other types (installation is a "snap").

NEW—Versatility... Only five types needed to cover the range from 50 to 500 milliamperes.

Always replace with an RCA Selenium Rectifier — for consistently good performance; faster customer service! Order RCA All-New Selenium Rectifiers from your RCA Distributor TODAY. Stock up on new, RCA "Universal"-type Selenium Rectifiers, — competitively priced for profitable, fast turnover.

5 Types Cover Your Replacements

RCA Type Number	Max. Output Current	Max. Input Volts	Suggested Price
200 G1	75 MA	130V	\$1.85
201 G1	150 MA	130V	2.25
202 G1	300 MA	130V	3.30
203 G1	400 MA	130V	4.25
204 G1	500 MA	130V	4.40



RADIO CORPORATION of AMERICA
ELECTRONIC COMPONENTS
HARRISON, N. J.



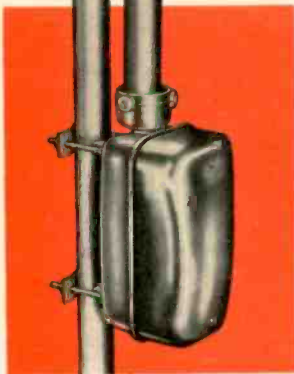
**MITI-MITE
ROTATOR
No. RR-2**

List Price
\$34⁹⁵

Introducing the

"MITI-MITE"

ANTENNA ROTATOR



NO-COAST BRAKE:

The MITI-MITE "No-Coast" brake prevents drift and assures correction of direction to within less than 1° accuracy.

MITI-MITE is a quality product, backed by a quality name—accurate, dependable, and trouble-free.

FACTORY GUARANTEE: Servicing is not necessary with the MITI-MITE RR-2 Rotator. Alprodco guarantees one year of trouble-free service, and your Alprodco distributor is authorized to replace MITI-MITE rotators with new units in case of mechanical failure.

BURN-OUT PROOF: Thermo overload switch and electrical stop limit switches prevent damage to Alprodco MITI-MITE RR-2 Rotators caused by excessive or faulty use.

MITI-MITE RR-2 ROTATORS are available through your authorized ALPRODCO distributor.

LIGHT-WEIGHT: Weighing only 8 lbs. (packing weight) and with at least 50-inch pounds of torque, the MITI-MITE gives best performance with least weight.

PRE-WIRED:

Each MITI-MITE Rotator is completely pre-wired at factory. Standard wiring includes 75 feet of lead wire.



Alprodco, Inc.

MINERAL WELLS, TEXAS

DUBLIN, GEORGIA

KEMPTON, INDIANA

TUNG-SOL "Magic Mirror"

ALUMINIZED

PICTURE TUBE

**BRIGHTER-SHARPER
MORE DETAIL
MORE CONTRAST**

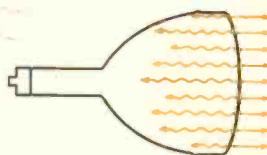


The "Magic-Mirror" Aluminized Picture Tube creates the brightest, most realistic TV picture you can bring into the homes of your customers. The "Magic-Mirror" tube effectively utilizes *all* the light generated by the phosphor screen.

Tung-Sol has developed a unique "fogging" method of backing up the phosphor screen with a mirror-like aluminum reflector. This reflector prevents light radiating uselessly back into the tube. It brings out all the detail of which the receiver circuit is capable. So smooth and true is the Tung-Sol aluminum reflector that mottling, streaks, swirls, "blue-edge", "yellow-center" and other objectionable irregularities are eliminated.

Tung-Sol pin-point-focused electron gun assures a steady, brilliant picture—free from alternate fading and overlighting. Tung-Sol's exacting standards of quality control, manufacture and testing further guarantee the high uniformity and maximum performance of the "Magic-Mirror" TV Picture Tube.

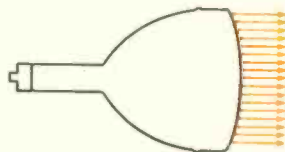
For further details, including Tung-Sol's sales aids and advertising support, call your Tung-Sol supplier today.



ORDINARY TUBE—Only *half* the light produced by the phosphor screen is utilized in the picture. Other half radiates wastefully back into tube.



RESULT—A light background within the tube which reduces picture contrast.



MAGIC-MIRROR ALUMINIZED TUBE—Aluminized reflector allows electron beam through. Blocks wasted light from backing up into tube. Reflects *all* the light into picture.



RESULT—Pronounced increase in contrast to make a bright, clear, more realistic picture.

TUNG-SOL ELECTRIC INC., Newark 4, N. J.

Sales Offices: Atlanta, Chicago, Columbus, Culver City (Los Angeles), Dallas, Denver, Detroit, Montreal (Canada), Newark, Seattle.

Tung-Sol makes All-Glass Sealed Beam Lamps, Miniature Lamps, Signal Flashers, Aluminized Picture Tubes, Radio, TV and Special Purpose Electron Tubes and Semiconductor Products.

TECHNICIAN

& Circuit Digests

CALDWELL-CLEMENTS, INC., 480 LEXINGTON AVENUE, NEW YORK 17, N. Y.

Are You Your Biggest Problem?

Anyone who has followed TECHNICIAN's history even casually knows that we are not prone to paint rosy pictures of the TV-electronic service industry, or shut our eyes in the face of evil. Our record in highlighting *your* problems speaks for itself.

Our "gripe" scorecard notwithstanding, we want to go on record emphatically, here and now, as believing that our dynamic industry is a wonderful one, that it is loaded with opportunities now and for the future.

While we don't intend for one moment to forsake our annoying (to some!) habit of picking apart evil and evil-doers, we cannot over-emphasize the need for perspective. Let's appreciate and correct our own faults.

Do the so-called "night crawlers" get you hot? We must be selective when we condemn. Many are honest operators, working their way to full-time status.

Do retailing jobbers get your goat? The industry boasts of many a helpful and legitimate one. How often has your jobber "carried you on his back?" And how often have *you* done business with the phonies?

Do you turn purple every time you think of the set manufacturer? Many have given you field data, lectures, advance info on color and public-relations campaigns worth a fortune in building up good will.

What we're getting at is this: If you're having a tough time of it, remember that a lot of service technicians are making out well in this industry right now, although they're suffering from the same "impossible" conditions that bedevil you. TV-electronic service is big business, running into the billions, and still increasing. The annual service bill runs well ahead of the amount spent for new sets. If you're not getting your cut—legitimate gripes notwithstanding—take a long look at *yourself!*

Have you been keeping a decent-looking shop? What sort of impression do you make on your customers? Is your complement of test equipment adequate? Are you keeping up with new developments? Do you know where you stand just by looking at your business records—or don't you even have any in a well-organized form? Are you actively looking for new business? Are you really supporting your association?

In the answers to these questions and others, many of you may very well find the reasons you are struggling while the fellow in the shop a block away, bucking the same difficulties, bought a new car this year again.

Now is the time to make your self-evaluation because next month is the beginning of the season for the biggest dollar volume the industry has ever seen!

Repercussions—Phase One

TECHNICIAN's investigation of unethical practices in the receiving tube field, and disclosure of findings in the "Inside Story of the Reprocessed Tube Racket," published in the July issue, has stirred up a hornet's nest of reactions. The gamut ranges from surprise and praise through worry and indignation . . . depending on who is reacting. These varied responses are a natural Phase One repercussion. The Phase Two repercussion—direct action against offenders—should not be long in coming.

Briefly, here is a spot resume of some of the events growing out of the reprocessed tube report:

Several manufacturers, trade associations and distributors have voiced their desire to reprint or distribute extra copies of the report.

The National Better Business Bureau and Radio-Electronic-Television Manufacturers Association have noted their concern and intention to evaluate further measures to stamp out the racket.

One tube distributor who specifically advertises that his tubes are not rejects, rebrands or reworked bargains has been pressured by certain interested parties who thought he had provided inside information to TECHNICIAN editors. (Fact of the matter is that this distributor did not know anything about the investigation until the report was published.)

Bargain tube companies who refuse to state exactly what kind of tubes they are selling (rejects, reprocessed, etc.) are not being allowed to advertise in TECHNICIAN. This is to assure our readers that they can buy products advertised in TECHNICIAN with confidence.

All over the country, service technicians are starting to realize that bargain tubes require close scrutiny. And the ire of several techs was roused when they learned that the old tubes they sold to the "junkie" for 2¢ each may have been the very ones they repurchased for 85¢.

We'll let you know of further developments.

Tuning In the

THREE MOTORS PER SECOND for the next five years is the estimated output that will be required of the nation's electrical manufacturers, estimate Westinghouse engineers, to power the 428 million electrical appliances that they expect to be sold by 1960. While the prospect is a happy one, it has its sober side: to handle the growing demand for electric current needed to power the increasing number of appliances in the home, more than 34 million American houses today need heavier, more adequate wiring at an average cost of about \$150 each.

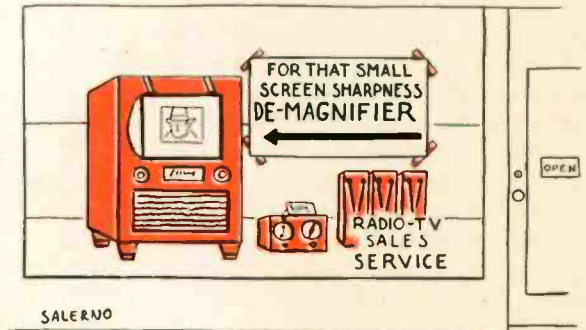
TRENDS ALONG THE BUSINESS FRONT: Discount-houses in some areas stepping up servicing facilities. The idea back of this is to try to live down the "no-service" competitive angle frequently being used . . . From Kansas City, W. C. Johnson, Admiral VP, reports that radio sales skyrocketed as soon as it was disclosed that the Kansas City Athletics' games would be broadcast and not televised; that sales of Admiral radios during one month were 300% higher than in '54. He also said that service shops were jammed with old sets awaiting repair . . . All over the country there's a marked trend by shops to buy and use more manufacturer-supplied identification signs and other display material than they ever bought before . . . In many sections of the country visited by **TECHNICIAN** editors, the auto-radio repair shops are jammed with work, and usually are able to get good prices . . . Noted, too: a slow, but steady growth in volume of Hi-Fi service and installation revenue.



Transistorized wrist radio is inspired by Dick Tracy comic strip.

DICK TRACY WRIST RADIO, "invented" over 10 years ago on the cartoonist's drawing board, is here for real. The "Little Mite" features a high-gain regenerative circuit with a transistor audio amplifier in a plastic case, all mounted on a wrist-watch strap. The single headphone resembles a hearing-aid pick-up. The unit is available from Huckert Electronics, 4406 74th Ave., Hyattsville, Md. Complete kit is \$17.95; ready-to-play set is \$39.95.

TV ABROAD: First application of TV in the young state of Israel, oddly enough, is not in broadcasting. It will be a closed-circuit 2-way hookup at the Israel Institute of Technology, The Technion. The system will be used in a teaching method developed here in the U. S. and now operating at Chicago Teachers' College, Case Institute of Technology in Cleveland, and at the Army Signal Corps Center in Fort Monmouth. The Israel installation, which will tie in every room in the Technion's Electrical Engineering Building, is the gift of Milton J. Shapp, prexy of Jerrold Electronics Corp. Odd international note: plans for the layout (in Hebrew) will have to be interpreted for J. Nishamura, Jerrold's Japanese-American engineer.



DID YOU KNOW THAT service technicians and dealers make up 70 percent of all the customers of parts jobbers and distributors? You can afford to act independent! You also account, as a group, for most of the dollar volume the middlemen turn over each year. They get more from service customers than from all other groups combined, including industrial accounts. The trend is still moving rapidly in your favor, as it has been doing for the past five years. A little over two years ago, service technicians accounted for less than half the jobber's business.

AUGUST 1955 NETWORK COLOR TV SCHEDULE

MONDAYS, WEDNESDAYS, FRIDAYS, August 1, 3, 5, 8, 10, 12, 15, 17, 19, 24, 26, 29*	7:30—7:45 PM (EDT)	NBC	"Matt Dennis Show"	(Live)
TUESDAYS, THURSDAYS August 2, 4, 9, 11, 16, 18, 23, 25, 30	7:30—7:45 PM (EDT)	NBC	"Vaughn Monroe Show"	(Live)
MONDAY, August 22	8:00—9:30 PM (EDT)	NBC	"The King and Mrs. Candle" (Producers' Showcase)	(Live)
SUNDAYS, August 7, 14, 21, 28	6:00—7:00 PM (EDT)	DUMONT	"Color Film Series"	(Film)

*The Matt Dennis Show will also be seen on Monday, August 22, but it will be shown in black and white only on that date.

Picture



SMALLER SIZE, GREATER EFFICIENCY is the trend in batteries as it is in everything else today. Little more than 20 years ago, the hearing aid battery would last only 18 hours. Newest ones, according to the American Standards Association, will last up to 75 hours although they may be little more than half an inch in diameter. Flashlight batteries that would give 12½ hours of service a few years ago now last up to about 18 hours.

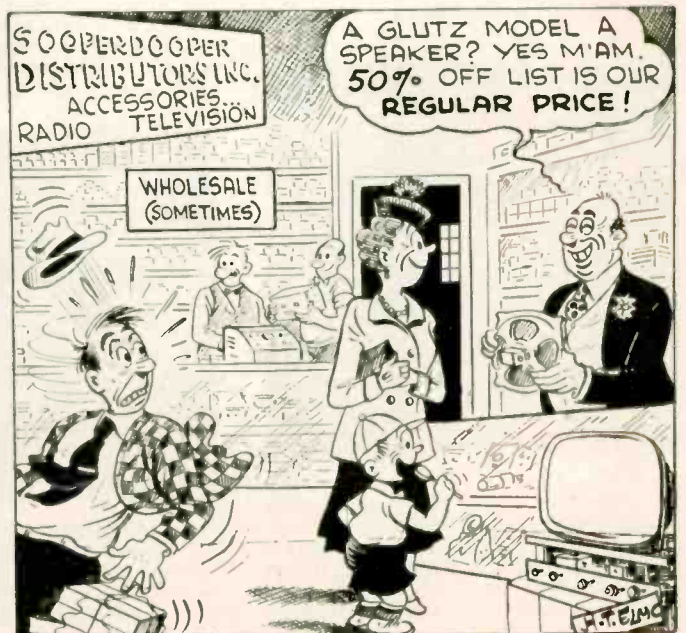
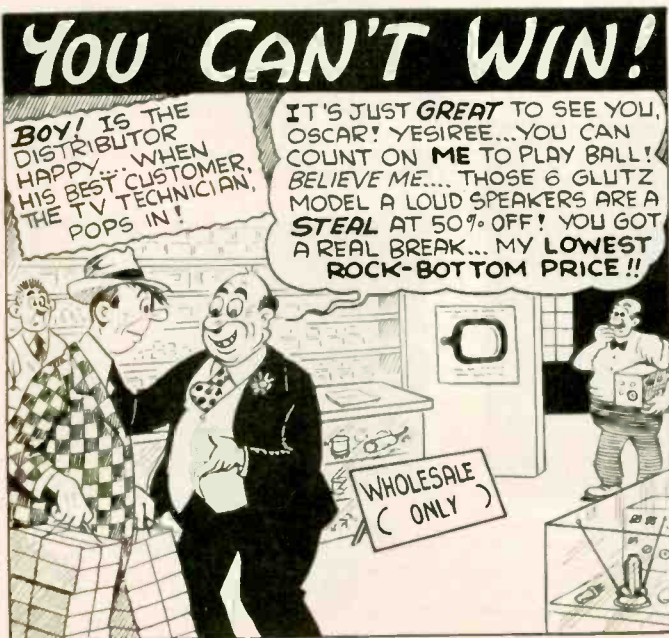
TV FIGHTS FIRE: Pickup cameras that scan deep into forest areas from look-out towers relay pictures by microwave back to forest ranger headquarters. Here, the images from the many rotating cameras located on different towers are projected on a series of monitor screens and watched by observers for signs of forest fires. This system of electronic fire-watchers was demonstrated by Raytheon engineers to a convention of the Forestry Conservation Communications Association. Though the cameras are set up to rotate continuously and automatically, they may be stopped, started or reversed by remote control when an observer thinks he has spotted something suspicious. Use of the system may help cut down on the \$60 million in timber lost annually to forest fires.

TV-ELECTRONIC INDUSTRY OUTLOOK, as forecast by the Business & Defense Services Administration, is a 1955 production of \$6.2 billion, including home, commercial and military equipment. Value of TV receiver production is expected to exceed \$1 billion. Production during first half of this year was at near-record level of 3,750,000 units. Price cuts are expected to stimulate color-set sales this fall. Radio production continues at high level.

CALENDAR OF COMING EVENTS

- Aug. 19-21: National Alliance of Television & Electronic Service Assoc. National Service Show, Hotel Morrison, Chicago.
- Aug. 24-26: Western Electronic Show, Fairmont Hotel, San Francisco, Calif.
- Aug. 26-28: Third Annual Texas Electronics Association Clinic and Fair, Gunter Hotel, San Antonio, Texas, Sponsored by Texas Electronics Assoc., Inc.
- Sept. 30- Oct. 2: 1955 Hi-Fidelity Show, Palmer House, Chicago, Ill.
- Sept. 30- Oct. 2: Third Annual High Fidelity Audio Show, sponsored by Northern California Audio Shows, Inc., Sheraton-Palace Hotel, San Francisco, Calif.
- Oct. 3-5: Eleventh National Electronics Conference, Hotel Sherman, Chicago, Ill.
- Oct. 12-15: 1955 Convention, Audio Engineering Society, Hotel New Yorker, New York, N. Y.

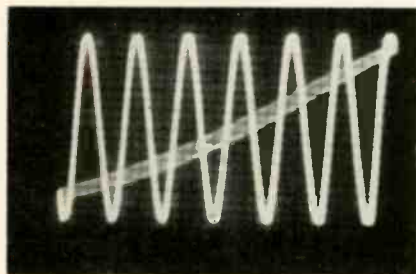
"AUTOMATION: n. 1. The act or technique of making a manufacturing process fully automatic. By this technique parts are moved into and out of machines without being handled by human operators. 2. The state of being automatic. 3. Automatic operation, as of a machine." This new entry is scheduled for appearance in the next edition of Merriam-Webster's International Dictionary, according to Anderson Ashburn, editor of "American Machinist," giving recognition to the increasing importance of automation in our modern technology. Though the definition is new, Ashburn traces the beginnings of the concept back to the 1780's, when Oliver Evans designed an automatic grist mill in Philadelphia. The mill was automatic from the unloading of grain to the barrelling of the flour.



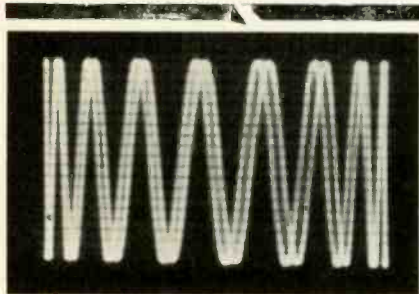
Important Scope

Analysis of Basic Traces and Patterns

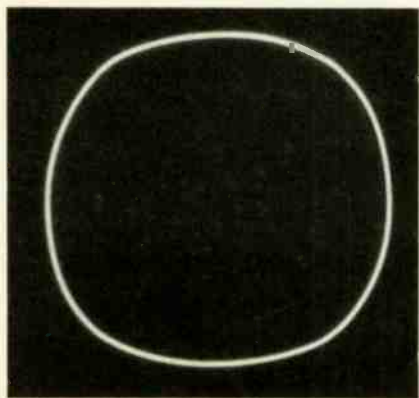
ROBERT MIDDLETON
CHIEF FIELD ENGINEER
SIMPSON ELECTRIC CO.



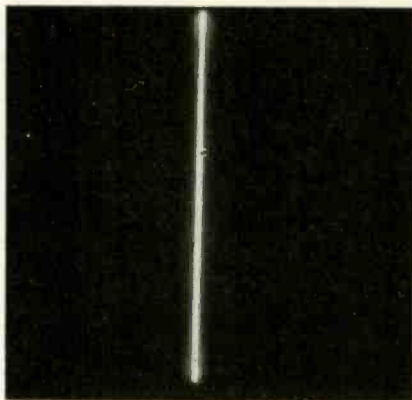
Sine wave displayed on sawtooth sweep. The sine wave is the "ATOM" of ac electricity, from which all other waveforms such as sync pulses, sawtooth waves, etc., are built up. The sine wave has three basic characteristics: frequency, phase, and voltage.



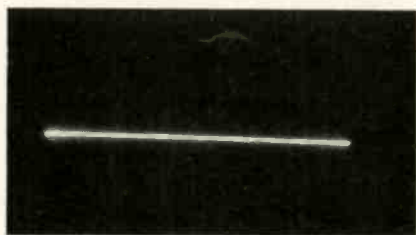
Sine wave displayed on sine-wave sweep. The sweep voltage has 1/9 the frequency of the applied voltage to the vertical amplifier. Sine-wave sweep is utilized almost exclusively in visual-alignment applications, because of elimination of the synchronizing problem, and because of the more useful nature of the display which is obtained.



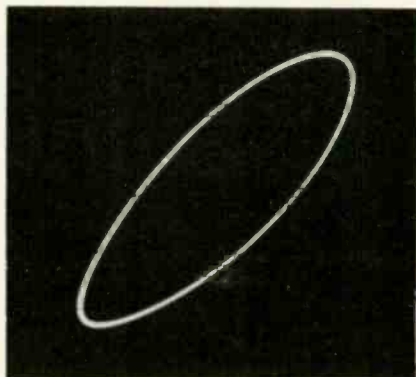
Sine wave displayed on sine-wave sweep. The sweep voltage has the same frequency as the voltage applied to the vertical amplifier. However, the two sine-wave voltages differ in phase by 90°. Those service scopes providing a phasing control for the sine-wave sweep function allow a suitable phase relation to be obtained.



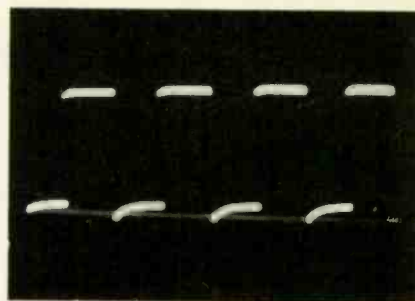
When a 60-cycle sine-wave voltage is applied to the vertical-input terminals only, a line is seen on the scope screen, as shown. The spot appears to produce a continuous line because of the persistence of vision and the decay characteristic of the phosphor.



