

FEBRUARY, 1951

Radio-Television
**SERVICE
DEALER**



The Professional Radio-TVman's Magazine

IN THIS ISSUE:

Antenna Rotators, Part I
Phase Inverters
The CBS Field Sequential Color System, Part 2
Converting An RCA #8TV41 To Accommodate A
14" Rectangular Tube
Tube Topics
Let's Recruit For The Future

AM-FM-TV-SOUND

Total Distribution Of This Issue: Over 30,000

Don't gamble with comebacks!

Hundreds of servicemen, interviewed in a recent survey, say that to avoid comebacks they use Mallory Vibrators. For right-the-first-time jobs, their rule is . . .



Make Sure! Make it Mallory!

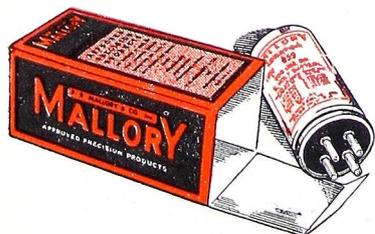
We called on every serviceman in the phone book—in widely scattered cities—talked to every one we could find in his shop. We found that servicemen prefer Mallory vibrators in a ratio of two to one over any other brand!

Why? Better performance! Longer life! Less service trouble!

Mallory vibrators give you the performance you want because of experience dating back to the first commercial vibrator development—because of a patented design that gives you positive starting, quiet operation, long life. Mallory gives you a better vibrator, available in a complete line, meeting original equipment specifications . . . and you pay no more.

Don't just order vibrators. Order Mallory! Get the benefit of the precision quality that is the reason for more Mallory vibrators being used in original equipment than all other makes combined.

Depend on your Mallory Distributor for precision quality at competitive prices.



P. R. MALLORY & CO. Inc.
MALLORY

CAPACITORS • CONTROLS • VIBRATORS • SWITCHES • RESISTORS
• RECTIFIERS • VIBRAPACK* POWER SUPPLIES • FILTERS

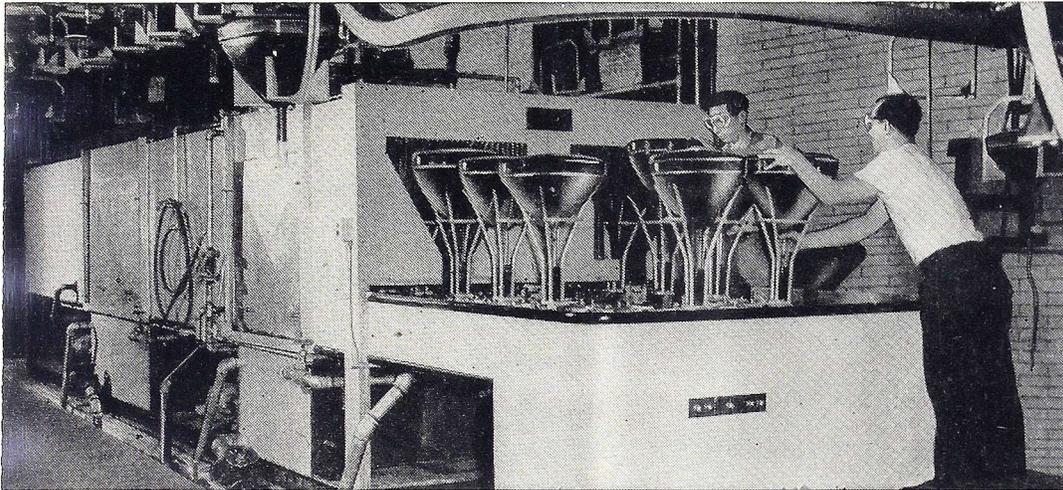
*Reg. U. S. Pat. Off.

APPROVED PRECISION PRODUCTS

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

no

washday blues



at

Sheldon

The new Sheldon giant washing machine that uses over 1,000 gallons of water every hour of the day. Sheldon's Irvington, N. J. plant uses 360,000 gallons of water per day much of which comes from wells within the plant.

The sensational, extra-fast washing and trouble-free efficiency of our newest type glass-blank washing machine allows us to take care of the tremendous demand for Sheldon Television Picture Tubes . . . and to maintain the perfect screen quality of these tubes.

This specially designed automatic washing machine actually washes our glass-blanks in three cycles: First, the inside face of the glass-blank gets an acid wash; then it is rinsed with water. Next, the inside face is given a caustic wash, and then rinsed again with water. As the final step, the inside face is rinsed for several minutes with a high pressure stream of "thirsty water" — water from which all minerals and foreign substances have been removed by our special equipment and techniques.

When the glass blank leaves our washing machine, the inside surface of the glass-blank is bacteriologically clean and medically pure . . . so pure, in fact, that it is "thirsty" or "hungry" to reabsorb foreign substances . . . PRIMED to receive the phosphor coating. The phosphor coating is applied over this "thirsty" surface to consistently produce the uniformly perfect blemish-free, "TELEGENIC" screen for which Sheldon Picture Tubes are famous.

WRITE today for the latest "Sheldon 'TELEGENIC' Picture Tubes—General Characteristics & Dimensions Wall Chart" containing the new Sheldon VITATRON Glass-Metal 19AP4B and 19AP4D, and the New Rectangular 20CP4!

TELEVISION MIS-INFORMATION NO. 4 is off the press! Write for your copy today!

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A Division of ALLIED ELECTRIC PRODUCTS INC.
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➡ VISIT SHELDON BOOTHS NO. 390-1-2 AT THE RADIO ENGINEERING SHOW, MARCH 19-22, GRAND CENTRAL PALACE, N. Y. ◀

RADIO-TELEVISION SERVICE DEALER • FEBRUARY, 1951



Sheldon
NATURAL IMAGE

SOFT GLOW
Picture Tube

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EDITORIAL

by S. R. COWAN

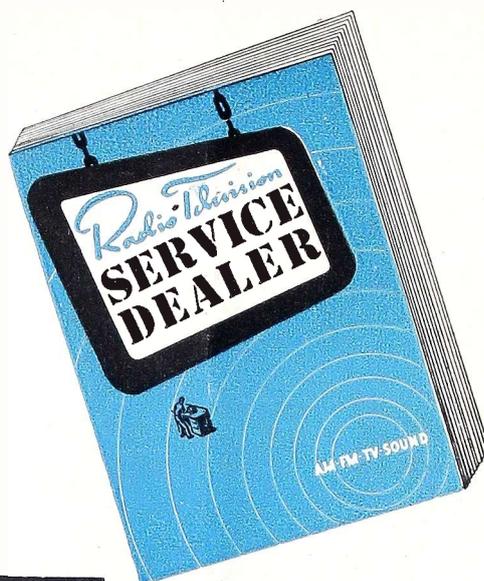
Parts Supply Outlook

From the very moment that the Korean "incident" occurred this writer feared that it would eventuate in a severe shortage of replacement tubes, parts, etc. for the radio-TV servicing trade, and despite the subsequent "assurances" of top-bracket factors in RTMA that such would not be the case, it now develops that our fears were well grounded. There *will* be shortages of all radio replacements and we must all face that fact.

By no means do we suggest that servicers should overstock or hoard. In fact, the supply lines are so thin that one could hardly succeed in accumulating large inventories at this late hour. But, the situation is so critical that an astute businessman would be remiss if he failed to review his position at once to ascertain what protection can be gotten now to assure him of at least obtaining his fair allocation of merchandise from his wholesale suppliers. Bear in mind that price-fixing regulations will undoubtedly hold prices to present-day ranges. Then, review your needs of replacements and consider how, where and what substitutes can be obtained to enable you to carry on as-near-normal-as-possible service by means of the substitution method. For example: most TV sets have upwards of 200 insulated resistors in them. Should some insulated resistors blow, it might be possible to replace them with uninsulated carbon types provided care is taken so that no shorts will occur from their touching one another. In like manner, some available type tubes can be substituted for unobtainable types provided minor circuit revisions are also effected. Finally, bear in mind that overhead and general costs, such as labor, are increasing daily, while manpower is becoming scarcer and more costly. This justifies a review of your pricing scale.

The Business Overlook

If, as the experts predict, only 4 million new TVsets and 10 million new radio receivers can be produced during 1951, this will result in the servicing profession having the biggest volume of business in the industry's history. Of the 10 million TVsets now in use, 1 million have been in service over 4 years and 3 million others have given their users 2 years or more of service. Thus these 4 million units are especially "ripe" for servicing. In fact, the bulk of them are prospective conversion jobs to big-size screens. Cut-back of new TV production should make sufficient big picture tubes available for this purpose. Then, insofar as AM-FM radio receiver service potential is concerned, of the 100 million receivers in use, over 90% have already given more than one year's service, and over 70% have been in use for more than three years, thus here again the potential amount of volume is so high that it nearly staggers the imagination. So, one word of caution must be given again with all the force we can command — don't do your work at a loss.



Sanford R. Cowan
EDITOR & PUBLISHER

Samuel L. Marshall
MANAGING EDITOR

COWAN PUBLISHING CORP.

67 WEST 44TH ST.
NEW YORK 18, N. Y.



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DAVID SALTMAN, Production Mgr. SELMA WILE, Circulation Mgr.

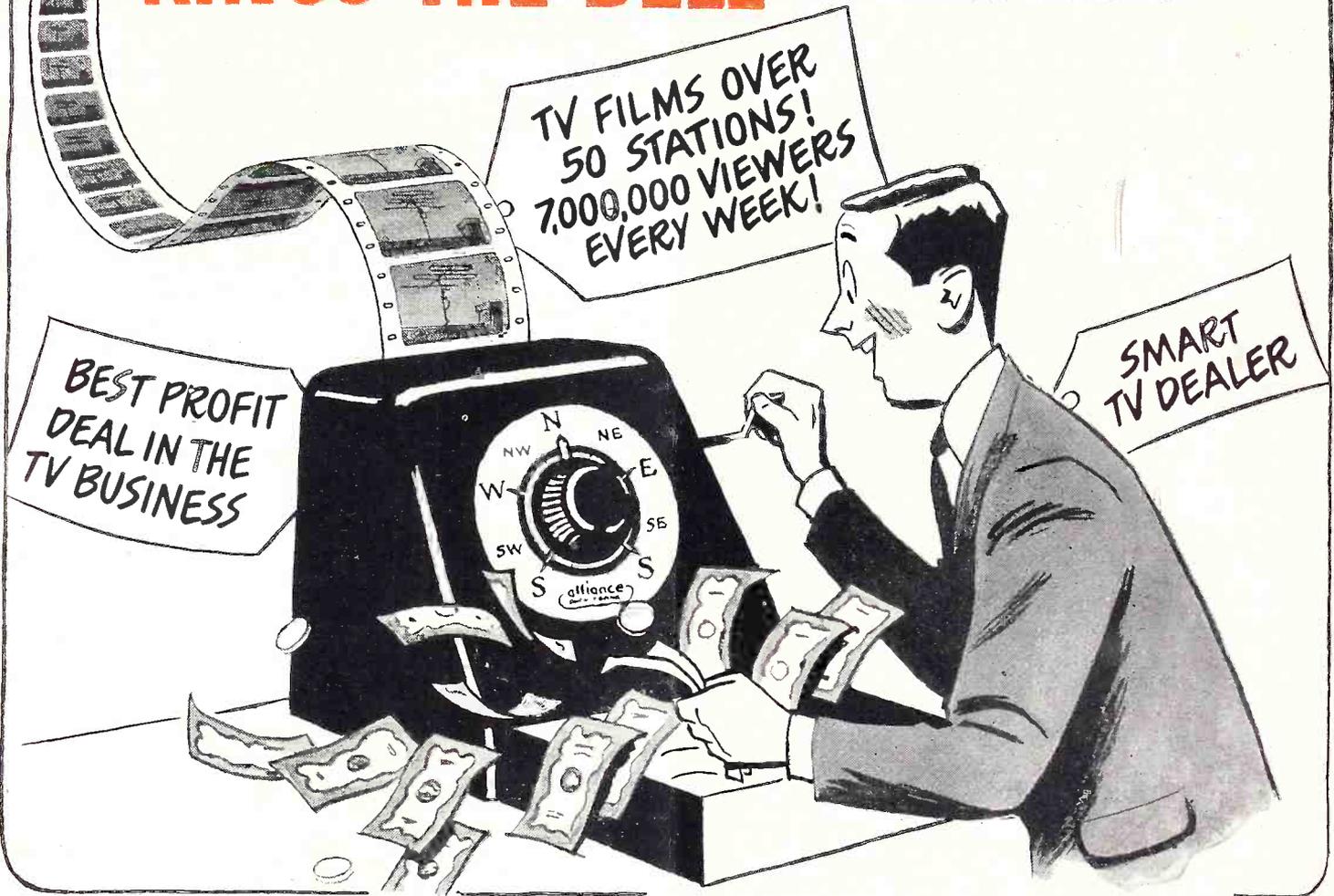
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ALLIANCE TENNA-ROTOR

RINGS THE BELL for smart TV dealers!



Be Sure You Have This Winning Combination



Model HIR Tenna-Rotor

TENNA-ROTOR

The only fully automatic rotor. Just set it and forget it! Set the pointer . . . the antenna turns to that position and stops. North—East—South—West—direction indicator dial shows exact antenna position at all times.



Tenna-Scope

ALLIANCE TENNA-SCOPE

The new TV booster with one simple control. Gives maximum uniform high gain on all channels. Automatic on-off switch. Easy to install. An excellent companion item to Tenna-Rotor.

THE SALES ARE 'SET UP' FOR YOU!

Nation-wide TV Advertising delivers
Thousands of Sales—Every Week!

Seven million viewers see Alliance Tenna-Rotor demonstrated on 50 key TV stations every week. Tenna-Rotor is the only TV accessory backed by a consistent, powerful national TV campaign. Hundreds of thousands of Alliance Tenna-Rotors are in use! ● Alliance Tenna-Rotor offers faster installation with 4-conductor "Zip" cable. Works in all weather. Guaranteed for one year. Approved by Underwriters Laboratories.

NEW DELUXE MODEL HIR IS FULLY AUTOMATIC!

ALLIANCE MANUFACTURING COMPANY • Alliance, Ohio

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ask for
**SPRAGUE
CAPACITORS**



SPRAGUE TVL
"TWIST-LOK"
DRY ELEC-
TROLYTICS



SPRAGUE
"TELECAP"
MOLDING
TUBULARS



SPRAGUE
"CERA-MITE"
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CERAMICS



SPRAGUE
TVA "ATOM"
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Sprague's famous Four

**BIGGEST LITTLE
TROUBLE-SAVERS
IN TV SERVICING**

... Avoid costly callbacks!

WRITE FOR CATALOG

**SPRAGUE
PRODUCTS COMPANY**

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71 MARSHALL ST., NORTH ADAMS, MASS.

ATOM, TWIST-LOK, TELECAP and
CERA-MITE are SPRAGUE Trademarks

TRADE FLASHES

A "press-time" digest of
production, distribution,
and merchandizing
activities

Proposed NYC License Bill

The proposed N.Y. City license bill for TV service organization is presented herewith without comment.

A Local Law to amend the administrative code of the city of New York, in relation to television receivers.

Section 1. Chapter thirty-two of the administrative code of the city of New York is hereby amended by adding thereto a new article, to follow article thirty-four, to be article thirty-five, to read as follows:

ARTICLE 35 TELEVISION RECEIVERS

§ 32-263.0 *Legislative declaration.* — It is hereby declared that the inhabitants of the city are daily becoming the owners of a greater number of television receivers, and as a result thereof, a new business of servicing, maintaining and repairing said television receivers has come into being. It is hereby declared that due to the method of operating said business, a great many of the inhabitants of the city have received poor and unskilled workmanship and have paid in advance sums of money for yearly service contracts and thereafter have failed to receive said service due to the financial failure of the service organizations. The necessity for legislative intervention by the enactment of the provisions of this article is hereby declared as a matter of legislative determination.

§ B32-264.0 *Definitions.* — Whenever used in this article, the following terms shall mean and include:

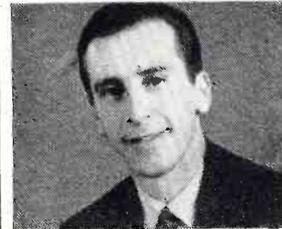
1. "Servicing and/or maintaining and/or repairing television receivers." The installation of antennas, both indoor and outdoor, the testing of equipment and repairing same either on the premises of the owner of the television receiver or at any other place and the furnishing and installation of replacement parts.

2 "Service organization." Any individual, firm or corporation operating and conducting the business of servicing and/or maintaining and/or repairing television receivers.

§ B32-265.0 *License required.* — a.

PHOTOFACT Users Write Our Best ADS!

Hundreds of unsolicited letters
tell what the world's finest Radio
Data means to Service Technicians



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5410 Trask St.
Oakland, California

"Your PHOTOFACT Folders, in my estimation, are priceless. In fact, the same applies to all your servicing materials which are of the greatest aid to us who service radios, phono changers, etc., and want to do so by the simplest and yet the proper method."



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2112 Brown St.
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"... your T.V. PHOTOFACTS are a sure fire help to Television Servicing."



Harry D. Kratz
4112 Frederick Ave.
Baltimore, Maryland

"The frequent \$1.50 Folders helps a fellow to 'budget' his library, while being up-to-date as well. Orchids to you."

NOW! GET THE PROOF FOR YOURSELF!

FREE

We'll Send You a FREE Photo-
fact Folder on any postwar set

Learn for yourself—at our expense—how PHOTOFACT pays for itself by earning bigger repair profits for you! Ask for a FREE Folder covering any postwar AM, FM or TV receiver listed in the PHOTOFACT Cumulative Index. Examine it. Put it to work at your bench—then judge for yourself!

WRITE FOR FREE FOLDER TODAY!

HOWARD W. SAMS & CO., INC.
2201 East 46th Street • Indianapolis 5, Indiana



NOTE the wide ranges of this compact pocket-size instrument. Note controls—flush with panel. Then study the inside view. Nowhere will you find, in design and manufacturing quality, the equal of 666-R.



Model 666-R

A BASIC TOOL

**POCKET-SIZE: VOLT-OHM-MIL-AMMETER
WITH SELF-CONTAINED RESISTANCE RANGES TO 3 MEGOHMS**

1. Resistance Ranges from 0-3000 Ohms (.5 Ohm low reading) to 3 Megohms, self-contained. Also A.C.-D.C. Volts to 5000, 10 ranges; and 3 Direct Current ranges.

2. Enclosed Selector Switch, molded construction. Keeps dirt out, and retains contact alignment permanently.

3. Unit Construction—Resistors, shunts, rectifier, batteries, are housed in a molded base integral with the switch. Direct connections without cabling. No chance for shorts.

4. Resistors are precision film or wire-wound types, each in its own compartment.

ONLY \$26.50—at your Distributor

In Canada: Triplet Instruments of Canada, Georgetown, Ontario.

FOR THE MAN WHO TAKES PRIDE IN HIS WORK

Triplet

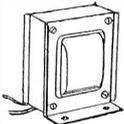
TRIPLET ELECTRICAL INSTRUMENT CO., BLUFFTON, OHIO, U. S. A.

AN Original...



Always look for the RCA monogram on the red-black-and-white carton

It takes an RCA Original... to insure top TV performance



Performance-proved in millions of television receivers of many makes—RCA "original" TV components will cut your service call-backs and insure customer satisfaction. That's because RCA TV components are designed to work perfectly with the tube types and circuits used in the top television receivers...and rated to withstand abnormally high peak voltages.

When replacements are called for...play safe...use genuine RCA television components...they cost no more than substitutes.

SEE YOUR LOCAL RCA PARTS DISTRIBUTOR
FOR "ORIGINAL" RCA TV COMPONENTS



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

It shall be unlawful for any service organization to maintain, operate or conduct the business of servicing and/or maintaining and/or repairing television receivers without a license therefor, issued by the commissioner.

b. A license to maintain, operate or conduct the business of servicing and/or maintaining and/or repairing television receivers shall be granted to a person, firm or corporation with an established place of business and in accordance with the provisions of this article and the rules and regulations of the commissioner.

§ B32-266.0 *Fees; term.*—a. Every license issued under this article shall be for a period of one year and shall expire on the thirtieth day of April next succeeding the date of issuance thereof.

b. The fees for such license shall be:

1. Upon the issuance of a license: \$25.
2. Upon the renewal of a license: \$15.

§ B32-267.0 *Applications.*—Every applicant for a license shall file with the commissioner a written application in such form and contain such information as may be prescribed by the commissioner.

§ B32-268.0 *License not transferable.*—No license issued under the provisions of this article shall be transferred or assigned to any person, firm or corporation, nor shall such license be used at any location other than the location stated in such license.

§ B32-269.0 *Payments of judgments.*—Every license issued pursuant to this article shall be subject to suspension or revocation upon the failure of such licensee to pay or satisfy any judgment secured against him, provided that such judgment was secured in a court of competent judgment against the licensee for acts of commission or omission with regard to the business maintained, operated or conducted by him pursuant to the license issued hereunder.

§ B32-270.0 *Regulations.*—The commissioner may promulgate such rules and regulations as may be necessary to carry out the provisions of this article.

§ B32-271.0 *Revocation, suspension, or renewal of license.*—Any license may be suspended or revoked by the commissioner, and any application for a renewal thereof denied, for the failure of the licensee to comply with any applicable provision of law or any rule or regulations duly promulgated by the commissioner.

§ B32-272.0 *Violations.*—Any person, firm or corporation who shall violate or fail to comply with any

Floyd Makstein, field engineering
manager at **Emerson** recommends

Simpson MODEL 480 GENESCOPE

FOR TV-FM SERVICING

This is what Floyd Makstein of EMERSON says about the Simpson Model 480 Genescope: . . . "The Simpson Model 480 Genescope far surpasses the standards required in the servicing and aligning of all TV-FM receivers.

The wide frequency response and the 25 millivolt sensitivity of the oscilloscope, combined with the required fundamental signal sources which are provided in the AM & FM oscillator sections, simplifies the accurate aligning of all TV receivers, including those with intercarrier systems.

