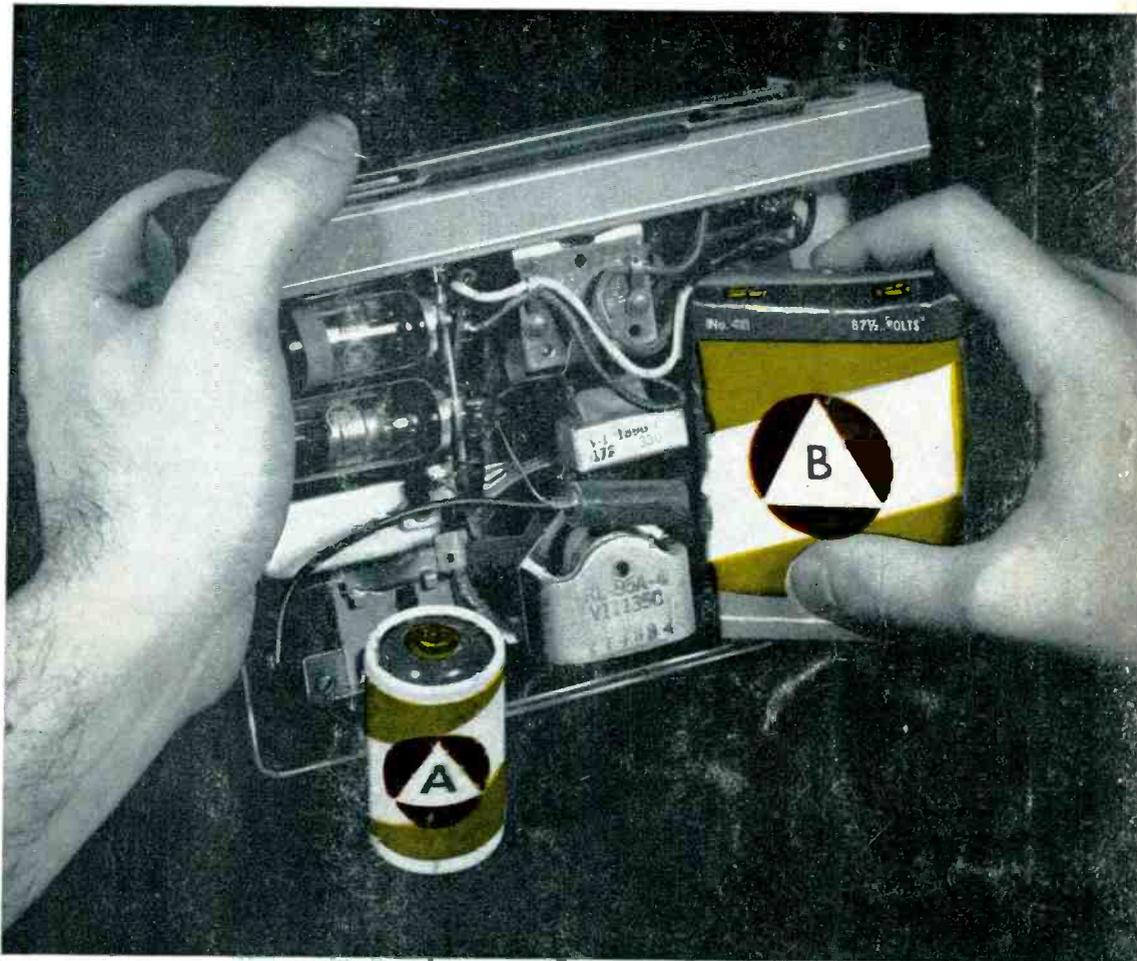


TECHNICIAN

& *Circuit Digests*





PORTABLES & BATTERIES





NEW



Here are wire wound power resistors designed for today's servicing requirements. New, rectangular design is more compact. Famous IRC element is sealed in ceramic case for complete insulation and protection. Axial leads are easily soldered and speed replacement. Clear, permanent markings give full identification.

- 2 SIZES—PW-7 seven watts; PW-10 ten watts.
- COST LESS—new, low price for IRC Power Resistors.
- FULL POWER—Conservative ratings permit continuous operation at full power.
- NEW VALUES—in keeping with today's needs.

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in handy Resist-O-Card Assortments



IRC Resist-O-Cards are easier to buy, stock and use. Values are printed on each card—you always know what you have, and you always have what you need. Assortments are based on popular usage.

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- ASSORTMENT = 20—Twenty 10 watt resistors. Dealer Price \$6.60
- ORDER NOW—From your IRC Distributor

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INTERNATIONAL RESISTANCE COMPANY

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Wherever the Circuit Says

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APRIL, 1955

FRONT COVER

This time of year, the emergence of portables is as much a national institution as the annual revival of baseball, daylight saving and garden-puttering. Besides a good dusting, most carry-about sets need a check-up on the service bench and a new set of batteries. Get in on the trend! See pages 18, 38 and 40.

FEATURES AND ARTICLES

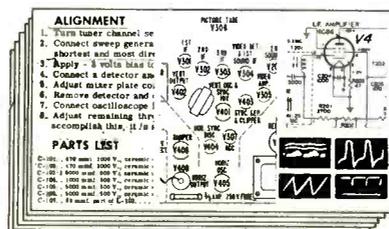
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CIRCUIT DIGESTS

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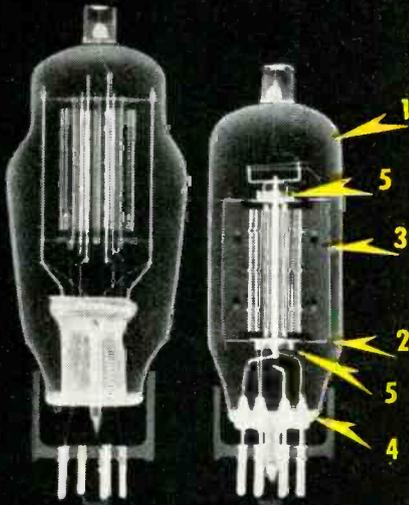
ADMIRAL: Portable Radio Chassis 5K3
 EMERSON: TV Chassis 120245-D series
 HALLICRAFTERS: TV Chassis A1850D
 RAYTHEON: Transistorized Portable Radio Ch. 8RT1
 RCA: TV Chassis KC592 series
 WESTINGHOUSE: Portable Radio Chassis V-2185-2

Ready to install!

6 NEW G-E

You can put top quality in more TV sockets,

X-RAYS PROVE STRONGER TUBE CONSTRUCTION



OLD 6BG6-G NEW 6BG6-GA

1. New bulb is straight-side, much smaller and sturdier.
2. Bottom mica, as well as top, now contacts the glass all around, for greater rigidity.
3. Redesigned, more shock-resistant structure.
4. Button-stem base gives shorter and better-separated leads; improves heat conduction.
5. New beam shields mask off stray electron bombardment from micas and bulb.

NEW SERVICE-DESIGNED 6BG6-GA



● X-ray pictures at left explain why the new tube is stronger through-out, also more compact. (Note that new straight-side bulb is "necked down" at bottom to take the same diameter base as prototype, so the same ring-clamps can be used when installing.)

Tube performance is much improved. Internal structure and micas have been redesigned to cut down inter-electrode leakage, reducing the chance of horizontal TV-picture shrinkage. The new beam shields, which mask off stray electron bombardment, further increase operating stability.

And every 6BG6-GA is high-voltage seasoned—is pulse-treated at absolute max voltage ratings, among other checks!

NEW SERVICE-DESIGNED 6CD6-GA AND 25CD6-GB



● Prototypes gave arc-over trouble, causing horizontal TV-picture streaking. In the new sweep tubes, brand-new mica design corrects this fault.

Also, plate area has been increased for greater dissipation. Ratings are higher:

| | PROTOTYPES | | 6CD6-GA and 25CD6-GB |
|------------------------------|------------|--------|----------------------|
| Plate positive-pulse voltage | 6600 v | 7000 v | |
| Plate dissipation | 15 w | 20 w | |

New tubes are high-voltage seasoned. Every 6CD6-GA and 25CD6-GB gets an arc-over test at absolute max ratings!

More compact and sturdier than prototypes, with same base diameter. All of the new construction features shown in the X-ray picture of the 6BG6-GA, apply also to Types 6CD6-GA and 25CD6-GB.



Electronic
TUBES

NOW 14 G-E SERVICE-DESIGNED TUBES . . . SPECIALLY DEVELOPED, BUILT, AND TESTED TO OUT-PERFORM AND OUTLAST THE TYPES THEY REPLACE!

| | | | |
|-------------|-------------|-------------|---------------|
| NEW 1B3-GT | NEW 6AX4-GT | NEW 6BX7-GT | NEW 6SN7-GTB |
| NEW 5U4-GA | NEW 6BG6-GA | NEW 6CD6-GA | NEW 12SN7-GTA |
| NEW 5Y3-GT | NEW 6BQ6-GA | NEW 6J6 | NEW 25BQ6-GA |
| NEW 6AV5-GA | | | NEW 25CD6-GB |

SEE YOUR G-E DISTRIBUTOR FOR NATIONALLY-ADVERTISED G-E SERVICE-DESIGNED TUBES!

SERVICE-DESIGNED TUBES!

build more customer goodwill, than ever before!

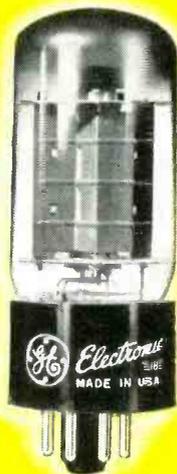
NEW SERVICE-DESIGNED
6J6



NEW SERVICE-DESIGNED
6SN7-GTB



NEW SERVICE-DESIGNED
6AV5-GA



● **6J6** . . . Whisper-quiet! Microphonics are cut 'way down! The prototype, used in many head-end TV circuits, was subject to microphonic disturbance when jarred or shaken. This caused picture jitter . . . in some sets, audio noise.

Redesigned tube elements and structure now give servicemen a whole new deal on this much-used type. With Service-Designed 6J6's, technicians can satisfy their most critical customers.

● **6SN7-GTB** . . . Shows that G-E design improvement is a never-ending process! A brand-new model of the popular 6SN7-GTA, with all the latter's superior performance . . . plus a 600-ma heater with "series-string" warm-up time.

Completely interchangeable with the 6SN7-GTA. Also, because of its "series-string" heater, a tube that's universally adaptable for servicing old or new sets.

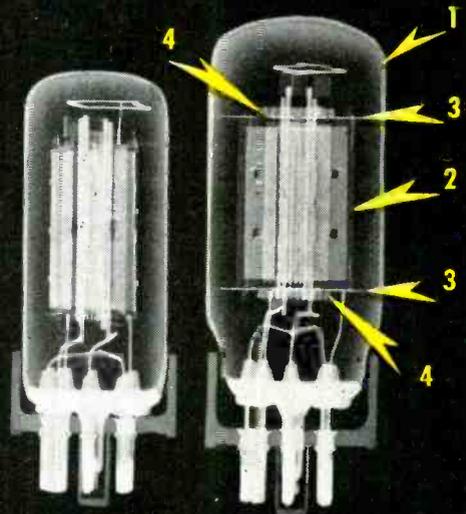
● The prototype 6AV5-GT had a tendency to run hot, which shortened tube life. X-ray pictures at right show important improvements in G.E.'s new 6AV5-GA that add up to more hours of service.

The new tube operates safely at high temperatures, withstands high pulse plate voltages, and is sturdy in construction. All these advantages are integral in the 6AV5-GA's new design.

Also—like other Service-Designed Tubes—the 6AV5-GA is high-voltage seasoned. *Every tube* is pulse-tested at absolute max voltage ratings.

Your can count on 6AV5-GA dependability and long life! Install this tube to improve still further your standing with your customers!

X-RAYS SHOW WHY
TUBE LIFE IS INCREASED



OLD 6AV5-GT NEW 6AV5-GA

1. New bulb is much larger, radiates more heat. Tube runs cooler and gives longer service.
2. Redesigned plate has larger area, reducing internal operating temperature of tube.
3. Redesigned micas cut down on high-voltage arcing.
4. New beam shields mask off stray electron bombardment from micas and bulb. Help stabilize tube performance.

● G-E SERVICE-DESIGNED TUBES cost no more than others . . . yet give far superior service. Fully interchangeable with prototypes, they perform better, and tube life is longer. You *gain* when you install them, because they enhance your reputation as a TV service technician.

You *save* in fewer customer call-backs—in reduced tube inventory needs, due to the fact that G-E SERVICE-DESIGNED TUBES give top performance in

all television chassis, regardless of the make.

Now 14 types are available, covering a wide range of sockets. G-E SERVICE-DESIGNED TUBES—a popular success from the start—are nationally advertised. TV owners know about them, ask for them. *Profit* by selling and installing these proved high-quality tubes, obtainable only from your G-E tube distributor! Tube Department, General Electric Company, Schenectady 5, New York.

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All FP Capacitors are Mallory. There are imitations, but no substitutes. Only Mallory FP Capacitors have these features . . . developed by Mallory and accepted for years as the industry's standard of performance by manufacturers and service men:

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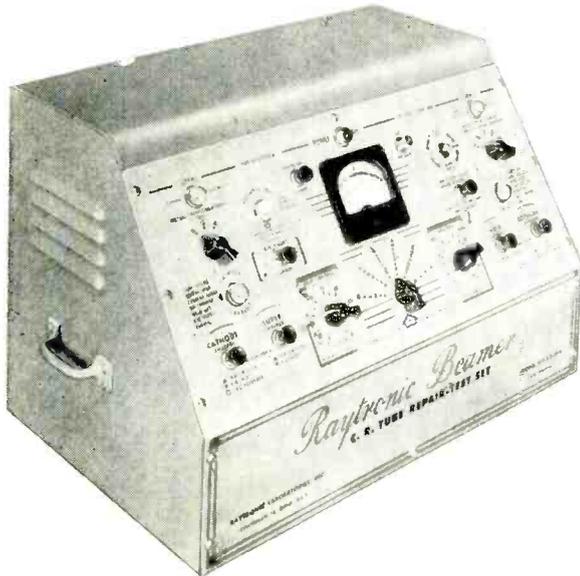
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these RAYTRONIC "firsts"



STOP the KIDDING about TV picture tube service!

There will be millions of dollars worth of new, additional, profitable TV picture tube service business this year. There is ONLY ONE way to assure yourself of a big piece of this non-competitive business:

RAYTRONIC BEAMER "firsts"!

- 1** FIRST and ONLY COMPLETE TV picture tube test and repair instrument ever developed.
- 2** FIRST and ONLY instrument having the critical gas check circuit for determining expected life of picture tube.
- 3** FIRST and ONLY instrument to be tested, used and endorsed by leading TV set manufacturers and distributors in U.S. and Canada.
- 4** FIRST instrument to enable service operators to guarantee their TV picture tube tests and repairs.

The RAYTRONIC BEAMER makes the 8 tests required to show true condition of any TV picture tube; it makes the 5 repairs needed to reactivate 85% of the repairable tubes.

This instrument is a highly engineered, precision-built, electronic instrument that is enthusiastically used by THOUSANDS

of progressive service operators. You cannot obtain the Raytronic standards of performance from any other instrument.

Raytronic Beamers are sold by prominent and conscientious distributors representing top quality products, on the basis of their own tests and the endorsements of their set manufacturers.

Compare the Raytronic Beamer feature for feature with ANY unit claiming to perform similar operations. See the Raytronic Beamer demonstration TODAY!

RAYTRONIC LABORATORIES, INC.
9701 READING ROAD CINCINNATI 15, OHIO

WHO'S THE ONE YOU TALK TO

It's a

AND WOMEN BUY

A Crossley, Incorporated survey shows that this Seal influences 53% of all women in their purchases of everything from raisins to refrigerators . . .

and . . . *CBS TUBES* have the Good Housekeeping Guaranty Seal! When you

**SO-O-O-O
ADVERTISES**

CBS is the *first and only tube* manufacturer to address its advertising to women.



CBS tubes will be consistently advertised throughout the year in *Good Housekeeping* and *Life*, reaching 17,171,419 readers every time an advertisement appears!

CBS-HYTRON Main Office: Danvers, Massachusetts • A DIVISION OF CBS . . . THE COLUMBIA BROADCASTING SYSTEM, INC.

A member of the CBS family: CBS Radio • CBS Television • Columbia Records • CBS Laboratories

ON MOST SERVICE CALLS?

Woman...

... BY THIS SEAL

install CBS tubes you leave no question in your customer's mind about the quality of the tubes you supply. Keep *your* customers happy — with CBS tubes, the tubes with the *Good Housekeeping Guaranty Seal* on the carton.



... CBS TO WOMEN

And it's women you talk to on most service calls.



Quality products through *ADVANCED-ENGINEERING*

CASH IN WITH THIS NEW **CBS TUBE** **SALES PROMOTION KIT!**

Ask your distributor for special offer, or mail coupon *today.*

CBS-Columbia • CBS International • and CBS-Hytron

CBS-HYTRON, Danvers, Mass.
Please rush me the new CBS TUBE SALES PROMOTION KIT, PA-70, containing:

1. Three Truck Posters
2. Metal Frame for Truck Posters
3. Window Display with three-dimension Giant CBS Tube Carton
4. New Inside/Outside Decal

I enclose \$2.00 to cover the cost of this kit.

Name.....
(please print name and address)

Street.....

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

Two Centralab P.E.C.* Kits that save time, cut your parts investment

1.

Centralab Plasti-Pak No. PCK-45

gives you a handy shop stock of 45 Printed Electronic Circuits

\$24.00

including hinged-lid plastic container
suggested net price



With Centralab's PCK-45, you have at your fingertips the equivalent of a stock of 106 ceramic-based resistors and 133 ceramic capacitors.

You're glad you have this kit, every time you run up against one of the millions of old radio and TV sets that were built before P.E.C.'s were used. Instead of wasting time trying to locate a shorted or intermittent component, you simply replace an entire section of an old-style circuit with a single P.E.C. — and that's that!

That makes sense, doesn't it? You don't replace only one old, worn-out component; you replace all the components of the same age, easily and inexpensively — and you end another service headache.

Centralab's Plasti-Pak No. PCK-45 can be one of the handiest service "tools" you have in your shop. Order one from your Centralab distributor.

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

2.

Centralab Plasti-Pak No. PCK-18

\$9.00

including hinged-lid plastic container
suggested net price



You get 18 Printed Electronic Circuits — nine of the most popular types in ratio to usage. Enough circuit elements to replace 42 old-style resistors and 52 old-style capacitors. Order from your Centralab distributor.

LETTERS To the Editors

Licensing Problem

EDITORS, TECHNICIAN:

If we had licensed techs, how would they be licensed? By years of experience? By test? What about a man who's in business and has men working for him? Suppose he's doing well and loses a technician because of an exam? Many men can do the work but couldn't pass a test.

PAUL GATES

Pacific Grove, Calif.

Vertical Chassis Design

EDITORS, TECHNICIAN:

I'm sounding off like a pessimist but, about the new vertical chassis, how does a technician remove and replace a defective component underneath the deflection yoke with greater ease than in a horizontal chassis? These parts, as you know, are in the i-f strip. All in all, though, the advantages of this design outweigh the disadvantages.

JOHN L. MANCINI

Winthrop, Mass.

How Many Per Day?

EDITORS, TECHNICIAN:

Most provocative (January 1955) was the item on page 15 about a service group that "only turns out 6 TV sets per day per man." Please call this person's attention to your request for articles, because I would like to know how he operates.

I have found that, if it is necessary to put a set in the shop, it is advisable to run a test on all tubes and clean the chassis and cabinet. An hour or more can be spent in removal, basic checking and ordinary adjustments. "On the bench" is not very definite. Just what is the procedure? What is done in the home, in the shop, before, during and after a set is "put on the bench"? What equipment is supplied to outside men?

JOSEPH A. KUCHER

Upper Lisle, New York

Theme's the Same

EDITORS, TECHNICIAN:

Our four-man shop only averages three sets per day output per man taking all comers. We wonder how many sets in the shop you know of are sets brought in by customers, where only tube changes are necessary?

We have always felt that five sets per day per man would be a good average. We are certainly interested in raising our shop output and would like to correspond with your friend who averages six to get his ideas.

If you publish our average, please do not mention our name.

T. A.

Lincoln, Nebraska

Centralab

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A Division of Globe-Union Inc.
902 D E. Keefe Ave., Milwaukee, Wis.

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

Name.....

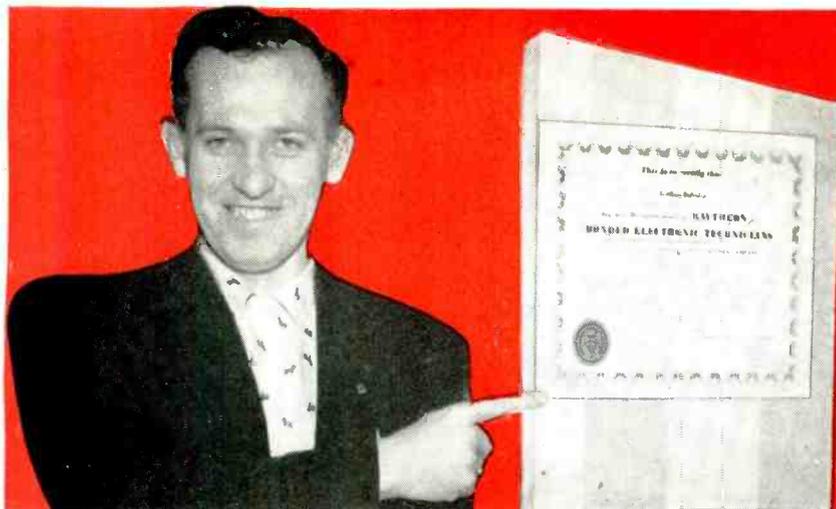
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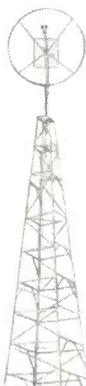


"Your Raytheon program* has gone far toward the needed understanding between customer and dealer..." says Bailey Root of ROOT TELEVISION

One need only glance at these pictures of ROOT TELEVISION'S modern, efficient looking operation and competent staff of technicians to realize that here is a well organized, dependable, profitable Radio-TV service business.

We're proud that they are Raytheon Bonded dealers, and happy that we could play a part in their success story. Why not ask your Raytheon Tube Distributor if you can qualify for the Raytheon Bond that helps thousands of Service Dealers throughout the country gain prestige and profit? If you can qualify, it's yours for the asking.

*The RAYTHEON Bonded Electronic Technician Program



"Let ROOT get to the root of your trouble"

Root television

317 MONMOUTH STREET • NEWPORT, KENTUCKY
 • CO lonial 5864
 • AX tel 5555

Raytheon Manufacturing Co.,
 55 Chapel Street
 Newton 58, Massachusetts

Gentlemen:

We have just received our 1955 Raytheon Bond Certificate for which we extend a most gratified "Thank you".

As one T.V. - service dealer we appreciate the effort which your entire organization has put forth over the past years in behalf of we dealers. We for one, feel that your program has gone far toward the needed understanding between customer and dealer. You are setting a perfect example for other tube and part manufacturers to follow. Keep up the good work.

Yours very truly,

Bailey S. Root
 Bailey S. Root

BSR/bb



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Receiving and Cathode Ray Tube Operations
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ELECTRONIC
PARTS**

**A GENERAL MOTORS
VALUE**



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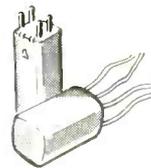
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VIBRATORS



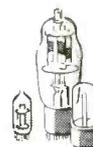
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COILS



CAPACITORS



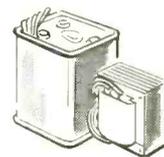
RECEIVING
TUBES



PICTURE TUBES



CONDENSERS



TRANSFORMERS

*Here's an
Important Step
towards improving your
electronics business!*

Get acquainted with the Delco line. You'll find that the advantages of doing business with Delco and General Motors extend far beyond the initial handshake. Both of these great names have long been respected throughout the industry. Add to this the sales advantages of Delco's fine line of electronic parts, and you can see how important this line can be to your business.

In addition, Delco is the sole source for special application parts used for original

equipment replacement for a ready-made market of over 13,500,000 Delco auto radios . . . also, the source for the most important universal replacement parts group.

Another part of Delco's service is current bulletins and field schools to keep the industry well posted on latest developments. And, there are still other advantages in handling the Delco line, so see your Delco Electronics Distributor today and get all the details.

A GENERAL MOTORS PRODUCT



A UNITED MOTORS LINE

Sylvania "600 ma" Tubes

99.7 proof*

FOR SERIES-STRING TV



* In a 15-tube series string, analysis proved that 99.7% of all probable combinations of Sylvania types operated within 2% of the heater-current design center. Sylvania's tight heater-current limit is one of the most important contributions to tube performance for series string operation.

Best for Service In 4 big ways

WHEN YOU SERVICE TV SETS using series-string-heater tubes, don't take chances on call backs. Here are four big reasons why only Sylvania "600 ma" tubes give you the uniform, dependable performance that insures customer satisfaction.

1. Less heater voltage variations — even distribution of tube voltages

throughout the series string insures better tube life.

2. Less heater burn-outs — heater burn-outs are reduced because the controlled heater warm-up of 11 seconds is uniform from tube to tube throughout the circuit.

3. Less time for normal set operation — controlled heater warm-up brings set to normal operation in less than half the time.

4. More uniformity — because Sylvania makes everything but the bulb, quality is controlled from raw materials straight through to finished product.

Write for this handy reference guide to Sylvania tubes for series string television. It's both a brochure and wall chart! Write Department D39N.

All Sylvania TV PICTURE TUBES now have heaters specially controlled for series string operation!



SYLVANIA

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TECHNICIAN

& Circuit Digests

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

Needed: A Bold Credit Plan

While talking to a number of TV-electronic techs around the country, we kept running into the following two problems: Customers are often reluctant to have their TV receivers repaired if the estimate is high, and service outfits are operating with a very tight margin between cash income and cost of parts and overhead. It was indicated that both problems could be eased if some form of financial credit were made available to service technicians.

To obtain some insight into the dollars-and-cents involved we instituted a national survey of service shops, and included the following five questions. Here are the results.

Answers Highlight Problem

1. *What is your average bill for a typical TV servicing job?* Replies showed \$8.00 list for parts plus \$9.85 for labor. The \$17.85 total is higher than has been estimated by some other sources.

2. *At about what amount, on a TV job estimate, do you encounter customer reluctance to have job done?* Answer is \$32.50.

3. *What percent of total number of jobs do customers turn down because estimated bill is too high?* The rather impressive amount of 10.6% shows that a lot of people are either shopping around a great deal or letting their set's performance remain poor.

4. *How much does this loss of business amount to monthly?* \$180 is the average reply. Multiply this amount by 12 months and 50,000 shops and you can see there is over \$100,000,000 worth of annual servicing revenue floating around in no-man's land, either not being done or going to price-cutting operators.

5. *How much extra monthly business do you estimate you could get if a credit plan were available to you which permitted customer time payments, with you getting paid for the job immediately from a finance*

company? Here is the crux of the matter. The answer is a walloping \$443. Even if this estimate is optimistic, it still points up the crying need for a sound financial plan for technicians.

Can Plan Be Financed?

Since there appeared to be sound basis for a plan, we checked with several finance companies to see if we could set up a credit arrangement to make your financial life a little easier. Some of these lenders turned the idea down because they do not handle "service receivables," that is, bills for work done rather than goods sold. But several other finance companies expressed serious interest, and suggested that one of the following would have to be done:

1. Loans could be made directly to individual service shops on the basis of shop equipment as collateral, and accounts receivable as an indication of forthcoming income. The tech could then extend time payment credit to his customers on big jobs, but would be responsible for collecting the payments himself. This could prove troublesome.

2. A more effective program envisions group financing through a centralized agency. Lenders are much more eager to deal with the single large sums which would be involved here. The logical clearing house could be sponsored by replacement parts manufacturers or service associations. Each tech would lump say \$200 of jobs under one loan, and, in a given community, combine his amount with 100 others. With \$20,000 involved, the central agency could afford to relieve individual techs of the burden of bill collecting.

Many detail problems remain to be worked out, but the important point is that a very real need for credit aid to technicians does exist. Through letters and personal conversations we urge you to encourage your associations and suppliers to set up a financing plan.

Tuning In the

REST ASSURED—OR INSURED—with a new type of policy being issued by the Security-Connecticut Insurance Companies of New Haven. It provides comprehensive coverage for "most service and processing firms that work on property belonging to others." The contract provides protection beyond loss or damage of the customers' goods due to negligence of the "bailee" (legal parlance for the owner of the service shop, in this case). Some items covered are loss or damage by fire, lightning, explosion, collision of vehicles, theft, storms, civil commotion. Protection extends from the time that goods are picked up to the time they are returned to the customer.

LOTS OF TV SETS ARE BEING SOLD these days, but the buying rate has slowed down a bit in many localities. Meanwhile, the public is demanding better sets, and wanting them at a price. Nonetheless, the trend toward consoles, consolettes and better cabinetry is a healthy sign. That more than 7 million B&W TV receivers will be sold this year seems like a safe bet.

CONFIDENTIAL REPORT OF COMPLAINTS made to the Better Business Bureau in Washington, D. C. confirms a long-held and oft-repeated conclusion: it's always that handful of unscrupulous operators who give us all a black eye. In one month, 70 complaints on TV sales and service were made to the BBB. About 550 service shops of varying size, according to estimates, operate in the nation's capital—but most of the complaints were against only 10 of these shops. In other words, complaints were non-existent or negligible for more than 98% of the service installations! What's more, this figure does not take into account how many of the 70 complaints were justified and how many had no basis.



NO STICKY FINGERS IN THE TILL is the bright idea behind one plan for closed-circuit TV. "We have a client," says a letter received by the editors, "who is interested in a closed circuit camera to be used between the cash register system and the main office in a supermarket." Guess someone wants to start a private Don't-Break-the-Bank-show.



Thumbnail size mercury battery has smaller diameter than a dime.

BATTERY DESIGN is scheduled for a new look as an outgrowth of present-day advances in practical transistor applications. Reduced voltage and current-drain requirements will permit smaller size, to go along with the miniaturization made possible by the transistors themselves. General Dry Batteries, Inc., for example, announces a mercury cell less than a quarter inch thick, little more than a half inch in diameter, and weighing less than a sixth of an ounce. At a drain of 2 ma, it delivers 200 hours of useful life with a 12-hour day test cycle. The "625" is intended for use in transistorized hearing aids.

MANY OF THE BIG SHOPS ARE still worried over certain of their technicians who do free-lance work on their own in their spare time. It's considered to be unethical, but many operators don't know how to cope with this problem.

ATOMIC CLOCK, called the Cesium Atomic Frequency Standard, has been announced by MIT's Lab. for Nuclear Science. It's said to be so precise that, if it had been ticking away since the time of Christ, it would be only half a minute off today. Timing is controlled by the oscillation of electrons in the cesium atom at a frequency of about 9192.632 mc.

YEP, SHE'S STILL AROUND, and we're referring to that certain technician's dumb girl friend. She thinks the Better Business Bureau is a horse parlor, that the term piezo refers to an Italian pie of sorts, and that a coax cable is a telegram in which a guy begs a dame to elope with him. And the other day she was so embarrassed! She told some people that her boy friend was a pig, when all the time she meant to say that he was a Ham. The next thing we know this frail may be going about telling customers that her BF shouldn't take money for making repairs because he's an Amateur.

Picture



ODD & INTERESTING DEPARTMENT: Men are much more critical of picture and sound in TV than are women, most technicians agree . . . Although we have no figures to back it up, all evidence obtained in talking with technicians in many parts of the country leads us to believe that there's been a steady decline in number of people bringing in radio and TV tubes for checking . . . Some shop owners say that the slow-down in fix-it-yourself activities is due to the satisfactory economic picture now existing . . . A Southern service department manager lowered the long repair bench in his shop, and increased his output 20 percent. Seems the old bench was too high, a condition resulting in arm fatigue.

PLENTY OF PRICE-CHISELING customers having grief with brand-new sets bought from shady operators are bringing such receivers in for service, and now and then expect the service department to fix 'em for free. Talk about crust!



PROJECTED TV PICTURES measuring up to 6 ft. by 8 ft. originate in a 5-in. picture tube, the 5AZP4, recently announced by RCA. The crt is intended primarily for closed-circuit operations. The super-bright tube will take up to 40,000 volts for its second anode.

TECHNICIAN RHYME—ANTIDOTE FOR TOP-BLOWING. Part of one's job is to put up with pesky kid and nippy pup, and adults, too, who often beef about the charge—yet all such grief—will be encountered now and then by television servicemen. In such tough spots the guy who burns, simply ups and overturns the applecart filled with good-will, and becomes known as just a pill. Most folk are reasonable today, and customers are the ones who pay the wages and the overhead, and keep the shop out of the red. So treat 'em all alike and take the stale bread fare 'long with the cake.