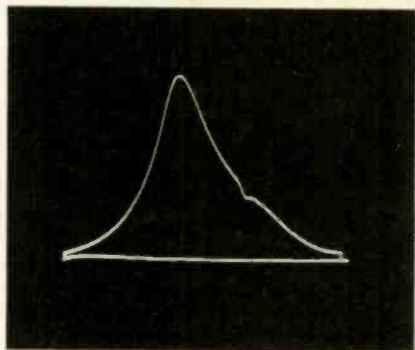
When the same 60-cycle sine-wave voltage is applied to the horizontal-input terminals only, a line appears at right angles to the first, as shown. It is evident that, if the same sine-wave voltages were applied to both vertical and horizontal terminals, the spot must indicate a point on the screen, at each instant, which is the resultant of both voltages.



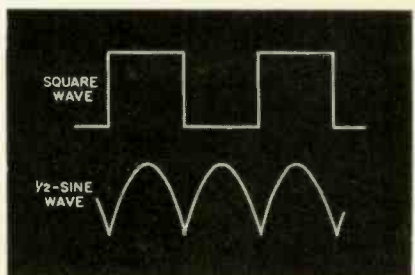
This Lissajous pattern is the result of applying 60-cycle sine-wave voltages simultaneously to the vertical and horizontal input terminals of the scope amplifiers. The phase of the horizontal voltage is different from the phase of the horizontal voltage by 30°.



The square wave is a fundamental type of waveform utilized in TV service work. It consists of a fundamental frequency plus numerous odd harmonics which decrease in voltage as the order of the harmonic increases. If there is no distortion in the square wave, the harmonics are all in phase with each other and with the fundamental.



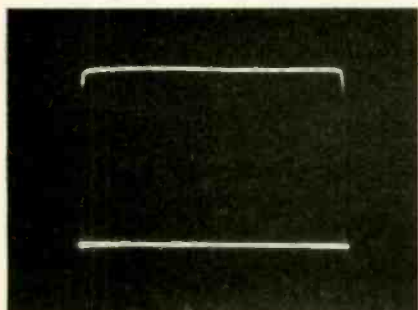
A visual-response curve is related to a square wave. In fact, a theoretically perfect flat-topped response curve would evidently be a square wave. Hence, if a scope has good 60-cycle square-wave response, it is a good scope for visual-alignment work. If a scope has poor 60-cycle square-wave response, it develops loops at the ends of a response curve.



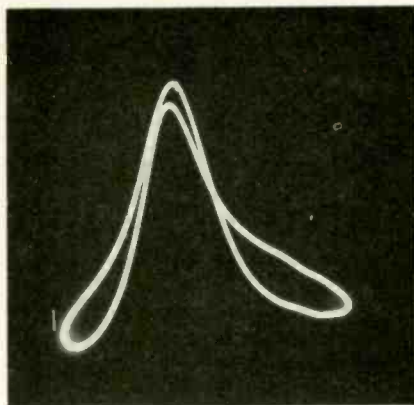
A square wave has odd harmonics only. A rectified sine wave has even harmonics only. Symmetrical distortion of a waveform causes the generation of odd harmonics. Unsymmetrical distortion of a waveform causes the generation of even harmonics.

Waveshapes

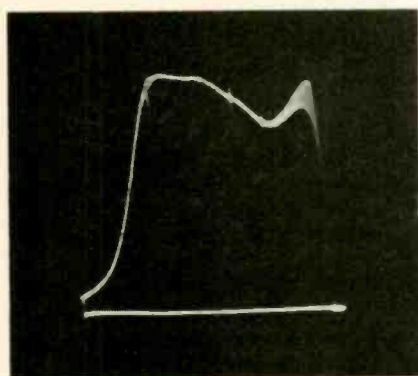
of Interest to the Service Technician



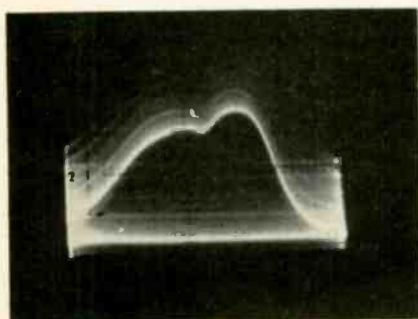
Display of a 60-cycle square wave on sine-wave sweep. By visualizing the development of the 60-cycle sine-wave sweep, the reader will perceive the similarity between this pattern and the more familiar type of display obtained when sawtooth sweep is used.



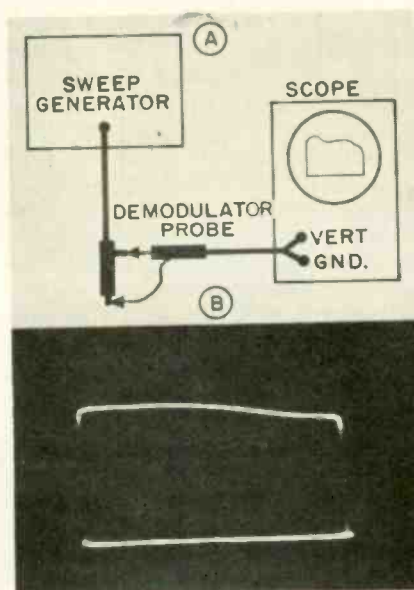
This is a common difficulty encountered by the technician. This waveform is distorted, the retrace showing a different waveform from the forward trace; the ends of the curve are also looped. The distortions are the result of capacitive coupling in the circuit under test, or in a scope that is inadequate for 60-cycle voltages; the value of the coupling capacitor(s) must be increased.



This response curve shows a close approach to the display of a 60-cycle square wave, and clearly shows how a good response curve fits into the generic family which includes the square wave.



Waveforms in service tests often show more than a single component. Here is an example of a response curve with a spurious component consisting of a crosstalk voltage from the vertical sweep circuit beating with the 60-cycle display. Cure is to remove the vertical-output tube during alignment. Where series-filament or stacked B+ circuits prevent removal, disable stage by other means.



Sweep alignment is one of the fundamental 60-cycle sine-wave applications. Another basic application is illustrated here, viz., checking the output of a sweep generator for flatness with a demodulator probe. Similar displays are encountered in impedance tests.

IS YOUR TEST EQUIPMENT SET-UP ADEQUATE?

Do you have all the instruments you need to handle every job properly? Are you getting the most out of them? Do they meet the advanced demands of the latest bench techniques? See "Know Your Test Equipment," page 21.

Accreditation for TV Technicians

The following information is taken from a bulletin entitled, "Suggested Accreditation Program for TV Receiver Service Technicians," published by the Radio-Electronic-Television Manufacturers Association (RETMA). It is intended as a guide for local industry groups in the development of a program to upgrade technicians.

- Since the television set owner is constantly seeking a way to identify technically competent servicemen, it has become imperative that a plan be devised whereby good technicians can be recognized by the public.

It is to the advantage of the public and the local service industry that a roster of competent servicemen be compiled as a guide for TV set owners. However, a good technician for today's TV set is not necessarily going to continue to be as competent on tomorrow's products unless he constantly upgrades himself.

Thus, a plan is needed to accredit good technicians—keep them competent—and inspire others to meet these requirements.

The RETMA training course in Advanced TV Servicing Techniques can be used as a basis for training and testing the technical competence of service technicians. By using the course as a guide, the community has a means of evaluating the skills of servicemen. On the other hand, the technician has a means of establishing that his technical knowledge is in accord with the industry's needs.

An accreditation program in which all interested parties can participate, as suggested by RETMA, is a cooperative program of self-help within the community, and should automatically enlist the interest of the local television industry, the community schools, service technicians and the set owners.

Servicemen who successfully complete courses in these schools become closely integrated with the local service industry, become more aware of their community responsibilities, and in general increase their prosperity.

Thus, it is that service technicians who are willing to participate in an upgrading program should be

(Continued on page 39)

AGC Clamp Circuit Troubles

Critical Component Values Complicate a "Simple" Circuit

By JAMES A. McROBERTS

• The first glance at a typical agc clamp circuit on the schematic reveals an arrangement that is very elementary. This notion disappears as soon as the receiver itself is inspected, and note is taken of the considerable number of precision resistors used.

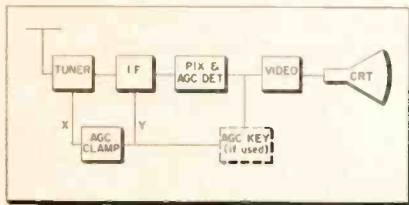
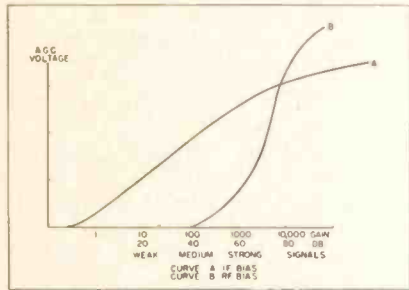


Fig. 1—Position of clamp stage in agc line.

Fig. 2—Relative level of agc voltage applied to r-f and i-f strips as signal level varies.



Troubles in clamping action can produce many symptoms generally associated with the main portion of the agc circuit, which may itself be in proper operation. These include

sync difficulties due to overloading and consequent sync clipping on signals that are strong or moderate; the addition of snow on weak signals or moderate ones; the readily recognized attenuation of signals on weak stations; and many others (see *AGC Service Tests*, April, page 16, and *Tests for Keyed AGC Systems*, May, page 24).

Clamp and other agc defects are often due, rather than to out-and-out breakdowns, to accumulations of subtle factors or simply to aging. Often unfortunate combinations of tolerances—wherein individual parts in the circuit are within prescribed ratings, but the accumulation of small errors in components results in a departure from tolerance of the overall circuit—result in subtle mal-operation from the start. Also, this condition can come about after aging. For this reason, the performance of many sets could be improved with some service work on the clamp circuits. Before considering causes, symptoms and cures, a summary of clamping action is in order.

With weak signals, the least amount of agc action that will prevent fading is desired. Accordingly the agc clamp, acting like an open switch on such signals, substantially removes agc voltage from the tuner while permitting this control voltage to be applied to the i-f stages. See Fig. 1. By permitting the tuner to operate relatively wide open on weak signals, less snow is thus like-

ly to be picked up. As signals get stronger, agc action must also be applied to the tuner to prevent overloading. The figurative switch of Fig. 1 is now closed, and the desired control takes effect in the front end. The relative amounts of signal present at the antenna terminals, along with corresponding amounts of age voltage applied to the tuner and i-f stages respectively, are shown in Fig. 2. In other words, low levels of agc voltage will be blocked by the action of the clamp tube, which is tied only to tuner agc. When input signal strength (and consequently the amount of developed agc voltage) passes a certain level, the control voltage is sufficient to over-ride the action of the clamp tube.

The best way to check for improper clamp action is to take readings of the agc voltages applied respectively to the tuner and i-f strips, and to see how they compare at different levels of signal strength. They should properly follow a pair of curves similar to those in Fig. 2. Often the set manufacturer will provide a more specific set of curves in his literature. If the clamp circuit is defective, either of three conditions will be noted: clamping will not take place at any signal level because the clamp is permanently closed; the action will not take place because the clamp is always open; or the action will take place, but not at the desired point of signal level; that is, it will occur at too high or low a

Fig. 3—Clamp in agc circuit, Sylvania 508-1. X marks r-f agc.

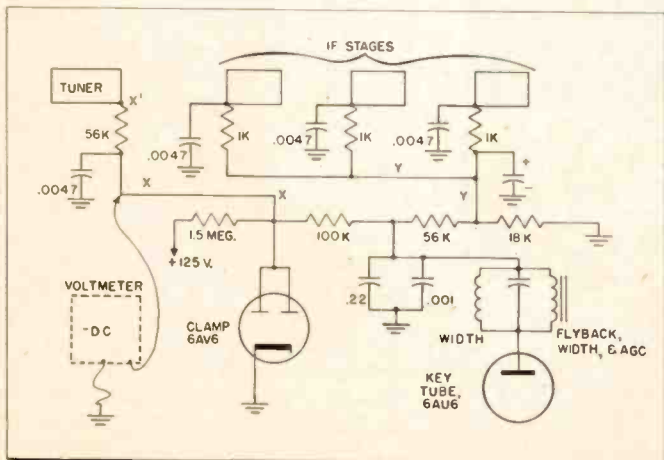
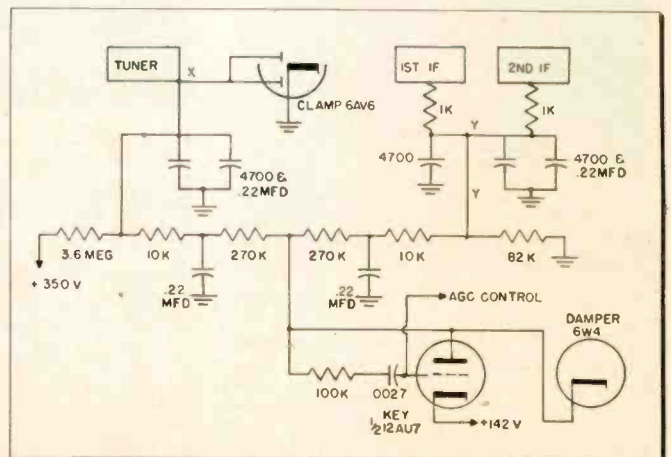


Fig. 4—AGC and agc clamp circuit as used in RCA chassis KCS 81.



level. These possibilities are considered separately.

A. No clamping occurs at all. At any signal level, agc continues to be applied to the tuner. Tuner gain is reduced even on low signals. It is therefore on the weaker stations that the symptom is most evident. A typical customer's complaint may run like this: "Channel X was never too good; but now I can hardly make anything out on it anymore."

To test, connect the vtvm dc probe to the tuner agc line while set to a low voltage scale. A negative reading on a weak station indicates a "no clamp" condition. (A small voltage, to about half a volt, may be present due to contact potential. This should be ignored.) Specifically, the meter's dc probe is connected to points marked "X" in Figs. 3, 4, and 5; the meter's common lead is to ground; and the vtvm is set to read negative voltage. The test set-up at point "X" is shown in Fig. 3, for clarification.

Causes of the condition include, of course, a defective clamp tube. However, this possibility will ordinarily have been eliminated before the meter test. A frequent cause is inadequate B-plus at the plate of the diode. No B-plus at all, low B-plus, or excessively high resistor values between the B-plus source and the clamp tube are possibilities to be investigated. Excessively low resistor values from the tube to ground through the voltage divider may produce the same effect. The voltage dividers referred to may be traced out individually in the circuits of Figs. 3, 4, and 5. The resistors from B-plus to the clamp tube are 1.5 meg in Fig. 3, 3.6 meg in Fig. 4, and 2.2 meg in Fig. 5.

Do not make replacements in this stage with ordinary high-tolerance

resistors, unless you want to do some series connecting or shunting to make up precision assemblies. Values are rather critical.

Fig. 5 shows, effectively, two clamping diodes whose plates are separated by a 240k resistor. The purpose is to provide progressive clamping at two different points along tuner agc curve B of Fig. 2. On stronger signals, as a result, curve B will "droop" more at the top.

B. The clamp remains closed at all signal levels. No matter how high the level of input signal, no agc voltage reaches the tuner. In this case, the symptoms are most prevalent on moderate or strong signals. Even where overload does not occur, snow is likely to appear at all signal levels, since the tuner is operating wide open. Overloading may result in sync instability due to sync clipping or compression; it may also cause black-white reversal of picture content. While the severest example of the latter is a negative picture, sometimes only the extremes of the tonal range (black or white) are affected, particularly white. Incipient or partial overload may cause a tone reversal on noise pulses. In this example, a black noise pulse will be followed by a white space.

The general cause of the always-closed clamp is too much clamping voltage (B-plus at the plate of the diode), so that the developed negative agc voltage is never strong enough, at any level, to over-ride clamping action. The test procedure follows that already discussed for the condition of the always-open clamp.

Specific causes include too high a level of B-plus; insufficient resistance in the line between B-plus and the clamping diode; and excessive

resistance in the voltage divider between the clamping circuit and ground. An ohmmeter may be helpful in running down improper resistance values but, in terms of the precision often required, this instrument will often fail to give adequate indication. Another method, to be considered soon, is usually preferred.

C. Intermediate cases of trouble. Clamp switching action works, but the "over-ride" point is not the one intended by the design engineer. Conditions may approach either the nearly-always-open or nearly-always-closed state. In effect, this condition will be similar in nature either to conditions listed under A or under B, the difference being only in degree. Similarly symptoms will resemble those in either A or B, but be less pronounced.

One method for correcting agc faults of the type discussed here is used frequently in factory adjustment procedure. Where a resistor in the agc system is suspected of being too large, it is shunted with a potentiometer whose value is at least 20 times that of the suspect. The pot is varied until agc action is found to be normal. Then the set is turned off, the actual shunt resistance is then measured, and a fixed resistor of this value is permanently wired into the circuit.

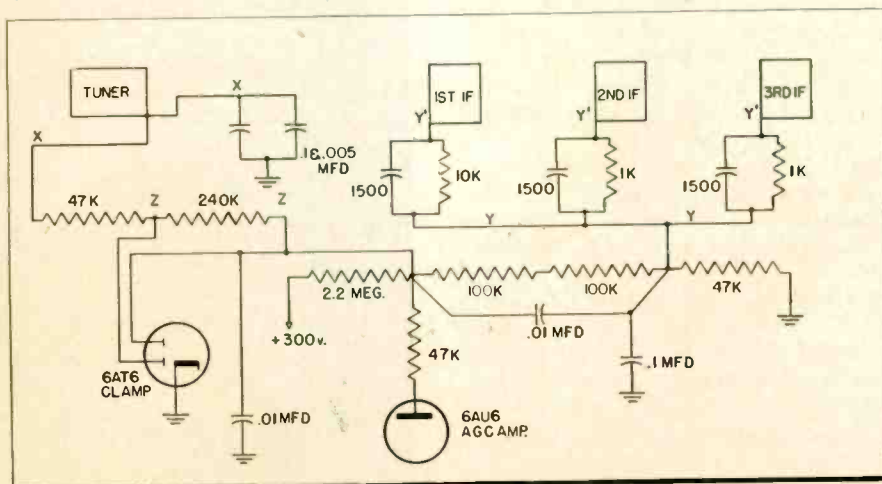
Where a resistor is suspected of being too small, the test potentiometer is placed in series with the presumed culprit. Again, the pot is varied to produce normal action; the series resistance is measured; and a fixed resistor is wired in series.

Of course, if the manufacturer of the set supplies a chart like the one shown in Fig. 2, it is possible to take experimental measurements with different resistors in an attempt to approximate the curves. Generally, this is the long way of doing the job. The potentiometer method already described is used by production personnel in many set manufacturing plants, so why should you do otherwise? •

New TV Film-Slide System

G. E. announced that they are in commercial production of a new film and slide system for TV stations. The system was designed primarily for color film and slide programming but will be installed initially to handle monochrome film and slides. The new equipment uses a continuous motion projector developed by the Eastman Kodak Co. for use with the system's electronic flying spot which is its light source and film scanner.

Fig. 5—Du Mont RA 170 uses progressive clamping to produce sharper r-f agc curve droop.



Vibrator Power Supplies

Part 2: Series, Shunt Drive Systems; Vibrator Advantages

BY KENNETH BACKMAN
SR. COMMUNICATIONS ENG.
MOTOROLA, INC.

• In either of the two types of vibrators discussed in the preceding article (non-synchronous and synchronous or self-rectifying), there may also be found either of two different types of drive systems. The drive system is that part of the unit that causes the reed to vibrate at its given operating frequency.

The first type, known as the "series" or "separate" drive, was discussed briefly in the earlier portion of the article. It consists of an electromagnetic driving coil in series

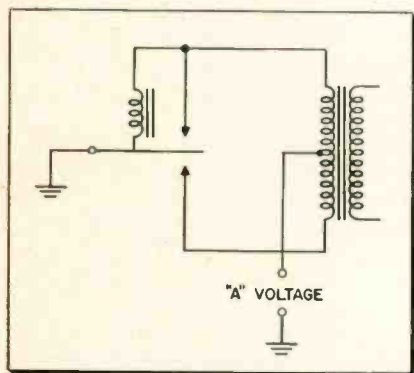


Fig. 1—Shunt drive coil in vibrator circuit.

with a pair of contacts. The contacts connect one end of the coil to the reed of the vibrator.

The other end of the coil is brought out to one of the base pins, in order that it may be connected directly to the driving source voltage. The driving circuit is, therefore, completely independent of the transformer and the rest of the circuit. This arrangement permits more flexible applications, one being that, through the use of dropping resistors, the vibrator may be operated from a multiplicity of input voltages. This has definite advantages where it is necessary that a radio set be capable of operation from several input voltages; i.e., 6, 12, 24 volts, etc.

The second type of drive circuit also derives its name from the manner in which it is used in the circuit, and is known as the "shunt" drive (Fig. 1). In this case, the electro-

magnetic driving coil is connected between the reed and one of the primary power contacts. Thus, the starting current for the driving coil will be in series with one half of the transformer primary winding. As the reed pulls upward, the driving coil will become shorted out by the power contact. The magnetic field will collapse, and the return of the reed will then take place. However, once the reed has reached its full amplitude, the energizing voltage at the driving coil will be approximately twice the input voltage. This is due to the autotransformer action of the primary windings. For this reason, the resistance of a shunt coil is normally about four times greater than that of a series drive coil. The higher resistance of the shunt type circuit has a somewhat detrimental effect at high ambient temperature operation, as the increase in coil resistance due to the high temperature affects the performance of the driving circuit. The tendency is to reduce the time efficiency of the vibrator and thus lower the output voltage. Another characteristic of the shunt drive vibrator is that it may have slightly shorter life, due to the fact that the driving circuit is dependent upon the condition of the power contacts. As the vibrator ages and the power contacts become pitted and worn, the resulting increased contact resistance increases the starting voltage required by the vibrator.

We have discussed the most common types of vibrators which are to be found in the majority of automobile radio installations. These vibrators will usually operate at a frequency of 95, 100, or 115 cycles per second. This is an optimum frequency range determined by methods which permit practical and economical construction of a vibrator which exhibits good life characteristics and at the same time permits the use of components of reasonable size, such as transformers, filter chokes, capacitors, etc. Fig. 2 illustrates a conventional 95-cycle, interrupter-type vibrator.