In addition, the large, easy-to-read dials, having a 20-1 vernier control and 1000 division logging scale, cuts down on servicing time."

Mr. Makstein concludes . . . "The compactness of the complete unit will be a big factor in many of the service shops where space is at a premium. We are sure that the whole TV industry appreciated your efforts in raising the engineering standard in servicing." Emerson Service personnel know that modern FM and TV development and servicing demand test equipment made to the most exacting standards.

They prefer the Simpson Model 480 Genescope because it is the most accurate, flexible and convenient instrument available. The Genescope will render many years of uninterrupted service and always produce accurate results.

SIMPSON ELECTRIC COMPANY

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THESE RANGES SHOW HOW MUCH THE SIMPSON GENESCOPE CAN DO FOR YOU

FREQUENCY MODULATED OSCILLATOR

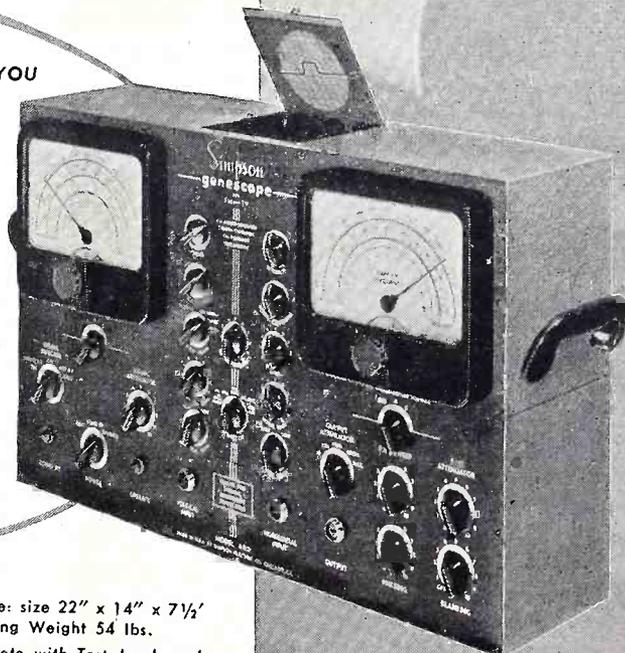
Band A: 2-120 megacycles
Band B: 140-260 megacycles
Sweep width variable from
zero to 15 megacycles
Sweep rate 60 cycles per
second
Specially designed frequency
sweep motor
Continuously variable
attenuator
Crystal calibrator:
5 megacycles \pm .05%
Audio Oscillator 400 cycles
Output Impedance 75 ohms
Step attenuator for control of
output

AMPLITUDE MODULATED OSCILLATOR

Band A: 3.3-15.6 megacycles
Band B: 15-75 megacycles
Band C: 75-250 megacycles
30% modulation at 400 cycles
or unmodulated
Continuously variable attenuator
Visual method of beat
frequency indication

OSCILLOSCOPE

Vertical sensitivity:
25 mv per inch
Horizontal sensitivity:
70 mv per inch
Linear sweep frequency:
2 cycles to 60 kilocycles
60 cycle sine sweep
Frequency essentially flat to
200 KC. usable to over 3
megacycles



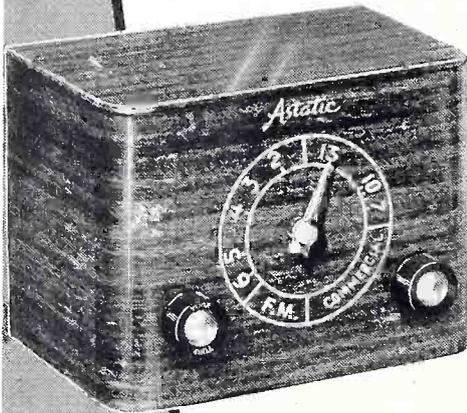
Simpson Model 480 Genescope: size 22" x 14" x 7 1/2"
Weight 45 lbs. Shipping Weight 54 lbs.

DEALER'S NET PRICE complete with Test Leads and
Operator's Manual, \$395.00.

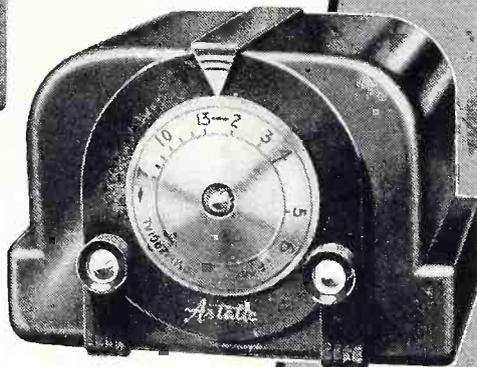


BEST BEFORE NOW EVEN BETTER THAN EVER *Astatic* TV and FM Boosters

YES, ASTATIC engineering research has found a way to improve still further its BT Series Boosters, in ability to sharpening quality of TV reception. From the first, these Astatic entries in the low-cost booster field have won top preference of the trade in virtually every instance where performance has been compared. So, it's a matter of yesterday's best made even better today—thanks to constant Astatic research and engineering progress. This continuing search for better methods and products is also your greatest assurance of first quality in phonograph pickups and cartridges, microphones and related equipment.



Model BT-1
List Price
\$32.50



Model BT-2
List Price
\$34.95

QUALITY FEATURES

- 1 Mallory Inductuner for continuous variable tuning.
- 2 High gain, very uniform on both high and low channels.
- 3 Simplified controls—single tuning knob with continuous tuning through both TV and FM bands.
- 4 Band width adequate over entire range.
- 5 Low noise design and construction.
- 6 No shock hazard to user.
- 7 Off-on switch for easily cutting in and out of the circuit.
- 8 Selenium rectifier.
- 9 Single 6AK5 tube.
- 10 Provide for either 72 ohm or 300 ohm impedance input and output.
- 11 Model BT-2 has handsome, dark brown plastic cabinet.
- 12 Model BT-1 has metal cabinet in rich mahogany woodgrain finish.
- 13 Large dial face is easy to see in tuning.
- 14 Model BT-2 has recessed pilot light to show when booster is on.

THE
Astatic
CORPORATION
CONNEAUT OHIO
IN CANADA CANADIAN ASTATIC LTD. TORONTO, ONTARIO

provision of this article or any rules or regulations promulgated thereunder shall, upon conviction thereof, be punished by a fine of not more than one thousand dollars for each offense or by imprisonment for not more than one year, or by both such fine and imprisonment.

§ B32-273.0 *Separability*.—If any clause, sentence, paragraph, or part of this article or the application thereof to any person or circumstances shall be adjudged by any court of competent jurisdiction to be invalid, such judgment shall not affect, impair or invalidate the remainder thereof or the application thereof to other persons and circumstances, but shall be confined in its operation to the clause, sentence, paragraph or part thereof and the persons and circumstances directly involved in the controversy in which such judgment shall have been rendered.

§ 2. This local law shall take effect May first, nineteen hundred fifty-one.

Referred to the Committee on General Welfare.

Oxford Produces 3,000,000th

Speaker for 1950

Four days before Christmas, Oxford Electric Corporation produced its three millionth speaker for 1950. This marks the highest production achievement of Oxford in over twen-



ty-five years of manufacturing speakers.

Angelo Sorice, works manager (on the right) is handing the three millionth speaker to John A. Proctor, Jr., general sales manager (left) and Hugo Sundberg (second from right), vice-president and manager, and Karl Wessel, chief engineer, look on.

Mfgs Organize New R. R. I. C.

Leslie F. Muter, President of the Muter Company, Chicago, announced that the Radar-Radio Industries of Chicago, Inc., has been revitalized to meet the increasing demands of the present national defense program on Chicago electronic equipment manufacturers.

The R.R.I.C. is a non-profit corporation established during the World War II to develop a cooperative effort between Chicago radio manufacturers

Never Before a Sales Boosting Campaign Like This—all for You!

This SYLVANIA star-studded program will keep your service business booming during 1951!

Appealing Life-Like Window Displays

You'll find prompt expert television and radio service Right Here!

Colorful Counter and Store Displays

You'll find prompt expert television and radio service Right Here!

Call us for top quality television and radio service

Don't you say, "For Reliable Radio and Television Service I Depend on this Emblem!"

We Use SYLVANIA Radio and Television Tubes

We Use SYLVANIA Radio and Television Tubes

More Wilson Says: "I rely on this Emblem for dependable Radio and Television Service"

We Use SYLVANIA Radio and Television Tubes

RADIO TELEVISION SERVICE
SYLVANIA RADIO TUBES Authorized Dealer

Bright window streamers

More Wilson Says THIS EMBLEM IS MY ASSURANCE OF FINE RADIO AND TV SERVICE

If your Radio or Television set needs expert attention SEE US
WE USE SYLVANIA RADIO AND TELEVISION TUBES

We Use SYLVANIA Radio and Television Tubes

RADIO TELEVISION SERVICE
SYLVANIA RADIO TUBES Authorized Dealer

Sales-getting postal cards



New giant mailers



Reminder stickers for every set you service



Radio spot announcements for every month



It's ready and waiting for you now... the most colorful and appealing Service Dealer advertising campaign ever planned!

Featuring famous stars of screen, television and radio, it ties in with the national advertising your customers will see in *The Saturday Evening Post*, *Life*, *Look*, and *Collier's Magazine*, and with Sylvania's weekly CBS-TV Show, "Beat The Clock"!

So, win with Sylvania in '51. Send for this material NOW... and display it prominently. It identifies you as the expert with the super-fine Sylvania tubes... the tools and the know-how for the finest radio and TV service.

All of the display material, stickers and radio spots are FREE. You pay only 1¢ apiece for the four mailing pieces you send to your prospects. So, see your Sylvania Distributor or mail coupon NOW!

SYLVANIA ELECTRIC

RADIO TUBES; TELEVISION PICTURE TUBES; ELECTRONIC PRODUCTS; ELECTRONIC TEST EQUIPMENT; FLUORESCENT TUBES, FIXTURES, SIGN TUBING, WIRING DEVICES; LIGHT BULBS; PHOTOLAMPS; TELEVISION SETS

Sylvania Electric Products Inc.
Dept. R-2302, Emporium, Pa.

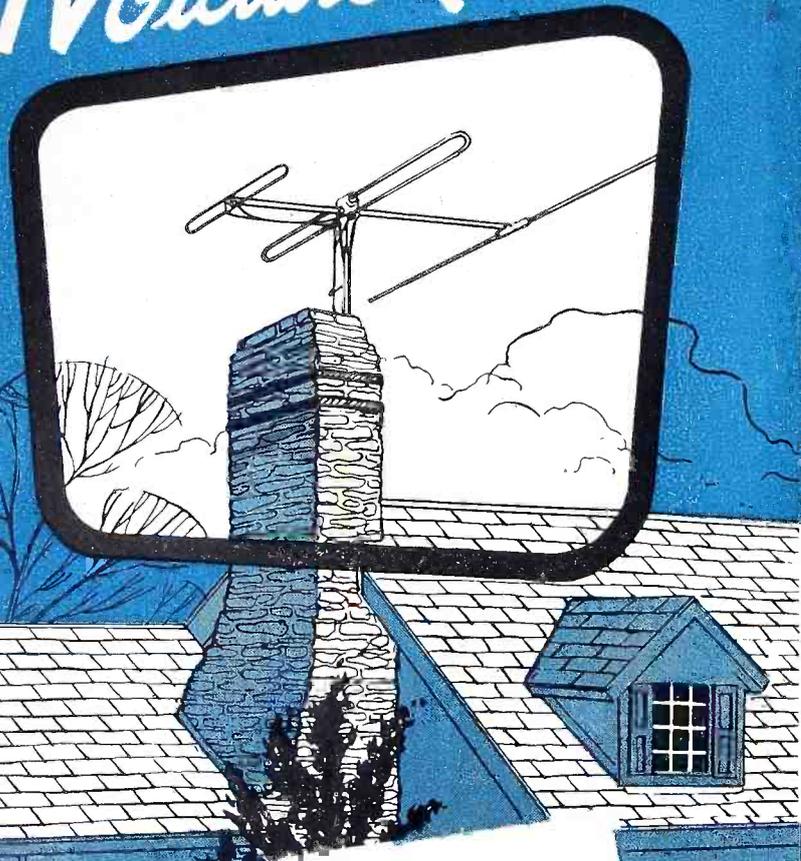
Please send me full details about Sylvania's great 1951 Dealer Promotion Campaign.

Name _____

Street _____

City _____ Zone _____ State _____

For Greatest
TV Picture Quality



AMPHENOL
—INLINE—
TV ANTENNA

* Reissue Patent Number 23,273

Manufacturer, dealer, serviceman alike benefit when the customer receives the greatest picture quality that his set can produce. Customers expect a good picture on all channels when they purchase a TV set—but even the most expensive set cannot produce a better picture than the antenna brings to it.

Exhaustive laboratory and field tests have proved that the AMPHENOL Inline Antenna gives higher, more uniform gain over the entire TV spectrum. Its full 12-channel coverage insures fine reception for all future, as well as all existing, stations in any area.

Give your customer TV picture quality right from the time of installation by recommending an AMPHENOL Inline Antenna and you will build customer satisfaction.

Send for "The Antenna Story"—a sincere discussion of TV antennas based on actual field tests.



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SYNC PULSES

by San D'Arcy

Accurate Statistics can be mighty helpful to any businessman who uses them to guide him in his planning. So, we're going to give you some late statistics that should prove valuable: approximately 96% of all U.S. homes have one or more radio sets; 4.7% own a TVset and 10% have an electric record-player that is separate from a radio. Most homes have more than one radio set. For example, 37% have a console, 62% a table model, 22% a portable, 29% a radio-phono combination and 2% a radio-TV-phono combination. A survey made in late December 1950 indicated that during 1951 almost 4 million families now located in TV areas have the purchase of a TVset on their agenda while less than 500 thousand families planned to buy a radio. 1½ million families expect to buy an electric refrigerator this year. As, during 1950, almost 8 million families bought TVsets, over 6 million bought refrigerators and over 12 million bought radios. One analyzing the survey gets the impression that the public is to an alarming degree non-buying minded. Perhaps, conditions being what they are, it is a good sign. It's quite likely that consumer durable goods production in 1951 will run 60% as high as it was during 1950 so a slow-down of buying demand will prevent black markets and inflationary trends.

Manpower Shortages are again critical. Thousands of students enrolled in radio-TV training schools and planning to be graduated as technicians prior to December 1951 have dropped out of their classes in order to enlist in the Armed Forces rather than wait for almost certain induction via the draft. This has contributed greatly to the already "tight" manpower shortage and seems to be an insurmountable obstacle having no solution. The demand being so great, and the supply of technicians so limited, has forced wage demands to peak records. Only a few good servicemen today earn less than \$125 weekly. Naturally increased costs and wages have forced service fees up to new high levels, and in most major cities the minimum hourly labor charge being asked for services rendered is \$6.00 for both radio and TV work. The set-owning public has recognized the situation and is paying the new rate scales without quibbling. However, the public is also more selective and quite naturally is favoring firms that are older, more firmly established, of "better reputation," et cetera.

Phonevision, in the first stages of practical test, has "clicked." In Chicago, about 23,000 families or 3% of all TV equipped homes thereabouts, participated. Consensus was that the idea itself is quite practical and further, that if good, exclusive programs are offered, the public will not be averse to paying the fee of approximately \$1 for each viewing. In New York non-commercial tests of the transmitting equipment for "scrambled" telecasts are now under way in off-hours and despite the very frequent announcements made to the effect that this is merely a test effort a vast number of extra service calls have been made to plague TV service contractors with unnecessary and silly checkups.

RADIO-TELEVISION SERVICE DEALER • FEBRUARY, 1951

which resulted in the production of approximately 40% of all electronics equipment used throughout the conflict.

National Technicians & Service Dealer Group Formed

The National Electronic & Service Dealers Associations, a new national organization of associations representing servicing technicians and service dealers, was launched Sunday, January 28th, at a meeting of 22 technician and servicing dealer association delegates, held at the Hotel Hamilton in Washington, D. C.

The aims of this organization are: 1) The furtherance and improvement of the electronic servicing industry. 2) To promote the welfare of servicing dealers and technicians. 3) To promote a better understanding between the electronic service industry and the electronic industry. 4) To promote and secure better relations with the public. 5) To provide educational facilities for its members. 6) To raise the standards of the electronic servicing profession. 7) To cooperate with federal, state, and municipal agencies.

Temporary elected officers are: President—Max Leibowitz (N. Y. C.). Vice-President—Norman R. Selinger (Wash. D.C.). Corresponding Secretary—Richard R. Devaney (Phila. Pa.). Recording Secretary—Roger K. Haines (Haddonfield, N. J.). Treasurer—Vance E. Beachley (Harrisburg, Pa.). Samuel L. Marshall (N.-Y. C.) was appointed chairman of the Inter-relations and publicity Committees; James L. Burns (Wash. D. C.) chairman of the Membership Committee; and Frederick J. Schmidt (Steelton, Pa.) chairman of the Steering Committee.

The address of this new association is Dorchester House, 1625 Kalorama Road, N. W., Washington, D. C.

Sheldon Expands Plant

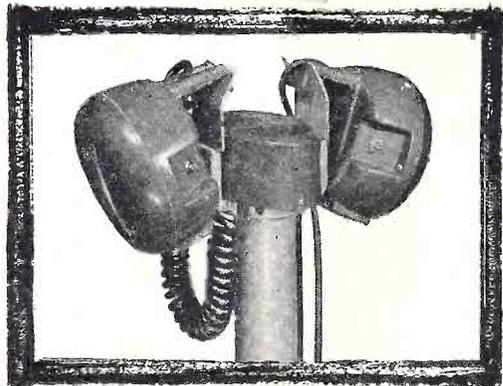
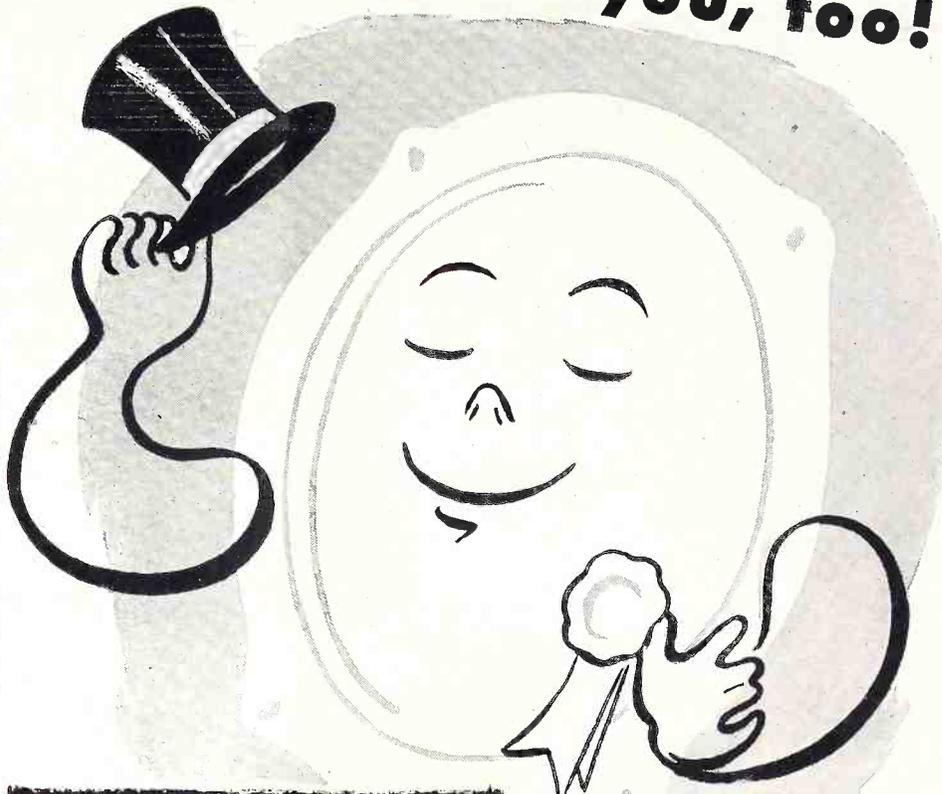
The Sheldon Electric Company Plant of Allied Electric Products Inc. is rushing its building expansion program with the erection of a two-story addition to its main building, James Schrope, works manager of Allied announced.

Mr. Schrope said the two-story addition with a half basement would add 15,000 square feet to the manufacturing facilities of the company in Irvington. This addition is expected to be ready for occupancy by March first.

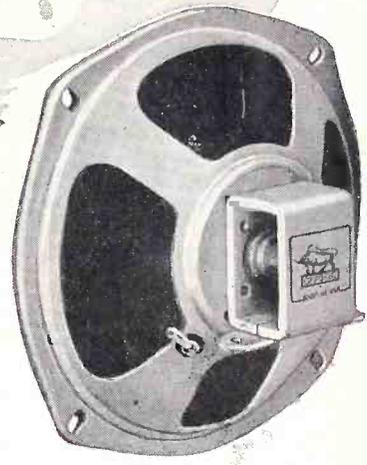
Sylvania Reduces Pix Tube Prices

Sylvania Electric Products Inc. has reduced prices on over 90% of its TV picture tube production by close to 5%, effective immediately, according to an announcement by George R.

my hat's off to you, too!



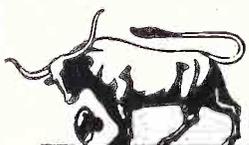
Junction box with a pair of in-car speakers, manufactured by Motiograph, Chicago



Yes, we at OXFORD are taking our hats off to the many manufacturers who combine excellent components to produce quality equipment.

Motiograph, the world's best outdoor theater equipment, serves America's fastest growing phase of the entertainment field.

