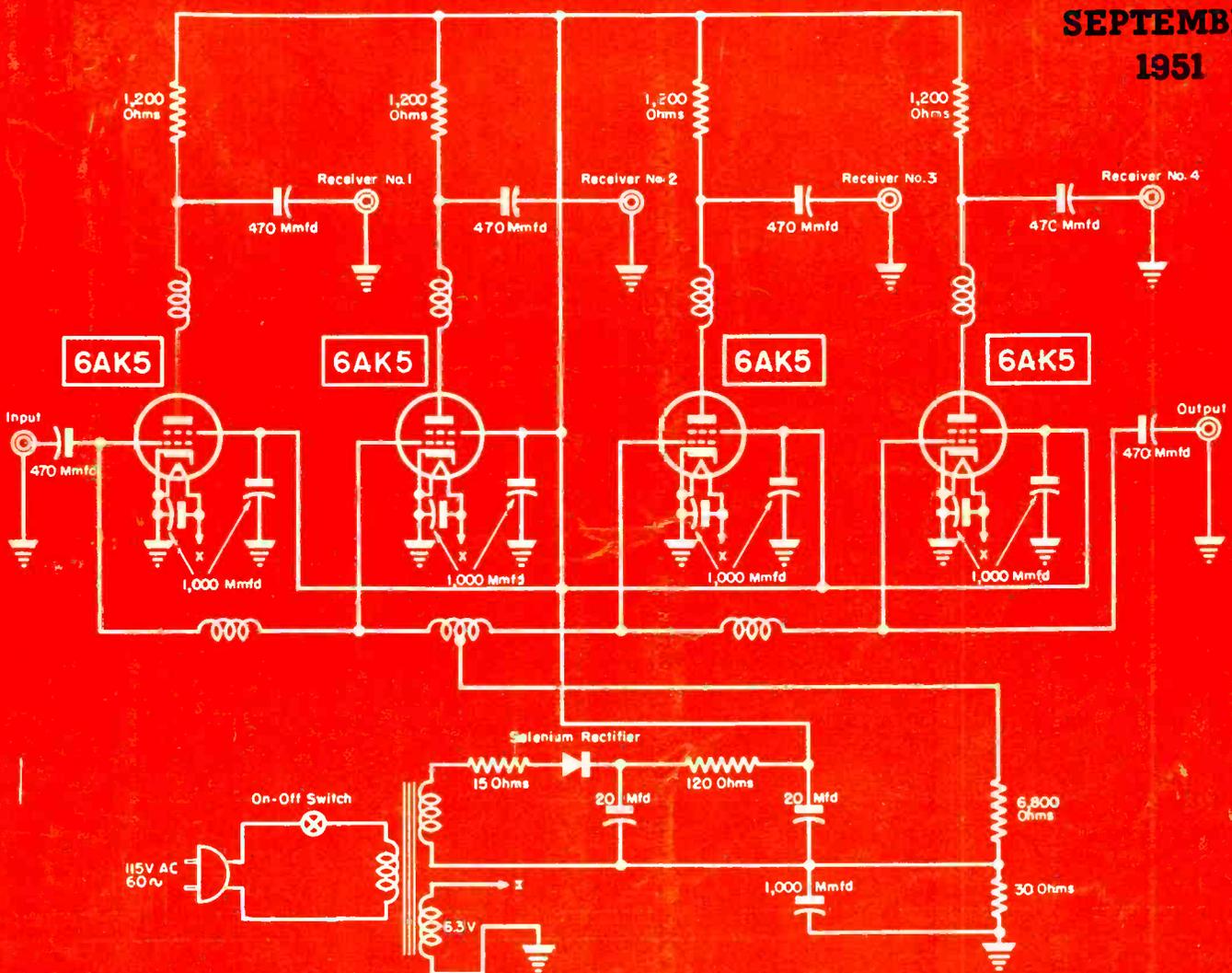


# SERVICE

SEPTEMBER  
1951



Four-tube TV master-antenna distribution system.

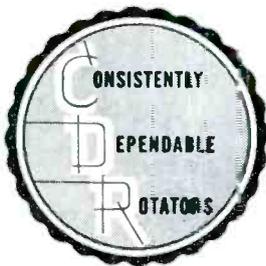
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All features add up to ...

# Dependability

the word that

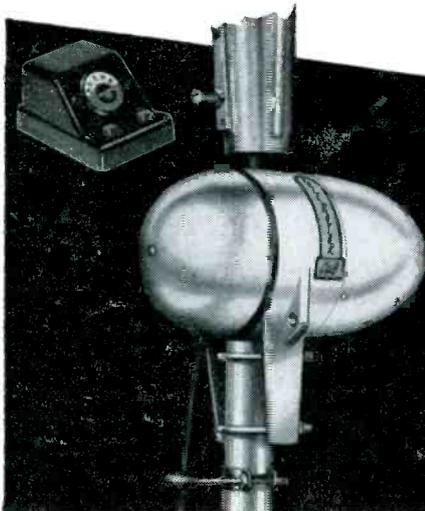
best describes the



# TELE-ROTOR

you can depend on a *TELE-ROTOR*

under any and all weather conditions



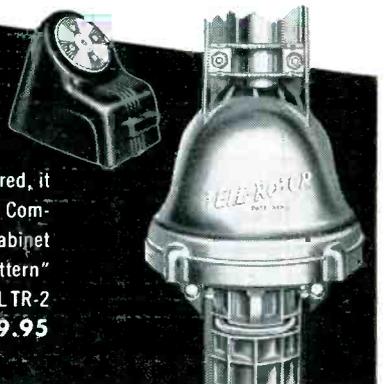
## TELE-ROTOR

### CUB

Ideal for average installations—easily installed. MODEL 502B . . . rotator with meter control cabinet for "hairline" tuning (uses 5 wire cable) . . . \$44.95

## TELE-ROTOR

This HEAVY-DUTY "Tele-Rotor" is the most powerful TV antenna rotator made. Superbly engineered, it is the best your money can buy! Complete with "compass control" cabinet having illuminated "perfect pattern" dial (uses 8 wire cable) . . . MODEL TR-2 . . . \$49.95



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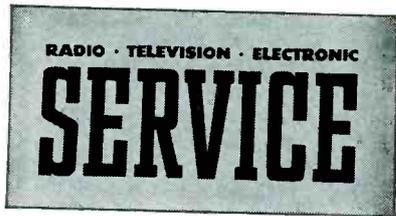


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Entire contents Copyright 1951, Bryan Davis Publishing Co., Inc.

Published monthly by Bryan Davis Publishing Co., Inc.  
52 Vanderbilt Avenue, New York 17, N. Y. Telephone MURRAY Hill 4-0170

Bryan S. Davis, Pres. Paul S. Weil, Vice-Pres., Gen. Mgr. F. Walen, Sec. A. Goebel, Cir. Mgr.  
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Entered as second-class matter June 14, 1932, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Subscription price: \$2.00 per year in the United States of America and Canada; 25 cents per copy. \$3.00 per year in foreign countries; 35 cents per copy.

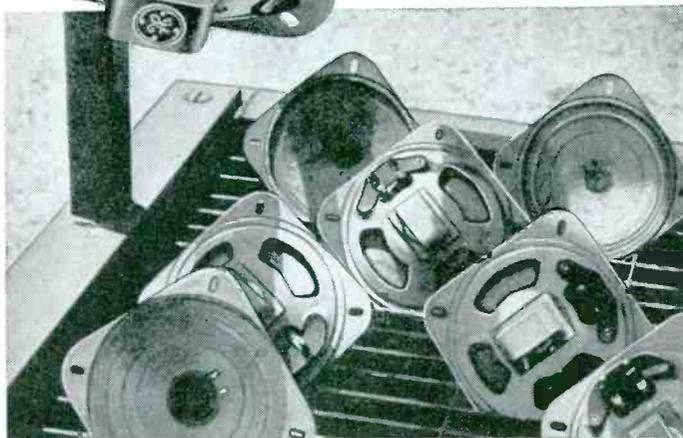


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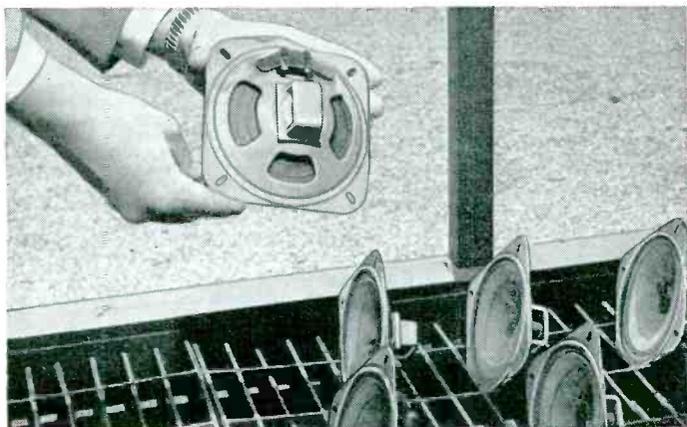


▲ Unretouched photo shows only slight tarnish on speakers. Special G-E plating gives excellent protection to steel frames, none of which were corroded after grueling tests.

★ After two years exposure to hot sun, rain, sleet and snow — with no shelter whatever in any season — 7 out of 8 General Electric speakers played well enough to perform in your radio set!

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Electronics Park, Syracuse, N. Y.

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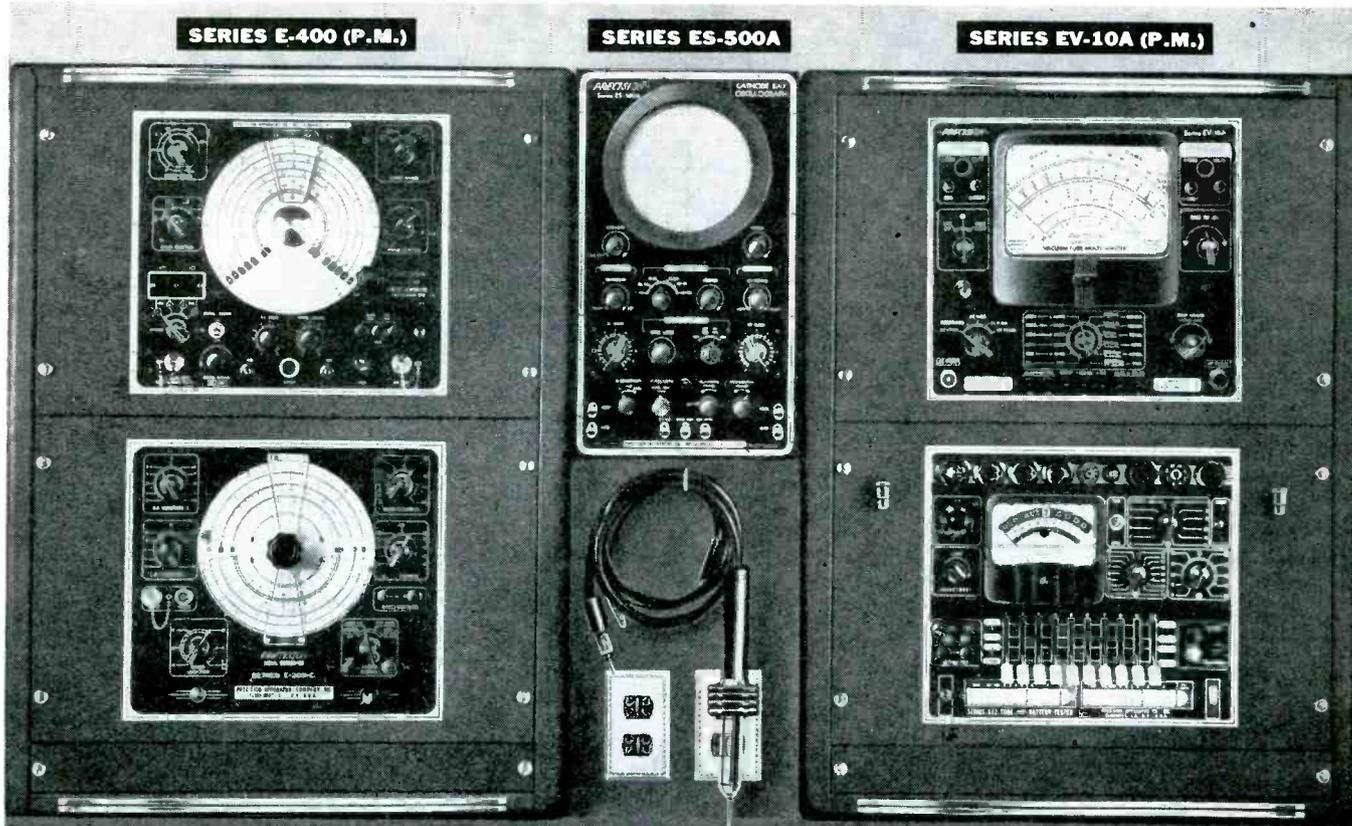
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**For A.M., F.M., And TV Alignment**

Exceptional Accuracy and Stability! 1000 pt. vernier calibrating scale! G-100% Modulation! A.V.C. - A.G.C. substitution-override network! Direct reading 88KC to 120 MC! Complete with Coaxial output cable and tech. manual! In matched standard panel mount, 12¼ x 19".

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**SERIES ES-500A**

**High Sensitivity Wide Range 5" OSCILLOGRAPH**

**With PUSH-PULL V and H AMPLIFIERS**

20 mv. per inch "V" sensitivity 150mv. per inch "H" sensitivity 1 MC Band Width • High impedance, compensated "V" input Step Attenuator • V pattern reversal switch • Z axis modulation • 12 tubes incl. V.R. and 2 rect. • Light Shield and Mask • Heavy Steel Case, 8¼ x 14½ x 18".

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**SERIES EV-10A (P.M.)**

**SERIES EV-10A (P.M.)**

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**With Large 7" Meter**

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Net Price: \$94.50

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**SERIES 612 (P.M.)**

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Incorporates RTMA recommended circuit principles! 10 lever free-point element selection! Built-in roller chart! Dual short-check sensitivity! Noise, Ballast and Pilot Tests! Free replacement tube test data chart service! Complete, ready to operate! In matched standard panel mount, 12¼ x 19".

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**SERIES 612 (P.M.)**

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With new improved RMS HI-GAIN LINE, clear television pictures can be obtained where normal line losses might otherwise deteriorate reception.

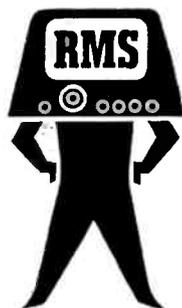
This means your *fringe area prospects*, for whom TV reception has been unpractical, can now get signals through the Hi-Gain line *with virtually no loss!*

In these installations, Hi-Gain is comparable in cost to 300 ohm twinex. Thus Hi-Gain helps you overcome the main deterrents to set ownership in extreme fringe areas.

\*Reg. TM—HI-Gain Line, Cat. No. HG 450 is an improved open transmission line with a steel core within the copper wire, to prevent stretch and breakage of the line.

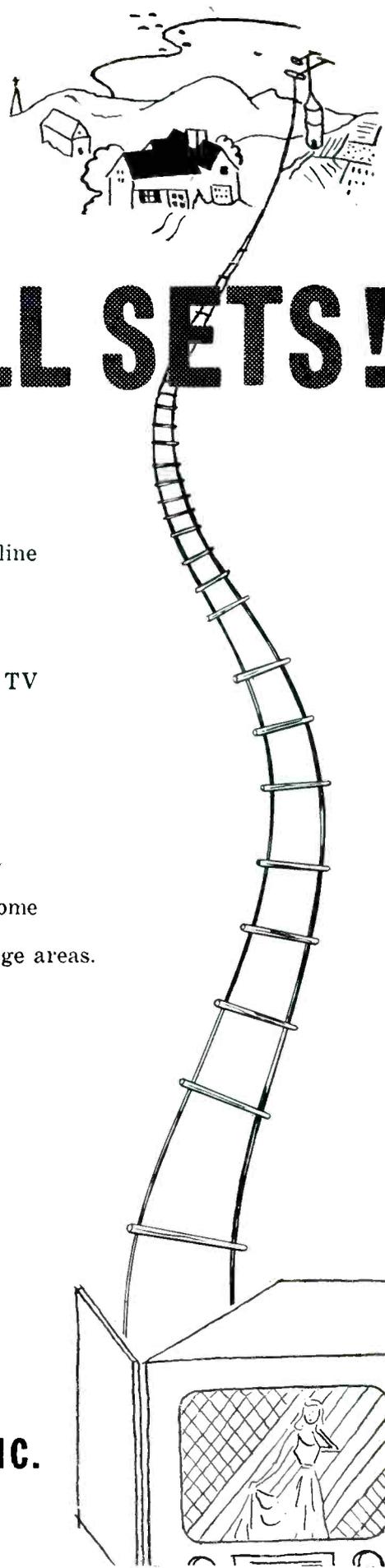
Loss is 1/6 that of 300 ohm twinex.

Ask your jobber for RMS HI-GAIN LINE—or for complete details write:

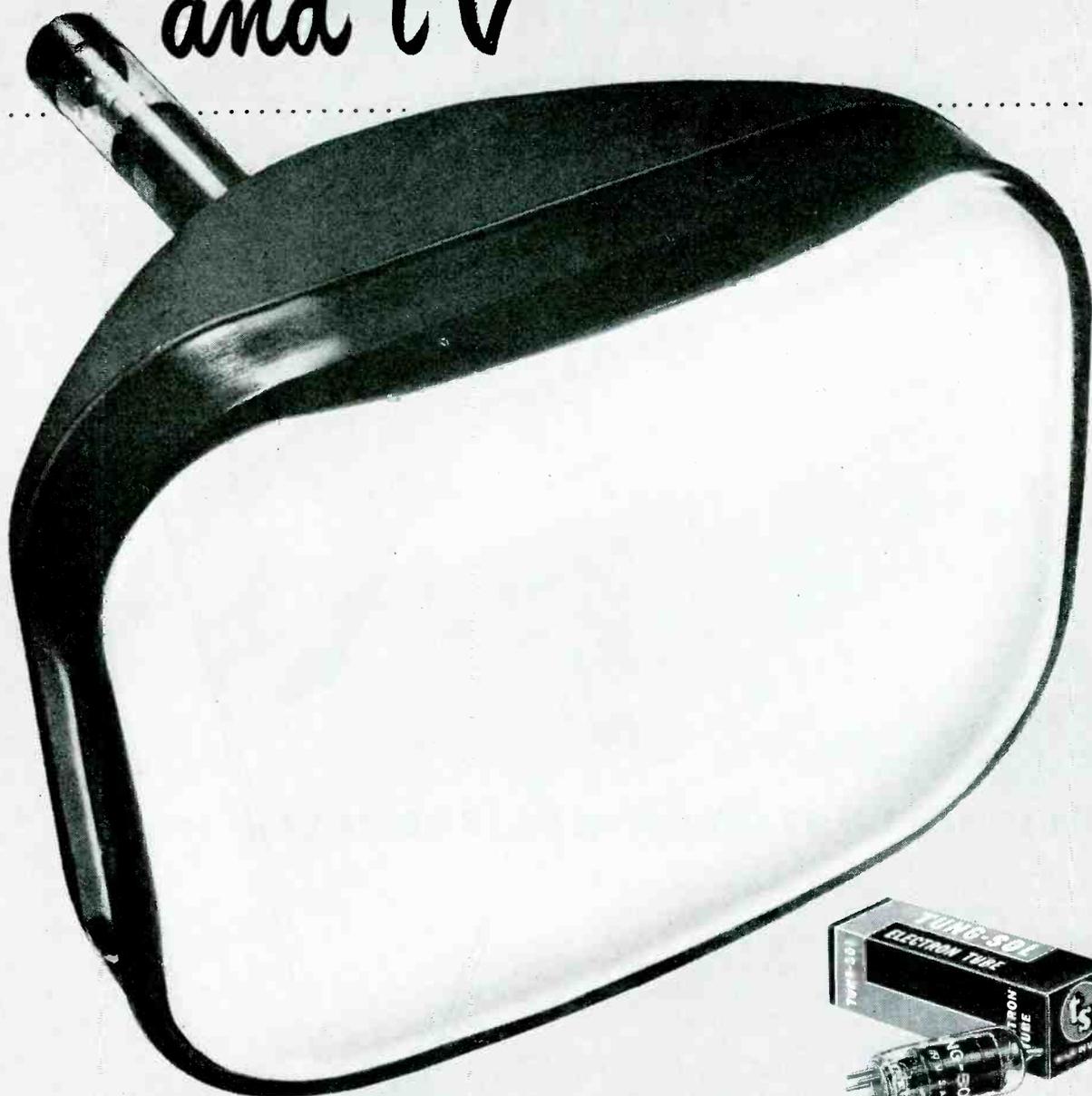


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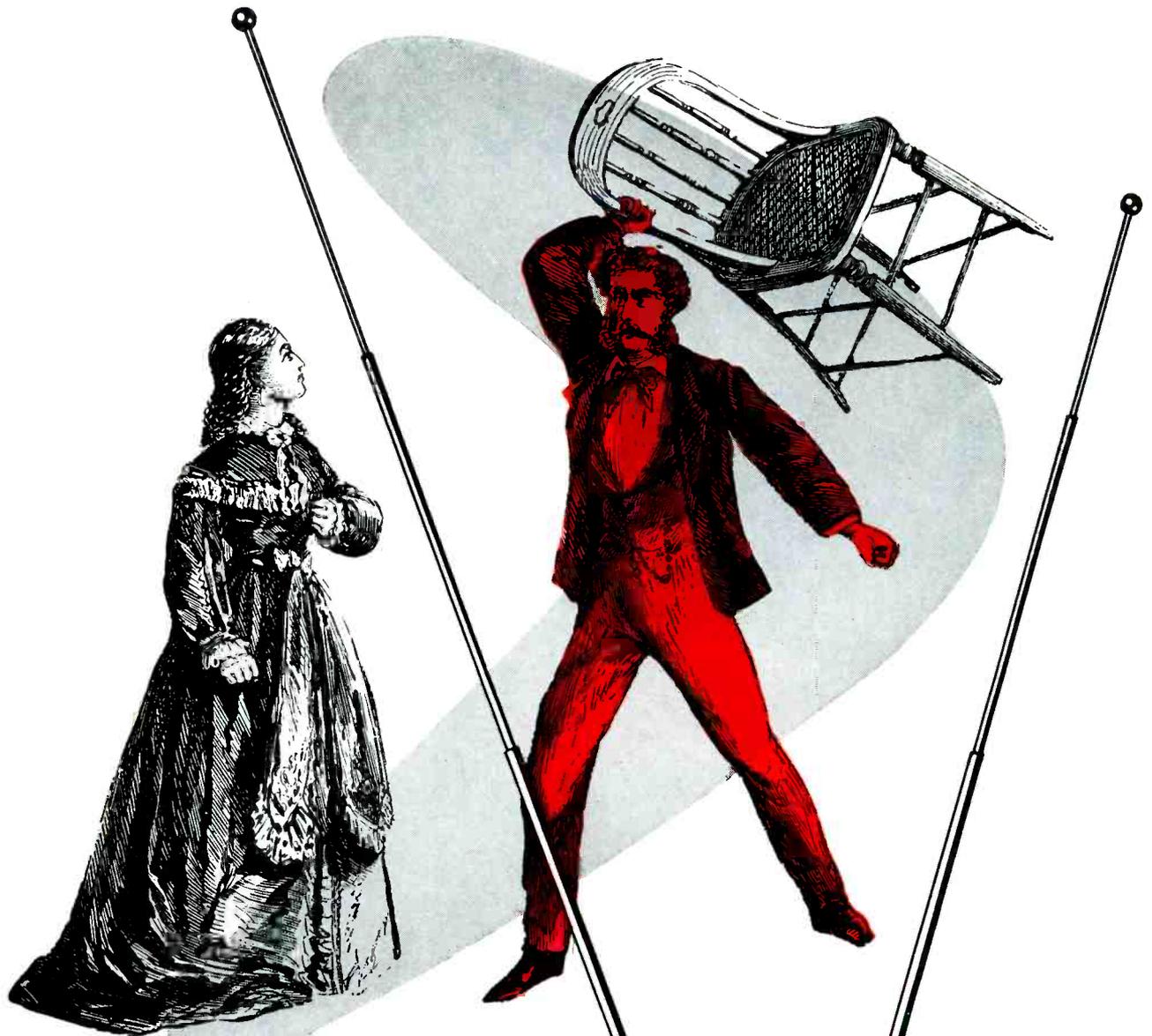
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*Quality* -that keeps pace with the growth of the electronic industry  
-that meets fully the performance requirements of all  
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-that safeguards dealer service work

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by powering a sure-fire "Free Installation"  
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you profit even more because the Radion TA-49  
can be installed by *one deliveryman* . . . in a fraction  
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Dept. S-9, Chicago 14, Illinois  
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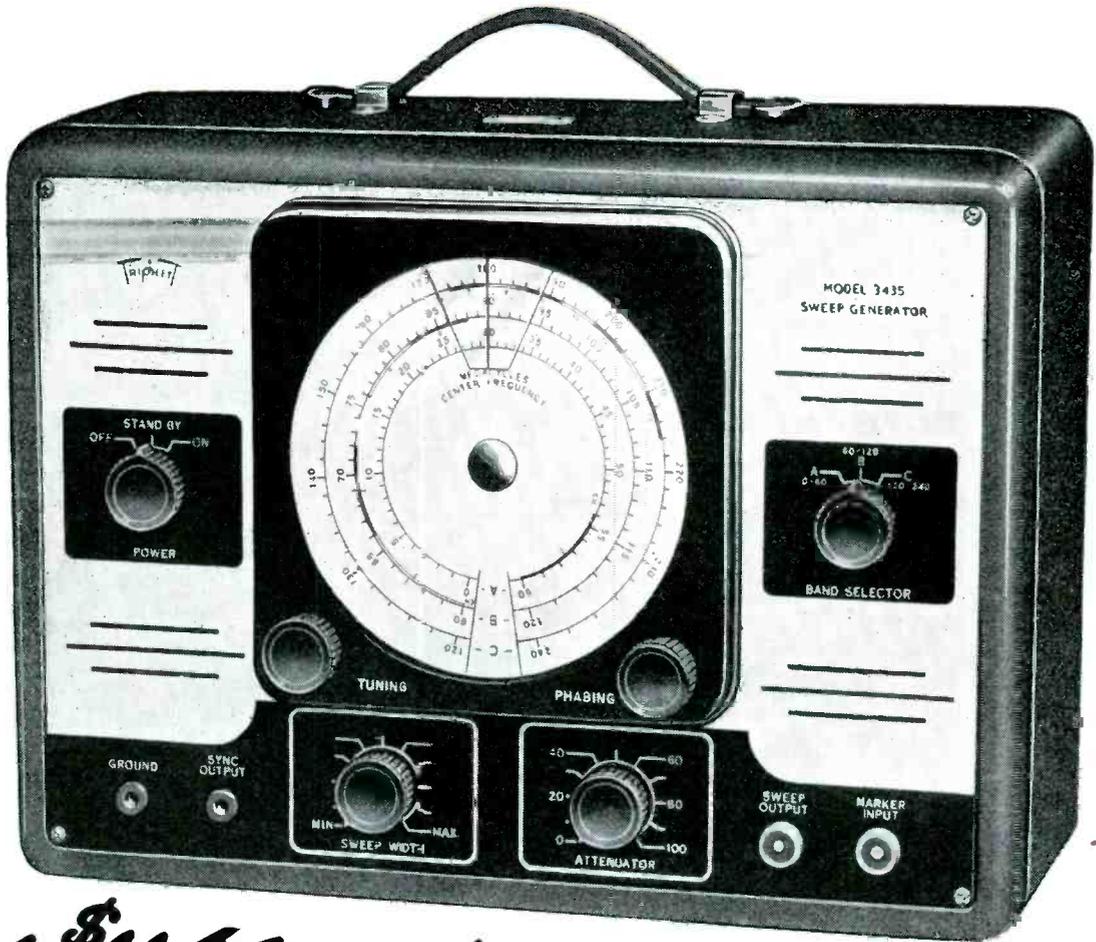
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Firm \_\_\_\_\_

Address \_\_\_\_\_

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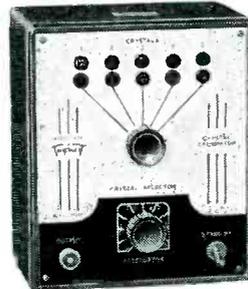
# Model 3435



*Only \$114.50 and you're "in" —*

## SPECIALLY DESIGNED EXTERNAL MARKERS

If you have a marker, or any good AM Generator, you can substantially cut your investment in a Sweep Signal Generator by getting a Model 3435. With over 12,000,000 TV receivers in use, here's your chance to get into TV servicing with a minimum investment. Its unusual low price and ten outstanding features make Model 3435 one of the best buys of a lifetime. No complications in use; connection of external marker to the circuit under test is simple and quick through a panel connector. If you don't have a marker, use Triplett Model 1235 or 1236, shown at the right.



*(Designed for use with Model 3435; also can be used with any Sweep Signal Generator)*

● **MODEL 1235**—New Absorption TV Marker. First to provide control of Marker Dip Amplitude. Two tuning ranges on this Absorption TV Frequency Marker provide complete coverage of all present TV-IF frequencies, plus ample provisions for future additions. In metal case, 7 $\frac{1}{8}$ " x 6 $\frac{1}{8}$ " x 4 $\frac{1}{2}$ " Copper plated feet.

U.S.A. Dealer Net Price . . . . . \$29.50

● **MODEL 1236**—New TV Crystal Marker. Easy to use—speeds testing. Has frequency coverage on crystal fundamentals up through 19 MC. Harmonics to 240 MC. (Crystals not included). Buy only those crystals needed for a particular TV service area and most-used IF frequencies. For power, plug into special terminals on Model 3435.

U.S.A. Dealer Net Price . . . . . \$24.50

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*Prices subject to change.*

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TRIPLETT ELECTRICAL INSTRUMENT COMPANY • BLUFFTON, OHIO, U.S.A.