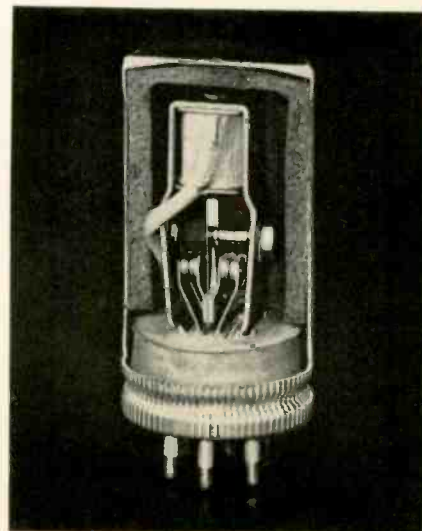
The question may now arise, why the trend toward vibrator power supplies? We mentioned earlier that

several types of equipment could be used for the same purpose, yet one familiar with the radio industry may have noticed that vibrator type equipment is coming more and more into use every day. All other factors being equal, under prescribed operating conditions the difference is economy, simpler construction and less expensive maintenance with respect to the radio equipment, vehicle battery and generator system.

The vibrator is relatively unaffected by extreme environmental conditions such as dust, heat, cold, humidity, etc. This is exceedingly important where high reliability is required. With the "all-vibrator" power supply more watts per unit size per ampere drain is achieved. Weight and physical size can be held to a minimum. Another factor is the inherently quieter operation and stability of noise level which is easily controlled.

The vibrator does not draw a high inrush current when starting. This not only lightens the burden on the vehicle battery but eliminates the need of power-consuming, heavy-duty starting relays and also permits better fusing and lighter cable to be employed. Also, a faulty vibrator is easily detected and, like a tube, can be replaced in a matter of seconds. •

Fig. 2—Cutaway of 95-cycle interruptor type.



Know Your Test Equipment

Some Basic Instruments: Features, Applications, Accessories.

• A well-equipped service shop can carry more than 25 pieces of test equipment—not including accessories and tools—without wasteful duplication of function between any two instruments.

If you've been operating successfully for a number of years, the chances are you've accumulated that number gradually without even realizing it. There may be fewer than 10 instruments on the bench, or on the panel or shelves above it, that come in for day-in, day-out use, but you'll probably be surprised—as was one technician we used as a guinea pig—at the gold mine of equipment under the bench or elsewhere in the shop. Items in the latter group, according to our test subject, had been taken for granted but were earning their keep. He was mighty glad to have them around when he needed them, although they did not get the same heavy use accorded his meters, generators and scope. What's more, he has decided to review their specs in the light of increasingly stringent requirements, and maybe to replace some that have become outmoded.

Do you have enough of the right kind of test equipment? Are you getting the most out of what you have? Let's take a look at your line-up. As a minimum, you should have one or more meters, one or more test oscillators, an oscilloscope, a sweep generator, and a tube checker.

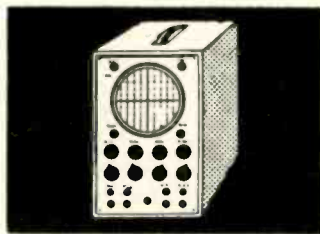
Meters

Your vtvm or multimeter is useful for more than simple I, E, and R measurement. In conjunction with a generator, it is an invaluable alignment tool. Connect the right probe to it and you can trace signal.

The vtvm is unexcelled for measurements in low-voltage high-impedance circuits, such as in monitoring agc or avc lines, because of its relatively high constant input resistance, generally 10 meg or more regardless of scale on dc. In the same application, for example, a 20,000 ohms-per-volt multimeter would have an input resistance of only 200k on its 10-v scale, loading down the agc line and giving a false picture of circuit conditions. Gener-

ally flat frequency response is useful for audio measurements. A zero center scale facilitates FM alignment chores.

The multimeter, on the other hand, provides higher input resistance on the higher scales, permits dc current measurements and doesn't have to be connected to an ac source or be built large enough to carry a heavy battery. Some modern lightweight vom's are small enough to be carried in the palm of



the hand, making them ideal for outside calls. Some combination vom-vtvm instruments are on the market to provide the ultimate in flexibility.

A db scale and a facility for reversing dc polarity to expedite negative voltage readings are useful features. Specialized meters include the ac voltmeter, the peak-reading voltmeter and the audio-watt-meter.

Accessories: Peak-reading probes are helpful checking gain; r-f probes are helpful in circuit tracing and in extending the high-end response of the meter for signal tracing; high-voltage probes extend voltage measuring capabilities to include 2nd-anode supplies. With color in mind, try to get up to at least 30,000 v with your h-v probe.

Signal Generators

The chances are you will want more than one generator or test oscillator to cover all ranges desired for different types of work and to provide additional facilities. A separate oscillator for audio frequencies, providing essentially flat, undistorted output from 20 cps upward, will usually come after the shop has already acquired a generator that will cover important i-f and r-f frequencies in AM, FM and TV. The generator is useful in signal injection and tracing, alignment

with meter or to provide markers in sweep alignment, as a substitute oscillator in tests, and for making capacitance or inductance checks in conjunction with other pieces of equipment.

Most service generators nowadays start between 100 and 200 mc and go up through the VHF-TV band, either on fundamentals or calibrated harmonics. Some go up through the UHF band on harmonics; in other cases, where UHF service is a factor, a separate generator may be necessary. A fixed audio oscillator, generally at about 400 cps, may optionally be used to modulate the i-f or r-f output. Some include a variable audio oscillator in place of the fixed 400-cps stage. Other useful facilities include the ability to take separate output from the audio oscillator portion, an input for external audio modulation, variability of the percentage of modulation, a built-in output meter for monitoring i-f, r-f or audio signals, and input facilities for crystals to calibrate the generator for precise alignment work. Some generators also provide optional switch-selected square-wave output.

Accessories: Crystals for calibration at important alignment frequencies; matching pads.

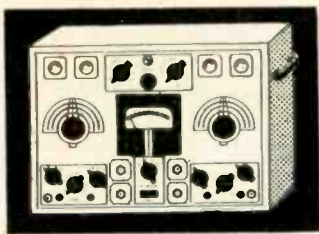
Oscilloscopes

The days of the scope with "slow roll-off beyond 100 kc" are rapidly waning, but you still don't need a laboratory instrument. There are many good service scopes that drop off rapidly after 4 mc, but are fairly flat to that point. Even in horizontal-sync waveforms, whose fundamental frequency is 15,750 cps, there are pulsed components that go out beyond 2 mc and are therefore distorted by limited bandwidth. For aligning color receivers, it will not only be necessary to observe signals close to 4 mc, but to see them in proper relative amplitude.

Since many technicians prefer to display three cycles of any waveform under observation while observing the relatively undistorted center cycle, sync facilities down to 20 cps are desirable to display three cycles of 60-cps waveforms. Fast rise time and low overshoot are

also recommended. Input resistance should be high but input capacitance should be low (vertical amplifiers) to avoid the loading or detuning of circuits under test. In addition to the built-in sweep oscillators there should be a fixed 60-cps sine-wave sweep and facilities for external sync. The latter is useful for locking in relatively unstable phenomena of high frequency. Many technicians who have trouble with jittery horizontal-circuit waveforms find, for example, that a length of wire hanging near a pix tube of a set under test will pick up enough of the horizontal pulse to provide more stable external sync than is available internally.

Having a "flat" vertical amplifier doesn't mean much if the scope's attenuators are not frequency-compensated. Otherwise, flat response



is only obtained at one or a few gain settings. Access to the scope tube's deflection plates for direct connection is also useful. Some scopes have a bandwidth switch so that the instrument can be operated either as a low-gain wideband device, or as a high-gain device of limited bandwidth. The latter is useful in observing low-amplitude phenomena. Built-in voltage calibration facilities, for taking waveform amplitude measurements, are also helpful. A phasing control for sweep alignment procedures is also important if such a control does not exist on the sweep generator. A waveform polarity reversing switch is helpful.

Accessories: An electronic switch can be used to display two traces at the same time (such as input and output waveforms of a single stage or chassis, for comparison purposes). A separate voltage calibrating device is also handy. Various types of demodulator probes aid in sweep alignment of individual stages and in tracing signals in r-f or i-f circuits. A low-capacity isolating probe prevents the scope from loading or detuning circuits under test. A probe of this kind with an adjustable trimmer is sometimes useful, to a limited extent, in extending the frequency response of a scope that is deficient in this regard. A calibrated voltage divider probe will help in checking

high-amplitude waveforms, like those found in horizontal-output systems.

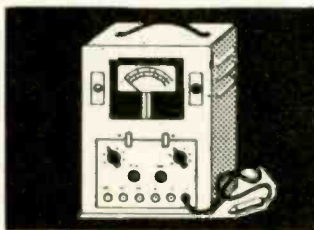
Sweep Generators

Beyond the well-known usefulness in visual scope alignment of overall FM and TV i-f and r-f systems, the sweep generator can be used to check video detector and amplifier circuits, and for single-stage i-f or r-f alignment (the latter with a detector probe).

Absolute flatness of output from its lowest available frequency to its highest is not essential in a sweep generator. Few service sweepers, for that matter, are linear devices in that sense. If the generator will provide reasonably flat sweep to a width of about 10 mc at the important FM and TV i-f and r-f frequencies, it will suffice. If yours doesn't, make sure you take its deficiencies into account when shaping response curves.

Many sweep generators also incorporate marker generators that are separately useful. Sweep width should be easily adjustable and should go to at least 10 mc maximum at 20 mc and above. A retrace blanking switch and sync output for an oscilloscope are desirable. The phasing control is also important, especially if one is not on the scope.

While few sweep generators are designed to operate below 4 mc, the extremely useful procedure of sweeping video detector and amplifier response curves, or of sweep-aligning AM i-f stages, may be achieved. This is done by heterodyning the output of the sweep generator along any flat portion of its band against the fixed signal of a standard generator, mixing the signals in a nonlinear device (crystal



probes are available for this purpose) and using the low-frequency heterodyned sweep output from the probe.

Accessories: A detector probe, for single-stage visual alignment, is handy. So is a crystal probe of the kind just mentioned for heterodyning purposes. The latter will become more important as color comes into the foreground, as there are circuits involved whose bandpass character-

istics below 4 mc are best aligned by the sweep method.

Color Servicing

The impact of color TV will make itself felt on test equipment in two ways. Completely new instruments will be necessary, on the one hand. On the other hand, traditional instruments will undergo changes. So, if you're thinking in terms of picking up standard equipment now, make sure it's still good when color TV hits with full impact. Scope bandwidth and the ability to get good low-frequency sweep out of your generator will be important, as noted. If you have been thinking in terms of getting a pattern generator for linearity adjustments, you would do well to get the white-dot type that can also be used for convergence alignment.

Other Instruments

Not a word has been said here about flyback-yoke checkers, condenser checkers, tube checkers, Q meters, impedance bridges, audio analyzers, signal tracers, crt tester-reactivators, battery testers, grid dippers, bias boxes, antenna orientation devices, substitution boxes and any one of a number of others—yet all of these have their legitimate role in the shop. There's no end to good test equipment. ●

Pay TV "Unscrambler"

A technique for decoding "scrambled" telecasts without paying has been described as rendering scrambled subscription TV readily susceptible to bootlegging.

At a conference in N. Y. C., Milton J. Shapp, pres. of Jerrold Electronics Corp., of Philadelphia, stated his firm is filing for patents on a device that could reassemble a scrambled picture regardless of the encoding method.

At the same time, a brief is being filed with the FCC proposing another method of bringing toll-TV to the public. The proposal outlines a plan for distributing programs through closed-circuit community antenna systems such as are currently in operation in more than 300 U. S. towns and cities. Similar facilities could eventually be expanded to cover any city in the nation. Such a pay system, it was pointed out, would not cut into "free air" but would rather exist in addition to it.

Mr. Shapp's firm favors pay-TV "if it effectively serves a public demand."

Shop Hints to Speed Servicing

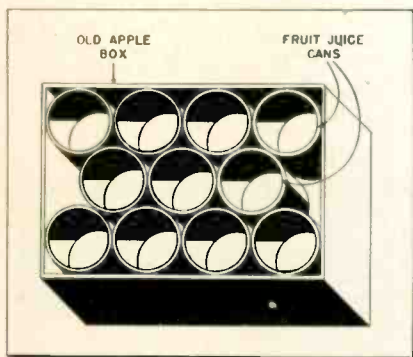
Tips for Home and Bench Service Contributed by Readers

Boosting Soft CRT's

When one filament booster is used to restore brightness to an aging crt, it is often not sufficient if the tube has become too "soft." A simple method of achieving enough improvement to extend the life of the picture tube is to put two crt boosters in series temporarily. This will give the filaments approximately 3 or 4 additional volts. It is not advisable to leave the two connected any longer than is necessary to bring about the desired improvement. Then one of the boosters is removed. We have found that this procedure straightens out most of the very soft picture tubes.—*Joseph F. Valenti, New York, N. Y.*

Small Parts Storage

It has always been a problem to keep small hardware easily accessible, especially hardware used for antenna installation and service. This problem can be solved simply with an old apple crate, which can be obtained from any grocer. Cut the sides of the box down to leave a depth of 7 in.; then insert 11 large fruit juice cans (the 1-qt., 14-oz. variety), as shown in the illustration.



Small parts can be stored in cheaply made bin.

The cans will just fit snugly. I constructed two of these bins. For the small amount of time and effort required to make them, I have saved many, many hours of searching for lag screws, antenna lugs, U-bolts, stand-offs, turnbuckles, lightning arresters, tacks, etc. You can also tell at a glance when you are running low on any item.—*Frank M. Dickinson, Stony Point, N. Y.*

Alignment Time "Shaver"

Like many useful tips, this was found by accident. I had some TV sets in noisy locations and found that, by carrying my electric razor with me, putting it into operation beside the set, and adjusting the ratio detector secondary carefully for a definite and critical null in the noise, I could achieve very good noise rejection.

But that isn't the end of the tip. There came a day when it didn't work. I eliminated the AM noise all right, but the FM sound was then garbled. Good sound and good AM rejection occurred at different settings of the secondary slug. Fortunately the primary adjustment is also accessible from the top of the chassis on this set if the correct hexagon alignment tool is used. I turned the primary a little clockwise, and then tried the secondary again. The two points (good sound and good noise rejection) had moved a little closer together. A touch more clockwise on the primary, and good sound and good rejection then coincided on the secondary. I later confirmed this procedure on the bench.

Now I can set up both the primary and secondary of the ratio detector transformer without using instruments—unless you call the razor a test instrument!—*Bob Eldridge, Vancouver, B. C., Canada.*

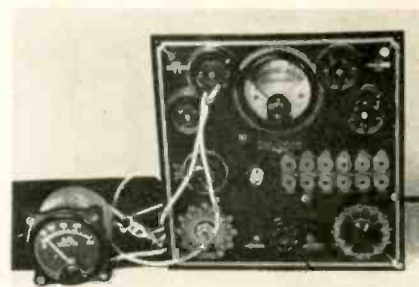
V Chassis Shortcut

Here is a speedy way to work on Crosley Super V's or other similar vertical chassis when you do not have a bench monitor. Some of the stages are very hard to get at since the picture tube is in the way.

Simply disconnect the crt and put it aside temporarily. Then unfasten the two bolts that hold the yoke in place, remove the yoke, reverse it, and replace it with the bolts. Now you only have to re-install the picture tube from the opposite end. The crt socket will reach around and can be connected. A 2nd-anode extension lead and adjustment of the ion trap are all that are needed. You will then have the whole chassis in front of you with no obstructions. The entire cycle can be completed in a few minutes.—*Dick Worrell, Bowen, Illinois.*

Voltages from Old Tester

Tube testers that may be obsolete for checking modern tubes are still worth keeping around the shop. A low voltage of some odd value is often required, as for testing an instrument over a range of scales. The



Outdated tube checker as low-voltage supply.

obsolete tester can supply a considerable range of such voltages by merely attaching test leads to the filament terminals of one of the sockets, as shown, and adjusting the instrument for the proper value.—*H. Leeper, Canton, Ohio.*

Simple Fuse Check

On many models of TV receivers made during the past few years, particularly some by Motorola, both the high-voltage fuse and the h-v rectifier are located under the chassis, thus making a check of these parts difficult without removal of the set from its cabinet. To overcome this obstacle, I take a capacitor of 0.1 mfd or larger, rated at 600 volts, and contact the positive lead to the cap of the horizontal output tube. The other lead is touched to the chassis. If there is a charge spark, the fuse is good. If there is no spark, the fuse is bad or there is no B-plus for some other reason. In any case, the set will then have to be pulled. Be careful not to use a capacitor too large in value. If you do, the surge current may blow out a perfectly good fuse.—*J. Lee Elmore, Cambridge, Massachusetts.*

SHOP HINTS WANTED

TECHNICIAN will pay \$5 for acceptable shop hints. Unacceptable items will be returned. Send your hints to "Shop Hints" Editor, TECHNICIAN, Caldwell-Clements, Inc., 480 Lexington Ave., N. Y. 17, N. Y.

TRENDS IN HIGH-FIDELITY

Transistorized Hi-Fi

The newest line of RCA packaged high fidelity home systems employs a transistor in the phono preamplifier-equalizer stage. The phono pickups used in the 6-HF line are of the moving coil type, and have extremely low output impedance. To match the high-impedance input of most equalizer-preamplifier stages, a transformer of high quality is normally used. This component, which must operate linearly across the audio range, is generally quite expensive.

In the RCA circuit, output leads from the low-impedance pickup are fed directly to the low-impedance input of a 2N104 transistor. This arrangement not only eliminates the expense of the transformer and whatever distortion it may introduce, but also skirts the problem of

dealing with hum that usually enters through the filaments of low-level preamp stages. The equalizer selector switch, in this circuit, immediately follows the amplified transistor output.

Hi-Fi Notes

Records: Industry wise men are forecasting the death of the 10-in. long-playing disc. The trend, in evidence earlier, is believed to be hastened by sales involving drastic price slashes on the smaller micro-groove records by three large manufacturers, Columbia, Mercury, and London. Among the major disc manufacturers, two are reported about to discontinue production on the 10-inchers altogether, while another has cut back its output sharply.

Tape: The trend to pre-recorded

tape, competitive with long-playing discs, continues. At least two more deals have been consummated whereby producers of these reels have acquired rights to tape all or part of the catalogs of disc manufacturers. Jazz and pop music is also finding its way into the pre-recorded tape medium, indicating a bid for a wider market than that represented by long-hair music lovers.

Packaged Hi-Fi: Even among manufacturers of separate-unit audio equipment for individual assembly, there appears to be a trend toward consolidated combination units. Evidence is the increasing number of AM-FM tuner-preamplifier-amplifier units combined on a single chassis. Only additional equipment needed for these is a record reproducer, speaker or speaker system, and cabinets.

PUT YOUR THINKING CAPS ON!

BIG CONTEST COMING NEXT MONTH

Valuable prizes for the most useful suggestions answering the question: "What features do you want to see designed into an all-around portable multi-tester for TV servicing?"

Start making notes of your ideas now. Watch for detailed contest requirements in the September 1955 issue of **TECHNICIAN & Circuit Digests**.

Contest entrants will be under no obligation.

Predicting Tube Failure

Failure Prediction for electron tubes is the key to safe and acceptable use of electronic equipment, reports a top engineer in the field. Ruggedizing is very desirable, he says, but no matter how much operating life is extended, eventually you run into the problem of trying to find out when it will fail. So far, an effective means of determining this has not been available, although considerable research is now in progress. The alternatives have, for the most part, been early tube replacement in preventative maintenance — which can be quite wasteful — or operation under a cloud of uncertainty. Because of this, in some cases electronic controls for submarines and other applications have been re-

placed by mechanical devices. According to work being carried out by the CAA and other organizations, it is believed that the rate of decrease of g_m during use is a prime indication of impending failure. That is, the faster g_m decreases for a given tube the greater is the likelihood of failure, even though its absolute value may be higher than that of a comparable tube. Of course, this must be considered with regard to plate voltage and other circuit requirements. Additional factors such as increased filament resistance caused by "necking down" of the wire are also indicators. What is needed now is further statistical investigation to all pertinent data, but it appears that critically important criteria for failure prediction are forthcoming.

Lossproof Radio Golf Ball



The magic golf ball reported here last month contains a tiny transistorized transmitter. In left background is pocket receiver that keeps track of ball. In lower center is mid-gut transmitter that is built into golf ball, right. The gadget, not intended for commercial production, was built by Motorola to demonstrate possibilities of miniature, shock-proof designs employing transistors.

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Difficult Service Jobs Described by Readers

Out-of-Phase Vert. Sync

This Crosley 9-403 would start rolling vertically after two or three hours. Then the picture could be locked in again with the hold control, but it would hold shifted slightly out of sync and was very touchy. Any change in contrast of the picture would start the roll again. Checks of voltages and resistance around the set, especially in the sync and vertical sections, showed nothing abnormal, as was expected, since the trouble only showed up when the set was hot.

A quick check of waveforms in the vertical circuit, under both hot and cold conditions, showed a lack of sufficient sync when the set was hot. The signal at the input to the vertical integrator (point X), which displayed a properly positive pulse (see the illustration) when the set was cold, became a positive pulse with a trailing negative pulse when the hot condition was reached, as shown. Apparently the set was then being locked by the trailing negative portion of the wave after warm-up, accounting for the phase difference.

The next step was to find out what caused the change in the sync pulse

to produce the appearance of a double condenser charge of narrow time. Checks of the sync circuits, hot and cold, showed a marked difference in the composite video waveform at the grid input of the 1st sync amplifier. When cold, the waveform appeared normally on a rather flat baseline. After warmup, the composite waveform at the 1st grid of the 6SN7 appeared notched or tilted. A similar hot-and-cold check was made at the plate of the video amplifier (other side of the 0.05 coupler). Since no change could be observed, it was concluded that everything was satisfactory to this point, as suspected anyhow by the fact that the set at all times reproduced a good picture.