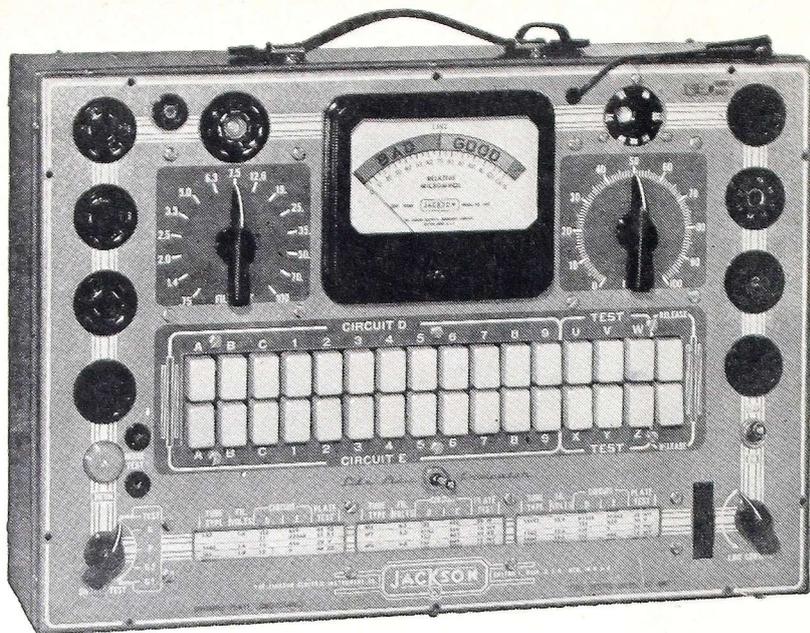
We take our hats off to people like Motiograph who pioneer and have no superiors. Yes, and we take our hats off to our research engineers who have perfected the finest and most complete speaker line through research and development for over a quarter of a century.



Leading jobbers carry OXFORD SPEAKERS for TV, FM, AM, AUTO, PA, and outdoor applications. Write for your copy of our latest catalog.

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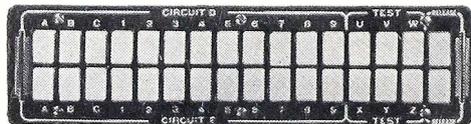
3911 South Michigan Avenue • Chicago 15, Illinois
EXPORT: ROBURN AGENCIES, NEW YORK CITY



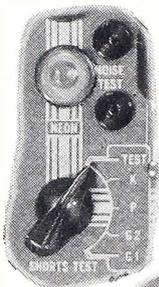
Dependable—Simple—and, "Service-Engineered"

JACKSON "Dynamic" * Tube Tester

Here is the tube tester used and recommended by manufacturers, laboratories and smart service organizations. Uses the "Dynamic" principle, pioneered by Jackson. Here are just a few of its major features.



Sequence Switching—no obsolescence with this amazing switch. Simple to use. Tube elements not connected together. Each element gets the right load or the right voltage.



Complete Shorts and Noise Tests

You test every element for shorts. Because tube elements are tested separately, you get a true picture of tube operation. Switch position shows which element is shorted—helps you locate source of circuit trouble.



Life-Line Indicator

Reduces normal heater or filament voltage. Tells you if tube is approaching the end of its life. Helps avoid troublesome call-backs. Insures more satisfied customers.

There are many more advantages to this fine Jackson tube tester—big, 4" meter—sockets for every type of tube, including sub-miniatures, blanks for future types—built-in roll chart. For the complete story, fill in and mail coupon today.

Available in bench, counter, or portable styles. Prices as low as

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Tube Testers—Television Generators—
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ers—Vacuum Tube Voltmeters.

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Sommers, general sales manager of Sylvania's Radio and Picture Tube Divisions.

This price reduction has been made possible Sommers stated, by lower costs resulting from new automatic equipment which the company has been installing throughout the past year.

"Since picture tubes constitute one of the two major component costs of a television set," Sommers said, "Sylvania is making these price reductions in spite of shortages of critical materials as an aid to set manufacturers in helping them hold the line."

Thomas Electronics, Inc. Expands

Thomas L. Clinton, President of Thomas Electronics, Inc., announces that as a result of negotiations which have been underway for some months, 100,000 square feet of additional floor space have been obtained by the Company in its present location.

This new addition to manufacturing capacity will be devoted to expanded facilities for the production of cathode-ray picture tubes, and several new items, also in the electronic field, which have not yet been announced by the firm.

Acquisition of this space will nearly double the industrial potential of Thomas Electronics, Inc. The Company is recognized as holding an important place among the leading companies in the picture tube field.

EMC Moves Plant

Electronic Measurements Corporation, formerly of 423 Broome Street, New York City, has announced the removal of their offices and factory to 280 Lafayette Street, New York 12, New York, effective February 1, 1951.

The new quarters will afford EMC twice the floor area for manufacturing facilities, and will allow them to meet the demand for their electrical test equipment.

Sylvania Tube Substitution

Manual

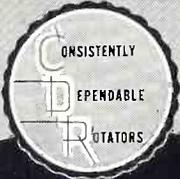
A new 40-page tube substitution manual for quick reference for substitute types of radio and television tubes has been announced by H. H. Rainier, Mgr. Dist. Sales, Radio Tube Division, Sylvania Electric Products Inc. The manual is distributed free on request to the Advertising Department, Sylvania Electric Products Inc., Emporium, Pennsylvania.

The manual is arranged in nine sections providing informative text and charts on general tube classifications; circuit modifications in which additional resistors are needed; sub-

[Continued on page 30]



*We're Doing Our Best
to Keep Up With the Demand*

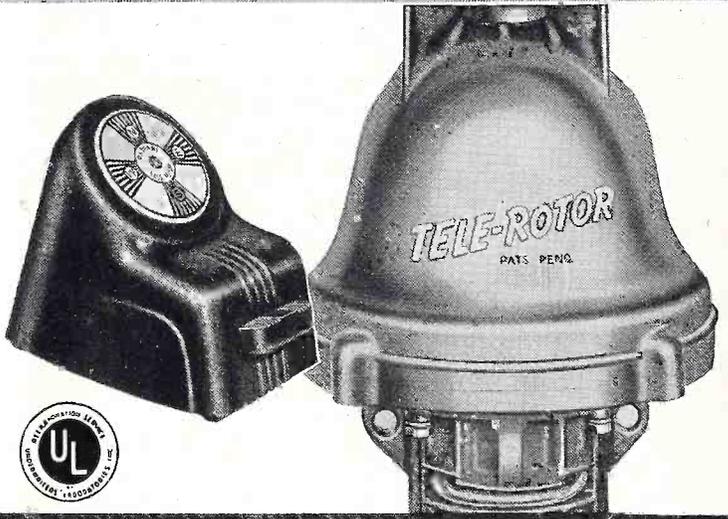


AND THE DEMAND IS PHENOMENAL — far beyond our material limitations
... but be patient and your order will be delivered. We are distributing
TELE-ROTORS uniformly throughout all TV areas ... so wait ... don't
compromise with quality. **YOU CAN'T BEAT A TELE-ROTOR!**

TELE-ROTOR

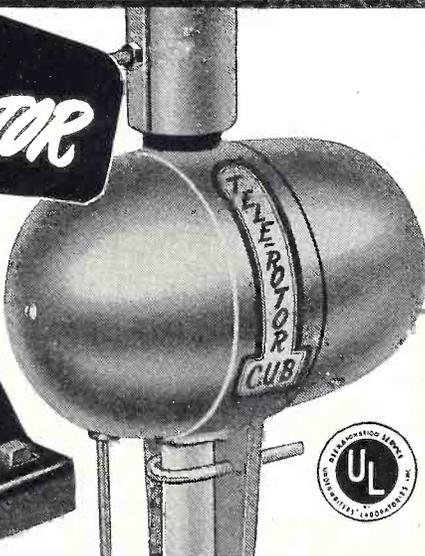
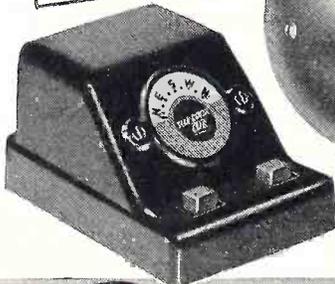
This heavy-duty TELE-ROTOR has no match! It's more powerful ... will turn any TV antenna array under any weather conditions. Easily installed ... it is trouble-free in performance. Easiest of all to operate!

MODEL TR-2 rotator with "compass control" cabinet having illuminated "perfect pattern" dial ... (uses 8 wire cable) \$49.95



TELE-ROTOR

CUB



The new TELE-ROTOR "CUB" is ideal for average installations. The same husky motor as the Heavy-Duty model ... the "CUB" is the fastest and easiest of all rotators to install. All-In-Line design ... with true in-line thrust between antenna and mast. The 3/4" STEEL shaft rotates on a case hardened steel ball ... with inline reamed oilless bearings.

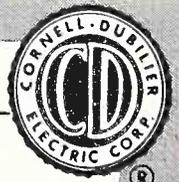
MODEL 502A rotator with plastic control cabinet having indicating meter for "hairline" tuning. (Uses 5 wire cable) \$44.95

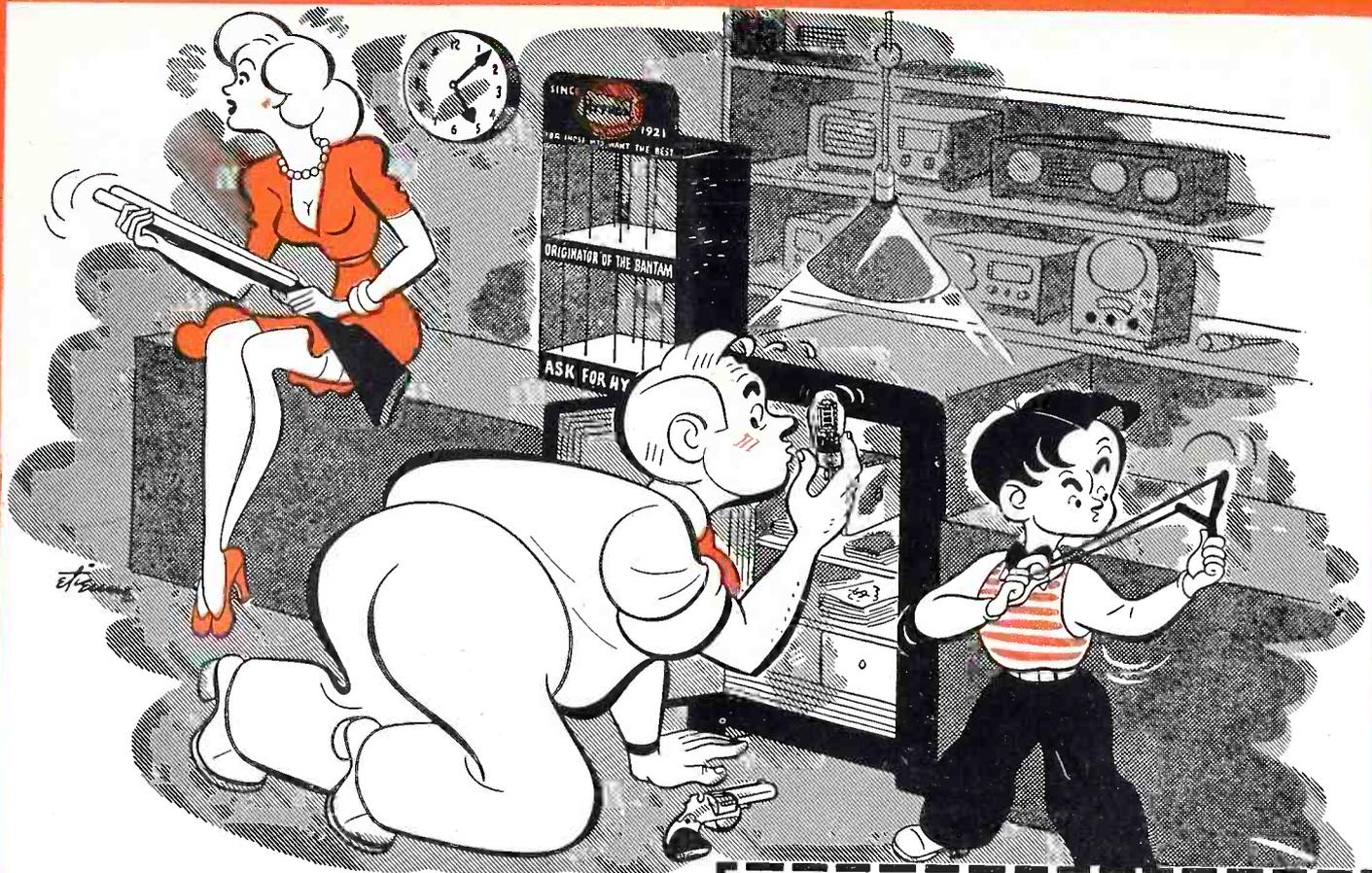
MODEL 501A rotator with control cabinet having end-of-rotation signal. Light flashes every 7.2° showing antenna is turning. (Uses 5 wire cable) \$34.95



CORNELL-DUBILIER SOUTH PLAINFIELD, N. J.

THE RADIART CORPORATION CLEVELAND 2, OHIO





THE TENSION'S TERRIFIC

What-AGAIN?

FEEL LIKE THIS AGAIN TODAY? Back in '43, when Hytron first ran this ad, Hytron tubes were worth their weight in gold. T'aint that bad today. But, despite quadrupled production, it's bad enough. Hytron tubes are more in demand than ever before.

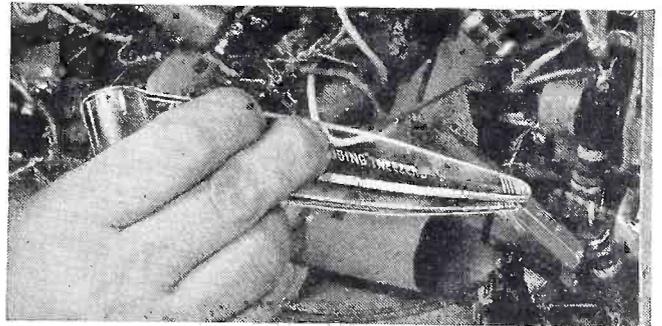
Defense . . . TV . . . radio . . . industry want more tubes than all the tube manufacturers can make. We know how it is. And how vital your needs for replacements are.

Despite the crazy demand . . . and the irritating shortages of materials, we're straining every effort to increase production for you. We'll give you more Hytron replacement tubes yet, or "bust a gut" trying.



OLDEST MANUFACTURER OF RECEIVING TUBES
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Probing made Natural . . . Quick . . . Safe!

Pestered by elusive intermittents, shorts, opens, noise, feedback? Want to probe for them — with set operating? Without danger? Without detuning effects? Try new Hytron Probing Tweezers. The precise . . . safe . . . natural extension of your own fingers long sought for this job. Of rich, tough polystyrene with ideal electrical and mechanical characteristics. This contest prize winner saves time, money . . . *maybe your life.* Only 35¢ from Hytron jobbers. Get your Probing Tweezers today.

It's a Cinch! As natural as using your bare fingers. With set on, Hytron Probing Tweezers probe, grasp, and manipulate suspected wiring and components. Easily, surely ferret out: intermittents, shorts, opens, noise, feedback from adjacent wiring, etc. Free from danger of accidental shocks and shorts. Without disturbing normal performance of set.

Jaws of Probing Tweezers grip firmly. Have fine and coarse serrations for different sizes of wires, condensers, resistors, etc. High dielectric constant of polystyrene minimizes capacitive detuning. No pull by strong magnetic fields. Safely long for TV. Handily compact for burrowing into tight spots. Heat resistant, too, if you avoid very hot irons and components.

You'll like this unique Hytron tool "by servicemen, for servicemen."



NEW!

HYTRON

Probing Tweezers

35¢ net

EIGHTH MEMBER OF
 THE HYTRON SERVICE TOOL KIT!

ANTENNA ROTATORS

PART I

by J. F. SEYBOLD

(Rotator Engineer, Radiant Corp.)

A marked increase in the use of antenna rotators in both rural and urban areas has been noted in the industry because of their ability to provide better overall reception with a given antenna. This 2-part article deals with general design considerations, construction and servicing of these units. The servicing technician should know these details.

WITH the rapid increase in TV set ownership, especially in localities which are not in the primary signal area, a proportional increase of interest has been observed in methods of obtaining better reception.

The alert service technician will study conditions of his locale with respect to how he, most economically and profitably, can improve his customers' reception.



J. F. Seybold

Some of the methods which he may consider are increasing the height of the antenna; adding one or more directors to the antenna assembly; cutting the elements to proper lengths for a given channel; adding antenna bays for greater gain; improving the impedance match between the antenna and set; or, by providing for orienting the antenna for best reception.

In most cases, the use of an antenna device in combination with one or more of the other methods provides the most favorable solution to the problem of obtaining maximum reception at a minimum cost, since it allows the use of a practical, economical antenna system which may be oriented to obtain maximum signal pickup from any one of several specific directions. Interference may be minimized or eliminated entirely, increasing the signal to noise ratio to a desirable level.

General Consideration

The rotator must be clean and simple in design to eliminate any customer objections to an external unit which would not be compatible with surrounding objects.

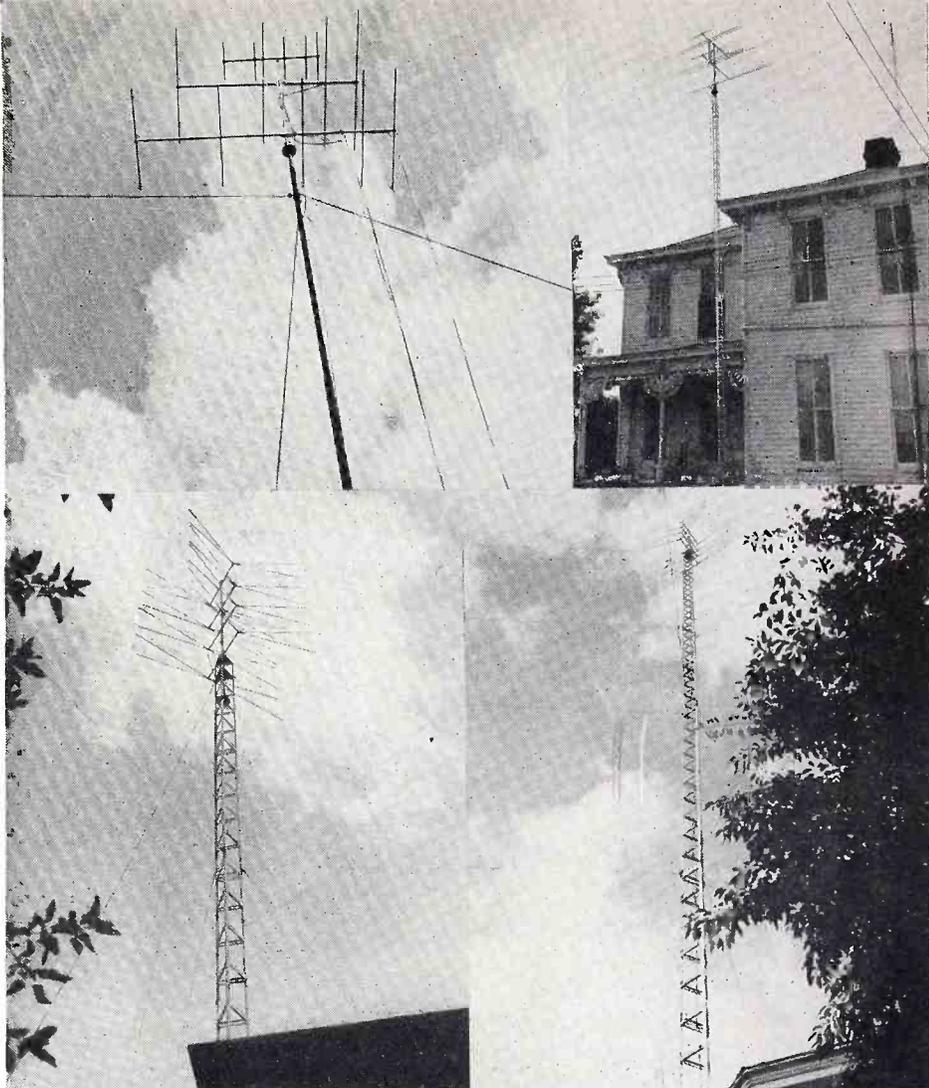


Fig. 2. High mast rotator installations. Top left: TR-2 Tele-Rotor mounted on Thompson and Ruby tower. Courtesy, D. M. Campbell, Columbus, Ohio. Top right: Photo by James R. Gillen. Bottom: Courtesy Thompson Radio Service, Zanesville, Ill.

Rotating devices comprising a system of pulleys, gears and cables may, of course, be used. However, human nature being what it is, the customer usually prefers an installation requiring the least expenditure of his energy to operate.

From the technician's viewpoint, then, the rotator should preferably be an electrically powered, motor-driven unit, simple and efficient in operation, which would require a minimum amount of installation time, with no adjustments required by the customer after installation.

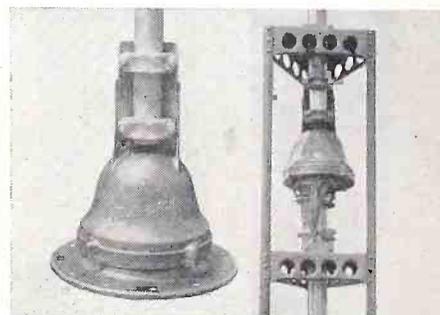


Fig. 1. Left: flat surface mount. Right: rotator mounted on tower.

To enable the technicians to meet the antenna mounting requirements of his customers, the unit considered must be adaptable to installations on a mast, flat roof, platform, the side of a building, or perhaps on a tower (Fig. 1). Once installed, constant operation without maintenance, under all weather conditions is essential, since a rotator must be weather-proof and resistant to the corrosive effects of the salty atmosphere along the coasts, waste gases in general manufacturing areas, or to gases and soot which are expelled from chimneys on which the rotator may be mounted.

The unit must be able to handle any one of a wide variety of antennas from single bay units to those of four bays which are usually required in the outer fringe areas. Another important consideration is the possibility of the rotator being mounted on any common type of mast material the diameter of which may vary considerably, depending on the type of array being installed.

In some areas, masts are successfully used to heights of about 75 feet and towers to 125 feet (Fig. 2). Installations of this type must be well guyed at one or more heights. It is sometimes desirable to use a rotatable guy ring under the lowest antenna bay section, but above the rotator, in order to reduce undue strain on the rotator, which may be caused by the wind forces on the mast and antenna array. With some towers, it is possible to mount the Tele-Rotor inside the tower structure on platforms conveniently provided.