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Americans save . . ."*



**JOHN L. COLLYER**  
President, The B. F. Goodrich Company

*"I want to see Americans save for their own personal security, and I want to see them, as stockholders in our government, urge economy in all phases of our national life in order to provide national security against aggression."*

By their rapidly mounting participation in the Payroll Savings Plan. Americans *are* saving for their personal security, fighting the menace of inflation and making a major contribution to America's defense against aggression. In Mr. Collyer's own company 80% of the 38,000 employees throughout the company have already enrolled in the Plan, with two large divisions still to report.

As Chairman of the Ohio Payroll Savings Advisory Committee, Mr. Collyer knows what is being accomplished by leaders of industry, top management and labor in their joint effort to step up the Payroll Savings Plan. A few recent figures should be interesting to those not so familiar with the national picture:

- In the steel industry campaign, Carnegie-Illinois Steel Corporation (now U. S. Steel Company), recently raised its payroll participation from 18% of 100,000 employees to 77% . . . Columbia Steel Company of California went from 7.9% to 85.2% . . . American Bridge Company signed 92.8% of the workers in the large Ambridge plant . . . 87%

of Allegheny-Ludlum Steel Corporation's 14,000 employees are now on the Payroll Savings Plan . . . Crucible Steel Company of America, reinstating its plan, signed up 65% of its 14,500 employees.

- In the aviation industry, Hughes Aircraft Company went from 36% to 76%; Boeing Aircraft enrolled 10,000 new names before Christmas.

Some dollars and cents figures? In the last quarter of 1950, sales of \$25 E Bonds—the denomination so popular with payroll savers—increased 2.5% by 245,000 bonds more—over the last quarter of 1949.

If you do not have The Plan That Protects the personal security of your employees, the national economy and our country's defense, phone, write or wire to U. S. Treasury Department, Savings Bonds Division, Washington Building, Washington, D. C. Your State Director is ready to help you install a Payroll Savings Plan or step-up your employee participation.

*The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and*

**S E R V I C E**



# The RCA "TV Duo"...



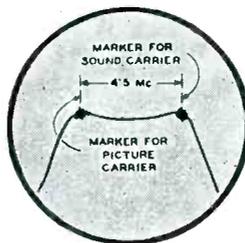
... the last word in *precision* and *versatility*

## RCA WR-59B Television Sweep Generator

**What it does**—Provides fast and accurate sweep alignment and trouble shooting of TV front ends . . . sound and picture if amplifiers . . . discriminators and ratio detectors . . . trap circuits . . . video amplifiers . . . and if amplifiers in FM sets.

**What it features**—Preset switch positions for TV channels 2 to 13 . . . continuous tuning from 300 kc to 50 Mc . . . flat output, within  $\pm 1.5$  db even at maximum sweep width . . . fundamental oscillator output on all TV channels . . . filtered beat-frequency-fundamental output on if/vf range . . . zero-voltage reference line provided by return-trace blanking . . . dual piston attenuator with maximum attenuation ratio of 20,000 to 1 . . . continuously variable sweep width up to 10 Mc . . . output frequency-modulated at the fundamental frequency by a precision-type vibrating capacitor, for long life and good linearity . . . balanced rf output cable terminated in 300 ohms . . . fully shielded circuits and filtered power line . . . resistance-terminated if/vf output cable.

For complete details ask your RCA Test Equipment Distributor for Bulletin 2F753-R.



"Scope pattern of dual markers for rf picture and sound carriers, produced by the "TV Duo."

## RCA WR-39C Television Calibrator

**What it does**—Provides dual markers for rf picture and sound carriers . . . provides signals for peak alignment of stagger-tuned if amplifiers . . . develops vertical bar pattern for horizontal linearity adjustments . . . generates a crystal-controlled AM signal for alignment of inter-carrier sound if's . . . provides triple markers for sound discriminator adjustment . . . allows adjustment of local oscillators in TV front ends with crystal accuracy . . . checks reception on all 12 channels by means of video signal obtained from single channel of a TV set.

**What it features**—Variable-frequency oscillator operating on fundamentals over entire range . . . sound and picture carrier frequencies marked on expanded, easily-read scale . . . two crystal oscillator stages with 3 crystals supplied . . . wide-band modulator stage with range of 0 cps to 30 Mc . . . crystal standard supplying over 600 calibration check points at 0.25-Mc intervals . . . bar-pattern generator for

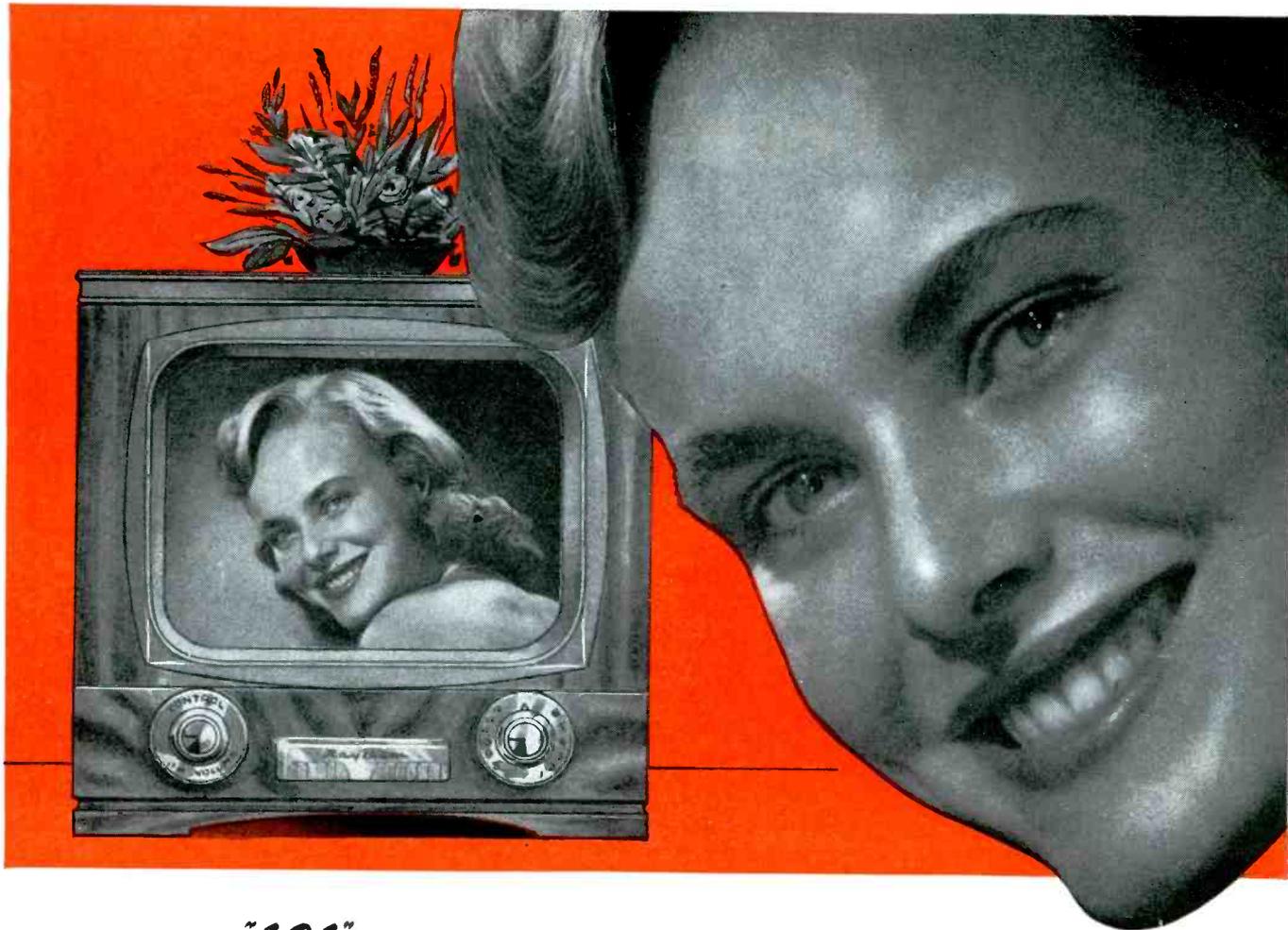
linearity adjustments.

For complete details ask your RCA Test Equipment Distributor for Bulletin 2F751-R2.

Available from your RCA Test Equipment Distributor



**RADIO CORPORATION of AMERICA**  
TEST EQUIPMENT  
HARRISON, N. J.



THERE ARE "101" REASONS WHY I LOOK MY BEST ON

## RAYTHEON TELEVISION PICTURE TUBES

The reasons are the 101 *rigid quality tests and inspections* that Raytheon Television Picture Tubes must pass before shipment. At every stage of their assembly — the components, the chemicals, the processing, — Raytheon Tubes are checked and rechecked to insure electrical and mechanical perfection of finished tube.

This strict control of quality is an old story at Raytheon. For more than twenty-five years they have pioneered and manufactured almost every type of electronic tube — always to the highest standards of quality and performance known to the industry.

Logically, this vast experience and knowledge applied to Raytheon Picture Tubes guarantees superior quality and performance, makes them Right for Sight!

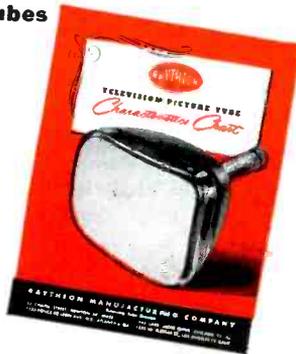
That's why you can replace with Raytheons with

complete confidence that you are giving your customers the finest tubes on the face of the earth — the finest pictures on the face of a tube. See your Raytheon Tube Distributor today.

### A "MUST" for SERVICE DEALERS!

**8 pages of the latest information on all Television Picture Tubes**

The new RAYTHEON Television Picture Tube Characteristics Chart lists over 110 television picture tubes, including the new 14", 17" and 20" electrostatic focus tubes. It contains complete basing information, technical data, safety handling precautions plus a section covering factors concerning interchangeability. Write for your free copy of this valuable booklet, today. Address Dept. D Raytheon Mfg. Co., Receiving Tube Division, 55 Chapel Street, Newton 58, Massachusetts.



*Excellence in Electronics*

RADIO AND TELEVISION RECEIVING TUBES, CATHODE RAY TUBES, SPECIAL PURPOSE TUBES, SUBMINIATURE TUBES, MICROWAVE TUBES

**RAYTHEON MANUFACTURING COMPANY**

Receiving Tube Division

Newton, Mass., Chicago, Ill., Atlanta, Ga., Los Angeles, Calif.

COMBCH 758

RADIO · TELEVISION · ELECTRONIC  
**SERVICE**

### The Fringe TV Boom

THE SECONDARY RECEIVING AREAS, within the 50 to 100 and in some instances 150-mile radius, which have always been favored with a share of the viewing audience, has become within the past few months, a happy hunting ground for an increasing circle of lookers.

Increased power, as noted earlier in these columns, has been substantially responsible for the zooming popularity. But, the development of antennas, boosters and accessories, which have been found to guarantee, in the main, higher gain, has actually played the key role. With knowledge gained from thousands and thousands of hours of field studies and extensive laboratory probes, it has become possible to produce practical pickup gear capable of providing more *db*, than anyone might have dared to predict a short while ago.

Aware of these potentialities, manufacturers have been surveying the means to stimulate further the interest in remote pickup, and in addition, simplify and streamline installation procedures. In one instance, a manufacturer has created a fringe-area kit with all of the parts that might be required in the rural areas. Included in the package are steel masts, guy wire, and guy-wire hookeyes, guy rings, a roof mount, stand-off assemblies, screw standoffs, twinlead, a booster, a stacking bar, a lightning arrester, two antennas and a lightning rod. The supplier has attempted to provide for every possible field requirement.

Many chassis makers have indicated that they'll soon have available fringe-area antenna packages which will not only take care of so-called local fringe spots, but really distant points, through the supply of sectionalized towers and several stacks of antennas. Some have even indicated that they will include rotators, as well as antenna-mounted boosters.

The reactivated fringe trend has also accelerated interest in the second TV set market, which heretofore has been cataloged as a prospect, but with not too much enthusiasm. The subur-

ban homes have always been found to be an ideal site for additional broadcast receivers, and the same thinking has begun to appear on the TV scene. As a result, Service Men have been finding themselves installing two receivers instead of one, and in many instances, returning to those homes where one set had been installed previously, to connect up another chassis. The additional set market has brought happy days to many of the boys in servicing, providing them with an opportunity to sell a host of new accessories.

There appear to be avenues of rainbows ahead, in the fringe areas, for many Service Men.

### Service Men and Distributors

IN THE SHOP, devoted to consumer or specialized commercial servicing, there is one item on the daily agenda that has been found to demand a priority on attention: the parts and accessory supply.

Supplied with this information, Service Men have found that they can plan the day's program skillfully by scheduling installations so that there'll be a minimum of loss of on-the-job time, setting up calls so that all repairs can be made to the complete satisfaction to all concerned, insuring no call-backs, and organizing projects so that they can be carried out in the most proficient manner. To one of the Service Man's best friends, the *distributor*, has fallen the critical assignment of providing the flow of the shop essentials which can insure the fulfillment of such a hardy, continuing routine.

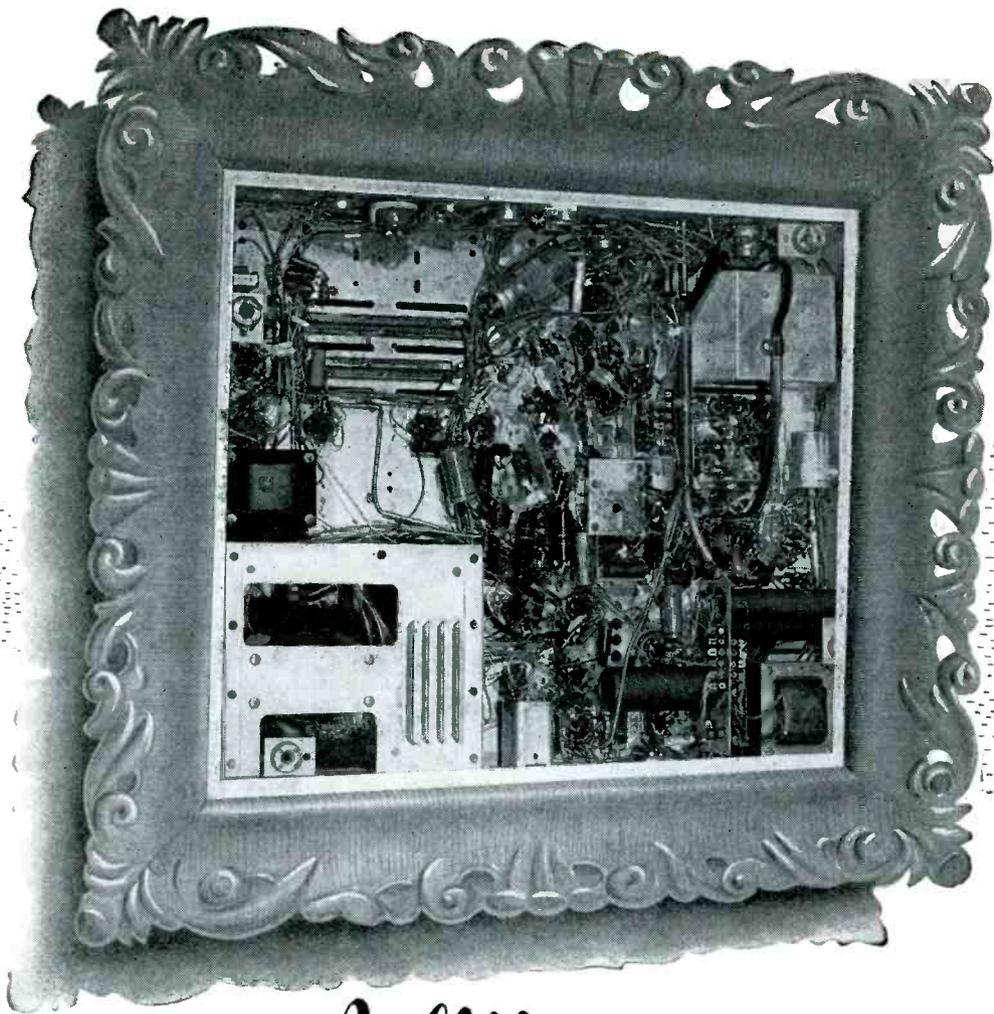
Since space and general economics usually dictate nominal inventories, probably just sufficient to meet the normal requirements in the field or in the plant, depletions can be rapid and replacement needs quite urgent. The jobber with his extensive warehousing facilities thus becomes the ideal supply depot. Not only is he able to offer, often quite promptly, the necessary parts, but in the necessary quantities. Because of his familiarity not only with the operations of the typical service shops involved in AM, FM, TV,

auto-radio or public-address work, but with general market trends of supply and demand, the jobber can anticipate the procurement problem and rise to the occasion, even in dire emergencies.

Today the distributor has become an even more stalwart friend of the man who services, installs or builds, all of whom would be in quite a predicament if they had to be concerned with the variety of problems common to any distributing operation: extensive inventories, credit risks, warehousing facilities, heavy trucking, corporation accounting, replacements, exchanges, etc.

Not only do distributors assume the responsibility of serving as an ever-ready supply source, but as consultants on management and technical problems, too. Appearances at numerous meetings with factory departmental heads and general reps, and attendance at clinics and conferences featuring talks on production and application, serve to provide him with a liberal education on industry practices, which can't help but be of profound use to the Service Man. No individual shop owner could possibly spend all the time required to absorb the wide assortment of information disseminated at the various conclaves held by industry throughout the country, which most distributors attend. Actually, the distributor's establishment is a veritable storehouse of vital facts, pooled from countrywide sources. In addition, it often is a miniature exhibition hall, stocked with the latest offered by industry.

With color TV, increased power at the TV transmitters, and the ultra-highs generating more and more interest in all facets of the sight and sound business, standard broadcast receivers still a popular product, audio gear and wire and tape equipment now the white-haired pet of an ever-growing audience, and such standbys as auto-radio, now a four-season favorite, there's quite a super-charged era of activity ahead, an era in which distributors will continue to demonstrate vigorously their ability to lend a hand and be of genuine service.—L. W.



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# *SERVICE... The National Scene*

GOVERNMENT ISSUES RULES TO OUTLAW MISREPRESENTATIVE ADVERTISING--In an effort to eliminate completely, exaggerated claims, deceptive pricing and guarantees and sheer misrepresentation in advertising, which has been found to be so prevalent in copy appearing in popular magazines and newspapers, the FTC has proposed one of the severest sets of regulations any industry has ever seen. The rules, which will be debated within the next few weeks during an open forum in Washington, and are expected to eventually replace the '39 draft for industry, would make it illegal to make or publish . . . "any false, misleading or deceptive statement" concerning an antenna's ability to . . . "bring in distant transmission." It may also become improper to make . . . "unqualified general representation that television receiving sets equipped with built-in or indoor antennas, will perform as satisfactorily as if they were equipped with outdoor antennas, when such is not the fact." It may become necessary to indicate that there are only a number of limited locations or instances under which the built-in antennas could operate properly. Banned also would be misleading statements involving the adaptability or convertibility for services other than those for which the receiver was originally manufactured. In the latter instance, inhibited by the FTC would be representations that . . . "any set can be converted or adapted so as to permit the reception of a color signal in color, or of a color signal in black and white, when such is not the fact." Clarification of statements made on the ultrahigh, FM, all-wave and other popular features of receivers, will also be required, according to the new specs, which industry will be asked to review, and which it is believed will become law very soon.

LABOR DEPARTMENT PREDICTS SUNNY ROADS AHEAD FOR SERVICE MEN--A cheerful picture of the employment outlook for radio and television Service Men has been portrayed by the Labor Department, in a recently issued report. Reviewing the employment potentialities, the report predicted that during the next few months, and '52, there will be a very strong demand for skilled Service Men, who will urgently be needed to service TV receivers, broadcast chassis, audio and allied equipment. Stressing the growing importance of television as a national commodity, the government review declared that . . . "Many men who now have their own radio repair shops will be forced out of business unless they can successfully enter the TV repair field."

PHILADELPHIA GROUP ACTS TO SOLVE INTRA-INDUSTRY PROBLEMS--The formation of a joint electronics and radio committee on service, with a six-point program which would provide for the solution of difficulties existing among Service Men, contractors and jobbers, was announced recently by the president of the NEDA-Keystone chapter, Al Steinberg. The aims of the new group were said to involve a consumer educational program designed to tell the consumer what can be expected from his television set; an identity media which would permit a consumer to recognize the responsible, ethically operated service shop or contractor; a coordinated method of resolving consumer complaints as quickly as possible, and the development of means to avoid their undue repetition; a program which would bring about the abatement of practices which have been found objectionable in the servicing industry; and a plan which would provide for the encouragement of business-like managed service outlets among contractors or Service Men, which would reduce business failures and eliminate complaints among service-contract holders for service not rendered. A subcommittee has been assigned to the project of preparing a bill of particulars for submission to the committee's joint membership very soon.

# *SERVICE...The National Scene*

SERVICE ASSOCIATION HEAD SEEKS INDUSTRY REGULATORY BOARD--Establishment of a group of reps from RTMA, NARTB, EPEMA, NEDA, BBB, NATESA, and others, to regulate servicing has been proposed by the prexy of the National Alliance of TV and Electronics Service Associations. This board, he indicated, with subcommittees in various metropolitan centers, could set up standards and codes of ethics for both companies and Service Men, and provide qualifying technical examinations on both theory and practice. It was suggested that there be an examination fee of \$5 for Service Men, and \$25 for companies; and in addition, annual fees of \$2.50 and \$10 for Service Men and companies, respectively. The furnishing of acceptable copies of certified financial statements, sworn statements itemizing test equipment, insurance certificates, and a listing of manpower by category, were cited as prerequisites for certification by the board.

BOX-OFFICE TV--Service Men may find themselves soon confronted with pay-as-you-see devices on TV receivers, involving perhaps coin-operated devices. According to a report from a recently formed company, owned in part by Paramount Pictures, the device will be able to handle a show costing anywhere from 5 cents to \$2, in multiples of 5 cents. Featured is a coin receptacle and an electronic tape which can record exactly what shows have been received on the set during a 30-day period. The slot, it was said, could handle nickels, dimes, quarters and half dollars.

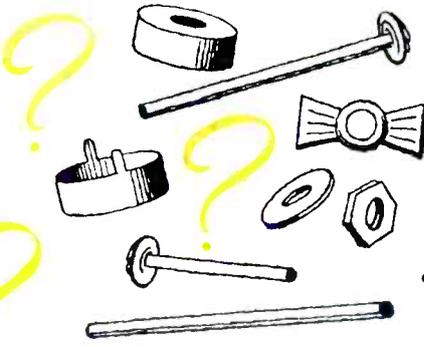
WIRED-TV SERVICE--A new type of TV service, providing direct connection to central receiving points, or the transmitter proper, similar to the technique used by Muzak, has been introduced in Montreal. An area involving 54,000 homes has been wired up with experimental TV chassis placed in a few homes, preparatory to a full-scale operational schedule. Currently, patterns and special moving pictures are being piped over the line. As soon as TV stations in Canada go on the air, the sets will be set up for pickup of all programs, as well as wired music. The receivers now being tested are 17-inch models, mounted on wheels, and capable of being plugged into any room in the house. Similar systems have been placed in operation in practically all of the British-Commonwealth countries. It is understood that the sets will be installed on a rental basis, costing about 75 cents per week. The system is somewhat akin to the community-antenna arrangement, which has become quite popular throughout the eastern area of our country. In the latter instance, purchasers of the service are being charged between \$150 to \$175 for the initial contact to the antenna, and are required also to pay a monthly service charge of from \$4-\$6.

CALIFORNIA ASSOCIATION OPENS SEASON WITH INSTRUMENT TALKS--The first meeting of the season, conducted by the Radio-Technicians Association of Southern California, held in Long Beach, featured a session on test equipment, with talks by John Petrsek and Hal Bersche of RCA. Service problems for retail personnel were also covered during the meeting, which was reported to have had an overflow audience, indicating that Service Men are alert to problems of the day, and are anxious to listen to expert counsel offered by industry.

A BOUQUET FOR GREELEY--Philip H. Greeley, whose test-instrument articles have been appearing in *SERVICE*, has been receiving quite a few orchids from Service Men. In the opinion of Theodore Nolan of Clinton, Indiana, Greeley's articles are excellent; they are very practical. "Mr. Greeley," says Nolan, "is of great value to us newly started Service Men." Many thanks for the plaudit.--L.W.

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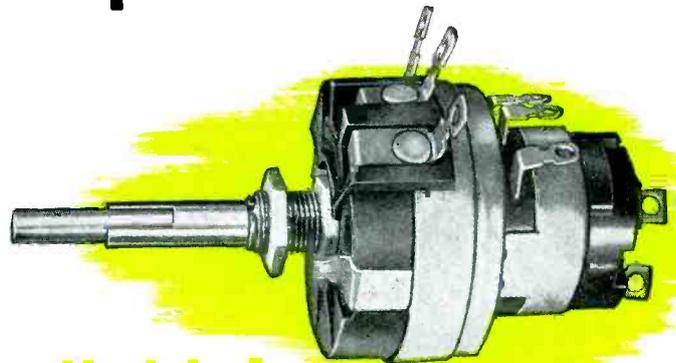
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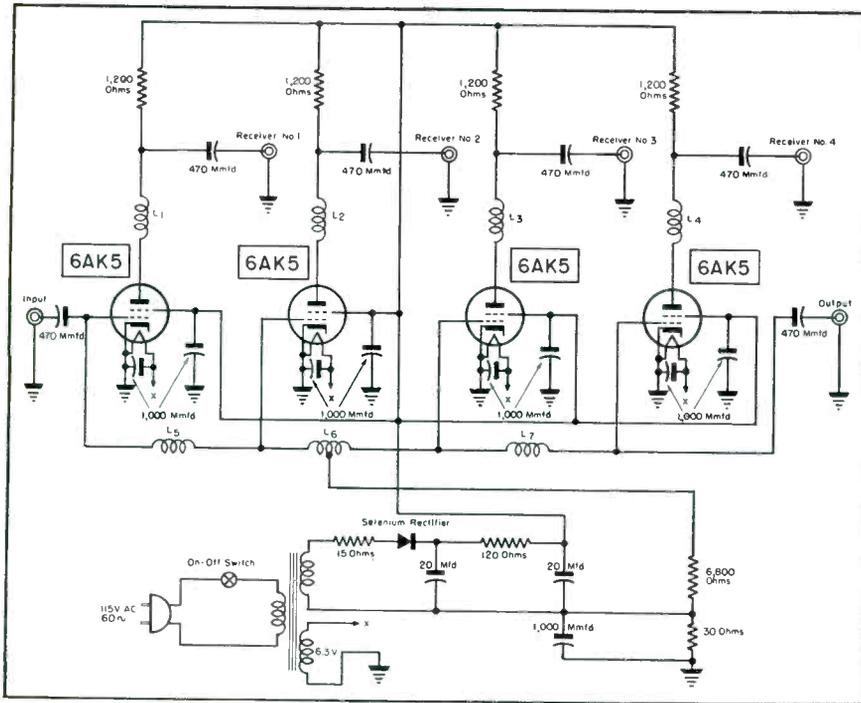
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# TV Master-Antenna

**Four-Tube Feed Unit with 6AK5s Provides Isolation of TV Chassis in Single-Antenna Multiple Receiver Installations.**

[See Front Cover]



Circuit of the distribution unit.



Fig. 2. Automatic-type TV booster.

WITH TV pacing radio in popularity and in most areas finding its way into practically every home that has a broadcast chassis, the problem of installation has become more and more acute. This has been particularly true in the larger apartment dwellings where the most effective pickup roof locations have been crowded out by prior installations. The result has been turmoil, featuring diminished pickup and interference in many instances.

Master antenna systems have been found to be the solution to most of these problems, minimizing interference, caused by local oscillators of TV

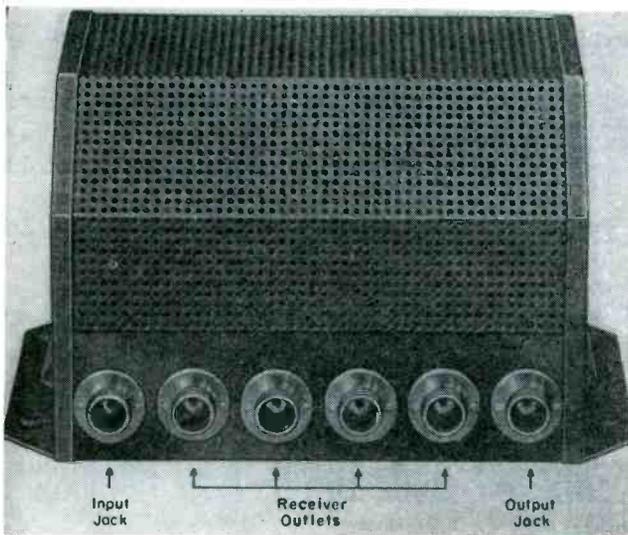
chassis, and providing substantially-improved signals, because of choice antenna locations.

The effectiveness of the master-antenna idea has been found to lie in not only antenna efficiency, but in the distribution system's ability to feed signals effectively to all sources along the line.

In designing a circuit for a distribution system, it has been found that there are five prerequisites for efficient operation.

*First*, the circuit must have a low insertion loss for all TV channels. *Second*, the circuit should include an

isolation stage consisting of *buffer* tubes or amplifiers between the antenna and the receiver. The isolation stage must block the transmission of local oscillator frequencies along the leadin from the receivers at the same time TV signals flow freely in the opposite direction from the antenna *to* the receivers. *Third*, the circuit should provide for a high degree of flexibility in installation. It should, for example, afford satisfactory performance when only a single distribution system is required to service a small installation of up to four receivers. And, it must perform equally well when multiple



(Left)  
Fig. 1b. Rear view of master-antenna feed apparatus.

Fig. 1a. Front view of TV distribution system.



# Distribution System

by JOHN D. HARPER and D. J. TOMCIK

Electro-Voice, Inc.

distribution systems are installed in large installations, where a number of receivers must be serviced. *Fourth*, it should be possible to operate the circuit continuously for long periods of time without need for service. *Fifth*, the circuit must be one that can be assembled in a compact unit for ease and convenience in installation.