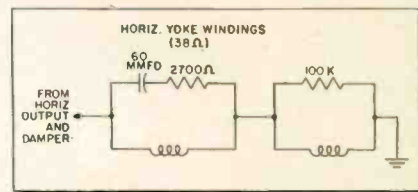
Changing the coupler between the video amplifier and the 1st sync stage cleared the trouble. Apparently this condenser, when hot, was partially open, changing the time constant of the circuit.—C. R. Maduell, Jr., New Orleans, Louisiana.

Yoke Loads H-V

I was called on to repair a Motorola TS-118B that had normal sound but no raster. When the high-voltage

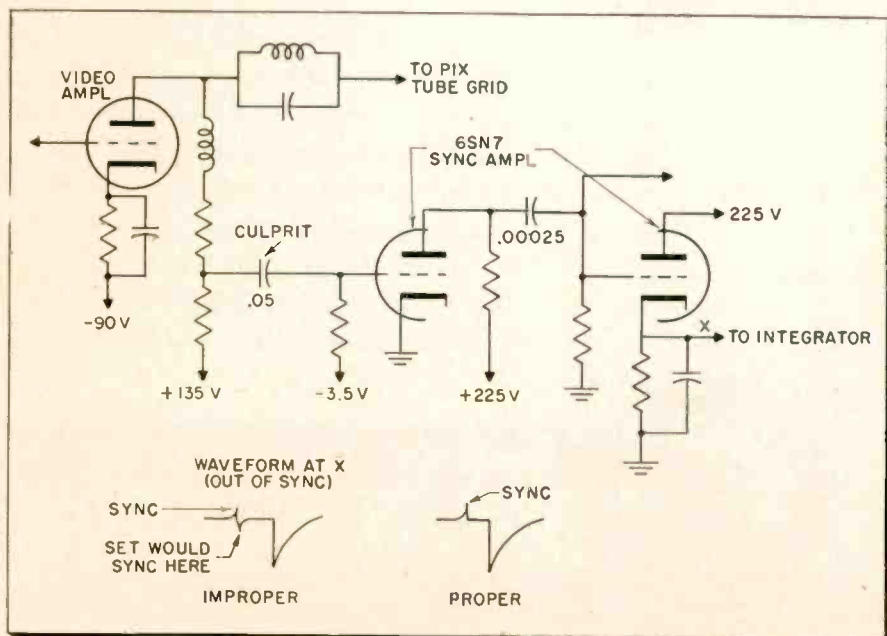
lead was pulled off and held close to the chassis, only a feeble spark was available. Horizontal oscillator, output, h-v rectifier and damper tubes were found to be generally normal. There was no boost voltage, but filament and plate voltages throughout the set were otherwise in order. The four tubes mentioned were replaced anyhow, without resultant improvement.

A scope check showed only 50 volts drive on the grid of the output tube (6BQ6) instead of the required



Drop in value of the 100k resistor loaded h. output, slashed h-v, and thus killed raster.

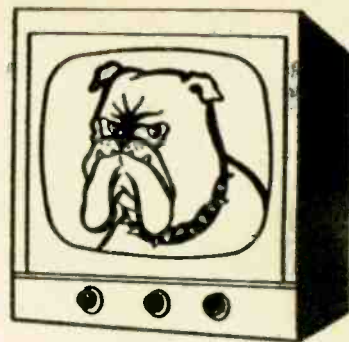
A bad coupler in this circuit changed a time constant, distorting vertical sync pulses.

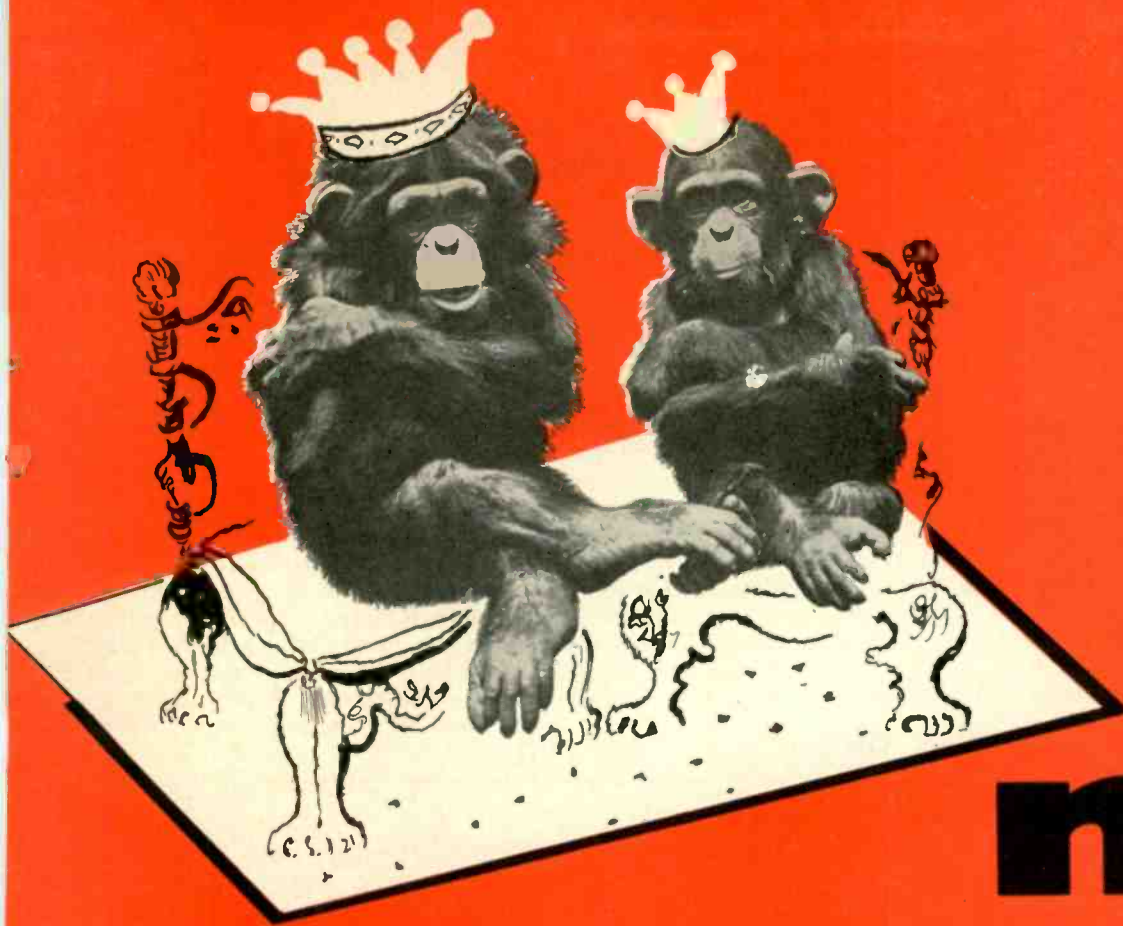


100, but this would be a natural result of the loss of boost voltage. The trouble seemed almost certainly to be in the output circuit, but a careful check of every component revealed no fault. I tried a replacement horizontal output transformer, but there was still no high voltage.

A dc resistance check of the yoke (see the illustration) had shown it to be within specification. The schematic shows a resistor and condenser in series across one half of the horizontal winding, with a resistor across the other half. The focus coil and yoke cover were removed so the yoke itself could be examined. The resistor-condenser combination across one half checked okay. However, the 100k resistor across the other half appeared slightly discolored. One end of this component was unsoldered; its resistance was measured at 900 ohms.

With a new resistor placed in the yoke and the focus coil put back in place, the set was turned on. As Mr. G. Gobel would say, "Well, here you are, and there's the picture."—Sam Miller, Philadelphia, Penna.





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Your Trouble Scorecard

Statistical study shows relative importance of servicing industry problems. "Troublemeter" allows you to rate yourself

INDUSTRY SURVEY

Before solutions to problems in the servicing industry can be worked out, it is necessary to know exactly which problems are causing the most trouble. As part of TECHNICIAN'S continuing series of industry studies, the editors sent out 4000 inquiries across the country to readers such as yourself. The ques-

tion asked was: "What basic problems do you encounter locally which prevent you from making an adequate profit?"

To speed the results to you, the first 430 replies received—a more than adequate cross section—were scientifically tabulated and analyzed. The results are listed in the order of frequency of complaint. The 39 most important problems listed on the "scorecard" are those noted in more

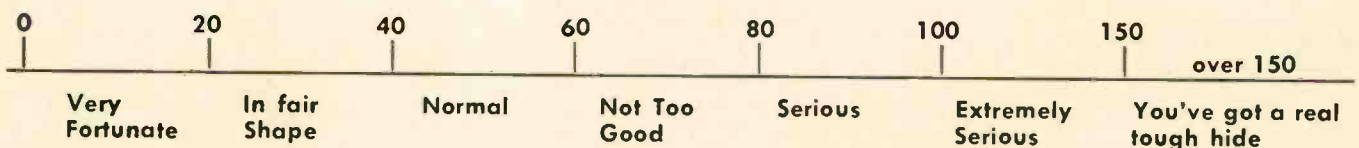
than one complaint. Elsewhere, 24 problems which were noted by only one complaint are listed. Naturally, some of the problems are closely related, but since technicians themselves preferred to point them out separately, they have not been lumped together.

The results of this investigation serve a most useful purpose. They provide us with the target at which (Continued on page 35)

YOUR TROUBLE SCORECARD

No. of Complaints	Nature of Trouble	Mod-erate	Serious	Very Serious	No. of Complaints	Nature of Trouble	Mod-erate	Serious	Very Serious
199	Unfair servicing practices, including cut throat pricing and bait ads				6	Poor TV signal in area			
127	Distributors selling wholesale to public				6	High wholesale prices			
48	Need for customer education				5	Manufacturers' own service groups			
31	Slow bill collection, credit problems				5	Inability of techs to organize			
29	Discount-house operation				5	Difficulty in getting retail price for parts			
25	Price complaints from customers				5	Fix-it-yourself books			
21	Call-backs				4	Low income			
20	Low-price and cut-price TV sets				4	Too much competition			
17	Poorly trained technicians, inadequate supply of good technicians				3	Having to pull chassis			
14	Poor quality of TV set designs				3	Lack of cooperation from manufacturers			
12	TV being sold in all kinds of stores				3	Parts guarantees too long			
11	Poor quality parts and tubes				3	Misleading ad claims by manufacturers			
11	Manufacturers selling at cut price to own employees, federal employees				3	Need to stock many parts			
10	Mail order sales to public				3	Manufacturer technical literature not available, too late, or inadequate			
8	Difficulty in locating set troubles				3	Slow mfr. replacement for distributors			
6	Little consumer money available				2	Bargain shoppers			
6	Low profit-margin				2	High cost of labor			
					2	High cost of advertising			
					2	High freight rates			
					2	High federal income tax			
					2	Dealers giving free service			
					2	High car delivery expenses			
						Column sub-totals	x1	x3	x10
						Grand Total points			

TROUBLEMETER RATING

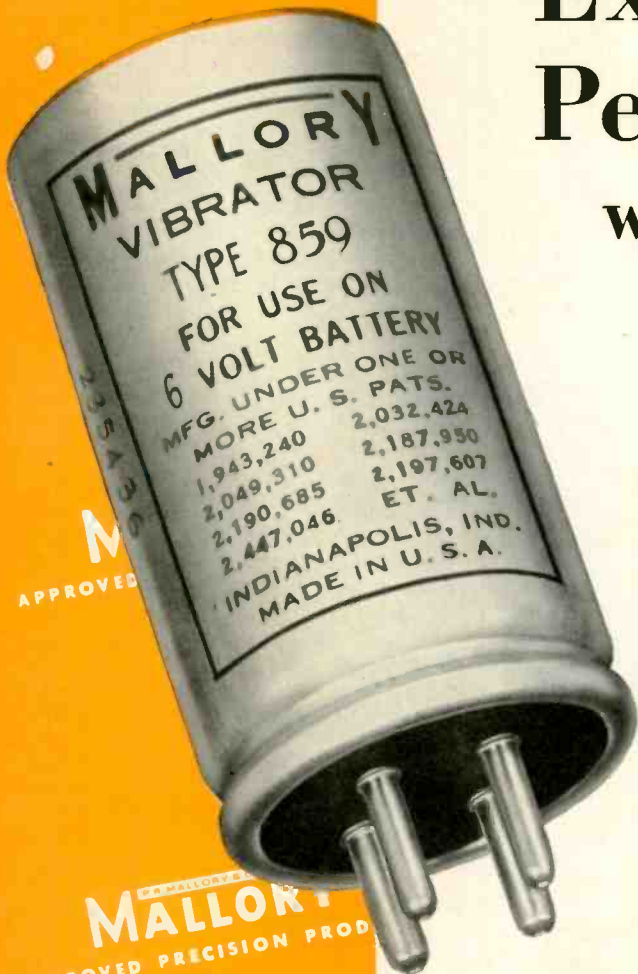


MALLORY
APPROVED PRECISION PRODUCTS

MALLORY
APPROVED PRECISION PRODUCTS

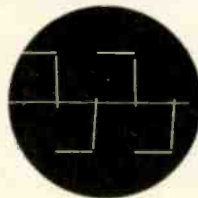
MALLORY
APPROVED PRECISION PRODUCTS

Extra Vibrator Performance... without Extra Cost

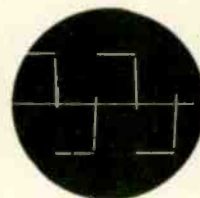


IN THE MALLORY 25th ANNIVERSARY VIBRATOR,* mechanical hum has been squelched right at its source. In any mounting position . . . prongs up, side-wise, or prongs down . . . this is the quietest vibrator ever. And it costs no more than the previous Mallory vibrators which it replaces!

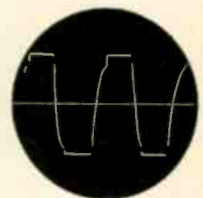
TOP ELECTRICAL PERFORMANCE—for hundreds of hours. These test oscillograms show how Mallory vibrators are adjusted to excellent wave form, and continue to produce this performance for hundreds of hours. Note that even after long service, the 'scope shows complete freedom from hash, off-frequencies or variations in amplitude . . . no evidence of contact chatter or bounce.



Ideal vibrator wave form



New Mallory vibrator



Mallory vibrator after hundreds of hours of service

In every respect, the new Mallory vibrators live up to the reputation for long, dependable service which has made Mallory vibrators the leading choice of servicemen and manufacturers.

Your Mallory distributor carries the new models, with part numbers identical with those you've been using. Call him soon . . . and order your supply of the quietest vibrators you've ever used.

**Patent Applied For*

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Hi-Fi and Audio Gear

Fairchild HI-FI

Model 235 high fidelity audio input transformer designed for use with the Fairchild Series 220 Moving Coil Cartridge is recommended with amplifier systems where extra gain is desired. Each transformer has a built-in phono jack and a 30-inch lead with phono plug to feed the preamplifier. No wiring is required. Also announced is the Model 260 fifty watt amplifier selling for \$149.50, styled by Raymond Loewy. Fairchild Recording Equipment Co., 154 St. & 7 Ave., Whitestone, N.Y.—TECHNICIAN (Ask for No. 8-7)



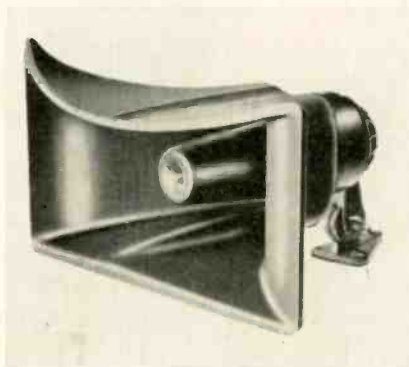
EV MICROPHONE

Model 664 Variable D Cardioid Dynamic Microphone for public address and recording has uniform response from 60 to 13,000 cps. Output level -55db. 150-ohm and high impedance. Alnico V and Armco magnetic iron in non-welded circuit. Swivel permits aiming directly at sound source for most effective pick-up. 5/8"-27 thread. On-Off switch. 18-ft. cable with MC4M connector. Size 1 7/8 in. diam. 7 1/16 in. long not including stud. List price is \$79.50. Electro-Voice, Inc., Buchanan, Mich.—TECHNICIAN (Ask for No. 8-3)



University SPEAKERS

Models CIB and CMIL both feature a reflexed "cobra" air column for wide angle horizontal dispersion of sound. The CIB is rated at 12 watts continuous duty with a response of 300 to 13,000 cps. Horizontal dispersion of sound is 120°, vertical dispersion 60°. It measures 7 3/8" high x 14" wide x 12" deep. Model CMIL, of similar construction, is rated at 3 watts, response from 400 to 13,000 cps. Dept. NR-1, University Loudspeakers, Inc., 80 South Kensico Ave., White Plains, N.Y.—TECHNICIAN (Ask for No. 8-2)



RMS INTERCOM

The "Double Talk" is molded in a bakelite cabinet which houses in the master unit a 4" Alnico speaker, 3 tubes, a handy on-off and volume control switch. Another feature is its adaptability to a 3rd remote station. When using the additional remote station, a push button Selector Switch and 50 feet of 3-wire cable are provided. List prices are: Model DT-100, \$29.95; IDT-100, \$32.45; RDT-100 remote, \$9.95. Radio Merchandise Sls. Inc., 2016 Bronxdale Ave., New York, N.Y.—TECHNICIAN (Ask for No. 8-1)



Presto TURNTABLE

A new three-speed, high-fidelity turntable is called the "Pirouette." This was the name chosen from entries submitted in the firm's contest. Originally designated as the T-18, the new turntable replaces the T-15. It is a three-speed unit with a 12-in. diameter cast-aluminum turntable, and carries a 45-rpm adapter disc, permanently attached to the turntable spindle, which retracts under the surface of the turntable when not in use. The "Pirouette" is equipped with either a standard four-pole shaded induction motor or a hysteresis-wound, synchronous motor. List price of the standard turntable is \$53.50; model with hysteresis synchronous motor is \$108.00. Presto Recording Corp., P.O. Box 500, Paramus, N.J.—TECHNICIAN (Ask for No. 8-5)

SR TUNER

An AM-FM tuner, model 707, offers the following FM characteristics: distortion, 0.5% at 100% modulation, 190 kc overall i-f response, 20 to 20,000 cps audio response, ± 1 db, and hum 75 db below 1 volt out. Phono and tape recorder provisions. SR-707 price is \$167. Also announced is a 14-watt amplifier, SR-14B, selling for \$59.50, with harmonic distortion 0.2% at 10 watts, hum 86 db below rated output. Sargent-Rayment Co., 1401 Middle Harbor Rd., Oakland 20, Calif.—TECHNICIAN (Ask for No. 8-6)

GE ENCLOSURE

An eight-inch speaker enclosure Model A1-411, in mahogany, has a suggested reseller's price of \$33.25; A1-412, in blond wood, \$35.50; Model A1-413, in cherry, \$33.25; and Model A1-414, which is unfinished, \$31.00. It is 1.2 cubic feet in volume, 26-in. in length, 11 in. deep and 10 in. high, and is of the "distributed port" design with half-inch acoustic lining. The speaker opening is concealed behind a Lumite cloth grill covering one entire side of the enclosure. General Electric Co., Syracuse, N.Y.—TECHNICIAN (Ask for No. 8-8)

National AM-FM TUNER

New AM-FM tuner offers calibrated AM-FM logging scales, "lock-in" tuning and binaural or simultaneous AM-FM tuning. The tuner's 8 capture ratio makes sensitivity usable for fringe area reception by rejecting all interfering signals up to 80% as strong as the desired signal. National Company, Inc., 61 Sherman St., Malden, Mass.—TECHNICIAN (Ask for No. 8-65)

For more technical information on new products, use inquiry card on page 34

Letters to the Editors

(Continued from page 8)

Color TV

EDITORS, TECHNICIAN:

In connection with your article in the June 1955 issue of **TECHNICIAN**, I would appreciate receiving information regarding color service potentialities.

JERRY J. DOLANSKY
JERRY'S SERVICE SHOP

Chicago, Ill.

EDITORS, TECHNICIAN:

I hope to get started in color as soon as possible.

MICHAEL TYRPAK
TELEVISION TECHNICIAN

Detroit, Mich.

EDITORS, TECHNICIAN:

I would like to get started in color television.

PAUL E. GEIGER
PAUL'S RADIO SERVICE

Ventnor City, N. J.

EDITORS, TECHNICIAN:

I was not very much impressed by your arguments in favor of getting started in color TV now. Being one of the first television service companies to "get started in TV" in my area, my company and several friends who have (or had) companies of their own did just what you recommended—purchased \$2000 to \$4000 of test instruments, television sets, and the like in order to be the first to render service in the new medium. All well and good, but where does it get us now? Will spending some \$2000 to get into color insure me that no one else can repair color TV sets unless they too spend as much on equipment? Will I be spending \$2000 only to have someone who only knows how to change tubes compete with me after spending only \$0.25 or so for a "do it yourself" book? Manufacturers say No. But they also said NO to the very same questions when black and white TV came into being.

C. R. MADUELL, JR.
DELTA ELECTRONICS, INC.

New Orleans, La.

EDITORS, TECHNICIAN:

Something must be done to get some color sets into the homes. I am planning to buy the additional Test Equipment to set up and service color sets.

HAROLD W. PITCHER
RADIO & TV SERVICE

Eaton Rapids, Mich.

EDITORS, TECHNICIAN:

I wish to invest in a color TV receiver for servicing purposes.

WILLIAM J. KALOWSKY
SERVICEMAN

Jersey City, N.J.

(Continued on page 41)

TRY ONE FREE!



Forget claims and counterclaims. When it comes to picking the **BEST** molded plastic tubular, there's only one sure way—your own tests. That's why Aerovox offers you a free DURANITE.* You be the judge and jury.

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DISTRIBUTOR SALES
DIVISION

NEW BEDFORD, MASS.

FILL OUT AND PRESENT THIS COUPON
TO YOUR LOCAL AEROVOX DISTRIBUTOR . . .

I'm trying a DURANITE for myself . . .

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FIRM _____

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CITY _____ STATE _____

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women
YOUR CUSTOMERS
IF YOU WANT
TO MAKE YOUR
BUSINESS GROW

It's a woman you have to please in 76.9% of your service calls.

You'll please more women when you use tubes with the Good Housekeeping Guaranty Seal . . . CBS tubes.



CBS tubes are advertised and merchandized to millions of women in national magazines . . . and on Arthur Godfrey's Talent Scouts over both CBS Radio and CBS Television networks.