Grippers and pests may not be funny, but when they fork over their good money—try to take it with a grin, and not just merely on the chin. Such technique often works out grand and has 'em eating from your hand.

THE BIG DRIVES BY SOME of the tube & component makers to publicize the technician, building up his prestige, merit the support of all shop operators and dealers. Money being spent in this direction is ringing a bell with the consumer, and will help counteract the adverse publicity in the press, which, though aimed at the gyp, leads many to believe that all repairers are shady.

WITH RATE OF DISPUTES OVER BILLS increasing everywhere, and stimulated to a great extent by the "bad press" technicians are getting, shop operators are itemizing bills more than ever before. Many are insisting that customers be given a clearly-understood estimate. Some, too, like The Ethical Radio Shop of Lynbrook, N. Y., have prominently-displayed signs stating the charges made for various services and parts.

SMALL BUSINESS MEN—and that includes how many of the nation's TV service techs?—will be interested in a helpful booklet put out by the Small Business Administration, Washington 25, D. C. Title of the publication is "Management Aids for Small Business, No. 32."

GOOD SERVICE IS BEING SOLD HARD these days as retailers, beset by price-cutting competition in the sale of TV sets and radios, are bearing down heavily on their service facilities, know-how, and reputation. This activity is certain to stimulate repair volume, and is helping those profit-minded dealers to hang onto sales they might otherwise lose to the price-cutters.

COLOR-TV STILL DRAGGING, and it now appears that early optimistic estimates of sales will have to be revised downward. In the meantime, though, the nation's technicians have been doing plenty of reading, and are ready for action when color really gets rolling. The knowledge and know-how you fellows have been accumulating will not be likely to get out of date soon, since no major changes in circuitry are foreseen in the near future. Better sales prospects are probable this Fall.

CALENDAR OF COMING EVENTS

- April 29-30: New England Radio-Electronics Meeting, Sheraton Plaza Hotel, Boston, Mass. Sponsored jointly by the Boston & Connecticut Valley Sections of The IRE.
- May 16-19: The 1955 Electronic Parts Show, Conrad Hilton Hotel, Chicago, Ill. Sponsored by Assoc. of Electronic Parts & Equip. Mfrs., Radio-Electronic-Television Mfrs. Assoc., West Coast Electronic Mfrs. Assoc., National Electronic Distributors Assoc., Sales Managers Club (Eastern Group).
- June 6-8: The Fourth Annual Convention and Trade Show for the National Community Television Assoc., Inc., Park Sheraton Hotel, New York, N. Y.
- Aug. 19-21: National Alliance of Television & Electronic Service Assoc. National Service Show, Hotel Morrison, Chicago, Ill.

Service Tests for Operation

Defects in AGC Systems May Show Up as Improper Behavior in

JAMES McROBERTS

• Fading or negative pictures are symptoms familiar as the result of improper agc action. Faulty agc can cause other symptoms less readily recognized, such as: 1. Loss of sync—usually vertical—on strong stations. 2. Impaired interlace on strong and probably medium signals. 3. Poor shadow detail, poor blacks and near blacks. 4. Bad highlights, whites and near whites. The clue to agc difficulty lies in the fact that symptoms are not present on all stations but only on those of certain signal intensities.

Tests will be described whose purpose is to ascertain whether or not the agc is properly performing its mission. Further tests will be described for a simple system, which will include some general tests for more complex systems with keyed and clamped agc. All the tests may be performed with an ordinary portable type vtvm or relatively *high resistance* voltmeter. They may be performed in the customer's home or on the bench with equal ease. Before giving these tests, we will consider some basic design requirements, since violation of these requirements results in some of the symptoms previously mentioned:

1. The least troublesome requirement is imposed by poor action of a diode picture detector (such as a 6AL5) whenever the input signal is very low—say below about a half volt. Therefore agc should keep all strong stations to a certain level of signal intensity (for reasons to be

described) but should *not* reduce the intensity of stations having a weak signal and producing less than a half volt input to the detector.

2. As Fig. 1 illustrates, the picture detector's output is the input to the video amplifier which usually has a contrast control in it to make some variation in its output for a more satisfactory picture. An important fact is that the contrast control does *not* reduce the input to the video amplifier. For this reason positive peaks of a strong signal may be clipped off completely or compressed, and negative peaks may drive the input (control) grid beyond cutoff, also with consequent clipping, or drive into a non-linear part of the tube's characteristic curve with resulting compression.

Results of Clipping

Clipping by either positive drive or by cutoff in these ends of the signal will result in bad blacks and loss of sync pulses (if the polarity of the signal having the sync pulses is affected) while the compression or cutoff of the signal polarity opposite to the sync pulses results in a deterioration of the whites or highlights of the picture. Since the whites usually extend only to 10-15% modulation, the effect of compression on the whites is not so easily observed.

3. The sync circuits are designed to work with a relatively constant signal input—the composite video signal. If agc does not hold the in-

put to the picture detector reasonably constant, then too much variation may be present in the sync take-off, with consequent sync trouble due to a form of overloading. Some manufacturers employ an adjustable trimmer condenser to cut down the sync input. This is called the 'sync locking range' adjustment, and it helps compensate for agc deficiency.

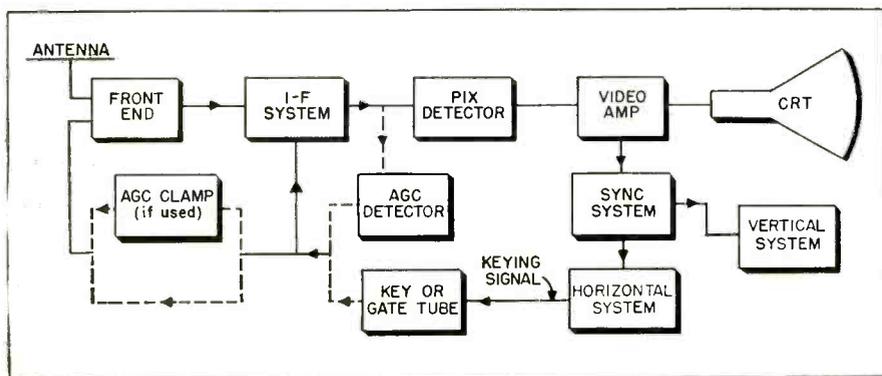
In summation, the agc must provide a relatively constant input to the picture detector of the i-f signal or else there will be symptoms—somewhat unusual symptoms—peculiar to some definite range of signal intensity, and which may occur in other sections of the receiver, such as the sync circuits. We proceed to tests designed to find out whether or not the agc is performing its job properly:

The test for proper agc action: If we vary the input signal to the antenna terminals, we can measure the strength of the developed voltage across the output of the picture detector by an ac voltmeter, or we can measure the voltage developed by the agc detector across its load resistor. Measuring the developed agc voltage is less fundamental than measuring the picture detector's output voltage, and may be further complicated by a delay bias or circuit malfunction. Therefore, it is suggested that the ac voltmeter be hooked up as Fig. 2 shows with a blocking condenser to prevent dc voltage from being registered. (Some ac meters respond to dc, too.) Alternatively, the meter may be connected as shown, but on dc with the blocking condenser omitted. This latter connection is less troublesome and meters the rectified voltage across the detector load.

Use of Signal Generator

In the shop, one might use a signal generator and vary its output controls to produce a variable attenuation or decrease of the signal input to the antenna terminals. In the field, this is not so practical. However, several means exist for varying the input signal by using

Fig. 1—Simplified receiver block diagram shows other stages and functions related to agc.



of Automatic Gain Control

Sync or Other Stages, As Well As in Video Portion of Receiver

the station signals:

1. The most simple technique is to switch to different channels and note the voltmeter reading. A variation of about two to one is permissible for voltmeter connection to the pix detector output—either ac or dc; the variation of the agc output may be more complicated and may not give a conclusive answer. A variation of this test includes switching to a blank or unused channel, on which there should be no output signal present since the presence of a reading—an output—means that you are metering something other than a voltage due to a station. (About a half-volt contact potential may be present.) Naturally, the alert technician immediately in-

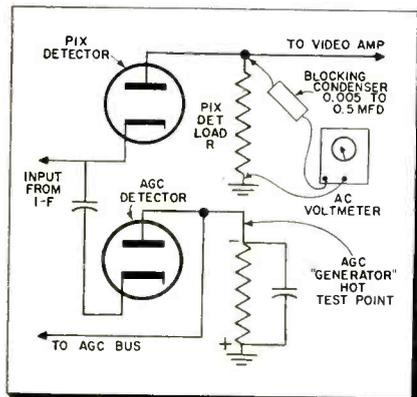


Fig. 2—Set-up for monitoring agc output.

quires into the presence of an output with no input.

2. Some localities do not have the large number of stations present in the metropolitan areas and can not make the variation test mentioned, so resort may be had to a different procedure. The input signal may be varied on a strong signal by removing one of the antenna leads, which may be touched to its antenna post or disconnected from it, observing the meter meanwhile to note the range of variation.

3. The aforementioned method may work all right on a balanced line, but some lead-ins or transmission lines are coaxial. Here too, we have an alternative. We may connect a resistor in the lead-in central conductor and, by short-cir-

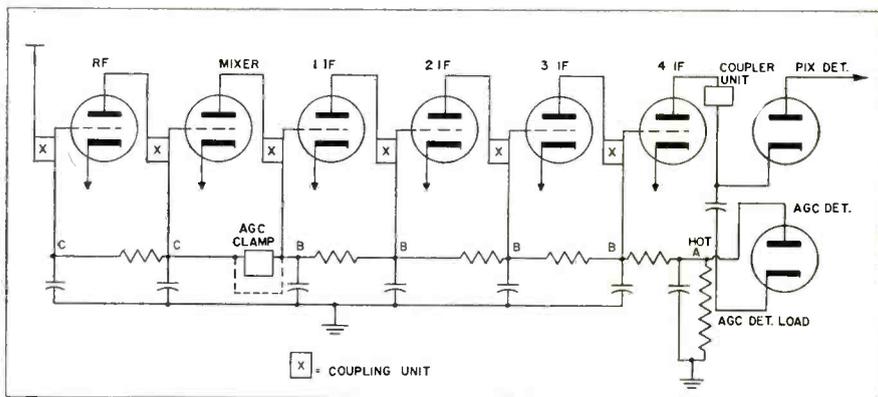


Fig. 3—Skeletonized diagram showing agc detector and stages that may be controlled by it.

cutting it, produce a variation. The value of the resistor depends on location and signal strength, so an exact value cannot be given. A guide is present in the picture, which will show the typical signs of a weak signal with great reduction, and less pronounced signs for a moderate reduction of signal intensity. A balanced line need not have two resistors included or a pad inserted since we are testing for agc, not for ghosts, etc.

Test Procedures

Once again, it is emphasized that the function of the agc is to hold the picture (video) detector input relatively constant over a wide range of input signal variation from the antenna. A variation of several thousand to one of the input to the antenna terminals should produce a variation of only two or three to one at the video detector output. Greater variation means improper agc action due to improper setting of an agc control if any, defective components or tubes, or circuit irregularities like leaky condensers, changed resistor values, etc. which must be traced down. To these tests on a simple agc system we now proceed:

Inspecting the block diagram of Fig. 1, the reader will be able to visualize that the agc detector acts like a dc generator to develop a dc voltage proportional to the strength of the incoming signal. This voltage is subsequently fed to controlled

grids of the r-f, i-f, and mixer sections to reduce their gain with increase in signal strength. In the case of *delayed agc*, some means is provided to bias the agc detector so that it does not conduct or does not produce a voltage until the intensity of the incoming signal can over-ride this bias. This delay action permits full gain of the amplifier tubes on the weakest signals. An appreciable amount of such a delay bias may prevent agc voltage from being developed with the consequence of overloading of set functions beyond the video detector by strong signals. Consequently, the amount of the 'permanent' voltage on the load resistor of the agc detector should be measured with no signal input—on a blank channel for example. Any extreme variation of this voltage from that called for on the schematic should be investigated immediately.

Test Points

Fig. 3 gives a skeletonized diagram of the agc system and the possible controlled grids of the high frequency amplifiers. Note that not all may be so controlled. The first point to connect the voltmeter is point "A" of Fig. 3. Then perform the signal intensity variation using medium and strong signals, if a delay voltage is present. A lack of variation in output indicates trouble in the circuit of the agc detector. (Note that, since we are hunting
(Continued on page 57)

Performance Problems in

Critical Design in Tuning, Oscillator and Conversion Stages

A. R. CLAWSON

• The nature of the portable radio presents some problems other than those arising from compactness or from the power supply. We will treat problems involving the tuning and frequency conversion stages of the set.

The r-f stage may not exist as a separate entity in the portable, but the r-f circuits of the mixer are invariably present. The input signal picked up by the loop antenna—frequently the mixer tuning inductance also—is rather scanty contrasted with the home radio set's larger loop and possible separate r-f stage. Hence, every effort should be made to make the r-f gain as large as possible.

Careful adjustment of the parallel trimmer capacitor on the tuning gang will do the job insofar as the high frequencies are concerned, provided the Q of the circuit is high enough. A very good idea is to check all soldered joints in the r-f circuits for high resistance. Perhaps the best method of checking is resoldering ALL such joints, as an increase in resistance greatly lowers the gain. Actually a *tenth ohm* increase in series resistance will often greatly decrease signal pickup.

More technically, one might note that gain is proportional to the Q of the coil. The Q is determined

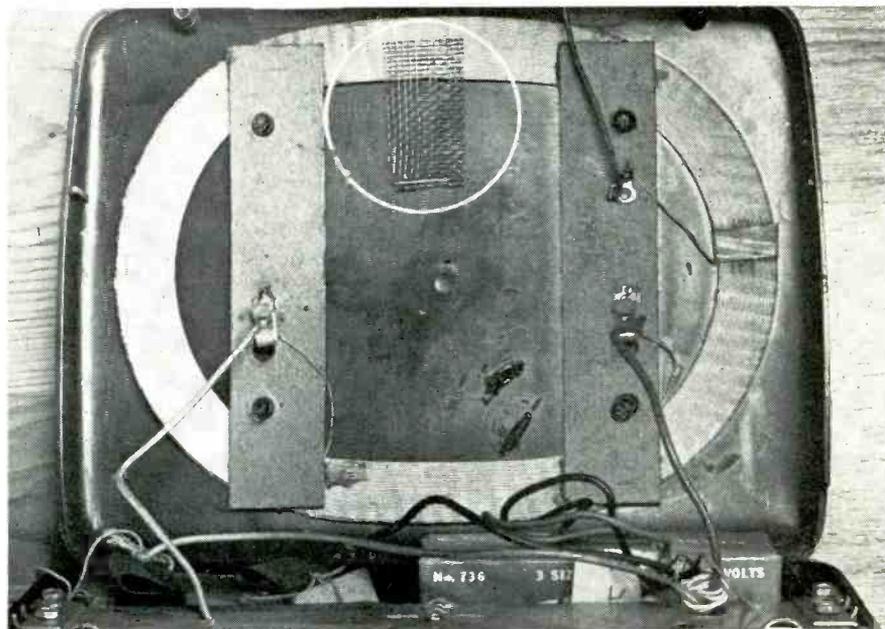


Fig. 2—How a strip of screen is used to tune loop antenna. Metal strips may also be used.

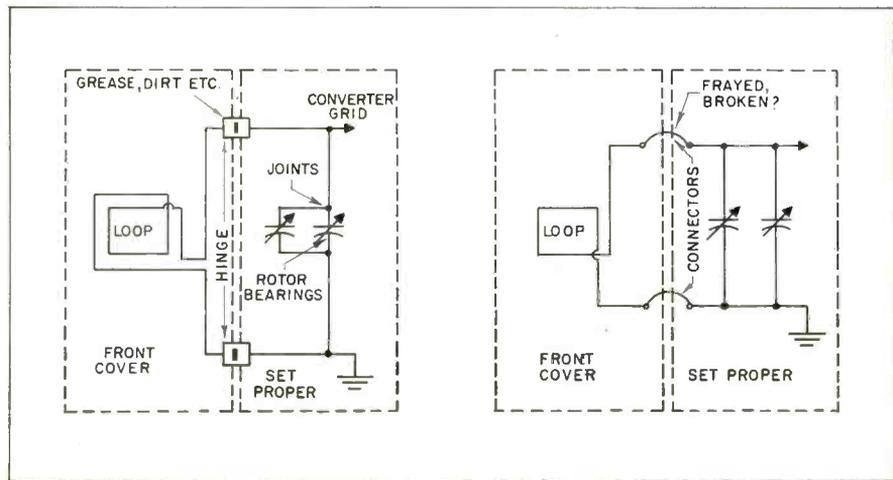
from the following formula: Q equals $(6.28 \times F \times L)/R$, where R is the series resistance. Obviously, R must be kept low for good gain. This is even more desirable at the *lower* end of the broadcast band because, as the formula shows, Q is even lower when the frequency, F , is reduced.

Another common source of high frequency resistance is the lead or leads from loop to set. Two such

leads are frequently encountered as tinsel or litz wire. Any suggestion of fraying or breaking should be sufficient cause for renewal. The cover hinges are also often employed as conductors. These may have collected quite an amount of grease and dirt during normal service. These *insulating mediums* should be removed with benzine and contact lubricant. Fig. 1 shows the typical circuit of the average portable with the points to which attention should be given marked.

The majority of portables do not have provisions for tuning or adjusting the low frequency range. Although the r-f circuits are relatively broad, the low frequency pickup may be materially improved in many instances by an improvised method of tuning the loop and/or other r-f inductances. Ordinary screen wire may be obtained in both copper (or brass) and iron base. A small strip of such screening may be moved across the loop until maximum signal is obtained. The strip of screening may then be affixed permanently in place with a couple of dabs of Duco cement or its equivalent. The *iron* wire will *lower* the resonant frequency of a loop; while the copper wire will raise the frequency. Pieces

Fig. 1—Two types of connections from loop on cover to main chassis that often give trouble.



Portable AM Receivers

Often Presents Knotty Problems for Service Technicians

of tea strainer screening from the dime store are very satisfactory for this service.

Loop Tuning Method

The photograph of Fig. 2 illustrates the method of tuning a loop with a piece of screening. While this tuning will not upset the high frequency trimmer adjustment appreciably, it should be rechecked and then the low frequencies rechecked prior to firmly anchoring the screening in place. This cycle between low and high frequencies is commonly employed in oscillator low and high frequency adjustments. If the set has an r-f coil for an added r-f stage, its low frequency should be tuned in this manner if found wanting.

As a matter of routine, the oscillator should be aligned at the high and the low frequencies. In the absence of a low frequency adjustment, the l-f tuning procedure previously outlined will materially improve operation.

A frequent complaint of portable radio oscillators is failure to oscillate at the low frequencies. A frequent cause of this complaint is the high impedance of the screen grid bypass capacitor, which is a part of the oscillator feedback circuit. In numerous case histories of this type

of complaint, the remedy has been the increase in the value of this capacitor. Fig. 3 shows the actual circuit of a typical oscillator at A, and the equivalent circuit at B.

Failure to oscillate, or insufficient oscillation (as evidenced by low grid bias) at the low frequencies may be due to insufficient value of the grid capacitor of the oscillator tube. The grid coupling capacitor may be in the form of a gimmick comprising a single turn of wire. Two or three turns may be required to yield a satisfactory output at the lower frequencies. This gimmick is marked on the schematic diagram of Fig. 3A. Too much oscillator voltage may be developed because of too high a value of the oscillator's grid leak or grid resistor. An ohmmeter check will reveal this difficulty.

Bias May Be Touchy

Many portable radio sets employ a form of oscillator feed to the automatic volume control (avc) bus to provide some bias. Bias is more easily obtained in this manner to avoid difficulty with directly heated filaments. The circuit showing this feedback or supply resistor is shown by Fig. 4. The oscillator grid voltage will have a very pronounced effect on the entire gain of both r-f and i-f stages in such an arrangement.

The time constants of the oscillator grid circuit must be checked whenever such an arrangement is encountered and low gain is the symptom.

The self bias for the oscillator may be disconnected, and a bias box or bias battery substituted for the oscillator feed. The circuit can then be checked for adequacy of gain with a signal generator. If the gain so obtained is adequate, then the trouble has been localized and the technician knows that he must adjust the bias feed oscillator or the adjustments of the time constant in the oscillator gain control circuit—the grid capacitor and the grid resistor.

Another cause of low oscillator output is the screen supply resistor or any other screen dropping resistor(s) encountered in the B-plus circuit. The screen grid of the oscillator acts as a plate, as depicted in Fig. 3B, and this plate equivalent must have sufficient B-plus to oscillate strongly enough. The low voltages of portable operation aggravate this condition so that sometimes the tolerance variations of the dropping resistors may be excessive even within the rated 20%. Matters are usually satisfactory if the tolerance is on the low side; that is, a lower resistance will pass, but the converse is not necessarily true. •

Fig. 3A—Typical oscillator in portable. B—Redrawn equivalent. Plate bypass returns r-f to cathode; screen functions as plate.

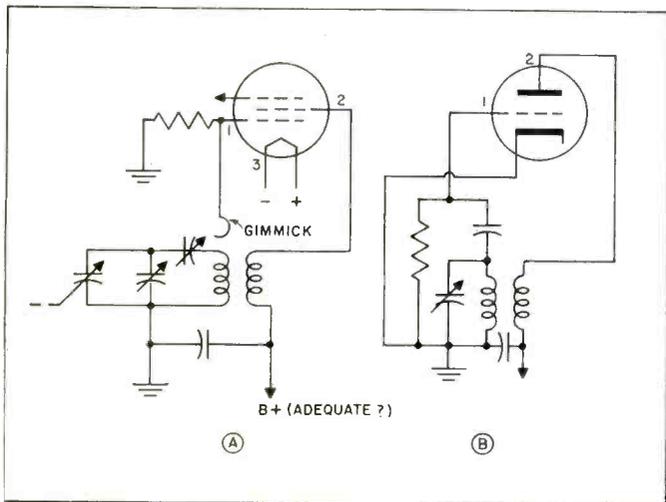
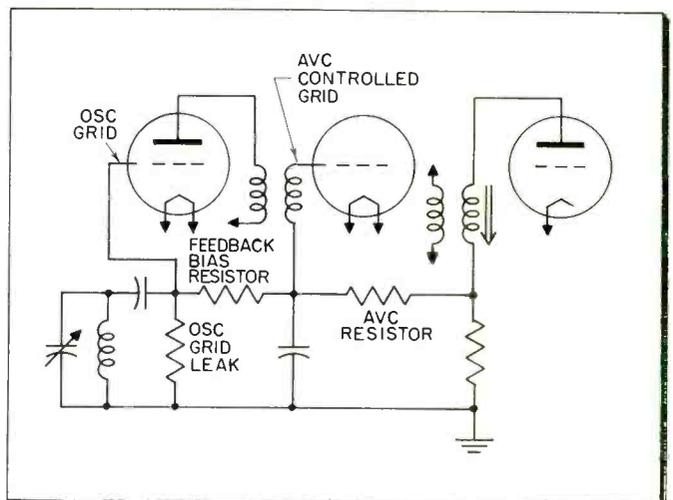


Fig. 4—The grid bias for the oscillator may also be employed as the minimum bias for a stage that is also controlled by avc.

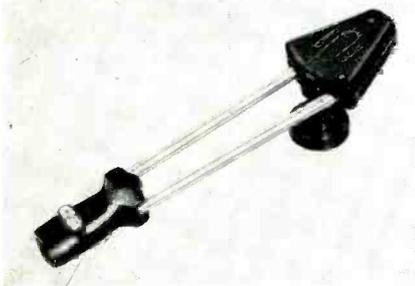


Tone Arm Solves Hi-Fi Problem

• One of the long-standing problems in obtaining quality record reproduction may be near solution with the appearance of a new patented tone arm. The difficulty arises from the fact that, in order to preserve fidelity and keep distortion down, the playback stylus must be tangential to the groove in which it rides for perfect tracking. With standard arms, however, this condition exists only at one point during the play of a record, at a groove somewhere near the center of the disc. From start to finish in the playback of a recorded side, the tone arm swings in an arc. The pickup and the stylus move with it. (See *Hi-Fi Guide to Pickup Arms*, TECHNICIAN, February 1954).

The B-J Arm, illustrated in Fig. 1, frees the pickup head and stylus from having to follow the arc of the arm. As can be seen from the illustrations, it actually uses two arms instead of one, one of the two being longer than the other. Also,

Fig. 1—B-J tone arm works on new principle.



there are four pivot points instead of one. The action of the arms while they swing an arc across the disc automatically corrects the position of the pickup. Fig. 2 shows how such a device would operate. At the beginning of the record side (part A), the head is swung around to counter the angle of the arm, and tracking remains tangential. This relationship is maintained throughout the play (Fig. 2B, C).

Recent high-fidelity pickup arms have reduced the angle of tracking error to about 10 degrees by being made very long. This construction requires a great deal of space for mounting the player-and-tone-arm combination. The B-J Arm, 11 in. long, requires no more space than a standard arm—yet the total angle of tracking error is said to be less than one degree, plus or minus.

Other advantages provided by the unique design are: wear of both record and stylus are substantially reduced by the improved tracking; compliance is maintained; the arm will accept most standard Hi-Fi cartridges; a counterweight permits adjustment for optimum stylus pressure; and the two arms, being of different lengths, are resonant at different frequencies. The designers have taken advantage of the latter fact to make the two resonances cancel out, thus avoiding the problem of having the mechanical pickup assembly disturb frequency response.

Already in use overseas, the two-armed pickup was developed by Mr.

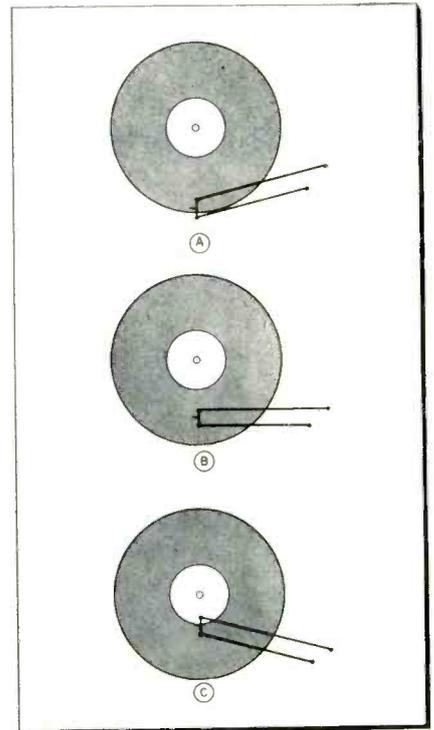


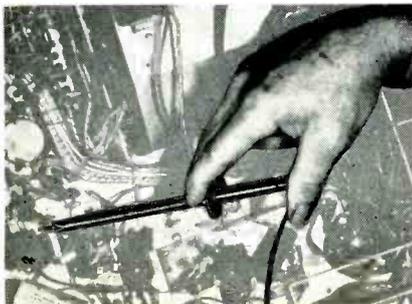
Fig. 2—How arm tracks across surface of disc.

Burn-Jones of Great Britain. It is being marketed in this country by Hi-Fidelity Inc., 420 Madison Ave., New York 17, N. Y. Manufacturer and sales representative here is British Electronic Sales Co., 23-03 45th Road, Long Island City 1, N. Y. Price is \$22.50. It is believed that the principle employed is adaptable to record changers and other moderate-priced Hi-Fi players. (Ask for No. 4-112).

Probe Streamlines Testing

One or more extra hands are available to you for testing and other bench work by way of the new Jet Probe. Bearing as much of a resemblance to the physician's hypodermic syringe as it does to any

Fig. 1—The Workman Jet Probe, ready for use.



standard technician's prod, the new patented item is reported to be a positive, shockproof and foolproof way of making temporary connections to any circuit, no matter how cramped working space is.

As held during operation (Fig. 1), pressure of the thumb on a button at one end exposes a wire clip at the other. The exposed clip may be seen more clearly in Fig. 2. After the clip has been hooked around the desired wire, thumb pressure is released. The plunger on which the hook is mounted, being spring loaded, withdraws the clip and the wire to which it is now connected into the plastic body of the probe, as in Fig. 3.

A V-cut slot in the business end

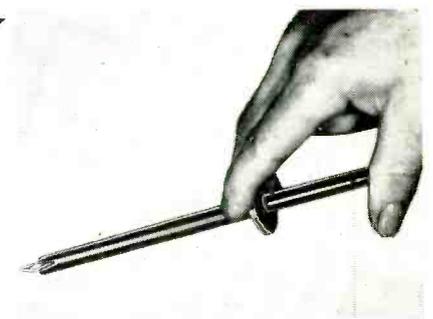


Fig. 2—Thumb pressure exposes the hook tip.

of the device allows entry of the connection into the body of the probe—or, to put it another way, the end of the probe wraps itself around the connecting point, isolat-

(Continued on page 29)

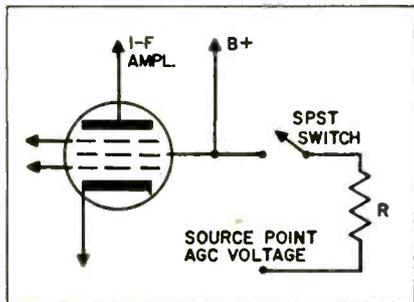
Shop Hints to Speed Servicing

Tips for Home and Bench Service Contributed by Readers

Fringe Improvement

In an attempt to boost sensitivity and gain in fringe areas, some technicians either ground the agc voltage entirely, or attempt to reduce the no-signal agc voltage by some-times involved and devious circuit modifications. When such receivers are returned to normal signal areas or when increases in transmitter power eliminate the need for the change, extensive alteration is again required to restore the receivers to proper operation. Also, a permanent internal change creates difficulties where the same set is required to work on weak and strong signals on different channels.

A much better idea is to install a simple "local-fringe" switch, if the circuit doesn't have one. This gives the owner some external means for adapting the set to different conditions without having to rewire it. A



Circuit for simple "fringe-local" switch.

study of many commercial variations in actual sets and some actual experimenting shows the circuit presented here to be simple, easy to install and effective.

B-plus is taken off at some such point as the screen grid of one of the i-f tubes and applied to the output of the agc circuit through a resistor of high ohmic value. The point to which this bucking voltage is applied is the one at which external bias would be connected dur-

SHOP HINTS WANTED

TECHNICIAN will pay \$5 for acceptable shop hints. We are particularly interested in hints on the following subjects: Hi-Fi servicing, TV and radio interference, industrial electronics, TV antennas, test equipment and UHF. Unacceptable items will be returned. Send your hints to "Shop Hints" Editor, TECHNICIAN, Caldwell-Clements, Inc., 480 Lexington Ave., N. Y. 17, N. Y.

ing alignment. A typical value for resistor R would be 15 megohms, though experiment may indicate another value in individual cases. As illustrated, closing the switch will generally reduce the agc voltage from about minus 2 volts to about minus 1 volt, as measured with a vtvm.

—B. O. Riis, Miami, Florida



No accidental spilling with this holder.

Spill Insurance

When using a bottle of cement, soldering acid, contact cleaner or other fluid on the bench, there is always the danger of accidentally spilling the contents in the normal course of service work. An ordinary spool of solder wire provides excellent protection against such a possibility. Simply stand the spool on end beside the bottle being used and twist a turn of the solder around the bottle, as shown in the accompanying sketch.—Harvey Muller, Danboro, Pennsylvania

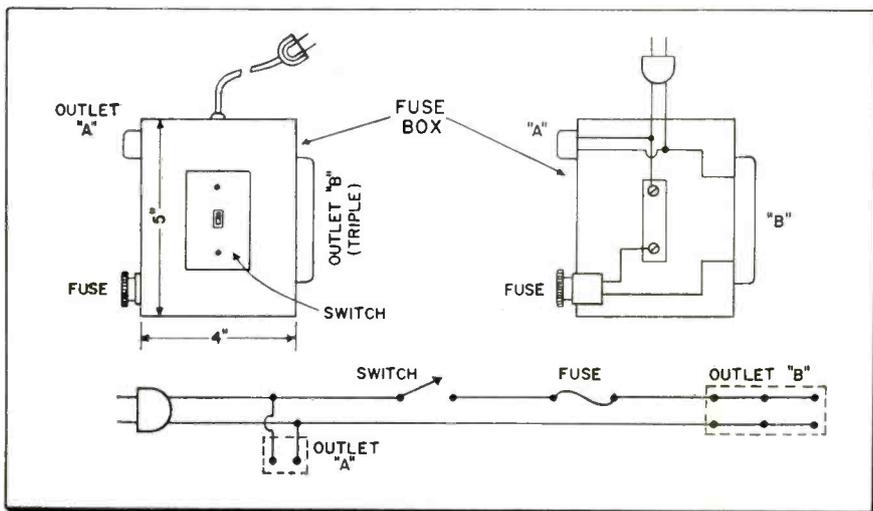
Handy AC for Bench

For years, I've been using this handy set-up for ac power on the bench. The basic unit is a fuse box with outlets to use while I'm repairing radios, TV sets or other appliances. If a short in a chassis that is being serviced blows a fuse, a replacement can easily be made without a separate trip to the main fuse center. Three outlets are provided for appliances under test. The fuse should be no greater than 15-amp size, but less than the rating used at the main box. The switch is also handy for interrupting the circuit. The outlet for the soldering iron, unaffected by the opening of the switch or the fuse, will serve to keep the iron hot at all times and available for use regardless of what is happening to the fused circuit.—Ellisworth Bell, Anniston, Alabama.