On the cover and in Fig. 1, appears the circuit of a distribution setup which has been found to meet the foregoing requirements. To obtain a lower insertion loss, an electronic circuit rather than a purely resistive one was employed.  $L_1$ ,  $L_2$ ,  $L_3$  and  $L_4$  were installed to serve as high-channel peaking coils. Because the plate load of each *buffer* tube consists of an inductance and a resistance in series, high channel signals, which are normally attenuated because of the output capacity of the tubes, can be amplified to an equal or greater extent than the low channel frequencies.

In production, the maximum loss allowable from distribution system input jack to the receiver outlet is 5 db on low channels and 1 db on high channels. Maximum allowable loss from the distribution system input jack to the output jack is 1 db on low channels and 3 db on high channels. In prime service areas, this loss has not been found to be detrimental. In marginal service areas, boosters\* can be used as line amplifiers.

The circuit was designed to use coax cable because of its superior shielding characteristics. Coax cable has been found to prevent local oscillator energy from being fed capacitively between leads. Open wire lines, on the other hand, can form a capacitive coupling outside the circuit and act as a bypass around the unit, subverting its effectiveness.

Fentode-type tubes were selected because their plate-to-first grid capacity was found to be the smallest of any type tube. Low plate-to-grid capacity has been found desirable in an isolation unit because of the low capacitive coupling between input and output.

The circuit was plate loaded to utilize fully the low plate-to-grid capa-

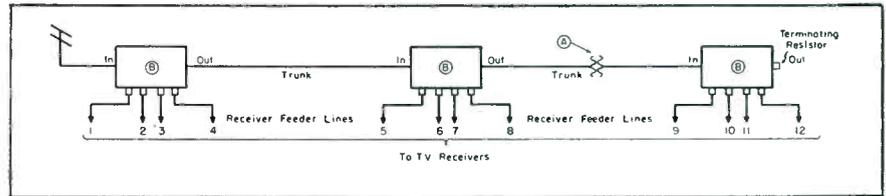


Fig. 3. Layout for installation of distribution units (b) in primary service area, where no line amplifier is necessary. Additional distribution systems can be inserted at (a).

city of the pentode tubes. It was found that a cathode-follower type circuit would negate the advantages gained by using pentode tubes, because the output of the tubes would be taken off the cathode. In addition, grid-to-cathode capacity is much higher than plate-to-grid capacity. In production, the isolation provided by the distribution system has been found to average

by a loading resistor at the output jack. In larger installations, where several distribution systems are connected in series, the loading resistor can be removed from all output jacks except that of the final unit.

All components are operated at or below recommended ratings so that continuous operation of the distribution system will not cause excessive

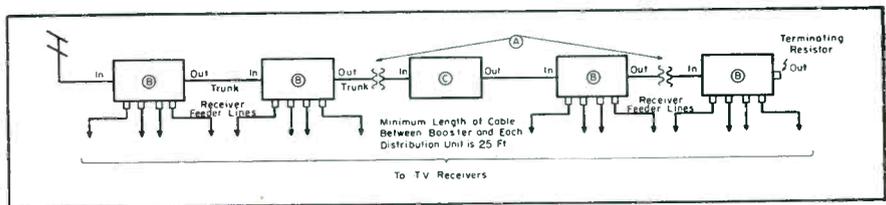


Fig. 4. Large installation setup using distribution equipment (b) and a booster (c) as a line amplifier.

45 db on low channels and 30 db on high channels.

To provide flexibility so that the distribution system could be used singly or in multiple, and to prevent the formation of standing waves on the transmission line, which would cause output signals of varying values to reach the receiver outlets, the circuit was designed to provide for a continuation of the transmission line.  $L_5$ ,  $L_6$  and  $L_7$ , used in conjunction with the grid-to-cathode capacity of the tubes, constitute an artificial transmission line which has been terminated

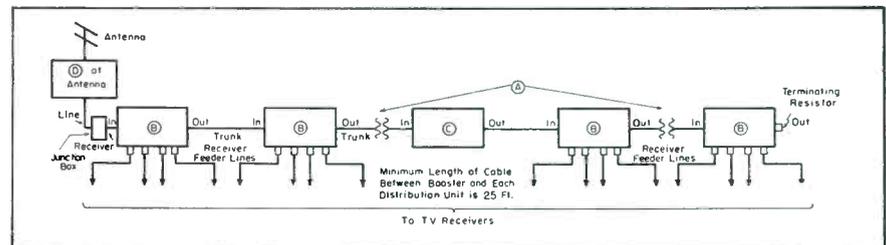
deterioration; ac isolation has been accomplished by making the unit ac operated. Tube bias is developed across a 30-ohm resistor, in series with a 6800-ohm unit.

## Physical Characteristics

The distribution system is housed in a ventilated, metal case. Six coax sockets\*\* provide access to four receiver outlets, the signal input jack and the signal output jack. The unit is supplied with an on-off switch, ac line cord and plug

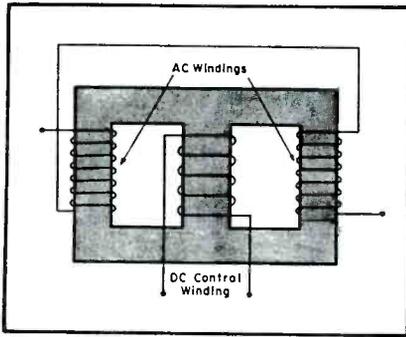
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Fig. 5. Installation featuring use of distribution unit (b) and booster (c). Breaks at (a) include provision for additional feed systems.



\*E-V Model 3000.

Fig. 1. Diagram of saturable reactor required in color-TV disc systems.



# COLOR TV Wheel Synchronization

by PHILIP SELVAGGI

## Color-Wheel Mechanical Requirements . . . Drum Receiver Design Features

IN FIELD-SEQUENTIAL COLOR TV, three points must be satisfied to assure proper operation of the required disc:

- (1) The wheel must rotate at the proper speed to maintain synchronization with the picture sequence.
- (2) A control must be provided to insure proper phasing, so that the color wheel will present the red, blue, and green colors as the red, blue, and green frames appear on the tube face.
- (3) A means must be provided to keep the rotating wheel in proper sync and phase during operation.

Since the motor which drives the color wheel is an induction motor\*, its speed depends upon the applied voltage and the loading due to the color wheel\*\*. To obtain the proper speed and to obtain correct phasing as

well, a saturable reactor must be placed in series with the motor to change the voltage applied to the motor. The motor current flows through the reactor, causing a voltage drop which lowers the terminal voltage of the motor. Naturally, the reactor and the motor have to be chosen so that the motor will run at the right speed of 1440 rpm.

A saturable reactor is really an iron core choke with a second winding, which is used to control the inductance

\*An induction motor's speed varies with its loading so that, by applying the proper load on its shaft, it can be made to run at 1440 cps. When the motor is to be used to drive a color wheel, it must operate at 117 volts at 60 cps nominally, and be able to give full output with supply voltage varying between 105-125 volts. It must have low rotor resistance, and be able to deliver full load with not more than 30 rpm slip. Its minimum efficiency must be 60%. It must have a single ended shaft of from 3/8" diameter to 1/2" with a 1 1/4" extension, and run extremely quietly; about 20 to 24 slots have been suggested to provide this result.

The horsepower required for various discs are: 1/20 to 1/15 for a 19 1/4" disc; 1/15 to 1/8 for a 22 1/4" disc and 1/10 to 1/5 for a 27 1/4" disc.

The disc speed of 1440 rpm could be obtained from either a sync motor operating from a 48 cps source or from a 60 cps synchronous motor geared down to the proper speed. However, the prospect of building a 48 cps source capable of driving a motor is not appealing, especially since the source must not only deliver power, but also must have associated with it electronic circuits which will stabilize its frequency from the 1440-cps sync pulses. These requirements make this method very unpracticable. The possibility of gearing down a sync motor makes the mechanical aspect of the problem too complicated.

\*\*The disc illustrated in Part II of this series was for a 7-inch tube. A 10-inch tube requires a 22" disc and a 12-inch tube a 26" disc.

A point to bear in mind when a receiver is to be converted is the loss of light as it passes through the filter. The result is that the picture loses brightness and it will not compare favorably with equivalent black and white pictures. One way to overcome this is to increase the high voltage on the larger tubes. It would seem desirable to have two filament windings on any manufactured dual-type flyback transformer so that voltage doublers may be used in the high-voltage circuit.

(Right)

Fig. 4. Current flow illustrations. Circuit in (a) represents current flow in 12AU7 correcting setup when the disc speed and phase is correct. Each tube conducts equally and the net voltage across C is zero. At (b) the disc speed is too slow. Lower triode section conducts more giving a net positive voltage on the capacitor. When the disc speed is too fast, we have the result shown in (c), with the upper triode section conducting more, providing a net negative voltage on the capacitor.

and therefore the impedance of the choke. It is well known that the inductance of an iron core choke can be varied by a direct current passing through a winding on the same core; Fig. 1. As the *dc* through the winding increases, the inductance becomes smaller, and as the *dc* decreases, the inductance increases. In the case of the color wheel, the *dc* must be adjusted so that the saturable reactor places the proper voltage across the motor for rotation at 1440 rpm. The *dc*, therefore, furnishes a means of control; the speed of the motor can be adjusted by changing the inductance of the saturable reactor. This means of control, in conjunction with a phase-detection circuit, is used to maintain proper speed and phase.

In Fig. 2 this automatic synchronizing system is illustrated. The circuit

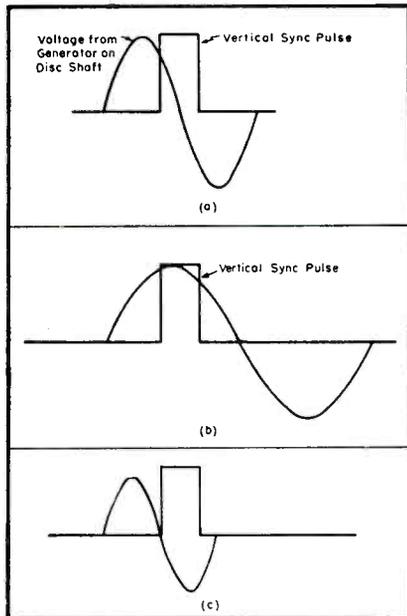
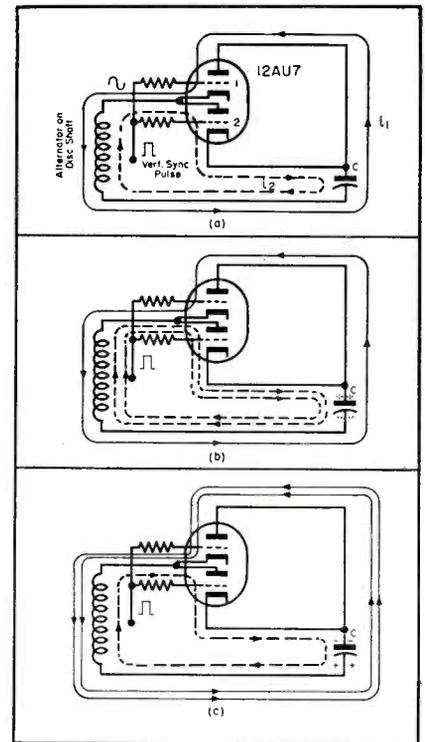


Fig. 3. Different phase positions of color wheel with respect to vertical sync pulses. Plot at (a) illustrates result when disc is rotating at right speed and phase, providing zero correction voltage out. At (b) appears the result when the disc is rotating too slow or slightly out of phase, providing a positive voltage out. The result at (c) illustrates the effect achieved when the disc rotates too fast or out of phase in opposite direction, providing a negative voltage out.



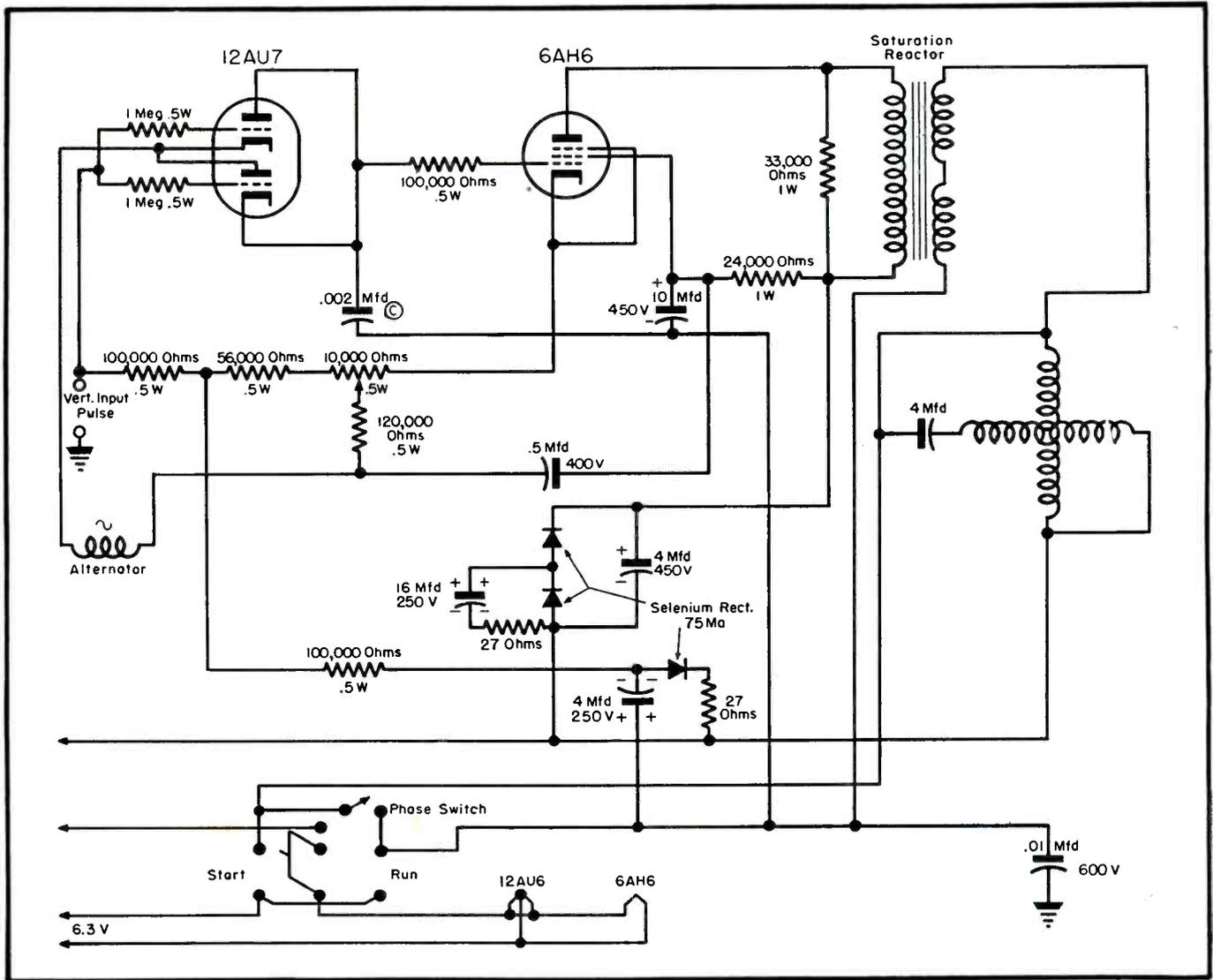


Fig. 2. Automatic sync circuit for color-wheel TV.

consists of a 12AU7 and a 6AH6, three 75-ma selenium rectifiers and a saturable reactor. There are four inputs to the circuit consisting of 6.3 ac, 117 ac vertical sync pulse input, and an alternating voltage of 144 cps. At the power input point, there is a *dpt* switch which has a start and run position. In either position, 6.3 volts are applied to the two tubes, but in the start position, full line voltage is applied to the motor to allow it to build up to speed quickly from the rest position. Once the motor is up to speed, the switch is thrown to the run position where it places the saturable reactor in series with the line voltage and the motor. A phase switch is used to short out saturable reactor to speed the motor when color phasing is incorrect.

#### Plate-Current Flow

The plate current of the 6AH6 flows through the *dc* control winding of the saturable reactor adjusting its inductance to the proper value. It is by means of this current that the proper

phasing is maintained. The grid voltage of the 6AH6 varies in accordance with the difference in speed of the motor rotation and the vertical frame rate. The correction voltage on the grid of the 6AH6 is obtained from the phase-detection circuit consisting of the 12AU7 and associated circuitry. The coil marked *alternator* is in reality a small generator located on the same shaft as the color wheel. The frequency of its output voltage thus depends upon the frequency of rotation of the shaft. This alternating voltage is applied simultaneously to the cathode of the 12AU7 and the plate of the 6AH6 tubes. At the same time the vertical sync pulse is applied to the grids of both tubes. When the motor is rotating at the correct speed and the phasing is correct, the relationship between the vertical sync pulse and the generator voltage will resemble the curves shown in Fig. 3. In operation, the 6AH7 conducts tending to charge *C* up with a positive voltage. Then the 12AU7 conducts, tending to charge up with a negative voltage.

The net result is zero, as shown in Fig. 3a, and the bias on the grid of the 6AH6 does not change. If the motor slows down a little, the relationship will be as shown in Fig. 3b. In this case, the 6AH7 will conduct more than the 12AU7 (shown in Fig. 4) because the plate of the 6AH6 goes positive at the same time that its grid goes positive. The voltage on *C* then becomes positive and the current through the 6AH6 increases, causing the inductance of the saturable reactor to decrease and the speed of the motor to increase. If the motor goes too fast, the relationship between vertical sync pulse and the generator will appear as shown in Fig. 3c. In this case, the generator voltage lowers the cathode potential on the 12AU7 at the same time that the vertical sync pulse raises its grid potential, so that the capacitor gets charged with a negative voltage, and the current through the 6AH6 decreases. The inductance of the saturable reactor will increase and lower the voltage across the motor  
(Continued on page 54)

# TV Receiver

**New Trends in Circuitry Involving Germanium Crystal Detectors, Video Amplifiers, Audio and AGC, Deflection Systems, and Power Supplies Using HV Selenium Rectifiers.**

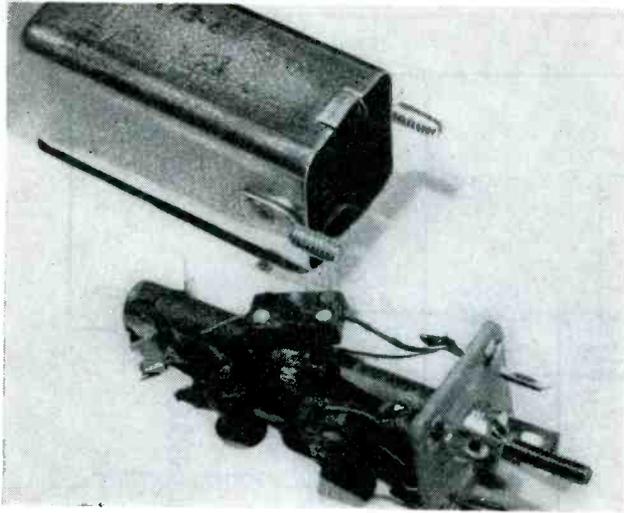


Fig. 1. Streamlined video-detector assembly. (Courtesy G.E.)

AS INDICATED in several circuitry analyses in SERVICE,\* the improvement of tubes and crystal diodes and the development of a variety of new components and allied circuits, have made it possible to introduce a host of simplified features in the new runs of TV chassis.

The germanium diodes have become particularly popular in TV models. There are three circuits in which germanium diodes have been found to provide optimum performance: video detection, *dc* restoration, and synchronization pulse clipping. There are other circuits where crystal diodes may be used, but performance may not be entirely comparable with that obtainable from a diode like the 6AL5, or triodes, which provide some amplification in addition to whatever rectifying action they may contribute.

## Video Detection

An illustration of the simplification process in actual operation appears in Fig. 1; a G. E. video detector-assembly. This assembly contains all the components shown in the dotted line portion of the diagram in Fig. 2. In addition to saving space and weight this assembly has been found to elim-

inate a number of parts and minimize circuit difficulties.

The diode crystals have many unique operating features. They have low capacity, no contact potential or feedback characteristics, a linear output over a wide range and down to very low signal voltages, plus the fact that there is no filament to heat and consequently no *ac* hum problem.

Whenever the coupling from the video detector to the picture tube includes a blocking capacitor, the *dc* component is lost and must be restored. It has been customary to design an *rc* video amplifier and use half the detector diode for *dc* restoration. Obviously, it is better not to block out the *dc* component in the first place than it is to restore it after it has been eliminated.

## DC Amplifier Design

This means the designing of a *dc* amplifier, which is quite simple, and with the advantage of having a small number of essential components. By not blocking out the *dc* component the circuit may be simplified, and there is no problem of using the other half of a detector diode when the germanium

crystal serves as the video demodulator.

## Video Amplifier Streamlining Possibilities

It might be possible to apply the demodulated signal from the video detector to the picture tube, but this would demand a very high-gain *if* amplifier system. There are tubes available which could be used in such *if* stages to provide an output of about 50 volts *rms* to the detector, but practical experience has shown that better-gain bandwidth figures are possible in the conventional-type video amplifier, than in any specially designed *if* high-gain amplifier system yet devised. In general, a video amplifier of at least one stage is desirable, although it is possible to provide a two-stage video amplifier with but one tube like the 12AT7.

The video amplifier must be designed so that it provides the necessary *dc* level control in a *dc*-coupled circuit. Here the reference *dc* point must be stable during changes in amplitude of the input signal. Proper maintenance of the *dc* level is important to prevent the background of the picture from changing with changes in scene. When the polarity of the

Fig. 2. Simplified video detector system used in all current G.E. Models.

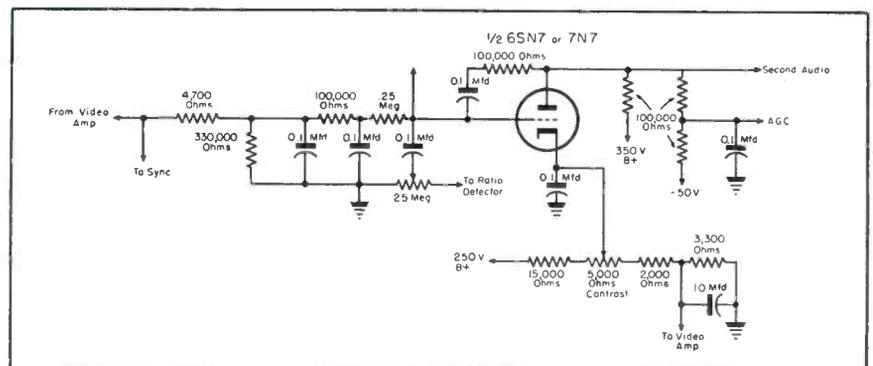
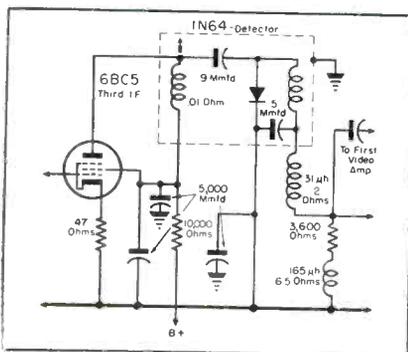


Fig. 3. Combination first audio and *agc* circuits, providing an audio response curve that is fairly level from 200 to 10,000 cps. (Courtesy Sylvania)

# Simplification Techniques

by DAVID T. ARMSTRONG

signal in the video detector is correctly chosen, there is the possibility of some noise limiting in the video amplifier.

When the output from the video detector is negative, noise pulses may drive the video amplifier tube beyond cutoff. This helps the video amplifier to function as a noise limiter. The output from the video amplifier will then be in a positive going direction which means it will be applied to the cathode of the picture tube. This is identical with grid modulation with a negative signal.

The possibility of combining related dual functions in one tube envelope has been receiving serious attention. Since an amplifier tube provides amplification, some work has been done on the possibility of using one envelope in combination that would provide both final video and final sound amplification. This is a natural result of the amplification of the composite video and sound signal in the *if* strip and then separating the 4.5-mc sound beat at the plate of the video amplifier from the video portion of the transmitted intelligence.

In a step in this direction, Sylvania has simplified circuitry through the use of their 28D7, applying it as a combination final video amplifier and final sound amplifier. Any such dual combination use means only one socket and only one filament to heat. It may also mean some cross talk inside the tube envelope. It has been found that the cross talk is 60, or better, db down, with an average somewhere around 70 db. Experimental work has revealed that the 28D7 has desirable characteristics as a video amplifier and that it will supply a voltage gain

of approximately 20 with a bandwidth of 4 mc.

The two pentode sections of this tube may be operated separately. Fixed bias operation will furnish additional power output since it permits utilization of the total supply voltage. The tube has been designed to furnish comparatively large amounts of power at low plate voltages. Inasmuch as the plate, screen, and filament supply are subjected to whatever variations occur in the supply voltage, it is important to know that the operating supply may vary from 32 to as low as 22 volts. The low plate and screen requirements for this type tube permit the use of smaller transformers for low-voltage power requirements.

## Audio and AGC

Generally audio amplifiers for TV should be two-stage systems, or a total of two tubes. Duo-triodes like the 12AT7, 12AU7, or 12AX7 might very well serve here. We have seen how it is possible to eliminate one tube in the final audio stage by using a dual-purpose tube like the 28D7. This solution suggests the query: Where might a similar dual function be served by another single tube? *Agc* and first audio seem a likely place for such a possible combination.

The circuit shown in Fig. 3 illustrates a specially-developed *agc* circuit and combination first audio amplifier. This *agc* operates from the black level voltage of the video signal with but very little power from the negative bias. This combination of two related functions is made possible with half a

6SN7. The other half may be made available for another function.

Automatic gain control is of major importance in TV receiver operation. It lessens the need for adjusting the contrast control during tuning, stabilizes the amplitude of the pulses, and avoids both overdrive and underdrive in manually-operated receivers, while switching to signals of greater or lesser voltage levels.

## Sync Amplification and Separation

There are many possibilities of simplified sync amplifiers and separators. A duo-triode circuit has much to recommend it, since there are few associated circuit components. The *agc* circuit shown in Fig. 3 may be used as a sync amplifier by utilizing the other half of the duo-triode tube, or the half tube left may be used as part of the horizontal deflection system. Since two tubes are minimal requirements for good sync amplification and separation, a duo-triode sync circuit is suggested here.

This is one instance in which germanium diodes will offer optimum performance in the simplified receiver. The circuit shown in Fig. 4 has the merit of using but little space, eliminating filament supply, socket, and some associated resistors and capacitors.

## LP Filter Components

A satisfactory low pass filter for the vertical integration network can be made of two capacitors and two resistors. It will not function well as a three-unit network but it will provide a sufficiently steep pulse output for

(Continued on page 56)

Fig. 4. Germanium-diode sync separator. The values of the capacitors will affect video leakage and sync pulse amplitude.

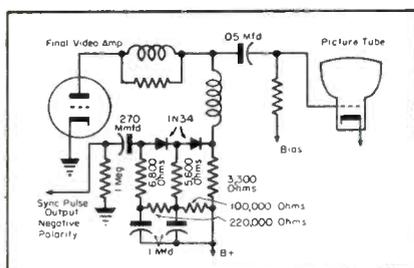


Fig. 5. Horizontal phase detector using germanium diodes. (Courtesy John Meck Industries)

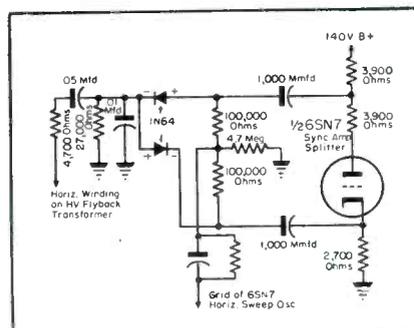
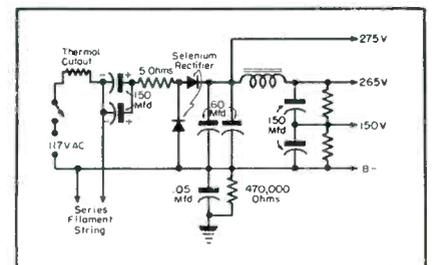


Fig. 6. An ac/dc transformerless low-voltage power supply.