More and more women will have greater confidence in you and your service when you use tubes with the Good Housekeeping Seal . . . tubes with the respected name — CBS.

*Ask your distributor for
CBS tubes*



CBS-HYTRON

Danvers, Massachusetts

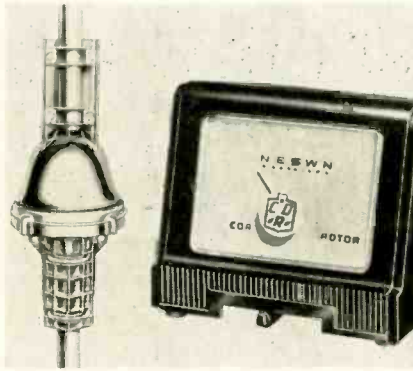
A DIVISION OF

COLUMBIA BROADCASTING SYSTEM, INC.

New Antennas & Accessories

Radiart ANTENNA ROTORS

A new cabinet has been added to the line of CDR Rotors for the model TR-4. This new meter cabinet has accurate directional indication, covering all points of the compass. TR-4 uses 4-wire cable and is a meter control dial cabinet version of the TR-2. Other features include a heavy load capacity of as much as 150 pounds; weatherproof design; 12 heavy duty ball bearings; and reversible clamps that handle $\frac{7}{8}$ " to 2" masts. The Radiart Corp. (a Cornell-Dubilier subsidiary), 3455 Vega Ave., Cleveland 13, O.—TECHNICIAN (Ask for No. 8-34)



Photocircuits COUPLER

Printed circuit two-set coupler using "wound" sections of pure copper ribbon wire on a Fiberglas support are connected to match 300 ohm signal input. The coupler permits operation of two TV sets, or one TV set and one FM radio, from a single antenna. Simple to install, the coupler may be located anywhere in the house. Photocircuits Corp., Glen Cove, N.Y.—TECHNICIAN (Ask for No. 8-54)

Delco AUTO ANTENNAS

New line of auto aerials includes four new and improved models, which include a new universal top mount aerial for one man installation on cowl or fender; a new modern streamlined aerial with wind-stream top mount; a new rugged aerial designed for side cowl mount for truck application or older aerial replacement; and a new dual rear mount aerial for installation on rear fenders or rear deck. Delco, United Motors Service, Division of General Motors, GM Bldg., Detroit 2, Mich.—TECHNICIAN (Ask for No. 8-51)

Telco "GLOBE-TENNA"

"Globe-Tenna" is the name of a new indoor UHF-VHF television antenna with a handsome 12" globe incorporating a built-in antenna. It features an authentic full color map, has a bright brass base, and rotates to any position. Lead-in has a three-way quick clamp for easy connection to all TV sets. "Globe-Tenna" (Catalog No. A-9265) has a list price of \$19.95. Telco Electronics Mfg. Co. (Division of General Cement Mfg. Co.), 919 Taylor Ave., Rockford, Ill.—TECHNICIAN (Ask for No. 8-33)

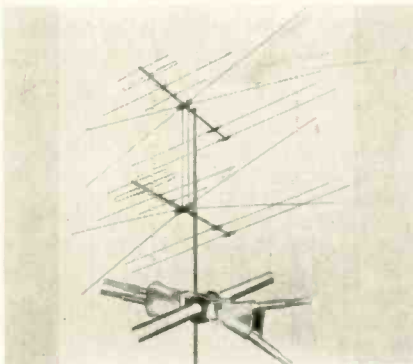


Tele-Matic FILTER

Hi-Pass Filter, Model No. WT-300A is a three section filter designed to improve TV reception in areas affected by various forms of interference below 54mc. The filter has better than 40db. attenuation at 43 mc., is a balanced 300 ohm unit, consisting of six precision inductances and eight capacitors. Each half of the line is internally isolated and shielded to eliminate inter-filter coupling. It lists for \$3.50. Tele-Matic Industries, Inc., 16 Howard Ave., Brooklyn 21, N.Y.—TECHNICIAN (Ask for No. 8-53)

Channel Master YAGI

A new conical yagi, Model 321-A, features a conical head that speeds assembly and nests the elements. Also announced is a lower-priced version of the same antenna, the "Maverick" conical yagi. The single-bay conical yagi, Model 321-A, lists at \$12.64. The 2-bay conical yagi, Model 321-A-2, lists at \$25.97. The single bay "Maverick," model 346, lists at \$9.44, and the 2-bay antenna, Model 346-2, lists at \$19.58. Channel Master Corp., Napanoch Rd., Ellenville, N.Y.—TECHNICIAN (Ask for No. 8-35)



Transvision MASTER AMPS

Line of low cost TV broadband amplifiers for TV master antenna systems has eight different types, all similar in appearance but each designed to handle particular problems encountered in installing master systems in communities and buildings. Special features include built in "Cable Loss Equalizers" for repeater amplifiers, "Dual Outputs" for systems requiring more than one main line, and choice of low band only, high band only or low band—high band amplifiers. VHF models available range in price from \$69 to \$129. Transvision, Inc., 460 North Ave., New Rochelle, N.Y.—TECHNICIAN (Ask for No. 8-38)



Alliance ROTATORS

Two new "Tenna-Rotors"—Model T-12 (formerly T-10) and Deluxe automatic Model U-98 (formerly U-83), have important design changes. Some of the engineering and design changes cited are more perfect synchronization and alignment, faster rotation without swinging or drifting, and quieter operation. The rotator mechanism is stronger, has more torque connecting linkages, has less play. Self-wiping contacts eliminate arcing. Alliance Mfg. Co., 100 Lake Pk. Blvd., Alliance, Ohio—TECHNICIAN (Ask for No. 8-56)

For more technical information on new products, use inquiry card on page 34

Latest Test Equipment

TeleTest CAPACITY TESTER

The "CapaciTester" will indicate the presence of leakage in coupling condensers without the need for disconnecting either end of the condenser from its circuit. It may also be used to detect leakage between transformer



windings or between any two points where leakage may develop. A high accuracy Wien bridge is included for the measurement of capacity from 10 mmf to 50 mf. Dealer net is \$44.95. TeleTest Instrument Corp., 31-01 Linden Pl., Flushing, N.Y.—TECHNICIAN (Ask for No. 8-16)

EICO GEIGER COUNTER

Geiger Counter #803 is a sensitive instrument able to detect ore with as little as 0.01% uranium (.05 milliroentgens per hour). In an all-electronic, low-drain, battery-operated circuit, it is very easy to use and indicates simultaneously by flashing neon lamp and headphone clicks—making possible operation while you stroll, hike, fish or boat. Kit price is \$19.95, wired, \$29.95. Sensitivity of the 900V geiger tube is 2000 counts/minute/milliroentgen/hour. Tube life is 500 million to 1 billion counts. Electronic Instrument Co., Inc., 84 Withers St., Brooklyn 11, N.Y.—TECHNICIAN (Ask for No. 8-21)

Authorized TEST SPEAKER

Model #401 "Unispeak" universal test speaker offers a socket providing speedy connections for most sets. An adaptor cable is made up, and plugs into the speaker and/or the set. This feature eliminates the need for pulling



a speaker. Single ended or push-pull out transformer circuits are accommodated, as well as direct voice coils. The unit includes a choke and variable bleeder for matching electro dynamic speakers. It is priced at \$24.95. Authorized Mfg. Co., 919 Wyckoff Ave., Brooklyn 27, N.Y.—TECHNICIAN (Ask for No. 8-18)

Phaotron PANEL METER

A 4½" panel meter is available in four types, all of which are housed in magnetically shielded "unbreakable" metal cases with large scales (readable from eight to ten feet) and front zero adjustments. 2% accuracy is insured. Types are: Custom Chrome Meter with rectangular black die cast bezel; Custom Chrome Illuminated with 5000 hour self-contained lamps; 4½" Custom; 4½" Custom Illuminated. Phaotron Co., 151 Pasadena Ave., South Pasadena, Calif.—TECHNICIAN (Ask for No. 8-22)

Precise VTVM

Vacuum tube voltmeter Model 9071, selling in kit form at \$35.95 and factory wired at \$49.95, features a 7½ in. meter. The unit has a new type VR tube assuring stable readings. Model 9071 has a separate 5V ac scale; a 25



MEG input on dc; and true zero center. The unit is housed in a sturdy steel case, 11x8x5 in. The VTVM weighs 11 lbs. and comes with a 3-color "step by step" construction book. Precise Development Corp., Oceanside, L.I., N.Y.—TECHNICIAN (Ask for No. 8-17)

RCA OSCILLOSCOPE

Oscilloscope (WO-91A) for testing black-and-white as well as color TV has a dual-band response, with a 4.5 mc response in the wide-band position. The vertical amplifier has a voltage-calibrated, frequency-compensated 3-to-1 step attenuator. Among other features of the 5 inch WO-91A are: Built-in calibration for peak-to-peak voltage measurements; vertical polarity reversal switch for "upright" or "inverted" trace display; sturdy one-piece probe with built-in switch for low capacitance or "direct" operation; pre-set "vertical" and "horizontal" sweep positions for TV trouble shooting; "plus-or-minus" internal sync-selector. RCA Tube Div., Radio Corp. of America, Harrison, N.J.—TECHNICIAN (Ask for No. 8-20)

Anchor "REACTO-TESTER"

Combination picture tube reactivator-tester tests for open connections, open elements, shorted elements, cathode emission and gaseous tube. The "Reacto-tester" Model T-400 also repairs certain open elements and shorts, and reactivates low emission. Price is \$39.95. Anchor Products Co., 2712 W. Montrose Ave., Chicago 18, Ill.—TECHNICIAN (Ask for No. 8-19)

More New Products on p. 36-38

FOR MORE TECHNICAL INFORMATION ON NEW PRODUCTS OR BULLETINS

use this convenient coupon. Enter below the reference numbers for all items desired.

New Products Editor
TECHNICIAN & Circuit Digests
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New York 17, N. Y.

Please send me more information on the following items:

.....
My company letterhead or business card is enclosed.

Name

Firm My position

Address

City State

Business address (if different from above)

Your Trouble Scoreboard

(Continued from page 28)

TECHNICIAN editors can most effectively direct their efforts to improve servicing conditions. (See "Two-Fisted Action—Here's How," in the May 1945 issue.)

Rate Yourself

In conjunction with this report, which lets you see if your problems are the same as those most commonly encountered by fellow techs, the opportunity for a numerical rating system presented itself. Evaluating your own conditions on the "Troublemeter" should give a rough idea of how bad or how well off you are—and provide some fun in the process.

Secondary Problems (Each noted by one complaint)

- No local set distributors
- Too many TV models
- Non-standard pricing
- Distributors loading dealers
- Discounts through unions
- Slow set pick-up
- Slow manufacturer deliveries
- High cost of equipment
- Keeping shop records
- Poor technician public relations
- Lost time
- Picture tube insurance
- Drug store tube tests
- Tubes going out of warranty
- Poor technician recognition
- Preference to large dealers
- Running one-man shop
- Finding right part for job
- High inventories
- Express charges
- Demand for immediate service
- Information seekers
- High insurance rates
- High overhead

Next to each of the 39 problems on the scorecard are three spaces marked Moderate, Serious, and Very Serious. These refer to the "intensity" with which a particular problem affects you. Put a check mark in the appropriate box. Then total the number you've checked in each column, if any. Next, multiply the "Moderate" total by 1 point, the "Serious" total by 3 points, and the "Very Serious" by 10 points. Add up all the points and check your grand total on the "Troublemeter" at the bottom of the page.

The editors would be interested to learn how you make out. If you send in your score, together with your name and address, we'll publish as many as space permits.

STANDARD BRAND TUBES AT SENSIBLE PRICES

Only the 5 Top-Quality Brands Shipped

- Individually boxed.
- Only 1st quality.
- Latest Dating.
- Standard RTMA Guarantee.
- No private label, electrical or mechanical rejects.
- No rebrands or rewashed "bargains."

Write for Free 1955 New Air-Mail Handy-Order Blank.

- Lists ALL Popular TV & Radio Types.
- Makes Mail-Order a Pleasure.
- All Tube Orders Over \$25.00 (with full remittance) Postpaid in U. S. A. Overnight Shipment.

Tube Type	Unit Price	Tube Type	Unit Price	Tube Type	Unit Price	Tube Type	Unit Price	Tube Type	Unit Price	Tube Type	Unit Price
0A2	.85	3S4	.80	6AS7G	3.75	6L6GA	1.30	7N7	.95	1486	.85
0B2	.85	3V4	.85	6AS8	1.20	6L6M	1.50	7Q7	1.00	14C7	1.00
0B3/VR-90	.85			6A16	.55	6L7	1.15	7R7	1.30	14E6	1.20
0C3/VR-105	.90	4B07A	1.30	6A18	1.10	6N7	1.15	7V7	1.30	14E7	1.30
0D3/VR-150	.90	4B27	1.35	6AU4GT	1.00	6Q7	.95	7W7	1.30	14F7	1.00
0Z4	.50	5AM8	1.05	6AU5GT	1.10	6S4	.65	7X7	1.00	14F8	1.30
0Z4G	.65	5AN8	1.10	6AU6	.60	6S8GT	1.10	7Y4	.70	14H7	1.00
1A5GT	.80	5AQ5	.75	6AU7	.90	6SA7GT	.65	7Z4	.70	14H7	1.00
1A7GT	1.00	5AS8	1.10	6AV5GT	1.20	6SC7	.75			14I7	.95
1AD4	1.25	5AT8	1.10	6AV6	.55	6SF5	.75	12A4	.85	14R7	1.30
1AE4	1.00	5AY8	1.15	6AX4GT	.85	6SF7	.90	12A15	.70	14S7	1.25
1AG4	1.25	5AW4	1.15	6AX5GT	.75	6SG7	.75	12A25	.75	14W7	1.35
1AX2	1.00	5AZ4	.60	6B4G	1.25	6SH7	.80	12A76	.55	198G6G	2.00
1B3GT	.90	5J6	.90	6BA6	.65	6S7M	.70	12A77	.95	19T8	1.20
1B5GT	.75	5R4GY	1.55	6B7A	.90	6SK7GT	.65	12A78	.60	25AV5GT	1.30
1L4	.85	5T4	1.75	6BC4	1.60	6SL7GT	.80	12A79	.80	25AX4GT	1.10
1L6	1.10	5U4G	.60	6BC5	.70	6SN7GTA/B	.80	12AV6	.55	25BK5	1.00
1LA4	1.00	5U4GB	.70	6BC7	1.25	6SQ7GT	.60	12AV7	1.00	25C06GT	1.35
1LA6	1.00	5U8	1.10	6BD5	1.40	6SR7	.75	12AW6	1.00	25C06GA	1.75
1LB4	1.00	5V4G	.95	6BD6	.75	6SS7	.80	12AX4GT	.90	25C06G	1.35
1LC5	1.00	5V6GT	.70	6BE6	.70	6ST7	1.15	12AX7	.80	25C06T	.65
1LC6	1.00	5W4GT	.70	6BF5	.85	6T8	1.05	12AY7	1.75	25W4GT	.75
1LD5	1.00	5X4G	.80	6BF6	.70	6U5	.90	12AZ7	.90	25Z5	.70
1LE3	1.00	5X8	1.05	6BG6G	1.80	6U8	1.00	12B4A	.85	25Z6GT	.65
1LG5	1.00	5Y3GT	.45	6BH6	.80	6V3A	1.30	12BA6	.65	35A5	.70
1LH4	1.00	5Y4G	.65	6BH7	.70	6V6GT	.65	12BA7	.95	35B5	.70
1LW5	1.00	5Z3	.80	6BM5	.90	6V6M	1.20	12BB6	.75	35C5	.70
1M5GT	.90	5Z4	1.25	6B7A	1.10	6W4GT	.80	12BB6G	.70	35L6GT	.65
1M5GT	1.15			6BL7GT	1.15	6W6GT	.80	12BF6	.65	35L6GT	.65
1R4	1.00	6A7	1.00	6BN6	1.15	6X4	.50	12BH7A	.95	35W4	.45
1R5	.85	6A8M	1.00	6BQ6GTA	1.20	6X5GT	.50	12BK5	1.00	35Y4	.70
1S4	.90	6ARGT	1.00	6BQ7A	1.20	6X8	.95	12BQ6GT	1.40	35Z5	.45
1S5	.70	6AB4	.65	6BX7GT	1.25	6Y6G	.95	12BY7A	.95	41	.75
1T4	.80	6AB7	1.35	6BY5G	1.30			12BZ7	1.00	42	.75
1T5GT	1.05	6AC5GT	1.15	6BZ7	1.25	7A4	.80	12C06	1.40	43	.80
1U4	.75	6AC7	1.10	6C4	.50	7A5	.95	12J5GT	.70	50A5	.70
1U5	.70	6AD7G	1.45	6C5	.80	7A6	.80	12K7GT	.90	50B5	.70
1V	.95	6AF4	1.30	6CB5	4.50	7A7	.80	12K8	1.10	50C5	.70
1V2	.70	6AF6G	1.20	6CB6	.70	7A8	.80	12Q7GT	.80	50L6GT	.65
1X2B	.90	6AG5	1.10	6CB6G	1.75	7AD7	1.75	12SA7GT	.65	50K6GT	.90
2A3	1.30	6AG7	1.10	6CF6	.90	7AF7	.95	12SC7	.80	50V6GT	.80
2AF4A	1.40	6AH4GT	.85	6CG7	.85	7AG7	1.00	12SG7	.90	50W7GT	.80
2D21	1.00	6AH6V	1.00	6CL6	1.15	7AH7	1.00	12SH7	.95	70L7GT	1.55
2X2	.50	6AJ5	1.75	6CM6G	.85	7AU7	.90	12SI7	.90	80	.65
3A3	1.10	6AK5	.75	6CS6	.70	7B4	.80	12SK7GT	.65	81	1.90
3A4	.55	6AK6	.80	6C06	1.40	7B5	.70	12SL7GT	1.00	83	1.00
3A5	.75	6AL5	.60	6DC6	.95	7B6	.75	12SN7GT	.80	83V	1.00
3A5	.65	6AL7GT	1.40	6E5	.80	7B7	.80	12SO7GT	.60	117L7GT	2.50
3A5	.65	6AM4	1.55	6F5	.85	7B8	.80	12V6GT	.75	117N7GT	1.95
3A5	.65	6AM8	1.15	6FM6M	1.00	7C5	.90	12W6GT	.90	117P7GT	1.95
3A6	.70	6AN4	1.50	6FG6G	.80	7C6	.70	14A4	1.00	117Z3	.70
3AV6	.60	6AN5	3.50	6H6	.50	7C7	.85	14A5	1.50	117Z4GT	1.35
3BC5	.80	6AN8	1.20	6J4	3.95	7E7	1.20	14A7	.85	117Z6GT	1.00
3BN6	1.05	6AQ5	.70	6J5	.50	7F7	.90	14AF7	1.00	5642	1.00
3BY6	.75	6AQ6	.60	6J6	.75	7F8	1.20				
3CB6	.80	6AQ7GT	1.20	6J7	.95	7G7	1.15				
3CF6	.85	6AR5	.75	6K6GT	.60	7H7	.75				
3LF4	1.20	6AR6	2.25	6K7	.80	7J7	1.35				
3Q4	.85	6AS5	.75	6K8	1.20	7K7	1.20				
3Q5GT	1.00	6AS6	2.25	6L6G	1.15	7L7	1.15				

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You May Include Types Not Listed. We Stock Over 2,000 Types Including Diodes, Transistors, Transmitting and Special Purpose Types

TWO-COLORED TUBE CARTONS, with new Safety Partitions. Prevents Tube Breakage. This Super-Gloss Red and Black Carton is the Most Distinctive Box Available Today! Minimum: 100 any one size. Case Lot Quantity Price on Request. Boxes F.O.B., N.Y., N.Y.

SIZE	FOR TYPES SUCH AS	EACH
Miniature	(6AU6, 6AL5, etc.)	1¢
GT	(6SN7, 6W4, etc.)	1 1/4¢
LARGE GT	(1B3, 6BQ6GT, etc.)	1 1/2¢
LARGE G	(5U4G, 6BG6G, etc.)	2¢

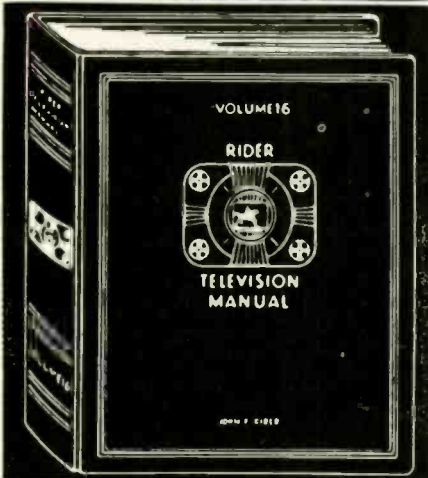
NEW! Same tube cartons as above, but in glossy white . . . Same prices apply. Specify white . . .



Terms: 25% with order, balance C.O.D. All merchandise guaranteed. F.O.B., N.Y.C.

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RIDER'S AUTO RADIO MANUAL, VOL. 1

Includes all factory-installed auto radios and custom built auto radios made between 1948 and 1955 for installation and replacement on all cars and trucks. Complete with schematics, voltages, alignment, pictorial views, dial stringing, noise suppression, tube layout, parts lists, etc.