At the control end of an installation, is the user of the device, who expects maximum benefits with ease of operation. The switching device must be simple and positive, while the indicating device in the control unit must be easily understood and, if possible, of a type that will not require adjustment or corrections by the customer.

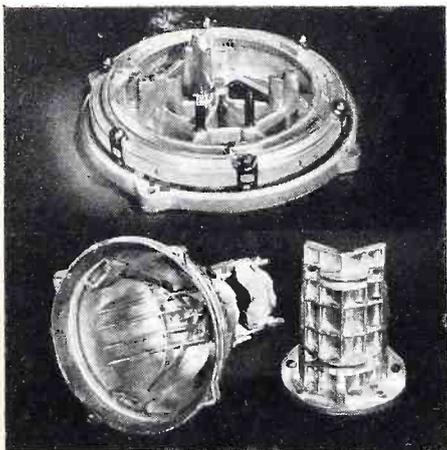


Fig. 4. Castings used in rotator construction.

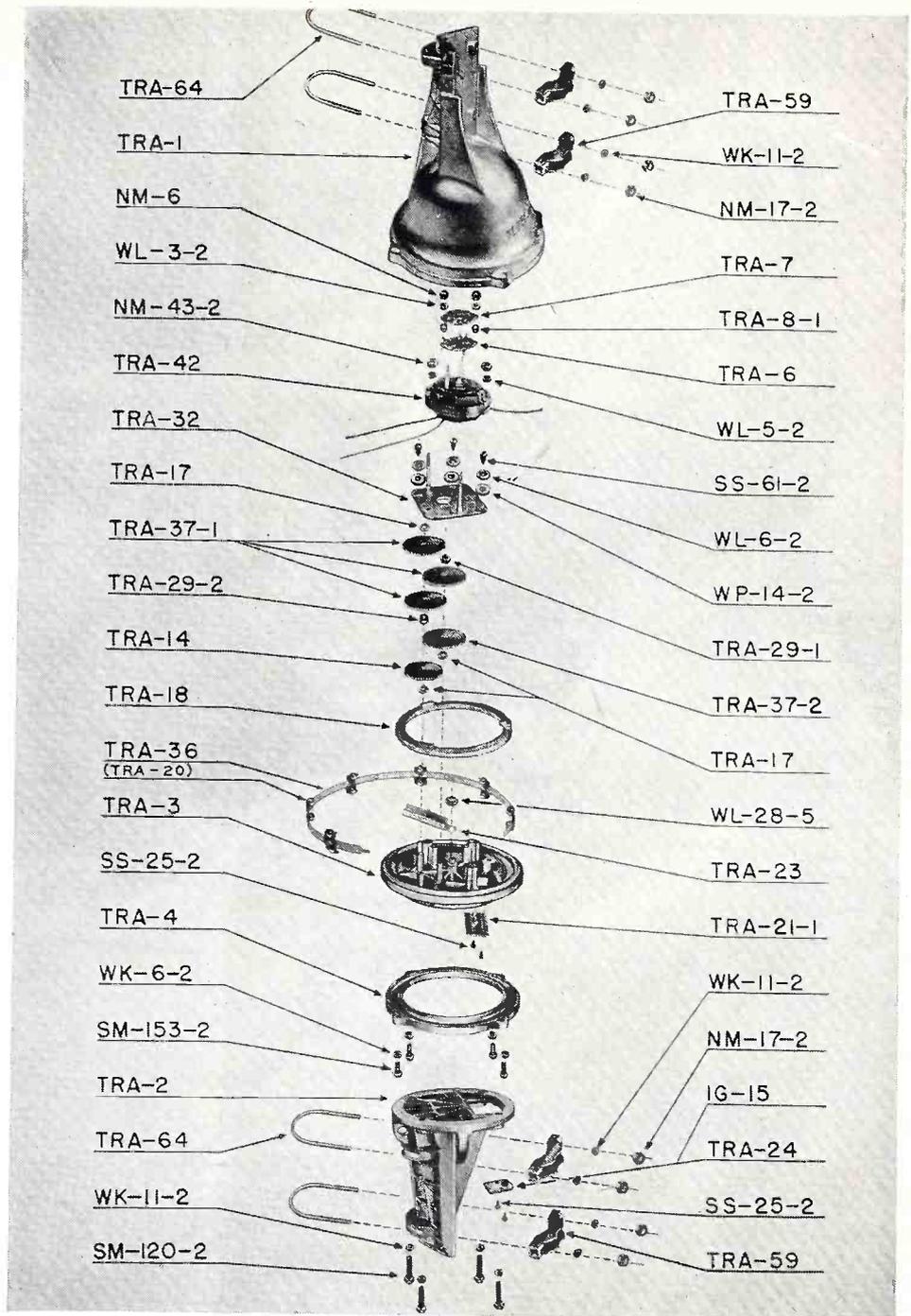


Fig. 3. Exploded view of rotator.

In some cases, a TV station will be in a direction near the end of rotation. To eliminate the need for completely rotating the antenna to obtain the point of maximum results, means should be provided for slightly more than one complete revolution. This is usually done by the use of some type of lost motion device to allow an extra 10° or 15° past a complete 360° rotation.

Although antennas vary considerably in design with respect to type, height, lengths of booms and elements, in general, the maximum physical size of the antenna proper will have an unguyed mast height of about 12 feet above the rotator, constructed of four bays of elements. Elements may vary

to lengths as long as 22 feet; booms from 4 to 8 feet in length. Weights of commercial antennas, in these types, may total 35 to 40 pounds.

Construction of Tele-Rotor

Because an electrically operated rotator is preferred, a single phase capacitor type motor is used, since it is easily reversible and has much more torque at operating speed than shaded pole motors of similar physical sizes.

Small motors, such as those used in the Tele-Rotor, operate at speeds of 3000 to 3500 rpm. under no load, therefore, in order to obtain the rotator speeds of approximately 1 rpm. a large gear reduction ratio is re-

[Continued on page 38]

PHASE INVERTERS

by NOEL NAMTRO

The most popular technique for driving push-pull grids from a single ended source is the phase inverter. Quality amplifiers, public address systems, audio sections of AM and FM sets, almost without exception, make use of this technique. A thorough understanding of phase inversion, the reasons for its existence, and how it functions, will greatly assist the technician in his work.

TO operate a pair of tubes in push-pull, it is necessary that the audio signal voltages at the grids of these tubes be equal in value. It is also important for distortionless push-pull operation that the signal voltages appear at the grids of the driven tubes 180 degrees out of phase. One might say, in clarification of the phase difference, that the voltage on one grid must be at its positive peak while the other is at its negative peak—and then vice versa 180 electrical degrees later.

This can be accomplished by using a transformer with a single primary and a center-tapped secondary. However, good quality plate to push-pull grid transformers with equal voltages, 180 degrees out of phase, either side of center-tap over the entire audio range are quite expensive. In some cases, space requirements for the transformer become an important consideration. In other cases, the transformer may be subject to inductive hum pickup from stray a-c fields. This becomes a factor worrisome to design engineers when the push-pull grids belong to a high gain voltage amplifier. Whatever the reason, it is often deemed desirable to operate the grids of two tubes in push-pull, driving them from a single ended signal source.

Splitting the Phase Without Transformers

The problem of splitting or inverting the phase of the signal voltage can be overcome inexpensively and compactly, without sacrificing fidelity, through the use of a simple resistance-capacitance circuit employing one or two triode tubes. There are three basic circuits in use in modern sets and amplifiers. Sometimes minor modifications are made, but the basic circuits are shown in *Figs. 1, 2, and 3.*

How it Works

It is characteristic of a vacuum tube that a signal voltage appearing at its grid is 180 degrees out of phase with the signal voltage appearing at the plate, under normal conditions of operation. Therefore, in *Fig. 1*, the signal or audio output voltage of *V1* is 180 degrees out of phase with the signal or audio input voltage appearing at its grid. If we take a portion of the output voltage of *V1* and pass it through another tube the signal voltage will go through another 180 degree change in phase. Following the signal voltage step by step in

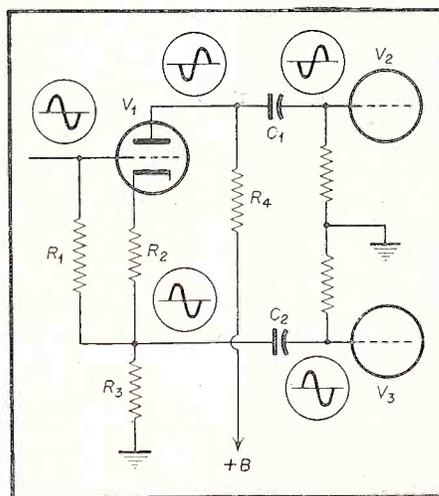


Fig. 1. Simple phase inverter.

Fig. 1, a signal voltage from a tuner, record player or preamplifier first appears on the grid of *V1*. Because of the phase inverting characteristic of vacuum tubes, the signal voltage, when it appears at the plate of *V1*, is 180 degrees out of phase. This same voltage appears at the grid of *V3*, 180 degrees out of phase with the grid of *V1*. The grid return of *V3* is through *R1* and *R2* in series. Tracing the signal voltage through *R1* and its junction

with *R2* to the grid of *V2*, the signal voltage on the grid of *V2* is in phase with the grid of *V3*. Because of the characteristic of the vacuum tube, the phase of the signal output voltage of *V2* is 180 degrees from the input voltage at the grid of *V2*. The output voltage of *V2* appears at the grid of *V4*. Thus, the signal voltages at the grids of *V3* and *V4* are 180 degrees out of phase with one another. So we have fulfilled one of the requirements of properly driving push-pull grids from a single ended source, that is, splitting or inverting the phase.

This is how the signal voltages at the grids of *V3* and *V4* are made equal! In *Fig. 1*, assume that *V1* and *V2* are the same type tube, or that they are tubes with the same amplification factors (μ). If we take a small portion of the output voltage of *V1* and apply it to the grid of *V2*, this small portion of voltage will be amplified by the operation of *V2*. In order that equal signal voltages appear at the grids of *V3* and *V4*, the signal voltages at the grids of *V1* and *V2* must be equal. By way of illustration, let's assume that *V1* and *V2* are 6C5's with amplification factors of 20. They are operating with equal bias and plate voltages. This means that, if a signal of .05 volts is impressed on the grid of *V1*, an input signal of 1 volt ($E_g \times \mu = .05 \times 20 = 1$) will be measured at the plate of *V1*. If we were to apply this full output voltage to the grid of *V2*, it would overload, distort and unbalance the push-pull stage it is driving. So, in order to obtain the proper signal voltage for the grid of *V2*, we make use of the simple voltage divider *Rt*, formed by *R1* and *R2* in series. The values *R1* and *R2* are determined by dividing the output voltage of *V1* by the amplification factor of *V2*—then dividing the result by the output voltage of *V1*—then

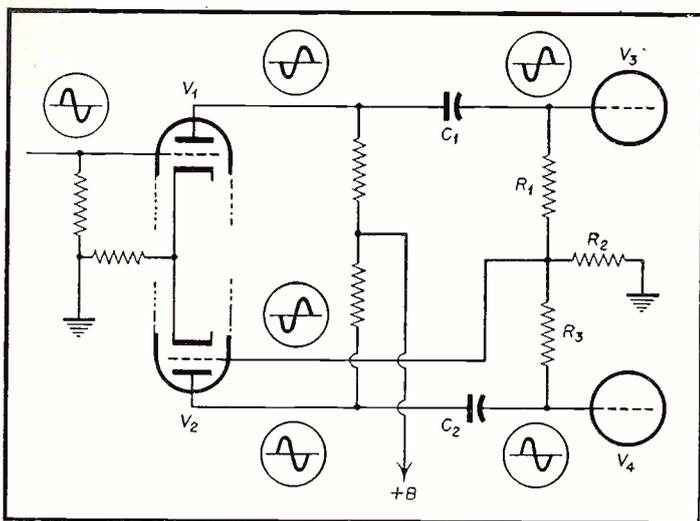


Fig. 2A. Self-Balancing or "Floating Paraphase" inverter.

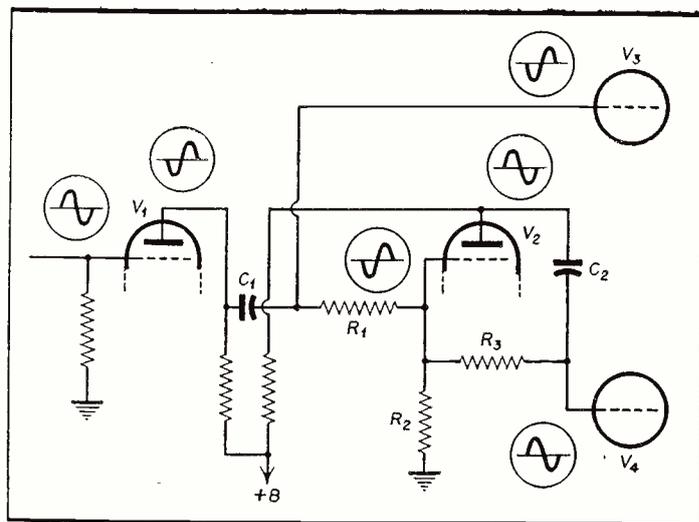


Fig. 2B. Self-Balancing circuit redrawn to show phase relations.

multiply this result by Rt in ohms to get the value of $R2$ in ohms. Subtracting $R2$ from Rt we find the value of $R1$.

Check this simple mathematics with the 6C5's as $V1$ and $V2$. With an input voltage of .05 and a μ of 20, the output of $V1$ is 1 volt. Divide this by the μ of $V2$, 20. The result, .05, divided by the output voltage of $V1$, 1, multiplied by Rt gives the value of $R2$. The usual value for Rt is 500,000 ohms. This figure multiplied by .05 results in a value of 25,000 ohms for $R2$ and 475,000 ohms for $R1$.

Thus we have met the condition of equal grid voltages for $V3$ and $V4$, as well as the 180 degree phase difference.

Self Balancing Inverter

In Fig. 2A is shown the circuit known as the self-balancing phase inverter, and also as the "floating paraphase". The first name has been more popularly accepted by the industry and its name more clearly describes its value in driving push-pull grids. In Fig. 2A $R1$ and $R2$ constitute the signal load of $V1$ and also the grid return for $V3$. The output voltage of $V1$ appears across $R1$ and $R2$, 180 degrees out of phase with the input voltage. At the junction of $R1$ and $R2$, a portion of the signal voltage is applied to the grid of $V2$. This makes the phase of the grid of $V2$ the same as the grid of $V3$, both of which are 180 degrees out of phase with the grid of $V1$. The signal voltage is amplified by the action of $V2$ and the output voltage appears on the grid of $V4$ 180 degrees out of phase with the grid of $V3$. Thus the condition for the 180 degree phase relationship between the push-pull grids is achieved in this circuit.

Analyze the circuit of Fig. 2A in the following manner and it becomes

clear how the "self balancing" term is applied. The signal load of $V2$ is $R3$ and $R2$ in series. However, $R2$ is also part of the signal load of $V1$. The signal at the plate of $V1$ is 180 degrees out of phase with the signal at the plate of $V2$. Therefore, the portion of the output signal from $V2$ that appears across $R2$ opposes the portion of the output signal from $V1$. This reduces the voltage applied to the grid of $V2$. A state of dynamic equilibrium is instantaneously found. The circuit redrawn in Fig. 2B reveals an actual condition of inverse feedback across $V2$ through $R3$ and $C2$. This feedback loop serves as a voltage

regulator or stabilizer in the phase inversion process. The cost of some loss in gain at $V2$ is more than compensated for by other advantages. The "self balancing" phase inverter is relatively independent of changing-tube characteristics, extending the satisfactory operating life of the tube beyond normal. The self balancing effect compensates for variations

Cathode Follower Inverter Circuit

The phase inverter shown in Fig. 3 is inherently self balancing. It has advantages over the other circuits which make it popular among commercial set manufacturers. The signal load of $V1$ consists of $R4$, and $R2$ and $R3$. The signal voltage at the plate of $V1$ is 180 degrees out of phase with the signal at the un-bypassed cathode of $V1$. Thus, by connecting the grid of $V2$ to the plate signal output of $V1$, and the grid of $V3$ to the cathode signal output of $V1$ the 180 degree phase difference is obtained for correct push-pull operation. $R3$ and $R4$ should be equal, each one half the total plate load resistance recommended for the particular tube used as $V1$. $R2$ is the cathode resistor and is determined in the usual manner, dividing the grid bias in volts by the plate current in milliamperes. The grid return of $V1$ is made to the junction of $R1$ and $R2$ so that normal grid bias will be applied. Because of the high values of cathode resistance employed without-by-pass, the circuit of $V1$ is highly degenerative. The fidelity of response is excellent. However, the voltage gain of this stage is less than 2, even with a high μ triode as $V1$. Its chief advantage is economy. If adequate signal voltage is applied, or if $V1$ is inserted in a point where low gain can be tolerated, this circuit is employed because it uses fewer components and only one relatively inexpensive triode.

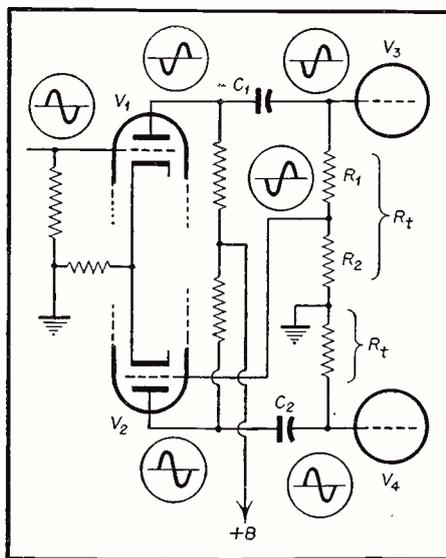


Fig. 3. Cathode follower phase inverter circuit.

regulator or stabilizer in the phase inversion process. The cost of some loss in gain at $V2$ is more than compensated for by other advantages. The "self balancing" phase inverter is relatively independent of changing-tube characteristics, extending the satisfactory operating life of the tube beyond normal. The self balancing effect compensates for variations

The CBS

FIELD SEQUENTIAL

COLOR SYSTEM

Part 2

By Edward M. Noll

IN a typical motor and color disc assembly the motor and disc are separated from each other using a belt as a drive link. Motor is a split-phase capacitive-type induction motor of 1/20 to 1/50 horsepower depending on size of color disc. For a 10" or 12½" screen a 1/20 to 1/30 HP motor supplies sufficient drive. A fan is often included to keep motor cool and of small physical size. Motor must be shock mounted with cushioned spacers or lord mounts to reduce any mechanical vibration. Present motor and drive shafts require occasional oiling.

Motor Control and Synchronization

A split-phase motor is a very simple type with two windings connected in series with the a-c line, *Fig. 1*. An external inductor can be conveniently inserted in series to control the speed of the motor. The color disc drive shaft, in addition to the drive sprocket and bearing assembly contains mounting plates and the actual color disc. The color filters are fastened to the front of the clear lucite disc. A mounting plate immediately in back of color disc has an opening in the proper quadrant to permit viewing of the picture tube screen through the rotating filters.

The motor control unit contains a phase detector and motor control tube. The phase detector compares the vertical sync component (positive pulse part of vertical sweep waveform at vertical output plate) that occurs during the vertical retrace time with a similar frequency picked up from a small generator running off the color drive shaft. These two signals are compared in frequency and phase by a phase detector. The output of phase detector (d.c.) biases the control tube,

The CBS field sequential color system can employ either a mechanical or electronic system of color interruption. When a rotating color filter is used some means of motor synchronization must be employed. Such a synchronizing system uses the 144 cycle vertical sync to phase the receiver motor in step with the camera motor.

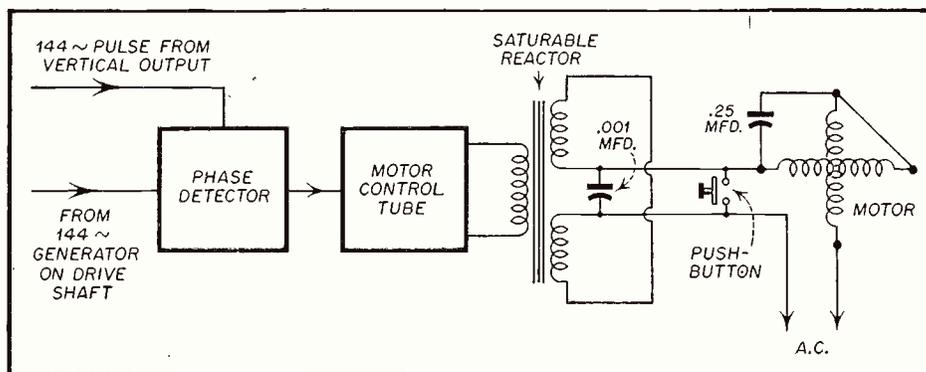


Fig. 1. Motor synchronization system.

controlling its current through a saturable reactor. The secondary of saturable reactor is in turn in series with motor windings, correcting speed and phase of the motor accordingly.

One signal for the phase detector is obtained from the plate of the vertical output tube. At this point the vertical sawtooth is negative with a sharp positive pulse or spike that occurs during vertical retrace. This positive pulse portion is active at the phase detector. The repetition rate is, of course, 144 cycles corresponding to the number of color fields.

A second signal for the phase detector is taken off a six pole alternator running off the color disc. It is to be noted, *Fig. 2*, that six armature bars are mounted on the outer peri-

phery of the color disc. These armature bars pass between two magnet coils fix-mounted on the disc mounting plate. In passing through, an a-c signal is generated in the magnet coils, which signal is fed back to the phase detector. The frequency of this signal is also 144 cycles (six poles).