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\*Switch Type

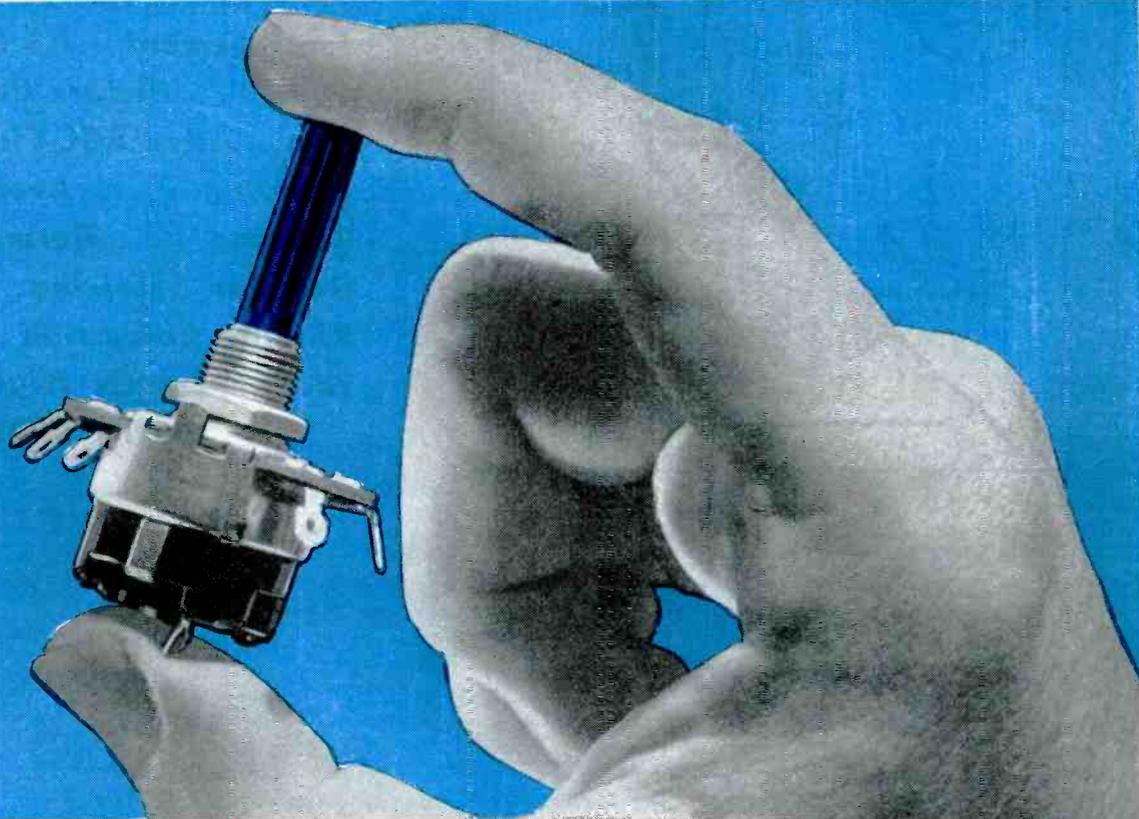
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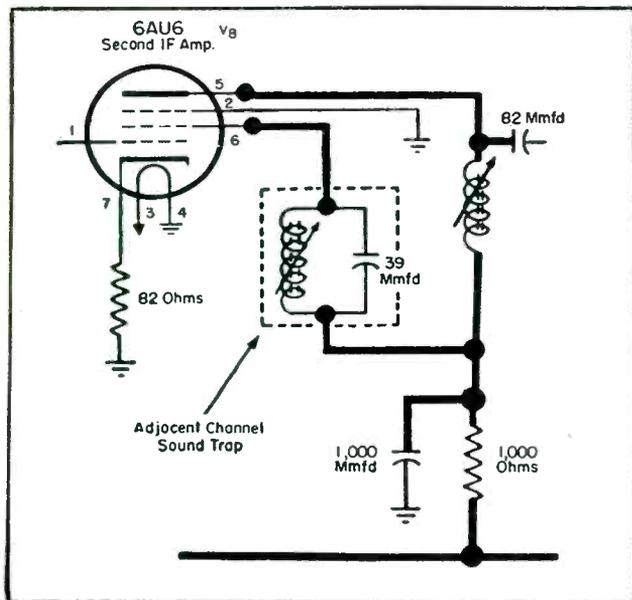


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# Servicing Helps

by M. A. MARWELL



**Adjacent-Channel Sound Trap Installation . . . Substitute for 25D8GT . . . Horizontal-Linearity Improvement . . . HF Degeneration Cure . . . Picture-Cutoff Prevention . . . Gated AGC Circuit Troubleshooting . . . Avoiding Picture Bending . . . Germanium Diode Detector Servicing . . . Yoke Ringing Correction . . . Cures for Low or Erratic High Voltage in the TV Chassis.**

IN MANY AREAS, adjacent-channel signals have introduced interference problems, particularly in the sound video section of the TV set. For some chassis, traps are available to cure the trouble. In the Stewart Warner 26-tube model, it is possible to install such a trap, which consists of a slug tuned coil and a fixed ceramic capacitor, designed to minimize interference caused by the sound carrier of the lower frequency adjacent channel.

When required, the sound trap can be added in the screen circuit of the 6AU6 second *if* amplifier.

To install, the trap coil is mounted in the hole located directly in front of the 6AU6 third *if* amplifier. The coil must be inserted from the under side of the chassis and pushed through the hole until the mounting clip snaps into position. Then the 1,000-ohm resistor, 174, is disconnected from pin 6 of the second *if* amplifier. In the next step, the 1,000-mmfd capacitor is disconnected from pin 6 of the second *if* amp and from chassis ground. The second *if* coil is then disconnected from pin 6 of the 6AU6, and one terminal of the trap coil is connected directly to pin 6 of the 6AU6.

The other terminal of the trap coil

is connected to the terminal of the second *if* coil which was previously disconnected. The open end of the 1,000-ohm resistor is connected to the junction of the second *if* coil and trap coil. Then the 1,000-mmfd capacitor, removed earlier, is connected by wiring one end to the junction of the second *if* coil and the 1,000-ohm resistor. The other end of the capacitor must be grounded at a point close to the second *if* coil. Fig. 1 shows the sound trap wired into the receiver.

#### Substitute for 25D8GT

Prior to World War II, a large number of Stewart Warner *Air Pal* models (A-65) were manufactured, using a 25D8GT. The stock of these replacement tubes was depleted during the war years and tube manufacturers never resumed production. Because of the unavailability of this tube, it has in many instances been impossible to restore the receivers to operating condition. Indicated in Fig. 2 is a simple means of salvaging these sets

through the use of a 25B8GT and a 1N48 crystal detector.

#### Horizontal Linearity Improvement

On certain Stewart Warner chassis (series 9120, 9121 and 9122), it has been sometimes found difficult to obtain correct horizontal linearity through the adjustment of the horizontal linearity, horizontal drive and width controls. When such cases are encountered, the capacitor in the return lead of the horizontal output transformer should be changed from .1 to .25 mfd.

#### HF Degeneration Cure

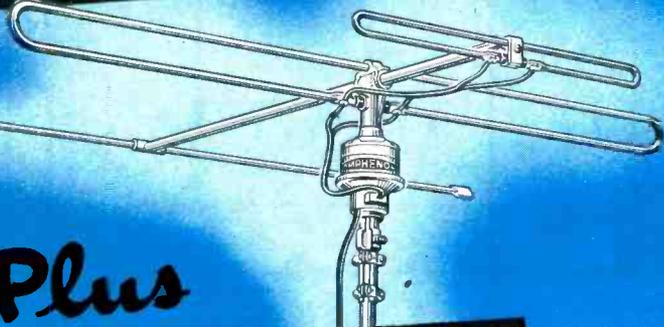
In some Westinghouse chassis, the addition of 330-mmfd in the video amp from the cathode of the video amplifier to ground has been found to eliminate degeneration at the high video frequencies, effectively emphasizing the higher frequencies. The resultant peaking improves the picture when a low-resolution picture is transmitted, but may be detrimental when a high-resolution picture is transmitted. Because of the arbitrary benefit, the capacitor is not used in latest production.

Above: Left

Fig. 1. Stewart Warner TV chassis rewired for adjacent-channel sound trap.



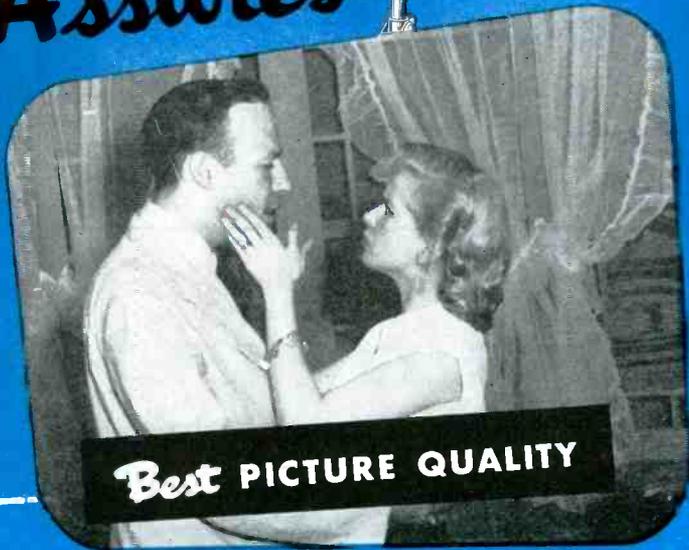
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## Servicing Helps

(Continued from page 27)

similar to the other Admiral series of TV receivers.

The most positive way to check for proper operation of the *agc* circuit is to measure the bias voltage with and without a TV signal. Bias voltage should measure from  $-25$  volt to  $-6$  volts depending on the strength of the TV signal. Waveforms should also be checked at pins 1 and 5 of the *agc* tube with a 'scope.

### Picture Bending

Leakage between the control grid and other tube elements in the *rf* amplifier, first *if* amplifier and second *if* amplifier, will decrease the *agc* voltage in some Admiral models. This generally will result in horizontal bending in the picture. In most cases it will be found difficult to reduce the contrast adequately with the picture control and the tuning control will be critical to adjust. If a receiver exhibits any of these symptoms, other tubes should be tried before deciding that the cause is due to misalignment or other trouble in the *agc* circuit.

### Video Detector Trouble Shooting

The 1N64 germanium diode used as the video detector in Admiral chassis will generally require very little attention. It will function with excellent stability, and exhibit long life and ability to withstand severe mechanical shock without damage. However, the diode may be permanently damaged by application of excess heat to the connecting leads. To avoid damage when replacing, the connecting leads should not be cut shorter than  $\frac{3}{4}$ " from the body. When soldering, the wire leads should be gripped between the body of the diode and the solder point with a pair of long nose pliers to

(Continued on page 40)

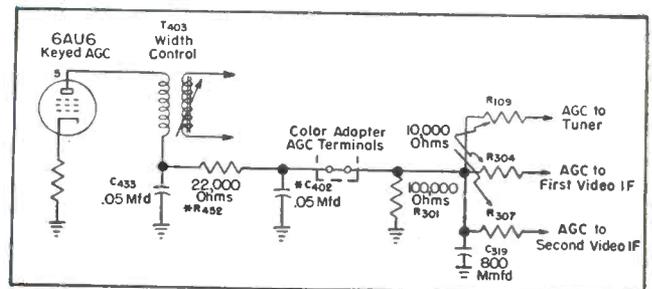
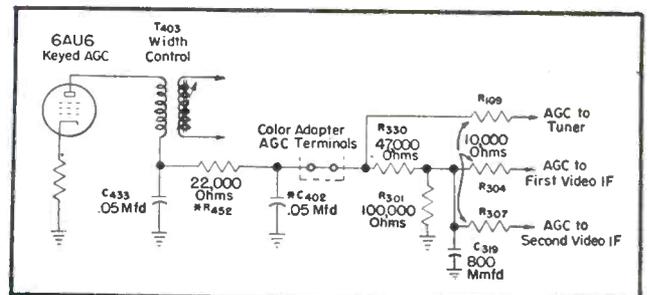


Fig. 5. The *agc* circuit used in Westinghouse V-2192-1 chassis series which have *rf* and FM traps.

Fig. 6. The *agc* circuit employed in Westinghouse chassis which do not use traps; circuit is used with V-10279-1 and V-10279-2 tuners.



# TUBE News

by L. M. ALLEN



## Characteristics of 21-Inch Metal Rectangular, 30-Inch Round and 17, 20 and 21-Inch Electrostatic Picture Tubes.

(Left)  
Twenty-one-inch metal rectangular picture tube announced by the RCA tube department, which produces a picture 18 $\frac{3}{8}$  inches wide and 13 $\frac{15}{16}$  inches high.

METAL RECTANGULAR PICTURE TUBES, which had been confined to the 17 and 19-inch production line, have now joined the larger-tube parade and become members of the 21-inch family.

One model, recently announced by RCA, 21AP4, provides a picture 18 $\frac{3}{8}$  inches wide by 13 $\frac{15}{16}$  inches high, with slightly curved sides and rounded corners. The tube has a white fluorescent screen on a relatively flat face made of frosted Filterglass, which has been found to minimize reflection of bright objects and increase contrast.

Employing magnetic focus and magnetic deflection, the 21AP4 is designed with a funnel-to-neck section which is said to facilitate centering of the yoke on the neck and, in combination with better centering of the beam inside the neck, contribute to the tube's good uniformity of focus. The diagonal deflection angle is 70°; the horizontal deflection angle, 66°.

Other features incorporated in the tube are short overall length, weight

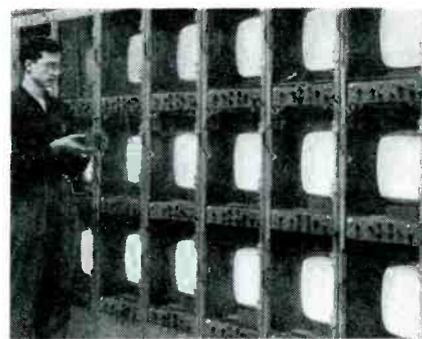
substantially lower than that of a similar all-glass tube, and an ion-trap gun requiring only a single-field, external magnet.

### Thirty-Inch Picture Tubes

The latest extra-large picture tubes to become available through distributors are the 30-inch models (30BP4) produced by the Cathode-ray Tube Division of Allen B. DuMont Laboratories, Inc.

The giant tube is said to present a usable picture area of approximately 536 square inches, or over twice the area of the 20" rectangular tube. The outstanding feature of the new tube is its short overall length achieved through the use of a 90° deflection angle. The overall length is 23 $\frac{9}{16}$ " or approximately 2" longer than the 20" tube, lending itself to compact cabinet design.

For maximum contrast as well as rejection of ambient light, the tube



Life tests on 17-inch zero-voltage electrostatic focus picture tubes at the G.E. picture tube plant at Electronics Park in Syracuse, N. Y.

employs a gray-filter face plate. The anode is designed to operate at 20,000 volts. A single-magnet ion trap has been incorporated to prevent ion burns.

### Electrostatic Picture Tubes

The larger-size feature, heretofore a property of *em* picture tubes, has been adopted by the electrostatic tube makers, and applied to 21-inch models. One model, having a rectangular face and cylindrical front section, has been announced by National Union. The cylindrical front surface has been found to afford elimination of reflection and preserve sharp definition of the picture.

These tubes provide a picture of 19 $\frac{7}{8}$  by 13 $\frac{7}{8}$  inches.

The tube, 21FP4A, employs low-voltage electrostatic focus and magnetic deflection. Another type, 21EP4A, features magnetic focus and magnetic deflection. Both types are designed to

(Continued on page 32)

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William C. Seales, national sales manager of the CRT division of DuMont, and Irving C. Rosenberg, division manager, surveying a 30-inch picture tube line.

to remove the focus coil from the chassis and replace with a resistor.

General Electric has also begun production of electrostatic picture tubes designed to operate without focus coils.

Elimination of the focus coil has been reported to stem from the development of an improved electron gun for zero-voltage.

The new gun design will be incorporated in a series of 17 and 21-inch tubes. First of the new tubes to go into production is the 17RP4, a 17-inch glass model.

The zero-voltage line will include both glass and metal tubes. Face plates will be spherical, as well as cylindrical.

#### Mirrorized Picture Tubes

Mirrorized picture tubes are now being made by the TV Q Custom built Corp.\* Tubes are said to receive a triple check to assure satisfactory service, tests being made for leakage between elements, electron emission and brightness, screen defects, cutoff voltage, gas content, glass, bakelite cap and soldering.

\*469 Straight St., Paterson, N. J.

#### PARTS DISTRIBUTORS AT RADAR TEST



Boston parts distributors who were guests of the Raytheon receiving tube division on a Boston Harbor cruise, to view the port of Le Havre, France, radar system designed and built by Raytheon and now being tested in Boston Harbor. Members of the party were (left to right): E. I. Montague (Raytheon); A. E. Akeroyd (New England Raytheon sales rep.); Frank Semple (Lincoln Electronics); Lewis Crosby (Electrical Supply Corp.); Lewis Scott (Melrose Sales); Morris Newman (Radio Shack); Henri Jappe and Howard Jappe (A. W. Mayer Co.), and Louis Del Padre (L. L. Del Padre and Associates).

## Tube News

(Continued from page 29)

be used on a single-magnet type external beam bender (ion trap assembly) and have external conductive coatings. They are also available without external conductive coating, bearing type designations 21FP4 and 21EP4, respectively.

The electrostatically-focused type is designed to operate from the normal low-voltage power supply of the television set, the focussing electrode potential of  $200 \pm 200$  volts being obtained from a one-megohm potentiometer connected across the B supply.

Production of 17 and 20-inch self-focus electrostatic picture tubes is now under way at DuMont.

Two types in production are the 17KP4 and 20JP4.

The 17-inch model is said to be a direct replacement for all 17-inch glass rectangular tubes, whether electrostatic or electromagnet.

The electrostatic tube's design is said to eliminate focusing controls, coils, network resistors, or mechanical focusers.

To install the electrostatic tube, DuMont notes that it is only necessary

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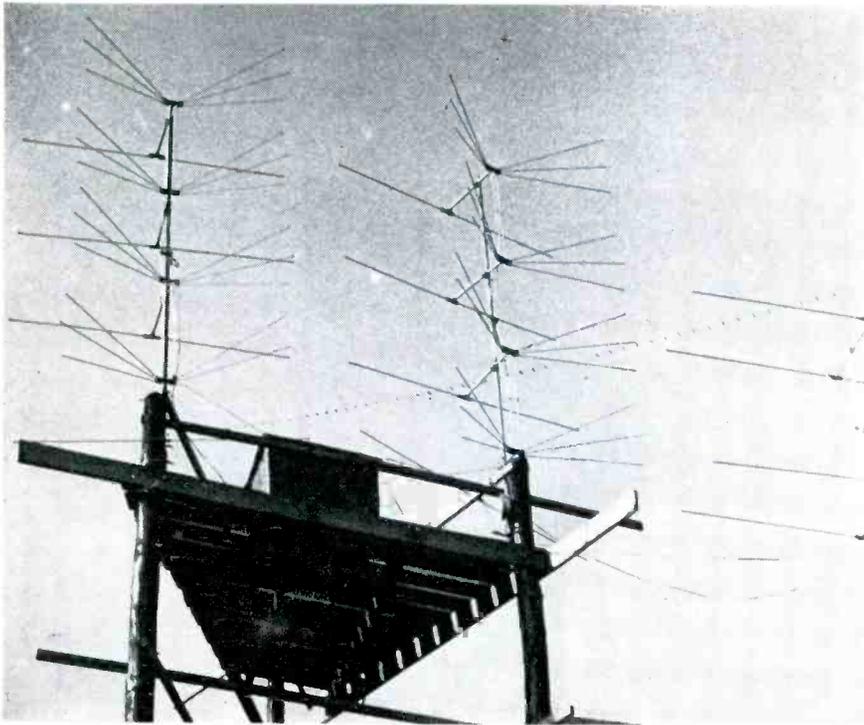
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# Fringe-Area TV Installation



Fringe-area installation at Grossingers, near Liberty, 85 miles from New York City, featuring use of open transmission line.

IN THE PAST, open transmission line has been quite popular among the ham fraternity, affording a means of obtaining a low-loss feedline. Recently this type of line has been adopted by Service Men for fringe-area TV installations where minimum loss is so important.

In fringe areas, where every ounce of signal is necessary to produce a viewable picture, the standard 300-ohm transmission line has not always been found effective. Because of the required high towers needed to intercept signals in these remote areas, the considerably long runs of leadin have been found to introduce severe losses.

Open transmission line has been found to be the answer to the loss problem. By varying the spacing and diameter of the wire, it has been found possible to bring the impedance down to about 450 ohms. In computing the losses on this line, .5 db per hundred feet prevailed at 200 mc, while a 3.3-db figure was obtained for twinex. This represents a gain in signal of about six times.

By virtue of this gain, long runs which were not tolerable before have become practical. In fact, the practice is now to explore surrounding terrain to find the strongest signal area in which to place the antenna, because there need not be any fear of

losing the signal in the transmission line. In a typical open-line installation near Liberty, New York, approximately 85 airline miles from midtown Manhattan, the line was found to be the solution to quite a complex receiving problem. In surveying the site, it was found that the area was situated behind two tall mountains, Wurtsboro and Bloomingberg Mountains, with the building scheduled to house the receiver located in a valley. Originally, all types of high gain antennas were experimented with, and various heights and towers were tried. The results were fair, considering all the obstacles. The biggest objection was to the inconsistency with which reception was received.

Thus, prior to the open-line installation, many weeks were spent making signal measurements of the surrounding hills, and the strongest signals were obtained at the seventeenth hole of the golf course. This was the highest spot, providing a height advantage of 500' to 600' over the former antenna location. However, at this point, the antennas would be 1,800' from the receiver! Here was a situation almost typical of all fringe-area installations. A signal was available,

\*RMS Hi-Gain.

by **MARTY BETTAN**

*Chief Engineer*

*Radio Merchandise Sales, Inc.*

**Report on Methods Employed in Probing Site for Best Pickup, Using Field-Strength Meter, and Selecting Low-Loss Line Required for Reliable Signal Feed Over Long-Distance Antenna-to-Receiver Route.**

but how was it to be fed to the chassis with no losses?

It was at this moment that investigations were made with open transmission line. Many experiments were conducted to find the proper combination of spacing and wire diameter. It was found that a pair of No. 18 copper wires, spaced one inch with polystyrene spacers every 18" was the answer, providing consistent reception and pictures free of snow. With receivers set up at both ends of the line, the difference in signal over the 1,800' of line was just barely noticeable.

Although the line was a technical success, we did not reckon with mother nature. Storms, high winds, and distances between supporting poles made it necessary to keep a maintenance crew on the job almost continuously. The two main faults found were in the stretching of the soft copper wire due its own weight because of the distances between supporting poles, and the constant breaking of the wire at anchoring points due to the swaying in the wind. Additional experiments were conducted, tests were made in all types of weather and wind conditions, and a new type of line\* was evolved.

The line consists of No. 18 copperweld, consisting of a 30% copper  
(Continued on page 53)

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# AUDIO installation and service

## Phono-Tape-Wire-PA-Amplifiers-Speakers

by KENNETH STEWART

### Design and Application Properties of Fluid-Sound Phono Pickups . . . Rim-Drive Three-Speed Changers . . . Hi-Fi Amplifiers . . . Disc-Tape Record-Playback Systems

IN PROBING the electrical and mechanical designs which might be used in phono equipment to provide improved tracking, reduced hum pickup, stability or elimination of vertical vibrations, many striking techniques have been uncovered, paving the way for the production of highly efficient arms, pickups, needles, etc.

As the result of one such developmental survey, it has been found that phono pickups\*, featuring fluid damping and fluid coupling, offer interesting possibilities, permitting, for instance, the stylus motion to be used only for modulation of the applied external direct current as it flows through the fluid. In applying the principle, it was found that the fluid effect could be achieved by filling three cells, placed in a plastic body, with an electrolytic, non-toxic, conducting fluid.

In operation, direct current was found to flow through the three cells in series and be modulated by the rec-

ord track oscillations (acting through a sapphire stylus). The current modulations thus produced were found to cause an output voltage to appear on the center cell electrode. This voltage could then be fed in the usual manner to any audio amplifier.

It was found that needle-record contact was necessary only to modulate externally supplied *dc* voltage as it flows through the fluid.

It is said that a basic *fluid sound cartridge\** can be used for all disc-recorded sound reproduction. However, three different points have been developed to accommodate variations in groove-width.

The pickup is said to be impervious to extreme temperatures and to high humidity. Under tests it is reported

Portable three-speed *Re-Cord-O-fone* tape recorder, which on  $1\frac{1}{8}$ " speed; provides four hours of continuous recording on  $3\frac{3}{4}$ " speed, gives two hours of recording. Can also be used on  $7\frac{1}{2}$ " speed. Half of double-track tape can be recorded or erased at a time. Interlock switch is said to prevent accidental erasing when the tape is being rewound. Amplifier is said to have frequency response of 70 to 8,000 cycles,  $\pm 3$  db. Output is 3.5 watts. Telephone type jacks are provided for direct connections to any amplifier or *pa* system. There's also an output of 3.2 ohms and high impedance for headphone monitoring. Internal speaker is a 6" type, which automatically disconnects when a remote speaker is plugged in. (Model RT-65B; Bell Sound Systems, Inc., Columbus, Ohio.)

the pickup has been submerged in water for over six months without damaging effects.

Current specs indicate that the unit has a frequency response of 20 to 10,000 cycles; tracking pressure range (depending on tone arm) of  $3\frac{1}{2}$  to 10 grams and a voltage output of .8 volt.

#### Rim-Drive Three-Speed Changers

On the new-development front has also appeared a three-speed drive\*\*, which in the off position is retracted from the drive pulley and the idler pulley, which is also retracted from the turntable. This has been reported to eliminate the appearance of flats on the idler pulley, preventing erratic running of the turntable.

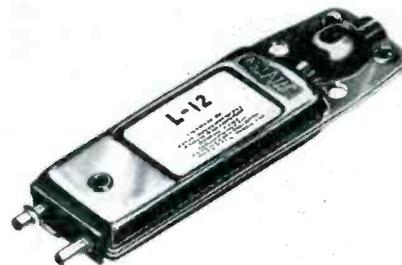
In operation, the turntable speed is selected by moving a control knob im-

\*Collaro, Ltd.

(Continued on page 38)

Crystal phono pick-up cartridge for 78s, with output rated at approximately 4 volts at 1,000 cycles per second, on Audiotone 78-1 test record. Designed to operate at a needle pressure of one ounce. Has a total weight of 18 grams. Housing is stamped steel. Terminals are quick disconnect pin type. Crystal element is moisture-proof coated. Furnished without stylus and has a universal chuck to receive all standard type needles. (Model L-12; The Astatic Corporation, Conneaut, Ohio.)

Fluid-sound phono pickup. (Lindberg Instrument Co.)



# 3 Important Rauland Policies

...Are they  
paying off for you?

**1** Did you know that Rauland's Replacement Picture Tube Warranty and Adjustment Policy provides a 6 months warranty from the date of purchase by the consumer? And that all Rauland replacement tubes now carry a triple registration card providing protection for jobber, dealer and consumer?

**2** Did you know that Rauland provides a full 120-day price protection on distributor inventory of replacement picture tubes? That Rauland distributors can carry a stock adequate for their territories without risk of loss through price adjustment?

**3** Did you know that Rauland offers valuable premium points for the prompt return of warranty registration cards? Each card returned promptly entitles dealer and distributor to premium points redeemable in valuable merchandise prizes.

• • •

*If you have not received full details on all of the above, write, phone or wire your distributing contact on Rauland tubes. If you have not received your prize merchandise catalog, use the coupon below today.*

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The Rauland Corporation  
4245 N. Knox Ave., Chicago 41, Illinois

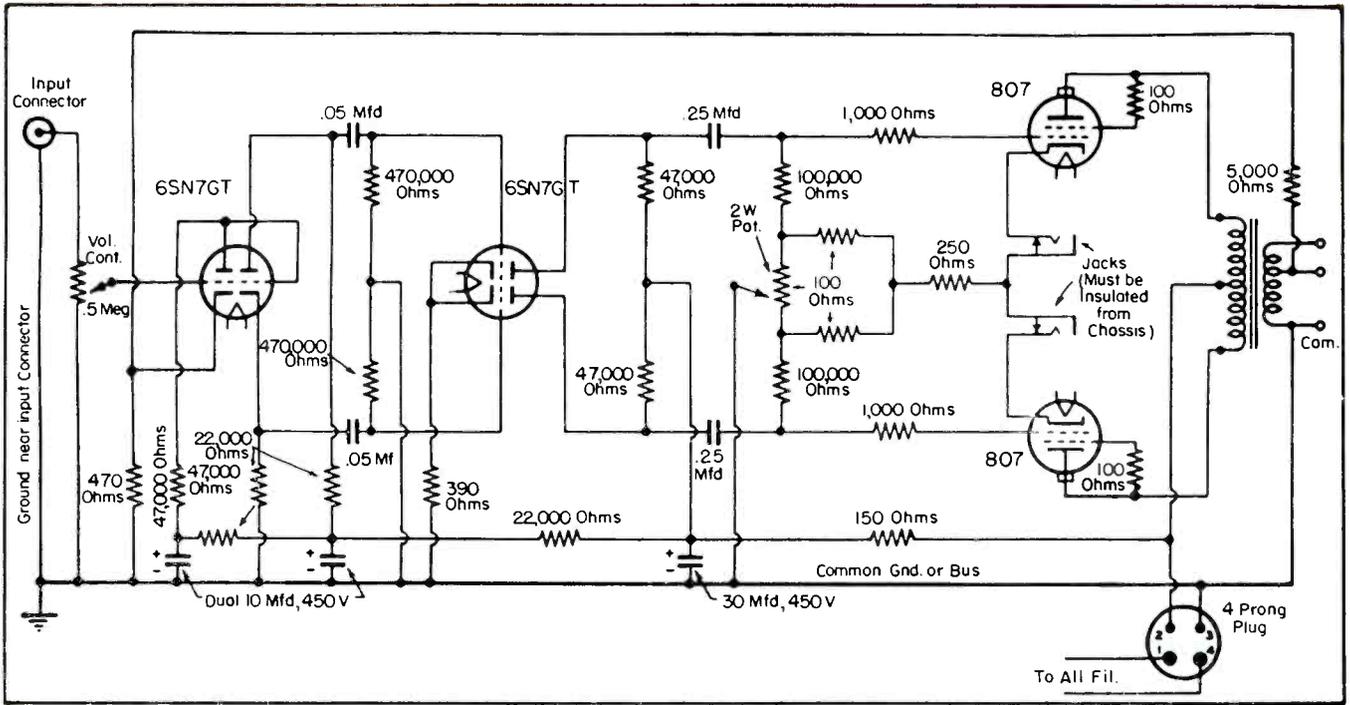
Please rush premium merchandise catalog and full information on:

Earning Premium Prizes  6 Months Warranty  
 Distributor Price Protection

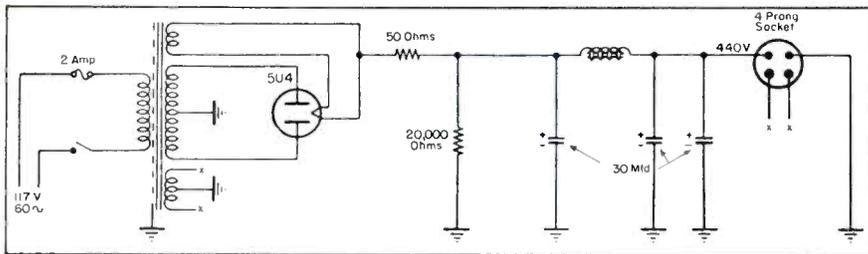
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Address \_\_\_\_\_

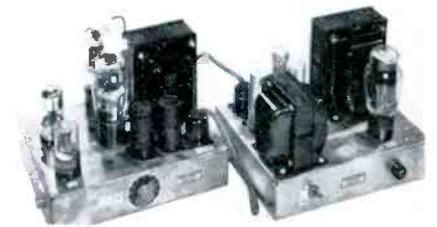
City \_\_\_\_\_ State \_\_\_\_\_



Above: Circuit of Williamson hi-fi amplifier, developed in England by D. T. N. Williamson, featuring use of Stancor high-fidelity output transformer, power transformer and filter choke. Tests are said to show that amplifier has 0 db frequency response at 8-watt level, remaining unchanged at the low level of 0.5 watt. Inter-modulation distortion was said to measure 3% at 8-watt output. (Stancor Williamson amplifier bulletin 382, now available, describes construction of the amplifier, with chassis drawing, schematic and complete parts list.)