Solder Iron Tip Removal

When it's necessary to remove the copper tip of a soldering iron to replace it, a lot of time can be saved with this simple procedure. Sop a small amount of household ammonia around the tip, and in the recess around it. The tip can be withdrawn easily in a few seconds.—Harvey Muller, Danboro, Pennsylvania

This fuse box on the service bench can save a lot of time when shorts occur in faulty chassis.



Troubleshooting Hum in

A Variety of Symptoms Will Be Available to Indicate the

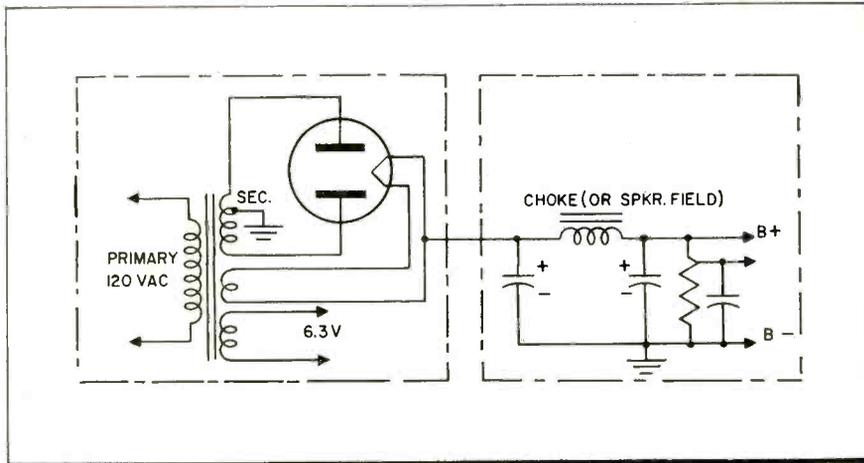


Fig. 1—Full wave power supply. Sources of 60 cps hum are at left; of 120 cps hum at right.

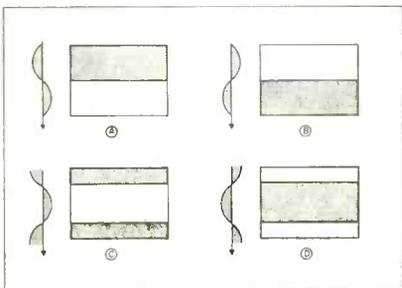
BY M. G. GOLDBERG

• In one sense, hum troubles are among the easiest that the technician encounters. There is usually ample evidence of the trouble—either in the sound or on the crt screen. And quite often, these clues lead directly to the trouble. Almost as frequently, however, a supposedly easy cure turns into a real headache before the problem is finally solved. These are the cases which we will discuss here.

Hum Sources

In the ordinary TV receiver, hum will show up at one of two frequencies—60 or 120 cycles. Not infrequently, we will run across a chassis in which both hum frequencies appear at the same time, thus complicating the search for the trouble. For instance, a short between cath-

Fig. 2—A and C are hum patterns 90° out of phase. For B and D the plug was reversed.



ode and heater in a tube drawing considerable current under normal conditions may give rise to 60-cycle hum. Because of the loss of bias, the plate current will perhaps double in value, increasing the load on the power supply and possibly giving rise to 120-cycle hum due to poor regulation. This, in turn, may be due to low capacity filters which had not been causing any noticeable trouble up to this time, but which are too low in value to filter the additional current drain. Usually, however, only one of the two frequencies will be a major offender at any one time. Therefore, the first step is to find out which one is the culprit and thus reduce by half the number of tests which must be made to locate the source.

The left-hand box in Fig. 1 shows components in the power supply circuit from which 60-cycle hum may originate; the right-hand box shows possible causes of 120-cycle troubles. A rare case may arise in which half of the secondary winding of the transformer may open up, thus changing the 120-cycle output frequency to 60 cycles. Because of the lower frequency, the filtering will be inadequate, the regulation poorer, and the voltage considerably less.

A hum trouble which develops gradually after the set has been left on for a while is nearly always due to a poor tube, usually one with a cathode-to-heater leak. The hum

pattern on the screen will look like Figures 2a, b, c or d depending on the polarity of the plug in the wall socket and the phase difference between the sync signal and the power line frequency. 2a and 2b are the most usual patterns encountered since they are more readily locked in place by the sync circuit.

120-Cycle Hum

Hum patterns similar to Figs. 3a and 3b will occur when 120-cycle variations in the B supply are present due to low filters. These are identical to 2a and 2b except that twice as many black and white areas are now present, because of the full wave rectification of the power supply. Advancing the contrast control increases the width of the black areas and reduces the white areas accordingly. A wise pre-

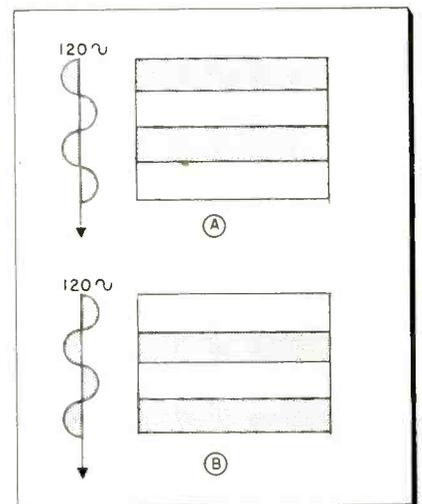


Fig. 3—Two solid bars means 120 cps hum.

caution when tracing hum in the field (or on the bench) is not to remove a number of similar type tubes for checking unless the position of each one is marked on the chassis so that they can be returned to the same sockets from which they were removed. Otherwise, if the checker doesn't show up the trouble (as often happens) the trouble may not show up when the tubes are replaced and doubt will exist as to whether a tube was originally at fault.

Television Receivers

Hum Source—if the Technician Can Read Them Correctly

The writer has always used the system of tube substitution in the home with very gratifying results. One of the simplest time-saving methods of locating a faulty tube is to interchange two of the same type. If no change is noted in the operation of the receiver when this is done, it may be assumed that both tubes are equally good (or bad—but the latter is only a rare possibility).

Consider the case of an Admiral TV receiver which developed a hum pattern similar to Fig. 2b. No hum was present in the speaker—at least not at ordinary viewing distance—but hum interference on the picture was severe. Lifting out any one of half a dozen r-f, i-f or video tubes eliminated the hum—and the picture, too, of course. Interchanging the pre-selector tube with a similar tube used in the i-f stages greatly reduced the hum pattern intensity, leading to what later proved to be a correct assumption that the tube which was originally in the pre-selector stage was the cause of the trouble. This was true because the hum from a leaky tube in the r-f socket would be amplified through the mixer, and the entire i-f strip, while the same tube placed in the 2nd i-f stage would have the gain of only one or two stages to build it up before detection. See Fig. 4.

Hum in Sound

A Motorola being serviced in the customer's home had a bad hum in the sound circuit but no trace of it was present in the picture; just the opposite of the case just mentioned. This almost certainly eliminated all r-f, mixer, oscillator and i-f stages as the cause. Lifting out any sound circuit tube from the 6AL5 through the output tube eliminated the hum. Finally, interchanging the 6AL5 sound and video detectors also eliminated the hum in the sound; and no hum was detected in the picture. The 6AL5 sound detector was at fault. A look at the sketches in Figs. 5a and 5b shows why. The tube had a cathode-to-heater leak between the points shown in Fig. 5a. However, when the tube was moved to the picture detector socket where the No. 3 socket lug was grounded,

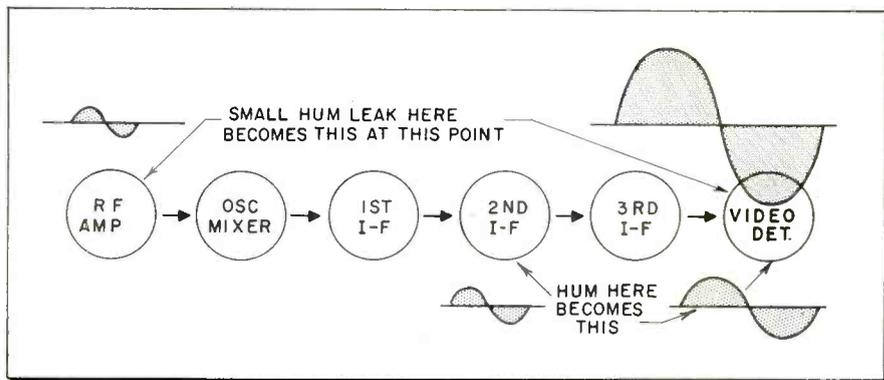


Fig. 4—Hum originating at the front of the receiver is amplified by succeeding i-f stages.

the leak could develop little or no hum output, and its resistance was not low enough to upset the circuit otherwise. In spite of this, just as a matter of good servicing procedure, the tube was, of course, replaced.

The above two examples of trouble originated in receivers using intercarrier sound rather than split-sound operation. In the latter case, the only tubes common to sound and picture circuits are the r-f, oscillator, mixer, and usually the 1st stage of video i-f. This must be kept in mind when troubleshooting any TV receiver.

If doubt exists as to whether hum is being picked up externally, before making any tests on the TV receiver first reverse the ac line plug. If the positions of the dark and light areas are reversed after this is done, the fault lies within the receiver itself. If no change is noted, or if the hum area gradually moves up and down with respect to the picture while the latter is locked in place on the screen, hum is being picked up from some external source. This external source may be the TV transmitter itself. If the frequency or phasing of the power supply used by the transmitter is different from that being supplied to the receiver, a slow, traveling weaving may occur from top to bottom, or the reverse, depending on whether the frequency is higher at the station end or at the receiver. If the frequency is higher by even a fraction of a cycle at the transmitter, the weaving will travel from bottom to top, and vice versa. This

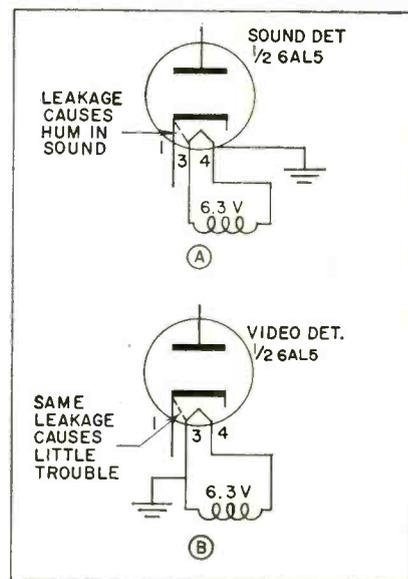
effect is more easily observed when a title is flashed on the picture tube face.

Dozens of examples could be cited where hum in the TV circuitry or in tubes gives rise to unusual effects. Most technicians have had experiences similar to this one of the writer's.

The receiver was a Magnavox, using a 16RP4. The complaint was of poor sync on strong stations, although the antenna input had previously been padded. The figures on the screen were being twisted and pulled out of shape, and moving the

(Continued on page 53)

Fig. 5—Where different ground points are used interchanging tubes may locate trouble.



Radio-TV Rectifier and

Part II: Multiplying the Supply Voltage Without Transformers:

MICHAEL CRAIG

• The rectifiers described in the first installment of this article (March issue) deliver a dc output voltage which is about at the same value as the ac input. However, rectifiers are often used that can increase this voltage without relying on a step-up transformer. Elimination of this relatively expensive component may be accomplished with any one of several voltage multiplier circuits. Most commonly used is the step-type doubler shown in Fig. 1.

Note that the left-hand portion of this doubler resembles the simple half-wave rectifier discussed in the preceding installment. When polarity of the ac input is as shown in part A of the figure, conduction takes place through diode D1, with D2 being blocked. The capacitor, however, takes the place during this half cycle of the load in the ordinary half-wave circuit. In other words, the rectified voltage is impressed across it, and it therefore charges up to the peak value of the ac input.

On the next half cycle, conduction takes place only through diode D2, over the path shown by the arrows, with D1 turned off. Note that the rectified voltage E through D2 is now in series with the similar charge E stored on the capacitor from the previous half cycle, and that both voltages are of the same

Fig. 1—Operation of the half-wave doubler.

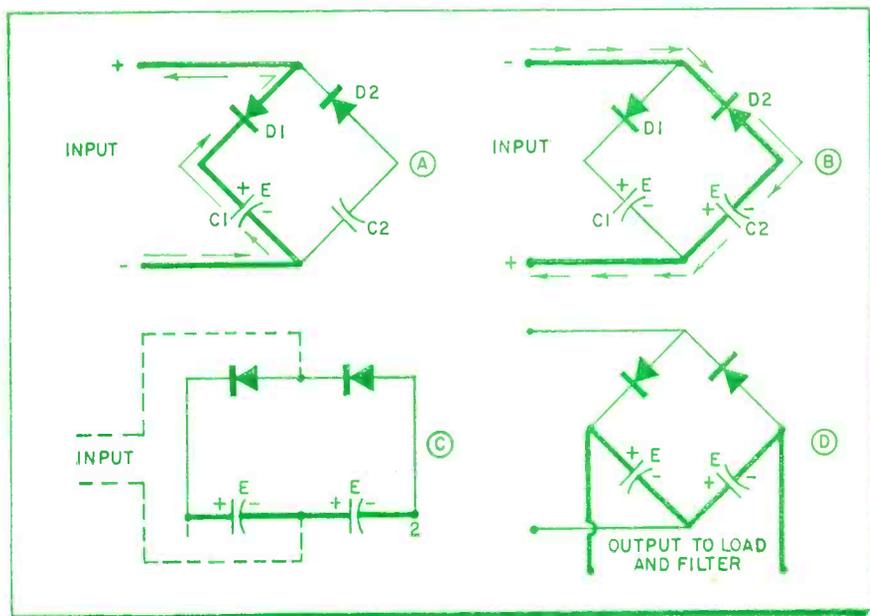
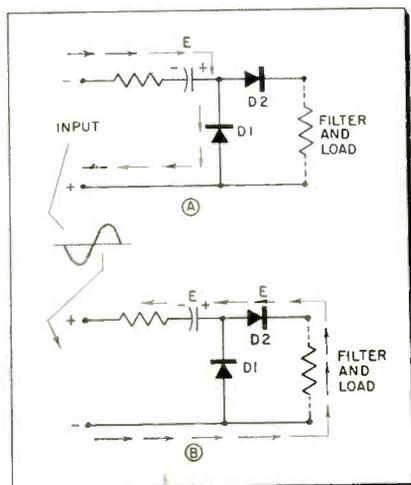


Fig. 2—How a voltage can be stepped up with the bridge-type doubler power supply.

polarity. The effect is the same as that of putting two batteries of equal voltage in series. Twice the voltage, or $2E$, is available across the load. Current can go to the load only through the conduction of D2, which occurs during every other half cycle, or once every cycle. This is therefore a half-wave doubler, and the ripple frequency of the dc output is 60 cps rather than 120 despite the fact that use is being made of both half cycles of ac at the input. Doublers of this design are frequent in "transformerless" TV receivers, and also appear in the power supplies of meters and other types of test instruments.

Bridge Type Doubler

In Fig. 2 we have a bridge-type doubler. During alternate halves of the ac cycle, current flows in opposite directions in the input circuit, but in the same direction in the dc output. An unusual feature here, and often a drawback as well, is the fact that both terminals of the ac circuit are hot with respect to both dc terminals. Because of increased cost and the lack of a common ground, this circuit has been used only for special applications recently, although some of the first ac-dc sets

used the arrangement with a 25Z5 tube. However, it is definitely worth attention now as it seems headed for a revival in color-TV chassis. This doubler has much better regulation than half-wave types—and voltage regulation is important in color circuits.

As for operation, action during the first half cycle of ac input is shown in Fig. 2A. With input voltage polarity as shown, conduction is through diode D1 along the heavy outline, with electron flow in the direction of the arrows. C1 is charged to input-voltage value. For the next half cycle, the flow through D2 (see part B) similarly charges C2. As shown in part C of the figure, the two capacitors are again like two batteries in series. The dc voltage available between points 1 and 2, therefore, is $2E$. The filter network and load are connected across these two "batteries" (Fig. 2D), which are constantly being recharged by the input. Tube rectifiers may be used in such circuits, although selenium diodes are more likely to be found. When the latter appear, limiting resistors will also be used. Two of equal value will be found, one in each leg of the input, although they are not shown in the figure.

Power Supply Circuits

Half-Wave and Bridge-Type Doubler Circuits, Voltage Triplers

Where still higher voltages than are available from a doubler are desired, the multiplication process can be carried one step further with another diode. The resulting circuit, the voltage tripler, has been used in such projection TV receivers as the Philco 2500, the RCA 9PC41 and others. It also appears in some TV circuits using conventional picture tubes where high B-plus in excess of 300 volts is desired without resort to the transformer.

As shown in Fig. 3A in heavy outline, the circuit starts out with the conventional half-wave doubler. As described earlier, conduction through D1 during the first half cycle of ac input charges C1 to the value of E. During the second half cycle, D2 conducts and its output is in series with the charge on C1. In place of the load, however, we now have capacitor C2, which is accordingly charged to 2E. On the third half cycle (Fig. 3B), diode D3 conducts. Its output, E, is now in series with the charge 2E on capacitor C2. The sum, 3E, passes through the load.

Same Polarity

Note that, during the third half cycle, the polarity is the same as that during the first half cycle. Therefore, diode D1 is recharging C1 again in preparation for setting up the next burst of 2E, then 3E. Effectively, this tripler is a half-wave arrangement, with 3E being available across the load at odd half cycles after the first. As may also be noted, the power supply has been sketched in the "upside-down" posi-

tion, with the B-plus point shown at the bottom. This was done to facilitate comparison with the doubler of Fig. 1.

For very high voltages, such as the second-anode supply, the use of selenium rectifiers is not very practical; and so vacuum-tube diodes, like the 1B3 and 1X2, are employed. Such circuits appear in Figs. 4 and 5. The tripler of Fig. 4 is used in the RCA 9PC41 projection receiver. R1 and R2 are each 3 megohms. All capacitors are 500 mmfd. A 10,000-v pulse from the horizontal output circuit is fed in at points A and B, with approximately 25,000 v dc available between cathode K3 and ground.

Stepped-Up R-F

The novel arrangement of Fig. 5 is used in custom jobs designed for installation in taverns or other places where people congregate. The output of an r-f oscillator, set at approximately 250 kc, is stepped up to about 10,000 volts. This is similar to the stepped up oscillator output used in earlier Sentinel, Motorola and Admiral 7-in. receivers, and is used instead of the now more familiar flyback supply. The 10 kv is fed into the tripler, with 30 kv being produced across the charging capacitors in the lower right-hand corner. The unusual feature here is the use of small r-f transformers, which are tuned to the 250 kc of the supply voltage, in the cathode-filament circuits of the rectifiers. Some of the current developed in these tank circuits is tapped off for the heaters. The heating of the filament,

in turn, improves the efficiency of conduction for the rectifiers. This increase again increases heater current. In this way, the tripler rectifiers are built up to maximum efficiency. Optimum adjustment of these tuned circuits for the correct high-voltage value is made by adjusting the padder capacitors—but be sure to use a very well insulated nonmetallic tool!

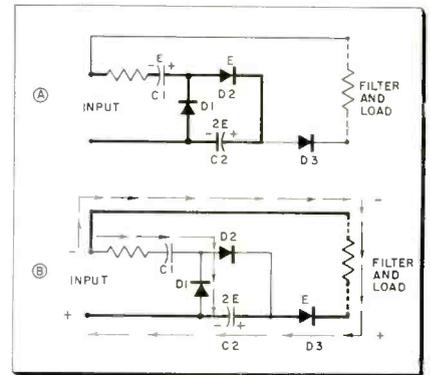


Fig. 3—Operation of the half-wave tripler.

Since a tripler like the one just discussed represents a step-up from line voltage in the order of 250 to 1, any change of line voltage is greatly magnified in the shape, size and focus of the picture on the screen. Some regulation is contributed by the r-f tanks just noted. In addition, a regulating stage is generally tied in with the r-f oscillator that feeds the tripler. Further regulation is provided in this circuit by the presence of a bleeder across the output of the first rectifier, which also allows take-off and adjustment of the focus voltage.

Fig. 4—High-voltage tripler used in the RCA 9PC41 projection set.

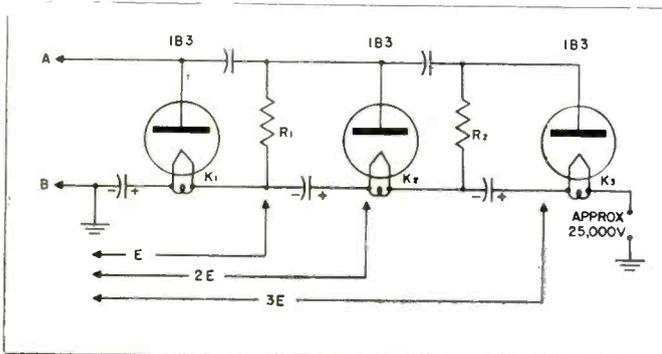
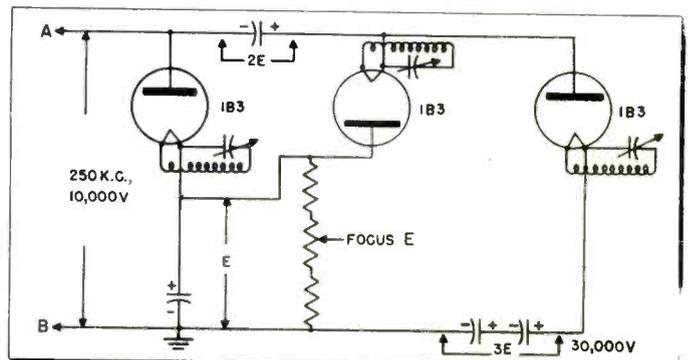


Fig. 5—Novel high-voltage tripler uses r-f tanks for efficiency.

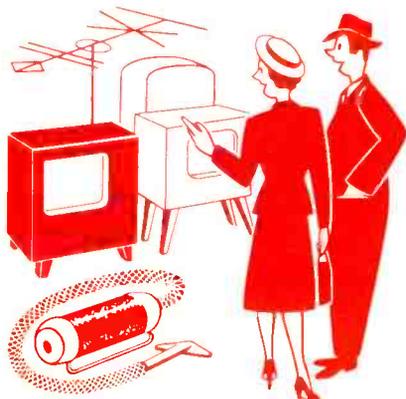


Sell MORE Antennas

The Right Sales Pitch; Stimulating Replacement Interest

JAMES C. SARAYIOTES AND
S. JOHN LA PUMA,
JFD Mfg. Co., Inc.

• There is a growing market for replacement antennas. However, big volume cannot depend on breakdown of old antennas alone. If we look to other products for example, it is apparent that other sales themes



Antennas, like freezers and washers, are major appliances. Play them up accordingly!

motivate the major replacement volume. To claim that antennas should be replaced annually is not convincing to the TV set owner who has enjoyed five years of good performance with the same antenna.

Refrigerators, radios, vacuum cleaners, automobiles and other hard goods cannot enjoy the replacement volume of cosmetics, motor oil and other soft goods. The cost is higher on hard goods. And, like other major appliances, antennas are built to last. Perhaps by analyzing sales methods for these other goods, we can put our finger on the key to volume.

Negative Selling

We all realize the damaging implications of condemning a product we might have sold in the past. It's negative selling that makes the customer dubious of our sincerity. Notice how Packard advertises the fact that old models of their cars are still on the road in quantity and

doing well. This goes for some of the popular brands of radios and refrigerators too. Why do manufacturers glorify their old models? Perhaps it's because belief in the quality of an earlier model will prompt us to favor this familiar brand in purchasing a new unit. The salesman assumes that we constantly desire something new, up-to-date, stylish, with new features. When the old model is glorified and the added features of the new model are pushed in addition to it, we feel that we're getting a gilt-edged value—a sure thing.

Let's see how this positive approach affects antennas and how we can take advantage of it. First, let's consider the difference between the old antennas and the new ones. We now have arrays that can replace 12 single-channel yagis for fringe reception. We have fool-proof compact VHF-UHF receptors that require only a single download and a rotator to provide all the reception the TV set owner ever could desire. And, if your customer has a VHF-UHF array that does not deliver full power on each band, you can point to newly designed couplers that have little or no loss, and show how they improve on the lossy couplers of yesteryear. Remember to offer a new model's advantages in consumer language—less eye-ache at the set, less eye-sore on the roof. Perhaps the old antenna is rusty. Now, we have all-aluminum arrays.

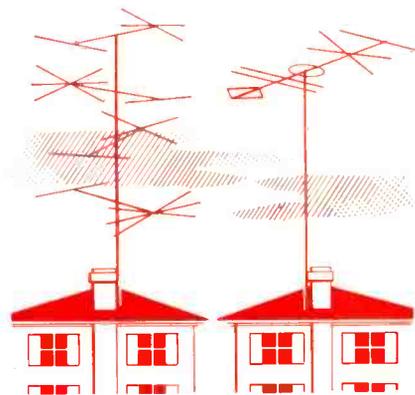
Limit the Selection

Let's analyze the local market and see what's the most effective antenna to push for replacement. The fewer items we promote, the more sales power we can use on each item. What can past purchasers of TV antennas in our area use best? Maybe they have single-channel yagis. On the other hand, perhaps they have broadband arrays that are not selective enough. Perhaps it's windy in our neck of the woods, and they need mechanical sturdiness that eliminates ghost-producing vibration. Perhaps interest in future

color TV would make the consumer inclined to accept an antenna with more selectivity than his present array and greater bandwidth on each channel. We know that these two factors are important to color reception.

Anyone who has ever seen full compatible color television will agree that, when perfected and mass-marketed, it will capture the public's fancy as no other form of entertainment could. The field of antennas for color television installations is practically unexploited. In color, as in black and white, the television set is no better than its antenna. Help your customer by informing him that an antenna capable of giving sharp, bright, ghost-free black and white pictures without interference and noise, will also deliver good color reception.

When we have decided on the item we want to promote, we estimate what kind of a job we can do on it. First, we can work on a mailing list



One up-to-date array can often replace an earlier cumbersome multi-unit installation.

of past purchasers of TV sets and antennas. Perhaps the local appliance distributors and parts distributors can supplement our list of home owners who purchased their brand sets. If your area is TV-saturated, it might be best to hire the services of a firm that can process a mailing to every family in the town or area you service. A count of the mailing
(Continued on page 28)

you asked for it!

THE *New* Akro-Milic STRON SWING BIN JR. SPECIAL OFFER



Complete kit with 90
Blue •Point® molded
plastic paper capacitors
only \$16.95

How you save

\$29.50 Blue • Points

+ 3.48 Swing Bin

\$32.98 Total Cost

—16.03 Savings

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your deal price

48% off list price
of capacitors and bin

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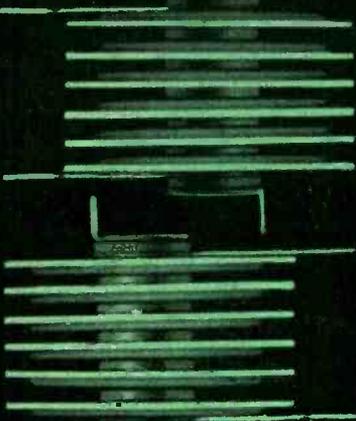


BE SURE TO SEE US
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PARTS SHOW

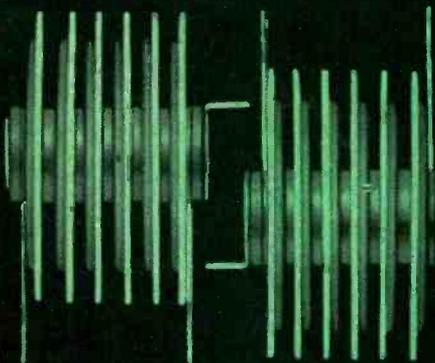
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no matter
how you look
at it...



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World's Largest Supplier of
Quality Industrial Rectifiers

Antennas

(Continued from page 26)

list gives you an idea of the maximum potential by which you can gauge a mailing.

A mailing is preferable to other methods, particularly because you can tell a complete story in unlimited space. Also, it provides the advantages of a pre-paid reply card. If we get a mailing permit number and print it on our reply cards, we only pay postage on the cards that are returned to us—and these cards mean business. If the TV set owner likes the offer but wants to hold off buying, he can hold a mailing piece and use it later. A broadcast must be acted on promptly, and a publication ad might not be kept as willingly as a small mailing piece or the enclosed reply card.

Advertising Help

Since we want maximum results for our money, why not consult the experienced advertising departments of antenna manufacturers and distributors? They are usually glad to provide suggested wording, perhaps layouts and art work ready for printing, certainly the printing plates of their products. Perhaps the cost of mailing, teaming up the product with your service, can be split with the manufacturer and distributor. Phone or write these sources for suggestions and aid.

Whether you come in contact with the set owner on a service call or through advertising, the same sales ideas should be pushed.

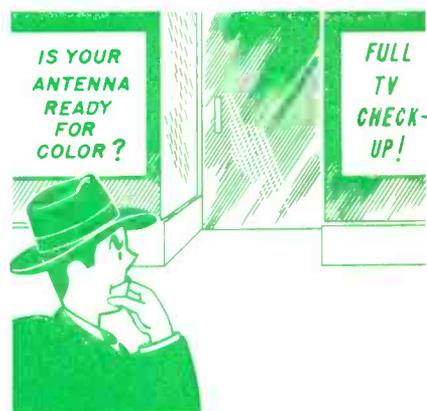
What's most attractive? Free check up of the old antenna? This is OK while doing a servicing job. But since this alone in a mailing piece won't create the desire to buy, let's make it a closing note. It will, at least, suggest that the old antenna might need replacing.

Better reception with a new antenna? Since this is the consumer's main motive for buying, it must rank first in our sales appeal. However, how can we dramatize the new product's advantages to create a buying desire? Let's offer what the old antenna lacks without knocking it. In an area where there are new stations, we can tee off with the promise of multi-channel reception plus better performance on the same channel(s) the old antenna receives.

If the new antenna is more selective, giving a greater gain on each channel, which provides greater bandwidth on each channel, it will do more justice to the color sub-carrier in the TV signal. It's a fact

that a poor antenna or a low-gain antenna could cause improper color registration. Gain variations exceeding 2 db within the 6 mc bandwidth of any one channel may cause smearing and poor color separation. Let the customer know that this antenna does better on both color and black and white. Since we're selling service as well as the product, try to formulate package (or complete) installations, both in personal talks and in the mailing piece. Show as many improvements as possible in everything you offer throughout the system. Even such accessories as metal-free standoffs, which eliminate line mismatches often caused by the old metal-ringed types, can be played up.

In the mailing, you might offer something free, such as a miniature trinket with your imprint, preferably a representation of one of your products. Offer this in return for a store demonstration of the new an-



The use of provocative window signs will create and maintain interest in replacements.

tenna or a free check-up of the old one. Something that attracts the kiddies might have a powerful effect.

Before, during and after your mailing, stress replacement—in the store, on the truck, in space ads. An antenna can be mounted on the service truck with signs suggesting replacement with this new model. In brief, bold lettering, stress its main features. This type of mobile promotion, once installed, serves as a constant reminder. It keeps you, the dealer, in the customer's mind. In your mailed bills, put the note that you're ready for color, that you have something special to replace the old antenna.

Your replacement sales program, based on the new product theme and the suggestion that the old model does or will require replacement, is bound to pay off if you stick with it. •

New Probe

(Continued from page 20)

ing it from other nearby hot points. When this is done, there is enough tension in the probe's spring to hold the device securely in position. There is no danger of the connector slipping out of place with resultant shorting, loss of the desired connection or damage to other parts.

About 4 ft. of insulated lead wire extending from the body of the probe terminates in a phone tip,

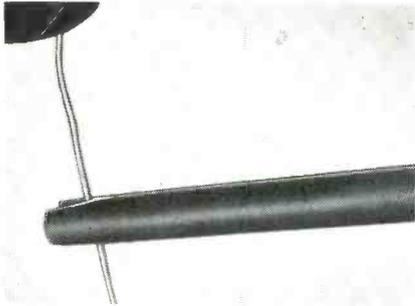


Fig. 3—Connection withdraws into probe body.

for connection to test instruments. An adapter is included for those instruments that use banana jacks. With several of these units, the man on the bench can rapidly set up all the connections necessary for an alignment job or other complex monitoring process while still keeping both hands and eyes free for other work.