When there is any change in the relation between this sinewave and vertical component, the phase detector changes its charge on its output capacitor. The capacitor charge contributes bias to the control tube so that any such change in charge causes a change in control tube plate current. This plate current flows through the winding of the saturable reactor bringing about a secondary inductance shift. The secondary is connected in

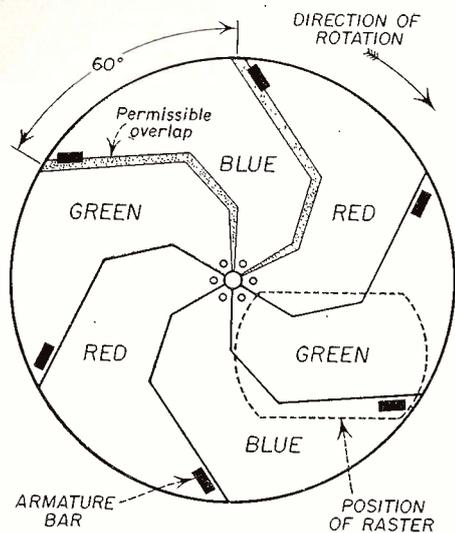


Fig. 2. Receiver color disc.

series with the motor windings and the change of inductance brings the motor back to correct speed.

Color Phasing

The circuit action as described above keeps the receiver motor in phase and turning over at correct speed. However, the motor phase and speed are not the only considerations. In addition, color must be matched with color. When red is in position at the camera, it must also be in position at the receiver. Thus, there must be some means to match or phase colors also. This can be done mechanically (or automatically with the presence of a special color phasing pulse inserted in the composite signal) with a push-button in motor circuit. When the motor button is depressed, the saturable reactor is shunted and the motor speeds up momentarily. When the button is released the motor locks in with another color phase relation. The button is depressed a few times until the color picture is most true—for example, skin tones are most natural. Generally, the true color locks in with just two tries.

When automatic color phasing is used, only every third pulse (one preceding the red field) is permitted to reach the grid of the phase detector—correct timing being set by the received color phase pulse which is inserted between the first and second equalizing pulses preceding the red field. A two pole generator on the color disc drive shaft generates a comparing signal for operation of the phase detector. Thus, the two signals to be compared are of the same frequency and the detector and motor control circuit function in the same manner; however, this time color phase is also set automatically.

Crispensing

In the field sequential television

system it is necessary to have a rather high field rate to overcome flicker. A high field rate means a sacrifice in horizontal resolution per given 6 mc restricted bandwidth. With added complexity a dot-interlace system can be used to improve horizontal resolution. In fact use of a dot interlace with a field sequential color system will produce somewhat better horizontal resolution than is present with a dot sequential color system. There is a simpler means of improving apparent resolution with a CBS developed crispensing circuit.

Such a circuit involves the addition of a single tube circuit in the video amplifier section of the receiver. *Fig. 3.* A composite signal is taken off one of the video amplifier stages and fed to the crispensing circuit. The output of the crispensing circuit is applied across a 10K resistor that

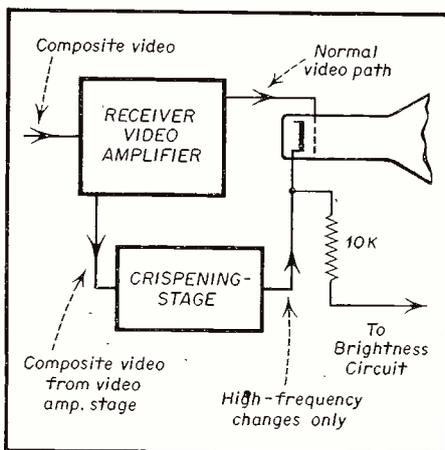


Fig. 3. Crispensing system.

has been inserted in series with cathode lead from picture tube. The normal video amplifier path to the grid of picture tube is not altered.

In any TV system that is somewhat limited in horizontal resolution there is a definite inability to follow a sharp change in brightness level (small area change) because such a change involves very high frequency components (leading edge of a pulse is a good simile). In fact, a signal representative of a thin, dense black line would be a pulse, *Fig. 4*, of negative polarity at the grid of picture tube, driving the grid quickly to black, and then turning the bright back on just as quickly. The leading and trailing edges of such a signal contain very high frequency components.

If the television system is unable to pass these frequencies, the signal pulse is rounded and attenuated (integrated). Thus, the grid voltage drops slowly and not as far as it should. A reproduced line therefore, changes shading slowly and does not reproduce as a good deep black.

Poor resolution means that sharp changes in brightness are not followed with exactness. When a signal of this type reaches the grid of the picture tube, sharp changes are compressed while slow changes and average levels remain true. With a crispensing circuit, however we take a portion of this signal and accent the sharp changes and steepen the sides of fast changing information. At same time the crispensing circuit attenuates slow changes and does not pass the d-c level.

The sharp changes created are applied to the cathode of the picture tube (in opposite phase to the weak counterpart present at the grid of the picture tube) and cause more sharp and decided small area brightness changes. This raises the small area contrast in the color signal and improves crispness and apparent resolution of the color picture. Normal slow changes in brightness, average levels, and large area contrast are still maintained by the signal at the grid and are not present at the cathode of the picture tube.

Receiver Adaptation and Conversion

Conversion of a chassis for dual standard operation can be simple or complex depending on the chassis and how one proceeds to do the job. Certainly, conversion requires skill but skill is what the good service technician is paid for. He does a fine job converting small picture tube receivers to large. He *can* do a good job on color conversions. The service technician who plans such activities can do well to make a thorough study of deflection circuits—such knowledge will enhance his ability to do the job speedily and well. Despite a reticence to accept CBS standards they do present a means of obtaining a *good color picture inexpensively* (as compared to other suggested methods)

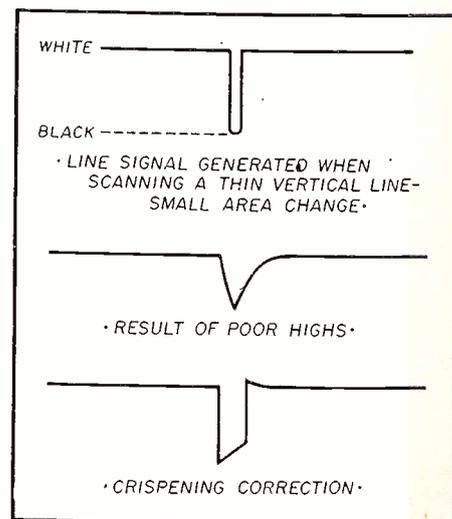


Fig. 4. Crispensing waveforms.

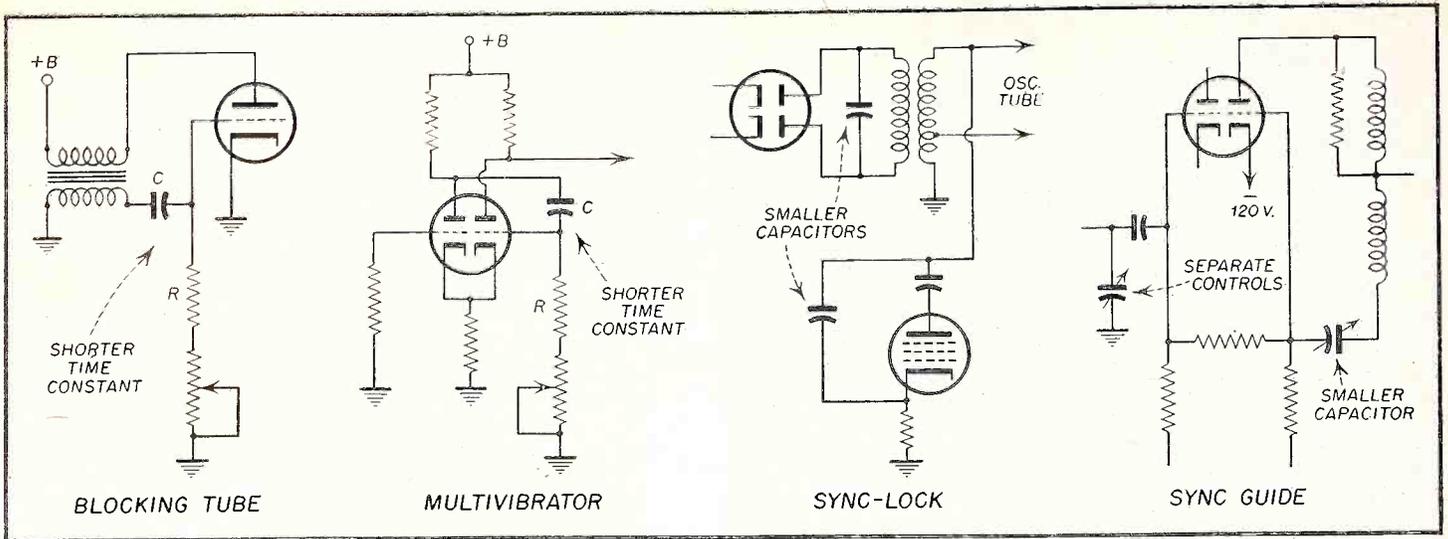


Fig. 5. Conversion frequency changes.

and a means that can give much added income to the serviceman.

Steps in Conversion

A number of steps are necessary in the conversion or adaptation of a present receiver for operation at color standards.

permit operation at higher color rates—29,160 for horizontal; 144 for vertical. To raise the frequency of a multivibrator or blocking-tube oscillator it is necessary to shorten the frequency control circuit time constants, Fig. 5. This can be done by

systems are a bit more difficult to change over. In a sync lock circuit the discriminator-oscillator tuned transformer is made to operate at a higher frequency by using smaller capacitors in the primary and secondary resonant circuits. In a synchro-guide circuit, the transformer is made to operate at a higher frequency by insertion of a smaller grid capacitor which reduces the grid time constant. The lock-in capacitor is changed to obtain proper range at the higher frequency.

2-Size

A change in frequency is only the first consideration in a revision of a deflection system. Certainly we want our color picture to have the same width and height as the standard rate monochrome presentation did. Thus, if the frequency is raised the period of the sawtooth is shorter and the sawtooth must build up to full amplitude in a shorter time interval. This requires a smaller sawtooth forming capacitor (shorter time constant). This smaller capacitor is inserted in the plate circuit of the discharge tube or sawtooth forming section of the horizontal sync control system; Fig. 6.

3-Linearity

Proper changes must be made to retain horizontal and vertical linearity of the picture when switching over to the higher color rates. This means that separate linearity controls or components, Fig. 7, are needed for standard monochrome and color rates. We would not want our customers to have to adjust the back panel controls whenever they switch from one rate to the other. In the horizontal deflection system linearity is in part, set by the horizontal drive circuit, and proper changes must be made accordingly.

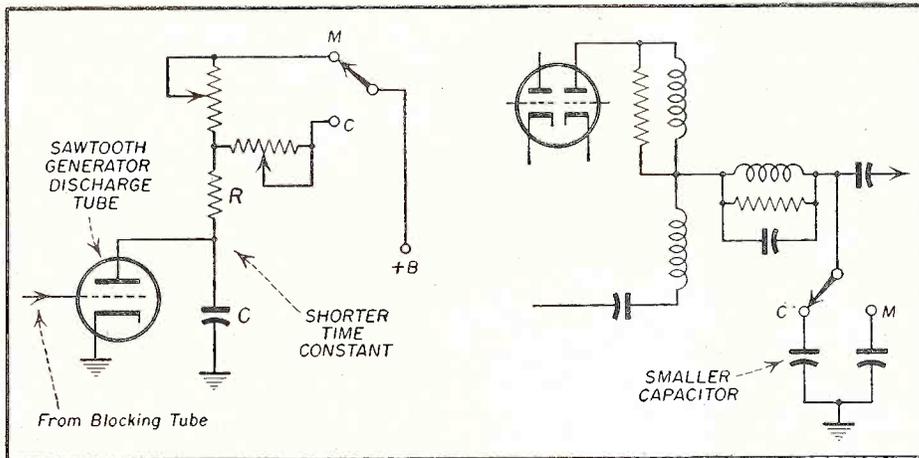


Fig. 6. Conversion size correction.

1-Frequency

The first step in the conversion of a receiver is to modify the receiver's horizontal and vertical oscillators to

switch insertion of a lower value grid resistor or by shunting the present one with a lower value resistor.

The various horizontal sync control

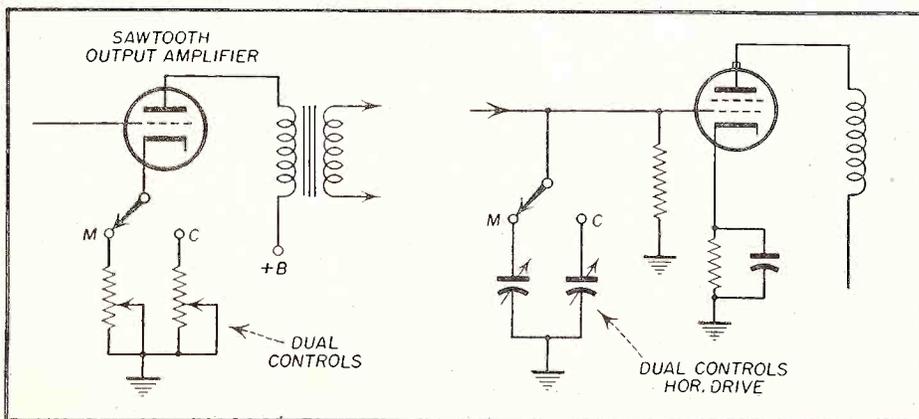


Fig. 7. Conversion linearity changes.

(Continued on page 37)

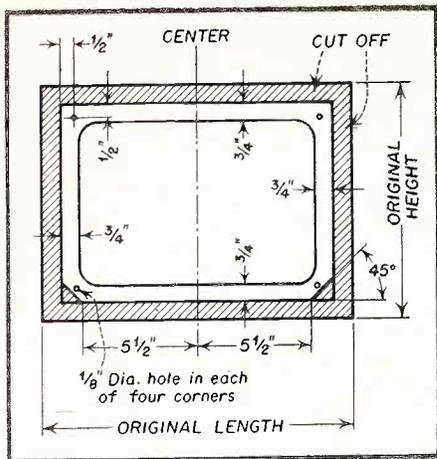


Fig. 3. Dimensional details of lucite mask.

square picture frame molding. This makes the face of the cabinet act like a shelf which supports the picture tube.

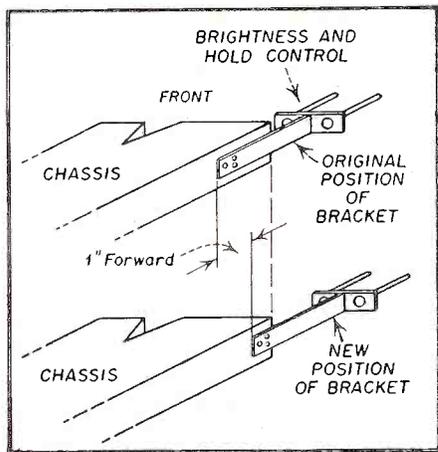


Fig. 4. How hold controls are brought forward on chassis.

Extending the Shafts Yoke & Focus Coil Bracket

The chassis must be moved back to allow the picture tube to fit properly. This requires the use of shaft extensions on the various controls.

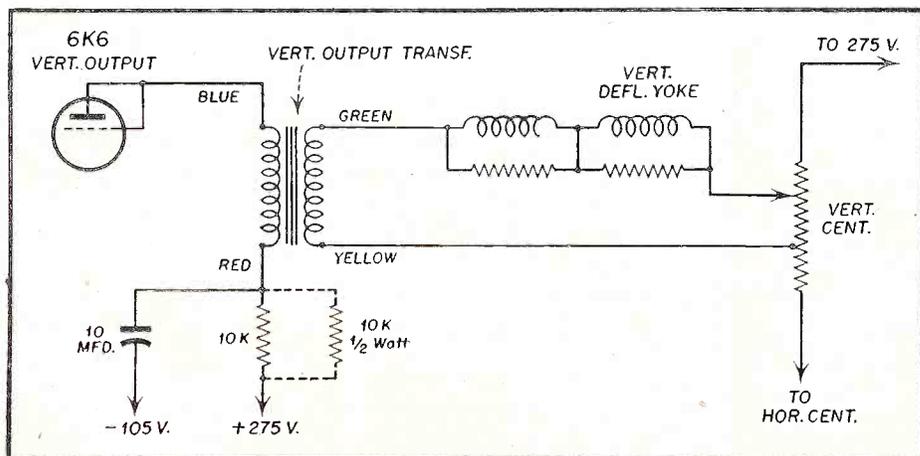
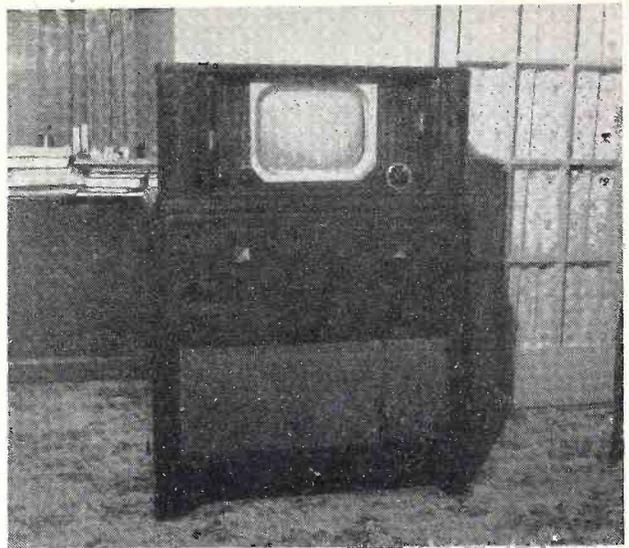


Fig. 2. Vertical output stage modifications. Additions are indicated by broken lines; deletions with "X".

This is a photo of the completed receiver. Careful attention to the alteration details outlined in the article will insure a professional job.



Many of the items required in this conversion, such as the lucite mask, the gold metal border, the new detent mechanism, etc., may be obtained at your local jobber.

1. To extend the hold and brightness controls remove three screws holding the bracket to the chassis. See Fig. 4. Move the bracket forward 1 inch. Drill new holes in chassis to correspond



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with those in bracket. Fasten the bracket to the chassis making sure that the control shafts line up with the holes in the cabinet.

2. To extend the fine tuner shaft remove the fine tuner and station se-

lector shaft from the tuner proper. Remove the "C" washer and slide the fine tuner shaft out. Cut the fine tuner shaft in half (see Fig. 5), and solder a 1 inch shield from a 1/2 inch expansion bolt between the two pieces.

3. To extend the selector shaft use a JFD No. 12 detent, or its equivalent, which is 1 inch longer than the old one.

4. To extend the contrast control shaft use a 1/4 D to 1/4 D extension shaft, 1 inch long.

5. Move yoke and focus coil bracket one inch forward on chassis in order to fit properly against neck and cone intersection of tube.

Finishing Touches

1. Mark and drill new holes in chassis shelf and fasten chassis to cabinet.

2. Slide pix tube through front of cabinet into yoke and focus coil. A small fitted piece of wood is wedged between top of cabinet and tube to hold it firmly in place.

3. Mount mast using rosette head machine screws or wood screws with cup washers.

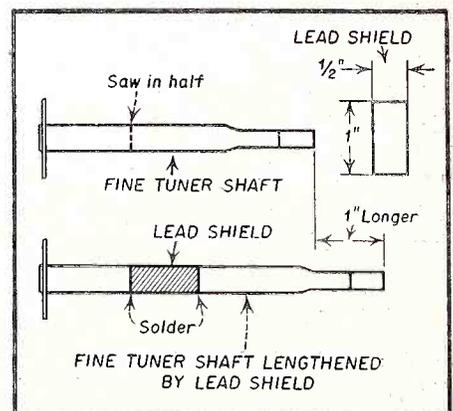


Fig. 5. Operations to be followed in extending fine tuner shaft.

TUBE TOPICS

by JAMES COREY

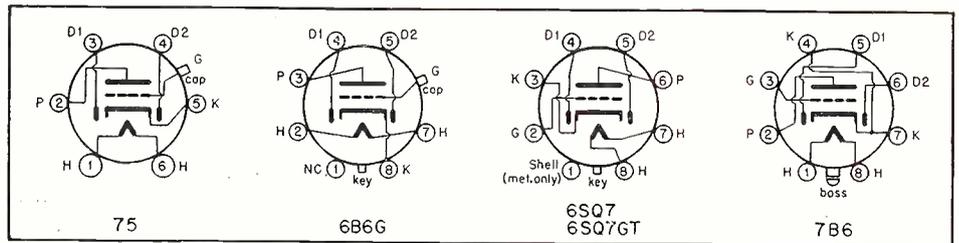
A new regular department devoted to presenting up-to-the-minute information to the Radio-TV Service Dealer on tube replacements and substitutions of all types, including picture tubes.

IN the near future and in some cases right now, one of the greatest problems facing the radio dealer and serviceman is the availability of parts with which to repair radio and TV sets. Ingenuity may soon be more important than technical knowledge and skill. With more than 500 types of radio receiving tubes in active use, the selection of satisfactory substitutes becomes really difficult, not so much from the technical aspect as from the availability. For example, it does little good to know that type 12BT6 will replace a 12AT6, when no 12BT6 is available. (In the case of the 12BT6 only several thousand tubes have been made and shipped, and the tube has been withdrawn from production.)

In these columns the writer will endeavor to suggest more available substitutes for tubes that are now scarce and likely to become more so. In general these will be the order types of tubes, for the tubes currently employed in either radio or TV set production are likely to become more plentiful as set production drops off. In addition, all substitutions suggested are within the maximum ratings of the tubes, for this is essential in full tube life is to be obtained.