Below: Williamson amplifier and power supply with Stancor transformers.



Diamond-tipped replacement needle, mounted in a GE variable reluctance cartridge, RPX-050. (Model W-66 TPD; Walco.)

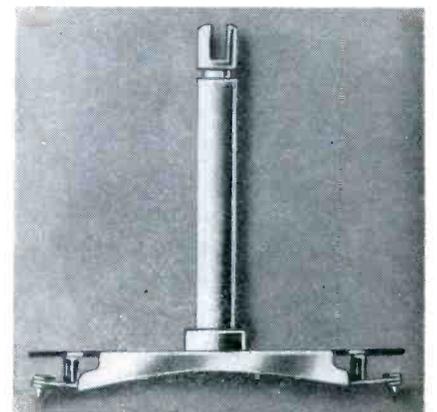
mediately in front of the pickup base. The movement of the pickup in an outward direction automatically switches on the motor and brings the idler pulley in contact with the turntable and the appropriate speed pulley,

and the speed pulley in contact with the motor drive pulley. When the pickup needle reaches the run-off groove the reverse operation takes place; a striker on the turntable contacts an auto-stop lever, the motor is

(Continued on page 50)

Pa system unit, combined with a transcription player, which has a 5-tube push-pull amplifier with approximately 5-watt output and is equipped with an 8" detachable loudspeaker and 10' extension cord, a 3-speed motor with indicator for 33 $\frac{1}{3}$ , 45 and 78 speeds. Plays records and transcriptions up to 17 $\frac{1}{2}$ ". Other features are a transcription arm with twist crystal cartridge fitted with 2 permanent needles for standard, 1p and microgroove records, variable volume and tone control, and pilot light jewel indicating operation. (Model 52-PA; Audio-Master Corp., 341 Madison Ave., N. Y. City.)

Cabinet-type rack assembly which provides panel space of 56". Mounting holes are RTMA standard 1 $\frac{1}{4}$ " and  $\frac{1}{2}$ " spacings. Panel mounting holes are tapped in  $\frac{1}{8}$ " stock. Cabinet is a welded assembly with dark grey hammer-tone finish. Provision in rear for nine  $\frac{1}{2}$ " conduits. Removable terminal strip mounting plate is included near conduit inlets. Dimensions are 59 $\frac{1}{2}$ " x 23" x 16". (Model 595-19; Newcomb Audio Products Co., 6824 Lexington Ave., Hollywood 38, Calif.)



July 27, 1951

Hytron Radio & Electronics Co.  
76 Lafayette Street  
Salem, Mass.

Gentlemen:

We thought you would like to know just how fine we think the new Hytron "Easy Payment Plan" is. We had a set in our shop for estimation the day this plan was first introduced to us by a salesman from Ra-Tel, Inc. This set would require a new 19AP4A picture tube and some other parts and service. The total charge would amount to about \$100.00, and right then we thought we might lose the sale because our customer might not have the cash for such a repair. Then, we learned of the Hytron plan and immediately introduced it to our customer. He thought it was a wonderful plan to be able to get his set repaired without having to part with so much cash at one time. Needless to say, he accepted the job, and went away a happy satisfied customer.

We have used Hytron products for years, and have always thought them to be of the highest quality. The new rectangular picture tubes are wonderful. We feel that this new "Time Payment Plan" is another Hytron first, and will no doubt be a great asset to the serviceman as well as the customer. We recommend it highly to all.

Very truly yours,



B. W. Hodges

## "HOW WE SAVED THE SALE"



B. W. Hodges,  
owner of Air Park  
Radio & Television,  
Dallas, Texas

## ANOTHER HYTRON "ASSIST" FOR YOU

Dropped a screw into an inaccessible chassis? No need to fuss. Just reach in with your Hytron-CBS Pick-Up Stick. A slight pressure of its special wax tip picks up screw pronto.

Trying to start a machine screw in a tight spot? Press head of screw into wax tip of your Pick-Up Stick. Push screw into position and start nut. As easy as that!

Use this Contest winner once and it pays for itself. Triples in brass as pencil too. Only 5¢ at your Hytron jobber. Get your Hytron-CBS Pick-Up Stick today!

STARTS SCREW  
IN TIGHT SPOT

PICKS UP  
SMALL PARTS



**HYTRON-CBS**

Pick-Up Stick 5¢ net

NINTH MEMBER OF

## ricing Helps

(continued from page 28)

to conduct some of the heat which would normally be absorbed by the diode.

A rough check to determine if the diode is open can be made using an ohmmeter. One end of the diode should be disconnected from the circuit and an ohmmeter connected across the diode terminals. A relatively low resistance (several hundred ohms or less) should be noted in one direction and a relatively high reading (many

thousands ohms) should be noted in the other direction as the ohmmeter leads are reversed.

### Defective 1N64 End-Results

A defective 1N64 diode will cause a weak picture or no picture with either weak or normal sound, in which case a 'scope will indicate low video output. If the diode is suspected as being at fault, one end of the original diode should be disconnected and a substitute diode tried. It is important to note polarity when connecting the diode.

### Stromberg Carlson Service Hints

*Models 119 and 24 Series . . . High Voltage Breakdown Preventive:* To prevent breakdown between the 6BG6 plate leads and chassis, rubber grommets have been inserted in the chassis holes where these plate leads feed through, and additional sleeving has been added over the lead itself.

*Model 317 Series . . . Corrected Yoke Ringing:* To correct excessive ringing, observable on some 317 receivers as several vertical white bars at the left side of the raster, it has been necessary to use a new higher impedance deflection yoke (part 114724). This new yoke replaces previous part 114706; the higher impedance achieves better match to the horizontal output transformer thereby correcting the ringing. All connections are the same as previously except the heavy insulated red lead from the No. 3 yoke terminal now connects to No. 7 terminal of the horizontal output transformer instead of to No. 5. Receivers date coded 51-18-3 and later employ the newer yoke.

*Model 24 Series . . . Strengthened Picture Tube Mounting:* Field reports have indicated instances where severe transportation treatment have caused the metal brackets supporting the picture tube mounting shelf to pull loose from the top of the cabinet during transit. This caused the picture tube assembly to drop down onto the main chassis resulting in tube breakage. This supporting method has been revised and the assembly strengthened so as to be capable of withstanding more severe transportation treatment. The new assembly method consists of the use of No. 8, 5/8", PK type screws in place of No. 8, 5/8", wood screws for mounting the metal supporting brackets. These screws have been found to give greater purchase than wood screws. In addition, two No. 8 1/4" wood screws, one on each side of the tube bracket, are now being used through the tube shelf itself into the cabinet top. These two screws will have to be removed to take the tube shelf from the cabinet.

### Sylvania Service Note

Low or erratic high voltage on Sylvania chassis 1-108, 1-139, 1-168, 1-186, 1-227, 1-231 using a 6Y6G as a

**Bendix Television**

600V  
R89 4.7M 10%  
4 MFD  
C33 10MFD 10%  
TO PIN 9 OF J6  
40 10%  
135V 60 Hz  
R53 2.2M  
R49 VERT 600K LIN.  
R23 600K  
C35 .001 500V  
R77 5.6K  
2W ±10%  
C52 .006 MFD  
C54 .1MFD  
C55 250 12.5KV  
R81 2.2  
CAP  
R78 15K 4.10%  
L17  
X1X  
+500  
OR 6AG5 V13

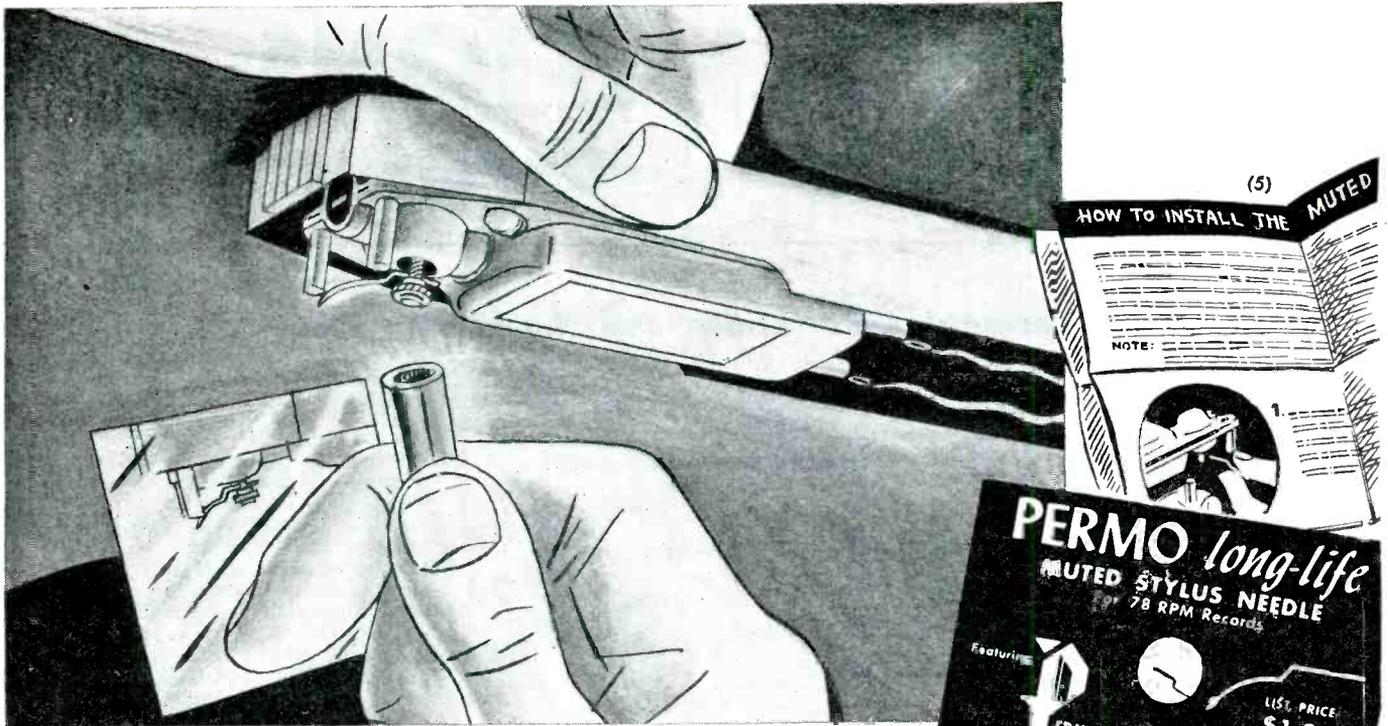
## TIME = PROFIT

The Bendix "Long-Range" Chassis is not only a powerful fringe area receiver but also a dependable unit. It was designed to provide all the time-saving, profit-making advantages of easy accessibility to controls, chassis and component parts.

The super-sensitive circuits, which provide the "Long-Range" chassis with peak performance and maximum operating efficiency of both picture and sound, are fully illustrated and described in the new Bendix Technical Data Handbook. Clear, concise schematics plus complete data provide quick, easy reference to all circuits.

## FREE POCKET-SIZE TECH DATA HANDBOOK

It's yours for the asking . . . a new combination handbook and memo pad containing schematics and technical data covering both the Bendix Standard and "Long-Range" chassis.



# YOU SAVE TIME — MAKE MONEY — WITH PERMO *long-life* PHONO NEEDLES

Here's why:

**1. COMPLETE "Facts"** — Here is a needle replacement guide that's complete, authentic, accurate—one that tells *specifically* what needle goes *where*. It's Permo's "Phonograph and Needle Facts", and Permo took the time to do it right. A guide that gives you *everything* you need to know for fast, easy replacement needle sales.

**2. COMPLETE NEEDLE STOCKS** — Individually packaged Permo Long-Life Phono Needles come to you on convenient display cards. Each display card carries a full set of replacement needles for one manufacturer's sets.

**3. REASONABLE INVESTMENT** — Complete initial needle stocks and "Facts" for all post-war Admiral and Philco sets are yours for less than \$12.00 dealer cost. Make high profits selling the easy-replacement needle line—Permo Long-Life!



**NO FUMBLING!**

**YOU GET EVERYTHING YOU NEED IN ONE PACKAGE**

Permo Long-Life Phono Needles are individually packaged with *installation tools* where necessary, *spare parts* (nuts, screws, etc.) and *complete installation instructions*. The C-320 Muted Stylus package (above) for example, contains: (1) needle (2) wrench (3) mirror (4) extra nut (5) installation instructions. You get *everything* you need in one complete package when you buy Permo Long-Life needles.

**NOW AVAILABLE**  
Admiral, Columbia and Philco "Facts" and Replacement Needles. Others coming soon! Write for your free copies of the "FACTS".



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# ASSOCIATIONS



## National Associations and the Service Man

by **DAVE KRANTZ**

Director of Public Relations  
National Electronic Technicians and Service  
Dealers Association

THE EVENTS OF TEN YEARS AGO, chronicled so effectively every month in *SERVICE*, which have recalled many pace-making incidents of the decade, a few months ago called attention to one announcement which it is generally conceded introduced a new era in *servicing*. The date was June and the announcement described the formation of the Radio Servicemen of America with Joe Marty, Jr., as executive secretary, a move brought about by the actions of representatives of past national associations. Among them were the *Institute of Radio Servicemen (IRS)* and the *National Radio Servicemen's Association (NRSAs)*. The report of their activities ten years ago brought to light the fact that since the early days of the World War II there has been no national association representing all of the radio and television technicians' associations.

Although there are almost a hundred active radio and television Service Men's associations and contractor groups in this country it was only recently that efforts were made to bring these groups together in a national group.

Great changes have taken place in the industry since the first efforts to form a national group almost fifteen years ago. Many who have been in the servicing business for twenty or more years, and who were reluctant to expend effort to produce efficient and workable technical associations, have begun to realize that it is important to take a different stand. Industry changes have accentuated the fact that what might have been good in the past is not sufficient for today's needs. (The writer was one of the reluctant Service Men who refused to admit that there were benefits to be derived from a national association.)

Today the picture has changed. Tremendous strides have been made in the development of electronics and the Service Man has become a vital part of a very important industry. With the addition of video to radio, and with its many changes and improvements, the Service Man has at last achieved a professional status, although he seems to be the last one to really be aware of this situation.

Manufacturers are beginning to understand that his products can not withstand daily use without proper installation and a constantly high level of service. In television there has been created a sensitive, delicate mechanism that is ten times more complicated than the most advanced radio chassis and which demands the highest skill in servicing.

The public, in its enjoyment of television, have become very conscious of the necessity of good and efficient service. However, in an eagerness to grasp this new entertainment medium, many failed to take into consideration that sets were

being manufactured faster than *capable* technicians could handle them. Nevertheless, by and large, a remarkable job was done by the service industry in satisfying the public, a job that has never been truly appreciated or understood.

The importance of the TV Service Man was overlooked during a period of fast manufacturing and selling. Everybody was too busy to see what was happening to the Service Man in this hurly-burly period. They just didn't have time to get around and lighten the load on his shoulders. He just seemed to be a convenient person upon whom to dump all the headaches and blame when things weren't made right or didn't perform as claimed.

Many a manufacturer hustled a new set on the market and six months later remembered that Service Men could, possibly with profit, use service notes and schematics on them. There was no real effort to do anything on an industry-wide basis; there appeared to be no program created by the creators of television which provided for service needs.

Service Men had a miserable time explaining that it wasn't their fault that a TV set couldn't be repaired immediately, and with only a couple of hairpins! Consumers had been quite impressed with four-color ads noting that antennas weren't really needed and that mechanisms were so simple that a set didn't have any real service problems.

Like sledge-hammer blows, these incidents were being felt by the Service Men. Their individual protests were overlooked or filed in near-by wastebaskets. Nobody had time to take them seriously. Nobody seemed to believe that this mad, wonderful era of unrestrained manufacturing would ever end. Nobody believed that he couldn't always blame the inarticulate Service Man for all the faults customers found.

The more progressive technicians' associations, realizing that they had to stand on their own feet and do something to alleviate the situation, began to

produce their own educational programs and trained their membership in the know-how of servicing and installing television. Appalled by the magnitude of the job they had elected to do, these associations began to look for better answers to their problems.

Many of these associations exchanged views and found that it was very helpful just to have the opportunity to do so. Out of their conversations came the idea of forming state federations of service associations. The first of such groups was formed in Pennsylvania and became known as *The Federation of Radio Servicemen's Associations of Pennsylvania (FRSAP)*.

The Pennsylvania federation was the first to realize the many problems posed in the service industry and has since promoted various educational programs, both on business management and technical knowledge, for the benefit of its various chapters. The significant results effected by these programs made a strong and lasting impression on the individuals who took advantage of them. They learned that such programs came about only because of the efforts of a strong, well-organized group which had the kind of leadership and progressive thinking necessary to carry them out.

Additionally, the efforts of the federation were impressive to manufacturers and distributors. Some of them tried very hard, on an individual basis, to assist in federation activities.

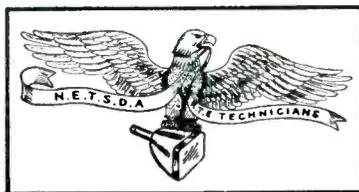
Impressed with the Pennsylvania group's plan, the individual organizations in the State of New York formed the Empire Federation of Radio Servicemen's Associations of New York. Working tirelessly, with energy and vision, they produced many outstanding educational programs. They, too, were assisted by friendly manufacturers and distributors, together with the Board of Education of New York.

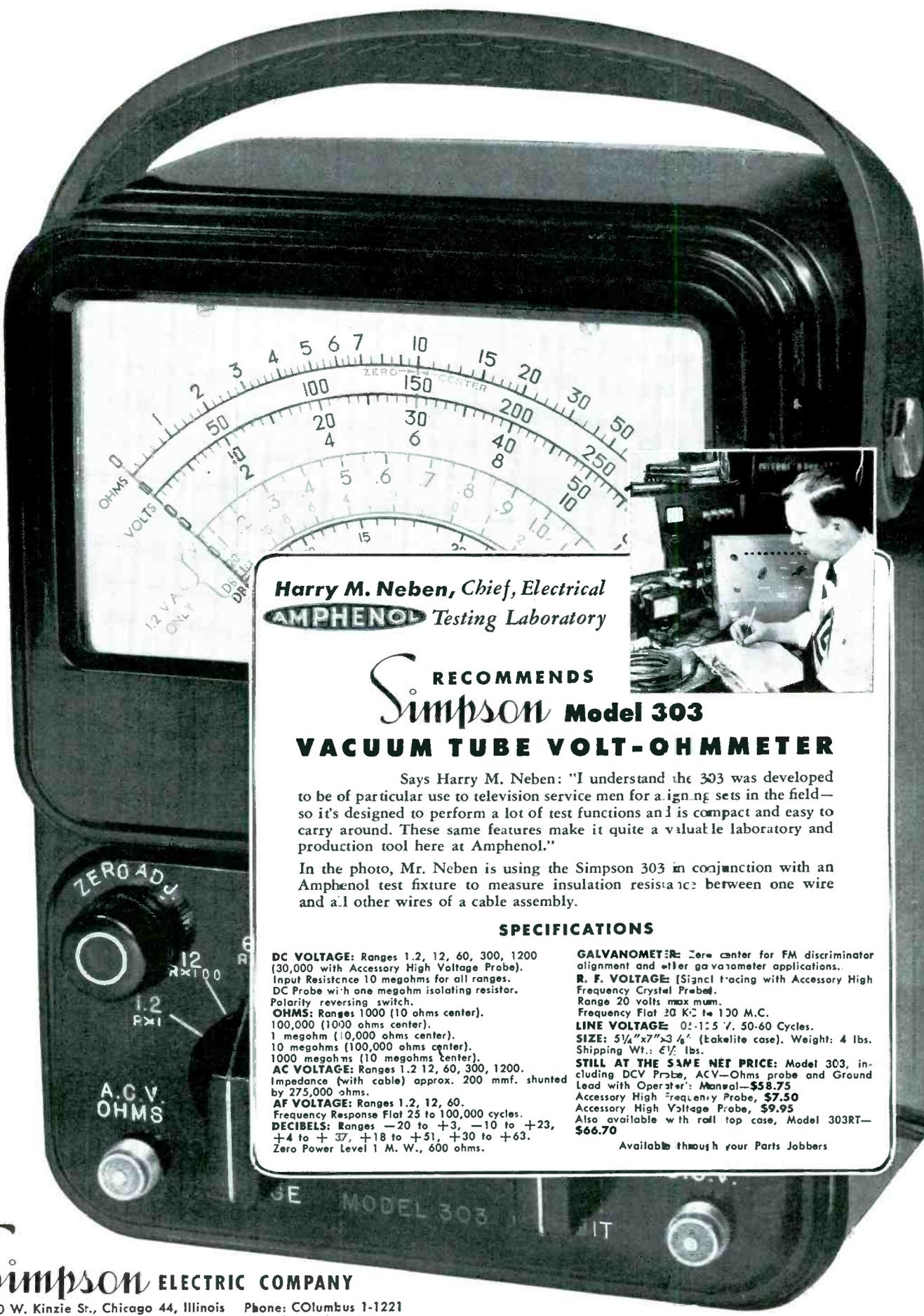
Such equivalent actions in a concentrated area naturally brought a lot of attention and interest from other organizations throughout the country. The men who headed these activities were soon recognized as the kind of leaders whom we should look to for guidance out of the service jungles.

It was inevitable that some movement tending toward national organization would come out of these activities. About nine months ago the State Federation of Pennsylvania called a convention of its various chapters and other groups in surrounding states. It was gratifying to note that representatives from 24 radio and television associations within this country were present at the first meeting.

The formation of a national association was discussed by the representatives

(Continued on page 58)





**Harry M. Neben, Chief, Electrical**  
**AMPHENOL Testing Laboratory**



RECOMMENDS  
**Simpson Model 303**

**VACUUM TUBE VOLT-OHMMETER**

Says Harry M. Neben: "I understand the 303 was developed to be of particular use to television service men for a ign.ng sets in the field—so it's designed to perform a lot of test functions and is compact and easy to carry around. These same features make it quite a valuable laboratory and production tool here at Amphenol."

In the photo, Mr. Neben is using the Simpson 303 in conjunction with an Amphenol test fixture to measure insulation resistance between one wire and all other wires of a cable assembly.

**SPECIFICATIONS**

**DC VOLTAGE:** Ranges 1.2, 12, 60, 300, 1200 (30,000 with Accessory High Voltage Probe).  
 Input Resistance 10 megohms for all ranges.

DC Probe with one megohm isolating resistor.  
 Polarity reversing switch.

**OHMS:** Ranges 1000 (10 ohms center),  
 100,000 (1000 ohms center),  
 1 megohm (10,000 ohms center),  
 10 megohms (100,000 ohms center),  
 100 megohms (10 megohms center).

**AC VOLTAGE:** Ranges 1.2, 12, 60, 300, 1200.  
 Impedance (with cable) approx. 200 mmf. shunted  
 by 275,000 ohms.

**AF VOLTAGE:** Ranges 1.2, 12, 60.  
 Frequency Response Flat 25 to 100,000 cycles.

**DECIBELS:** Ranges -20 to +3, -10 to +23,  
 +4 to +37, +18 to +51, +30 to +63.  
 Zero Power Level 1 M. W., 600 ohms.

**GALVANOMETER:** Zero center for FM discriminator  
 alignment and other galvanometer applications.

**R. F. VOLTAGE:** (Signal tracing with Accessory High  
 Frequency Crystal Probe).  
 Range 20 volts max. mV.

Frequency Flat 20 KC to 100 M.C.

**LINE VOLTAGE:** 0.1-1.5 V. 50-60 Cycles.

**SIZE:** 5 1/4" x 7" x 3 1/4" (bakelite case). Weight: 4 lbs.  
 Shipping Wt.: 6 1/2 lbs.

**STILL AT THE SAME NET PRICE:** Model 303, in-  
 cluding DCV Probe, ACV-Ohms probe and Ground  
 Lead with Operator's Manual—**\$58.75**

Accessory High Frequency Probe, **\$7.50**  
 Accessory High Voltage Probe, **\$9.95**

Also available with roll top case, Model 303RT—  
**\$66.70**

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BURTON BROWNE ADVERTISING



by M. W. PERCY

## Analysis of Streamlined Sylvania and Emerson Two-Control TV Chassis Featuring 17 and 20-Inch Rectangular Picture Tubes.

SIMPLIFIED TV CHASSIS, employing two panel controls, which for awhile were produced only in some runs of receivers, have now become quite a popular item, and with many unusual circuitry features contributing to the streamlining.

In Figs. 1 and 2 (p. 45 and 46) appear two interesting examples of this design trend; Sylvania 22M and Emerson 699B.

The Sylvania receiver operating controls on the front panel have been reduced to a minimum: brightness, volume and tuning. The remaining controls which are seldom adjusted are located at the rear of the chassis.

### RF Tuner Unit

The *rf* tuner unit employs continuous tuning to eliminate the need for bandswitch or fine tuning controls.

A direct-coupled video system has been incorporated to eliminate all video coupling capacitors and the *dc* restorer. This has been found to reduce the visible effects of noise.

For picture stability, even in the presence of noise and weak signals, a sine wave horizontal *afc* has been included.

The output of the tuner is applied to a video *if* amplifier consisting of 3 stagger-tuned stages and one band-pass stage. The adjacent channel carriers and co-sound carrier are attenuated by this *if* amplifier.

The amplified signal at the output of the video *if* amplifier is fed to the video detector where it is converted to video information. The video signal out of the video detector is then amplified by a single stage and impressed upon the picture tube.

Automatic gain control is obtained from the *agc* rectifier, amplified by the

*agc* amplifier and applied to the *rf* and *if* amplifiers. An *agc* line clamper prevents the tuner *agc* line from going positive under weak signal conditions.

The sync pulses are separated from the video signal, amplified, and clipped and then fed to the horizontal discriminator and vertical integrator plate. The vertical sync information from the vertical integrator plate is applied to the vertical oscillator to keep this oscillator in step with the vertical sync pulses from the station. The vertical oscillator produces a peaked sawtooth wave which is applied to the vertical-output stage energizing the vertical-deflection coils.

Horizontal sync information from the sync clipper is supplied to the horizontal discriminator. A voltage from the horizontal oscillator is also supplied to the horizontal discriminator. The output of the horizontal discriminator is then applied to the horizontal-control tube which serves to hold the horizontal oscillator in

synchronism with the incoming horizontal sync pulses.

The horizontal oscillator actuates the horizontal discharge tube through the horizontal-ringing coil, producing a peaked sawtooth wave. Approximately one-half of the sawtooth component of this wave causes current to flow in the plate circuit of the horizontal-output tube. This current energizes the horizontal-deflection coils through the horizontal-scanning transformer to provide the right half of the horizontal scan. During the right half of the scan, a small amount of current is also flowing through the damper tube. At the end of the sawtooth, the inverse pulse component acts on the grid of the horizontal output tube to cut off plate current flow. When this occurs, the energy in the horizontal-deflection circuit transfers rapidly from the inductive branch of the circuit to the capacitive branch, resulting in a voltage peak of approximately 2,000 across the horizontal-deflection coils. This voltage is stepped up to approximately 6,750 by the turns ratio of the horizontal-scanning transformer and fed to a voltage-doubling rectifier circuit to provide approximately 13,500 volts for the picture tube *hv* anode.

The damper tube does not conduct during the high-voltage period pulse because of the polarity of the pulse. During this pulse period, when the energy transfers from the inductive branch of the horizontal deflection circuit to the capacitive branch and back again to the inductive branch, the electron beam in the picture tube is moved rapidly from the right to the left edge of the raster to accomplish retrace.

At the completion of retrace, energy again flows out of the inductive branch

(Continued on page 48)

RCA ultrahigh converter. Left-hand knob has three positions: off, *vhf*, and *uhf*; the right-hand knob is for tuning.







# New 1952 HEATHKITS

**Heathkit TELEVISION GEN. KIT** \$39.50

**Heathkit ELECTRONIC SWITCH KIT** \$19.50

**Heathkit AUDIO GEN. KIT** \$34.50

**Heathkit CONDENSER CHECKER KIT** \$19.50

**Heathkit R. F. SIGNAL GEN. KIT** \$19.50

**Heathkit A.C. VOLT METER KIT** \$29.50

**Heathkit SQUARE WAVE GEN. KIT** \$29.50

**Heathkit INTERMODULATION ANALYZER** \$39.50

**Heathkit AUDIO FREQ. METER KIT** \$34.50

## Heathkit 5" OSCILLOSCOPE KIT

- New "spot shape" control for spot adjustment — to give really sharp focusing.
- A total of ten tubes including CR tube and five miniatures.
- Cascaded vertical amplifiers followed by phase splitter and balanced push-pull deflection amplifiers.
- Greatly reduced retrace time.
- Step attenuated — frequency compensated — cathode follower vertical input.
- Low impedance vertical gain control for minimum distortion.
- New mounting of phase splitter and deflection amplifier tubes near CR tube base.
- Greatly simplified wiring layout.
- Increased frequency response — useful to 5 MC.
- Tremendous sensitivity .03 RMS per inch Vertical .6V RMS per inch Hor.
- Dual control in vernier sweep frequency circuit — smoother acting.
- Positive or negative peak internal synchronization.
- Multivibrator type Wide Range Sweep Generator.