The fully insulated aid is available in either red or black plastic. The manufacturer is Workman TV of Teaneck, New Jersey. The "hard-to-explain" accessory is attractively packaged in a transparent plastic "blister" shaped to fit around the probe and to make it completely visible. This attractive Kontoor-Pak is designed and produced by Thompson, Ltd. of New York.—TECHNICIAN (Ask for No. 4-108)

Brach Magnetic Antenna



The all-new indoor antenna, flashed to TECHNICIAN readers last month, is shown here. Using a new type of magnetic material and housed in an attractive table-radio type of cabinet, the new unit fits neatly on the top of any TV set. Choice of cabinets available.

**WHEN STORMS BREAK LOOSE
PERMA-TUBE STAYS UP**
... and so does your reputation!

**J & L
M**

Look for this brand mark
—only genuine Perma-Tube
gives you this protection

Here's why . . . sturdy steel PERMA-TUBE is stronger than any other television mast

1. Its resistance to bending is *five times stronger* than structural aluminum.
2. Its resistance to deflection is *three times stronger* than structural aluminum.
3. Its resistance to destruction by wind-force is *twice as strong* as structural aluminum.

ADDITIONAL REASONS FOR USING PERMA-TUBE EVERY TIME

PERMA-TUBE IS CORROSION PROOF . . . it's treated with vinsynite—then coated *inside and outside* with a metallic vinyl resin base.

PERMA-TUBE IS EASILY INSTALLED . . . it's the *only mast* with *both ends* of the joint machine fitted.

ONLY GENUINE PERMA-TUBE GIVES THIS PROTECTION AND SERVICE . . . look for this brand mark . . . accept no claims from substitute materials.

**J & L
STEEL**

For complete information and scientific data write to: Jones & Laughlin Steel Corporation, Department 505, 3 Gateway Center, Pittsburgh 30, Pa.

Jones & Laughlin
STEEL CORPORATION — Pittsburgh

3-D Slides Introduce Line to Distributors

The use of 3-D color slides and 3-D stereo-viewers as a means of introducing their 1955 lines to their distributors, has been initiated by the TRAV-LER RADIO CORPORATION of Chicago. Joe Friedman, Trav-Ler pres., stated that although the slides and stereo-views were costlier than more ordinary means of presentation, he felt the money was well spent because the firm's more than 70 distributors are thus able to get a clear, unobstructed view of the merchandise. The 3-D

slides and 3-D stereo-viewers also make it possible for the distributors to see more clearly all the designs and features of every TV set, radio and phonograph. "By having the distributor view the line as though he were seeing it in person," says Friedman, "helps him describe and, consequently, sell the line, with more facts and authority than otherwise would be possible."

Hi-Fi Marketing Trends

A plan to help the dealer sell tape recorders, called Amprotection, is being tried out by the Am-

pro Corp. Empowered to offer recorders on a free 10-day trial basis, dealers are covered against loss from damaged returns. Local coop advertising and nation-wide sales promotion will support the campaign.

Another non-recording tape unit, designed for playback only, is being put out by Allegro Electronics to list under \$40.00. The dual-speed model T-10 (3.75 and 7.5 in. per sec.) comes with a pre-amp, ready to plug into TV, radio or Hi-Fi system.

The Radio Craftsmen, Inc., having recently decided to sell direct to the public at reduced prices rather than market through jobbers, is now considering a dual sales policy. Jobbers may be back in the picture while the direct-sale program continues, but they'll be getting smaller discounts than in the past.

TV Antenna Booklet

A new consumer education publication, "Your Television Antenna System," has been prepared for distribution by the Radio-Electronics-Television Manufacturers Assoc. in cooperation with the National Better Business Bureau.

The booklet is designed to acquaint the public with the importance of antennas for good television reception and the need for keeping an antenna properly serviced. It was prepared by the Antenna Section, RETMA Parts Division, under the chairmanship of Douglas Carpenter, JFD Manufacturing Co., Inc., Brooklyn, N. Y., and the Radio-Television Committee of the National Better Business Bureau.

A. G. Wertz, (l.) Cambria Equipment Co., Johnstown, Pa., the local National Co. Distributor, presents National NC-88 Receiver to Richard Pugh who, at the time of his contest entry, had been a ham for only fifteen months. Contest aim is to find out what "hams" want in a receiver.



New PORTABLE DOUBLE-DUTY Money-Maker



Size only 11"x7 1/2"x5"

Spots the Trouble and Quickly Corrects it—without removing tube from set!

Now it's easy to save thousands of weak and inoperative TV picture tubes. As much as 80% of the troubles which arise in picture tubes may easily be repaired with the CRT. This amazing portable instrument creates new profitable picture tube repair business. Saves servicing time, speeds work. Assures more satisfied customers. Eliminates tube transportation. Saves money on trade-in reconditioning. And at such low cost, the CRT quickly pays for itself—and continues to make big profits for TV service-dealers.

See Your Distributor, or
Write for Bulletin No. 102-T

TESTS and REPAIRS TV PICTURE TUBES

Amazing **\$54⁹⁵**
Low Price **NET**

No extra accessories necessary



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TESTS FOR Emission,
Inter-Element Shorts,
Leakage, Open Circuits,
Grid Cut-Off, Gas Content,
Probable Useful Life

RESTORES Emission
and Brightness

REMOVES Shorts

REPAIRS Open Circuits

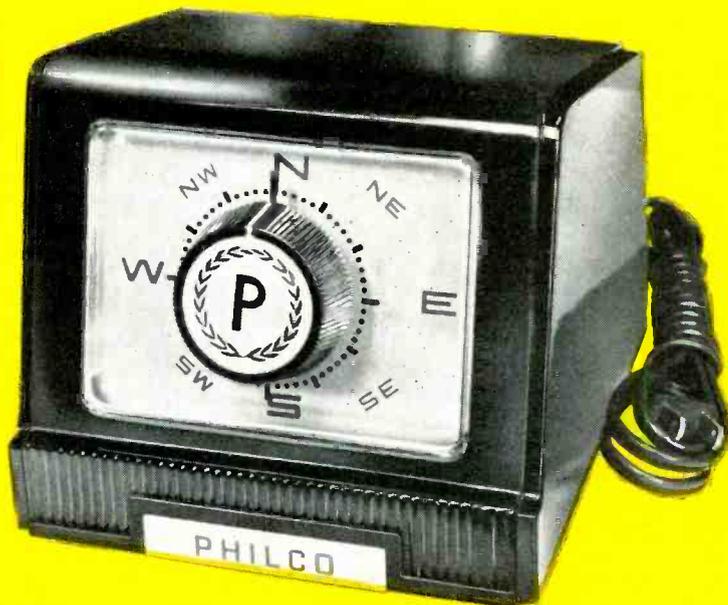
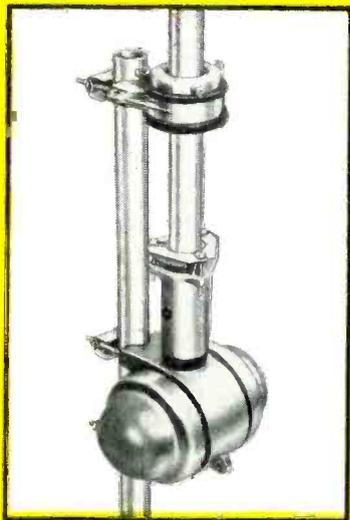
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PHILCO AUTOMATIC ANTENNA ROTOR



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Thousands of satisfied purchasers everywhere have found the Philco AP-2 a perfect answer for better pictures, and Service Dealers have found the Philco AP-2 Automatic Antenna Rotor the perfect answer for new sales volume . . . greater profits.

Order your stock of the AP-2 from your Philco Distributor now.

Don't forget—every AP-2 you sell means more Philco Share and Profit stamps—Free—More new merchandise to sell at a clear 100% profit. Ask your distributor about the 1955 Share and Profit program at once. *There's money in it for you.*

PHILCO CORPORATION Accessory Division

Philadelphia 34, Pa.

PHILCO TUBES
IMPROVE THE
PERFORMANCE OF
ANY TV OR
RADIO RECEIVER



Fuses for Radio and TV

Size and Shape Vary with Rating for Increased Safety

J. C. LEBENS,
BUSSMANN MFG. CO.

• The recent approval by the Underwriters' Laboratories Inc. of special fuse-holders represented the culmination of a long development to provide positive protection for electrical appliances such as television and radio receivers. The development was unusual in that it was encouraged by the manufacturers of television and radio receivers as well as by the Underwriters' Laboratories and was undertaken by two of the fuse suppliers, working together, pooling their engineering talents.

When radio receivers were first introduced they were battery operated so that the current which could flow under fault conditions was limited by the capacity of the battery. Even though relatively high voltages were present, the powers were small because of the battery limitation. Hence, glass tube fuses, rated at 32 V. or less, were used where electrical protection was required even though the voltage exceeded the voltage rating of the fuse.

In the blowing of a fuse it is the current alone which causes it to melt. Once it melts the entire line

voltage appears across the fuse and, before the circuit is cleared, the fuse must extinguish the arc established by this voltage. Obviously, the higher the voltage the greater the arc and the more difficult it is to clear the circuit. It is for this reason that the voltage rating of fuses always is given at "32 v or less," "125 v or less," or "250 v or less," meaning that the maximum voltage is established and the fuse will perform satisfactorily at any voltage up to and including this maximum.

Safety Test

The Underwriters' Laboratories, Inc. establishes the voltage rating of fuses on a dc circuit capable of delivering 10,000 amps at the voltage for which the fuse is rated. When a fuse is blown on such a system the fuse must remain intact and open the circuit without emitting sufficient flame or molten metal to ignite surgical cotton entirely surrounding it. Hence, this test establishes that the fuse will perform satisfactorily without creating a fire hazard at rated voltage under the most severe conditions.

Actually, the 32-v glass tube fuses used in the original battery-oper-

ated radio receivers performed satisfactorily at the higher voltages because the short-circuit currents were limited by the impedance of the circuit and the capacity of the battery. Hence, the only problem was to be sure the user replaced the blown fuse with one of the proper ampere rating.

However, when ac radio receivers and television receivers were introduced, the problem of fuse selection became more difficult. The picture was further complicated by the fact that the industry became highly competitive and cost of protection influenced the selection. It soon was realized that the device protecting the branch circuit to which the radio or television receiver was connected could not furnish adequate electrical protection. Currents which would damage if not destroy the receiver, were too small to cause the branch circuit protector to operate. Therefore, additional electrical protection was required and particularly in television receivers, this protection might be called upon to handle short-circuit currents of sufficient magnitude to blow it up, creating a hazard, if applied improperly.

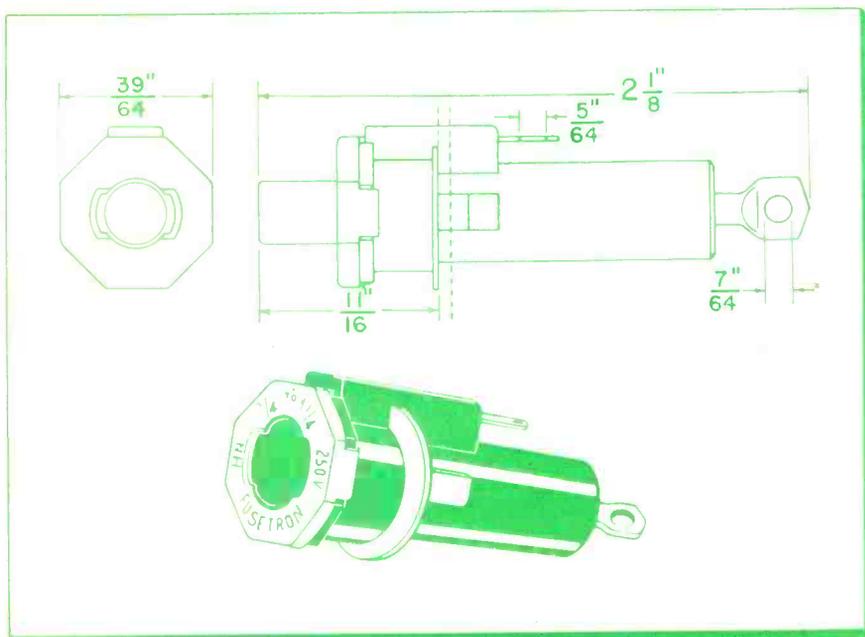
Since small dimension glass tube fuses are available commercially, rated at 250 v or less, the television manufacturers were most interested in using this type of fuse. However, the Underwriters' Laboratories did not consider this application safe because there was the possibility that the blown fuse would be replaced by a fuse of higher ampere rating or lower voltage rating, either of which could create a hazard.

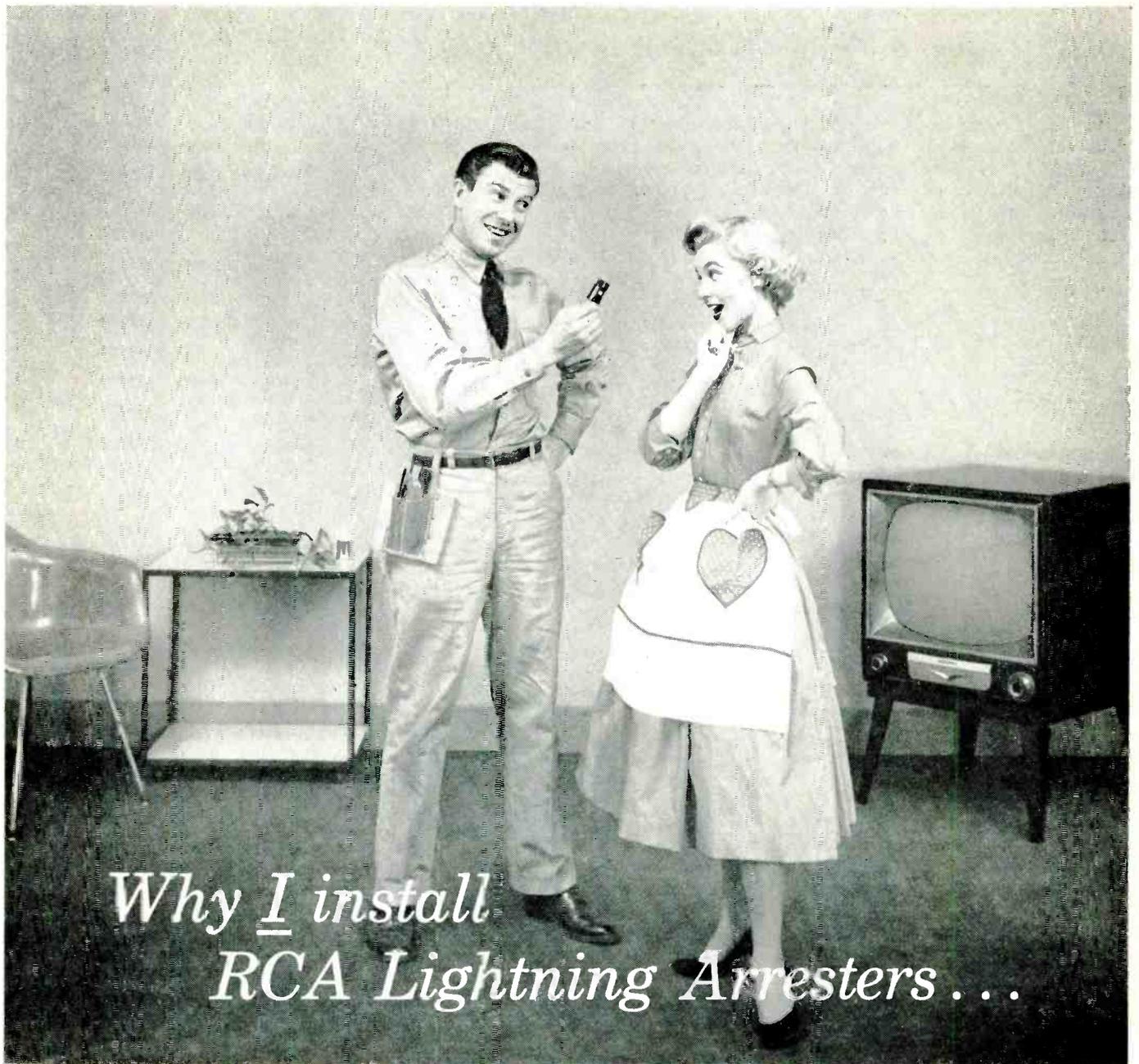
Non-Interchangeability

For this reason there was a demand for a fuse for the protection of appliances, low in cost, which could not be replaced with a fuse of larger ampere or lower voltage rating. In addition, the fuse manufacturers imposed the additional requirement on the development that fuses of different time-current characteristics should not be interchangeable.

The fast-acting and time lag fuses,
(Continued on page 34)

Fig. 1—Recently developed fuse and fuse holder for use in radio and TV receivers.





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RADIO CORPORATION of AMERICA
ELECTRONIC COMPONENTS

HARRISON, N. J.

Fuses for Radio & TV (Continued from page 32)

with their fuseholders, developed to provide positive electrical protection for television receivers are shown in Fig. 1. The bakelite body of the fuseholder for the fast-acting fuses, known as type C, and the time lag fuses, known as type N, is the same.

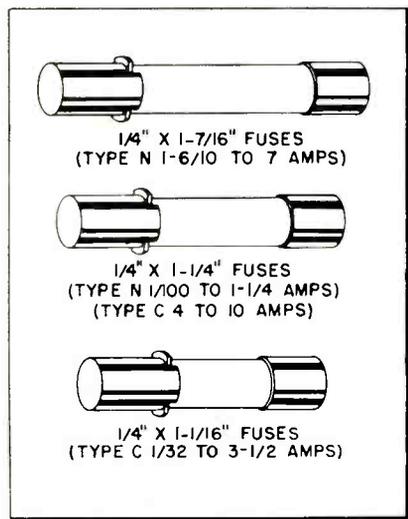


Fig. 2—Fuses are differentiated by three standard lengths and ears of different size.

When the fuseholder body is snapped into place on the television chassis the shoulder on the body seats on the top of the chassis but both terminals are on the underside, thereby simplifying the wiring of the device. One terminal is an extension of the bayonet socket at the top of the holder and the other an extension of the movable contact, surrounded by a coil spring, at the bottom of the holder. The bakelite key which prevents the holder from rotating in the keyhole in the chassis surrounds the side terminal and insulates it from the chassis.

Differentiation

The spring and movable contact are designed so that the fuseholder will take fuses $1\frac{1}{16}$ in. long, $1\frac{1}{4}$ in. long, and $1\frac{7}{16}$ in. long but only one length will fit in a particular holder. In other words, fuses $1\frac{1}{16}$ in. long will not make circuit in the fuseholder designed for $1\frac{1}{4}$ in. long fuses, and fuses $1\frac{7}{16}$ in. long will not even enter the holder for $1\frac{1}{4}$ in. fuses. Hence, one means of separation is obtained by the rejection feature resulting from the use of fuses of three different lengths.

To obtain greater separation the width of the slots in the bayonet socket on the fuseholder is varied. By varying the width of the slots

from 0.060 in. to 0.180 in. in steps of 0.020 in., seven additional means of separation result.

As shown in Fig. 2, the fuses are furnished in three lengths and the ferrule on one end is provided with ears, ranging in width from 0.060 in. to 0.180 in., which engage the bayonet socket in the fuseholder. Fuses having ears wider than the slots in the bayonet socket will not enter but fuses of the same length having narrower ears will enter. Hence, the ears on the fuse do not provide complete separation but, if the narrower ears are used for the fuses of lower rating the condition results that the user can insert a smaller fuse in his fuseholder but never a larger one. This will never create a hazard and only will result in greater protection or, at worst, unnecessary fuse blowing.

The fast-acting, or Type C fuses, are furnished in ratings of 10 amps. or less, at 250 volts or less. Fuses rated at $3\frac{1}{2}$ amps. or less are $1\frac{1}{16}$ in. long and fuses from $3\frac{3}{4}$ to 10 amps. are $1\frac{1}{4}$ in. long. Ten type HC fuseholders cover the range for the Type C fuse. All have the same body but rejection is obtained by the fuse length and width of the ears on the fuse ferrule.

Range of Ratings

The time lag, or Type N, fuses are furnished in ratings of $1\frac{1}{4}$ amps. or less, at 250 v or less, and from $1\frac{3}{10}$ to 7 amps. rated at 125 v or less. The fuses $1\frac{1}{4}$ amps. or less are $1\frac{1}{4}$ in. long and fuses from $1\frac{3}{10}$ to 7 amps. are $1\frac{7}{16}$ in. long. Nine type NH fuseholders cover the range for the Type N fuses. The intermediate steps are obtained by varying the width of the slot in the bayonet socket of the fuseholder and the width of the ear on the fuse ferrule.

Positive identification of the fuseholder and fuse is provided by stamping the type and ampere range on the socket of the fuseholder and the type and ampere rating on the end of the fuse eared cap. In other words, the socket of the fuseholder for the $1\frac{1}{4}$ to $1\frac{3}{4}$ amp. fast-acting fuse is stamped "HC $1\frac{1}{4}$ to $1\frac{3}{4}$ " and the $1\frac{3}{4}$ amp. fast-acting fuse has its eared cap stamped "C $1\frac{3}{4}$ " on its end. Since the eared cap projects from the fuseholder, above the chassis, when the device is installed in the set the replacement problem is simple. Both the rating of the fuse and the fuseholder are readily de-

termined before removing the fuse and, if the improper fuse which may create a hazard is substituted in spite of the marking, it will not fit.

Since the metal ferrule of the fuse projects from the fuseholder and must be held when the fuse is inserted or removed the device is limited to the protection of low voltage circuits or circuits provided with an interlock which prevents handling of the fuse before the circuit is de-energized. Hence, its greatest application at the present is to provide positive electrical protection for television and radio receivers.

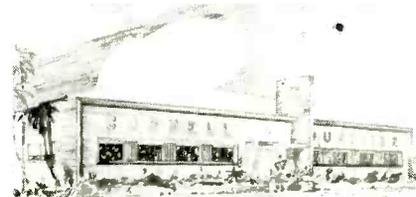
From the article "Fuses for Electronic Equipment" by J. C. Lebens, Chief Engineer, Bussmann Mfg. Co., St. Louis, Mo., published in the April 1955 issue of TELE-TECH & ELECTRONIC INDUSTRIES.

Automatic Tape Recording Firm Set Up By Cousino

Recent rapid development in the field of automatic tape recording and playback was marked recently by three significant announcements by Bernard A. Cousino, president of Cousino, Inc.—the development of a flexible tape playback mechanism, the mass production of a tape magazine, and the promotion of a new research organization.

The formation, by a group of Toledo businessmen headed by Cousino, of Browning Research Corp. disclosed the acquisition of all patent rights to the Audio Vendor project recently perfected by Cousino. This project affords a new concept in the field of magnetic tape recording and playback built around the continuous tape reel developed by Cousino as an accessory for standard tape recorders. The tape operates as a single continuous loop which eliminates the need for re-winding or removal from the reel. Browning Research is offering licensing arrangements to manufacturers of reproducing instruments embodying the Audio Vendor principle.

C-D INVADES WEST COAST



Announcement has been made by Octave Blake, pres. of Cornell-Dubilier Elec. Corp., of the new Los Angeles Div. plant. The new building is due to open about March 15th.



G-C LUMINOUS LITE-KOAT KIT
Coat dials, switches, etc., with this long-life, non-poisonous "glow in the dark" coating.
No. 184-0 NET \$1.95



G-C PICTURE TUBE EXTENSION
Extends picture tube leads from chassis to tube when servicing set. Complete, 48 inches.
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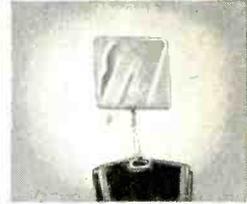
G-C ELEC. RESISTOR CEMENT
Ideal for resistors, appliances, etc. Heat-proof, hardens like porcelain.
No. 27-2 2-oz. bottle NET \$0.39



G-C SILVER PRINT
Pure silver compound used to repair printed circuits. Handy for touch-up, labs, etc.
No. 21-2 Troy oz. NET \$4.65



G-C DE-OX-ID KIT
Handy contact cleaner for switches, controls, relays. Kit contains 2 oz. De-Ox-Id and needle-type injector.
No. 8460 NET \$0.99



G-C TV PORTO MIRROR
Heavy chrome plated mirror for adjusting TV sets. Rubber lined spring clamp.
No. 8198 NET \$2.50



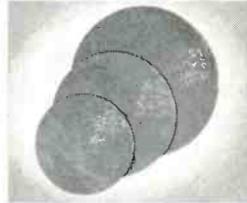
G-C STRIP-X
Removes insulating enamel from wires for easy soldering. Simply dip and wipe!
No. 26-2 2 oz. bottle NET \$0.39



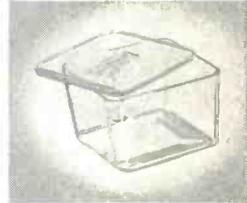
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Contains 10 shades of shellac sticks, stains, varnish, brushes, everything for cabinet repairs. Easy to use.
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G-C RECORD TURNTABLE FELT
Ready-cut replacements, center hole.
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G-C PLASTIC STOCK BOX
Handy, covered polystyrene box for stocking screws, nuts, resistors, capacitors, etc. 4x4x2 1/2".
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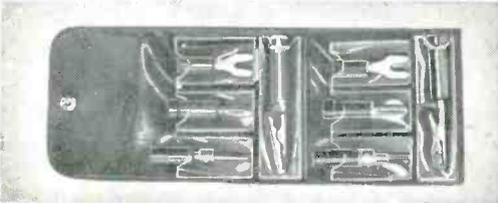
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Get into those hard-to-reach corners, inspect coils, connections, etc.
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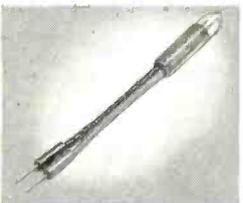
G-C TEST LEAD PLUG INTERCHANGE KIT
Easy to switch alligator clips, banana plugs, spade lugs, phone tips. Fitted plastic case holds one each in red and black.
No. 7743 NET \$1.95



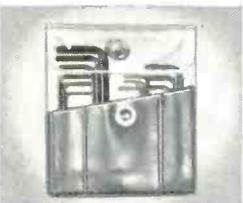
G-C ELECTRONIC HARDWARE LAB
Contains 60 most popular items in G-C 50 Line, each in hinged cover box. Good looking steel rack (9" x 13 1/2" x 2 1/2") for bench or wall mounting included in kit without charge.
No. 3660 NET \$19.50



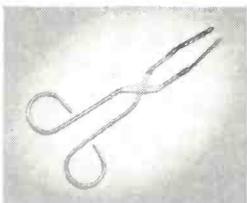
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Leatherette kit includes 16 high grade shims for speaker repair. Sizes: .004", .006", .008", .010".
No. 701 NET \$0.54



G-C NE-O-LITE TESTER
Neon glow lamp circuit tester for many uses. 60 V. AC to 550 V. AC-DC.
No. 5100 NET \$0.36



G-C ALLEN-BRISTO WRENCH KIT
Complete kit for both hex and spline type screws. Leatherette case, 12 wrenches.
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Originally designed for Signal Corps. Spring steel, cadmium plated. Prongs rubber cushioned.
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G-C MINIATURE TUBE PULLER
Suction, vacuum principle tool prevents tube breakage, burned fingers. Easy to use, saves time.
No. 5093 for 7-pin tubes NET \$1.08
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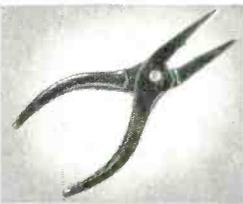
G-C UHF HOLLOW LINE CAPS
Seals round and oval hollow line ends. Easy to slip cap over end of line. Eliminates heat sealing.
No. H8912 Box of 8 NET \$0.30



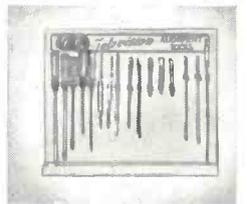
G-C BO ELIMINATOR
Eliminates Barkhausen Oscillation in horizontal sweep output tubes. Easy to install and adjust.
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G-C BEAM-O-CENTER
Beam adjuster fits in back of tube yoke coil to center picture. Bakelite housing. Easy adjusting.
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G-C TV HIGH VOLTAGE PLIERS
Insulated long nose pliers made of high impact Bakelite. Absolutely shock-proof.
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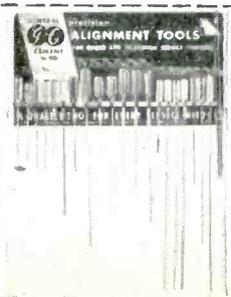


G-C ALIGNMENT BENCH KIT
Includes 16 most needed tools in handy stand-up bench rack.
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Ask Your Jobber
for the **GC**
SPECIALS OF THE MONTH

"Tough Dog" Corner

Difficult Service Jobs Described by Readers

Low Height Traced to Horizontal Output

This happened on a Du Mont Fairfield, which uses a 19AP4. There was no raster and very little sound to begin with. It was brought to the shop by a service technician who knew the trouble was in the power supply, but had had no luck with it in the home. On the bench it was found that a wire-wound resistor, whose insulation had broken down, was leaking to its metal shell. It was one of the kind that is riveted to the chassis to help dissipate its heat. After a proper replacement was installed the chassis was fired up and the picture came in fine except that there was insufficient vertical size.

Checked or changed in the following order were: vertical oscillator and output tubes, all voltages, resistors and capacitors in the vertical section, and the vertical output transformer. All were okay. In addition, all waveforms were correct up to the yoke—so it must be the yoke. The latter was changed—still no help. By this time, including myself, there were four technicians puzzling over the freak. Since the vertical circuit had been thoroughly checked, I reasoned, the trouble must be elsewhere. I don't know why we changed the picture tube—but it didn't do any good, anyhow. The other boys had already checked the high voltage and okayed it—it was over 15 kv. Just a minute! Over 15 kv is all right for a set designed for it, but the value seemed a little high. The circuit was designed for a lower value. Apparently the vertical sweep output voltage, which was entirely normal, just wasn't

great enough to deflect a 15-kv beam.

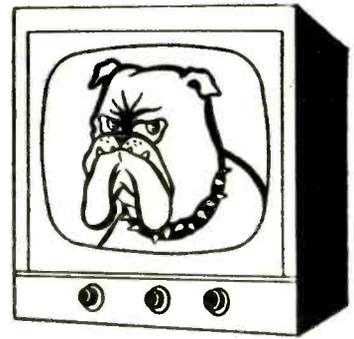
A further check showed that a 6CD6 was being used as the horizontal output tube instead of the specified 6BG6. The guess is that some service technician, somewhere in the past, had made the substitution in order to get more width. The extra width was probably needed to compensate for a low B-plus condition. This drop in dc voltage had probably occurred when the resistor we had just replaced was beginning to show leakage some time ago! When we put in a new resistor, B-plus went back up to its rated value—and so did second-anode voltage.

This is one case where a simple tube substitution was at the bottom of a very tough dog.—*Joseph F. DeBiak, Three Oaks, Michigan.*

Long and Short of It

I ran into some hair-pulling moments with a set on the bench that at times showed signs of ac getting into the picture, but, in the next moment gave symptoms of overloading. All tubes on the chassis were checked and rechecked for shorts; all voltages were checked and found to be normal. The culprit finally turned out to be the picture tube, but even this wasn't immediately evident. An ohmmeter check at the grid pin would show a normally high resistance reading at one time, but practically a dead short later on, depending on how the meter probe was moved.

Application of heat to the pins was tried, but only with partial success. For a short time after the



\$10 For Your "Tough Dog Story"

Have you tangled with a difficult or obscure service problem recently? Write it up, telling us how you licked it, and send it to "Tough Dog" Editor, *TECHNICIAN*, Caldwell-Clements, Inc., 480 Lexington Ave., N. Y. 17, N. Y.

set was turned on, there was a perfect pix. Then, bang—same old stuff. After deliberation, I used a hack saw to remove part of the bakelite base—about $\frac{3}{8}$ in.—of the crt, including the base pins. I found that one of the filament leads was almost $\frac{3}{4}$ in. longer than its mate. It was curled back on itself, as shown in the sketch, and was also curled back so that it was resting on the grid lead. Apparently the insulation on this lead had held for two or more years before beginning to give way—and the long wire had resulted in a short circuit.