TYPE 75

Type 75 has been in short supply for several months. It is a double diode high-mu triode. In areas of high-signal strength where a high value of signal is developed across the diode-load resistor, a type 85, which is the same tube except for having a low-mu triode section, will often provide satisfactory performance. Since no socket or wiring change is required, its substitution is easy to try. Technically speaking, the nearest electrical substitutes are the types 6B6G, 6SQ7GT, and 7B6, all of which require a change of socket. No other changes in component values or circuits are required. Types 6Q7G



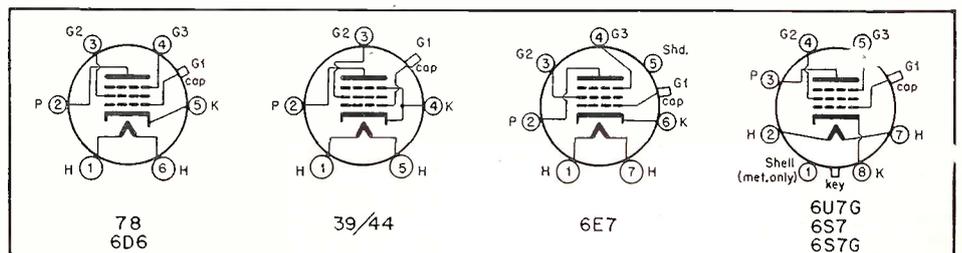
| | 75 | 6Q7G 6Q7GT | 6B6G 6SQ7 6SQ7GT |
|-------------|------|---------------|------------------------|
| Heater pot. | 6.3 | 6.3 | 6.3 volts |
| Heater cur. | 0.3 | 0.3 | 0.3 amp. |
| Plate pot. | 250 | 250 | 250 volts |
| Grid bias | -2 | -3 | -2 volts |
| Plate cur. | 0.9 | 1.1 | 0.9 ma. |
| Transcond. | 1100 | 1200 | 1100 micromhos |
| Amp. factor | 100 | 70 | 100 |

Fig. 1. Socket connections and characteristics of 75 tube and its substitutes.

and 6Q7GT, may be somewhat more available, and are considered to be equally satisfactory. Characteristics for these types are tabulated above

for reference.

The lower amplification factor of the 6Q7G & GT is generally of no particular significance.



| | 78 | 6D6 6E7 6U7G | 39/44 | 6S7 6S7G |
|-------------|------|--------------------|-------|----------------|
| Heater pot. | 6.3 | 6.3 | 6.3 | 6.3 volts |
| Heater cur. | 0.3 | 0.3 | 0.3 | 0.15 amp. |
| Plate Pot. | 250 | 250 | 250 | 250 volts |
| Screen pot. | 100 | 100 | 90* | 100 volts |
| Grid bias. | -3 | -3 | -3 | -3 volts |
| Plate cur. | 7 | 8.2 | 5.8 | 3.6 ma. |
| Screen cur. | 1.7 | 2 | 1.4 | 2 ma. |
| Transcond. | 1450 | 1600 | 1050 | 1750 micromhos |

Fig. 2. Socket connections and characteristics of 78 tube and its substitutes.

*Increasing to 100v. will slightly increase transconductance to more nearly equal that of the 78.

TYPE 78

In the same series of tubes is the 78 which is an r-f pentode. If available, a 6D6 is the most logical substitute as it has the same basing—but the 3/8" greater height of the 6D6 may make it impossible to put the chassis back into the cabinet. But 6D6 tubes are about as rare as 78's. Type 39/44 is more available. Characteristic-wise it's a satisfactory substitute but requires a socket change to 5-pin. Types 6E7 and 6U7G are the same as the 6D6 except they have different bases and therefore require a socket change. Types 6S7 and 6S7G are okay with only a change to an octal socket in sets having parallel heater connections. For series heaters a 47-ohm 1-watt resistor should be connected across the heater terminals. For comparison, characteristics are tabulated in Fig. 2.

TYPE 6A7

Electrically identical substitutes for the 6A7 will be found in the 6A8, 6A8G, 6A8GT, and the 7B8, all of which require socket changes. Type 6D8G is a similar converter having a heater current rating of 0.15 as compared with 0.3 amp. for the 6A7.

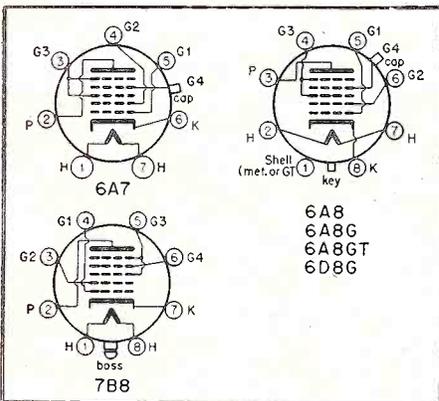


Fig. 3. Socket connections of 6A7 tube and its substitutes.

In circuits having parallel heater connections the only change required is that of a socket. In a series heater circuit a 1-watt 47-ohm resistor connected across the heater terminals will compensate for the lower heater current.

TYPE 25Z5

For a 25Z5 a 25Y5 can be substituted directly. The latter tube is the same except it was designed for use in 220 volt sets and has a higher factor of safety. Types 25Z6 and 25Z6G are electrically identical with the 25Z5 and can be substituted with only a socket change.

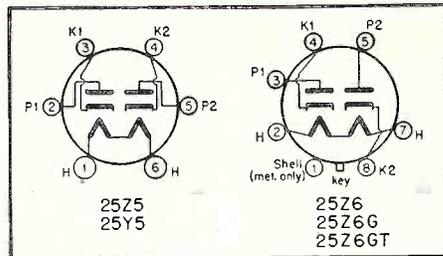


Fig. 4. Socket connections of 25Z5 tube and its substitutes.

TYPES 80, 5Y4G, 5Y4GT, 5Z3, 5X4G

Other older types of rectifiers sometimes difficult to procure are the 80 and 5Z3. The 80 is electrically identical with the 5Y3G and 5Y3GT. A

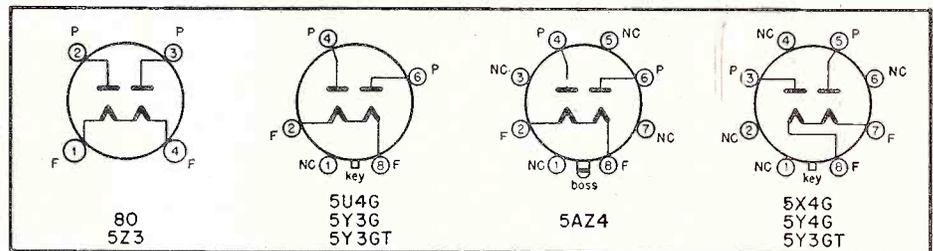


Fig. 5. Socket connections of 80 tube and its substitutes.

simple change to an octal socket is all that's required to make this modernizing substitution. A 5Y3GT will also replace a 5Y4G or 5Y4GT, which differ from it only in the matter of base connections. Type 5U4G, plentiful in non-TV areas, is electrically identical to the 5Z3, and its substitution requires only a change to an octal socket. Further, a 5X4G can be

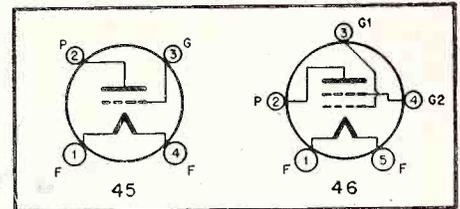


Fig. 6. Socket connections of 45 tube and its substitute.

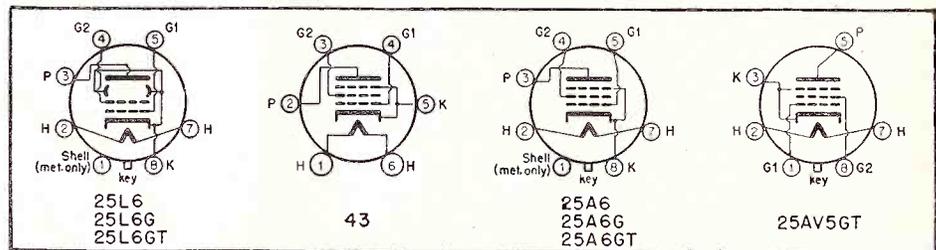
replaced by a 5U4G with only a change in the socket connections.

TYPE 45

Among the output types currently scarce is the type 45. If the extra tube cost is not objectionable a type 2A3 will substitute. Another possibility is

the use of a 46 with the second grid tied to the plate. The 46 as a Class A amplifier has an amplification factor of 5.6 as compared with 3.5 for the 45 so that a lower grid bias will be necessary; on the order of -30 volts. The 46 will also require a change to a 5-pin socket. While the 46 has

[Continued on page 35]



| | 25L6 25L6G 25L6GT | 43 | 25C6G |
|--------------|-------------------------|------|-----------|
| Heater pot. | 25 | 25 | 25 volts |
| Heater cur. | 0.3 | 0.3 | 0.3 amp. |
| Plate Pot. | 110 | 110 | 110 volts |
| Screen pot. | 110 | 110 | 110 volts |
| Grid bias | -7.5 | -17 | -11 volts |
| Plate cur. | 49 | 28 | 48 ma. |
| Screen cur. | 4 | 6 | 2 ma. |
| Load resis. | 2000 | 4000 | 1700 ohms |
| Grid signal | 5.3 | 12 | 7.8 volts |
| Power output | 2.1 | 1.5 | 2.4 watts |

Fig. 7. Socket connections and characteristics of 25L6 tube and its substitutes.

Let's Recruit For THE FUTURE

by E. C. CAHILL

(President, R.C.A. Service Company)

TELEVISION has grown strong with the aid of good, prompt, reliable servicing of receivers. To the extent that television servicing may be allowed to become inadequate, either in availability or in quality, the growth and strength of television will be jeopardized.

Recognition of these facts today is a challenge, for some 10,000,000 receivers will be in use by the end of the year, and there are far fewer than the 50,000 trained technicians required to service this number of instruments.

The situation is aggravated by the need for technicians in other electronic fields: radar, sonar, loran, ship and aircraft communication, radio remote control, and military applications of television. Nor is the competition for technical personnel confined to the armed forces. Radio is still growing and requires thousands of men to service it. Electronics is being used more extensively than ever before in industry, in medicine, in scientific research and many types of safety work—and wherever electronics gets a job, service technicians are required.

This is the situation we must face in television today: There are millions of receivers in use. Their number is increasing rapidly and steadily. As their number increases, so does the demand for service technicians. There are relatively few technicians. New men require prolonged training. Other agencies are siphoning thousands of television technicians into different channels. It is a time for more than concern. *It is a time for action.*

The challenge is real and urgent for the retailer, the independent serviceman, the distributor, the service association—in fact, everyone whose future and reputation depend on the retention and improvement of quality in television servicing.



E. C. Cahill

There are at least two approaches to the problem. One is the use of advanced technical equipment and procedures to save precious man-hours; the other, adoption of a vigorous and realistic program of recruitment and training.

Both measures have been adopted by the RCA Servicing Company, to insure the meeting of its commitments to offer service on RCA Victor television receivers in all television areas of the nation. An outline of the program of action we have undertaken may suggest measures helpful to others in the industry.

We have developed a joint recruiting and training program for technicians which utilizes the facilities of all of our service branches, in every television region of the country. We have thrown our doors wide open and offered to qualified men a type of training which will assure them of a substantial earning capacity. Among the features of this program which have helped and are helping us to attract intelligent, competent young men are the following:

1. Men are accepted as apprentices without previous experience, but they must show a strong interest in this type of work and have certain minimum qualifications which many grad-

uates of technical schools can meet.

2. Every man is paid from the day he first joins the company for apprenticeship training.

3. Rates of pay are increased as apprentices advance from one training level to the next.

4. Displacement of men is kept at a minimum. Frequently, apprentices can live at home because of the many cities in which this program is being undertaken.

We are not confining this activity to television areas. In fact, we recently began a campaign to secure radio technicians from non-television areas, train them to professional competence as television technicians, and then give them first preference should they choose to return to their home areas as RCA Service Company technicians when television comes to their communities.

The men are not required to remain with the organization for any specified period of time after they have completed their training. They may remain with the RCA Service Company, sometimes advancing to substantial executive positions, establish their own businesses, set up dealer servicing programs, or shift to any other phase of electronics for which they are qualified.

This program is important, as we see it, because it opens up a new source of manpower. In non-TV areas, there are large numbers of good radio technicians. With training, we believe they can become good TV technicians, available not only to RCA but to the industry.

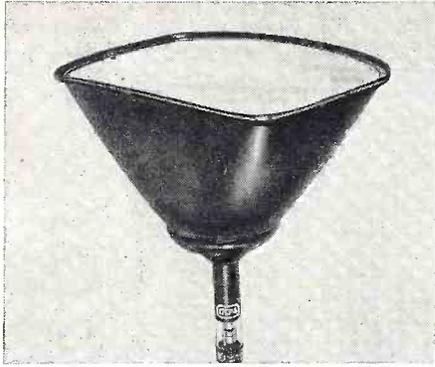
The training program for these recruits is laid out for a 42-month period, divided into seven 6-month steps. The student employee combines practical experience with formal training and home study throughout this period, and advances from elementary

[Continued on page 35]

NEW PRODUCTS

17-INCH METAL RECTANGULAR CRT

From the Radio Corporation of America, Harrison, N. J. a new, 17-inch, metal-shell, rectangular picture tube for television receivers has just been announced by the RCA Tube Department. This new tube—the first



metal-shell rectangular picture tube to be made commercially available—is designated as the 17CP4. It has a picture area $14\frac{1}{8}$ " x 11" with slightly curved sides and rounded corners—a shape that provides a very pleasing frame for the picture.

The 17CP4 with its design-center maximum anode-voltage rating of 16 kilovolts, provides pictures having high brightness and good uniformity of focus over the whole picture area. It has a high-efficiency, white fluorescent screen on a relatively flat, high-quality face made of frosted filterglass to prevent reflection of bright objects in the room and to provide increased picture contrast.

Employing magnetic focus and magnetic deflection, the 17CP4 features an improved design of funnel-to-neck section which facilitates centering of the yoke on the neck and, in combination with better centering of the beam inside the neck, contributes to the good uniformity of focus over the entire picture area. The diagonal deflection angle is 70° and the horizontal deflection angle is 66° .

Other features incorporated in the 17CP4 are short overall length and an ion-trap gun which requires only a single-field, external magnet.

TV ROOF MOUNT

A new roof mount designed to fit a variety of needs has been announced by Easy-Up Tower Company of Racine, Wisconsin. Designated the EZ-9 Mast Foot Mount, it is of heavy-duty, all-steel galvanized construction.

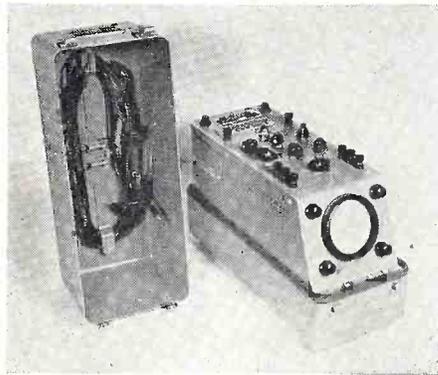


It is designed for straddle mounting over the roof speak as shown, or on a slanted or flat surface. A four-way hinge arrangement permits the mast to be "walked up" along the peak or tipped up from either side. It accommodates masts up to $1\frac{1}{2}$ " OD, while a companion model, EZ-9A, takes masts up to 2" OD.

MINIATURE 'SCOPE

Features typical of large precision laboratory oscilloscopes are characteristic of the new miniaturized oscilloscope announced by the Hycon Mfg. Company. In an instrument of this small size its adequacy with regard to testing of high frequency equipment and portrayal of pulse type wave forms is unique. The instrument is unusually compact, light in weight, and particularly designed for mobile applications. The instrument has high sensitivity, weighs only 17 pounds, and measures just 9" high x 6" wide x $14\frac{1}{2}$ " long. The circuit contains nine tubes, including rectifiers.

Now being produced for the Air Forces and the Navy in large quantities, the Hycon miniaturized oscilloscope is particularly designed to endure rough handling. The rugged outer case



is water tight. Its easy portability makes it especially useful for servicing television and radar equipment in the field.

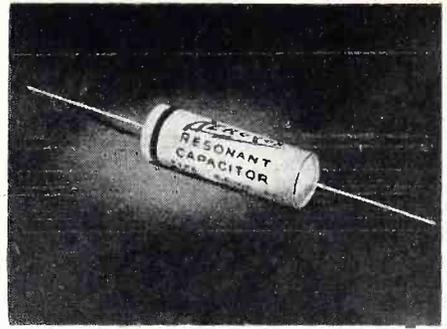
The wide band and linearity features of the instrument have heretofore been found only in laboratory type equipment. The sweep frequency range is from 3 cycles to beyond 50,000 cycles per second. Vertical amplifier response is flat within 3 decibels from direct current to 2 megacycles, while horizontal response is flat within 2 decibels from direct current to 100 kilocycles.

Manufactured by Hycon Mfg. Company, 2961 Colorado Street, Pasadena 8, California. Washington, D. C. Office - 910 - 17th St., N. W., Barr Bldg.

RESONANT I-F BYPASS CAPACITORS

To meet increasingly critical i-f bypass functions in modern receivers, Aerovox Resonant Capacitors are made available by Aerovox Corporation, New Bedford, Mass.

Such resonant capacitors (a) act as series resonant circuits, effectively by-passing undesirable i-f signals; (b) improve the filtering of i-f systems without resorting to larger capacitor size, the improvised trap consisting of a usual tubular with a series coil wound over it; and (c) reduce cost as well as bulk.



Such capacitors are applied where it is necessary to bypass the i-f circuit in order to prevent any i-f frequency currents or voltages (between 425 and 485 KC) from circulating in the system.

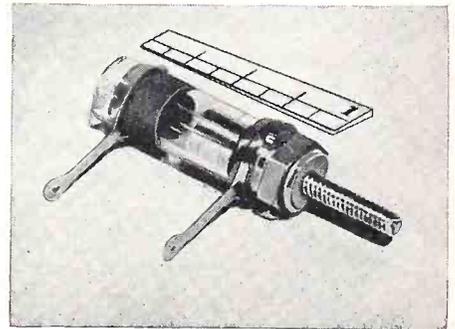
Aerovox resonant capacitors are made by winding sections in such manner as to increase the inductance in same. By properly placing the tabs, the section inductance can be controlled so that the capacitor will be resonant in the i-f frequency band. Aerovox resonant capacitors, Type RC, are available in these standard ratings: .05, .1 and .2 mfd, 400 WVDC; measuring $\frac{1}{2}$ " d. x $1\frac{1}{8}$ ", $\frac{1}{2}$ " d. x $1\frac{3}{8}$ ", and $\frac{3}{16}$ " d. x $1\frac{1}{8}$ ", respectively.

PISTON TYPE VARIABLE CAPACITOR

The JFD Manufacturing Co., Inc. of Brooklyn, New York announces the production of a new Piston Type Variable Trimmer Capacitor which provides the minimum capacities needed for exceptionally accurate and stable electronic adjustments.

Tubular in design, its design, it delivers continually uniform change of capacitance in relation to rotation. Smooth precise settings without backlash or disturbance from severe vibrations are made and maintained. Thread wear is automatically taken up. Extremely compact, the space-saving JFD Trimmer Capacitor is only one inch in length, offering maximum space economy with ease of mounting.

The three JFD Piston Type Variable Trimmer Capacitors available have the following specifications when measured at 0.1 mc. to 1 mc.: No. VC3 has max. 0.3 mmf. at minimum



setting and minimum 3 mmf. at max. setting. No. VC5 has max. 0.5 mmf. at min. setting and min. 5 mmf. at max. setting. VC11 has max. 1.5 mmf. at min. setting and min. 11 mmf. at max. setting.

TV ANTENNA MATCHING NETWORKS

Jerome E. Respass, president of the La-Pointe-Plascomold Corporation, Windsor Locks, Connecticut announced the addition of a new product to the VEE-D-X line of TV antennas and accessories.

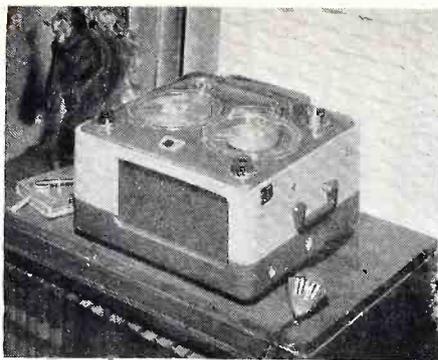
The Mighty Match is a filter network that does away with the necessity for using separate transmission lines where high and low band antennas are mounted on the same mast. The resulting saving of 300 ohm transmission line, Mr. Respass stated, is of great value at

this time to dealers and servicemen because of the present shortage of materials.

The Mighty Match consists of Hi and Lo filters that prevent both undesired signal and detuning disturbances from passing from one antenna to the other. The Mighty Match can be obtained as dual filter networks, or as four filter networks, depending on the required application. It can be used with all Hi-Lo stacks and also with high and low single channel directive type antennas that are mounted on one mast.

TAPE RECORDERS

This new Webster-Chicago Corp. tape recorder will record at both 3-3/4 and 7-1/2 inches per second. This feature means that spools recorded on it will be interchangeable with all other tape recorders. Since the machine uses a double-track tape, two hours of uninterrupted recording can be made at the



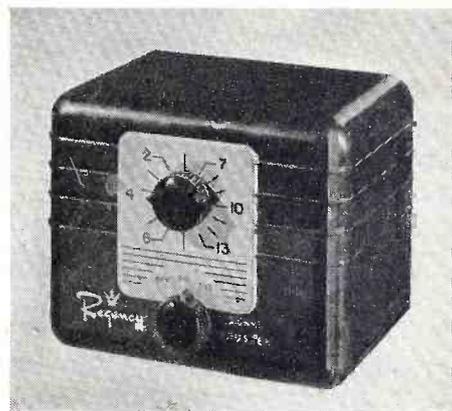
slow speed without turning over the reel. The machine has fast forward and fast reverse speeds. At the fast speed, a 1,200-foot reel of tape will run through in only three minutes.

It uses five tubes and a rectifier in a straight a-c circuit. Three of these are dual-purpose tubes, which give it the capacity of an eight-tube amplifier. It has a six-inch speaker.

The machine is portable and weighs 40 pounds. Standard equipment sold with it will include a microphone, power cord, an empty reel and one spool of tape measuring 1,200 feet and good for two hours of double-track recording. Nine hours of recording tape can be carried in the case. The case is of burgandy leatherette with attractive trimming.