A brand new 1952 Heathkit Oscilloscope Kit with a multitude of outstanding features and really excellent performance. A scope you'll truly like and certainly want to own.

The kit is complete with all parts including all tubes, power transformer, punched and formed chassis, etc. Detailed instruction manual makes assembly simple and clear — contains step-by-step instructions, pictorials, diagrams, schematic, circuit description and uses of scope. A truly outstanding value.

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- Quality Simpson 200 microamp meter.
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- Highest quality precision resistors in multiplier circuit.
- Calibrates on both AC and DC for maximum accuracy.
- Terrific coverage — Reads from 1/2V to 1000V AC, 1/2V to 1000V DC, and .1 to over 1 billion ohms resistance.
- Large, clearly marked meter scales indicate ohms, AC Volts, DC Volts, and DB — has zero set mark for FM alignment.
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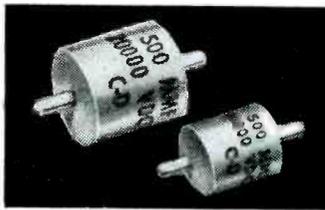
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*takes 30,000 volts with a grin!*

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## Ser-Cuits

*(Continued from page 44)*

of the circuit. The horizontal-output tube is still cut off during this time and a strong current flows through the damper tube. This current decreases to zero linearly to provide the left half of the scan. As the current approaches zero, the horizontal output tube again begins to conduct and the entire cycle is repeated.

### Emerson Chassis

The tuner in the Emerson model uses a rotary-turret, carrying individual coils for each tuned circuit, for

each channel setting. A 6AG5 serves as the *rf* amplifier and a 6J6 as the converter and oscillator. The *rf* amplifier is a wideband, tuned stage whose output is coupled to the converter. The oscillator operates in a Colpitts type circuit. Individual slugs provide for alignment of the oscillator for the various channels. A variable-dielectric type capacitor is used for fine tuning of the oscillator. The output of the converter is connected to a double-tuned *if* transformer.

### Video IF

Both the 25.75-mc video carrier and 21.75-mc audio carrier are amplified

by a wideband three-stage *if* amplifier. Three of the tuned circuits are peaked at different frequencies, forming a stagger-tuned system of relatively flat response and, together with the double-tuned first *if* transformer, provide the required overall bandpass.

Bifilar, slug-tuned coils are used as *if* transformers. Three stagger-tuned *if* transformers follow the overcoupled first *if*.

The second carrier level is maintained just below the point of interference with the video *if*. However, the audio *if* is not completely rejected, as the audio signal is recovered (at the output of the video detector) by heterodyning with the picture *if* carrier. The 4.5-mc beat between the video and audio intermediate frequencies is obtained from a tuned 4.5-mc trap and is fed to the first sound 6AU6 *if* amplifier.

### Video Detector

One-half of a 6AL5 is used as the video detector. The rectified signal is coupled to the first 6CB6 video amplifier, through a peaking coil coupled to a 4.5-mc tuned circuit which minimizes the effect of the 4.5-mc signal in the video.

### AGC System

The *agc* system in this series features a separate *agc* control of the *rf* tube, which keeps this tube at optimum gain at weak signals and cuts the tube off on very strong signals. The *if* is controlled by *agc*, resulting in an extended control range.

For best operation, a larger variation of tuner *agc* voltage than *if agc* voltage is required. This can be obtained by using the *dc* output of the video detector for *if agc* and using a circuit which would rectify the peak-to-peak carrier voltage with a suitable delay for tuner *agc*.

This has been accomplished by an *agc* detector, which is used to rectify the positive half of the modulation envelope and is keyed with the negative sync pulses above the average *dc*. The *dc* voltage thus obtained across  $R_{15}$  (1 megohm) is equal to the approximate peak-to-peak carrier voltage, less the average of one-half of the negative modulation envelope. This voltage is superimposed on the negative average *dc* voltage developed by the video detector across  $R_{10}$  (4700 ohms) which results in a *dc* voltage approximately equal to the peak-to-peak carrier.

To operate the *rf* amplifier at maximum gain at low signal level, a positive delay voltage is applied to the *agc* bus by means of a 10-megohm

resistor,  $R_{66}$ . A clamping diode is used to keep the *agc* voltage on the bus equal to the tube contact potential, until the incoming signal is strong enough to develop sufficient bias to overcome the positive delay voltage.

#### Video Amplifier

The output of the video detector is coupled to the grid of the video amplifier which consists of a single high-gain 6CB6 stage. Since only one tube is used, the output of the video amplifier is connected to the cathode of the picture tube so that correct picture phase is realized. Fixed bias, developed across an 8.5-ohm resistor,  $R_{65}$ , is applied to the grid of this stage. The contrast control varies the operating bias of the tube and the amount of degeneration, thus changing its gain.

#### Sync Clippers and Amplifiers

The video signal from the detector is fed to the grid of a 12AU7 sync amplifier which amplifies the composite video signal. This signal is then fed to a 6AU6 sync separator whose output only contains the vertical and horizontal sync information. This information is then fed to and amplified by a 12AU7 sync output stage. The plate of the sync output feeds the 6SN7GT horizontal control tube in positive sync phase while the cathode of this tube is used to feed the 6SN7GT vertical oscillator negative sync phase.

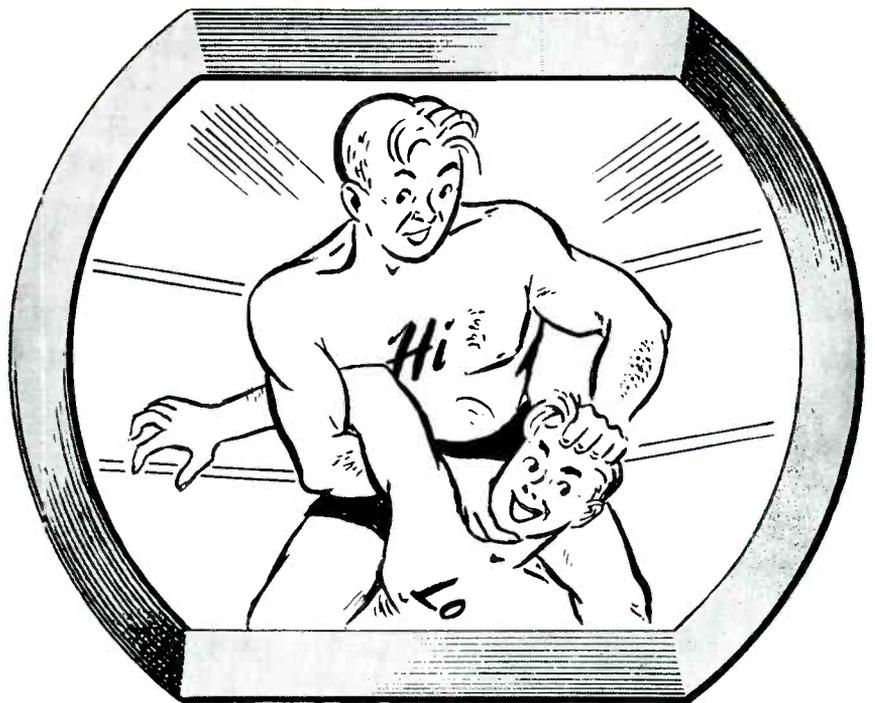
#### Horizontal Sweep

The horizontal-deflection circuits contain an automatic-frequency stabilizing circuit. The horizontal blocking oscillator using a 6SN7GT is controlled by a 6SN7GT horizontal-oscillator-control tube. This is done by properly phasing two waveforms at the input grid of the 6SN7GT; this is known as pulse-width frequency control. A phasing coil has a fly-wheel effect and helps in stabilizing the sync. A sawtooth voltage is built up across  $C_{68}$  (820 mmfd) which is charged through resistor  $R_{70}$  (68000 ohms) and is then coupled to the grid of the 6BQ6GT horizontal-output tube. The 6W4GT damper tube is effectively connected across the horizontal deflection yoke.

#### Vertical Sweep

A cathode-coupled multivibrator is used as the vertical oscillator. A 1-megohm vertical hold control controls the free-running frequency of a 6SN7GT. The integrated vertical sync pulses fed from the sync output tube causes the tube to lock in at the proper

(Continued on page 50)



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## Ser-Cuits

(Continued from page 49)

frequency. The output sweep voltage is controlled by a 2-megohm vertical size control. Since these controls change the plate voltage of the tube, its adjustment requires resetting of the vertical-hold control.

### Phono-TV Switch

In the phono position, the phono-TV switch removes  $B+$  voltage from the horizontal output tube and removes screen voltage from the video *if* tube. This renders the TV sweep, *hw* and signal circuits inoperative. At the same time the input to the volume control is disconnected from the discriminator output and connected to the output of the phono crystal.

### Audio

(Continued from page 38)

switched off, and the idler pulley and gear pulleys are retracted to their non-playing positions.

### BATTERY COUNTER MERCHANT



C. E. Balz (right) Burgess Battery ad manager, presenting recently - devised flashlight - battery counter merchant to L. H. Harriss, sales manager. Merchandising unit, of permanent, all-metal design, is a self-contained affair that is said to provide a complete sales and service department right on the counter. Has a slotted top designed so that it is possible to insert display cards for seasonal sale activities. Cards will be available in the spring, summer, fall and winter.

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## TV Distribution System

(Continued from page 19)

and terminating resistor. When more than four TV receivers are to be fed from a single antenna, additional distribution systems can be connected in series to provide the necessary number of outlets. In large installations and in installations in fringe areas, boosters\* can be used as line amplifiers to supply adequate signal level to all receivers.

### Typical Installations

Three typical installations appear in Figs. 3, 4 and 5. In the illustrations, *trunk line* represents the cable connecting the distribution systems and line amplifiers in series. *Receiver feeder lines* are those cables connecting distribution systems and TV receivers. In these installations, broadband boosters\* have been used as line amplifiers. Signal preamplification for the high noise area installation is provided by an antenna-mounted booster\*\*\*.

### Installation

Because the greatest losses in a multiple TV installation are incurred in the cables, a careful layout should be planned for each installation. The length of trunk lines and receiver feeder lines should be correlated so that they can be as short as possible. Layout of the trunk line will be determined by the building design, accessibility of service corridors, elevator shafts, etc. In apartment buildings, the four apartments to be serviced by a single distribution system need not be on the same floor. The determining factor should be the length of the receiver feeder lines required to reach the receivers.

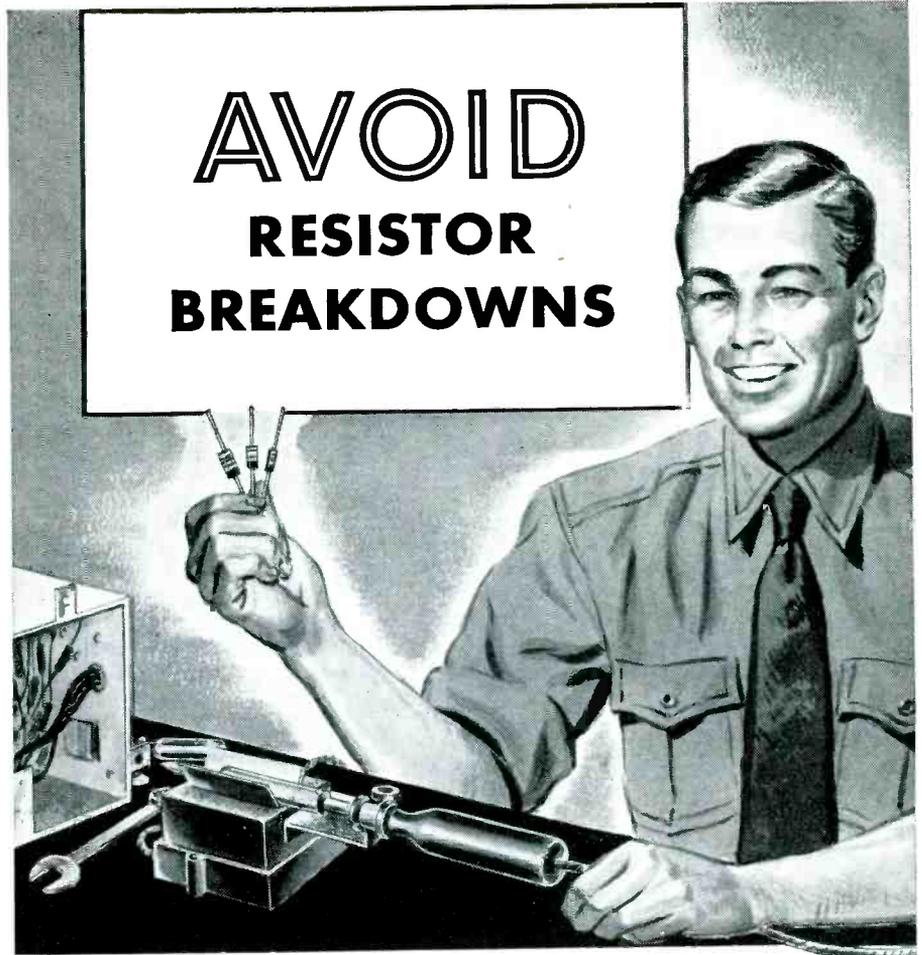
The antenna system used with the distribution system may be any type suitable for reception with a single TV receiver. In areas where a multiple antenna must be used for reception of more than one TV channel, any commercially available non-electronic antenna mixer network can be used to match antenna inputs to a common 72-ohm output.

All connectors must be soldered to cables to prevent excessive losses. To replace the load normally supplied by the trunk line, a terminating resistor is required at the output jack of a single distribution system in an installation, or at the last distribution system in a series string. A terminating resistor is not necessary at

(Continued on page 52)

\*\*Cinch-Jones.

\*\*\*E-V Model 3010, *Tenna-Top*.

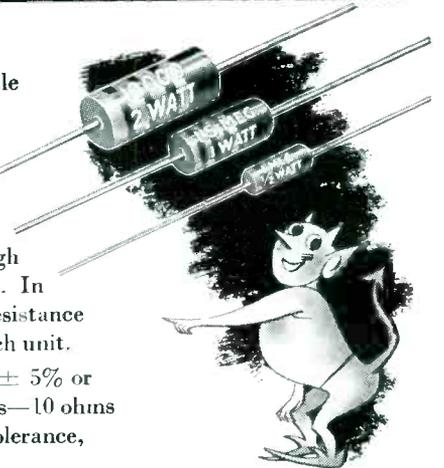


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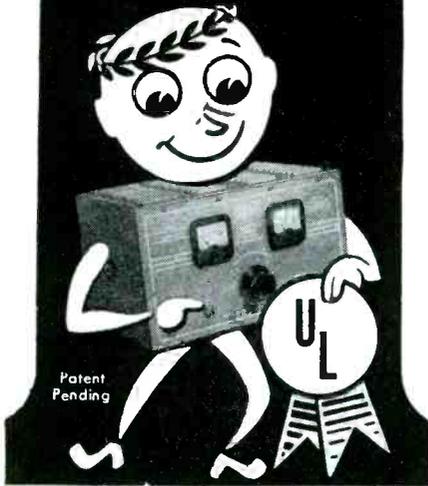
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**TV Distribution System**

(Continued from page 51)

unused receiver outlet sockets, but each distribution system output jack must accommodate either a continuation of the trunk line or a terminating resistor.

When lack of signal strength at the antenna or cable losses cause poor reception at receivers most remote from the antenna, line amplifiers should be installed on the trunk line midway between the distribution system serving the TV receiver at which reception is unsatisfactory and the preceding distribution system.

In extremely large installations or those in which more than one trunk line will increase the efficiency of the entire system, the distribution system may be used as a trunk distribution box. Trunk lines are connected to each receiver outlet socket as well as to the output jack.

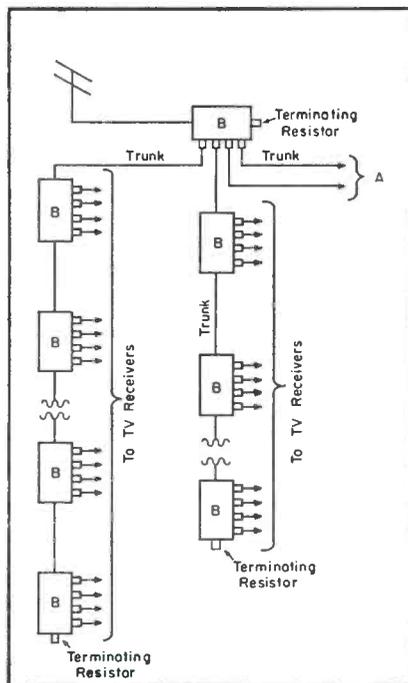
**Trouble Shooting**

Poor reception at a TV receiver or group of receivers can be isolated by studying the installation layout.

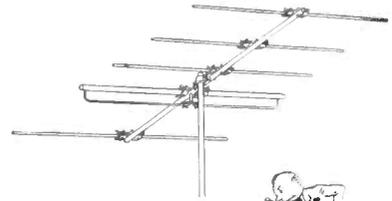
In the installation shown in Fig. 3, if reception is unsatisfactory at receiver 8, it may be caused by either the failure of the tube in the distribution system supplying the receiver or faulty cable or connectors.

The tubes can be checked by replacement with tubes of known perform-

Fig. 6. A layout of an installation requiring more than one trunk line. Point (a) may be used for additional lines.



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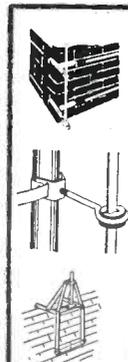
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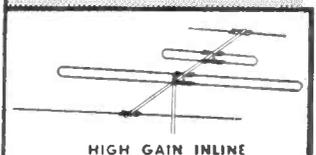


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ance. Cables and connectors should be checked for continuity with an ohmmeter.

**Checking Coax Lines**

Long coax cables can be checked for continuity by disconnecting both ends of the cable from the system. At one end, the inner conductor should be connected to the shield and at the opposite end an ohmmeter connected across the inner conductor and shield.

An open circuit in the cable or connector will be indicated by failure of the ohmmeter to register a reading. Short circuits in cables or connectors can be checked in a similar manner,

but without connecting the central conductor to the shield. An indication of low resistance on the ohmmeter confirms a shorted cable or connector.

If the entire system is inoperative, the output of each distribution system can be checked with a field-strength meter. Beginning with the distribution system nearest the antenna, the trunk line should be disconnected at the output of the distribution system and replaced with a terminating resistor. The output of each feeder line should then be checked. If the distribution system is operating normally, the output cable should be replaced, continuing on to the next distribution system or until the trouble is located. At each unit it is important to be certain that a terminating resistor is installed in the place of the output cable.

### Servicing Helps

(Continued from page 40)

tried. The high-voltage oscillator transformer may also be a cause of low high voltage. The transformer may still be operative but is operating inefficiently due to reduced Q of the coils caused by shorted turns, damaged insulation, humidity, etc.

If the high voltage is erratic, the cause may be a short in the -125 v choke in the high-voltage oscillator circuit.

### Fringe-Area TV

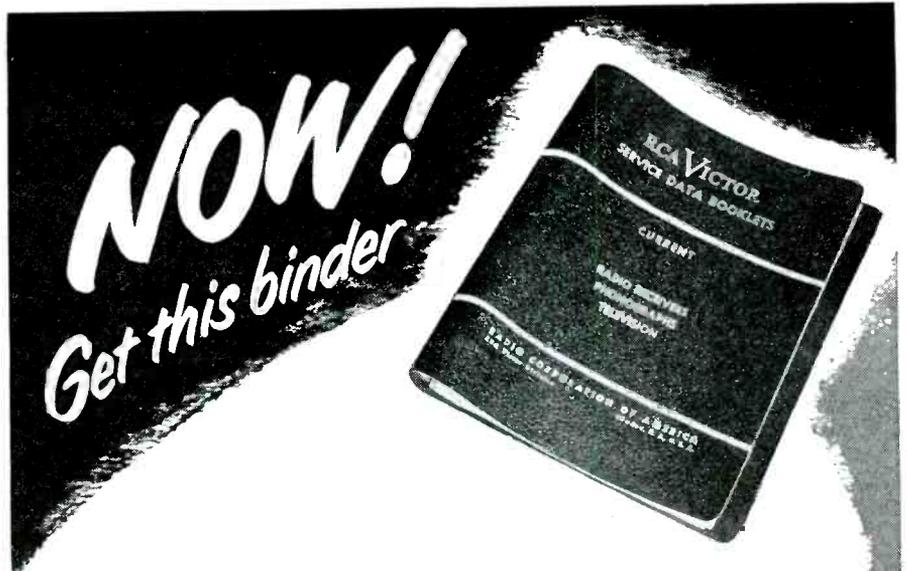
(Continued from page 34)

jacket over a steel core. Tests showed that inasmuch as TV signals travel the surface of a wire, a copper jacket on a steel core would answer all the problems. Investigations showed that a jacket of 15% to 20% was more than sufficient, but for safety's sake a copper jacket of 30% was applied to a steel core, providing the answer to the stretching and breaking problem.

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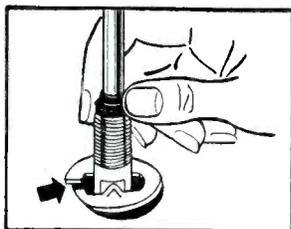
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# RADELCO

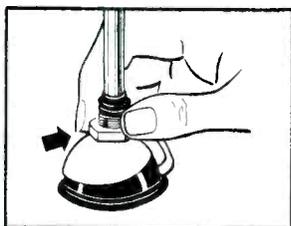
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## Color TV

(Continued from page 21)

terminals, decreasing the motor's speed.

Two of the 75-ma selenium rectifiers are used as a voltage doubler B supply for the 6AH6. The third rectifier is used as a negative bias source for the 12AU7.

### Drum Receiver

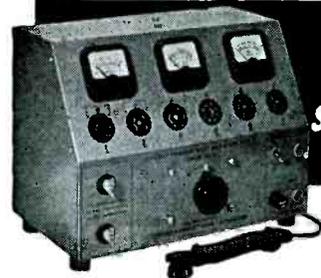
The mechanical limitations on the size of the color wheel limits the size of a color picture, to that obtainable with a 12-inch tube. A larger picture may be obtained through the use of a magnifier lens, although the lens structure in conjunction with the mechanical disc apparatus makes the entire assembly somewhat cumbersome and space consuming. To overcome these disadvantages and yet obtain a larger direct view picture in color, a new type of mechanical system has been devised for the larger picture tubes. This system utilizes a drum type structure surrounding the tube. The end circumference of the drum is about 20" in diameter, while the length is 18". A drum of this size can house a 17" or 20" rectangular tube. Across the end rims of the drum are stretched lucite color filters for red, green and blue arranged in three groups around the drum. When in operation, the drum rotates around the entire tube so that the color filters pass before the face of the tube in a manner similar to that of the disc. A sketch of the end and front views of the drum is shown in Fig. 5. The arrow indicates the direction of drum rotation.

The drum receiver is still a mechanical system and thus presents the same problems as a color disc. To house the entire structure, the enclosing cabinet has to be quite large. In addition, the larger size and weight of the drum assembly demands a more powerful motor than the color wheel. A quarter horsepower motor should be sufficient for the purpose. The large size and bulk of the drum also requires that the end sections be dynamically balanced or else noisy vibrations will be set up when the drum rotates. In addition to being annoying, this vibration will affect the mechanical system, making it difficult to achieve synchronization and causing damage to the rotating parts.

Another point to consider with rotating drums is the speed of the motor. The rotating drum has three sets of color groups, whereas the color disc only has two. The drum, therefore, has to rotate only  $\frac{2}{3} \times 1440$  rpm or 960 rpm. A motor operating at 960 rpm could be directly coupled to

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Here's a new ElectroX test unit that's *indispensable* for shops servicing auto radios, 2-way mobile communication systems or other equipment using 6-volt vibrators.

### TWO VALUABLE TEST UNITS IN ONE!

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the drum shaft, but this would mean that an induction motor powered from a 60-cycle line would be operating at too great a slip. An induction motor running at 1440 rpm has been found to offer a better solution. The motor could then be coupled to the drum shaft by means of gears, which would provide 960 rpm.

### Sync and Phasing Problems

The problem of obtaining synchronization and correct phasing exists in the drum receiver, just as it does in the disc receiver. As yet, no complete general solution to the problem has been achieved. A solution similar to

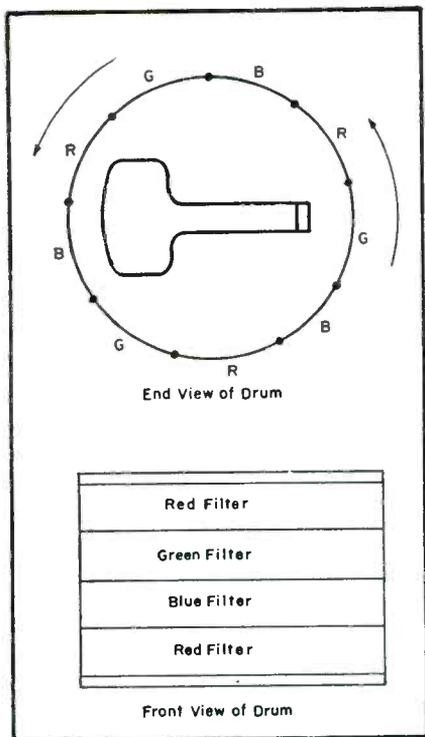


Fig. 5. View of drum which has been used in mechanical color TV systems.

that outlined for the disc receiver may be applied with the drum receiver, although the weight of the drum will make the problem more difficult. Another method would be to obtain power at a frequency which is a sub-multiple of 1440 cps and use this power to drive the drum motor. This could be accomplished by making use of the vertical-sync pulses in the receiver to obtain the proper frequency.

#### Credits

The author is grateful to CBS for their cooperation in supplying much of the information concerning conversion of electromagnetic-deflection circuits, the color wheel, and the motor drive.

#### RCA MANUAL ON UHF INSTALLATION AND MAINTENANCE

The latest booklet in the RCA electronic training series, titled *Ultra High Frequency Fundamentals*, has been published and is now available from the Government Service Division of the RCA Service Co., Gloucester, N. J.

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## TV Simplification

(Continued from page 23)

good conditions of modern receiver performance.

### Deflection Systems

Vertical deflection circuits are generally available in highly simplified form. One duo-triode will do a satisfactory job of generating a sawtooth wave and amplifying it sufficiently to deflect the beam vertically at proper triggering sequences.

A considerable amount of fine work has been done on horizontal deflection circuits, so that the main elements of simplification are now fairly well known.<sup>1</sup>

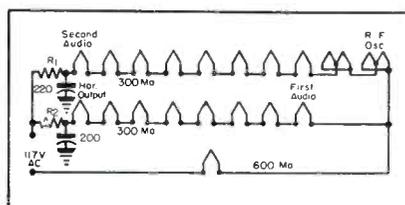
Germanium crystals may be used to advantage in *afc* circuits; they may also be used in horizontal phase control circuits as shown in the schematic of Fig. 5. These crystals could be replaced with a 6AL5, but space saving, elimination of associated circuitry components, and wiring simplicity would be sacrificed without any improvement in operation.

### Low Voltage Supplies

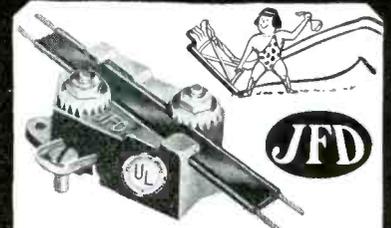
Too little thought has been given in the past to the simplification of the power supply, because most engineers have followed conventional power-supply design systems. It has been common practice to install the rectifier filter choke on the positive side of the rectified output, although there is no valid reason for this procedure, as hams have reported for years. The choke can just as well be put on the negative side, from ground to the center tap of the high-voltage transformer

<sup>1</sup>E. L. Clark has noted in the May, 1949, IRE Proceedings that in the *Automatic Frequency Phase Control of Television Sweep Circuits* the pulse-time type of *afc* circuit requires the minimum number of components. On the basis of this report, it seems evident that stable automatic frequency control and good horizontal deflection are possible with two tubes or two sections of a duo triode.

Fig. 7. Series filament heating supply arrangement. Chokes may be added in series for *rf* and *if* amplifier tubes. Capacitors can bypass *rf* and *if* tubes to B—, which is above ground, as shown in Fig. 6.



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secondary winding. In such a circuit the voltage drop across the choke and the focus coil in the commonly-used electromagnetic system can be utilized as negative bias. This eliminates a separate rectifier and avoids any wasted voltage drop.

### Selenium-Rectifier Systems

Another method of simplification appears in circuits using selenium rectifiers. Fig. 6 shows a transformerless low-voltage power supply. A method of series filament heating that can be used to supply filaments with different current drains is shown in Fig. 7. It will be noted that most of these tubes are of the 6-volt type, and that two are of the combination 6-12-volt types (which may operate on either 12 or 6 volts), and that the picture tube requires 600 mils.

The variety of available voltages from a single selenium rectifier is shown in Fig. 8, which uses only one 450-ma selenium rectifier. This is a highly simplified low- and high-voltage power supply with a minimum of components. When it is used with a series string for filament supply, such as that shown in Fig. 7, it is a genuine ac/dc transformerless power supply. For a large size television receiver, a power supply of the type shown in Fig. 9, using a voltage tripler and a special bias supply, has been suggested.

### High-Voltage Supplies

Of the many possible types of high-voltage supplies for a television receiver the horizontal deflection amplifier pulse type has been found to be economical and desirable. Among the features which recommend this type high-voltage supply are . . . little shielding, since the pulse voltage produced synchronizes with the horizontal deflection system; when the horizontal deflection fails, no voltage is generated and this provides the picture tube with sweep failure protection. In addition, the circuit is simplicity itself since the components are only a capacitor, resistor, and rectifier tube, and finally, there is some regu-

(Continued on page 58)

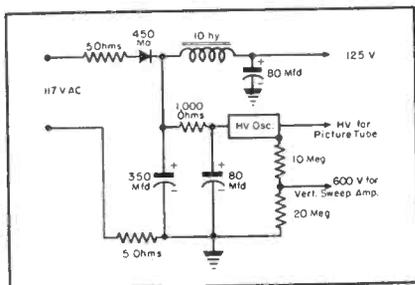


Fig. 8. Simplified low and high-voltage power supply system for TV chassis.