I pulled the filament lead out straight, replaced the base, and resoldered the pins. The picture tube is now giving service all over again.—*J. E. Zacharias, Philadelphia, Pennsylvania.*

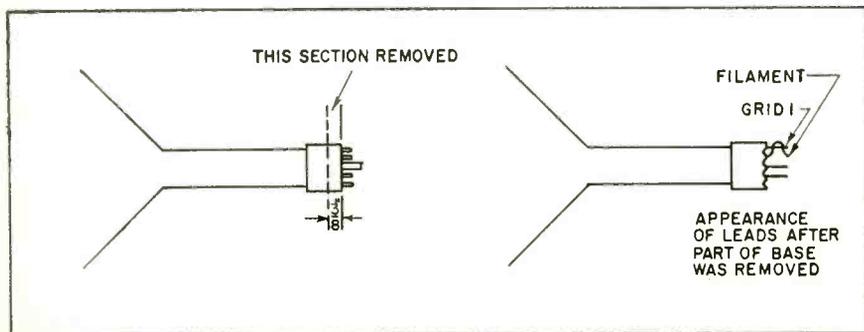
New Service Aid—Water!

After having replaced a weak crt and made some other repairs on an Admiral, I kept the set running for several days. Part of the original complaint had been that brightness took a long time in coming up. After checking the repaired receiver, I dismissed the complaint, no longer present, as being due to the weak picture tube that had been removed.

Several days after the set was returned, the customer called to say that the set was acting up in the same manner again. The delay would be anywhere from five minutes to an hour. After brightness came in, however, it stayed indefinitely. I dispatched my technician to the house but, as I half expected, he phoned from there to report that brightness came on while he was probing. What should he do?

Back to the shop came the set.
(Continued on page 56)

Twisted heater lead in base put this crt out of business—until a technician outfoxed it!





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THE RADIART CORP.
CLEVELAND 13, OHIO

Pointers on Batteries

Tips on Planning Your Inventory; Testing and Storage

• One of the more significant and anticipated signs of spring for the radio-TV technician is the healthy increase in battery sales. More and more people will be coming into the store and dropping their old batteries on the counter with a request that they be checked. And since, more often than not, the portable radios will have spent the past six months lying in some hot, stuffy closet, the batteries will very probably be run down to the point where they are unusable.

If the customer brings in both the radio and batteries you are in luck. Checking the output of the batteries in the radio is a simple matter. A voltmeter reading of less than $\frac{2}{3}$ the rated voltage indicates that the battery is beyond recall: the reading is taken, naturally, with the receiver turned on.

Battery Checking

If the customer brings in the batteries alone, however, the problem is considerably different. It is no secret that a voltage reading taken across the battery terminals means nothing; even a completely exhausted battery will often show close to its rated voltage. The only way of checking the battery then would be to load the output with resistance approximately equal to that provided by the radio receiver. For the "A"—filament supply batteries, the load resistor should be in the neighborhood of 180 ohms; for the "B"—supply voltage batteries, approximately 2,500 to 5,000 ohms, depending on the radio receiver in which it will be used.

Purchasing

No other replacement item demands such orderly, planned purchasing. Since the shelf life of most dry batteries is guaranteed for only 1 year, or less, it would not be at all difficult for the technician-dealer to end the "battery season" with a rather large inventory of batteries which would be outdated by the following spring. For this reason the wise dealer will plan his purchasing to meet his average battery sales

CREIGHTON M. MARCOTT,
ASST. EDITOR

figure. This will entail some slight additional record-keeping but the savings will make it more than worthwhile. One of the leading battery manufacturers recommends that the dealer keep a record of his battery sales for 1 year, noting both the batteries he sells and the ones for which he receives requests. With

| | |
|----------------------|-----|
| "A" BATTERIES | |
| (NEDA Code Numbers) | |
| 3 | 13 |
| 7 | 19 |
| 20 | |
| "B" BATTERIES | |
| (NEDA Code Numbers) | |
| 200 | 203 |
| 201 | 204 |
| 202 | 211 |
| "A-B" PACKS | |
| (NEDA Code Numbers) | |
| 401 | 404 |

13 most popular battery types for portables.

this information to guide him, he will be able to intelligently stagger his purchases over the next year so as to suffer minimum losses. In this connection, remember that orders for batteries should be placed at least 60 days in advance. In other words, to meet the first early rush in May, the orders should have been placed a few weeks ago.

Virtually all the manufacturers extend the same guarantee: 6 months on the smaller portable "B" batteries, and 1 year on all others.

Storage

The deterioration of dry batteries has been found to be generally slower at lower temperatures than at high temperatures. Exactly how much of a saving is effected will depend upon what the temperature would be if the battery were not cold stored, and upon the type of use

the battery is put to after the storage period. However, it is a safe general statement to say that the batteries, when not in use, should be kept at temperatures in the neighborhood of 40°-50°.

Before being put in storage the batteries should be sealed in a bag which is lined with asphalt or similar moisture resistant material. When removed from storage the package of batteries should be allowed to come to room temperature before opening the bag. This precaution prevents condensation on the batteries which might cause a short circuit across the terminals.

While the batteries should be stored at low temperatures they will not perform normally until they have again been warmed to about 70°.

Should the batteries, through some misfortune, be allowed to freeze, do not attempt to use them until they have been exposed to room temperatures (70° or higher) for an extended period. Premature use has been known to result in permanent damage to the cells.

In connection with the cold storing of the batteries there is another precaution to observe: handle the batteries as little as possible after they have been chilled. Many types of cell constructions employ waxes or plastics for sealing. At reduced temperatures these compounds become highly brittle and susceptible to cracking.

Batteries require rest for best performance. If extended continuous service is contemplated spare batteries should be kept on hand for rotation. For optimum battery life, portable receivers should not be operated continuously for longer than 4 or 5 hours in one duty cycle.

A point worth remembering when the blistering hot days of mid-summer roll around is that extremes of heat will also have a deleterious effect on battery performance. To combat this, make sure that the battery compartment of the portable is well ventilated. •

See Replacement Chart
on page 40

New Products

Masco TAPE RECORDER

Model 500 dual speed-dual track recorder has a frequency response of 50 to 12,000 cycles, ± 3 db. Faithful tonal rendition is provided by the specially designed 5 in. x 7 in. oval speaker. Audio power output is 5 watts. Single shift knob and beautiful ivory and gold decor with luggage type leatherette covering



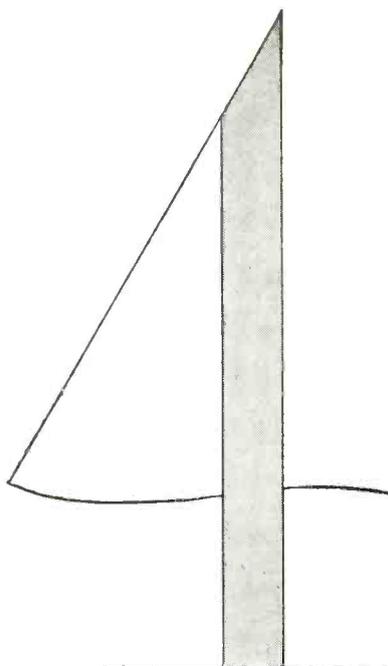
of DuPont Fabrikoid. Accessories include 7 in. reel with 600 ft. of tape, an empty take-up reel, a ceramic microphone styled to match the recorder, 10 ft. of cable and a patch cord enabling the user to record radio and television programs directly from the speaker of the radio and television sets or record players. \$168.50. Mark Simpson Mfg. Co., 32-28 49th St., Long Island City, N. Y.—TECHNICIAN (Ask for No. 4-95)

Gramercy NEEDLE BRUSH

The Hi-Fi needle brush is designed to be placed standing up on the phonograph chassis between the normal resting place of the arm and the turntable. As the arm goes to and from the record it automatically sweeps over the brush which is stationary. This action rids the phonograph needle of any harmful particles it has attracted from the record or the air. \$1.00. Prosound Corp., 175 Fifth Ave., New York 10, N. Y.—TECHNICIAN (Ask for No. 434)

Scott TURNTABLE

The new Type 710-A Stroboscopic Turntable, for broadcast and home hi-fi installations, provides pushbutton selection of 33 $\frac{1}{3}$, 45 and 78 rpm speeds. Each speed is adjustable by $\pm 5\%$ to allow matching the pitch of an accompanying musical instrument. The built-in expanded scale optical stroboscope, with electronic peak pulsing for extreme clarity, insures precision speed adjustment even while a record is being played. Significant innovations in mechanical design have reduced motor rumble by more than 60 db below recording level. Wow and flutter have been reduced to less than 0.1%. The turntable board can be mounted directly to a cabinet without additional vibration isolation. Herman Hosmer Scott, Inc., 385 Putnam Avenue, Cambridge 39, Mass.—TECHNICIAN (Ask for No. 4-33)

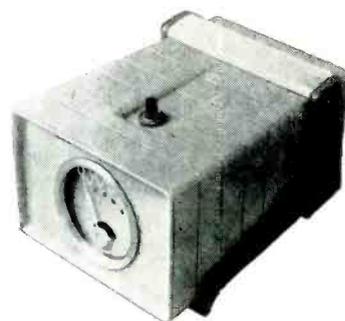


REASONS WHY CROWN IS THE LINE FOR YOU

- Outstanding Consumer Acceptance
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- Only 1.06% of Units Sold Required Service
- Two Beautiful Decorator-Styled Models

TENN-A-LINER MODEL CAR6B

It's another Crown exclusive . . . and it's packed with feminine buy-appeal. Beautiful three tone color styling in an advanced design . . . perfect for any decorating scheme. Incorporated are all the famous easy-to-sell Crown features . . . finger-tip control . . . instant directional indication . . . convenient off-on switch . . . easy-to-read illuminated dial. It's the newest, the smartest in antenna controls on the market today.



TENN-A-LINER MODEL CAR6A

Very popular and competitively priced, this dependable unit is available in rich mahogany bakelite. More conservatively styled, it offers the same outstanding Crown features as the Model CAR6B which has made it one of the most reliable and fastest selling units for dealers everywhere.



See them on DISPLAY

ELECTRONIC PARTS SHOW

Rooms 613 & 614 CONRAD HILTON HOTEL

SELL *with confidence*
sell **CROWN**

CROWN CONTROLS Co., Inc. NEW BREMEN, OHIO

Canadian Subsidiary Crown Controls Mfg. Ltd. Export Division, 15 Moore St., New York, N. Y., Cable—"Minthorne"

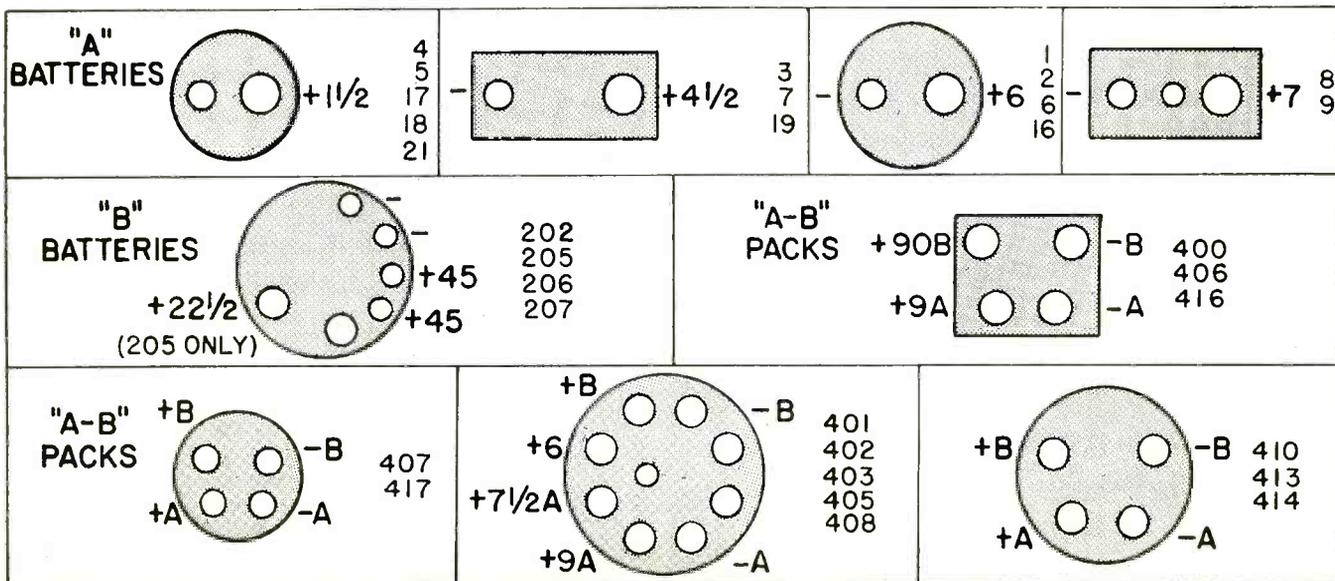
Battery Replacement Chart

Chart adapted from listings by National Electronic Distributors Association

| NEDA NUMBER | VOLTAGE | ACME | BRIGHT STAR | BURGESS | EVEREADY NATIONAL CARBON | GENERAL | OLIN WINCHESTER | PHILCO | RAY-O-VAC | R C A | USALITE |
|----------------------------|--------------|-------|-------------|---------|--------------------------|------------------|-----------------|---------|----------------|-------------|---------|
| RADIO A BATTERIES | | | | | | | | | | | |
| 1 | 6 | | 866 | 2F4 | 718 | | 4817 | | 698P | VS010 | 638 |
| 2 | 6 | | | Z4 | 724 | 39 | 4919 | | 67R4 | VS068 | |
| 3 | 4-1/2 | | 360 | F3 | 736 | 38 | 3816 | P38 | P93A | VS067 | 688 |
| 4 | 1-1/2 | 114 | 462 | 4F | 742 | 3 | 4818 | P94 | 194P | VS004 | 634 |
| 5 | 1-1/2 | 116 | 660 | 6F | 743 | | 4814 | P-96 | 196P | | 637 |
| 6 | 6 | | 646 | F4P1 | | 4 | 4914 | P 4F4R | P694A | VS009 | 639 |
| 7 | 4-1/2 | 123 | 381 | G-3 | 746 | 8 | 4818 | P-100 | P83A | VS002 | 683 |
| 8 | 7-1/2 | | | B-5 | 713 | | 5219 | | P551 | VS129 | |
| 9 | 7-1/2 | | 591 | C-5 | 717 | 31 | 5316 | | P751 | VS065 | |
| 10 | 7-1/2 | | | T-5 | | | | | 7CD5P | | |
| 11 | 1-1/2 | | | 2F | | | | | P 24A | VS141 | |
| 12 | 1-1/2 | | 485 | 4FL | | 13 | | | P94L | VS005 | |
| 13 | 1-1/2 | 111 | 10A | 2R | 950 | 912 | 1550 | 1550 | 2LP | VS036 | 75LP |
| 14 | 1-1/2 | 112 | 11M | 1 | 935 | 914 | 1311 | 1311 | 1LP | VS035 | 74 |
| 15 | 1-1/2 | 115 | 59-1 | Z | 915 | 900 | 1711 | 1711 | TR | VS034 | 908 |
| 16 | 6 | 118SL | 868 | 2F4L | 747 | | 4815 | P205 | 688PL | VS011 | 643 |
| 17 | 1-1/2 | 118 | 860 | 8F | 741 | | 4819 | P8F1 | 198P | | 635 |
| 18 | 1-1/2 | | | 2D | 720 | | 2516 | | 122P | VS069 | |
| 19 | 3 | | 360 | D-3 | 726 | | 4516 | | 423PX | VS072 | |
| 20 | 1-1/2 | | 61R | 21R | 964 | 77 | 2416 | P77 | 8R | VS236 | |
| 21 | 1-1/2 | | 865 | 8FL | 745 | 13 | 4813 | | 198PL | | 645 |
| 22 | 7-1/2 | | 581 | G5 | | | | | 785P | VS003 | |
| 23 | 1-1/2 | | 60A | 8R | | | | | PF1 | VS070 | |
| 24 | 1-1/2 | | | 7 | 912 | | 1911 | | 400 | | |
| 25 | 6 | | | F4L | | | | | 694PL | | |
| RADIO B BATTERIES | | | | | | | | | | | |
| 200 | 67-1/2 | 545 | 45N | XX45 | 467 | 108 | 1710 | P-67 | 4367 | VS016 | 767 |
| 201 | 45 | | | XX30 | 455 | 105 | 6211 | P-105 | | VS055 | |
| 202 | 45 | | 30-33 | M-30 | 482 | 109 | 6210 | P-45 | P7830 | VS013 | 640 |
| 203 | 67-1/2 | | | K-45 | 457 | | 1712 | | | VS082 | |
| 204 | 90 | | 60N | N-60 | 490 | 132 | 1713 | P-132 | 4390 | VS090 | 769 |
| 205 | 45 | | 30-59 | Z-30 | 738 | 104 | 6718 | PTR30 | | VS015 | 620 |
| 206 | 45 | | 30-55 | A-30 | | 110 | 6118 | P-210 | P430 | VS014 | |
| 207 | 45 | | 30-03 | B-30 | 762 | 111 | 6218 | P-305 | P5303 | VS012 | 624 |
| 208 | 15 | | | U10 | 411 | 611 | 1914 | | | VS063 | |
| 209 | 22-1/2 | | | | | | | | | VS085 | |
| 210 | 30 | | | U20 | 413 | 613 | 1916 | | | VS216-VS218 | |
| 211 | 67-1/2 | | 675 | P45 | 477 | 149 | 1709 | P149 | 946 | | |
| 212 | | | | XX50 | 437 | 144 | 1708 | P144 | 4375 | VS217 | |
| RADIO A AND B PACKS | | | | | | | | | | | |
| 400 | 9-90 | | 66-03 | G6B60 | 752 | 343 | 616 | P60B6F6 | AB995 | VS047 | AB677 |
| 401 | 7-1/2-9-90 | | 66-50 | F6A60 | 753 | 271 | 614 | P641-A | AB994 | VS019 | AB680 |
| 402 | 7-1/2-9-90 | | | G6M60 | 754 | 291 | 615 | | AB878 | | |
| 403 | 6-71/2-75 | | 66-52 | T5Z50 | 755 | 350 | 618 | | AB775 | VS050 | |
| 404 | 7-1/2-90 | | | T5Z60 | 756 | | | | | | 681 |
| 405 | 7-1/2-9-90 | | 66-53 | T6Z60 | | 362 | 619 | P-363 | AB601 | VS057W | |
| 406 | 9-90 | | 66-54 | F6A60P | | 273 | 620 | | AB909 | VS058 | |
| 407 | 1-1/2-63 | | | 4GA42 | | 258 | 624 | P41A4FL | AB944 | VS053 | |
| 408 | 7-1/2-63 | | | G5A42 | | 263 | 623 | P87 | AB794 | VS038 | AB676 |
| 409 | 1-1/2-90 | | | SDA60 | | 278 | | | AB24 | VS053 | |
| 410 | 1-1/2-90 | | | 6TA60 | | | 622 | | AB64 | VS054 | |
| 411 | 6-75 | | | F4A50 | | | | | | | |
| 412 | 1-1/2-60 | | | 2TXX40 | | 254 | | P-89 | AB419 | | |
| 413 | 1-1/2-90 | 782 | 61-05 | 17GD60 | | 328 | 518 | P80D11L | AB82 | VS022 | AB666 |
| 414 | 1-1/2-90 | | | 4SD60 | 758 | 299 | 513 | P80B6L | AB85 | | |
| 415 | 7-1/2-9-90 | | | S6D60 | | 326 | | P326 | AB326 | VS119 | |
| 416 | 1-1/2-9-90 | | | | 752W | 343(plus EF-728) | 616W | | | | |
| 417 | 1-1/2-90 | | | | | 279 | 611 | P60A4L | AB84 | | |
| 418 | 6-90 | | | F4B60 | | | | | AB695 | | |
| 419 | 67-1/2 | | | | | | | | AB484 | | |
| 420 | 6-7-1/2-90 | | | F5M45 | | | | | AB767 | | |
| 421 | 6-90 | | | G4B50 | | | | | AB604 | | |
| 422 | 6-75 | | | G4B50 | | | | | AB685 | VS046 | |
| 423 | 1-1/2-61-1/2 | | | 4GA41 | | | | P41A4G | AB1944 | VS052 | |
| 424 | 1-1/2-90 | | | 4TZ60 | | | | | AB82 Metal can | | |
| 425 | 1-1/2-90 | | | | | 364 | | P364 | | VS064 | |
| 426 | 1-1/2-90 | | | | | | | | | VS045 | |
| 427 | 6-67-1/2 | | | 18GD60 | | | | | AB6145N | | |

Socket Terminal Guide

Numbers to right of sockets are NEDA battery types. Chart adapted from Olin guide.



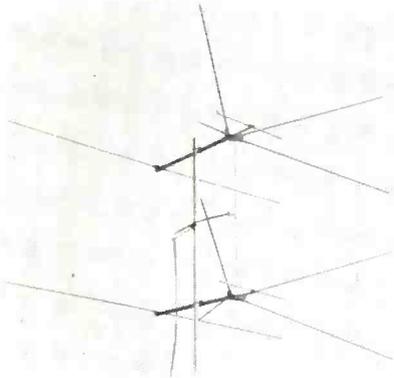
New Products

T-V INDOOR ANTENNA

Modern design "Whirl-Win" indoor TV antenna, for VHF-UHF reception, is 9 in. high, and 21 in. wide. It extends to 36 in. in width. It can be used with or without an outside antenna. Operates efficiently in most UHF areas, according to mfr. \$9.95. True-Tronics Inc., 7 N. Halsted St., Chicago, Ill.—TECHNICIAN (Ask for No. 4-90)

Channel Master TV ANTENNAS

The "Maverick" antenna line consists of two complete series of conicals in both preassembled and non-assembled versions. The entire line, comprising 22 different models, features 100% aluminum construction throughout. Every popular type of conical arrangement is included. The "Maverick 300" series,



comprising 12 different models, is claimed to be the first fully preassembled, complete conical line ever offered. There is no hardware to be tightened; every element swings open and automatically locks into position. "Maverick 340" line features the "Notch-Lock" clamp plate which prevents the elements from turning or twisting loose. List prices for the "Maverick 300" run from \$4.17 to \$5.56 per bay. The "Maverick 340" lists from \$3.50 to \$4.31 per bay. Channel Master Corp., Ellenville, New York—TECHNICIAN (Ask for No. 4-68)

Vaaro BUMPER MOUNT

Antenna bumper mount entirely eliminates need for cutting holes in the user's car to make a proper installation. The Bumper Curvature Insert fits any make or model of car in operation, and the insert can be inexpensively replaced as the user changes his car model. Two models are available, each with standard $\frac{3}{8}$ in. x 24 thread. Model V-105 is of cast aluminum, with Hammer-tone baked enamel finish. Model V-105V is cast bronze with heavy chrome and copper underplating. Guaranteed 5 years. Price for V-105—\$13.95; for V-105V—\$25.95. Vaaro Div., Davis Electronics, Box 1247, Burbank, California.—TECHNICIAN (Ask for No. 4-19)

More New Products on p. 45

Taco FM ANTENNAS

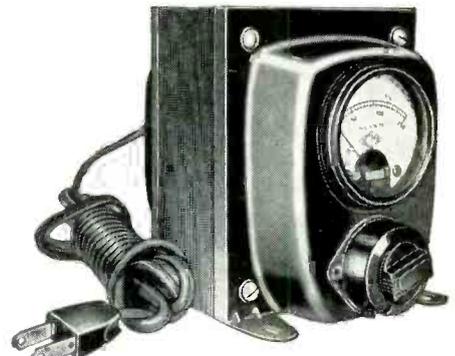
Designed primarily for the fringe areas, the Taco Cat. No. 644 FM antenna is also used in areas bothered by conflicting signals or interference. Consisting of 3 directors, 2 driven elements and a reflector, the new antenna is available as either a single, or stacked array, depending upon the gain required. Terminal impedance matches 300-ohm transmission line, for maximum transfer of energy. For reception of stations in different directions, the use of a mechanical rotor is recommended. Complete coverage of the 86-103 MC band is assured through the broad-band tuning of the antenna. Technical Appliance Corp., Sherburne, N.Y.—TECHNICIAN (Ask for No. 4-75)

Scotch INSULATION TAPE

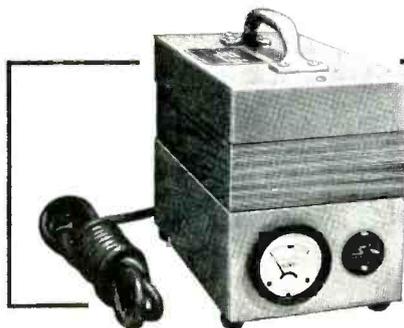
"Scotch" brand electrical tape No. 39 features a pressure-sensitive adhesive that sticks tight on contact with 50% more "grab" than its predecessor. An important feature of the improved tape is the thinner construction—now 5 mils thick—making it more useful where space is at a premium. The yellow, flat-back tape made from electrical grade rope paper also features a high dielectric strength—1500 v.—and greater solvent resistance. Tensile strength is 45 lbs/in. of tape width, insulation resistance is 10 megohms at 96% relative humidity, and the electrolytic corrosion factor is .95. Minnesota Mining and Mfg. Co., 900 Faquier St., St. Paul 6, Minn.—TECHNICIAN (Ask for No. 4-6)

9 OUT OF 10 Fringe Area Installations Need ACME ELECTRIC VOLTAGE ADJUSTORS

Overloaded distribution lines and low voltage service are prevalent conditions in TV fringe areas according to a recent "spot check". As a result complaints on picture shrinking, fluttering and dimming plague the service man. Usually this condition can be readily corrected with an Acme Electric Voltage Adjustor, either the inexpensive manual type or the deluxe automatic design.



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.



Regardless of line voltage supply, the Automatic Voltrol corrects voltage fluctuation over a range from 95 to 130 volts. The voltmeter supplied indicates secondary voltage while unit is in operation. A built-in relay automatically disconnects circuit when set is turned off.

Acme Electric
TRANSFORMERS

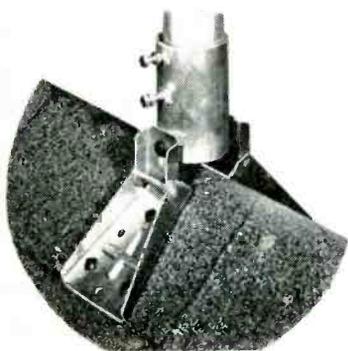
ACME ELECTRIC CORPORATION
MAIN PLANT: 889 WATER STREET • CUBA, N. Y.
West Coast Engineering Laboratories:
1375 West Jefferson Boulevard. • Los Angeles, California
In Canada: Acme Electric Corp. Ltd.
50 Northline Road • Toronto, Ontario

New Outdoor TV Antennas

Broadband Inline Yagis and Other High-Gain Types;

Channel Master MOUNTS

Universal mast mountings made entirely of aluminum called "ALU-Mounts," fit masting of all sizes. They are made of high-temper, special alloy aluminum, and can never rust. They



feature extremely thick sleeve walls and embossed rib construction for greater strength. An exclusive self-locking feature permits the mast to be completely self-supporting when it is swung into a vertical position. The serviceman is then left with both hands free to secure the guy wires and tighten the bolts. Channel Master Corp., Ellenville, N. Y.—TECHNICIAN (Ask for No. 4-2)

DHD MASONRY ANCHOR

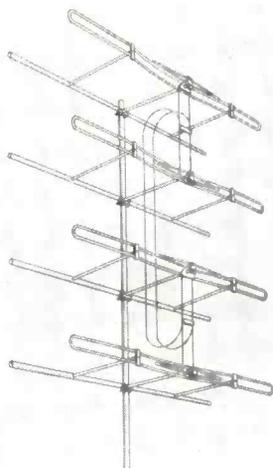
For anchoring into masonry, cinder block, and concrete, this aluminum alloy anchor is of one-piece construction, which the manufacturer says will permit perfect alignment in any drilled hole. The galvanized nail which comes with the aluminum shield has special nurling to increase holding power. This entire assembled unit offers more over-



all holding power; up to 1 ton for the $\frac{1}{4}$ x $1\frac{1}{4}$ size DHD anchor. They are packaged 25 in an individual box and are available in 13 sizes from $\frac{3}{16}$ x $\frac{7}{8}$ x $3\frac{1}{2}$. Diamond Expansion Bolt Company, Garwood, N. J.—TECHNICIAN (Ask for No. 4-22)

FINCO VHF ANTENNA

A broad-band antenna capable of excellent performance on both low-band and high-band channels, the F-4, according to the mfr., can perform well at distances up to 150 miles or more



from the station. "Fidelity Phasing" eliminates the necessity of matching harnesses to correct impedance mismatch. The Model F-4 is ideally suited for color and has extremely flat frequency response—less than 1 db. variation in frequency response on any channel. All-aluminum, weather-proof construction. Pre-assembled. The Finney Company, Cleveland, Ohio.—TECHNICIAN (Ask for No. 4-24)

Neal TV ANTENNA

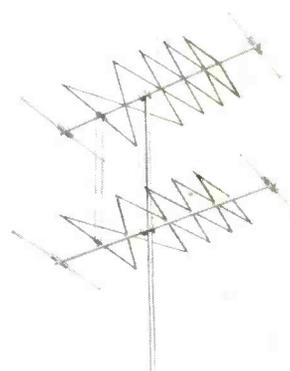
New Fringe Beam Model "Sky Rocket," is a broad band inline yagi. The sharp forward pattern of the "Sky Rocket" is due to the new J dipole design of the low band collector which transforms it into three half-wave length antennas that develop high gain on high channels when used with the high band collector and director. The gain on low channels is exceptionally high due to double reflectors—full size dipole and director. New click-rig design of element clamps with no nuts to tighten. Neal Electronic Co., Inc., P. O. Box 376, Huntsville, Alabama—TECHNICIAN (Ask for No. 4-76)

MORE TECHNICAL INFORMATION

describing the new products presented here may be obtained by writing on company letterhead to New Products 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. Please use coupon on page 44.