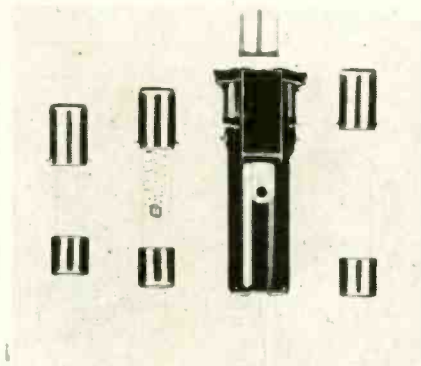
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New approach to circuit protection approved by Underwriter's Labs. eliminates the possibility of over-fusing. LC fuses are manufactured in three lengths and seven widths of bayonet locking tabs. LC fuses may not be replaced by



standard fuses. The fuse post accepts only the size amperage range and type in its range. The holder used with a 1 amp. slo blo fuse will only accept a slo blo above 3/4 to 1 1/4 amp. Littelfuse, Inc., 1865 Miner St., Des Plaines, Ill.—TECHNICIAN (Ask for No. 8-25)

CD PLUG-IN TUBULARS

"Type BC" phenolic-cased plug-in paper tubular capacitors are especially designed for use with printed circuits. They are encased in molded phenolic shells with two parallel lead wire terminals. These terminals are brought



out from the end of the capacitor through a thermo setting plastic end fill compound, and are spaced a fixed distance so that they may be plugged directly into printed circuits. Cornell-Dubilier Electric Corp., South Plainfield, N.J.—TECHNICIAN (Ask for No. 8-26)

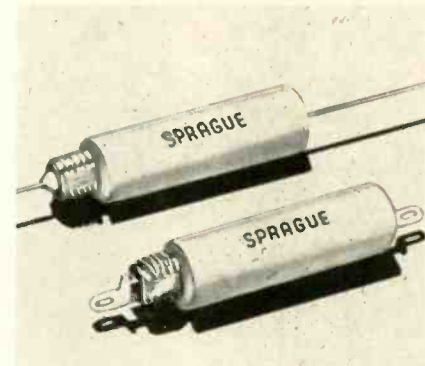
Erie DISK KITS

Each of two new capacitor kits for service technicians consists of a handy 18 section plastic storage case containing 100 High Stability Disc Ceramicons or 100 GP Tubular Ceramicons in 18 popular values. Erie Resistor Corp., Erie, Penna.—TECHNICIAN (Ask for No. 8-28)

For more technical information on new products, use inquiry card on page 34

Sprague METALLIZED CAPACITORS

Subminiature "Metal-Clad" metallized paper capacitors, provide reliability in high temperature operation. New Type 118P capacitors are rated for operation at 125°C without voltage



derating. The capacitors withstand dielectric test of twice rated voltage. Other features include self healing dielectric, complete hermetic sealing with glass-to-metal solder-seal terminals, and corrosion-resistant cases. Both standard wire leads and solder tab terminals are available. Sprague Electric Co., 65 Marshall St., North Adams, Mass.—TECHNICIAN (Ask for No. 8-24)

RCA SELENIUM RECTIFIERS

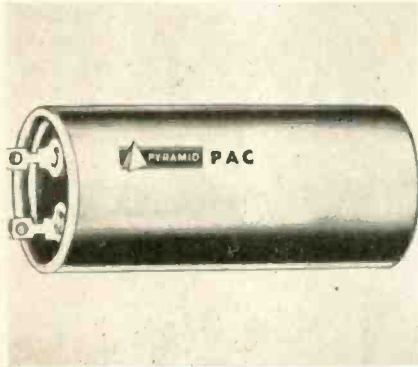
A new line of five universal-type rectifiers intended for general replacement use. They are designed to cover all current-handling requirements from 50 to 500 ma. One outstanding feature is the corrugated metal separator which is inserted between each pair of plates and then anchored firmly to a U-clamp surrounding the stack of plates, providing better heat radiation. Type designations and maximum output-current ratings of the rectifiers are: 200G1—75 ma; 201G1—150 ma; 202G1—300 ma; 203G1—400 ma, and 204G1—500 ma. RCA Tube Div., Radio Corp. of America, Harrison, N.J.—TECHNICIAN (Ask for No. 8-29)

Astron ELECTROLYTICS

New type ET subminiature electrolytic capacitor is designed for applications where space is severely limited. Outstanding features include: wide range of values, stable high-gain etch process, exceptionally low leakage current and low-resistance terminal tab connection. Type ET units are manufactured with contamination-free assembly of high purity foil, and are hermetically sealed in aluminum cases. Withstand high surge voltages, ripple current, and high temperature applications. Stable operation over a wide temperature range. Astron Corp., 255 Grant Ave., E. Newark, N. J.—TECHNICIAN (Ask for No. 8-73)

Pyramid MOTOR CAPACITORS

Electrolytic motor-starting capacitors, models PAC and PBC, are ruggedly constructed and simple to mount. Model PAC is assembled in a hermetically-sealed aluminum can, for greater protection, and has an insulating outer



cardboard sleeve. The price of the unit varies with the voltage and cycles. Mounting hardware sells for the following prices: plain end cap, \$40; end cap with grommet, about \$40 and mounting bracket, 0.60. Model PBC comes in a molded plastic case. Pyramid Electric Co., 1445 Hudson Blvd., North Bergen, N.J.—TECHNICIAN (Ask for No. 8-27)

Clarostat CONTROL KIT

A versatile assortment of wirewound controls together with an assortment of the most popular "pick-a-shaft" shafts are contained in the PD-1 Kit. It includes eight different values (500, 1000, 1500, 2000, 2500, 3000, 5000 and 10,000 ohms) of the Series A10 4-watt wirewound control; eight shafts, two each of the four most popular shaft types; and a handy mounting-nut wrench. Included is a data sheet listing TV manufacturers' part numbers with proper replacements. Clarostat Mfg. Co., Dover, N.H.—TECHNICIAN (Ask for No. 8-31)

Anchor CRT TESTER

Model T-400 "Reacto-Tester" tests picture tubes for open connections, open elements, shorts, cathode emission, and gas. Repairs open elements and corrects shorts, also reactivates low emission



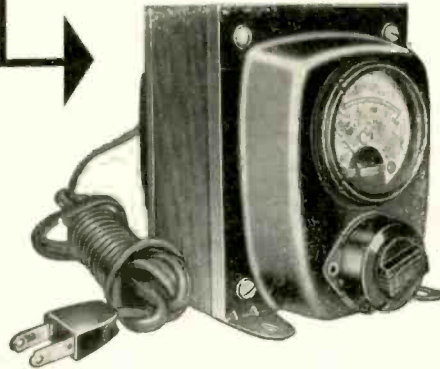
tubes. Indicator is a 4½-in. full view rectangular meter. Weight is 4½ lbs. Dimensions: 6¼ x 9½ x 4¼ in. \$39.95. Anchor Products Co., 2712 W. Montrose Ave., Chicago 18—TECHNICIAN (Ask for No. 8-97)

INADEQUATE WIRING A MAJOR PROBLEM AFFECTING TV PERFORMANCE

One of the greatest problems of the electrical industry is that of inadequate distribution and insufficient wiring. Systems that are planned to standards that existed years ago when the average residential load was only 25% or less of today's demand are inadequate to main-

tain the capacity and maintain the voltage necessary for the proper performance of all the usual appliances and equipment available in the average American home. The extreme sensitivity of a TV receiver is instantly effected in performance by a low voltage condition. This problem

CAN BE SOLVED WITH THE ACME ELECTRIC T-8394M VOLTAGE ADJUSTOR



The T-8394M Voltage Adjustor can be used by the service man to reproduce the operating condition about which the customer complains by turning tap switch to the voltage which simulates such condition. For example, customer complains that evening program pictures flicker and shrink. When service man calls next day all operation appears normal — voltage tests out properly. But, by adjusting voltage to 97 volts the condition about which the complaint was made is reproduced. This indicates low voltage condition during evening that can be corrected with a T-8394M Voltage Adjustor.

ORDER FROM YOUR JOBBER

ACME ELECTRIC CORPORATION
MAIN PLANT: 888 Water Street • Cuba, N. Y.
West Coast Engineering Laboratories: 1375 W. Jefferson Blvd. • Los Angeles, Calif.
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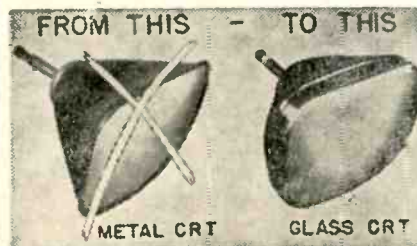
Acme Electric

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METAL-TO-GLASS

CONVERSION KIT



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ARROW MFG. DIVISION — BOX 423 — AMARILLO, TEX.

FOR
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TV SETS

- QUICK!
- EASY!
- \$5.95 List Price
- ONE MAN—
- ONE HOUR—
- IT'S DONE






3 MORE NEW

TRIAD *CORRECT REPLACEMENT

FLYBACKS

These three new flybacks are mechanically correct and electrically correct, ruggedized versions of manufacturer's items — precisely engineered by TRIAD for specific makes and models — to give exceptionally high performance and long, trouble-free service.

 <p>D-52 List Price \$7.15 *Correct Replacement for RCA 75519, 75585, 76381.</p>	 <p>D-53 List Price \$7.45 *Correct Replacement for RCA 76501, 76672.</p>	 <p>D-56 List Price \$9.50 *Correct Replacement for Airking, CBS, Silver-tone, 10104, 10107, 10108, 10110, 10126, 10135.</p>
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**COMPOSITE REPLACEMENT

Triad flybacks wherever possible are COMPOSITE items designed to provide correct electrical and mechanical characteristics for as many television chassis as possible.

Ask your distributor, or write, for Catalog TV-155K



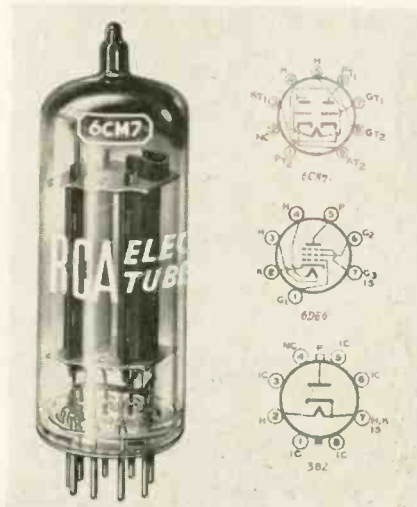
Triad *CR Transformers are listed in Sams Photofact folders and Counter-Facts.

4055 Redwood Ave. • Venice, Calif

New Tubes

RCA TUBES FOR TV

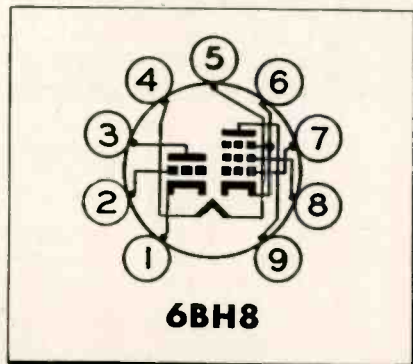
Three new tubes include the 6CM7, 6DE6 and 3B2. The 6CM7 is a medium mu dual triode for use as a vertical deflection oscillator and amplifier. Heater current is 600 ma. The two triode units in this 9-pin miniature are dissimilar, maximum plate dissipa-



tions being 1.25 and 5 watts. The 6DE6 is a sharp-cutoff, 7-pin miniature pentode for gain controlled picture i-f stages at 40 mc, and is also suited for r-f amplifiers in VHF tuners. The 3B2 is a glass-octal half-wave vacuum rectifier for high voltage TV scanning systems. RCA Tube Div., Radio Corp. of America, Harrison, N.J.—TECHNICIAN (Ask for No. 8-13)

GE TUBES

Two new 600-ma series string receiving tubes are: 6CN7, a combination duplex-diode and high-mu triode with center tapped heater, and 6BH8 sharp-cutoff pentode and medium-mu triode. The 6CN7 triode section is

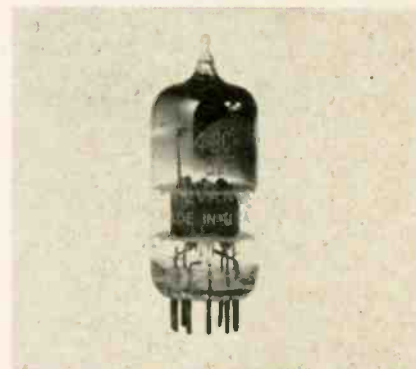


electrically identical to the triode of a 6T8, and is designed for a horizontal phase detector and reactance tube. The 6BH8 is similar to the 6AU8, but has lower amplification. Tube Dept., General Electric Co., Schenectady 5, N.Y.—TECHNICIAN (Ask for No. 8-11)

For more technical information on new products, use inquiry card on page 34

Sylvania TV TUBES

A new miniature twin triode, 4BC8, is a medium-mu, semi-remote cutoff type for AGC systems. It is intended for application as a VHF cascode amplifier in series string TV receivers. Also announced are 21-inch, all-glass electrostatic focus picture tubes for



20 kv operation. The 90° deflection 21ALP4A/B and 72° 21AUP4A/B and 21AVP4A/B meet all specs for previously registered 18 kv tubes. Sylvania Electric Products Inc., Emporium, Pa. (for 4BC8); Seneca Falls, N.Y. (for pix tubes)—TECHNICIAN (Ask for No. 8-10)

Raytheon SERIES TUBES

The 3CF6 is a heater-cathode type sharp-cutoff pentode of miniature construction designed for use in gain-controlled video i-f stages and as an r-f amplifier in VHF tuners. The 3CF6 is the "Series String" counterpart for the 6CF6, having a 600 ma heater rating. The 5V6GT is a heater-cathode type pentode designed for use as a power amplifier in ac and battery operated equipment or as a vertical deflection amplifier in TV. Raytheon Mfg. Co., Receiving and Cathode Ray Tube Operations, Newton 58, Mass.—TECHNICIAN (Ask for No. 8-14)

Wuerth "TUBE-SAVER"

Designed to extend the life of TV receiving tubes, the new "Tube-Saver" provides a thermal cushion action against damaging current surges. Comparative life tests in the laboratory show, according to mfr., deterioration of tube filament and cathode is greatly slowed by use of the Tube-Saver—to the point where mutual conductance drops are only 26.8% normal, and tube life is extended up to 7 times. Measures 5½ x 2½ x 3½ in., and mounts out of sight in back of set. Completely automatic. \$7.95. Wuerth Enterprises, 7819 Farnsworth street Philadelphia 15, Pa.—TECHNICIAN (Ask for No. 8-90)

New Products begin on p. 30

Accreditation

(Continued from page 17)

given credit for the effort. Local industry identifies them to set owners and endorses them with the aid of community schools.

An accreditation program calls for a high degree of standards. It requires that the foundation be based on industry advisory groups as promoters of the program and advisors to the school. The responsibilities of such local industry groups are outlined in the RETMA pamphlet, "Organization, Function and Operation of Industry Advisory Groups."

All schools will not be able to qualify as accreditation schools because certain minimum standards will have to be met—standards of laboratory equipment and teacher training. It will be up to the advisory group to determine what schools are qualified in this respect, to work closely with them to see that the standards are continuously maintained, and to promote the efforts of the schools in this program.

Advisory groups may only be able to work with a few of the qualified schools. However, all schools have the option to offer the RETMA course material and training program. If a school lacks the minimum standards, it should not be allowed to give the local industry accreditation to its graduates. All technicians may be accredited if they are willing to submit to and pass an accreditation examination which can only be given by accredited schools.

Suggested Standards for Accreditation

Course material must meet the industry requirements, and RETMA has made suitable material available in its three current publications for Advanced TV Servicing Techniques: an Instructor's Guide; a 200-page textbook based on the RETMA curriculum of advanced TV servicing techniques; a 46-page manual of laboratory assignment sheets to record trouble shooting procedures and test data.

Schools using the RETMA Advanced TV Servicing Techniques Course should follow the course outline. A minimum of 96 hours should be devoted to this instruction. At least 4 departmental exams should be given. These will consist of 2 theory and 2 practical tests.

There are many service technicians whose technical skills are

equal or better than the minimum accreditation standards suggested by the industry. These men also should be accredited, but without the need of taking a full or partial upgrading course. Their skills should, however, be tested so that they are known to be as technically capable as graduate students of accredited courses. Accreditation by examination can be a function only of accredited schools. RETMA has prepared a sample examination for the use or guidance of local advisory groups.

Because the examination is designed primarily to test circuit analysis and trouble shooting ability,

the technician will be tested for practical know-how. The variety of chassis and test equipment which an accredited school will have, provides a multitude of receiver test equipment combinations that will challenge the technician's basic skills.

Accreditation through examination will also have the salutary effect of (1) inducing technicians to upgrade themselves in preparation for the test, (2) revealing to technicians the need of additional technical training, and (3) developing interest in and recruiting students for an accreditation course. •



MODEL 532

- ELECTRONIC PLATE CONDUCTANCE TUBE ANALYZER
- ACCURATE VOLT-OHMMETER ● DRY BATTERY TESTER
- CONDENSER LEAKAGE TESTER
- ALL IN ONE ATTRACTIVE LUGGAGE TYPE CASE

Here's a new Chicago instrument with more useful features than you will find at anywhere near the price. You can check all receiving tubes (also picture tubes) quickly and accurately.

The Model 532 is strictly a quality instrument with a patented switching arrangement for quick set-ups to test diodes as diodes, triodes as triodes and pentodes as pentodes. It includes an illuminated roll chart, large 3-color clear plastic meter, picture tube adapter and highly attractive 2-tone Fabricoid covered case. The V.O.M. is of the same excellent accuracy for which Chicago instruments have long been noted. It has the following ranges:

A.C. Volts: 0-10/100/500/1000

D.C. Volts: 0-10/100/500/1000

Ohms: 0-5000/50,000/500,000/50 meg.

Model 532 Price Complete—

Only
\$90.00
net

Model 531 Tube and Battery Tester (not illus.) Similar to Model 532 but for tube and battery testing only. Attractive blue simulated leather covered, wood carry case. This genuine dynamic plate conductance tube analyzer is now yours at the price of an ordinary tester. Its illuminated roll chart lists all receiving tubes including the very latest types now coming on the market.

Model 531 Price Complete—

Includes Picture Tube Adapter

Only
\$70.00
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Ask your Jobber or write for complete information.

Chicago INDUSTRIAL INSTRUMENT CO.

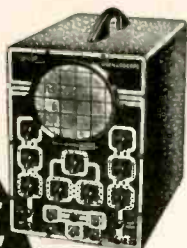
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EICO KITS are top-quality professional TV-radio-electronic test instruments—embody latest performance-proven design. Complete with all components, pre-punched chassis, deep-etched aluminum panel, rugged steel case. Easy-to-build with step-by-step instructions. Lifetime service guarantee.

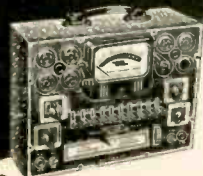


VTVM \$25.95



VOM \$12.90

Tube Tester \$34.95



See EICO's 38 Kits & 42 Wired Instruments in stock at your local jobber. Write for Catalog T-8.

Prices 5% higher on West Coast.



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News of the Industry

JACK SCHWEIGHAUSER has been appointed asst. to **DICK MORRIS**, sales mgr. of **SNYDER MFG. CO.**, Philadelphia, Penna.

RAYTHEON MFG. CO. announces two new appointments . . . **RICHARD P. AXTEN** as director of public relations and **ANN DELL'ANNO** as editor of monthly publication, "Raytheon News."

DANIEL NEWMAN has been named director of product service for **CBS-COLUMBIA** . . . **ALTON K. MARSTERS** has been appointed gen. sales mgr. of **CBS-HYTRON**.

DAN D. HALPIN has joined **WESTINGHOUSE RADIO TV DIV.** as gen. sales mgr. . . . **DuMONT TV** announces the appointment of four new field sales mgrs: **RICHARD F. O'BRION**, **ROBERT CHESHIRE**, **A. G. EVANS** and **C. J. MOLTHOP**. . . **HERBERT KUSHNER** has been named asst. mgr. of technical service for **DuMONT**.

ALBERT BENJAMINSON has been appointed chief engineer of **GRANCO PRODS. INC.**, Long Island City, N. Y.

ARTHUR L. FOSTER has been appointed sales promotion mgr. of **STROMBERG-CARLSON** sound equip. div.

HARRY A. RONAN has been named New England regional mgr. for **MOTOROLA COMMUNICATIONS & ELECTRONICS, INC.**

CHARLES GOLENPAUL has been elected chairman of the Sales Managers Club.

FRANK A. D. ANDREA, pioneer in radio and television and pres. of company which bears his name, is currently celebrating his 36th year in the field of electronics.

TACO ENLARGES PLANT



Mrs. Herbert H. Brown, wife of the pres. of Technical Appliance Corp., snips the ribbon and officially opens a new plant area being devoted to storage of TACO antennas. Left to right: H. Marsters, R. Gallinger, Mrs. Brown, H. Senkel, H. H. Brown and F. Vassallo.

DUMONT'S HI-FI



New DuMont "Sound Stage" hi-fi phonograph console, which marks DuMont's entrance into the hi-fi field. Retail for \$150.00 and has an amplifier frequency range of from 40 to 12,000 cycles. Cabinet available in mahogany, limed oak and walnut.

LESLIE HOFFMAN, pres. of **HOFFMAN ELECTRONICS CORP.**, was elected pres. of a reorganized Board of Directors of the Radio-Electronics-Television-Manufacturers Association at the conclusion of its 31st annual convention.

UNITED MOTORS SERVICE, div. of **GENERAL MOTORS**, announces an expanded line of **DELCO** automotive antennas along with a sales stand capable of holding 30 automobile antennas.

RAYTHEON MFG. CO. announces the opening of a new warehouse in Franklin Park, Ill. to take care of shipment of electronic tubes and related products to customers and dealers in the midwest.

MOTOROLA announces ground has been broken for their new one and one-half million dollar transistor manufacturing facility in Phoenix, Ariz.

KAY-TOWNES ANTENNA CO. is offering a 1956 Cadillac as 1st prize to **KAY-TOWNES** dealers and their salesmen in the Golden Harvest campaign which started June 1st and ends Nov. 30th.

ZENITH executive, **P. J. WOOD**, in a talk to member of the "TV Consumer Association," explained that "subscription TV will offer servicemen new horizons of opportunity, if not denied the public."

GENERAL ELECTRIC has introduced their new table and clock radio line, consisting of twenty-seven models with list prices ranging from \$14.95 to \$49.95.

ARTHUR E. PELTOSALO has been appointed mgr. of specialty capacitor sales for **GENERAL ELECTRIC**. . . . **CORRECTION**—In the May issue the name under the picture of **GRADY L. ROARK**, head of Tubes Sales service at GE, was transposed with that of **AL C. OLSSON**, mgr. New York district for **BURGESS BATTERY CO.**

Letters to the Editors

(Continued from page 31)

LETTER TO ALL RCA VICTOR TELEVISION DISTRIBUTORS

It has been—and will continue to be—the policy of RCA to assist, in any practical way possible, in the orderly transition to color TV as a nationwide service.