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## TV Simplification

(Continued from page 57)

lation of picture size, as line voltage varies.

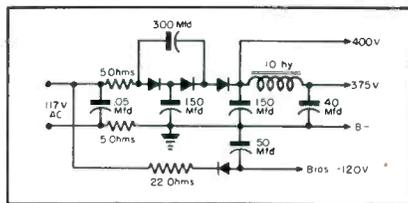
Although this practice has not yet been applied on any extended scale, the use of high-voltage selenium rectifiers is intriguing. In a voltage-multiplier circuit it is possible to achieve from 10,000 to 15,000 volts of *dc* output at low current drain for the second anode of the picture tube.

High-voltage selenium rectifiers, now available, are capable of providing fully the second anode requirements of TV receivers. They permit current drain up to 25 milliamperes, and are available in half-wave, full-wave bridge, and center-tap stacks.

The voltage rating for a single unit is usually 4,000 to 5,000 volts. By using multiple units in series, voltages to 15,000 (and higher) are possible. The *dc* output voltage per unit is of the order of 1,400 to 1,500 volts.

At this time they are not being designed into TV receivers because the present cost is high. When the engineering cost of producing these new components is written off and they become mass produced as a result of their applications in photoflash supplies, 'scopes, high-potential test equipment, and armed services military equipment, they are quite likely to be adopted by the TV receiver industry, both for their versatility and simplification characteristics.

Fig. 9. Low-voltage power supply for sets using large-size picture tubes.



## Associations

(Continued from page 42)

and a committee was appointed to initiate the action and make arrangements for future meetings. This, however, was fully dependent on the return of the representatives to their local organizations and carrying on discussions with their full membership on the desirability and feasibility of the proposal. Further, representatives had to obtain full authority from their organizations to act in their behalf in creating a national organization to bring about unity of effort and purpose in the service industry.

Authorization was forthcoming in every instance and local memberships were enthusiastic in their endorsement of the program outlined. After several meetings in New York, the groups then met in Washington, D. C., to fully implement their need and desire for a national organization. Out of that Washington meeting came about the formation of the *National Electronic Technician and Service Dealers Association*, composed of contractors, dealers, radio, television and electronic associations.

Temporary officers were elected at that time to operate the newly-born national association until a national charter could be obtained and a constitution drawn. Headquarters were established in the Dorchester House at Washington, D. C., an excellent choice because it exemplified the national character of the organization.

Max Leibowitz, president of the Associated Radio and Television Servicemen's Association of New York City, became temporary president of the national group, now more familiarly known as NETSDA. Norman Sellinger, vice president of Television Associates, Inc., of Washington, D. C., duplicated this position in NETSDA. Vance Beechley, past president of the Mid-State Radio Servicemen's Association, of Harrisburg, Pa., was elected to the position of treasurer. Dick Devaney, delegate from the Philadelphia Radio Servicemen's Association, became corresponding secretary. Roger Haines, president of the South Jersey Television Technicians Association, became recording secretary.

The officer's roster of NETSDA was fortunate in that it was composed of independent technicians, contractors and dealers, all of them currently active in their businesses, and all of them bringing

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a wealth of technical and organizational experience to their positions.

Shortly after election, president Leibowitz appointed committees to produce programs for the benefit of many chapters, and to represent them in industry problems on a national basis. As a guide to their efforts the following aims and purposes were promulgated: (1) to promote better understanding between service and other segments of the industry; (2) To promote and secure better relations with the public; (3) To provide educational facilities for its members; (4) To raise the standards of the servicing profession; and (5) To cooperate with federal, state and municipal agencies on matters pertaining to security, ethics, safety and public welfare.

As the aims and purposes of the national association become known, it will be appreciated that there are many more problems that must be solved before the recognition due the Service Man is forthcoming. Only through the efforts of a national organization can these problems be brought to the attention of the entire industry. The servicing dealer and the contractor has many problems, too. Some are unique and some in common with the Service Man, and they must be ably represented to the industry.

Consumers who will benefit by such constructive actions should also have these problems brought to their attention. They have long been kept in ignorance as to the real faults which reduce their pleasure and interest in television.

Today, in radio and television servicing, there are many changes which have brought about new concepts and methods in the operation of our daily business. Precise business methods, responsible management, capable purchasing, expensive facilities and equipment and complex technical libraries are part of this great, new business and it has been necessary to keep pace with these requirements.

Radio and TV have become a multi-million dollar business and it behooves us to recognize the Service Man's important position on the economic front. The purchasing of replacement parts, tubes and installation supplies has been said to amount to over five-hundred-million dollars annually.

These facts have been brought to the attention of the Service Man and dealers by various individuals in the industry. Many articles have accented these facts. Since we know, and since it is generally known, that servicing is *big business*, it is time to realize that the electronic service industry is the least organized and most poorly represented profession in the country.

In Canada and in England influential groups have made great progress in representing the service technician and dealer. Now, and no later than now, it is time that such steps be taken to bring about similar organizations in this country.

A national association would provide a united voice for all servicing dealers and technicians; represent the servicing profession at government councils probing defense restrictions and changes; represent our profession at industry councils and meetings, such as were recently held in Chicago by the RTMA, at which a delegate of NETSDA presented to the RTMA Service Committee suggestions on changes and recommendations for the benefit of the Service Man; assist the

(Continued on page 60)

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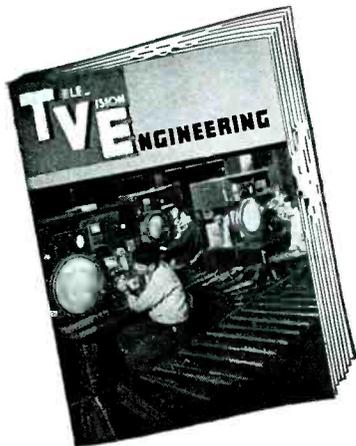
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(Continued from page 59)

local chapters or groups with advice and information on the subject of city, state or federal licensing or registration proposals; obtain for local chapters both industry and public recognition and assistance to promote progressive programs; assist in legal problems of which, today and in the foreseeable future, there are many; obtain technical information and service data, through an education and program committee for constant distribution to its membership; promote lectures for its various chapters on both technical and business subjects, through the same committee; obtain local, state and industry assistance in securing proper training for newly-developing technicians so that they, too, would be abreast of many new products and changes as they appear on the electronics scene; publicize and circulate in the industry, and to local trade publications, the many activities in which individual chapters are participating; and promote public confidence in the service profession for both the local technician and dealer associations, and strenuously combat the continuous negative publicity received through the consumer press.

The national association operates in a truly democratic fashion and the rights, privileges and prerogatives of each individual and member association are completely protected. From each member chapter there are three duly elected representatives and one alternate. It is not necessary to have the three representatives at each meeting; any one of the three representatives can cast his organization's three votes on any issue that requires voting.

Organizations that cannot have representatives at a meeting are advised in advance on important issues that require voting. This can be handled by proxy or mail.

Regardless of the size of the chapter association, it cannot have more than three elected representatives, and not more than three votes. From the representatives are selected the officers and committee members of the national group.

At the time of this writing, NETSDA meetings have been held on a one-a-month schedule. The representatives at each meeting determine and vote on where the next meeting shall be held, usually in a city where there is a local chapter, providing that they have suitable facilities and that adequate transportation is available.

The autonomy of each group is recognized and thoroughly supported. At no time will NETSDA attempt to govern a local chapter, but it will always seek to assist and represent its many chapters when necessary or desirable.

It is more important than ever that all associations in the United States be united. It is only through the strength in numbers that there can be presented to industry a united front, voice and program. The need for recognition of our profession by both the industry and the public can only be presented by a national body.

In Philadelphia one of our finest citizens offered a view that points up the needs for a national organization: "Let us all hang together; or, most assuredly, we shall all hang separately!" The author of this sage statement, Benjamin Franklin, didn't have us in mind at the time but we can't think of any more apt phrase to apply to the needs of our industry.

## TEN YEARS AGO

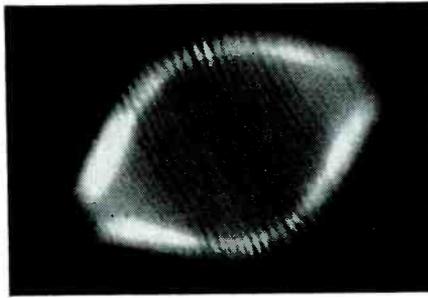
From the Association News Page of  
**SERVICE, Sept.-Oct., 1941**

RADIO TECHNICIANS GUILD, Rochester, N. Y., reported that they will hold its third annual *Info-Meet* in November at the Sagamore Hotel. Chairmen for the event were: Bertram L. Lewis, *Info-Meet* committee; Horace Chapman, program; George Thompson, speakers and entertainment; Al Marsh, finance; and William E. Brewerton, publicity. . . . The eighth annual radio industry picnic, sponsored by the Cleveland, Ohio, chapter of RSA, was held at Brunswick Lake. . . . The Fremont chapter of RSA reported that Robert J. Bay of the Warren Radio Co., loaned his RCA dynamic demonstrator for tests at a meeting. . . . Dr. Z. V. Harvalik of St. Ambrose College, Davenport, Iowa, was voted an honorary associate membership in the Interstate chapter of RSA. . . . The LaPorte chapter recently joined RSA, and revised its by-laws to conform with the national RSA by-laws. The chapter reported that it was working on a coding system for marking chassis. . . . Frank D. Langstroth of Hygrade Sylvania, addressed the Lehigh Valley chapter of RSA on *Solving Modern Service-Problems*. The chapter went on the air over WCBA with a quarter-hour program. . . . Chief engineer Henry Kaiser of WWSW and W47P spoke on FM and demonstrated many features at a meeting of the Pittsburgh chapter of RSA. . . . John Rider spoke to New York Service Men at the Hotel Capitol.

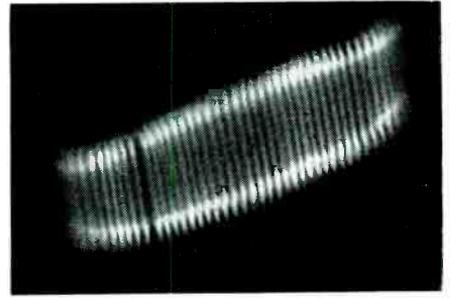
## Rep Talk

EDWARD T. CONNOLLY, headquartering in Cleveland, Ohio, has been appointed district rep of the G. E. tube divisions. He will be responsible for the sale of electronic tubes, test equipment and component parts in northeastern Ohio, northern West Virginia and western Pennsylvania. . . . *J. J. Hagerty*, Royal Oak, Mich., (Michigan) and *William H. Zimmerman Co.*, New York City (New York state), have been named reps for the Walter J. Schott Co. . . . *Ellinger Sales Co.*, 6663 Northwest Highway, Chicago, Ill., have been named reps for the cathode-ray tube division of Allen B. DuMont Laboratories, covering Illinois, Wisconsin and half of Iowa, including Des Moines. . . . *Gerald B. Miller Co.*, Hollywood, Calif., have arranged a system of furnishing catalogs to the trade; loose-leaf catalog sheets; catalogs of companies represented; instrument catalogs; and individ-

# Why G-E dial lamps are seen

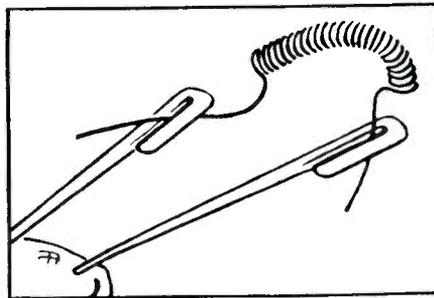


**OLD FILAMENT.** High notes often cause the filaments and lead-in wires of radio dial lamps to vibrate. In old-style lamps, they vibrate to frequencies different from those of the noise. This produces a whipping action (above) which eventually tears the filament apart.

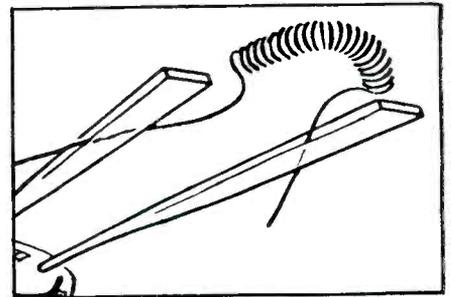


**NEW FILAMENT.** By redesigning the filament supports of G-E radio dial lamps, General Electric engineers matched the frequencies and greatly reduced the effects of vibration (above). As a result, G-E radio dial lamps give longer, more dependable service.

## ... but not heard



**OLD-TYPE JOINT.** Some types of dial lamps actually cause "static". Old-type clamp joints in the bulb (above) often permit changes in resistance or tiny arcs that cause the lamp to radiate bothersome interference.



**IMPROVED JOINT.** To prevent dial lamps from being "noisy", General Electric developed a better joint—one with tungsten filament legs pressed firmly into the softer metal of the lead-in wire. It's another reason why G-E dial lamps insure customer satisfaction!

GENERAL  ELECTRIC

ual folders of companies represented. . . . *Howard C. Elliott Co.*, 11808 Shadeland Ave., Cleveland 6, Ohio, has been appointed rep for Circle-X Antenna Corp., Perth Amboy, N. J., in Ohio excluding Lucas, Ottawa and Wood counties; western Pennsylvania, west of a north and south line drawn through Williamsport, excluding Williamsport and Erie county. . . . *F. A. Daugherty*, 100 Woodrow Ave., Bedford, Ohio, has been named rep for the cathode-ray tube division, Allen B. DuMont Labs, Inc., in West Virginia, western Pennsylvania and Ohio, excluding Cincinnati. . . . Insuline Corp. reps *Edward Colman*, of Perlmuth-Colman and Associates, Inc., covering the West Coast; *Norman Rahe* of Weller-Rahe,

covering the Ohio area; and *Harry Gerber* and *Ed Breen*, covering New England were guests recently of Bernard L. Cahn, Insuline's sales manager, at the plant. . . . Ward Products has announced that the Anderson Sales Co., 172 State St., Boston, will represent the Ward line throughout the New England States. . . . *Carl A. Stone* has taken over the California, Arizona, and New Mexico area for Empire Devices, Inc., Bayside, N. Y. . . . *Harry Finkelstein*, New York City, has been appointed national sales rep for Haydu Bros., Plainfield, N. J. . . . *J. J. Hagerty*, Wolverine Chapter secretary, has taken on two new lines, American Microphone and Walter C. Schott Co., covering the state of Michigan.



**What You Want!  
Where You Want It!  
When You Want It!**

**ERIE CERAMICON TV REPLACEMENT KIT**

- Popular types in quantities correctly proportioned as determined by popularity of sales for replacement.
- Individually packed by type and capacity in handy plastic kit.
- Contains General Purpose Tubular and Disc Types . . . ideal for replacing paper and molded micas.
- Ideal for service man in the shop and on the job.
- Assortment "D"—contains 70 Condensers—and Color Code Card for easy Ceramic Condenser identification. List Price \$17.75

Dept. C—Electronics Division  
**ERIE RESISTOR CORP., ERIE, PA.**  
LONDON, ENGLAND · TORONTO, CANADA.

**TUBES Price - Slashed!**  
Receiving & Transmitting

RMA Guaranteed—  
Standard Brands

0Z4 . . . \$ .59	6V6 . . . \$ .89
1R5 . . . .89	7C4/
5U4 . . . .79	1203A .89
5V4 . . . 1.39	12AT7 . 1.19
5Y3 . . . .49	12AU7 . 1.19
6AC7 . 1.29	12BH7 . 1.19
6AG5 . 1.29	12SA7 . .79
6AL5 . .79	12SK7 . .79
6AU6 . .79	12SQ7 . .69
6BC5 . .89	35A5 . .92
6BG6 . 1.89	35L6 . .89
6BN6 . 1.39	35W4 . .69
6BQ6 . 1.59	35Y4 . .89
6K7 . . .59	35Z5 . .59
6SA7 . .69	50A5 . .98
6SN7 . 1.09	50B5 . .98
	50L6 . .75

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Full Year's Guarantee, Brand New, Black Face, Standard Brands, Sealed Cartons

10PB4 . . . . . \$22.95	17BP4 . . . . . \$24.95
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Genuine Molded Condensers		Electrolytic Condensers	
Fresh Stock—All Mineral Oil Filled 100° Centigrade—Meets Jan C91 Tests			
ALL 600 VOLTS			
Cap.	Per 10	Per 100	
001 . . . . .	\$.79	\$6.90	
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.01 . . . . .	.89	7.90	
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.05 . . . . .	1.09	9.90	
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Minimum order; \$5.00. 25% deposit with order, balance C.O.D. Include postage with order. All merchandise subject to prior sales, F.O.B. New York, N. Y.

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(formerly BLACKBURN)

**A-1 Ground Clamps**  
Fit 3/8" to 1 1/4" Pipe



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(formerly Blackburn Specialty Co.)  
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**BUYING POWER  
for your products!**

The more than 28,000 professional radio and TV service technicians who read SERVICE every month.

**TEL-O-TUBE PICTURE-TUBE REPLACEMENT WARRANTY**

A policy of warranting replacement picture tubes for six months after the date of installation, has been announced by Tel-O-Tube Corp. of America, East Paterson, N. J.

Picture tubes (em type) are now available in 10- to 20-inch sizes. Electrostatic types are also being produced.

\* \* \*

**GARDINER GREENE NOW GABRIEL CO. V-P**

Gardiner G. Greene has been appointed vice president in charge of the electronics divisions of the Gabriel Co., Cleveland, Ohio, which includes Ward Products Corp. and Workshop Associates, Needham, Mass. Greene was formerly president of Workshop Associates.

\* \* \*

**ELECTRONIC DEVICES BUYS PRECISION RECTIFIER CORP.**

Electronic Devices, Inc., 429 12th St., Brooklyn, N. Y., has purchased the Precision Rectifier Corp., which will be operated as the Precision Rectifier Division of Electronic Devices. This division will produce selenium rectifiers for civilian and military applications.

Initially this new division will manufacture three different types of rectifiers, the first of which will be the *Plastisel* line of molded and sealed-in miniature types. Two other lines to be produced are *Minisel*, subminiature type selenium rectifiers, and *Powersel*, high-power type selenium rectifiers.

Earl Steiker, formerly of Federal Telephone and Radio Corp., and Radio Receptor Co., has been named director of production and engineering. Sales will be handled by Herman Weissberger, company president, and purchasing will be under the direction of Robert Leonhardt, secretary-treasurer.

\* \* \*

**BRACH ASSIGNED JONES' PATENT FOR UHF MASTER ANTENNA SYSTEM**

William J. Jones' patent No. 2,531,438 for *uhf* master antenna systems has been assigned to the Brach division of the General Bronze Corp., 200 Central Ave., Newark 4, N. J.

The system will be incorporated in 2- and 4-set couplers, which will allow for the operation of two multiple *uhf* and *vhf* installations over one common antenna.

\* \* \*

**BURLINGAME NAMES PETER LAHANA FIELD ENGINEER**

Peter Lahana has become a field engineer for Burlingame Associates, 103 Lafayette St., New York 13, N. Y. Lahana was formerly a sales and application engineer for Sorensen and Co., Inc., and for Thomas A. Edison, Inc., and was also a resident instructor in electrical engineering at Rensselaer Polytechnic Institute.

**ASTATIC CARTRIDGE REPLACEMENT GUIDES**

Two phono cartridge replacement guides have been published by the Astatic Corporation, Conneaut, Ohio, one designed to aid the Service Man in finding the proper Astatic cartridge replacements for Columbia phonos and record changers (No. 53), the other offering similar guidance on Philco models (No. 52).

The recommended Astatic cartridges, and the Astatic needle types employed in each, are illustrated, each illustration with a numerical designation. All Columbia and Philco phonos and record changers for which there are Astatic replacements are listed by model number. Opposite these model numbers are the model designations of the proper replacement and needle type, together with the illustration numbers which picture the required particular cartridge and needle.

\* \* \*

**RCA NAMES M. J. YAHR MANAGER OF SOUND PRODUCTS SALES**

M. J. Yahr has become manager of the RCA Sound Products Sales Group. Mr. Yahr, a veteran of 22 years in the engineering, service, and sales activities of RCA, was formerly theatre sales rep in the Chicago region.

\* \* \*

**SPECTOR CELEBRATES 30TH YEAR WITH INSULINE**

Samuel J. Spector recently celebrated his thirtieth year as president of Insuline Corporation of America, 36-02 35th Ave., Long Island City, N. Y.



Samuel J. Spector

\* \* \*

**WILLIAM GEORGE NAMED EICOR CHIEF ENGINEER**

William C. George has been appointed chief engineer of the tape recorder division of Eicor, Inc., 1501 North Congress St., Chicago, Ill. Don Morse has been named assistant sales manager.

\* \* \*

**KERNER APPOINTED B-T SALES MGR.**

Joseph H. Kerner, formerly sales manager of T. V. Development Corp., has been appointed sales manager of Blonder-Tongue Labs, 38 North 2nd Ave., Mount Vernon, N. Y.



J. H. Kerner

\* \* \*

**SIEGEL NAMED RIDER SALES PROMOTION MGR.**

George Siegel has been appointed sales promotion manager of John F. Rider, Publisher, 480 Canal St., New York 13, N. Y. Siegel has been associated with the organization for the past five years in the advertising and sales departments.

# Install

# "CONICAL-V-BEAMS"\*

\*REGISTERED TRADE MARK

## for "EASE OF MIND"

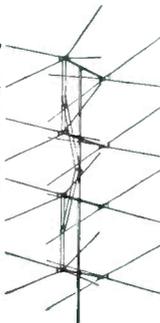
You are assured of the highest possible gain and bandwidth for maximum signal to noise ratio, full tone and elimination of busy background.

Install a genuine Telrex "Conical-V-Beam" engineered to eliminate your headaches and "See the Difference" in performance, material and workmanship.

A model for every requirement — local, fringe and extreme fringe.

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**The "ULTIMATE"** gain, 4 bay stacked array — 8X-TV. If the Telrex 8X-TV "Conical-V-Beam" does not provide a usable signal, YOU CAN BE SURE that TV reception is either impractical or impossible.



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"TELREX SERVICE NEWS" can be mailed direct to your place of business. This timely service periodical contains the most authentic antenna technical data available. It's FREE — Write on your Company letterhead or post card with Company stamp.

"CONICAL-V-BEAMS" are produced under Re-issue Patent No. 23,346.

CANADIAN AND FOREIGN PATENTS PENDING





CONICAL-V-BEAMS

AMERICA'S STANDARD OF COMPARISON

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**RAYTHEON APPOINTS DORFMAN SALES REP**

Julius Dorfman, formerly chief commercial engineer of National Union Corp., has been appointed sales rep for the equipment sales of receiving and TV picture tubes in the New York area for Raytheon Manufacturing Co., Newton, Mass. Dorfman will headquarter at 19 Rector St.

\* \* \*

**MARCHIANO NOW ROCKBAR JOBBER SALES MGR.**

Tony Marchiano, formerly with Harvey Radio and Radio-Wire Television, has been named jobber sales manager for Rockbar Corp., 13 E. 40th St., New York City.

**C-D CAPACITOR CATALOG**

A 60-page *Mica and Faradon Capacitor Catalog*, 420-421, has been announced by Cornell-Dubilier Electric Corp., South Plainfield, N. J.

Detailed are manufacturer's type number and the corresponding JAN unit designation, and capacitor characteristics, derating, dimensions, tolerances, extras or exceptions are shown on the same page with the particular type in question.

Featured are technical data on the selection, use, and method of specifying mica capacitors, including cylindrical, ceramic-cased and potted mica; plastic-cased potted mica; molded mica both for transmitting and receiving; metal-clad sulfinitic (sulfa-dielectric); cast-aluminum cased mica; rectangular brass-cased micas.



# PERFECTION ION TRAPS

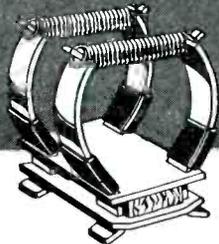
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### "TV TROUBLE SHOOTING METHOD"

**EARN more money!** Locate television troubles by this **quick**, entirely **new** method. Rapid checks enable you to locate all faults in record breaking time regardless of make or model! 160 Picture, Raster, Sound trouble symptoms. Over 100 Rapid Checks including over-all alignment checks, 26 illustrations; simplified step-by-step directions!

H. G. CISIN, well-known to radio men as a recognized electronic engineer, inventor, technical author and educator, has trained thousands of television technicians, many of them now owning their own prosperous TV service organizations. The results of his years of experience are embodied in this remarkable **TV TROUBLE SHOOTING METHOD**.

**HERE'S PROOF!** J. B. Seiler, Chicago, writes: "Rush another copy. Am tickled to death with results. Your book hasn't failed me yet." G. E. Hirsch, Jamaica, N. Y.: "Congratulations! Your book extremely under-priced. Very ingenious in its logical use of cause and effect, should be in every TV tool kit."

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Enclosed is \$\_\_\_\_\_, for which please rush \_\_\_\_\_ copies (postpaid) of your **TV TROUBLE SHOOTING METHOD**.

Name \_\_\_\_\_

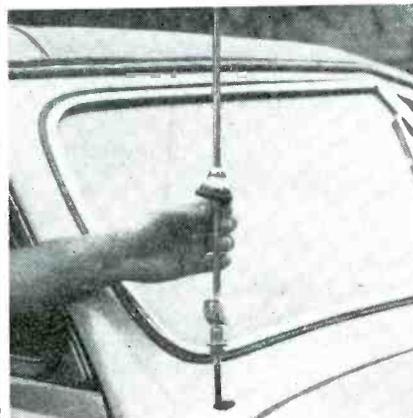
Address \_\_\_\_\_

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

### INSULINE AUTO ANTENNA

An auto-radio antenna, the *Solo-Mount*, has been announced by the Insuline Corporation of America, 36-02 35th Avenue, Long Island City 1, N. Y. The base of the antenna contains a special captive cup washer, which, after it is dropped through the hole in the cowl or the fender, adjusts itself to the shape of the latter to form a solid anchor for the whole assembly.

The antenna proper consists of three telescoping sections of chrome-plated brass, extending to 59". A shielded lead-in cable, 46" long and fitted with a presoldered plug at the receiver end, is included.



## New Parts . . . Instruments . . . Tools . . . . .

### RCA JUNIOR VOLTOHMYST

A vacuum-tube junior volttohmyst meter, WV-77A, in five different ranges, has been announced by the RCA tube department.

Meter employs a high-impedance diode tube as a signal rectifier, and features an electronic bridge circuit, a 200-microampere movement, and carbon-film multiplier resistors. Utilizes a single three-purpose shielded-input probe cable for measurements. Switching arrangement and a slip-on probe is said to eliminate need for separate cables and probes.

Employed as a *dc* voltmeter, meter will measure from .05 to 1200 volts in five ranges; as an *ac* voltmeter, from 0.1 to 1200 volts *rms* in five ranges. Measures resistance in five ranges, from .2 ohm to one billion ohms.

Featured are a high-input resistance on all ranges, protection against meter burn-out on all functions, a *dc* polarity-reversing switch, zero-centering facilities, metal shielding for stability in *rf* fields, and an ohm probe for the testing of electrolytic capacitors.



### PRECISE VTVM

A vacuum-tube voltmeter, model 909, in kit form or factory wired, has been announced by Precise Development Corp., Oceanside, N. Y.

Features a reflex circuit. Ranges are: + *dc*, 0-5-25-250-500-1000 volts; - *dc*, 0-5-25-250-500-1000 volts; *ac*, 0-5-25-250-500-1000 volts; ohms, R x 1, R x 10, R x 100, R x 10,000, R x 1,000,000 ohms (from .01 to 1 ohm to 1-billion ohms); and *db*, from -20 to +55 *db*.

Frequency range is said to be over 250 mc; top voltage is 30,000 volts.

### ACADEMY 3-WAY OUTLET

A 3-way outlet which is said to require no stripping or slitting of wire, has been introduced by the Academy Electrical Products Corp., 3842 Ninth Ave., New York City. Available for use as table tap or wall mounting.

Outlet is molded of urea plastic in colors of pearl and brown. Connection is made by metal points piercing the insulation and making electrical contact.

# TV Parts

## TELE-MATIC INTERFERENCE FILTER KIT

A TV filter kit designed to eliminate interference in the 13.5 to 112-mc range from disturbances caused by diathermy, short wave, FM, hams and electrical equipment, has been announced by Tele-Matic Industries, Inc., 1 Joralemon St., Brooklyn 2, N. Y.

Included are: wave traps *WT-14*, 13.5 to 3.6 mc; *WT-15*, 30 to 60 mc; *WT-16*, 60 to 90 mc; *WT-17*, 90 to 112 mc.

High-pass filters, *WT-300*, for 300-ohm receivers and *WT-072* for 72-ohm receivers, are also available. Filters are composed of three *pi* and *T*-sections, shielded and designed to cutoff all unwanted frequencies below 50 mc.



\* \* \*

## GRAYBURNE TV-IF SIGNAL BOOSTER

A TV-IF signal booster that is said to increase video and audio signals approximately 25%, has been introduced by Grayburne Corp., 103 Lafayette St., New York 13, N. Y. See August *SERVICE* for complete details.

\* \* \*

## DEITZ LENS AND MASK

A one-piece lens and mask assembly for use in color-TV equipment and a 21-inch mask for standard black and white reception, have been announced by Deitz Miracle Lens Co., 141 President St., Passaic, N. J.

Mask and lens assembly has a one-piece combination escutcheon and magnifying lens to frame and enlarge the picture. Available for seven- and ten-inch sets.

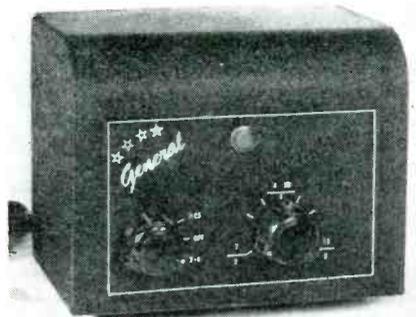
The 21-inch rectangular mask may be used in conjunction with a 21-inch flat-face picture tube.