JFD YAGI ANTENNA

New high-band antenna, JFD Yagi-Helix, for deep fringe reception, gives high band performance equivalent to 7 separate 10-element single-channel high band yagis. It delivers 11 db average



gain on the high band, and an average 13.5 db when stacked. It has high directivity and good front-to-back ratio. The Yagi-Helix can be stacked in different directions to pick up more than one high channel from more than one direction, by using the stacking bar supplied, and taking off at the normal center position. \$12.95 each, 2 to a carton, with free stacking transformer. JFD Mfg. Co., Inc., 6101 16th Ave., Brooklyn 4, N.Y.—TECHNICIAN (Ask for No. 4-74)

Jontz MAST

New 18 gauge mast is available in 20, 30, 40 and 50 ft. models. The top section is 16 gauge, hot-dipped, galvanized strip, rolled into tubing. The mast is available only in the standard sectional combinations, starting with $1\frac{1}{4}$ in. on the top and graduating $\frac{1}{4}$ in. in size and down. Jontz Mfg. Co., 1101 East McKinley St., Mishawaka, Ind.—TECHNICIAN (Ask for No. 4-13)

P-D COAXIAL CABLE

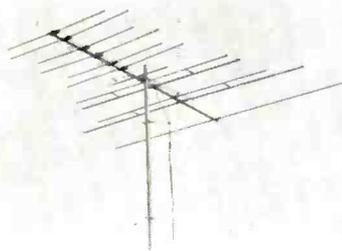
"Spirafil" coaxial cable is particularly well suited to applications in community antenna systems. Features include: no radiation, low attenuation, excellent frequency response, uniform electrical properties over wide temperature variations and unlimited operating life. The cable consists of a solid copper center conductor, a solid polyethylene filament helix and a tubular aluminum conductor. Standard lines of fittings for Spirafil cable are carried in stock by accessory manufacturers. Phelps Dodge Copper Products Corp., 40 Wall St., N.Y. 5—TECHNICIAN (Ask for No. 4-45)

and Installation Accessories

Mast Mounting, Wall Bracket, Lightning Arrestor, Coaxial Cable

Channel Master YAGI

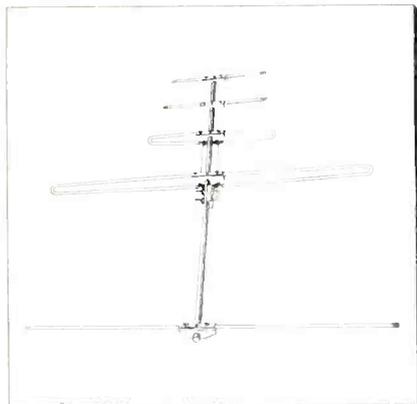
The Model 335 "Trail-Blazer" yagi antenna features high band directors which are a full wave length long. The antenna also has two elements more than similar antenna types. 100% alu-



minum construction, including cross-arm, elements, and brackets; 1-piece cross-arm. It is ideal for fringe area reception and has high gain on all VHF channels, together with excellent front-to-back ratios. Substantial improvements in the impedance match of this antenna have resulted in extremely high stacking efficiency and outstanding stacked performance, according to the mfr. List price of the 1-bay Trail Blazer, Model No. 335 is \$22.22; the stacked model No. 335-2, \$45.14. Channel Master Corp., Ellenville, N.Y.—TECHNICIAN (Ask for No. 4-67)

Fretco VHF-UHF ANTENNA

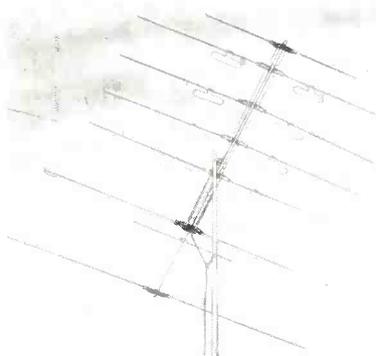
New all-channel inline yagi type antenna, custom designed to fit any particular area, is called the "Customliner." It is being manufactured to the exact specifications necessary to receive the channels broadcasting in a particular



area. The Customliner is designed to operate in fringe areas in a VHF range and in primary signal areas in a UHF range. It features riveted construction and 'flip rig' assembly. Fretco, Inc., 406 N. Craig St., Pittsburgh 13, Pa.—TECHNICIAN (Ask for No. 4-72)

TACO VHF ANTENNA

Utilizing the wave-trap design first introduced by Taco in the "Trapper," the "Super Trapper" incorporates 24 working elements on the high band channels and 7 working elements on the



low band channels. All elements are in the same plane, providing extremely rigid construction; no boom braces are required on the 1½-in. crossarm. The antenna was designed for fringe area reception. Elements are completely factory assembled by means of a spring-loaded quick rig design. Technical Appliance Corp., Sherburn, N. Y.—TECHNICIAN (Ask for No. 4-20)

Kenco WALL BRACKET

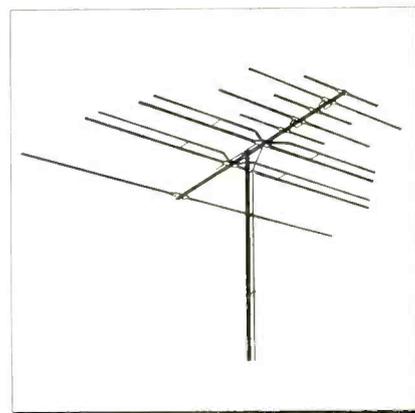
With this new 18-in adjustable wall bracket, the "Kenco Spider," the technician simply drives two lag screws on 16-in. centers to approximately ¼ in. of the wall. The pivoted "Drop Slot Feet" permit hanging of the bracket on these screws which are then tightened. Adjustment to desired distance from the wall is then easily made by raising or lowering the tripod leg before lagging it to the wall. Special full thread hex head lag screws are furnished. Available in combination with a 3-in upper bracket and an 18-in lower tripod "Spider." Kenwood Engineering Co., Inc., Kenilworth, N.J.—TECHNICIAN (Ask for No. 4-73)

MORE TECHNICAL INFORMATION

describing the new products presented here may be obtained by writing on company letterhead to New Products 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. Please use coupon on page 44.

Trio VHF ANTENNA

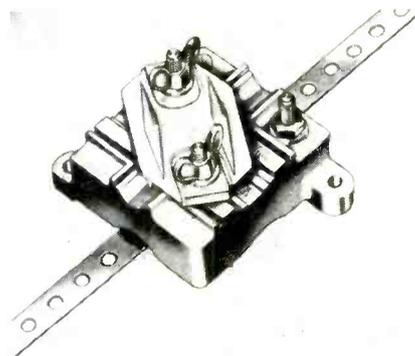
The "77" is an all VHF channel Yagi type using intermixed high-band and low band elements properly arranged for single line operation. Features are: high gain yagi performance on all VHF



channels; no interaction between high and low channel elements; very high rejection of signals off rear and sides. Especially designed to withstand high winds and icing; well balanced, for rotator operation. Constructed of extra sturdy Alcoa tubing. Trio Mfg. Co., Griggsville, Ill.—TECHNICIAN (Ask for No. 4-69)

Vee-D-X LTNG. ARRESTOR

Solution to the problem of arrester loss on UHF is claimed for the new Vee-D-X (Type ULA) universal lightning arrester. The unit is hermetically-sealed and employs patented special low-loss printed circuits which assure efficient operation at UHF by main-



taining correct line impedance with low distributed capacity and minimum signal attenuation. Accommodates all popular types of wire—flat, tubular, oval, foam and open. LaPointe Electronics Inc., Dept A-4, Rockville, Conn.—TECHNICIAN (Ask for No. 4-66)

New Test Instruments & Tools

New CRT Checkers; Signal Gen. and VOM Kits; Bridges

EICO SIGNAL GEN.

Model 324 signal generator can be used for i-f—r-f alignment, signal tracing, and troubleshooting of AM, FM, and TV receivers (all on fundamentals), as a marker generator for alignment of new high-frequency as well as older low frequency TV i-f's; for 400 cps sine wave audio testing, and laboratory and experimental work. Its frequency range is 150 kc to 145 mc on fundamentals in 6 bands; and 111 mc to 435 mc on calibrated harmonics. Accuracy of dial calibration is $\pm 1.5\%$, with 6.1 vernier tuning knob and excellent spread at most important frequencies. Model 324, Kit, is \$26.95. Model 324, factory wired, is \$39.95. Electronic Instrument Co., Inc., 84 Withers St., Brooklyn 11, N. Y.—TECHNICIAN (Ask for No. 4-11)

P-K SPRAY

"Plastic Spray" provides effective coating against moisture, dirt, corrosion, and grease. Will not discolor or crack; dries quickly to a tough, transparent, flexible film. Useful on ignition systems to protect against rusting and battery current leakage and on radio antennas when it acts as a corrosion preventive. Available in a 12-oz. aerosol can at the retail price of \$1.89. Plasti-Kote, Inc., 425 Lakeside Ave., N. W., Cleveland 13, Ohio — TECHNICIAN (Ask for No. 4-90)

Centralab CONTROL KIT

Engineering departments and laboratories doing experimental work or building pilot models using dual-concentric variable resistors will be aided by the new FR-22A "Fastatch" dual-concentric control kit. A sturdy metal stocking cabinet is furnished with the most popular front and rear units in the control system. A total of 22 controls can be built from a possible 363 combinations of resistance, taper, and

switch or plain types. Shafts of the "Fastatch" system units can be cut off to any desired length, and then the front and rear "snapped" together to make the dual-concentric control. Centralab, 900 E. Keefe Ave., Dept. B38, Milwaukee 1, Wisc.—TECHNICIAN (Ask for No. 4-40)

Knight VOM KIT

Featuring a 4½ in. meter, the Knight VOM provides easy-to-read scales for all functions and ranges. 50 ma meter sensitivity with 20,000 ohm/volt input resistance on dc result in low circuit loading. Selection of both function and range are accomplished with a single switch. Instrument has 19 ranges: 6 dc voltage ranges read 0 to 5000 v.; 6 ac voltage ranges read 0 to 5000; 3 resistance ranges read 0 to 200 megohms; and 4 dc ranges read 0 to 10 amperes. Use of 1% film-type multipliers provide a high degree of accuracy plus protection against effects of moisture. \$26.50. Allied Radio Corporation, 100 N. Western Ave., Chicago 80, Illinois.—TECHNICIAN (Ask for No. 4-17)

III BRIDGES

Type RN portable Wheatstone Bridges are available with or without Murray and Varley loops. All models are complete with batteries and ready to operate. Ratio dial settings of bridges are: .001; .01; 0.1; 10; 100; 1000; M10; M100, M1000; ¼; ½. Decade knobs have steps of 1, 10, 100, 1000 ohms. Ratios are guaranteed to $\pm 0.05\%$ tolerance and resistance dial resistors to $\pm 0.01\%$ of nominal value. Coils in the Type RN Wheatstone Bridges are bifilar wound on ceramic cores, oven aged and varnish-impregnated. All switches are self-cleaning with four phosphor-bronze spring wipers and detent mechanisms. Industrial Instruments, Inc., Cedar Grove, N. J.—TECHNICIAN (Ask for No. 4-18)

Central CRT REJUVENATOR

New crt rejuvenator, the Multiphase "Rejuva-Tube," tests, repairs and rejuvenates all types of electrostatic and electromagnetic TV picture tubes without the necessity of removing the tube



from the set. It detects open or shorted elements and leakages as high as 3 megohms between elements. A special metered circuit removes "particle" shorts between cathode and heater. The mfr. claims that it is the only device that meters cathode activity during rejuvenation; warns when to stop rejuvenation to prevent damage to cathode emitting surface. Price, \$49.50, in kit form; and \$59.50, factory wired. Central Electronics Inc., 1247 W. Belmont Ave., Chicago, Illinois.—TECHNICIAN (Ask for No. 4-99)

Century CRT CHECKER

Model 102 Picture Tube Tester is a budget-priced instrument which tests picture tube quality by the emission method. Also tests for inter-element leakage, shorts and open elements.



Completely self-contained; supplies its own crt power through a unique circuit which allows efficient testing whether the tube is in or out of the set. \$9.90. Century Electronics Co., 211-04 99th Ave., Queens Village, N. Y.—TECHNICIAN (Ask for No. 4-96)

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USMC DOOR OPENER

"Auto-Magic" garage door operator will open, close and lock the garage door and turn on or off the garage light from the operator's car. Two models are available: an electronic remote-controlled model wherein a small radio transmitter mounts under the hood of



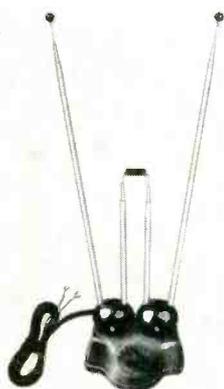
the car and goes into action with the press of a button mounted on the dashboard—opening or closing the garage door—and a push-button or key lock-switch model which is actuated by a control mounted on a gate post, light post, etc., installed alongside the drive. Both models feature simple installations. Auto Magic Division, United States Motors Corporation, Oshkosh, Wisconsin.—TECHNICIAN (Ask for No. 4-10)

CBS-Hytron TRANSISTOR

New germanium transistor, Type 2N82, is capable of 35 milliwatts collector dissipation at 71° C. Its metal case, only 0.33 in. long by 9.225 in. in diameter, is hermetically sealed against surface contamination, light excitation and humidity. CBS-Hytron, 100 Endicott St., Danvers, Mass.—TECHNICIAN (Ask for No. 4-60)

RMS INDOOR ANTENNA

Model B-29 "Duoscopic" indoor antenna features a 6-position selector switch and an adjustable 3-section



telescoping phasing bar. Base is of the "Nevatip" type, finished in crackleton brown. Complete with 5 ft. of twin lead. \$12.95. RMS, 2016 Bronxdale Ave., New York 62, N.Y.—TECHNICIAN (Ask for 4-70)

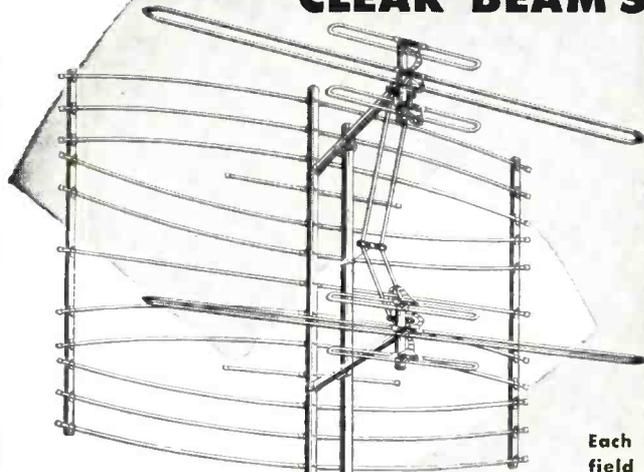
Raytheon PICTURE TUBES

The 21ATP4 is a direct view electrostatic focus picture tube employing magnetic deflection. It has a spherical rectangular filter-glass face plate for elimination of reflection and an aluminized screen. The 21ATP4 is designed to be used with an external ion-trap magnet of the single field type to prevent ion-spot blemishes. The external conductive coating, when grounded, serves as a filter capacitor. Raytheon Mfg. Co., Receiving and Cathode Ray Tube Operations, Newton 58, Mass.—TECHNICIAN (Ask for No. 4-93)

International METERS

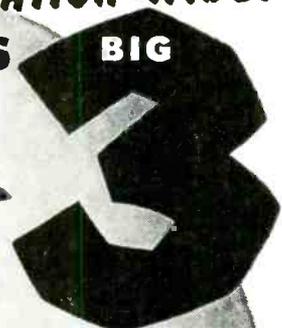
New series of larger Side Indicator panel meters, designated Model 1145, exceeds the specification for conventional 4½ in. meters and the panel area is less than 1/3 as much. The new meters are available for vertical or horizontal mounting, and require a panel area of only 5.5 sq. in. Overall dimensions are 3.5 in. wide by 1.3 in. high by 3.5 in. deep (plus terminal length as required.) Accuracy is ±2% of full scale deflection on dc and ± 5% on ac. International Instruments, Inc., New Haven 15, Conn.—TECHNICIAN (Ask for No. 4-111)

HOTTEST IN THE FRINGES.. NATION-WIDE! CLEAR BEAM'S BIG



Model
TK1500

TRI-KING



ALL-BAND FRINGE ANTENNAS

Each a peak performer in its field . . . a triple threat to any fringe problem . . . with more dollar-for-dollar construction value!

The Tri-King TK1500 offers super fringe performance through better design features. Half wave electrical spacing between dipoles for higher gain on every channel. Positive "back up action" through the use of a full radar screen . . . acclaimed industry-wide as the finest reflector ever designed for ghost rejection and elimination of co-channel

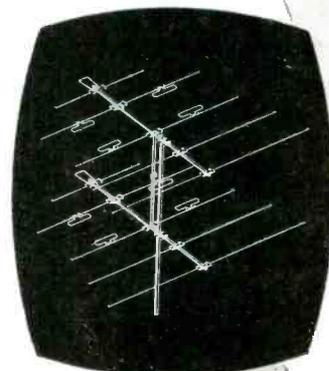
interference! Fully wind tunnel tested. Available in single bay (Model TK1000) and Super, wide spaced array (Model TK1800).

Clear Beam

BIG CHIEF

2 Bay Model BC 12-2

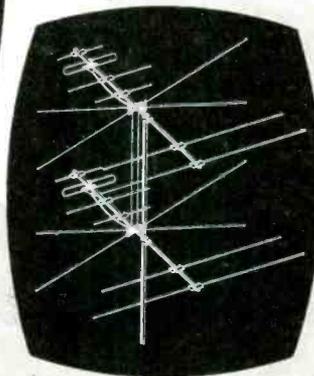
An advanced conical-Yagi with element diameters varied for precision tuning, matched sensitivity and peak performance on high and low band!



Clear Beam HUNTER

2 Bay Model MYH 50-2

New wave trap principle gives extremely high gain, sharp directivity, in-phase tuning on all channels. New, flat design for low wind resistance!



CLEAR ANTENNA CORP. BEAM

Canoga Park, Calif. • Chicago, Ill.
affiliated with TEMPO TV products

Warehouses in Seattle, Portland, San Francisco, Honolulu, Dallas, Kansas City, Chicago, Detroit, Baltimore

New Test Equipment

Oscilloscopes; Tube Checker, Yoke Tester; Dot-Bar Generator

RCA DOT-BAR GENERATOR

A modified version of the WR-36A Dot-Bar Generator which can be used for making convergence adjustments in both small-screen and large-screen home color-television receivers is announced. The new version carries the same WR-36A type number. The instrument which is used for all convergence and linearity adjustments in color receivers, produces on the receiver picture tube a pattern of white rectangular dots when convergence is accurate, and an overlapping pattern of red-green-blue dots when convergence adjustments are required. \$147.50. RCA Distributor Sales Div., RCA, Camden, N. J.—TECHNICIAN (Ask for No. 4-5)

EICO ROLL-CHART

New 1955 tube tester roll-chart N. 625-04 contains listings of the latest tubes released by the leading tube manufacturers. It widely increases the utility of all EICO tube testers. The roll-chart is printed on a 6-ft. long continuous sheet of durable high quality white paper, and easily fits on the tube tester's present roller mechanism. \$1.00. Electronic Instrument Co., Inc., 84 Withers St., Brooklyn 11, N. Y.—TECHNICIAN (Ask for No. 4-36)

Winston FLYBACK-YOKE TESTER

Designed to test horizontal output transformers and yokes, Model 810 Flyback-Yoke tester provides definite good-bad tests by use of a special oscillating neon indicator driven by a dc amplifier which makes the indicator more sensitive than a meter. Separate calibrated positions are provided for continuity and shorted turn tests on iron core and air core transformers



(color or B&W) as well as B&W yokes and color TV yokes. The instrument is housed in a portable blue-black case with blue-grey sloping front panel. Winston Electronics, Inc., 4312 Main St., Phila. 27, Pa.—TECHNICIAN (Ask for No. 4-21)

ETC SCOPE

New dual-channel oscilloscope, ETC Model K-26, employs two completely separate and independent channels with both signals displayed on the 5-in. screen of a single ETC Type 5AFP dual-beam cathode ray tube. Individual or common sweeps from 2 sec. to 50,000 cps may be selected from the front panel. Frequency response of both vertical and horizontal amplifiers is flat to dc, down not more than 10% at 100 kc. Deflection factor of vertical amplifiers is 0.025 peak-to-peak v./in. (0.009 rms v./in.); of horizontal amplifiers, 0.3 peak-to-peak v./in. (0.1 rms v./in.). Compartmentalized construction. Black wrinkle-finished cabinet. 17½ in. high by 16¾ in. wide by 22¾ in. deep. Electronic Tube Corp., 1200 E. Mermaid Lane, Phila. 18—TECHNICIAN (Ask for No. 4-97)

Seco TUBE CHECKER

New model of the portable tube tester, model GCT-4, is designed to supplement present testing equipment by offering features that no other tester can per-



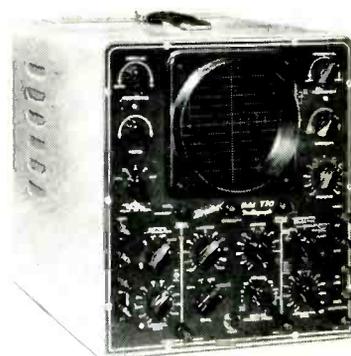
form, according to mfr. The tester is equipped with a filament voltage selector for 3, 4, 5, 6, 7 and 12 v. tubes. Without the use of any selector switch, the tester determines grid to cathode shorts, gaseous condition in tubes, cathode to heater shorts and control grid emission. The control grid emission test is claimed to be an exclusive feature. The tester is compact and fits into the technician's tube caddy. \$29.95. Seco Manufacturing Co., 5015 Penn Ave., S., Minneapolis, Minn. — TECHNICIAN (Ask for No. 4-9)

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Hickok OSCILLOSCOPE

New 5-in., wide range, high sensitivity scope, model 770, has a vertical amplifier response of dc to 2.5 mc, 3 db down, with band width switch in narrow position, and dc to 5 mc, 3db down, with switch in wide position. Horizontal amplifier has a response of dc to 500 kc, 3 db down; sweep circuit oscillator, 2 cycles to 30 kc. Input impedance of vertical amplifier is 2.2 megohms—50 mmf and deflection sensi-



tivity of the vertical amplifier is .010 rms volts/inch. Illuminated, calibrated screen backed with a green filter for reducing incidental illumination in the room. Hickok Electr. Instr. Co., 10523 Dupont Ave., Cleveland 8, O.—TECHNICIAN (Ask for No. 4-16)

Freed MEGOHMMETER

Type 1620 is a versatile insulation resistance measurement instrument with a continuously variable dc test potential from 50 to 100 v. Tests components such as transformers, condensers, motors, printed circuits, cables and insulation material at their rated voltage and above, for safety factor. Resistance—0.1 megohms to 4,000,000 megohms. Voltage—variable, 50-100 v. Accuracy—±5% on all ranges. Freed Transformer Co., Inc., 1718 Weirfield St., Brooklyn 27, N. Y.—TECHNICIAN (Ask for No. 4-101)

III OHMMETER

Feature of the new Model LRO Low-Resistance ohmmeter is the extremely low test current, which makes it adaptable for measurements of relay contact resistance, fuse resistance, bonding and ground wire resistance. Accuracy is ±1% of full scale reading. Current passing through test piece never exceeds 110 ma on any range. Self-contained; power is supplied by standard 1½ v. flashlight battery. Industrial Instruments Inc., 89 Commerce Rd., Cedar Grove., N. J.—TECHNICIAN (Ask for No. 3-23)

New Product Briefs

PLASTIC TUBING: The new "Alphlex" line of in stock extruded plastic tubing is available in a wide range of sizes and colors, from #24 through 2½-in. diameter, in long lengths and cut to order. With a high-temperature factor of 105° Centigrade, it conforms to MIL specs and UL standards, and is competitively priced. Alpha Wire Corp., 430 Broadway, New York 3, New York.—TECHNICIAN (Ask for No. 4-44)

PAGING SYSTEM: Electric Buzzer Paging System, complete in one "package," consists of a relay box, a push-button control box, and buzzers for individual locations (6 buzzers are provided in the standard "package"; any number up to 20 can be used). Operates on 115 v. ac. Outstanding for ease and economy of installation. Line Electric Co., Newark, N. J.—TECHNICIAN (Ask for No. 4-106)

IGNITION CABLE: Packard T.V.R.S. cable (Television and radio suppressor cable), for both automotive and marine use, has a conductor made of linen and nylon cord impregnated with a conducting material, then insulated with a high-grade Packard-compound. When used either as original equipment or replacement it is unnecessary to use any other type of built-in suppressor. United Motors Service Div., General Motors Corp., GM Bldg., Detroit 2, Mich.—TECHNICIAN (Ask for No. 4-107)

FLOOR MAT: Among the features of "Neo-Sponge" comfort mat are: permanent resilience, high electrical resistance (61,000 volts before puncture), and an almost impervious resistance to acid, oil, grease and heat. The mat will outwear any similar product made of rubber and, unlike rubber, will not absorb any liquid or vapor. Especially suited to any type of business where employees stand at their jobs. The American Floor Products Company, 4922 Wisconsin Ave., N.W., Washington 16, D. C.—TECHNICIAN (Ask for No. 4-42)

FELT: "Feltape" and "Feltdots" are self-adhesive felts which will adhere securely to rough or smooth surfaces of wood, metal, plastic, glass, china or any other known material. No glue or other adhesive is required. Felt is 70% wool, dark brown in color, mothproof and greaseproof. For surface protection as separators, silencers, vibration, sound and electrical insulation, rattle control. J. B. Dawn Products, Inc., Dept. 66, 3905 W. 64 St., Chicago 29, Ill.—TECHNICIAN (Ask for No. 4-102)

PLASTIC STRAPS: Non-corrosive plastic straps for fastening and supporting all types of open wires, cables and cords are made of polyethylene in black and ivory colors. Unaffected by heat, cold, moisture, salt air or gaseous fumes; will not age, rot, rust or corrode. Holub Industries, Inc., Sycamore, Ill.—TECHNICIAN (Ask for No. 4-103)

TWEEZERS: Swiss made precision tweezers of the finest alloy steel are for fine assembly work of all kinds. Fifteen different styles are available with both smooth and serrated points. Finishes include nickel plate, black oxidized and bronze anti-magnetic. Grobet File Company of America, Inc., 421 Canal Street, New York 13, N. Y.—TECHNICIAN (Ask for No. 4-30)

REAR VIEW MIRROR: All-angle adjustable wing mirror converts car's interior mirror to full rear and side view vision. "Look-out" provides full wide-angle vision with full 180° adjustment on each wing. Fits all mirrors; durable triple-chrome finish. \$2.50. American Homecraft Co., 3714 Milwaukee Ave., Chicago 41, Ill.—TECHNICIAN (Ask for No. 4-32)

3-WAY ILLUMINATION KIT: G-S "Syte-Ayde" provides light in out-of-the-way places. Powered by flashlight batteries, the "Syte-Ayde" provides 4 light transmitting rods. Two are straight, 3½ in. and 6 in. long and two, of the same lengths, are bent 90°. Three 1½ power mirrors, ½ in., ¾ in., and 1¼ in. in diameter are supplied with clips which fit rod ends. \$5.50. General Scientific Equipment Co., 2700 W. Huntingdon St., Philadelphia 32, Fla.—TECHNICIAN (Ask for No. 4-43)

WELDER: "Handy-Giant Welder," for amateurs and professionals, welds, brazes, solders, also etches and cuts holes in metal. \$49.95. Cauhorn Mfg. Co., 9999 Broadstreet, Detroit 4, Mich.—TECHNICIAN (Ask for No. 4-104)



MODEL 532

NEW . . . COMPLETE PORTABLE SERVICE UNIT

- DYNAMIC 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 volt-ohmmeter 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 Complete with Picture Tube Adapter—only \$70.00 net

Ask your Jobber or write for complete information

Chicago INDUSTRIAL INSTRUMENT CO.

536 W. ELM STREET

CHICAGO 10, ILL.

New Hi-Fi Products

Amplifier, Tape Recorder, Tape Reel; Output Transformer

Pickering CARTRIDGES

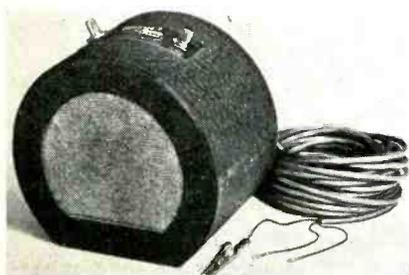
New miniature cartridges are identical to the units which make up the 260 Turnover Pickup. Features are broad frequency response, wide dynamic range and distortion-free quality. The gold 220 series, for use with standard 78 rpm records, are available with either diamond or sapphire styli. The silver 240 series cartridges for use with MG records, both 33½ and 45 rpm, are



available with diamond styli only. A simple clip type universal adapter packaged with each cartridge permits easy installation of the cartridges in all standard makes of changers and tone arms. Pickering & Co., 309 Woods St., Oceanside, N.Y.—TECHNICIAN (Ask for No. 4-65)

F-A REMOTE SPEAKER

The "Private Sound" remote speaker attaches easily to any sound-reproducing instrument by means of a 25-ft. plastic-encased 3-wire cable of lamp-cord size. The speaker's dual dust-sealed wire-wound potentiometers, with full-off position, enable the listener to



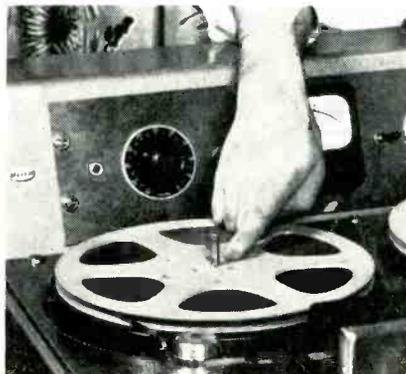
independently control the volume at the instrument speaker, and also at the remote speaker by his side. The unit contains a 4 in. p.m. speaker with 1-oz. Alnico V magnet; screen face is of sturdy woven wire covered with soft beige flocking; crackle finish in cocoa brown. First-American Products, Inc., 1717 Wyandotte St., Kansas City, Mo.—TECHNICIAN (Ask for No. 4-4)

AIC TRANSFORMER

"Ultramax-30" audio transformer is designed for use in all "linear" and Williamson type circuits requiring screen grid taps on the primary of the output transformer. Plate and screen load for optimum output, 6600 ohms. Max. dimensions: 4½ in. x 3⅝ in. x 4¼ in. high. Flexible plastic coated wire leads 7 in. long. Mounted in a seamless drawn steel shell, fully potted. Frequency response: 10 cps to 100 kc. Power response at 30 watts output ±1 db from 20 cycles to 30 kc, at 40 watts output ±1 db from 30 cycles to 22 kc. \$13.95. Atlantic Industrial Co., 101-38 91st St., Ozone Park 17, N.Y.—TECHNICIAN (Ask for No. 4-7)

MMM TAPE REEL

New 10½-in. magnetic tape reel of tough, glass-reinforced plastic eliminates many of the problems encountered with conventional aluminum reels. The new reel features a ⅜-in. center hole, 1-piece precision construction, and su-



perior tape handling characteristics, according to the manufacturer. The combination of reinforced plastic construction and the small centerhole provides a reel that cannot permanently be bent out of shape or distorted, thus avoiding the problem of trying to straighten bent metal reels. Other features include V-slot threadings, as well as conventional threading; and raised beads around the hub and rim of the reel to prevent scratching of the surface of the reel. Minnesota Mining and Mfg. Co., 900 Fauquier Street, St. Paul 6, Minn.—TECHNICIAN (Ask for No. 4-8)

MORE TECHNICAL INFORMATION

describing the new products presented here may be obtained by writing on company letterhead to New Products 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. Please use coupon on page 44.