TV SIGNAL BOOSTER

In order to produce the same high quality despite allocation difficulties, the engineering department of I.D.E.A. of Indianapolis has redesigned the Regency TV Signal Booster. The new model which will be known as DB 410 will retain much the same appearance. Its compact size of 4 1/2 x 5 1/2 x 3 3/4 inches and the single knob tuning will be retained. Only outer cabinet change is new satin-finished, gold-colored metal panel for the dial face.

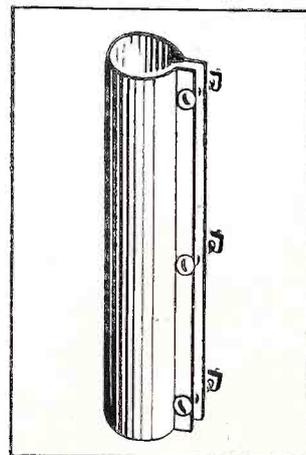


Model DB 410 has contra-wound bifilar coils with push-pull triode to give a balanced circuit. Internal impedance matching an input and output accommodates either 300-ohm parallel-line or 75-ohm coaxial cable. The wide bandwidth assures satisfactory video-audio reception on all 12 channels.

There has been no change in price. Still available in two finishes, the dark finish lists at \$32.50 and the light (blond finish) lists at \$37.50.

MAST COUPLING

A mast coupling is being offered to the trade by Technical Appliance Corporation, Sherburne, N. Y., manufacturers of Taco antennas and accessories, that will couple wood and metal mast sections securely.



Cat. No. 189 Mast coupling masts of 1 1/4" to 1 5/8" O.D. It is made of heavy gauge steel and is clamped securely to masts by means of three 1/4" bolts running through flange.

Eliminates Messy Soldering Jobs!



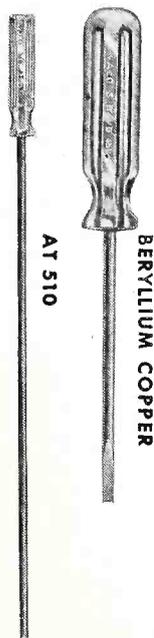
Now you can get a positive, trouble-free connection on every terminal... as fast as you can close your hand. No messy soldering or waiting for an iron to heat! With a Lynn *Lightning* service kit you just strip primary wire from 10 to 22 gauge with handy, combination stripping and crimping tool... select the proper terminal... then *crimp* it on. Every job quick, clean, professional-looking! Kit comes complete with crimping tool, 10 different types of terminals plus insulation tubing in 11-bin, clear plastic box. Only... \$7.95

Two New Television Screw Drivers

Reach hard-to-get-at spots with the new Vaco AT 510 non-metallic, fiber shank driver for critical tuning and aligning work... the 10" blade gives you all the length you need. Adjust the new type focalizers with specially designed Vaco Beryllium-copper drivers... non-magnetic, yet nearly as hard as steel for adequate torque without interference with the Ion trap field. Full information on other aligning tools, nut setters and special radio tool kits on request. Write for FREE catalog.



317 E. Ontario St., Chicago 11, Ill.
In Canada: Vaco-Lynn Products Co., Ltd.
1212 Notre Dame St., W., Montreal 3, Que.



of clamp acts as guy wire anchor.

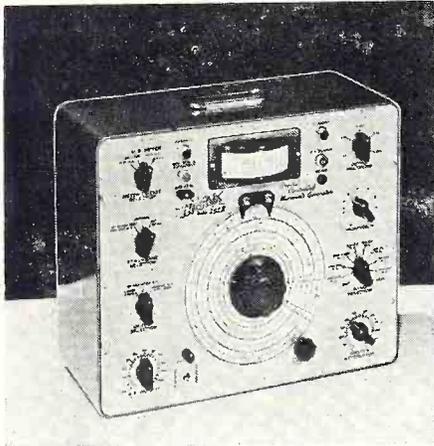
Clamping action is fast and positive. Bottom

This design is especially adpptable to wood masts inasmuch as pressure is distributed over a large area of the mast as compared to the U-Bolt type of coupling.

MICROVOLT SIGNAL GENERATORS

A new microvolt signal generator is just announced as a popularly priced instrument made available to provide an accurate and wide range of technical characteristics.

Known as the Model 292X, this new generator covers all AM, FM, TV and Mobile frequencies in 7 ranges. Has double range of 125 KC to 110 MC and 120 to 220 MC, all on fundamentals. Crystal accuracy is available to .0025% for mobile bands of 30-50 MC and 152 to 162 MC.



Provides accurately controlled modulated and unmodulated output from .2 to 100,000 microvolts through a 10 to 1 cast aluminum attenuator. May also be externally modulated from 15 to 10,000 cycles per second.

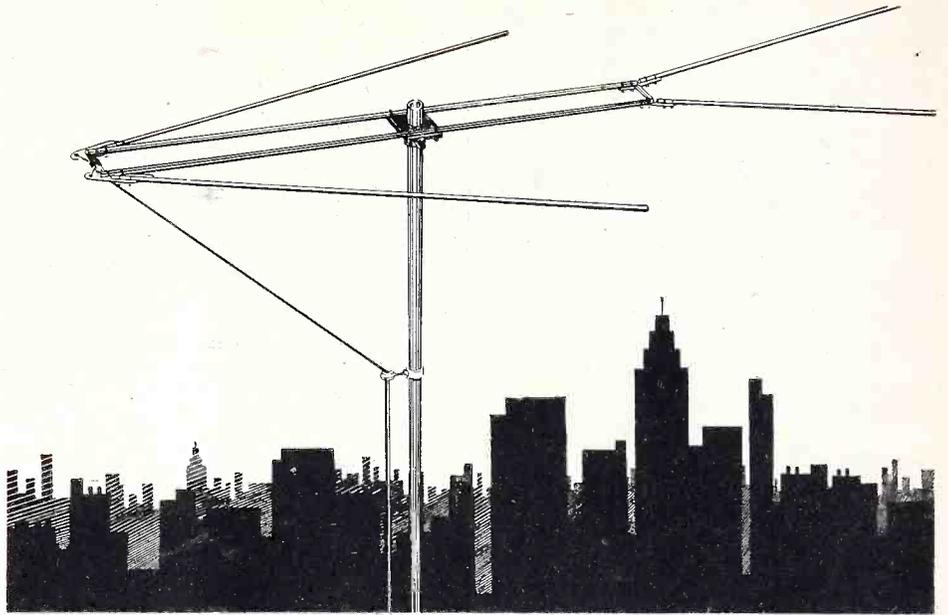
Temperature compensation, negligible change in frequency due to output, and absolute minimum leakage, features the excellent stability of this instrument.

AF output: 0-2 volts at 400 cycles. Contains a decibel meter to indicate reference level. Extra large scale is easy to read. All test leads are included.

This new generator is built entirely of highest quality, original components to provide long-lasting dependability for the exacting engineer. Write for complete information to the Hickok Electrical Instrument Co., 10533 Dupont Avenue, Cleveland 8, Ohio.

TUBE TESTER KIT

The ever-increasing purchase of television and radio sets by the American public has created unprecedented opportunities for the merchandising of vacuum tubes. To help the service-dealer take maximum advantage of this profit-making market—at low cost—Electronic Instrument Co., Inc., 276 Newport



THE RUGGED WORKSHOP

DUBL-VEE TV ANTENNA

PATENT PENDING

Stands up in Winter Storms . . . Saves Costly Service Calls

That well-remembered storm in late November knocked down thousands of TV antennas but only a small percentage of DUBL-VEES. Alert set owner, dealers, and installers were quick to note that it stood up through wind, ice, sleet, and snow . . . saved annoying, expensive service calls. This rugged performance was possible because the DUBL-VEE offers less wind resistance than any other popular TV antenna.

Coupled with its exceptional mechanical strength, the DUBL-VEE's high gain and sharp directivity insure clear, brilliant pictures throughout the TV spectrum with a minimum of interference. Four outstanding pictures under all conditions get the WORKSHOP DUBL-VEE.

Write for Bulletin E



THE WORKSHOP ASSOCIATES, Inc.

135 CRESCENT ROAD, NEEDHAM 94, MASSACHUSETTS

FREE TO TV SERVICEMEN THE LAST WORD IN TV 'TENNA INSTALLATIONS



**BRAND NEW
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INFORMATIVE**
Simplifies

TV-ANTENNA INSTALLATIONS

A fact-filled, pocket size reference manual edited by outstanding authorities. Packed with vital information on all types of antennas, Helpful Hints, Do's and Don'ts, Dimension Guide, Channel Frequencies, Proper Feed Methods and many other subjects.

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22nd & Ontario Sts., Phila. 40, Pa.

Please send free copy of TV 'TENNA TIPS

Name.....

Address.....

City..... Zone..... State.....

Street, Brooklyn 12, N.Y. has just released the new Eico Model 625-CK Counter-Display Tube Tester Kit.

Incorporating the identical engineering features and circuits of the nationally accepted Eico Model 625-K Tube Tester Kit, recently announced, the new EICO Model 625-CK is specifically designed for that extra counter "showmanship" that means so much for successful vacuum tube merchandising.

Individual switches for separate testing of every tube element; tests conventional receiving and TV tubes including 4,5,6, large & small 7, octal, loctal, noval, hytron, VR, magic eye & pilot bulbs; blank spare socket for future new tubes; illuminated gear-driven "Speed Roll-Chart"; two grid caps; protective overload bulbs; vacuum tube rectifier; full-vision bakelite-cased meter.

TRADE FLASHES

[from page 12]

150 ma tube types; substitute 300 ma tube types; substitute transformer and auto types; substitute TV receiving type tubes; substitute TV picture tube types; and frequently needed change-over diagrams,

November Tube Production

Production of TV picture tubes in November continued at its peak fall rate, running slightly above October, the Radio-Television Manufacturers Association reported.

A total of 851,872 cathode ray tubes were sold to equipment manufacturers in November and 914,804 were produced for all purposes. Approximately 98 percent of the tubes sold to set makers were 16 inches or larger, and more than 60 percent were of the rectangular type.

Sales to users and distributors of tubes for replacement purposes amounted to 61,938 in November.

November sales of radio receiving tubes dropped slightly below the all-time record established in October.

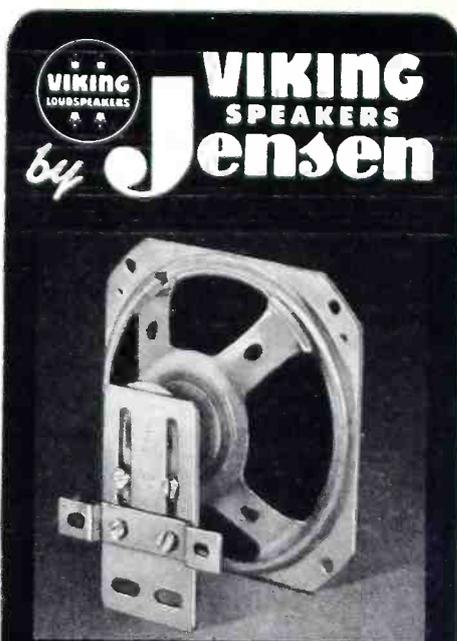
November tube sales totalled 39,326,641 compared with the 40,105,611 units in the previous month. Tubes sold in the first 11 months of 1950 aggregated 344,236,998. RTMA reported. This compares with 174,946,014 receiving tubes sold in the corresponding 1949 period.

A breakdown of the November report shows 31,327,152 tubes sold for new sets; 6,744,892 for replacements; 1,134,997 for export; and 119,600 tubes sold to Government agencies.

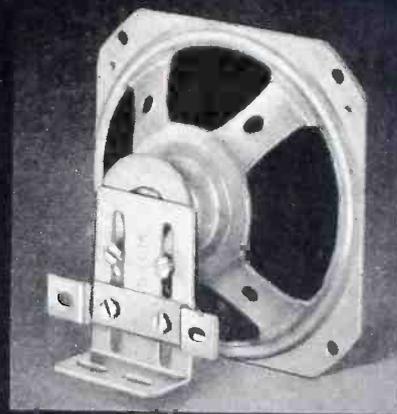
GE To Construct New Electronic Plant

General Electric officials here have given the "go ahead" on construction of a new million dollar electronics plant at Auburn, it was announced recently.

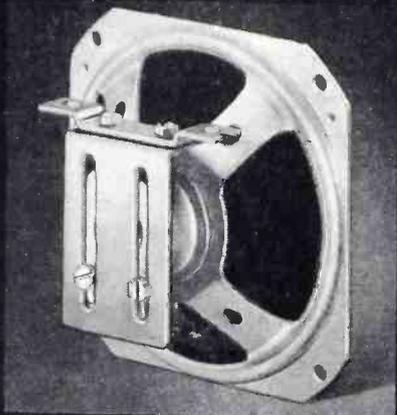
Orders have been placed with a Buffalo contractor to begin immediate



VIKING speakers by JENSEN are reliable, economical units for replacement and general use. 12 sizes (3 ovals) cover 98% of your service needs.



These new handy chassis and transformer brackets easily, quickly solve every mounting problem. They fit all VIKING speakers, 6" size and smaller.



Jensen
MANUFACTURING COMPANY
Division of The Muter Company
6601 S. LARAMIE AVENUE
CHICAGO 38, ILLINOIS

excavation and construction work on a 60-acre site on the Auburn city line, according to Dr. W. R. G. Baker, General Electric vice president and general manager of its Electronics Department.

The new plant is expected to be ready for occupancy by late summer or early fall, Dr. Baker explained.

New Rider Publications

John F. Rider Publisher, Inc., 480 Canal St., New York 13, N.Y., announces that "TV Master Antenna Systems" their new book co-authored by Ira Kamen and Richard H. Dorf is available at the organization's jobbers.

Installation and distribution, maintenance, usage, and merchandising of TV master antenna systems is thoroughly discussed. Detailed explanations of every important amplified and nonamplified master antenna system now in manufacture, complete with actual schematic diagrams, performance figures, and design data are included here. The scope of the book has been planned to treat problems and their solutions from beginning to end.

A second publication, the new Rider Manual Volume XXI (21), was made available to all of the organization's distributors in January. This latest volume in the AM-FM series of factory-authorized servicing data contains information on AM, FM, auto radios, record changers, tuners, disc and tape recorders for the inclusive period December 1949 - October 1950. 586 models, the productions of 61 manufacturers are incorporated into this 8½ x 11 inches addition to the 21 year old service.

TV Tenna Tips

Through the cooperation of Snyder Manufacturing Company, Philadelphia television and radio accessories firm, a new booklet on the subject of television antenna installations, titled TV 'Tenna-Tips, is being made available without charge to authorized servicemen through Snyder distributors.

TV Mis-Information

Much-in-the-news Color Television is treated in the lead story of the latest edition of Television Mis-Information, Sheldon Electric's information publication, now going to 80,000 in Television and Radio. As a special feature to the story on Color Television, Television Mis-Information makes five specific predictions on Color's future. The recent court decision on Color bears out some of these predictions.

This edition of 20 pages in three colors, containing over 45 specific



"When did you last change your Phono-Cartridge?"

That's your \$70 (Million) question, Mr. Service-Dealer!

Right now . . . 10,000,000 old style, heavy, stiff-acting phono-cartridges in existing record players are *obsolete*. They limit reproduction. They rapidly wear out valuable records. They should be replaced immediately with *modern, lightweight, compliant* cartridges that guarantee greater record enjoyment, longer record and needle life. Current cartridges that operate inefficiently should be replaced, too.

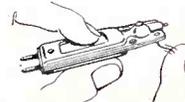
So check the cartridge on every job . . . ask every record player owner this simple question: "When did you last change your phono-cartridge?" You'll render a service your customers will appreciate—you'll sell replacements like never before—you'll make more money!

Now for better playing, record saving performance ... REPLACE... MODERNIZE with easy-to-install E-V Cartridges. Exclusive features of E-V Torque Drive make it ideal for fast and slow speed records. Has extra-high voltage-compliance ratio. No bearings or bushings to deteriorate. Simplified design permits maximum replacements with fewer models. Single and dual needle types. Used today in original equipment of many leading manufacturers.

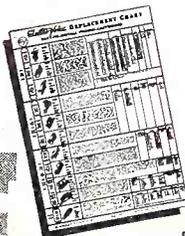
Make the Finger-Tip Compliance Test



Modern, compliant needle system



Old style, stiff-acting needle system



FREE!

REPLACEMENT CHART
Large, Complete Replacement Chart. Gives handy cross-reference and valuable data. Tells when to replace a phono-cartridge. Ask your E-V Distributor or send for it now.

Electro-Voice

412 CARROLL STREET • BUCHANAN, MICHIGAN
Export: 13 East 40th St., New York 16, N.Y., U.S.A. Cables: Arlab

Electro-Voice, Inc.
412 Carroll St., Buchanan, Michigan
Send FREE Cartridge Replacement Chart

Name

Address

City Zone State

BUILD PRESTIGE and PROFITS



No installation is better than its component parts. In loudspeakers, there's no wiser choice than **UNIVERSITY**—the time tested leader that provides *performance plus!* **UNIVERSITY** "progressive engineering" constantly explores new materials, new production methods, new ideas to further improve the performance, construction, and dependability of its products. These are your guarantee of satisfied customers every time.

WITH
University
LOUDSPEAKERS



**MODEL 1B8
PAGING
SPEAKER**



**UNIVERSITY
LOUDSPEAKERS • INC**

80 SO. KENSICO AVE., WHITE PLAINS, N. Y.

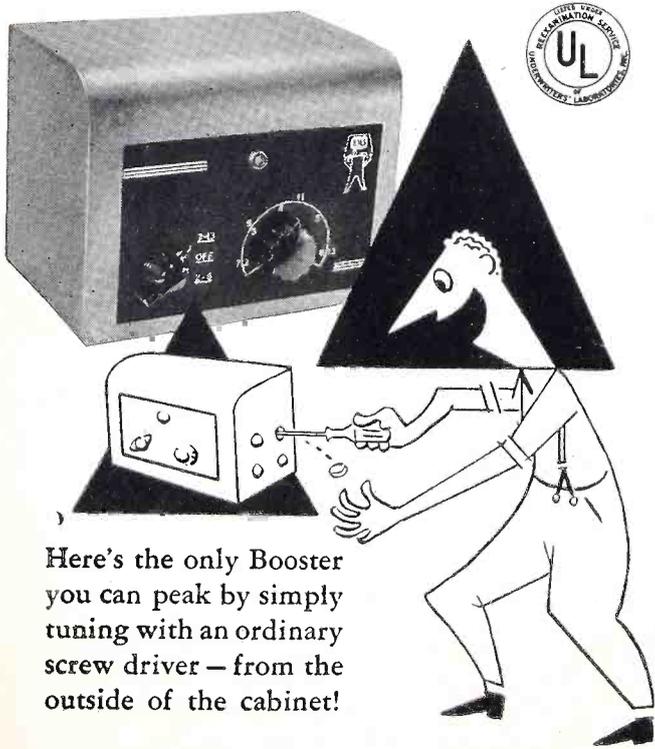
The most popular paging speaker ever made. Features high sensitivity on talk-back and unusual conversion efficiency. Requires less amplifier power and gives more watts-per-dollar. Frequency response 300-10,000 c.p.s. with rising characteristics results in exceptional intelligibility and noise penetrating ability. Only 8½ x 9 inches, Model 1B8 is a veritable powerhouse with a conservative 12 watts continuous power rating. Rugged, weatherproof construction assures lifetime dependability.



TECHNILOG

IT'S HELPFUL...
IT'S PRACTICAL...
Aids to better sound-casting. A technical catalog written by experts for engineers, designers, installation and service men. Write for free copy to Desk 26.

PEAK FOR PERFORMANCE *on your channels* with the new **RMS BOOSTER SP-5**



Here's the only Booster you can peak by simply tuning with an ordinary screw driver — from the outside of the cabinet!



Has an edge in engineering!

Wide band width
Lowest insertion loss
Greatest signal to noise ratio.

Has an edge in styling and simplicity!

All metal cabinet in mahogany ripple finish — blends with all furniture.

Gear driven for velvet-smooth, 1-knob tuning.

Write for fuller details or See Your Jobber

RADIO MERCHANDISE SALES INC. • NEW YORK 5

toons has already aroused interest illustrations, photographs and car-among manufacturers, distributors, jobbers, dealers, and servicemen. A copy can be secured by writing to the Sheldon Electric Company, Irvington, N. J.

RCA Technical Material Made Available To Servicemen

Service and technical data on all RCA Victor radios, phonographs, and television receivers are now being made available to servicemen through RCA tube and parts distributors, it has been announced by the RCA Tube Department.

Covering all RCA Victor instruments from 1923 through 1950, this technical material provides schematic and wiring diagrams, electrical and mechanical specifications, alignment and adjustment procedures, complete service parts lists, chassis layouts, and other useful service information.

The material is available in two forms. Service information covering the years 1923 through 1948 is contained in four bound volumes, and a fifth volume covering 1949 is now in preparation. Service information on 1950 models is contained in booklets, each covering one or more models.

Bound volumes and booklets are now available from RCA Victor tube and parts distributors at moderate cost.

New CRT & Special Tubes Booklets

A newly revised and enlarged edition of the widely used RCA booklet, "Phototubes, Cathode-Ray, and Special Tubes," CRPS-102-A, has been announced by the RCA Tube Department. This new booklet and its companion booklet, PG-101-A Power and Gas Tubes, together present the most complete line of tubes for communications and industry available to the electronics trade.

Fidelity To Mfr. Miniature Tubes

The Fidelity Tube Corporation of East Newark, N.J., today announced plans for the manufacture of miniature receiving tubes and radar tubes for use by the armed forces.

In making the announcement, Mr. Benjamin Ozaroff, president of the company declared that the new production policy grew out of President Truman's recent request for increased electronic equipment for the nation's mobilization effort.

Radio-TV Industry Breaks Past Records

The radio-television industry broke all past records in production and sales of TV and radio sets in 1950,

President Robert C. Sprague, of the Radio-Television Manufacturers Association, revealed recently.