\* \* \*

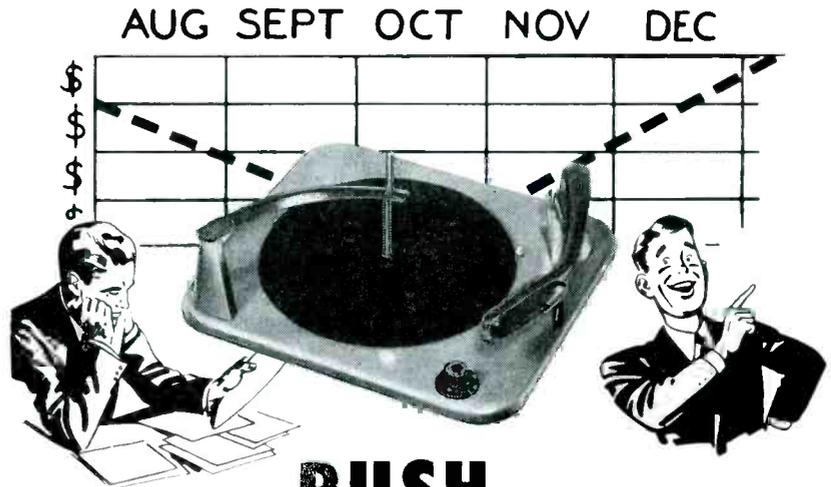
## T. V. DEVELOPMENT TV BOOSTER

An all-channel TV booster, the *General (B-55)*, that is said to have a gain of 5 times on all channels, has been produced by the T. V. Development Corp., 2024 McDonald Ave., Brooklyn 23, N. Y.

Featured are silver-plated precision wound coils, permeability-type gear-driven tuning, short leads, and a shield against interference. Uses a 6AK5 tube.



# billings need boosting?



## PUSH

## V-M tri-o-matic® RECORD CHANGERS!

There's good money to be made, in selling and installing V-M tri-o-matic replacement changers—the ideal unit to replace obsolete one- and two-speed record changers.

- Original Equipment in Most Top-Brand Combinations
- Nationally Advertised
- Exclusive Features
- Easy Installation (precut mounting boards available)
- Minimum Mounting Space — 13 $\frac{3}{8}$ " wide x 11 $\frac{1}{8}$ " deep, over-all height 7 $\frac{1}{4}$ ".

For a demonstration and full details about the amazing V-M tri-o-matic, contact your V-M jobber



# V-M Corporation BENTON HARBOR, MICH.

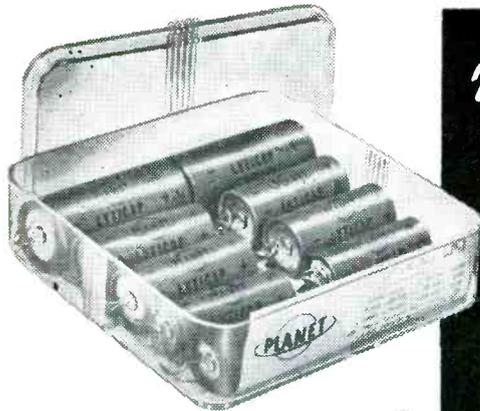
## MASTERCRAFT ANCHORS

Screw anchors, *Scru-Tite*, that are said to anchor any material to a solid surface, have been introduced by Master Craft Products, 95-01 150th St., Jamaica 4, N. Y. Claimed to be corrosion proof and non-magnetic with a low-thermal conductivity.

Can be installed by drilling a hole to size, driving the anchor into the hole with a hammer and fastening material by inserting the screw and screwing it in. Over-size screws up to four sizes larger than their corresponding anchor can be used.

## INSULINE TV SERVICING TOOLS

Two precision tools for television and radio servicing operations have been placed on the market by the Insuline Corporation of America, 36-02 35th Ave., Long Island City 1, N. Y. The first is *No. 6247* dual-bladed *Kleer* aligner, a rod of low-loss transparent plastic, 4 $\frac{1}{2}$ " long and  $\frac{3}{8}$ " in diameter, fitted with corrosion-proof steel blades .018" and .025" thick, respectively. The second is *No. 6249* tuning wand, a brown phenolic rod 4 $\frac{3}{4}$ " long and  $\frac{1}{4}$ " in diameter. One end contains a molded powdered iron core having a permeability tolerance of 2% and a  $\phi$  tolerance of 10%; the other end contains a silver-plated brass core.



*When You Want*

**FINEST MATERIALS**

**BEST WORKMANSHIP**

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*You'll Find That*

The Planet trademark on a dry electrolytic condenser assures you of satisfaction plus. Each unit is quality controlled from design to finish to give you the highest quality at the lowest cost.

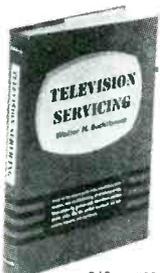
All Planet capacitors carry a 1-year replacement guarantee. They are attractively packaged, and are manufactured in specifications and mounts best suited to your needs.

Send for our new catalog C-2 for complete information.

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## TELEVISION SERVICING

by **Walter H. Buchsbaum**

Get this brand new, complete handbook for sure-fire working knowledge of TV installation, maintenance and troubleshooting. Tells you step-by-step procedures for audio IF alignment, video IF alignment, aligning RF amplifiers, mixers, oscillators, etc. All possible defects classified for ready reference, thoroughly analyzed to show what is wrong and why . . . and what to do to correct the defect. No mathematical knowledge needed! Practical, authoritative, up-to-the-minute, the perfect handbook for set owners, trainees, and repairmen.



Symptoms of defective operation easily recognized, quickly corrected by illustrations, diagrams and how-to-do-it facts in this new book.

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Coupon below brings you "Television Servicing" on FREE trial for 10 days, without obligation. Mail it NOW.

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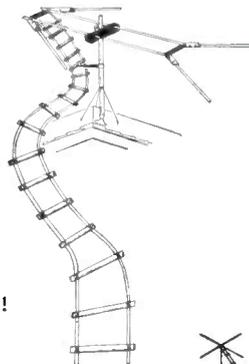
Send me, for 10 DAYS' FREE TRIAL, "Television Servicing." I will return it in ten days and pay nothing—or keep it and send \$1.35 down (plus postage) and \$2 monthly for 2 months.

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## 1/6 the LOSS With Permanent OPEN LINE by T. V. Wire Products

Guarantees lowest loss . . . holds the signal stronger on short or long runs (1/2-mile to mile with minimum loss) . . . resists disastrous atmospheric conditions indefinitely!



**NOW AT  
A NEW  
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THE PERFECT FINAL TOUCH  
TO QUALITY INSTALLATIONS

102 Prospect Ave., Burbank, Calif.  
ROckwell 9-2562

### BRACH FRINGE AREA ANTENNA

A fringe-area antenna, model *TA-450 Air General*, which is a 4-bay stacked 6-bar antenna with 24-dipole elements and 4 reflectors, has been introduced by the Brach Manufacturing Corp., 200 Central Ave., Newark 4, N. J.

Antenna is said to have a gain of 12 db on channels 7 to 13 and 8 db on channels 2 to 6. Featured are 3S aluminum, non-hydroscopic insulators, seamless tubing and seamless cross arms.

\* \* \*

### SUPER-TOOL MASONRY DRILL

A carbide-tipped masonry drill, *Speed Spiral*, has been designed by the Super Tool Company, 21650 Hoover Road, Detroit 13, Mich.

Drill is machined from the solid with a round nose supporting the carbide tip, a design which is said to provide ample dust clearance without necessitating gashing ahead of the carbide tip or otherwise weakening the end that does the work. It also reduces the chance of cracked or weakened tips due to brazing strains.



\* \* \*

### TROJAN PICTURE-TUBE TESTER

A miniature picture-tube tester, model 601, that determines the condition of a picture tube without removing it from the chassis, has been developed by Trojan Electronics, 3706 North Halsted St., Chicago 13, Ill.

Featured are a meter that is fused with a 1/200 ampere fuse, and a six-foot line cord.



\* \* \*

### RAYTHEON CONTROL KNOBS

A series of *standard control knobs* made of black injection molded cellulose-acetate butyrate and incorporating anodized aluminum inserts with two plated hex socket set screws, have been announced by the equipment sales division of the Raytheon Manufacturing Company, Waltham 54, Mass.

Provided are five basic sizes, six functional styles, and two surface finishes, *Mirror* and *Matte*, available in 44 varieties of knobs ranging from 7/10" diameter for subminiature applications to 2 3/4" diameter, and in matched sets of round, pointer, dial, and crank knobs.

**MAR-VEL INDOOR ANTENNA**

An indoor TV antenna, the *Antenna*, in the form of a ceramic faun, has been produced by Marvel-Lens Industries, Inc., 12 South 12th St., Philadelphia 7, Pa. Available in forest green, chartreuse and ebony.



\* \* \*

**JFD SINGLE-CHANNEL BOOSTER**

An automatic single-channel TV booster, *model VB Tuck-Away*, that does not, it is said, require any tuning, and employs an automatic *on-off* switch, has been introduced by the JFD Manufacturing Co., Inc., 6101 Sixteenth Ave., Brooklyn 4, N. Y.

Unit is reported to be able to deliver over 20-db gain of full 6-mc bandwidth. Dimensions of cases are 4½" x 4¾" x 1¾".



\* \* \*

**UNITED TEST-PROD ADAPTOR**

A test-prod adaptor, *Klipzon type L*, designed for use with standard RTMA test points or the phono needle type, has been announced by the United Technical Laboratories, Morristown, N. J.

Adaptors, which are about 3" long, available in red and black, clip onto wires ranging from the finest to No. 12 B & S gauge.



[Additional TV Part news on page 71]

**PERMANENTLY**

*Fine*

**REPRODUCTION**

DUST PROOF

ALUMINUM VOICE COIL FORM

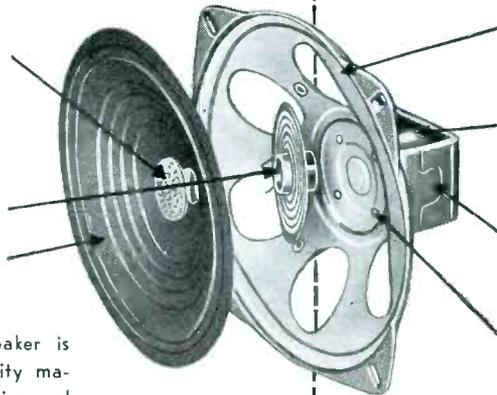
QUALITY CONE

STRONG BASKET

ALNICO 5 OR ELECTRO MAGNET

SPECIAL POT JOINT

BASKET AND POT—permanently staked.



Every CLETRON speaker is built of highest quality materials properly engineered and assembled to a strong permanently sealed unit to withstand all climatic conditions and deliver a wide range tonal response.

Aluminum voice coil form handles greater power without distortion, warping or buckling because it dissipates heat more rapidly.

CLETRON 4", 5" and 6" speakers include a universal mounting bracket. Recommend CLETRON for: Radio, TV and Waterproof Speakers, TV Deflection Yokes and TV Lightning Arresters. Write for complete information today.

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An aircore horizontal output transformer, HVO-8, designed for use in direct drive systems, has been produced by Merit Transformer Corp., 4427 N. Clark St., Chicago, Ill. Developed for use with the *MDF-30* cosine yoke.



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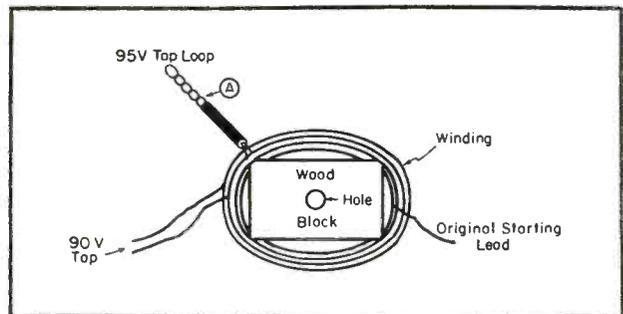
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**Autotransformer Tester**

by **JACK DARR**

Quachita Radio Service

**Troubleshooting Assembly Employing a Step-Type Transformer, Providing 90 to 135 Volts in Ten Taps, Found to be Ideal for Many Test Purposes Including Key Checks on Three-Way Portables.**



AN AUTOTRANSFORMER can be a very useful instrument around the service shop. It has been found very useful for the testing of receivers, particularly the *three way* portables, to determine whether they will operate satisfactorily at the lowest voltage encountered in service. Tests have shown, for instance, that if one of these sets will still work as low as 100 volts, you'll be practically free from that old complaint that . . . the radio stops every

time the refrigerator starts. A step up in line voltage will be also be found useful for trying to open up intermitments, especially if you suspect a hot short in some of the parts. The step up of the line voltage, and the increase in high voltage will help to break

down defective parts. As for the common *ac/dc* sets, oscillator performance at low line voltages often the cause of intermittent troubles, can be rapidly tested.

It is possible to construct an autotransformer unit quite easily in the shop. Required are one old power-transformer, a field-coil from a discarded 6-volt auto-radio speaker, a tap-switch (this could be the push-button tuner switch from an old set),

Above: Right

Fig. 1. Method which can be used to wind coils for autotransformer. The tapped loop lead must be twisted tightly and covered with spaghetti.

a toggle switch, and a pilot light and socket.

The transformer used in the unit built in our shop had a good primary winding. This was used as a base of operations. First removing the core laminations, the filament windings, which were on the outside, were then unwound. Counting turns of the 5-volt rectifier filament winding, it was found that this particular transformer had a turns ratio of 4.5:1. It was decided to call this an even 5 turns per volt, and as it turned out, we were close enough. In the next step the remaining wire, except the primary, was removed. We wanted to get down to about 90 volts, for a start; therefore, 125 turns were removed from the primary. (Since the total primary was wound for 115 volts, to secure 90 volts, 25 volts of winding had to come off;  $5 \times 25 = 125$  turns.) This was called the first tap. The end of the wire from our 6-volt speaker field, which was just the right size, was soldered to this, and taped carefully, using Scotch electrical tape. It was then brought to a flexible wire lead, about 10" long. A coil winder was at hand. Accordingly, we made up a block of soft wood, the exact size of the inside of the rectangular form used for the windings. A hole was drilled through this, so that it could be fastened to the winder. If a coil winder is not available a hand drill can be used placing a long bolt, of small size, through the hole of the wooden block, and chucking this in the drill, fastening the drill in a vise. The average hand drill will make around four turns of the chuck to one revolution of the handle, which makes it very easy to count turns.

Winding can now be attempted. With a ratio of 5:1, 25 turns will be needed between taps, if you want to tap every 5 volts, as we did. In the first step, 25 turns should be run on the form. A loop of wire, about 10" long, should be taken up, and twisted firmly, as close to the form as possible, (Continued on page 70)

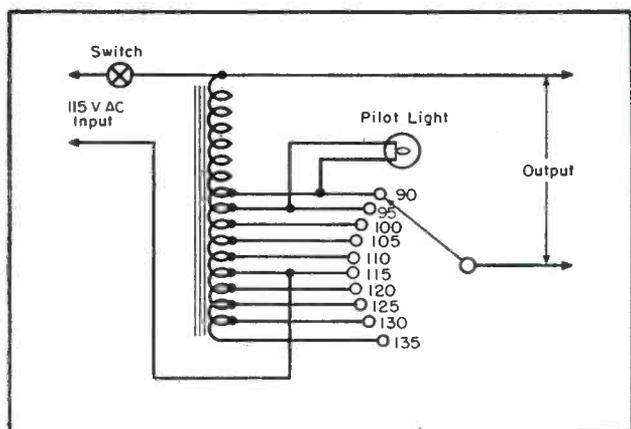
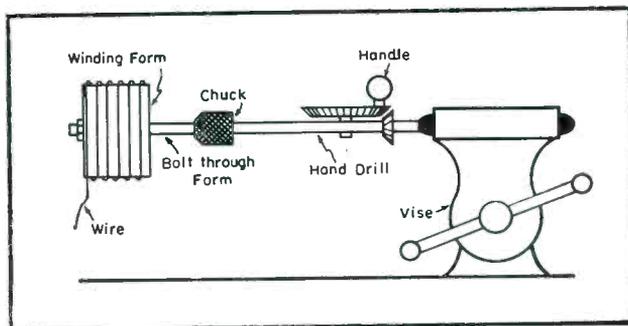


Fig. 2. Circuit of autotransformer test system.

Fig. 3. Emergency type winder using a hand drill.



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**Tester**

(Continued from page 69)

tacking down with a small piece of cellophane tape. This can be labeled 95 with a small tag. Now, the winding can be continued, stopping every 25 turns to take off a tap, twisting and labeling. As an average, 25 turns will just about form one layer across the form. As you finish, each layer should be tacked down with small pieces of cello-tape, crosswise. This will provide a much smoother surface to wind the next layer, and keep the windings from rolling off, when you remove it from the form! When the taps are brought out, it is important to see that they all come out in the same place, and also that they come out at a point which will be clear of the iron, when the transformer is reassembled.

When you've finished winding, the bolt and fillers should be removed and the tape fastened down inside the form. Now, the core-laminations can be replaced. Usually, the procedure will be three at a time; three *I* laminations, three *E* laminations, and so on, until the *window* is filled. When the iron was being disassembled a small, thin wooden wedge, should have been found. This should now be replaced and carefully driven down, until the core is tight. It is important to watch out, when driving the last few laminations into place, that the sharp edges don't cut through the windings, causing a short to the core. The core should be fastened together with the bolts removed earlier.

The test setup should look like the circuit in Fig. 2. The *ac* line should be connected to the beginning of the winding, and to the 115-volt tap. One tap should be connected to each point of the tap switch. The toggle switch should then be connected in the primary circuit, to break it when the tester is not needed. The pilot light may be connected across any two taps, as you'll have about 5 volts between any adjacent pair. If you happen to have a 150-*v ac* voltmeter around, it can be hooked up across the output, or you can simply mark the voltages on the taps of the switch.

It might not be a bad idea to coat the transformer with Glyptal or good insulating varnish, to be assured of long life. For testing, an *ac vm* can be connected across the output, and the voltages obtained measured as the tap switch is run from one end to the other. You can mark them on the switch plate at this time, if you prefer. Now, to test the performance of the

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unit under load, your soldering iron can be plugged into the outlet, while watching the meter. If your wire has been large enough, you won't have too much drop under load. Our unit was wound with about No. 24 wire, and there was no drop at all, under a full 100-watt load, which is quite a bit more than you will ever have occasion to put on it, in service work.

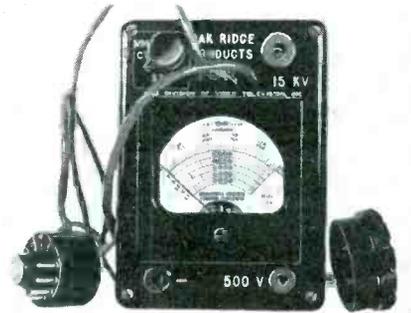
**PRECISE HV PROBE**

A high-voltage probe, model 999, has been introduced by Precise Development Corp., Oceanside, L. I., N. Y. Unit has multiple insulation: two areas of air insulation, plastic inside insulation and an outside plastic insulation which protects against voltage breakdown. Incorporates a double spring suspension system, stainless steel springs and fibre cushions to maintain vertical and horizontal shock resistant characteristics. Tips are interchangeable and include an alligator clip plus the conventional probing type. Probe also has interchangeable resistors for use with any *vvm* or 20,000 ohms-per-volt meter.



**OAK RIDGE PICTURE-TUBE TESTER**

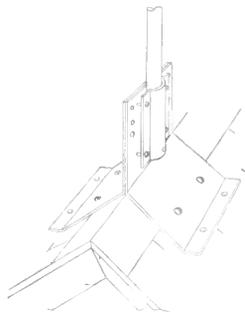
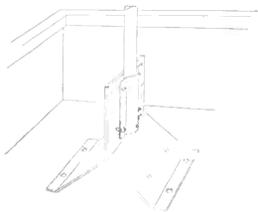
A picture-tube tester, the *Cathette 106*, that tests picture tubes right in the TV set, has been developed by Oak Ridge Products, 37-01 Vernon Blvd., Long Island City 1, N. Y. Measures 5½" x 3¾" x 2¼". Checks both magnetic and electrostatic tubes.



\* \* \*

**PHOENIX ROOF MOUNT**

A roof mount, *type PAM-12*, has been introduced by Phoenix Electronics, Inc., Lawrence, Mass. Designed for mounting on flat or peaked roofs. Clamps hold any size mast from 1" to 1½" in diameter.

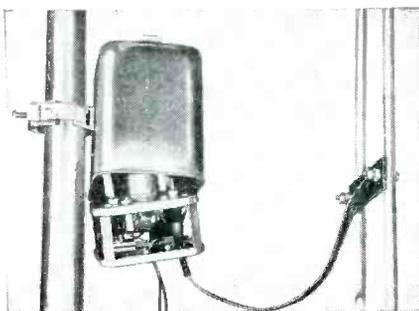


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**TACO ANTENNA AMPLIFIER**

An antenna amplifier, for mounting at the antenna, that is said to provide a signal amplification of 14 db, has been produced by the Technical Appliance Corp., Sherburne, N. Y.

Unit is powered by a 24-volt transformer located at the receiver. Designed for use with standard 300-ohm leadin from the antenna to the transformer, the power is conducted up the same 300-ohm leadin to the transformer in the upper unit.



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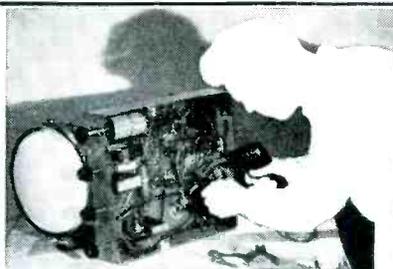
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## JOTS AND FLASHES

TELEVISION IS ENTERING AN ERA of replacements and conversions, according to *Ed Hinck*, sales manager of the electronic parts department of Allen B. DuMont Laboratories, Inc. He noted that sets have now been in use for several years and the need for replacements is growing daily. Also cited was the growing interest in the possibilities of converting small-size screen chassis to accommodate the larger picture tubes, now available at moderate costs. . . . G.E.'s tube department has leased the 50,000-square foot bus terminal of the Garden State Lines in Clifton, N. J., for use as its eastern regional electronic tube warehouse. . . . The Astatic Corp. has appointed *Joseph Plasencia, Inc.*, New York City, to handle foreign sales of their products. . . . *E. W. Merriam*, manager of the Teleset service control department of DuMont, has resigned. *C. W. Cooper*, manager of the department in New York, has also resigned. . . . *D. W. May*, 30 Church St., New York 7, N. Y., has been appointed regional manager for Hoffman Radio Corp. . . . *Rider's Perpetual Trouble Shooter's Series*, Volume 22, will be available in October. Contains 1520 pages and is priced at \$18.00. . . . H. & A TV Picture Tube Co., 3547 West Montrose Ave., Chicago 18, Ill., owned and operated by *Bernard Avers* and *Richard Harrison*, has announced expansion of their service for nation-wide coverage. . . . *Lester Klein* has been appointed manager of the branch store of the Hudson Radio & Television Corp., 212 Fulton St., New York City. . . . John F. Rider Publisher, Inc., 480 Canal St., New York 13, N. Y., will publish a 325-page book, *TV and Electronics as a Career*, with chapters on engineering, broadcasting, manufacturing, servicing, parts and receiver distributing, sales representation, and retailing, written by *J. R. Poppele*, vice president, WOR-TV; *R. W. Peterson*, assistant manager electronics division of Admiral Corp.; *W. H. Bolke*, manager custom service operation section, RCA Service Corp.; *Ira Kamen*, director of TV development of Brach Manufacturing Corp., and *R. H. Dorf*. Priced at \$4.95. . . . Dynamic Stores and the Brach Manufacturing Corp., Newark, N.J., will present a series of 30 TV spot announcements over WOR-TV, featuring the Brach 2-set coupler. . . . A recent issue of the *Aerovox Research Worker* details *uhf* power measurements. . . . Webster-Chicago Corp. has announced production of an auxiliary color TV unit, for attachment to standard black-and-white receivers, which provides a 12½-inch picture. . . . A catalog, 95, covering TV, radio and industrial electronic parts and equipment has been issued by Concord Radio Corp., 901 W. Jackson Blvd., Chicago 7, Ill. . . . *Benjamin Cardenas Del Rio*, Permo, Inc. rep in Mexico, recently visited the Chicago office of the company. . . . A recent issue of *Telrex News* includes a discussion on color and *uhf*. . . . *Kim Oman* has been appointed production supervisor of the South River Metal Products Co., Inc., South River, N. J. Supervision of the sales department is now under the direction of *Max Cohn*, who is president and general manager. *Marty Roth* has been named eastern rep.

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First, you get a permanently fixed, tubular brass shaft that can be adapted for split-knurl or flatted type knobs in a few seconds by inserting one of the steel shaft ends supplied in every package. This means utmost convenience without sacrificing the stability

of permanent, two-point shaft suspension.

Second, you get the convenience of AC switch design that permits secure attachment, without removing the control housing. Positive indexing assures proper position.

Third, you get exceptionally accurate resistance values and taper curves.

Fourth, you can be sure of years of quiet, satisfactory service life through extremes of humidity and temperature.



*Make it Mallory and make sure! Ask your distributor to show you the time-proved Mallory Midgetrol with the new features that make installation faster and simpler than ever.*

In addition to single controls, dual concentric Mallory Midgetrols can be made up easily by combining factory-assembled front and rear sections of desired resistance values. Ask your Mallory Distributor for details!

\*Reg. U.S. Pat. Off.

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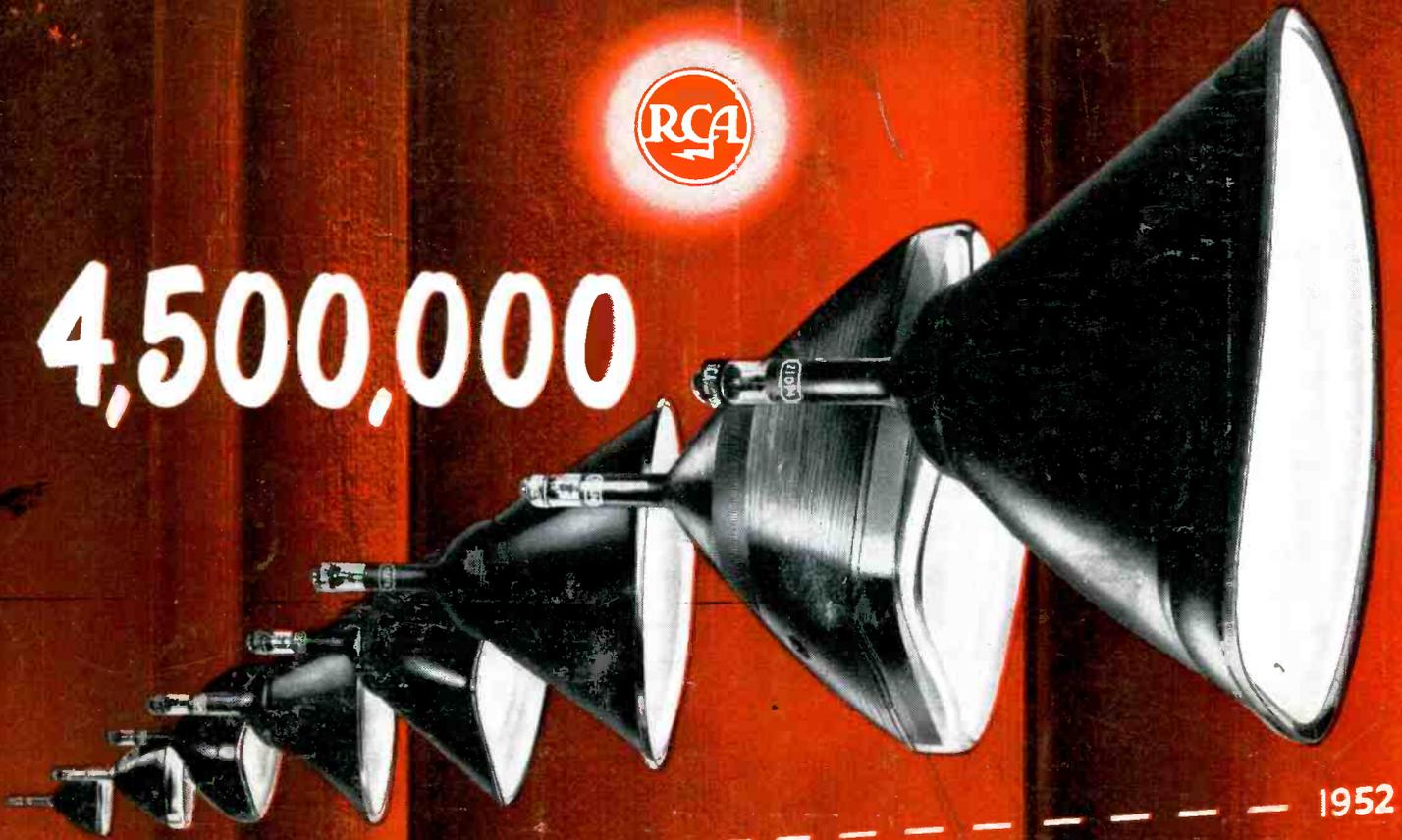
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It is a well-established fact that more RCA kinescopes are now in active service than any other brand . . . over 4½ million since the advent of commercial television, when RCA pioneered the first large-scale production of kinescopes.

Significantly, many RCA kinescopes installed *four and five years ago* are still giving good performance today, providing continuous reliable service year after year. Yes, RCA picture tubes of all types have consistently given outstanding performance.

RCA's kinescope quality means substantial savings to dealers and servicemen, in fewer call-backs and "out-of-pocket" replacements. In the long run, it amounts simply to this . . . stocking RCA picture tubes is good business . . . as any long-term user of RCA kinescopes will tell you.

Your local RCA Tube Distributor carries a complete line of RCA picture tubes. See him the next time you buy kinescopes for replacement.

*Keep informed . . . keep in touch with your RCA Tube Distributor*



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