RCA TAPE RECORDER

New hi-fi magnetic tape recorder-reproducer chassis covers the audible range from 50 to above 10,000 cycles and is designed for simple plug-in connection to home assembled high-fidelity



music systems. The unit (SRT-1) is electrically matched for use with all combinations of RCA intermatched hi-fi electronic components; utilizes all types of standard magnetic tapes, in 5-in. and 7-in. reels; and is designed for half-track recording. It can be installed in either vertical or horizontal position. \$325. Engrg. Prods. Div., RCA, Camden, N. J.—TECHNICIAN (Ask for No. 4-12)

Knight PRE-AMP

New, self-powered, "Knight" preamplifier has separate bass and treble controls and 5 input jacks to accommodate a radio tuner, tape recorder, microphone and two magnetic phono



cartridges. A 6-position input selector switch selects any of the above components and provides three positions of record compensation: FFRR, RIAA and HICUT for old, noisy records. Two output jacks: Tape out, for feeding tape recorder to make recordings of material being played through the hi-fi system; Output, for feeding any high fidelity amplifier. Rated output is 2.5 v. Frequency response: 20-20,000 cps, ±1 db. Harmonic distortion 0.8%. \$36.95. Allied Radio Corp., 100 N. Western Ave., Chicago 80, Ill.—TECHNICIAN (Ask for No. 4-110)

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MAY ISSUE of
TECHNICIAN
& Circuit Digests

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| Type | Price | Type | Price | Type | Price |
|--------|-------|--------|-------|---------|-------|
| OZ4M | .65 | 6AU5GT | .82 | 7C6 | .59 |
| 1AX2 | .62 | 6AU6 | .46 | 7F7 | .79 |
| 1B3GT | .73 | 6AV5GT | .83 | 7H7 | .59 |
| 1E7 | .29 | 6AV6 | .40 | 7N7 | .69 |
| 1H4 | .30 | 6AX4GT | .65 | 7Q7 | .66 |
| 1LA6 | .69 | 6BA6 | .49 | 7Y4 | .69 |
| 1LH4 | .69 | 6BC5 | .54 | 12A4 | .60 |
| 1LN5 | .59 | 6BC7 | .82 | 12AL5 | .37 |
| 1R5 | .62 | 6BE6 | .51 | 12AT6 | .41 |
| 1S5 | .51 | 6BG6G | 1.25 | 12AT7 | .72 |
| IU4 | .57 | 6BH6 | .53 | 12AU6 | .46 |
| IU5 | .50 | 6BJ6 | .49 | 12AU7 | .60 |
| 1X2A | .68 | 6BK5 | .80 | 12AV6 | .39 |
| 3A3 | .80 | 6BK7 | .80 | 12AV7 | .73 |
| 3AL5 | .42 | 6BL7GT | .91 | 12AX4 | .67 |
| 3AU6 | .46 | 6BN6 | .74 | 12AX7 | .63 |
| 3BC5 | .54 | 6BQ6GT | .98 | 12B4 | .60 |
| 3BN6 | .74 | 6BQ7 | .90 | 12BA6 | .49 |
| 3CB6 | .54 | 6BZ7 | .90 | 12BE6 | .51 |
| 3Q4 | .59 | 6C4 | .40 | 12BF6 | .39 |
| 3Q5GT | .69 | 6CB6 | .54 | 12BH7 | .63 |
| 3S4 | .58 | 6CD6 | 1.11 | 12BY7 | .65 |
| 3V4 | .58 | 6CF6 | .64 | 12CU6 | .98 |
| 4BQ7 | .90 | 6CS6 | .51 | 12SA7GT | .65 |
| 4BZ7 | .96 | 6H6GT | .41 | 12SJ7M | .67 |
| 5AW4 | .59 | 6J5GT | .48 | 12SK7GT | .63 |
| 5J6 | .64 | 6J6 | .52 | 12SL7GT | .57 |
| 5T4 | .79 | 6K6GT | .45 | 12SN7GT | .59 |
| 5U4G | .55 | 6L6 | .84 | 12SQ7GT | .56 |
| 5U8 | .75 | 6Q7 | .45 | 12V6GT | .46 |
| 5V4 | .71 | 6S4 | .48 | 12X4 | .38 |
| 5Y3GT | .37 | 6SA7GT | .55 | 14A7 | .63 |
| 6AB4 | .46 | 6SH7GT | .49 | 14B6 | .63 |
| 6AC7M | .86 | 6S17GT | .50 | 14R7 | .79 |
| 6AF4 | .90 | 6SK7GT | .53 | 19BG6 | 1.39 |
| 6AG5 | .56 | 6SL7GT | .67 | 19T8 | .69 |
| 6AG7M | .99 | 6SN7GT | .59 | 25AV5GT | .83 |
| 6AH4 | .67 | 6SQ7GT | .46 | 25BQ6GT | .98 |
| 6AH6 | .73 | 6T4 | .99 | 25L6GT | .51 |
| 6AK5 | .75 | 6T8 | .80 | 35B5 | .52 |
| 6AK6 | .59 | 6U8 | .78 | 35C5 | .51 |
| 6AL5 | .42 | 6V6GT | .50 | 35L6GT | .51 |
| 6AM8 | .78 | 6V8 | .86 | 35W4 | .47 |
| 6AN8 | .78 | 6W4GT | .47 | 35Y4 | .54 |
| 6AQ5 | .50 | 6W6GT | .57 | 35Z3 | .59 |
| 6AQ6 | .46 | 6X4 | .37 | 35Z5GT | .47 |
| 6AQ7 | .70 | 6X5GT | .37 | 50A5 | .55 |
| 6AR5 | .55 | 6X8 | .75 | 50B5 | .52 |
| 6AS5 | .50 | 7A7 | .69 | 50C5 | .51 |
| 6AS6 | 1.49 | 7A8 | .68 | 50L6GT | .61 |
| 6AT6 | .41 | 7B7 | .49 | 80 | .43 |
| 6AU4GT | .68 | 7C5 | .69 | 117Z3 | .45 |

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New Tools & Components

Soldering Gun; Cable Extension and Printed Circuit Kits

Primax SOLDERING GUN

The increased wattage now brings the new "Primax" soldering gun to soldering heat in less than 6 seconds. Other features are the unbreakable plastic handle and the exclusive alloy tip, which never has to be filed, and lasts indefinitely in normal use. Balanced grip and trigger control are designed



for easy soldering in hard-to-reach places. Models are available for 110 or 220 v. ac. Paul C. Roche Co., Inc., 11 Park Place, New York 7, N.Y.—TECHNICIAN (Ask for No. 4-64)

T-D PRINTED CRT KIT

Printed Circuit Kit, model 1955, contains all materials and equipment needed to fabricate experimental printed circuits. Includes heating apparatus, thermometer, etching trays and the necessary handling equipment, as well as copper clad laminate, resist ink and conductive paint. Complete, easily followed step-by-step instructions and suggestions concerning printed circuit design are included. Instructions are paralleled by a description of each process as it is accomplished in automatic mass production. \$19.55. Tele-Diagnosis Co., 155 West 72nd St., New York 32, New York.—TECHNICIAN (Ask for No. 4-25)

Belden CABLE

Newly designed PA and sound system cable, No. 8790, features a new spiral wrapped tinned copper shield. The spiral wrap offers greater coverage than the average braided shield. It also eliminates time-consuming terminations. The spiral is easily unwrapped, twisted, soldered. The color-coded twisted pair is accurately produced to provide line balance and eliminate cross-talk. Tough over-all chrome vinyl plastic jacket is waterproof and offers full protection for the shield and inner conductors. Due to its smooth surface and its small size (.225 in. OD), it is easily pulled through conduit. Belden Mfg. Co., 4647 W. Van Buren St., Chicago, Ill.—TECHNICIAN (Ask for No. 4-98)

CBS-Hytron Soldering Aid

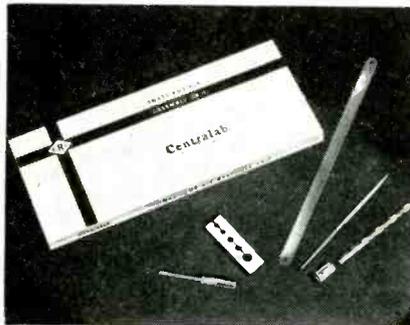
Two hexagonal-handled models of the original CBS-Hytron soldering aid are available. One model has the original straight reamer tip, the other offers an



angled tip for reaching into a close-packed chassis. The new flat-sided handle gives the tool a firm grip and checks elusive rolling when it's set down. Twist-proof, the tips are insulated from each other inside the handle. The reamer of the new hexagonal SH20A Soldering aid is straight, as in the familiar round-handled model; and in the SH20B it is angled at 31°. CBS-Hytron, 100 Endicott St., Danvers, Mass.—TECHNICIAN (Ask for No. 4-41)

Centralab KIT

Kit containing a selection of 6 tools aids in the adapting of control and switch shafts to individual requirements. A custom made shaft clamp tool, similar to that used by many tool makers, has been produced especially for this kit. The tool holds a variety of diameters of shafts in a vise without damage for a clean cut. The kit also



includes a fine-tooth hacksaw blade, a precision half-round needle file, an "A" size drill and drill stop for drilling out holes in knobs, and a small screwdriver. Centralab, 900 E. Keefe Ave., Dept. C-2, Milwaukee 1, Wisc.—TECHNICIAN (Ask for No. 4-29)

MORE TECHNICAL INFORMATION

describing the new products presented here may be obtained by writing on company letterhead to New Products 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. Please use coupon on page 44.

Astron CAPACITOR

Metallized paper, molded plastic, miniature tubular capacitor, extra marked "The Comet," provides extra protection against over-loads and momentary surges. Metallized paper construction results in small size and light weight with low r-f impedance. A new, solid thermo-setting impregnant provides high dielectric strength and improved insulation resistance. Operates dependably up to 125°C and the bonded shell and protected seal are immersion-proof and impervious to all extremes of heat, cold and moisture. Astron Corp., 255 Grant Ave., E. Newark, N. J.—TECHNICIAN (Ask for No. 4-27)

Vidaire CABLE KIT

CRT Extension Kit consists of the 3 most popular extension units packaged in a pocket-size lucite case. Units are: Anode Extension, model AI-1—rated for minimum of 25,000 v. breakdown; Yoke Extension, model YE-1—



handy extension for many late type TV receivers; CRT Socket Extension, model SE-3—6-wire, for use with all picture tubes. The transparent C-thru case is silk-screened with extension "data" for instant selectivity. Vidaire Electronics Mfg. Corp., 576 W. Merrick Rd., Lynbrook, N. Y.—TECHNICIAN (Ask for No. 4-94)

International Rectifier DIODES

Three new, high temperature germanium diodes are announced for operation over an ambient temperature range from -60° to +100°C. All three types are rated and tested at 25°C and at temperatures above 75°C. They are RETMA registered as Types 1N265, 1N266 and 1N267. Designed for clip-in or solder-in application, these diodes measure .230 in. in diameter and .470 in. in length. All are supplied with #22 tinned copper 1 in. (min.) pigtail leads. International Rectifier Corp., 1521 E. Grand Ave., El Segundo, California—TECHNICIAN (Ask for No. 4-35)

Reps & Distributors

RADIO RECEPTOR CO., INC. has appointed two new sales reps for its Semi-Conductor Div. **CHARLES W. POINTON LTD.**, Toronto, will cover all of Canada and the **GATES CO.**, Salt Lake City, Utah, will cover Utah, Wyo., N.M., Colo., and parts of Texas, Idaho, Mont. and Neb.

THE ELECTRO DEVELOPMENT CO., Van Nuys, Calif. announces the appointment of **PERLMUTH-COLMAN & ASSOC.** as their sales eng. rep in S. Calif., Ariz. and Nev.

THE BUCKEYE CHAPTER OF THE REPS approved an amendment to their by-laws whereby the officers of the chapter will serve concurrent terms to the national officers. The newly elected officers are: **WALTER J. BRAUER**, pres., **W. R. WELLER**, vice-pres., **ERNEST P. SCOTT**, secy.-treas.

MARTY BETTAN SALES of New York has been named rep to handle the line of test instruments for **SECO MFG. CO.**, Mpls., Minn., in the New York metropolitan area. **JOHN MUSTICO** of Philadelphia will handle the same line in the mid Atlantic states territory.

WILLIAM J. PURDY CO., San Francisco, has been named to represent all **MERIT COIL & TRANSFORMER CORP.** products in the San Francisco area.

WINSTON ELECTRONICS, INC., Philadelphia, announces the appointment of new reps. **ALBERT ENGELMAN & CO.**, Memphis, Tenn. will cover Ala., NW Fla., La. and Miss.; **FRANK NICKERSON**, Atlanta, Ga. will cover Fla. (except NW), Ga., N. C. and S. C.; **A. E. AKEROYD** of Boston, Mass. will cover Me., N. H., Vt., Mass., R. I. and Conn. and **LEONARD D. ALLEN, INC.**, Syracuse, N. Y. will represent them in N. Y. state.

PARKER-EASTERN CO. announces the appointment of two new sales reps. **LAWRENCE ELLIOTT CO.** of Cleveland, O. will cover O., N. Ky., Mich. W. Penna. and W. Va. **JOSEPH WILEY ASSOC.**, Chicago, Ill. will cover the Chicago area.

J. W. MARSH CO., Los Angeles, has been named sales reps for **CLEAR BEAM ANTENNA CORP.** They will cover the entire state of Calif. as well as Nev. and Ariz. The **MARSH CO** has resident salesmen in Ariz., San Diego, San Francisco and the Los Angeles home office.

FILM CAPACITORS, INC., New York, N. Y. has appointed **AL DENBURG** as their factory sales rep. for metropolitan New York and N. New Jersey.

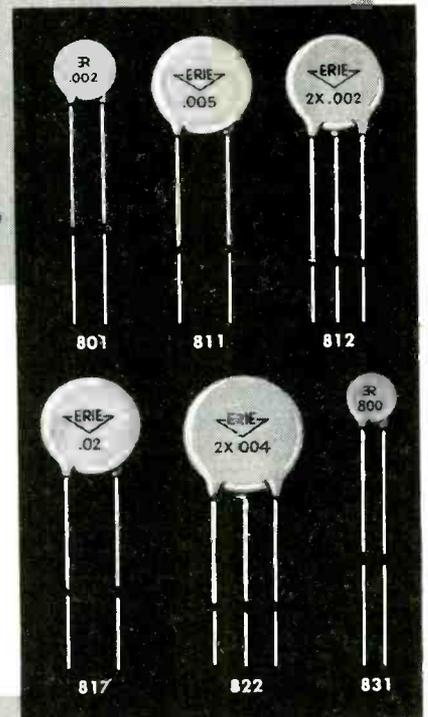
KEGAR-CARIBE, INC., Miami, Fla. was named distributor for **HAYDU BROS.**, Div. Burroughs Corp., Plainfield, N. J., in Cuba, Central and S. America.

(Continued on page 53)

Use the complete line...

ERIE DISC CERAMICONS®

Erie Disc Ceramicons are available at Distributors in four classes as standard stock:—High Stability General Purpose Ceramicons in a wide range of values, (5mmf to 1800 mmf) with 10% capacity tolerance.—Hi-K By-Pass and Coupling Ceramicons from 470 mmf to .02 mfd G.M.V.—Hi-K Dual Ceramicons.—High Voltage Ceramicons rated at 1500, 3000, and 6000 Volts, DC. Working. Characteristic of all classes is smallness of size graduating with increase in capacity value. For complete listing of styles and values available write for D-54 Catalog which includes all Erie Distributor products, or ask your nearest Erie Distributor.



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7 Signal Generators in One!



- ✓ R. F. Signal Generator for A.M.
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- ✓ Audio Frequency Generator
- ✓ Bar Generator
- ✓ Cross Hatch Generator
- ✓ Color Dot Pattern Generator
- ✓ Marker Generator

R. F. SIGNAL GENERATOR: Generates Radio Frequencies from 100 Kilocycles to 60 Megacycles on fundamentals and from 60 Megacycles to 180 Megacycles on powerful harmonics.

VARIABLE AUDIO FREQUENCY GENERATOR: Provides a variable 300 cycle to 20,000 cycle peaked wave audio signal (also fixed 400 cycle sine wave).

BAR GENERATOR: Projects an actual Bar Pattern on any TV Receiver Screen. Pattern will consist of 4 to 16 horizontal bars or 7 to 20 vertical bars.

CROSS HATCH GENERATOR: Projects a crosshatch pattern on any TV picture tube. Pattern consists of non-shifting, horizontal and vertical lines, interlaced.

DOT PATTERN GENERATOR (FOR COLOR TV): The Dot Pattern projected on any color TV Receiver tube by the Model TV-50 will enable you to adjust for proper color convergence.

MARKER GENERATOR: The Model TV-50 includes all the most frequently needed marker points. 189 Kc., 262.5 Kc., 456 Kc., 600 Kc., 1000 Kc., 1400 Kc., 1600 Kc., 2000 Kc., 2500 Kc., 3579 Kc., 4.5 Mc., 5 Mc., 10.7 Mc., (3579 Kc. is the color burst frequency).

Comes absolutely complete with shielded leads and operating instructions. Only

\$47.50
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SHIPPED ON APPROVAL NO MONEY WITH ORDER — NO C. O. D.

Try it for 10 days before you buy. If completely satisfied send \$11.50 and pay balance at rate of \$6.00 per month for 6 months.—**No interest or Finance Charges Added.** If not completely satisfied. return to us. no explanation necessary.

MOSS ELECTRONIC DISTRIBUTING CO., INC.
Dept. D-115, 3849 Tenth Ave., New York 34, N. Y.

Please rush one Model TV-50. I agree to pay \$11.50 within 10 days after receipt and \$6.00 per month thereafter.

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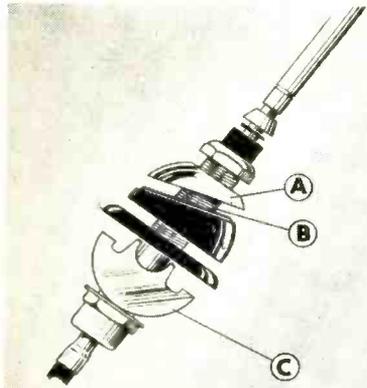
Automobile Antennas, Mounts; Mobile Equipment, Test Unit

GE MOBILE EQUIPMENT

Complete new line of FM mobile and base station two-way radio communication equipment for both 25-54 mc and 114-174 mc land-mobile radio services is announced. Featuring the use of plug-in chassis, the "Progress Line" was designed around twelve basic "building blocks" of standardized physical dimensions. Flexibility has been provided by designing each of the chassis (transmitters, receivers and power supplies) so that it is completely interchangeable with other units of its type mounted in either a base station or mobile housing. The 12 basic building blocks consist of 2 receiver, 4 transmitter and 6 power supply chassis. Sixty different mobile two-way radios are available as standard units by combining the appropriate "blocks." General Electric Co., Syracuse, N.Y.—TECHNICIAN (Ask for No. 4-61)

ASC AUTO ANTENNA

Newly-designed telescopic antenna, the "Baseball," offers several design improvements, including a rocker support which guarantees positive grounding, and a new mounting support design which eliminates wet-weather shorts. Designed for top cowl or fender mount, the antenna has a universal swivel



base which permits mounting on any curved surface with a slant of up to 35° from horizontal. Only one hole is required for installation, and the entire job can be done from the outside of the car. All exposed metal parts are heavy brass, triple chrome plated. The "Baseball" antenna is sold completely assembled, with a 56-in. replaceable telescopic whip, and either a 36-in. lead or a 54-in. lead. The Antenna Specialists Company, 12435 Euclid Ave., Cleveland 6, Ohio.—TECHNICIAN (Ask for No. 4-28)

**New Products on pgs.
39, 41-48, 50, 52, 54**

Ward AUTO AERIAL

The "Dura-Ramic" fibre-glass automobile aerial employs 8-ball construction and is available in a range of colors. The colors have been impregnated throughout the material so that it won't fade, rust or corrode. Its resiliency prevents breaking, warping and bending under normal conditions. Available in 6 colors—blue, brown, green, white, red and yellow. The new aerial, model TGF-1, is 36 in. long with a 54 in. lead. The TGF-1 is a conventional front fender mount and lists for \$7.95. Two other models, the TGR-1, a rear mount model with an 18 in. lead, and the TGT-1 twin rear mount aerials with two standard 54 in. leads feeding into a Y connector with a single lead to the radio, are priced slightly higher. Ward Products Corp., Div. of the Gabriel Co., 4710 State St., Ashtabula, O.—TECHNICIAN (Ask for No. 4-63)

Du Mont TEST METER

Compact test meter for servicing and tuning of two-way mobile radio equipment, also tests base station transmitters and receivers, and any dc equipment within meter ranges. The meter is plugged into the equipment's test receptacles, and the several circuits are quickly checked by turning a 12-position rotary circuit selector switch on the front panel of the meter. The meter, Type 5819-A, functions as a micro-ampere-galvanometer, as a micro- or milliammeter, and as a dc volt meter with ranges up to 1,000 volts dc. The meter is extremely rugged and has been subjected to vibration tests and to 50G drop tests without ill effect. Mobile Communications Department, Allen B. Du Mont Laboratories, Inc., 1500 Main Avenue, Clifton, N. J.—TECHNICIAN (Ask for No. 4-14)

Link CONVERSION KITS

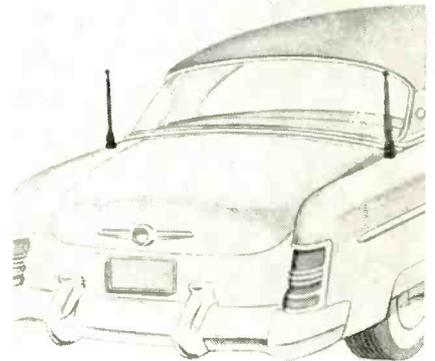
Newly designed 12-volt conversion kits are available for all Link 2-way mobile radio equipment manufactured in previous years exclusively for 6-v. operation. These kits, at moderate cost, are complete and include circuit diagrams and instructions. Link Radio Corp., 125 West 17 St., New York 11, N. Y.—TECHNICIAN (Ask for No. 4-105)

MORE TECHNICAL INFORMATION

describing the new products presented here may be obtained by writing on company letterhead to New Products 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. Please use coupon on page 44.

Snyder AUTO ANTENNA

Modern design rear-deck dual auto antenna provides the driver with maximum vision through its rear deck position. Also better reception is provided because the antennas are placed away



from the ignition system. The two 3-section staffs are 13½ in. high when collapsed, and 27 in. high when extended. They are easily mounted on the rear fenders and are adjustable to 180°. They are available in the swivel type (RD-8 and in RD8B for country and low signal area reception) and in the ball and socket type (RD-9 and RD-9B). Snyder Mfg. Co., 22nd & Ontario Sts., Phila., Pa.—TECHNICIAN (Ask for No. 4-38)

Vaaro WHIP CLAMP

"Whip Flexor" keeps the mobile receiving antenna, or whip, in a perpendicular position while the car is moving, eliminating signal fading at high speeds. The unit serves a dual purpose: it is designed to keep the whip perpendicular at high speeds thus preventing bad "QSB" and it also permits the whip to be brought down in a horizontal plane for storage in a garage or for passing through low, thickly wooded areas, etc. It is constructed of heavy duty square steel wire spring, and cadmium plated. \$3.95. Vaaro Div., Davis Electronics, Box #1247, Burbank, California—TECHNICIAN (Ask for No. 4-39)

Raytheon RADIO DIRECTION FINDER

Described as the first fully automatic radio direction finder specifically designed for marine use, the RD-132 was developed in cooperation with the U.S. Coast Guard for use in search and rescue missions. The unit indicates the bearing or direction of any radio station which the set is tuned. Tuning range is in two bands: from 275 to 510 kc, and from 2 to 35 mc. Raytheon Mfg. Co., Waltham 54, Mass.—TECHNICIAN (Ask for No. 4-100)

(Continued from page 51)

ELLIOTT-LEWIS CORP., Phila., Penna., has been named distributor of DuMONT TV receivers in this area.

ELECTRONIC PARTS DISTIS. SHOW theme for 1955 "Bring Your Order Pad With You!", suggested by **BERNARD L. CAHN**, treas.; will help counteract the tendency of some to make the show a social affair. For time and place see "Calendar of Coming Events" on page 15.

CHANNEL MASTER CORP., Ellenville, N. Y., announced the appointment of following distributors: **WARREN RADIO, INC.**, Meadville, Penna.; **C. A. WINCHELL**, Cortland, N. Y.; **EWALD DISTRIBUTING CO.**, Louisville, Ky.; **MAIN TV SUPPLY CO.**, Akron, O.; **PURCHASE RADIO SUPPLY**, Ann Arbor, Mich.; **CLYDE E. SHAW**, Angola, Ind.; **R & R SUPPLY CO.**, Roswell, N. M.; **STRAITS DISTRIBUTORS, INC.**, Sault Ste. Marie, Mich. **THUROW DISTIS., INC.**, Daytona Beach, Fla.

MAX FISCHMAN CO., Pittsburgh, Penna. has been appointed distributor in this area for the TV and broadcast receiver div. of **BENDIX AVIATION CORP.** and **KILSBY REFRIGERATION** of Honolulu has been appointed dist. in the Hawaii territory.

TRI-STATE CHAPTER OF NEDA elected **HERBERT FARR, JR.**, pres. and **EDWARD GORSICA**, secy. at a recent meeting . . . **THE BIG FOUR CHAPTER** heard a talk by **EDWARD WIMMER**, VP Nat'l. Small Business Men's Assoc., at their Feb. 14th meeting . . . **THE BATTERY COMMITTEE** met with reps of major battery mfrs. to review 1955 edition of **NEDA Battery Index**.

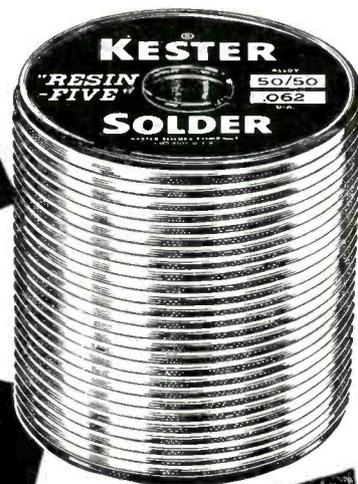
Troubleshooting Hum

(Continued from page 23)

horizontal hold control would start a slice of the picture distorting. As the control was rotated further the section affected would move downward until an approximate half way point would be reached. Further rotation would snap the picture out of sync. Two previous technicians had checked the set in the home and replaced a number of tubes. The second tech had left one of the antenna leads disconnected because the set was a bit more stable in this condition. However, neither one had bothered to look under the chassis where the tuner tubes were located; both of them being mounted horizontally near the tuner and out of sight from the top. The 6J6 had a slight cathode leak, and because of its position in the circuit, the hum was being amplified through the entire i-f and video stages of the receiver. A new tube cured all the trouble!

(Concluded in May)

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PERMO'S SALES INDEX

A Factor of the relative national rate of movement of each type of needle to other types

| Permo Needle Number | Std. 1/2 Price | Std. 3/4 Price | Std. 1 Price | Std. 1 1/2 Price | Type of Material | Permo % Material & Size | Permo % |
|---------------------|----------------|----------------|--------------|------------------|------------------|-------------------------|---------|
| A-200 | \$7.50 | \$1.50 | \$1.47 | 7.9 | 33 1/4 & 45 | Shielded Jewel | .001 |
| A-204 | 1.50 | .90 | .88 | 7.3 | 33 1/4 & 45 | PermoMetal | .001 |
| B-210 | 1.00 | .50 | .49 | 136.3 | 33 1/4 & 45 | PermoMetal | .002 |
| A-214 | 1.50 | .90 | .88 | 1.3 | 33 1/4 & 45 | PermoMetal | .001 |
| C-220 | 1.50 | .90 | .88 | 17.9 | 78 | PermoMetal | .003 |
| B-224 | 2.50 | 1.50 | 1.47 | 0 | | Shielded Jewel | .001 |
| B-220 | 25.00 | 15.00 | 14.70 | 0 | | PermoMetal | .002 |
| C-260 | 7.50 | 1.50 | 1.47 | 0 | | PermoMetal | .001 |
| C-260 | 15.00 | 15.00 | 14.70 | 0 | | PermoMetal | .001 |
| A-211 | 1.50 | .90 | .88 | 7.3 | 33 1/4 & 45 | PermoMetal | .001 |
| A-211D | 25.00 | 15.00 | 14.70 | 30.7 | 78 | PermoMetal | .001 |
| C-212 | 1.50 | .90 | .88 | 7.3 | 33 1/4 & 45 | PermoMetal | .001 |
| C-212D | 15.00 | 15.00 | 14.70 | 78 | 78 | PermoMetal | .001 |
| AC-213 | 3.00 | 1.80 | 1.78 | 4.7 | 33 1/4 & 45 | PermoMetal | .001 |
| AC-213D | 26.50 | 15.90 | 15.58 | 78 | 78 | PermoMetal | .001 |
| A-214 | 7.00 | 1.20 | 1.18 | 1.4 | 33 1/4 & 45 | PermoMetal | .001 |
| A-214D | 25.00 | 15.00 | 14.70 | 78 | 78 | PermoMetal | .001 |
| AC-213 | 2.50 | 1.50 | 1.47 | 6.7 | 33 1/4 & 45 | PermoMetal | .001 |

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year sellers . . .

PERMO PHONO NEEDLES



PERMO, INC.

CHICAGO 26

New Products

Sprague FILTERS

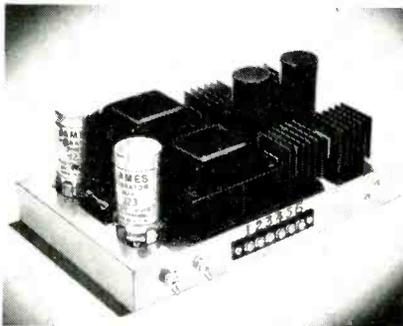
New miniaturized bulkhead-mounting interference filters for aviation and mobile electrical and electronic equipment are available in production quantities in ratings from 0.1 a. to 20 a. for both 125 v. dc and 125 v. ac, 400-cycle service. The units meet all pertinent MIL and AN requirements for operation at operating temperatures from -55°C . to $+85^{\circ}\text{C}$. Insertion loss characteristics are uniformly high. All designs are hermetically sealed with solder seal terminals. Sprague Electric Co., Marshall St., North Adams, Mass.—TECHNICIAN (Ask for No. 4-26)

DV RADIO DOOR CONTROL

New DV Autodor Control utilizes r-f signals to actuate garage doors or estate gates. Unit is designed to mount against garage ceiling rafters. Contains $\frac{1}{4}$ -hp motor, operating, through silent chain drive, a drawbar which is mechanically attached to the door. A friction clutch included in the drive permits overriding the door in either direction at any time. Operates from 115-volt, 50/60 cycle supply. \$247.50. Engineered Instruments, Inc., DV Controls Division, 937 Soto St., Hayward, California.—TECHNICIAN (Ask for No. 4-37)

James POWER SUPPLY

New mobile vibrator power supply, model C-1050, intended primarily for amateur mobile installations, has a maximum power output of 95 watts at 450 v. Model C-1050 is equipped with a



low voltage transmitter and a reserve voltage tap, and has an incorporated receiver muting relay. Supply will operate on either 6 or 12 v. by minor tap changes. The same standard heavy duty 4 prong vibrators are used for either input voltage. Completely wired and tested, \$49.95; in kit form, \$39.95. James Vibrapower Co., 4036 N. Rockwell St., Chicago 18, Illinois.—TECHNICIAN (Ask for No. 4-23)

Sylvania DUAL TRIODE

New tube type, the 6BC8, is a miniature 9-pin, medium-mu dual triode with semi-remote cutoff characteristics, which lends itself readily to applications as a cascode amplifier in VHF television tuners, and also gives more satisfactory performance in AGC sys-



tems under both strong and weak signal conditions. In addition, the new tube provides relief from objectionable cross modulation effects when reception of a weak signal is degraded because of strong adjacent channel station interferences. This effect is minimized because the transfer curve of this tube approached the desirable square law characteristic, which is the optimum shape for minimizing cross modulation. Sylvania Electric Products, Inc., 254 Rano St., Buffalo, N. Y.—TECHNICIAN (Ask for No. 4-91)

NEW STOCK OF FIRST QUALITY TELTRON TUBES
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- Tests all conventional and TV tubes

This Eco Tube Tester is yours FREE when you buy \$1.99 worth of tubes or more within 60 days at Teltron.

May be bought outright from Teltron for \$34.95.

| TYPE | PRICE | TYPE | PRICE | TYPE | PRICE | TYPE | PRICE |
|--------|-------|--------|-------|---------|-------|----------|-------|
| 1A7GT | .53 | 6AR5 | .48 | 6K7 | .40 | 12BA7 | .58 |
| 1B3GT | .62 | 6AU5GT | .60 | 6L6 | .78 | 12BE6 | .46 |
| 1H5GT | .51 | 6AV5GT | .60 | 6Q7 | .40 | 12BH7 | .61 |
| 1L4 | .51 | 6AV6 | .37 | 6S4 | .41 | 12BY7 | .65 |
| 1L6 | .51 | 6AX4GT | .60 | 6S8GT | .65 | 12A7 | .63 |
| 1L6C | .49 | 6AX5GT | .60 | 6S8T | .60 | 12SA7 | .45 |
| 1N5GT | .51 | 6BA7 | .58 | 6SN7GT | .60 | 12SL7GT | .60 |
| 1R5 | .51 | 6BE6 | .46 | 6T8 | .71 | 12SK7 | .45 |
| 1T4 | .51 | 6BF5 | .48 | 6U8 | .76 | 12S07 | .38 |
| 1U4 | .51 | 6BG6G | 1.18 | 6V3 | .80 | 12SN7GT | .56 |
| 1U5 | .43 | 6BH6 | .51 | 6V6GT | .48 | 19T8 | .71 |
| 2A3 | .35 | 6BK6 | .51 | 6W6GT | .53 | 25C06 | 1.09 |
| 2A7 | .35 | 6BK5 | .75 | 6X4 | .37 | 25L6GT | .41 |
| 3Q4 | .53 | 6BN6 | .90 | 6X5CT | .38 | 25Z5 | .55 |
| 3Q5GT | .61 | 6BQ7 | .85 | 6X8 | .80 | 25Z6GT | .36 |
| 354 | .48 | 6BL7GT | .78 | 7F8 | .49 | 35R5 | .48 |
| 3V4 | .48 | 6BV5G | .60 | 12AL5 | .43 | 35C5 | .48 |
| 5V4G | .49 | 6BZ7 | .95 | 12AT6 | .37 | 35L6GT | .41 |
| 5Y3GT | .30 | 6C4 | .41 | 12AU6 | .43 | 35W4 | .33 |
| 5Y4G | .40 | 6C06 | .95 | 12AU7 | .58 | 35Y1 | .42 |
| 6A8 | .40 | 6DC6G | 1.63 | 12AV7 | .73 | 50A5 | .49 |
| 6AC7 | .65 | 6F6 | .42 | 12AX4GT | .60 | 50B5 | .48 |
| 6AF4 | 1.02 | 6F5GT | .44 | 12AZ7 | .65 | 117L7GT1 | .20 |
| 6AG5 | .52 | 6H6 | .50 | 12B4 | .72 | 117Z3 | .33 |
| 6AH4GT | .65 | 6J5GT | .49 | 12B87 | .61 | 117Z6GT | .65 |
| 6AK5 | .96 | 6J6 | .61 | 12BA6 | .46 | 80 | .40 |
| 6AL5 | .43 | 6K6GT | .39 | | | | |

SPECIALS! Till May 1st

| | | | |
|--------|-----|---------|-----|
| 1X2 | .57 | 6S07 | .34 |
| 5U4G | .38 | 6W4GT | .37 |
| 6A05 | .41 | 12AT7 | .67 |
| 6BA6 | .49 | 12AX7 | .55 |
| 6BK7 | .67 | 25B06GT | .71 |
| 6BQ6GT | .75 | 35Z5GT | .29 |
| 6D06G | .99 | 50C5 | .41 |
| 6SA7 | .39 | 50L6GT | .41 |
| 6SK7 | .39 | 1629 | .25 |

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SERVICE ASS'N REPORTS

ESA Holds Color Meeting

The Electronic Service Assoc., 1763 E. Seven Mile Rd., Detroit 3, Mich., recently held a color and UHF meeting, co-sponsored by the local RCA jobbers. The RCA Dist. Co. furnished the speaker and color receivers which were used for the lecture and demonstration. About 700 servicemen were in attendance.