In this connection, we have received numerous requests from independent service technicians seeking to purchase RCA Victor 21-inch color television receivers for use in their business establishments. These instruments would be used to acquaint the servicemen with the problems of installing and maintaining color receivers.

We feel it is to the best interests of the RCA Victor Television Division—and to your individual distributorships—to cooperate with these qualified independent service technicians, who may care to purchase a 21-inch color receiver. Therefore, we recommend that you permit qualified independent service technicians to purchase these instruments from you at your dealers' price. Obviously, the purchases should be limited to one instrument per serviceman—or possibly two sets, depending upon your discretion.

Your cooperation will be appreciated.

Sincerely,

R. W. SAXON

GENERAL SALES MANAGER

Television Div.
RCA Victor Div.
Camden, N. J.

Reps & Distributors

ASTRON CORP., E. Newark, N. J., has announced the appointment of **PEYSER & CO.** as their exclusive Rocky Mountain States rep.

NORMAN FREEMAN has been appointed District Mgr. for **MORRIS F. TAYLOR CO.**, mfrs. reps of Silver Spring, Md.

EDWARD G. OROS has been appointed a sales rep for **NATIONAL CO., INC.**, Malden, Mass.

JENSEN MFG. CO. announces the appointment of **AARON F. BOWSER** as their rep for industrial accounts in the up-state New York territory.

BOB SEYD of Andover, Conn. was feted at a meeting of the New England Chapter of the "Representatives" in commemoration of his more than 25 years of service to the "Reps" and the electronic industry. . . . **JOE MARSEY**, chairman of membership committee, announces that two new members at large from Mexico have been accepted. **WILLIAM P. OSKAM** and **KENNETH H. JONES**, bringing the total membership in the "Reps" to 686.

FLORIDA ELECTRONICS REPRESENTATIVES ASSOC. elected **ARTHUR H. LYNCH**, Pres.; **JACK GEARTNER**, Vice-Pres.; **W. L. HASEMEIER**, Secty.-Treas.; **ROSCOE KENT** and **ED KIMBALL** appointed to Board of Directors.

ALLIANCE MFG. CO. announces the appointment of **JAMES W. ECKERSLEY** as their sales rep in the Northwest, covering Wash., Id. and Ore.

PERMA-POWER CO., Chicago, Ill. announces the appointment of **WILLIAM B. GOLLIHER** as their sales rep in the rocky mountain states. . . . also appointed was **LeROY & McGUIRE, INC.** to handle upstate New York.

PARK & GOODMAN, Philadelphia, Penna., is now covering Va. for **BLONDER-TONGUE LABS.**, Westfield, N. J.

CARTER MOTOR CO., Chicago, Ill. announces the appointment of six new distributors. **ACK RADIO SUPPLY CO.**, Birmingham, Ala.; **ALLIED RADIO CORP.**, Chicago, Ill.; **ALMO RADIO CO.**, Philadelphia, Penna.; **ARROW ELECTRONICS INC.**, New York, N. Y.; **WALTER ASHE RADIO**, St. Louis, Mo.; **ATRONIC CORP.**, Chicago, Ill.

RADIO SURTIDORA, Mexico, have been appointed exclusive distributors in Mexico for **PILOT RADIO CORP.**, Long Island City, N. Y.

the
complete
line!



Cornell-Dubilier
Communication
Vibrators

Based on
Rigid U.S. Government
Engineering Specifications



NOW . . . Cornell-Dubilier makes available to commercial users of communications equipment a new line of vibrators based upon the experience of producing over two million similar units to the exacting requirements of U.S. Signal Corps specifications.

These Eight Types Offer Complete Replacement for ORIGINAL Communications Equipment:

old	new
5515	5715
5518	5718
-	5721
-	5722
5605	5805
5620	5820
5621	5821
5622	5822



CONSISTENTLY DEPENDABLE

CORNELL-DUBILIER

SOUTH PLAINFIELD, NEW JERSEY

ROTORS · CAPACITORS · VIBRATORS · ANTENNAS · CONVERTERS

KEEP GROWING with CLAREMONT TUBE CORP.

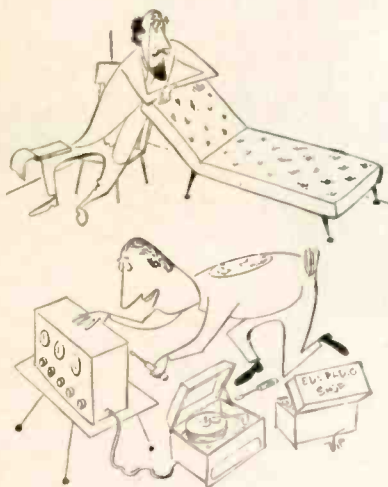


Now Claremont offers you an opportunity to grow, too. Become a Claremont Tube distributor. Sell the finest replacement TV picture tube made.

More than 30,000,000 television receivers are now in use. It is estimated that one-fourth will need a new picture tube every year — for a repeat, regular demand of 7-8,000,000 replacement CRT's annually.

New Claremont distributors are being appointed. Learn how you can become a Claremont dealer in your territory. Write for more information NOW.

CLAREMONT TUBE CORP.
36-02 35th Ave., Long Island City, N. Y.



"There's nothing wrong with you, doctor, that a new JENSEN NEEDLE won't fix up."

Catalogs & Bulletins

ANTENNA MOUNTINGS & ACCESSORIES: New catalog illustrating extensive line of antenna mountings and accessories and manner in which they are used by installation men. Lists price, standard packaging and weight. Available without charge from South River Metal Prods. Co., Inc., 377-379 Turnpike, South River, N. J. (Ask for No. B8-1)

STORAGE EQUIPMENT: New catalog featuring plastic drawer cabinets, wireless intercom system, general office equipment and industrial items. Available from General Industrial Co., 5725 N. Elston, Chicago 30, Ill. (Ask for B8-2)

WIRE & CABLE: Data sheet describes 8 new types of wire and cable with plastic insulations that withstand moisture, abrasion, oil, dirt and chemicals. Available free from: Chester Cable Corp., Chester, New York. (Ask for B8-3)

INTERFERENCE SUPPRESSION: 16-page brochure, "Suppressing Radio Interference with Metex Electronic Weatherstrip and R-F Gaskets," deals with the problems of suppressing r-f leakage at its source. Free copies available from O. P. Schreiber, Dev. Engr., Electronics Dept., Metal Textile Corp., Roselle, N. J. (Ask for B8-4)

PANEL INSTRUMENTS: Catalog sheet announcing new line of custom panel instruments meeting military specifications. Available from Phaostron Co., 151 Pasadena Ave., S. Pasadena, Calif. (Ask for B8-5)

ELECTRONICS PARTS EQUIPMENT: 7 new colorful bulletins categorized by aerials, capacitors and resistors, vibrators, transformers, speakers, hardware and suppression material, and auto radio controls. Available from United Motors Service, General Motors Bldg., Detroit 2, Mich. (Ask for B8-6)

TV SERVICE DATA: The second volume of General Electric's "TV Service Guide," containing condensed essential service information for all GE monochrome TV receivers from 1953 to present, is available for \$1.00 through GE distributors in all major cities. (Ask for B8-10)

ALLOYS: Literature sheet giving brief descriptions of special soft solder alloys and some of their suggested uses. Available free from: Mr. Frederick C. Disque, Research Dir., Alpha Metals, Inc., 56 Water St., Jersey City 4, N. J. (Ask for B8-9)

OBTAIN THE BULLETINS

described here by writing on company letterhead to Bulletins Editor, **TECHNICIAN**, 480 Lexington Ave., New York 17, N. Y., listing numbers given at end of each item of interest. Please mention title of position held. Use coupon on page 34.

New Books

TRANSISTOR APPLICATIONS. *Collected articles. Published by Raytheon Mfg. Co., Receiving and Cathode Ray Tube Operations, Dept. P-&, 55 Chapel St., Newton 58, Mass. 116 pages. Paper cover. \$50.*

This book, containing articles reprinted from periodicals, presents "how to build it" information on 50 transistorized devices, providing technicians with a practical guide for getting acquainted with this new semiconductor technology. Among the equipment described are radios, amplifiers, oscillators, meters, control relays.

F-M LIMITERS AND DETECTORS. *By Alexander Schure. Published by John F. Rider Publisher, Inc., 480 Canal St., New York 13, N.Y. 48 pages. Paper cover. \$90.*

This compact volume explains the operation of an often misunderstood type of circuit, the FM limiter and detector. It specifically covers the modern FM discriminator, ratio detector and gated-beam tube (6BN6).

ELECTRONIC CIRCUITS. *By Thomas L. Martin, Jr. Published by Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N.Y. 707 pages. Hard cover. \$12.00.*

This textbook presents a technically analytical examination of basic circuit theory, amplifiers, feedback, oscillators, modulators, rectifiers, mixers, computing and trigger circuits. It may prove useful to the very advanced electronic technician.

HANDBOOK OF 630-TYPE TV RECEIVERS. *By Simon S. Miller and Howard Bierman. Published by John F. Rider Publisher, Inc., 480 Canal St., New York 13, N.Y. 200 pages. Paper cover. \$3.50.*

The 630 chassis, considered by many as the pioneer design for post-war mass produced TV receivers, is treated in considerable detail in this book. In addition, the numerous modifications of each of the original receiver sections are discussed at length, along with the critical components, symptoms of failure and remedies. Some 25 pages of "troubleshooting charts," listing symptoms, features to check and special remarks, are an extra aid in reducing servicing time.

Perfection SHIELDING

Magnetic shielding material consisting of ferrite and ferrous powders coated on base materials may be used with cathode-ray tubes such as color TV pix tubes to prevent interference from stray magnetic and electrostatic fields. Also useful for transformer cases, motor shields, chassis deck plates and magnetic tape storage cases. Photo shows color tube application. Shield is also used between convergence coil and yoke. Magnetic Shield Div., Perfection Mica Co., 1829 Civic Opera Bldg., 20 N. Wacker Dr., Chicago, Ill.—**TECHNICIAN** (Ask for No. 8-9)

Association News

RSA Elects Officers

The Radio Servicemen's Assoc. of Trenton, N. J. elected the following new officers: George Owens, Pres.; Francis J. Wolf, Vice-Pres.; Michael E. Toth, Secy. and Charles A. Rebman, Treas.

New Santa Clara Assoc. Fights Shady Deals

More than thirty TV repair shops have joined forces and formed the Radio and Television Assoc. of Santa Clara Valley, Calif. for a twofold purpose: (1) elevate professional and business standards to levels becoming a complicated science and (2) protect the public against fraud and deception in service and overcharging. Heading the new organization are: H. F. Ash, Pres.; Len Scarpelli, Vice-Pres.; Jack Kellogg, Treas. and Wesley Strouse, Secy.

Bay Area Ass'ns. Meet In Convention

Radio & television ass'ns. of the bay area and the central valleys of Calif. met in convention at the Richmond, Calif. civic auditorium in an attempt to foster cooperation between the existing ass'ns. throughout the area. Host to the convention was the Radio & Television Servicemen's Ass'n. of Contra Costa County. A keynote speaker from each group presented the views of his particular area and the manner in which it was felt the industries problems could best be solved.

Allen-Bradley RESISTOR

A tiny molded resistor measures 0.140 in. long and 0.015 in. diameter with 1-inch leads and is rated at 1/10-watt. The Type TR resistor is a molded composition unit with an insulating coating. It is especially suitable for use with transistors, diodes, and other small components. Resistance values for standard tolerances of plus or minus 5%, 10%, and 20% are from 10 ohms to 22 megohms. Voltage rating—maximum continuous 150 volts RMS or DC. Allen-Bradley Co., 136 W. Greenfield Ave., Milwaukee 4, Wisc.—TECHNICIAN (Ask for No. 8-30)

Smith TEST LEADS

With these interchangeable leads, tips, clips, plugs and lugs with threaded inserts can be interchanged quickly into one pair of leads at both prod and meter ends. Herman H. Smith, 2326 Nosstrand Ave., Brooklyn, New York—TECHNICIAN (Ask for No. 8-98)

KESTER

A can of Kester Solder is the central focus, labeled "KESTER 'RESIN-FIVE' SOLDER" with "50/50 C62" also visible. Surrounding the can are four cartoon characters, each holding a sign that reads: "FASTER ACTING", "EASIER TO USE", "LONGER LASTING", and "THE BEST".

KESTER SOLDER COMPANY
4264 Wrightwood Avenue • Chicago 39, Illinois
Newark 5, New Jersey • Brantford, Canada

Absolutely non-corrosive and non-conductive, KESTER "RESIN-FIVE" CORE SOLDER contains an activated type of resin that gives you that fast, positive action on all your jobs . . . including the most difficult.

SOLDER

NEVER BEFORE HAS ANY TEST INSTRUMENT WON SUCH IMMEDIATE AND UNANIMOUS ACCEPTANCE!

TeleTest

FLYBACK TESTER

The Only Flyback Tester that's 100% accurate!



FT 100

only
\$44⁹⁵

- it tests GOOD flybacks as well as bad!
 - now used exclusively in many famous service shops...at John Wanamaker, Sunset Appliances, Winston Appliances!
 - the tester that needs no reference flyback!
 - tests flyback under full operating voltage!
 - tests for even a single shorted turn!
 - does not require calibration!
- The only Flyback Tester that has won acceptance by TV service men all over the country.

TELETEST
INSTRUMENT CORP.

See the RejuvaTester, Flyback Tester and TeleTest's other service instruments at your jobber.

31-01 Linden Place, Flushing, N. Y.

ALL "CIRCUIT DIGESTS" TO DATE

Including Current issue. CIRCUIT DIGEST NOS. 211 to 216 will be found in this issue of TECHNICIAN

All Units Are TV Receivers
Unless Otherwise Noted

ADMIRAL	Circuit Digest No.
Chassis 2242: Models 520M15, 520M16, 520M17.	
Chassis 22A2A: Models 520M11, 520M12. Chassis 22M1: Models 121M10, 121M11A, 121M12A, 121M11, 121M12, 121K15A, 121K16A, 121K17A, 121K15, 211K16, 121K17, 221K46A, 221K47A, 221K45, 221K46, 221K47. Chassis 22Y1: Models 321M25A, 321M26A, 321M27A, 321M25, 321M26, 321M27, 421M15A, 421M16A, 421M15, 421M16, 421M35, 421M36, 421M37, 521M15A, 521M16A, 521M17A, 521M15, 521M16, 521M17	1
Chassis 19B1: Model 17DX10, 17DX11. Chassis 19C1: Model 121DX12, 121DX16, 221DX15, 221DX16, 221DX17, 221DX26, 221DX38. Chassis 19F1A: Model 121DX11. Chassis 19H1: Model 222DX15	15
Chassis 22A3, 22A3Z: Models 122DX12, 222DX15B, 222DX16B, 222DX17B, 222UDX15, 222UDX16, 222UDX17, 222DX27B, 322DX16A, 322UDX16	101
Chassis 20A2, 20A2Z, 20D2	111
Chassis 20L2: Models TA2216A, TA2217A, CA2236A, FA2226	134
Chassis 21A3Z: Models T2311Z (Coral Gables), T2312Z (Bell-Aire), T2316Z (Beverly Hills), T2317Z (Bermuda), T2318Z (Bar Harbor), C2316Z (Catalina), C2317Z (Casablanca), C2326Z (Del-Monte), C2327Z (California), F2326Z (El Dorado), F2327Z (Riviera), F2328Z (Deauville)	142
Chassis 20AX5, 20AX5A, 20AX5CZ, 20AX5D, 20AX5EZ, 20AX5F: Models TA1831, TA1832, TA1842, CA2256, TA2212B, CA2306Z, CA2307Z, TA1812B	161
Chassis 17XP3: Models T1801 (Pasadena), T1802 (Palm Beach), T1806 (Palm Springs), T1807 (Palo Alto)	168
Portable Radio Chassis 5K3: Models 5K31, 5K32, 5K34, 5K38, 5K39	188
Chassis 18XP4BZ: Models T2301Z (Nassau), T2302Z (Bahamas), T2326Z (Jamaica), T2327Z (Martinique), T2336Z (Hawaii), T2337Z (Honolulu)	205

ANDREA	Circuit Digest No.
Chassis VM21: Models T-VM21, C-VM21, 2C-VM21, CO-VM21	44
Chassis VO21: Models T-VO21 (Montauk), MC-VO21 (Capri), C-VO21 (Hampton)	202

ARVIN	Circuit Digest No.
Chassis TE331: Models 6175TM, 6179TM	13
Chassis 337-341: Models 7210, 7212, 7214, 7216, 7218, 7219	45
TV Dual Tuner, used in Chassis TE 330, 332, 340, 341	75
Chassis TE 359: 9200 series	100
Chassis TE 373-UHF: Model 9245	128
Chassis "D" 379-UHF, "D" 382-VHF: Models 21-560, 551, 552, 553	150
Chassis "E" 383-VHF: Models 21-544, 555, 557	174

BENDIX	Circuit Digest No.
Chassis T14: Models 21K3, 21KD, 21T3, 21X3, OAK3	20
Chassis T17: Models KS21C, TS21C. Chassis T17-1: Model TS17C	50
Chassis T14-3: Models FM27C, HB27C. Chassis T14-10: Models TM24DS, TB24DS. Chassis T14-11: Models TM24DU, TB24DU	116
Chassis T14-15, T14-16	144

CAPEHART	Circuit Digest No.
Chassis CX-36, RF-IF chassis coded R-3, Deflection chassis coded D-4: Models 1T172M, 2C172M, 3C212M, 32212B, 4H212M, B, 5F212M, 6F212M, B, 7F212M, 8F212B, 9F212M, 12F272M, 10W212M, 11W212M	17
Chassis CX-37: Models 1T172MA, 1T172BA, 3C212MA, 3C212MG, 3C212BA, 4H212MA, 4H212BA, 5F212MA, 6F213B, 7F212MA, 8F212BA, 9F212MA, 11W212MA, 1C213M, 2F213F, 3C213M, 4T213M, 4T213B, 5H213M, 8F213B 37	37
Chassis CX-37 and CX-37-1, 1955 series	151
Chassis "CX-38" series	179

CBS-COLUMBIA	Circuit Digest No.
Chassis 817: Model 17T18, 17M18, 17C18. Chassis 820: Models 20T18, 20M18, 20M28 14	

Circuit Digest No.	Circuit Digest No.
Chassis 1027: Models 27C11, 27C21	77
Chassis 750-3: Models 17M06, 22C06, 22C38	95
Chassis 921-11: Models U22C05, U22C07, U22C07B, U22T09, U22T09B, U22T09EB, Chassis 921-13: Models U22T19, U22T19B. Chassis 921-14: Models 22C09, 22C09B, 22T19B	145
Models 205C1, 205C2 (Color Receiver)	167
Chassis 1603: Models 23TS005, 23TS006, 23TS007, 23TS008, 23CS013, 23CS014. Chassis 1605: Models 22TK301, 22TK321, 22CK009, 22CK010. Chassis 1607: Models 23TK001, 23TK002, 23TK003, 23TK004, 23CK011, 23CK012	198
Chassis 921-93: Models U23T19, U23T19B, U23C39, U23C39B, U23C49L. Chassis 921-94: Models 23T19, 23T19B, 23C39, 23C39B, 23C49S, 23C49SB, 23C49L, 21C49LB, 23C59, 23C59B	211

COLUMBIA RECORDS	Circuit Digest No.
360 Phono Amplifier	43

CRAFTSMEN	Circuit Digest No.
Model "Solitaire": 20-watt Amplifier-Preamplifier	200

CROSLLEY	Circuit Digest No.
Chassis 380: Models EU-17COM, EU-17TOE, EU-11TOM. Chassis 381: Models EU-21CDE, EU-21CDM, EU-21CDN, EU-21COBA, EU-21COMa	2
VHF Chassis 392: Models EU-GOMUa, 21COBUa, 21CDMU, 21CDBU, 21CDNU	

HOW TO FIND MONTH in which any CIRCUIT DIGEST APPEARED

Circuit Digest Numbers	Month
1-8	Sept. 1952
9-16	Oct. 1952
17-24	Nov. 1952
25-30	Dec. 1952
31-36	Jan. 1953
37-43	Feb. 1953
44-49	Mar. 1953
50-58	Apr. 1953
59-64	May 1953
65-70	June 1953
71-76	July 1953
77-81	Aug. 1953
82-88	Sept. 1953
89-94	Oct. 1953
95-100	Nov. 1953
101-105	Dec. 1953
106-110	Jan. 1954
111-115	Feb. 1954
116-120	Mar. 1954
121-125	Apr. 1954
126-130	May 1954
131-133	June 1954
134-138	July 1954
139-143	Aug. 1954
144-149	Sept. 1954
150-155	Oct. 1954
156-161	Nov. 1954
162-167	Dec. 1954
168-173	Jan. 1955
174-178	Feb. 1955
179-184	Mar. 1955
185-190	Apr. 1955
191-198	May 1955
199-204	June 1955
205-210	July 1955
211-216	Aug. 1955

Note: Months prior to September, 1953, refer to issues of Television Retailing (predecessor of TECHNICIAN)

Circuit Digest No.	Circuit Digest No.
(Chassis 392 is very similar to the 380—refer to Circuit Digest No. 2)	
Chassis 388: Models EU-30COMU, 30COBU	33
Chassis 393: Models EU-21TOLU, EU-21-TOLBU. Chassis 394: Models EU-21COLU, EU-21COLBU	46
Chassis 402: Models F-17TOLH, F-17TOLBH; Chassis 403: Models F-21TOLH, F-21TOLBH; Chassis 404: Models F-21COLH, F-21COLBH, F-21CDLH, F-21CDLBH; Chassis 402-1: Models F-17TOLU, F-17TOLBU; Chassis 403-1: Models F-21TOLU, F-21TOLBU; Chassis 404-1: Models F-21COLU, F-21COLBU, F-21CDLU, F-21CDLBU	82
Chassis 411: Models F-24COLH, F-24COLBH; Chassis 411-1: Models F-24COLU, F-24COLBU	96
Chassis 412: Models F-24CDMH, F-24CDBH, Chassis 412-1: Models F-24CDMU, F-24CDBU, Chassis 416: Models F-27COMH, F-27COBH, Chassis 416-1: Models F-27COMU, F-27COBU	106
Chassis 426: Models G-17TOMH, G-17TOBH, G-17TOWH	126
Chassis 431-2: Models H-21COMH, H-21COBH, H-21COWH, H-21COSH, H-21COSBH, H-21-HCBH, H-21HCWH, H-21COMU, H-21COBU, H-21COWU, H-21HCBU, H-21HCMU	163
Chassis 434: Models H-21TOMHb, H-21TOBHb, H-21TOWHb, H-21HCMHb, H-21HCBHb, H-21-HCWHb, H-21COSHb, H-21COSBHb, H-21CO-MHb, H-21COBHb, H-21COWHb	176
Chassis 466: Models H-21TKMF, H-21TKBF, H-21CKMF, H-21CKBF, H-21HKMF, H-21-HKBF. Chassis 467: Models H-21TKMU, H-21-TKBU, H-21CKMU, H-21CKBU, H-21HKMU, H-21HKBU	199