NATESA Award to V. Lutz

Frank J. Moch, pres. of National Alliance of Telev. & Elec. Service Assoc., 5908 S. Troy St., Chicago, Ill. selected Vincent Lutz, pres. of TISA of St. Louis and NATESA W. Central VP, as the officer who, during 1954, rendered the best cooperation and the greatest contributions to the advancement of NATESA and independent service. A cup was presented to Mr. Lutz at one of a series of advanced technical sessions at which Mr. Moch was a speaker.

FRSAP Censures Philco Plan

At a recent meeting of the Federation of Radio Servicemen's Assoc. of Penn. a resolution was unanimously passed condemning the Philco plan to set up captive service companies to service their products. The resolution says in part: "We hereby condemn the Philco Corp. for their publicly announced plan to set up an official servicing company in Chicago, to install, service and maintain Philco Equipment." It was agreed at the meeting that this move is completely contrary to the well advertised Philco policy of cooperating with the independent servicemen and represents an invasion in the independent servicing field.

WCRTA Elects Officers

The Will County Radio & TV Assoc. of Joliet, Ill., organized in September 1954, has 42 members, including 26 shops. Donn Wright is pres. and John D. Goeken is vice-pres.

New Association Formed

The Television Service Dealers Assoc. of San Mateo County, Calif., was officially formed on March 9, 1955.

Temporary officers were named as follows: chairman, W. D. Haines, E & H TV, Burlingame; co-chairman, A. F. Blumenthal, A & K Radio & TV, Redwood City; secy.-treas., E. Mitchell, M & M TV, San Carlos.

TISA of Chicagoland

Television Installation Service Assoc., 5908 S. Troy St., Chicago, Ill. has taken cognizance of their community responsibility by donating \$100.00 to help finance Channel 11, Chicago's educational TV station.

TISA has also decided to amend the name of TISA of Illinois to TISA of Chicagoland. This action was deemed advisable in view of the great number of local associations, including another in the State of Ill., who have adopted the corporate name, TISA.

RTA's New Officers

The Pomona Valley chapter of Radio Technicians Assoc., Pomona, Calif., elected the following officers for 1955: Carl W. Musarra, pres., Merle S. Leak, vice-pres., Raul Pacheco, secy. and Jay Perez, treas.

RTSDSC Elect Officers

The Radio & Television Service Dealers of Snohomish County elected the following officers at a recent meeting: Joe Mulholland, pres. Bill Varn, vice-pres. and Vernon Downing, secy-treas.

NEW RTA OF S. CAL. OFFICERS



New officers in the Long Beach Chapter of Radio Technicians Assoc. of S. Calif. Standing, left to right: Ken Summers, Joe Timlin, Walt Rundquist, Harry Ward, P. N. Nibbelin, A. J. Shoemaker, Lee Johnson, Roy Broom. Sitting: Hal Myers, Fred Abrams, Bob Whitmore, Lloyd Peterson and Bob Bergman (not in picture).

Licensing Survey Results

The latest issue of the LIETA News, by the Long Island Electronic Technicians Assoc., 88 Fourth St., Oceanside, N. Y., contains the results of a survey which they conducted to determine technicians' attitude toward licensing. Figures show that 41% of TV technicians are against licensing in any form; 12% are for the present NYC bill; 25% see need for legislation.

6 MORE NEW TRIAD *CORRECT REPLACEMENT FLYBACKS

These 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.

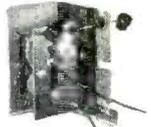
D-45 List Price \$10.00

*Correct Replacement for Zenith S-20908, S-15911, S-15912, S-16566, S-17130, S-17140, S-17233, S-17245, S-17265, S-17435, S-17646, S-17767, S-17811, S-17927, S-18930.



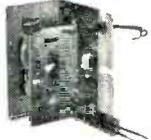
D-46 List Price \$10.50

*Correct Replacement for Muntz TO-0031 TO-0031-1, TO-0031-2.



D-47 List Price \$10.50

*Correct Replacement for Muntz TO-0036, TO-0036-1, TO-0036-2.



D-48 List Price \$8.25

*Correct Replacement for Crosley 158481-1, 187820-5-1; Sentinel 20E995; Hallicrafter 55D251, 55D253.



D-49 List Price \$8.25

*Correct Replacement for Admiral 79C60-2, 79C60-3, 79C60-5.



D-55 List Price \$11.00

*Correct Replacement for RCA 211T5. Voltage doubler type.



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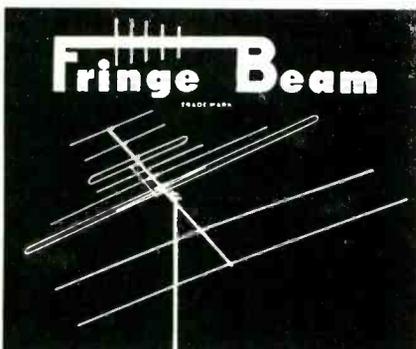
Tube Tester \$34.95



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Sky Rocket is a broad band inline yagi affording high gain in a compact design. It is a sensational performer, permitting deeper penetration of fringe areas. Has new click-rig element clamps with no nuts to tighten. Just unfold and they lock in place automatically. Mail coupon for details.

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Catalogs & Bulletins

SOUND EQUIPMENT: The "Jobber Sound Products" catalog, 8 pp., contains information on a line of microphones, speakers, enclosures and matching transformers. "High Fidelity Home Music Systems," 9 pp., well-illustrated, describes a full line of high quality audio equipment. Both are available from Altec-Lansing Corp., 9356 Santa Monica, Beverly Hills, Calif. (Ask for No. B4-1)

PARTS: The 1955 Philco Parts and Accessories Catalog contains descriptions of over 24,000 Philco service parts and universal replacement parts, identified by part number for convenience in ordering. Includes newly developed technical material on standard and special parts for library reference. Available through local Philco distributors. (Ask for No. B4-2)

VIBRATORS: "Imperial Vibrator Replacement Guide," 20 pp., contains complete specifications, operating data and base diagrams for a complete line of vibrators. Includes 3 cross-referenced sections listing replacements for all 6 and 12 v. auto-radios built since 1939. Vokar Corp., Dexter, Mich. (Ask for No. B4-3)

GERMANIUM DIODES: Specifications on high temperature diodes, computer diodes, UHF mixer diodes, meter protection diodes and other general purpose types in this germanium point contact diode line are contained in "Bulletin GD-2." Includes interchangeability and replacement chart. International Rectifier Corp., Semi-Conductor Div., 1521 East Grand Ave., El Segundo, Calif. (Ask for No. B4-4)

SSB FILTER: Details on a 17.0 to 20 kc LC bandpass filter for single sideband transmission which features stabilized toroidal inductances and precision silver mica capacitors is contained in bulletin 360. Barker & Williamson Inc., 237 Fairfield Ave., Upper Darby, Pa. (Ask for No. B4-5)

ANTENNA ACCESSORIES: A 22-page catalog of TV antenna accessories available from Parker Metal Goods Co., Summer St., Worcester, Mass., describes a line of TV antenna accessories, including chimney and peak mounts, masts, stand-offs, guy rings and wall mounts, among others. (Ask for No. B4-6)

CONNECTORS: Unique rack and panel connectors employing a ribbon-type contact instead of conventional pin and socket contacts are described in Bulletin R1 available from American Phenolic Corp., 1830 54th Ave., Chicago 50. (Ask for No. B4-7)

WIRE AND CABLE: New catalog W1, 34 pp., devoted to Amphenol wire and cable products, contains information on jackets, conductors and dielectric data,

attenuation and power ratings, a complete listing of military RG/U nomenclature, and a cable-connector selector chart. American Phenolic Corp., 1830 54th Ave., Chicago 50. (Ask for No. B4-8)

JERROLD VHF BOOSTER: A 4-page illustrated brochure describes the "De-Snowor Pre-amplifier," a broad-band, low noise cascode amplifier which is mounted on the antenna mast. Models covered are DSA-132 (Channels 2 to 13), DSA-62 (Channels 2-6) and also Model ABD-8 distribution amplifier. Write Jerrold Electronics Corp. Dept. 823, 26th and Dickinson Sts., Phila., Pa. (Ask for No. B4-9)

CAPACITORS: A handy reference for the technician is this new catalog which cross references the parts numbers of Sangamo and the other four leading manufacturers of twist tab dry electrolytic TV replacement capacitors. Sangamo Electric Co., Capacitor Div., Box 7, Marion, Ill. (Ask for No. B4-10)

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 44.

"Tough Dog" Corner

(Continued from page 36)

For a full week, brightness would come on in the normal length of time from a cold start. Back to the owner went the set. It was on our bench again in two weeks. This time luck was with us. The scope and vtvm were placed at immediate check points and, before brightness came on, the trouble was at least narrowed down to the horizontal oscillator, which used a 6SN7. Replacing the tube brought the high voltage and a normal picture immediately but, to our consternation, the old tube checked out perfectly. How could we be sure we had cleared up the trouble? Since the fault could stay away for weeks, there was no immediate way of proving the 6SN7 was at fault, although it was suspected.

Finally, we immersed the suspect tube in cold water for several minutes, then put it back in the chassis. Sure enough, no brightness or high voltage. When the new tube was put in, everything was fine. This procedure was repeated several times to be sure that the trouble was finally cleared.—Jerry Miller, Astoria, L. I., N. Y.

see Shop Hints, page 21

New Books

BASIC ELECTRONICS. Vols. 1 to 5. By Van Valkenburgh, Nooger and Neville Inc. Published by John F. Rider Publisher, Inc., 480 Canal St., N.Y.C. Total of 560 pages in the 5 volumes. Paper cover. \$2.00 per volume; \$9.00 for set of 5 volumes.

Technicians who have attended electronics courses in the Navy's specialty schools during the past few years will recognize this set as the basic textbook for that curriculum. It is now being released by the Navy for civilian use.

Designed "to make basic electronics understandable to every Navy student, regardless of previous education," this course stresses simplicity and conciseness. Mathematics is kept to a minimum and a good deal of emphasis is placed on the graphical representation of the theories involved. The manner of presentation makes the course particularly useful for home-study. The diagrams which accompany the text are bold and forceful and completely unlike those encountered in the conventional textbook.

Subjects covered range from the basic concepts of vacuum tubes and rectifiers to r-f and video amplifiers, transmitters and transmission lines.

RIDER'S SPECIALIZED TAPE RECORDER MANUAL, VOL. 1. By Rider Laboratory Staff. Published by John F. Rider Publisher Inc., 480 Canal St., N.Y.C. 310 pp. (286-24) Paper cover. \$4.50.

The first of a series devoted to magnetic tape recorders, this volume contains complete servicing information on the units manufactured during the years from 1950 to 1954 by the following manufacturers: Bell & Howell, Brush, Crescent, Daystrom, Eicor, Pentron, RCA, Revere, V-M, Webster-Chicago, Webster Electric, and Wilcox-Gay. The notes, diagrams and photos are accurate and authentic, having been procured directly from the manufacturers. For the technician unfamiliar with tape recorders, there is included in one section (Brush), an excellent introduction to tape recording principles.

HOW TO INSTALL TV ANTENNAS. By Samuel L. Marshall. Published by John F. Rider Publisher, Inc., 480 Canal St., N. Y. 13, N. Y. 124 pp. Paper cover. \$2.50.

Since most TV antenna installations are made in close-in, metropolitan areas where neither the orientation nor installation presents any serious problem, antenna theory and installation techniques have been sadly neglected in technical literature. While passable results have been, and are being obtained, with relatively crude installations, vastly superior reception can be achieved when the installations are made in accordance with sound elec-

(Continued on page 58)

Automatic Gain Control

(Continued from page 17)

agc trouble, we have a picture and that this fact presumes a picture i-f signal. Therefore, very little remains untested in the input to the detector, usually only a condenser.) Tube substitution, ohmmeter tests, condenser substitution or shunting tests will readily locate trouble localized by the test just described.

We go to the points "B" for further tests, varying the input signal or simply observing for the presence of an agc voltage. In the case of keyed agc, no voltage variation at points "B" means a defective key, gate, or switch action. No agc at points "C" may be due to improper clamp action if the circuit contains such a function.

If the points "B" and "C" do indicate an agc voltage or proper variation of this voltage, then tests may be properly made at the controlled grids themselves. For these tests, use an isolating resistor of about 5k on the end of the dc probe or prod of the voltmeter, even if the instrument has an isolating probe contained in it. The object is to reduce the detuning effect of the small added metal of the probe between its point and the internal isolating resistor. The tests at the controlled grids (note that not all those shown on Fig. 3 may be controlled) show up lack of agc and variation of it. Even one grid without agc is enough to cause plenty of trouble if that grid is supposed to be controlled. Defects at the controlled grids may be readily analyzed and located by conventional ohmmeter tests and condenser replacement tests. •



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Rush Your Letter To JSC Today! Coupons mailed to you on receipt of your letter for free wire. Important, coupons redeemed at your wholesale distributor. Write today (your distributor has full details).

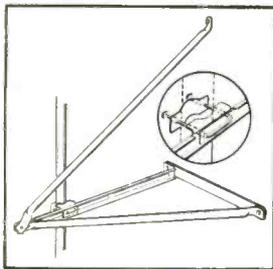
Jersey Specialty Co., Inc.

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**All Steel Adjustable
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2 heavy-gauge, adjustable, embossed steel, rugged braced brackets permit 18" clearance under eave. Hot-Dip galvanized to prevent corrosion.

Bracket has embossed steel bracing leg. Features unique "reversed" U bolt and plate type mast clamp for simplified installation.

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PIONEER AND OUTSTANDING PRODUCER
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manufactured by
**QUIETROLE
COMPANY, INC.**
Spartanburg, South Carolina

New Books

(Continued from page 57)

tronic principles. This book shows the way.

The TV installation man must be, at the same time, an electronic technician and a construction man—equal parts of each. The author has subdivided his book in the same manner. Approximately half of the book is devoted to the theory of VHF and UHF antennas, transmission lines and stubs, and the other half to the problems encountered in physically mounting the antenna and installing the lead-in. Particular attention is paid to the various new mounting equipment now on the market, and an excellent section is devoted to the problems encountered with high masts and towers.

BASIC TELEVISION: PRINCIPLES AND SERVICING. By Bernard Grob. Second Edition. Published by McGraw-Hill Book Co., 330 W. 42nd St., N.Y. 36, N.Y. 660 pp. Hard cover. \$6.00.

The material of the author's earlier book is expanded in this edition to include the late developments in TV circuitry. Color TV is thoroughly covered, from both the theory and servicing angles, and up-to-date information is provided for setting up and trouble-shooting color receivers. The different methods of color transmission and reception are also reviewed and analyzed.

The author has enlarged the sections dealing with intercarrier sound and horizontal automatic frequency control circuits, and those dealing with video transmitting equipment and the video signal make-up. More liberal use is made of graphs and photos of actual television components.

The chapter on the design of video amplifiers is probably the most complete treatment yet made of this subject, below the design engineering level.

News of Industry

VINCENT F. CROWNINSHIELD has been named as Technical Placement Director at the National Company, Inc., of Malden and Melrose, Mass.

JACK KIRSCHBAUM has been named to the position of Distributor Sales Manager at Alpha Wire Corporation.

WILLIAM PATON has been named purchasing agent for all manufacturing divisions of Allen B. Du Mont Labs., Inc.

NELSON P. MARSHALL, formerly Manager of Eastern Division Sales at Sola Electric Co., Chicago, has been appointed General Sales Manager. Former Western Division Sales Manager **PAT J. MORRISEY** has been appointed to the post of Field Sales Manager.

VICTOR GROSS has been appointed vice pres. by the Sterling Transformer Corp., Brooklyn, N. Y.

WALTER F. MARSH has been named vice-pres. in charge of sales at Lab-Tronics, Inc., Chicago.

W. WALTER JABLON has been appointed Sales Manager of Radio City Products Co., Inc. and its affiliate, Reiner Electronics Co., both of Easton, Pa.

ROBERT S. WINDT has been appointed Sales Manager for Radio at CBS-Columbia.

A. R. ANDREWS has been appointed vice pres. and gen. sales mgr. of the Pyramid Electric Company, manufacturers of capacitors and selenium rectifiers.

W. S. PETERS has been appointed manager of Raytheon's entire transistor sales program, nationwide.

THOMAS C. PIDDINGTON has been appointed District Manager for N. J. and upper N. Y. State, for Andrea Radio Corp.

F. P. RICE is the new director of manufacturing and purchasing for Allen B. Du Mont Labs., Inc.

WILLIAM J. HORN has been appointed merchandising and advertising manager of the Parts and Accessory Division, Philco Corporation.

ROBERT J. MURRAY has been named manager, Service Department at National Company, Inc., Malden and Melrose, Massachusetts.

Jerrold Electronics Corp., Philadelphia, has appointed 5 key executives: **WILLIAM H. MILLER**, manager, Community Operations Division; **ROBERT J. TARLTON**, manager, Community Constructions; **BARBARA LOOMIS**, planning supervisor; **CLAIRE OSTROFF**, Field Management Representative; **EARL FLETCHER**, Engineering Supervisor.

JULIUS FINKEL, pres., JFD Mfg. Co., Inc., announced that his son, **HARVEY**, recently returned from the Far East joins the company as General Production Manager. Mr. Finkel's six other sons are already associated with JFD.

MERLE S. WICK has been appointed administrative vice pres., **WILL JAMES** has been named vice pres. in charge of operations and **ROBERT K. HARTMAN** has been appointed vice pres. in charge of the Govt. and industrial division, at CBS-Columbia.

RECOTON CORP. has moved to new quarters at 52-35 Barnett Avenue., Long Island City 4, N.Y.

AEROVOX has established a West Coast Research Lab. under the supervision of **Arthur C. Davis** as Managing Director. It will work primarily on research projects for the Cinema Engineering Div., the West Coast Div., and Acme Electronics Inc.

TRIO MFG CO., Griggsville, Ill., has announced that their new "Aristocrat" rotator control cases are available in four colors. The cases are purchased separately in cartons of four cases (one of each color) at a very nominal price.

ALLIED VISI-DEX



A new display system used in the salesrooms of Allied Radio Corp., Chicago, enables the customers to see and measure some of the 25,000 items in stock. Displays are changed frequently.

DOUGLAS C. LYNCH, formerly exec. vice-pres. of BRUSH ELECTRONICS CO., Cleveland, O., has been named pres. of the company.

Executive offices of **JERROLD ELECTRONICS CORP.** have been relocated to 23rd & Chestnut Streets, Phila.

SNYDER MFG. CO., mfrs. of television antennas, auto antennas, and auto accessories, recorded an increase of over 35% in their export sales in 1954 according to Ben Snyder, executive head of the firm. Mr. Snyder attributes the great increase to the company's many new and specially designed products in its fields, and the great expansion and acceptance of television in the export market.

A new motion picture, titled, "Up She Goes!," produced by **CHANNEL MASTER CORP.**, Ellenville, N. Y., in full color, discusses antennas, rotators, masting, and couplers. The presentation is designed to help the dealer take advantage of every profit-making opportunity by informing him of today's latest time-saving, labor-saving installation techniques.

CBS-HYTRON, electronic tube manufacturing division of the Columbia Broadcasting System, Inc., has announced the inauguration of warehousing facilities in Dallas, Tex., to serve the Southwest with an inclusive range of CBS-Hytron television picture tubes. Territory to be serviced includes Texas, Oklahoma, Arkansas and Louisiana.

The **TRAV-LER RADIO CORP.** of Chicago, Ill., has officially assumed full control of the entire stock of the Hallicrafters Company wholly-owned Canadian Subsidiary, Hallicrafters Canada, Ltd.

Space-saving orange and black carton which holds ten 100 ft. coils of flat TV lead-in cable and occupies little counter space is being featured by the **CORNISH WIRE CO.**, 50 Church St., New York 7, N.Y.

BERLANT ASSOCIATES, manufacturer of magnetic tape recorders, has been integrated into the group of companies controlled by American Electronics, Inc.

The sales department of the **WARD PRODUCTS CORP.**, a division of the Gabriel Co., of Cleveland, has moved operations to Ashtabula, where the plant is located.

The 500,000th instrument has recently come off the production lines of **ELECTRONIC INSTRUMENT CO., INC.** (EICO), Brooklyn 11, N. Y. The "landmark" unit—one of EICO's new #232, Peak-to-Peak Vacuum Tube Voltmeter Kits—was delivered to Allied Radio Corp., Chicago.

The **KAY-TOWNES ANTENNA CO.** of Rome, Georgia, has been granted a patent on its widely used "Big Jack" television antenna which it has manufactured for the past four years.

BECKMAN INSTRUMENTS, INC., Fullerton, Calif., has completed the acquisition of **SPECIALIZED INSTRUMENTS CORP.** and **SPINCO SERVICE CO.**, both of Belmont, California. These companies will henceforth be known as the **SPINCO DIV., BECKMAN INSTRUMENTS, INC.**

AUDIO MARKETING SERVICES opened their new modern office and showroom at 860 N. Vine Street, Los Angeles.

ALLEN B. DU MONT LABS., INC., has announced that the litigation between them and the Tel-O-Tube Corp. of America has been settled. The Tel-O-Tube Corp. has entered into a license agreement with Du Mont and a settlement for past infringement has been worked out between the two companies.

The Distinguished Salesman's Award, presented annually by the Sales Executives Club of N. Y. to top salesmen of the nation, has been won by **SAMUEL WAGMAN** of Du Mont-Florida, Inc. Mr. Wagman was judged winner of the national sales contest conducted by the Receiver Sales Div. of Allen B. Du Mont Labs., Inc.

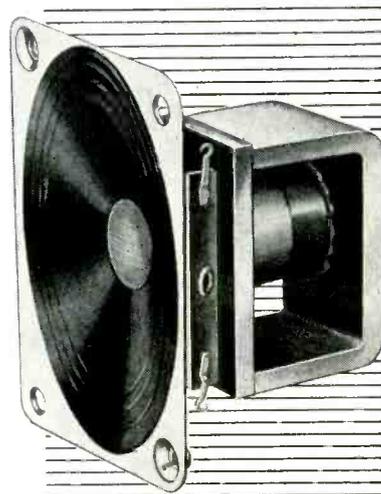
IRVING GREENE has joined University Loudspeakers, Inc., White Plains, N. Y., as Advertising and Sales Promotion Manager. **FRED STEINER** has been added to the sales staff.

ROBERT C. SPRAGUE, chairman of the board and treas. of Sprague Electric Co., has been appointed a Class C director of the Federal Reserve Bank of Boston.

(Continued on page 61)

RCA SERVICE PARTS • FACTORY-TAILORED TO SAVE YOU TIME AND MONEY

take
SPEAKERS
for
example



RCA Speakers for RCA Victor TV receivers, radios, and phonographs are specifically designed to save you time and money by fitting right, installing fast. Speakers are just one example of how every RCA Service Part is **FACTORY-TAILORED** to keep your servicing "on the go" profitably. Remember: RCA Service Parts are the only genuine replacement parts for RCA Victor TV receivers, radios, and phonographs.



**RADIO CORPORATION
OF AMERICA**

SERVICE PARTS

HARRISON, N.J.

ALL "CIRCUIT DIGESTS" TO DATE

Including Current Issue. CIRCUIT DIGEST NOS. 185 to 190 will be found in this issue of TECHNICIAN

All Units Are TV Receivers

Unless Otherwise Noted

ADMIRAL Circuit Digest No.
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 Chassis 22A2A: Models 520M11, 520M12. Chassis 22M1: Models 121M10, 121M11A, 121M12A, 121M11, 121M12, 121K15A, 121K16A, 121K17A, 121K15, 211K16, 121K17, 221K45A, 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
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News

(Continued from page 59)

Change Tube Brand Name

One of the oldest names in receiving tubes disappears from the market this month. CBS-Hytron Div. of CBS has announced that from now on their tubes will be marketed under the brand name "CBS." The change simplifies the trade mark problem for both CBS and its customers.

With the new brand name the tubes also acquire new 2-color, red and black, packaging.

COLOR-TV



Photo showing what it takes for a 21-in. RCA compatible color-TV receiver. These 2076 parts are provided by more than 600 suppliers located in many different sections of the U. S. Industry leaders indicate a more widespread production of color-TV receivers this fall.

New Printed Wiring Boards

GE's Electronic Components Dept. has announced that it will concentrate its production of printed wiring circuit boards on a new through-connecting type which will eliminate production steps and reduce the cost of mechanized assembly of electronic equipment. At the same time, the department will curtail production of etched board types, according to E. A. Malling, department marketing manager.

The "Thru-Con" boards have the copper wiring pattern plated not only on the board, but through its holes to make the front-to-back circuit connections. No staking pins are required since the holes have eyelets plated as integral parts of the wiring.

Set Owners Satisfied With Service, Roper Survey Reveals

That the television service industry continues to receive the hearty endorsement of the public was disclosed in a nationwide survey made by Elmo Roper, noted market research expert, for the RCA Service Co. and the Consumer Products Div., RCA.

The survey—the latest in a continuing study being done for RCA—highlighted the following:

1. Of the TV families interviewed, covering different income brackets in widely-separated parts of the country, "overwhelming majorities" were thoroughly satisfied with all aspects of service received; few set owners had any complaints with repair service they are getting.

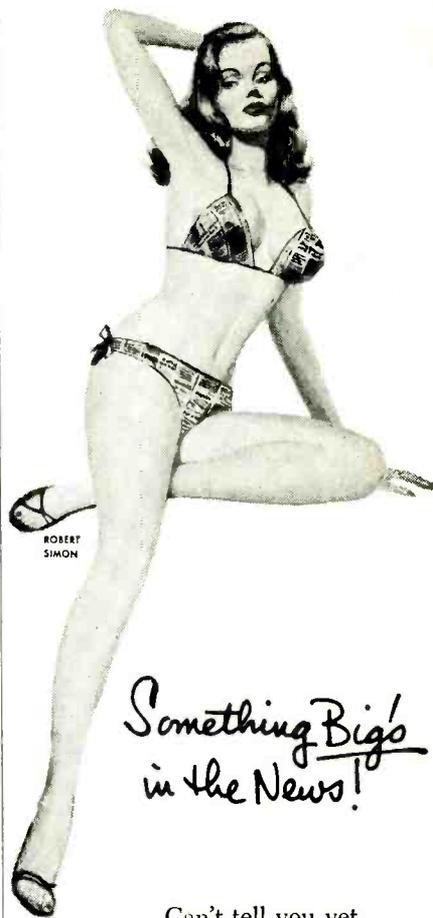
2. To the question: "Do you plan to use the same service company in the future, or not?" 80% said "Yes," with only 8% saying "No" and 12% undecided.

3. Of the 8% who said they would not use the same service company in the future, nearly one half of those interviewed, said the reason was because of discourtesy on the part of a serviceman.

4. 49% of all persons interviewed, who made calls for service during the past year, reported "same day" service; 20% received service the next day; 10% within three days—or 79% of all service calls were filled within three days of a call.

5. While the median cost of service calls increased 11% this year over last, reflecting the increased age of the average TV set, 87% of the persons interviewed reported satisfaction with prices charged, while 7% said the prices were "not very good" and 6% did not know or did not answer.

Commenting on the results of the survey, E. C. Cahill, pres. of the RCA Svc. Co., said, "Naturally, we are pleased with the results of the findings. Not only is the RCA Service Co. proud of the record of its service technicians, but we are proud to be associated with an industry which has in its ranks the thousands of trained and reliable independent technicians that make up the entire electronics service business. If this most recent survey proves any one point, it is that the record of the country's TV service technicians warrants continued public confidence in their work—and I am sure the industry will continue to provide just as good service in the future as it has in the past."



*Something Big's
in the News!*

Can't tell you yet...
but what Walco will
unveil at the Parts Show
will make your phonograph
needle sales spiral.

Watch this magazine for
later developments (and we do
mean developments!) Watch
WALCO for bigger and
better needle profits.

Write for a full-size print of the
Walco cutie above, suitable
for framing, plus informa-
tion on how you can up your
needle sales and profits.

NEEDLES FOR EVERY
PHONOGRAPH BY

Walco

Trade Name of Electrovox Company, Inc.
60-T Franklin Street East Orange, N. J.

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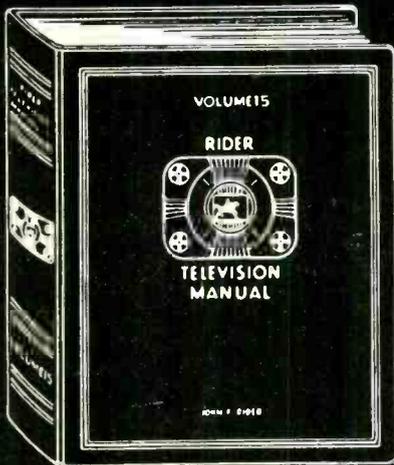
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| Symbol No. | Rating μF @ WVDC | RCA Part No. | Sprague Replacement |
|------------|---------------------|--------------|-----------------------|
| C114 | 100 @ 250 | 79314 | TVL-1535 |
| C132 | 80 @ 400/80 @ 200 | 79147 | TVL-3764 ¹ |
| C134 | 100 @ 400/30 @ 50 | 79146 | TVL-3672 ² |

¹Parallel 40 μf sections.
²Parallel 10 μf and 20 μf sections.

EMERSON CHASSIS 120245-D

| Symbol No. | Rating μF @ WVDC | Emerson Part No. | Sprague Replacement |
|-------------------|-----------------------|------------------|---------------------|
| C28 C32 C31 | 250+50 @ 150 | 925284 | R-1995 |
| C33 C60 | 250+120 @ 150/50 @ 25 | 925285 | R-1996 |

WESTINGHOUSE CHASSIS V2185-2

| Symbol No. | Rating μF @ WVDC | Westinghouse Part No. | Sprague Replacement |
|------------|---------------------|-----------------------|---------------------|
| C3 | 10 @ 90 | V-6321-7 | TVA-1406 |

ADMIRAL CHASSIS 5K3

| Symbol No. | Rating μF @ WVDC | Admiral Part No. | Sprague Replacement |
|------------|----------------------|------------------|---------------------|
| C19 | 60+40+30 @ 150 | 67C7-64 | R-1997 |
| C20 | 100 @ 25 | 67A4-17 | TVA-1207 |
| C22 | 200 @ 6 | 67A4-20 | TVA-1102 |
| M2 | Filter Plate | 63A3-1 | D-1 |
| M3 | Audio Coupling Plate | 63A4-3 | P-2 |

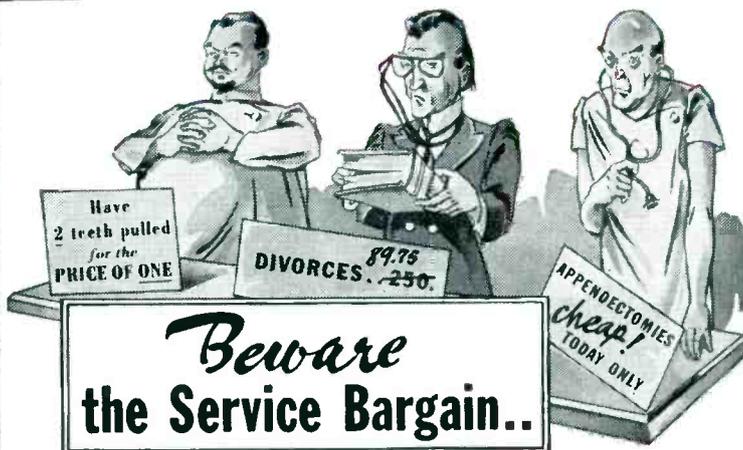
HALLICRAFTERS CHASSIS A1805

| Symbol No. | Rating μF @ WVDC | Hallcrafters Part No. | Sprague Replacement |
|------------|--------------------------|-----------------------|---------------------|
| C132 | 200+5 @ 150 | 45B260 | R-1645 |
| C138 | 20 @ 450 | 45B208 | TVA-1709 |
| C139 | 200 @ 150 | 45B265 | R-1646 |
| C140 | 140+5 @ 300/200+30 @ 150 | 45B263 | R-1553 |

RAYTHEON CHASSIS 8RT1 (Transistor Radio)

| Symbol No. | Rating μF @ WVDC | Raytheon Part No. | Sprague Replacement |
|----------------------|---------------------|-------------------|---------------------|
| C18 | 2 @ 6 | 8C-25013 | 103D-2MF6V |
| C19, C20 C21, C23 | 50 @ 6 | 8E-24903 | TVA-1100 |

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We at RCA firmly believe that National Television Servicemen's Week might well be adopted on an industry-wide basis. RCA initiated it, sponsored it, and promoted it this year.

We believe that this salute to the men who contribute so heavily to this great Electronics Industry

should become an annual event, shared in by all, sponsored by all.

To the many thousands of dealers and servicemen who cooperated with us across the nation, making possible the resounding success of this first Servicemen's Week, RCA says a hearty "Thanks."



RADIO CORPORATION of AMERICA

ELECTRON TUBES

HARRISON, N.J.