DELCO	Circuit Digest No.
Buick Electronic Model 981551 (see main section of magazine)	149

DE WILD	Circuit Digest No.
Models ET-140R, DT-163R, DT-163A, ET-170, ET-171, ET-172, ET-191, DT-190D	69

DU MONT	Circuit Digest No.
Chassis RA-164: Model Clinton. Chassis RA-165: Models Beverly, Ridgewood, Shelbourne, Milford, Wakefield	3
Chassis RA-166/167, 170/171: Models 17T350, 21T327, 21T328, 21T329, 21T359, 21T366, 21T376, 21T377, 21T378	51
Chassis RA-306, 307: Models Summit RA-306A1 & RA-307A1, Warren RA-306A2 & RA-307A2, Hampton RA-306A3 & RA-307A3, Bristol RA-306A4 & RA-307A4, Newport RA-306A5 & RA-307A5, Rutland RA-306A6 & RA-307A6, Hartford RA-306A7 & RA-307A7, Sheffield RA-306A8 & RA-307A8, Westbrook RA-306A9 & RA-307A9, Windsor RA-306A10 & RA-307A10, Bradford RA-306A11 & RA-307A11, Warwick RA-306A12 & RA-307A12	107
Chassis RA-301, 302: Models RA-301-A1, RA-301-A2, RA-301-A3, RA-302-A1, RA-302-A2, RA-302-A3	120
Chassis RA-312, 313: Models Barton, RA-312-A1, or RA-313-A1; Baylor, RA-312-A2 or RA-313-A2; Winsted, RA-312-A3 or RA-313-A3; Clifford, RA-312-A4 or RA-313-A4; Hamilton, RA-312-A5 or RA-313-A5; Dellwood, RA-312-A6 or RA-313-A6; Richfield, RA-312-A7 or RA-313-A7; Belvidere, RA-312-A8 or RA-313-A8; Bradley, RA-312-A9 or RA-313-A9	139
Chassis RA-321, 322: Model The Glendale	170

EMERSON	Circuit Digest No.
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Chassis 120168-D: Models 716F, 717F, 719F, 727D. Chassis 120169-B: Models 711F, 712F, 720D, 732B, 734B	31
Chassis 120174-B: Models 752A, 755A, 784A; Chassis 120198-D: Models 753F, 785C, 785E 91	
Chassis 120182-D: Models 741F, 757D, 758F. Chassis 120196-B: Model 781A. Chassis 120206-D: Models 792D, 781E. Chassis 120197-B: Models 784E, 784K. Chassis 120197-D: Model 784G. Chassis 120195-D: Models 785K, 759C. Chassis 120211-D: Model 784M	121
Chassis 120220-D: Models 1030D, 1032D. Chassis 120239-D: Models 1058D, 1060D, 1062D, 1064D	152

Circuit Digest No.

Chassis 120233-D: Models 1066D, 1070D, 1072D.
Chassis 120235-D: Models 1000H, 1002H, 1004H, 1006H, 1008H, 1010H, 1018H, 1022H, 1028H, 1040H, 1042H, 1074D, 1084D, 1044D, 1046D, 1048D, 1054D, 1086D, 1088D, 1090D, 1092D.
Chassis 120234-D: Models 1067D, 1071D.
Chassis 120236-D: Models 1009J, 1011J, 1075D, 1047D, 1049D.
Chassis 120238-F: Models 1041F, 1045F, 1047F 162
Chassis 120245-D: Model 1130D Chassis 120255-D: Model 1106H, 1106J Chassis 120255-F: Models 1106L, 1106N Chassis 120256-D: Model 1104F Chassis 120256-F: Model 1104J Chassis 120259-D: Model 1114D 186
Portable Radio Chassis 120252-B: Model 830B 194
(Transistor Pocket Radio) Chassis 120274: Model 838 209

ESPEY

513-C AM-FM Tuner 70

FADA

The "Imperial" Series: Models 17T6, 17T9, 17C2, 17C4 25
Models U2100C, U2150C, U2100T, UDL2100T, UH21T 83

GENERAL ELECTRIC

"Stratopower" chassis: Models 17C125, 20C107, 21T1, 21C208, 21C204, 21C201, 21C202, 21C214, 21C206 4
UHF-TUNER Model UHF-103 52
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According to Charles E. Torsch, writing in the July 1955 issue of TELE-TECH, several set and picture tube makers have agreed that a reduced nominal diameter of 1 1/8 in. has many merits. The reduced diameter would cut receiver costs for associated yokes, transformers, sweep output tubes, and B supply. The 1 1/8 in. crt, with a new 90-degree yoke, would produce full vertical sweep with less than half the power normally required in current designs. Also, approximately 80 percent of the present normal horizontal sweep intake would be required.

With these efficiencies, 125-volt basic B-plus would be adequate with the vertical system operated directly from this source, rather than putting a drain on the horizontal operation from the boosted B-plus.

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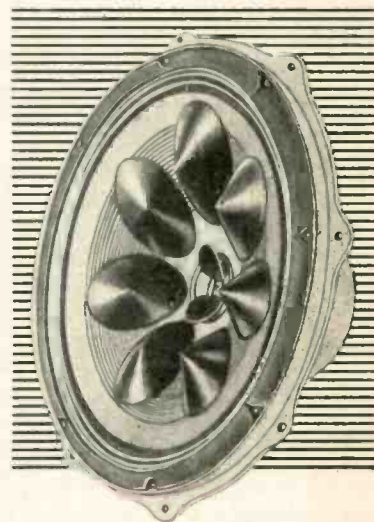
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SERVICE INSTRUMENTS CO.
ADDISON, ILLINOIS
"ADDISON INDUSTRIAL DISTRICT"

Get your share of the 26,000,000 market

with the new **Jensen**
TV *Duette* Hi-Fi Loudspeaker



Every dealer knows that table TV is sound starved . . . you just can't hear all you can see from a small speaker with muffled tone, aimed away from the viewer. TV this way is only half the TV program.

Now you can add high fidelity to table TV . . . make an extra sale with every table TV you sell or service . . . with Jensen's new TV Duette. Here's a true 2-way hi-fi speaker system in handy table design by Jensen—acknowledged leader in hi-fi speakers, that you, Mr. Dealer, can sell at real profit! Easy to demonstrate the big difference in sound with front mounted "show-off" switch—and a third position so the customer can use his TV Duette for record player, tape or radio, too.

Four models listing at \$49.50 to \$85.50. Find out about Jensen TV Duette today!

These Hi-Fi wholesalers stock TV Duette . . . and the complete Jensen Hi-Fi speaker line

ALLENTOWN, Pa.
Radio Elec. Serv. Co. of Pa.
AMARILLO, Tex.
R & R Electronic Sup.
ANDERSON, Ind.
Anderson Electronic Sup.
APPLETON, Wis.
Valley Rad. Dist.
ATLANTIC CITY, N. J.
Radio Elec. Serv. Co. of N. J.
AUBURN, Me.
Radio Sup. Co., Inc.
BALTIMORE, Md.
Radio Elec. Serv. Co.
BANGOR, Me.
Radio Sup. Co., Inc.
Maine Electronic Sup. Corp.
BIRMINGHAM, Ala.
James W. Clary Co.
BLOOMINGTON, Ind.
Stansifer Radio Co.
BOSTON, Mass.
DeMambo Radio Sup.
BRIDGEPORT, Conn.
Westconn Elec. Sup. Co.
BREMERTON, Wash.
C & G Radio Sup. Co.
BUFFALO, N. Y.
Radio Eqp't. Corp.
BURBANK, Calif.
Dean's Electronics
CADILLAC, Mich.
Straits Dist., Inc.
CAMDEN, N. J.
Radio Elec. Serv. Co. of N. J.
CALUMET, Ill.
Chauncey's Inc.
CHEBOYGAN, Mich.
Straits Dist., Inc.
CHICAGO, Ill.
Chauncey's Inc.
Lukko Sales Co.
Walker-Jimison Inc.
CLEVELAND, Ohio
Pioneer Electronic Sup.

COLORADO SPRINGS, Colo.
L. B. Walker Radio Co.
COLUMBUS, Ohio
Electronic Supply
CUMBERLAND, Md.
Zimmerman Wholesalers
DALLAS, Tex.
Wilkinson Bros.
DAYTON, Ohio
Sreco, Inc.
DAYTONA BEACH, Fla.
Thurrow Distributors
DENVER, Colo.
L. B. Walker Radio Co.
DETROIT, Mich.
The Crandall Wholesale Co.
DUBUQUE, Iowa
Boe Distributing Co.
DULUTH, Minn.
Low Bonn Co.
EASTON, Pa.
Radio Elec. Serv. Co. of Pa.
ERIE, Pa.
Warren Radio Inc.
EVANSTON, Ill.
Chauncey's Inc.
EVANSVILLE, Ind.
Ohio Valley Sound
FARGO, N. D.
Low Bonn Co.
FOND DU LAC, Wis.
Harris Radio Corp.
FORT MYERS, Fla.
Thurrow Distributors
FRESNO, Calif.
Dunlap White Rad. Co., Inc.
GARY, Ind.
Chauncey's Inc.
Walker-Jimison Inc.
GRAND JUNCTION, Colo.
L. B. Walker Radio Co.
GRAND RAPIDS, Mich.
Warren Radio Co.
HARRISBURG, Pa.
D & H Distributing

HAGERSTOWN, Md.
Zimmerman Wholesalers
HOUSTON, Tex.
Lenert Company
HUTCHINSON, Kan.
Interstate Ele. Sup. Corp.
INDIANAPOLIS, Ind.
Warren Radio Co.
JACKSONVILLE, Fla.
Thurrow Dist., Inc.
JAMESTOWN, Pa. Y.
Warren Radio Inc.
JOPLIN, Mo.
Four-State Radio Sup. Co.
KANSAS CITY, Mo.
Radiolab
LA CROSSE, Wis.
Low Bonn Co.
LAFAYETTE, Ind.
Lafayette Radio Supply Co.
LANCASTER, Pa.
Geo. D. Barbey Co.
LEBANON, Pa.
Geo. D. Barbey Co.
LONG BEACH, Calif.
Dean's Electronics
LOS ANGELES, Calif.
Kierulff & Co.
LOUISVILLE, Ky.
Peerless Elec. Eqp't. Co.
MADISON, Wis.
Satherfield Rail. Stp., Inc.
MANCHESTER, N. H.
DeMambo Radio Supply
MANTOWOC, Wis.
Harris Radio Corp.
MARYSVILLE, Calif.
Dunlap White Rad. Co., Inc.
MAYWOOD, Calif.
Kierulff & Company
MEADVILLE, Pa.
Warren Radio Inc.
MEMPHIS, Tenn.
W & W Distributing Co.
MERCED, Calif.
Dunlap White Rad. Co., Inc.

MIAMI, Fla.
Elect. onic Supply
MILWAUKEE, Wis.
Radio Parts Co.
MINNEAPOLIS, Minn.
Low Bonn Co.
MODESTO, Calif.
Dunlap White Rad. Co., Inc.
NEWARK, N. J.
All-State Distributors, Inc.
NASHVILLE, Tenn.
Curry's Wholesale Distg.
NEW BRITAIN, Conn.
United Radio Supply
NEW ORLEANS, La.
Southern Radio Sup. Co.
NEW YORK, N. Y.
Standard Electronics Corp.
NIAGARA FALLS, N. Y.
Niagara Falls Rad. Eqp't. Co.
NORFOLK, Va.
Radio Supply Co., Inc.
OAKLAND, Calif.
Elma Electronics, Inc.
OKLAHOMA CITY, Okla.
Johnson Whse. Electronics
OLEAN, N. Y.
B & B Radio Eqp't. Co.
ORLANDO, Fla.
OWENSBORO, Ky.
Peerless Elec. Eqp't. Co.
PALO ALTO, Calif.
Zack Radio Suppl. Co.
PASADENA, Calif.
Electronic Supply Corp.
PENSACOLA, Fla.
Thurrow Distributors Inc.
PEORIA, Ill.
Klaus Radio & Elec. Co.
PHILADELPHIA, Pa.
Radio Elec. Serv. Co. of Pa.
PHOENIX, Ariz.
Radio Parts of Ariz.

SPOKANE, Wash.
Columbia Elec. & Mfg. Co.
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Soundco Electronic Sup.
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Goddard Distributors Inc.
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Warren Radio Co.
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Trojan Electronic Sup.
UNIONTOWN, Pa.
Zimmerman Wholesalers
WASHINGTON, D. C.
Electronic Wholesalers, Inc.
Silberne Radio & Elec. Co.
WEST PALM BEACH, Fla.
Goddard Distributors Inc.
WHITE PLAINS, N. Y.
Westchester Elec. Sup. Co.
WICHITA, Kan.
Interstate Electronic Sup.
WILKES-BARRE, Pa.
General Rad. & Elec. Co.
WORCESTER, Mass.
DeMambo Radio Supply
YOUNGSTOWN, Ohio
Ross Radio Co.

PORTLAND, Me.
Maine Electronic Sup. Corp.
PORTLAND, Ore.
Lou Johnson Co.
POTTSTOWN, Pa.
Geo. D. Barbey Co.
PROVIDENCE, R. I.
DeMambo Radio Sup.
PUEBLO, Colo.
L. B. Walker Radio Co.
READING, Pa.
Geo. O. Barbey Co.
RICHMOND, Va.
Radio Supply Co., Inc.
ROANOK, Va.
Radio Supply Co., Inc.
RIVERSIDE, Calif.
Electronic Sup. Corp.
SACRAMENTO, Calif.
Dunlap White Rad. Co., Inc.
SALEM, Ore.
Lou Johnson Co.
SALT LAKE CITY, Utah
Standard Supply Co.
SAN BERNARDINO, Calif.
Kierulff & Company
SAN DIEGO, Calif.
Western Rad. & TV Sup. Co.
SAN FRANCISCO, Calif.
Pacific Wholesale Co.
Zack Radio Supply Co.
SAN JOSE, Calif.
Frank Quement, Inc.
SANTA ANA, Calif.
Electronic Supply Corp.
SAULT STE. MARIE, Mich.
Straits Dist., Inc.
SCRANTON, Pa.
Gen. Radio & Electronics
SEATTLE, Wash.
Western Electronic Sup.
Seattle Radio Supply

*WRITE TO JENSEN
Additional hi-fi wholesaler appointments have been made since this ad was released. If the list does not include one serving your area, write for his name and address. We'll include a free copy of "How to Make Money with Jensen TV Duette."

BURTON BROWNE ADVERTISING

Jensen MANUFACTURING COMPANY
Division of The Muter Company, 6601 S. Laramie, Chicago 33, Ill. In Canada: Copper Wire Products, Ltd., Licensee.

WORLD'S QUALITY STANDARD FOR MORE THAN A QUARTER CENTURY

capacitor replacements

FOR SETS OF THE MONTH

CBS CHASSIS 921-93, 921-94

Symbol No.	Rating μF @ WVDC	CBS Part No.	Sprague Replacement
C-125	1 @ 100	21000521	R-2060
C-131	50 @ 25	21000531	TVA-1206
C-134	10+10 @ 350/100 @ 50	21000851	R-2061
C-201	40+40+20+20 @ 350	21000861	R-2062
C-310	4 @ 50	21000341	TVA-1303

HALLICRAFTER CHASSIS 1900D

Symbol No.	Rating μF @ WVDC	Hallcrafter Part No.	Sprague Replacement
C-122	140+5 @ 300/200+30 @ 150	45B263	R-1553
C-138	20 @ 450	45B208	TVA-1709
C-154	200+5 @ 200	45B312	R-2063
PC-263	Sync. take-off network	49A045	102C17

OLYMPIC CHASSIS AA, AB, AC, AJ, AK

Symbol No.	Rating μF @ WVDC	Olympic Part No.	Sprague Replacement
C-11	50 @ 250	C02068	TVA-1713
C-12	60 @ 200/125 @ 50	C03856	R-2064
C-45			
C-31			
C-47	60+60+4 @ 350	C03380	R-2065
C-48			
C-44	20 @ 450	C02560	TVA-1709
C-37, C-38, C-39	Vertical	PC2435	V-1
C-48, R-49, R-50	Integrator		

RCA CHASSIS CTC4, CTC4A COLOR TV

Symbol No.	Rating μF @ WVDC	RCA Part No.	Sprague Replacement
C-106	5 @ 50	74521	TVA-1303
C-116	90 @ 350	100375	TVA-1850
C-117	40 @ 350/80 @ 200/500 @ 25	100393	R-2066
C-133	4 @ 350	78919	TVA-1601
C-140	4 @ 350	78919	TVA-1601
C-148	10+10 @ 25	79786	TVA-2210
C-169	60 @ 300	100376	TVA-1613
C-223	200 @ 250	78957	R-2067
C-224	200 @ 250	78957	R-2067
C-225	80 @ 450/40 @ 200	100394	R-2068
C-226	1000 @ 3	79625	TVA-1104
C-235	5 @ 25	100447	TVA-1203

UNITED MOTORS SERVICE MODEL 7265855 (CADILLAC)

Symbol No.	Rating μF @ WVDC	UMS Part No.	Sprague Replacement
30	20+20 @ 400/20 @ 25	M908	TVA-3678

Sprague makes more capacitors . . . in more types . . . in more ratings . . . than any other capacitor manufacturer. Send 10¢ for the 65-page giant seventh edition TV Replacement Manual to Sprague Products Co., 65 Marshall St., North Adams, Mass., or get it FREE from your Sprague distributor.

TRAV-LER CHASSIS 412E4, E5, F4, F5, G5

Symbol No.	Rating μF @ WVDC	TRAV-LER Part No.	Sprague Replacement
EC-16	40+40 @ 450	TV-EC-16	TVA-2764
EC-17	40 @ 450/50 @ 50	TV-EC-17	R-2069
EC-20	10 @ 50	TV-EC-20	TVA-1304
EC-25	30 @ 450/50 @ 200	TV-EC-25	R-2070
EC-27	100 @ 25	TV-EC-27	TVA-1207
C-85	Integrator Network	TV-CC-26	V-1



You'll never see your doctor advertise a special sale on appendectomies . . .

You'll never see your lawyer announce cut-rates for divorce cases . . .

You'll never see your dentist hold a "2-for-1" sale on extractions . . .

AND You'll never see the day when you can take your TV set in for a service "bargain" and be sure you're getting a square deal!

"Bargains" in home electronic service are as scarce as the proverbial hen's teeth! Here's why—

The expert service technician, just like other professional people, must undergo years of study and apprenticeship to learn the fundamentals of his skill. And a minimum investment of from \$3000 to \$6000 per shop technician is required for the necessary equipment to test today's highly complex sets. Finally, through manufacturer's training courses and his own technical journals, he must keep up with changes that are developing as fast as they ever did in medicine, law, or dentistry. Those best equipped to apply modern scientific methods are almost certain to be

most economical for you and definitely more satisfactory in the long run.

Unfortunately, as in any business, there will always be a few fly-by-night operators. But patients, clients, and TV set owners who recognize that you get only what you pay for, will never get gypped. "There just ARE no service bargains" . . . but there is GOOD SERVICE awaiting you at FAIR PRICES!

Harry Nathaniel
PRESIDENT

SPRAGUE PRODUCTS COMPANY
North Adams, Mass.

Blank space on the bottom for your imprint.

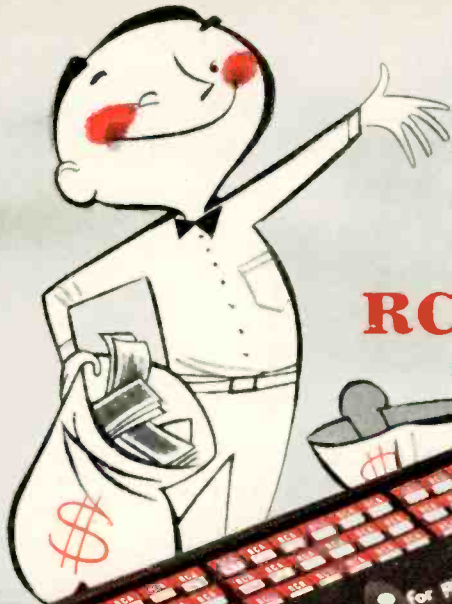
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BY POPULAR DEMAND!

... the new

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RCA "TREASURE CHEST"



LARGER—

holds more tubes!

STRONGER—

built to last longer!

MORE PROFESSIONAL LOOKING—

helps build your prestige!

Here it is—the *new, improved* RCA "Treasure Chest"! Use it to carry a full selection of receiving tubes with you on your service calls. Use it to carry small tools. Use it to display the world-famous brand name—RCA—and let it work for you to build your business by instilling customer confidence.

STARTING NOW . . . For each RCA Picture Tube, or every 25 RCA Receiving Tubes you purchase, your RCA Tube Distributor will give you one RCA "Treasure Note." Save 20 "Treasure Notes" and your RCA Tube Distributor will trade them for the *NEW* RCA "TREASURE CHEST." This rugged, custom-built tube-carrying case is *not for sale* anywhere, at any price!

Here's more
treasure . . .
the RCA
"MULTICORD"!



It's an all-in-one power cord with two popular types of "cheater" receptacles; a hard-rubber, 3-way power outlet for test equipment, soldering gun, etc.; and a clamp-on work light. A real time-saver for busy service technicians! It's yours **FREE** of extra cost for only 5 RCA "Treasure Notes."

These offers expire at midnight, August 31, 1955 so act promptly. Don't miss out . . . Order your RCA Picture Tubes and RCA Receiving Tubes and start collecting valuable "Treasure Notes" now!



RADIO CORPORATION of AMERICA
TUBE DIVISION

HARRISON, N. J.