Preliminary estimates indicate that close to 7,500,000 television receivers and over 14,000,000 radios were manufactured during the past year. Manufacturers' sales amounted to about \$1.7 billion, which represented an increase of 90 percent over 1949 sales and 125 percent over 1948's record.

Air King Exhibits 1951 Line

Air King Products Co. Inc. exhibited their 1951 line of television and A.M. table and 3-way portable radios at a regional showing held at the Park Sheraton Hotel, N. Y., January 22nd and 23rd.

The line includes two table model 17 inch rectangular tube receivers, three console 17 inch rectangular tube receivers, two console 20 inch rec-



tangular tube receivers, and a 17 inch rectangular tube television and radio receiver and three-way record player combination. All in a variety of attractive contemporary cabinets.

It is conservatively estimated that well over 500 interested dealers visited the two day showing as well as more than 50 Eastern regional distributors.

On hand to greet visitors was Roland D. Payne, Sales Mgr., Samuel Olchak, Assistant Sales Mgr., and Ed. Berliant, General Manager of Air King Distributing Co. Inc.

Admiral Introduces New Line

Admiral Corp. showed their complete line of 1951 TV receivers, AM and FM radios, refrigerators and ranges in the Terrace Room of the Hotel Plaza on Jan. 15 and 16. The star of the line is the Tele-bar which is a combination TV set containing a 21 inch tube, 3-speed record changer, AM and FM radio and bar. The latter contains a stainless steel tray, and adequate housing space for bottles and glasses.

and 35 TV receivers ranging in price from \$19.95 to \$895.00.

Replacement Needle Chart

M.A. Miller Manufacturing Company, Chicago manufacturer of phonograph needles has recently made available on excellent replacement needle cross reference guide. This simple, convenient guide is made up of three easily-read pages giving much valuable information.

The material includes the Miller Replacement Number, the name and number of the manufacturer, the tip material, the radius and the list price. To further assist the jobber and serviceman-dealer, Miller also includes needles of competitors which is a re-

markable and conscientious gesture of M.A. Miller to really serve its customers.

Collection Guide

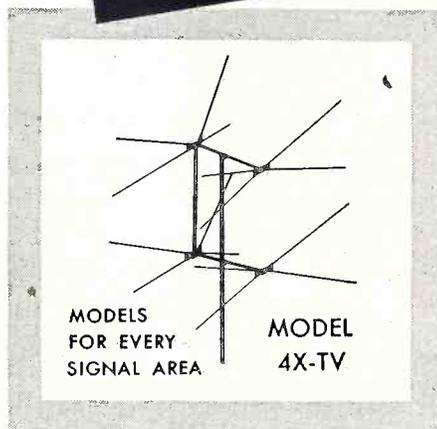
This 48 page booklet contains a complete digest coverage on basic collection rules written in clear, concise language. Includes these subjects and more: Series of standard form collection letters—credit form information requirements—a program helpful for the purpose of training outside collectors—pointers on skip tracing—Dunning by telephone and teletype—examples of classified ads that increase manpower. These and many

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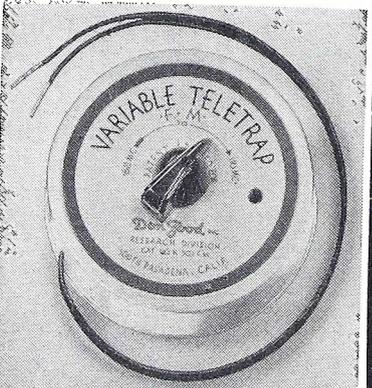
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credit business—a bible for collector in training—also "memorandum" for the credit department.

Obtainable from Sol Hirschhorn, 9042 West 24th Street, Los Angeles 34, California. Price: \$1.00.

William A. Wright Joins Chamberlin Concern

Harold A. Chamberlin, manufacturers representative for New England and upper New York State announced the appointment of William A. Wright



to assist him in covering the New York State territory. With sixteen years sales experience, he stated, Bill Wright will be a valuable addition to the staff. Bill replaces Fred A. Hess who recently became Sales Manager for VEE-D-X antennas and accessories.

Promotions & Personnel Changes

D. H. Cogan, President of Air King Products Company, Inc. Brooklyn, New York manufacturers of television receivers, radios and wire recorders announced the appointment of "ED" Berliant as General Man-

ager of Air King Distributors Corporation, 5302 Second Avenue, Brooklyn, New York. Air King Distributors is a wholly owned subsidiary that distributes Air King television receivers, radios and wire recorders in the New York City area.

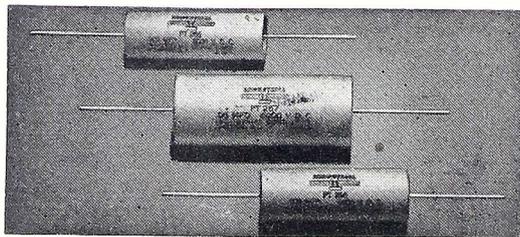
The appointment of Julius Haber as Director of Advertising and Sales Promotion for RCA Technical Products has been announced by L.W. Teegarden, Vice President in charge of Technical Products, RCA Victor Division, Radio Corporation of America.

Formerly Advertising and Sales Promotion Manager of the RCA Tube Department, Mr. Haber will now coordinate the advertising and sales promotional activities of all RCA technical products including those of the Engineering Products Department and the Tube Department. John P. Taylor continues as Manager of Advertising and Promotion for the Engineering Products Department. In his new capacity, Mr. Haber will be attached to the staff of the Vice President in charge of Technical Products.

Recently joining the executive organization of Thomas Electronics, Inc., Passaic, N.J. is M. J. Alexander, who will direct the television picture tube firm's sales and advertising programs, according to an announcement by Thomas Clinton, corporation president.

Mr. J. E. Respass, president of the LaPointe - Plascomold Corporation, manufacturers of the nationally

Insure BETTER Television Service to Your Customers! . . . Exclusively Designed



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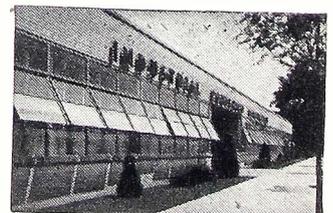
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known VEE-D-X television antennas and accessories, announced today the appointment of Mr. Sidney E. Warner as Director of Engineering and research.

Sylvania Electric Products Inc. today announced the appointment of four Company executives to the post of vice president. The appointments become effective January 1, 1951.

The men named include: Arthur L. Chapman, general manager of the Radio and Television Division, and of the Parts Division; Curtis A. Haines, general manager of Operations of the Radio Tube and Television Picture Tube Divisions; John B. Merrill, general manager of the Tungsten and Chemical Division; and Howard L. Richardson, Director of Industrial Relations.

LET'S RECRUIT

[from page 26]

installation training to the point where he can handle advanced, complex servicing problems alone.

Among the most practical benefits derived by the technician from this program are a strong awareness of the importance of earning the respect and confidence of the customer and an instinctive grasp of the means of doing so. As a natural result of practice in courteous handling of customers, cleaning up after a job has been done, teaching customers how to tune receivers properly, and answering questions about television politely, diplomatically, and authoritatively, the technician becomes a salesman for his employer, creating a favorable impression and helping to retain old customers and attract new ones, and a salesman for the television industry, helping to hold and expand audiences. Proficiency in this field of customer relations, combined with the professional competence that comes from thorough, practical training, makes each man a specialist, well equipped to serve television and earn a good livelihood.

Although television is today a vast industry, reaching those areas of the nation where nearly two-thirds of the population lives, it is far from the saturation point in those areas. There is also considerable likelihood that additional regions will be opened to television within a year or so.

We believe, and we are confident the TV servicing industry will agree,

that now, while the opportunity is yet great, is the time to attract desirable young men to this industry and train them to professional status.

TUBE TOPICS

[from page 25]

a larger envelope and slightly higher filament current than a 45, these differences should not prove objectionable for in these early-day sets there is plenty of space and transformers were generally rated more conservatively. Obviously, if the set has push-

pull output, both tubes will have to be the same—it isn't practical to use a substitute in just one socket.

TYPES 25L6, 25L6G, 25L6GT

When used as an audio output amplifier, the type 25L6G and GT can be replaced by pentode types 43, 25A6, 25A6G or 25A6GT. Type 43 with a 110 to 120-volt B supply requires not only a socket change, but also changing the cathode resistor to 560 ohms where used, or increasing the fixed bias to about -15 volts. For maximum power output these pentodes require about twice the load impe-



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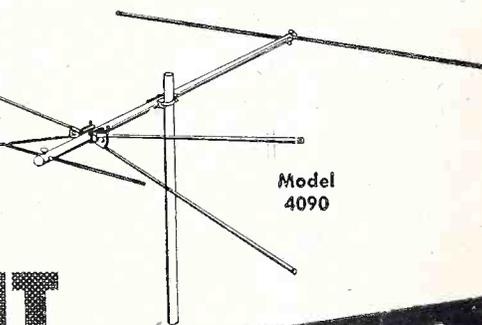
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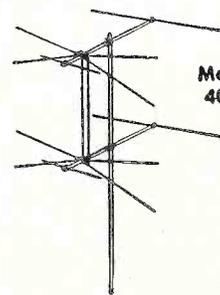
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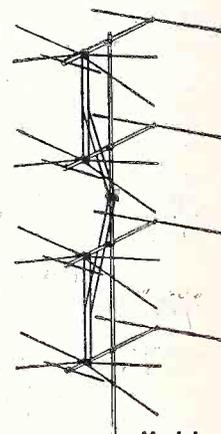
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- Assemble in a jiffy (less than 2 minutes).



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Model 4092



Model 4094

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| Pre R.T.M.A. type Nos. | Old R.T.M.A. type Nos. | Metal type Nos. | G type Nos. | GT type Nos. | Lock-in type Nos. | Miniature type Nos. |
|------------------------|------------------------|-----------------|------------------|--------------------|-------------------|---------------------|
| 43 | — | 25A6 | 25A6G | 25A6GT | — | — |
| 75 | 6B6G | 6SQ7 | 6SQ7G | 6SQ7GT | 7B6 | 6AV6 |
| 78 | (6D6) (6E7) | — | 6U7G | — | — | — |
| 80 | — | 5Z4 | (5Y3G) (5Y4G) | (5Y3GT) (5Y4GT) | 5AZ4 | — |
| — | 5Z3 | — | (5U4G) (5Y4G) | — | — | — |
| — | 6A7 | 6A8 | 6A8G | 6A8GT | 7B8 | — |
| — | 25Z5 | 25Z6 | 25Z6G | 25Z6GT | — | — |
| — | — | 12SK7 | — | 12SK7GT | 14A7/12B7 | 12BD6 |
| — | — | 25L6 | 25L6G | 25L6GT | — | — |
| — | — | — | 35L6G | 35L6GT | 35A5 | (35B5) (35C5) |
| — | — | — | 50L6G | 50L6GT | 50A5 | (50B5) (50C5) |

Chart of tubes having same electrical operating characteristics. The types that are shown bracketed differ only in basing or base connections. Various tube types are listed on top of chart and underlined.

ously lock-in types could be substituted for the octal series or vice-versa with only a socket change.

Another change if only one tube

is involved is the substitution of a 6SS7 or GT for a 12SK7 or GT. Similarly this applies also to a 7B7 for a 14A7. The fact that the series

dance of a 25L6GT, but such a change is not essential. Another substitution is that of a 25C6G. This type requires somewhat higher grid bias than a 25L6GT and an increase in the bias resistor to 180 to 220 ohms is in order. No other change is required. Typical characteristics are tabulated in Fig. 7 for reference. Two other substitutions are the 25AV5GT and 25BQ6GT where the greater overall height can be accommodated as well as the extra expense being acceptable. These are TV types which may be available in non-TV areas. A lead to the top cap is the only change required for the 25BQ6GT. The 25AV5GT requires rewiring of the socket.

TYPES 12SK7, 12SK7GT, 35L6GT

In the 6-tube ac-dc sets using a 35L6GT output, the shortage of that type and of the 12SK7 or 12SK7GT can be alleviated by a double switch. For some years certain manufacturers in their 6-tube sets have found it desirable to use a 50-volt output tube by employing 6.3 volt 150 ma. r-f and i-f amplifiers. For the 12SK7 or GT use 6SS7 or 6SS7GT and a 50L6GT for a 35L6GT. No other changes are required. The same is true in the lock-in series. For 14A7/12B7 use 7B7 and a 50A5 for the 35A5. Obvi-

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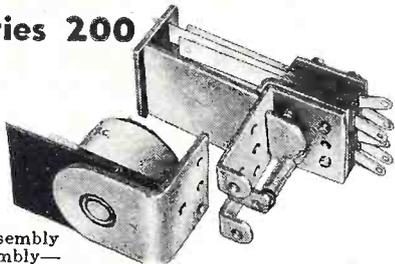
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Two basic parts—a coil assembly and a contact switch assembly—comprise this simple, yet versatile relay. The coil assembly consists of the coil and field piece. The contact assembly consists of switch blades, armature, return spring and mounting bracket. The new Guardian Midget Contact Assembly which is interchangeable with the Standard Series 200 coil assembly, is also available in either single pole, double throw; or double pole, double throw.

CONTACT SWITCH ASSEMBLIES

| Cat. No. | Type | Combination | |
|----------|---------------------------------|-------------|--------------|
| | | Single Pole | Double Throw |
| 200-1 | Standard | Single Pole | Double Throw |
| 200-2 | Standard | Double Pole | Double Throw |
| 200-3 | Contact Switch Parts Kit | | |
| 200-4 | Standard | Double Pole | Double Throw |
| 200-M1 | Midget | Single Pole | Double Throw |
| 200-M2 | Midget | Double Pole | Double Throw |
| 200-M3 | Midget Contact Switch Parts Kit | | |

13 COIL ASSEMBLIES

| A.C. COILS* | | D.C. COILS | |
|-------------|----------|------------|----------|
| Cat. No. | Volts | Cat. No. | Volts |
| 200-6A | 6 A.C. | 200-6D | 6 D.C. |
| 200-12A | 12 A.C. | 200-12D | 12 D.C. |
| 200-24A | 24 A.C. | 200-24D | 24 D.C. |
| 200-115A | 115 A.C. | 200-32D | 32 D.C. |
| | | 200-110D | 110 D.C. |

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| FEBRUARY 1949 Test Equip. Symposium Issue: CROs - VTVMs - Sq. Wave Generators - Markers - Multi- meters - Kilovolts - High Voltage Probes, etc. | APRIL 1950 Servicing Sync Separators The TV Waveform & Its Com- ponents Understanding Push-Pull |
| MARCH 1949 Tube Testers Chart Volt-Ohm-Milliameters TV Kilovoltmeter Signal Generators | MAY 1950 1-Man TV Antenna Orientation Elements of TV Signal Distribu- tion TV Sync-Sweep Tracing |
| JUNE 1949 Direct View Enlarging Lens Modern Tape Recorders, Part 2 Custom Building High Fidelity Circuits. | JULY 1950 Horizontal A-F-C Circuits, Part 1 Theory of Tape Recording Winch for Raising TV Towers |
| JULY 1949 Picture Tube High Voltage Sys- tems High Quality Tuner Analysis Amateur TV Interference | AUGUST 1950 Servicing FM Detector Systems Horizontal A-F-C Circuits, Part 2 Theory & Pract. of Video Detect. Circuits. |
| SEPTEMBER 1949 Legality of TV "Policies" Clari- | SEPTEMBER 1950 RCA's New TV Chassis Mechanical Features of Tape Recorders Horizontal A-F-C Circuits, Part 3. |

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Despite severe production difficulties, this new "BIG" TV Manual is being scheduled for delivery in March. However, due to paper shortages, we can print only a limited quantity. And since the contemplated curtailment of television receiver production makes the information contained in this volume absolutely essential to servicing technicians, we suggest that you order your copy IMMEDIATELY.

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string adds up to 6.3 volts less is not significant, unless the set is operated on a line in excess of 120 volts.

The often-suggested substitution of a 50L6GT for a 35L6GT is not to be recommended. With a 35L6GT a typical 6-tube string adds up to 119.4 volts. The use of a 50L6GT would add up to 134.4 which is altogether too high for good performance except where the normal line voltage is in excess of 122 volts.

Other substitutions of tubes having the same electrical characteristics are suggested by the table. Generally speaking the use of single-end tubes in place of top cap types will involve problems of keeping the input and output circuits separated, which the serviceman had best avoid. Exceptions are the output and rectifier tubes.

14BP4 versus 14CP4

Both of these are 14-inch rectangular television picture tubes which are electrically and mechanically identical. Difference?—merely in the external conductive coating. On the 14BP4 the coating comes to within 3/4" of the reference line. On the 14CP4 the distance is 2". Only case where these two types would not be interchangeable, is where only a cathode whisker (s) from the yoke mounting is used to contact the coating. Wires long enough for the 14BP4 might be too short to reach the coating on the 14CP4, but most manufacturers now ground the coating with a spring(s) from the chassis. Why stock and use two types of tubes? As 14CP4 is favored four-to-one in use over the 14BP4, why not standardize on 14CP4. One manufacturer already is double branding his 14CP4's to read 14CP4/14BP4.

CBS COLOR

[from page 21]

4-Deflection Output and Hum Considerations

The deflection output circuit consisting of the horizontal output tube, output transformer, and deflection yoke must continue to supply sufficient power to deflect the beam at a faster rate and with a shorter retrace period. Often, more power must be gotten from the output tube to handle additional losses at a high color rate. This can be done by boosting the output tube screen voltage. Occasionally a specially designed output transformer with characteristics which permit operation on both frequencies

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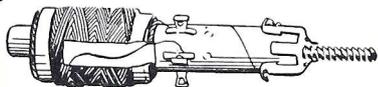
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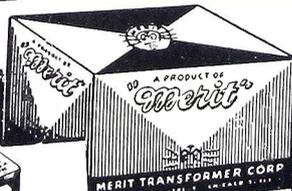


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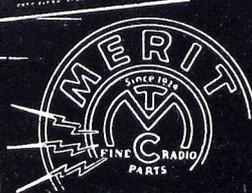
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must be substituted for the present transformers.

To minimize hum in a receiver when the vertical rate is 144 cps, which is not the same as the power supply ripple of 60 or 120 cps, and to reduce interference beats between these frequencies, extra filtering is needed in the power supply and at strategic points of supply in the receiver.

5-Switching

Proper switching is of primary importance so that the customer can switch from one rate to the other without having to make any back panel and a very minimum of front panel adjustments. This means certain controls must be duplicated and pre-set—one group for monochrome and another for color.

Despite elaborate changes necessary in some models, change over can be done effectively. In fact, with good converter design and adapter plugs most models can be changed over without removal from the chassis. It would be the responsibility of each manufacturer to design an effective adapter-converter unit for each of their own models.

ROTATORS

[from page 16]

quired. Gears in the train may be fabricated of brass, steel or plastic materials, or a combination, to achieve the required results.

The tensile strengths of the above materials are different and care must be used in determining at what position in the gear train a certain type of material may be used. Steel, of course, has the highest tensile strength of the above named materials.

The housing of the rotator unit presents design problems, since it must basically be a structural member. Because it is also the only part of the rotator the ultimate user sees, the housing must be appealing in appearance, easy to fit into various surroundings. Commonly used housings are constructed of aluminum, steel sheet, zinc die castings or aluminum die sand or permanent mold castings, alone or in combination. Of course, a prime factor of consideration is the use of materials which will provide the greatest resistance to corrosion under all types of weather conditions. Other important considerations are strength to weight ratios and ease of installation. The Tele-Rotor is high pressure die cast of high strength aluminum alloy (Fig. 3.)

Two basic types of construction are

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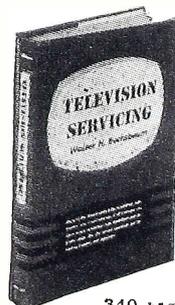
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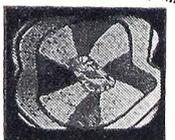
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used in rotator designs. These are in reference to the relation of the axes of the antenna and mounting masts after installation and are, namely, the off-set and in-line types of designs, both of which are commonly used.

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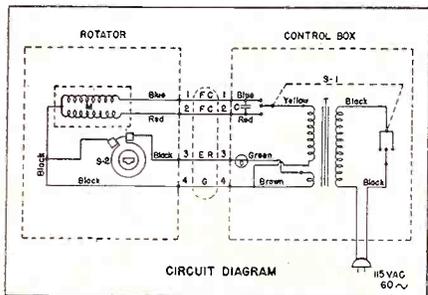


Fig. 5. Circuit diagram of rotator and control box, TR-1.

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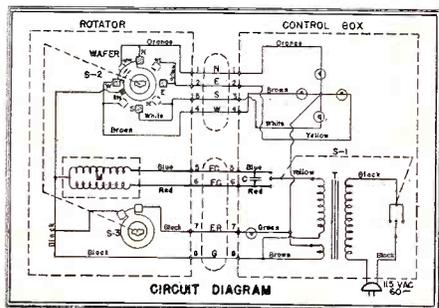


Fig. 6. Circuit diagram of rotator and control box, TR-2.

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A quick check with an ohmmeter at the terminal board with the cable disconnected would easily disclose any electrical difficulty. There should be no continuity between the rotator and any terminal lugs. The resistance across the red and blue leads of the motor should normally read near 5 ohms. (See schematics, Fig. 5, Fig. 6).

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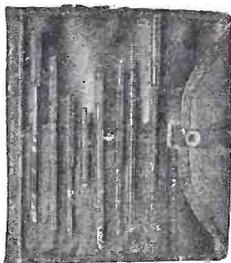
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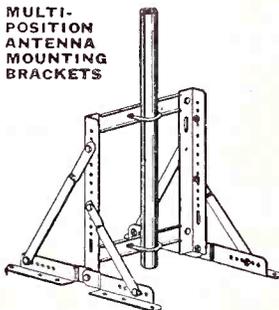
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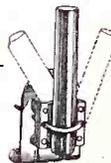
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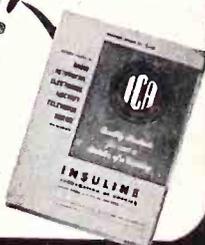


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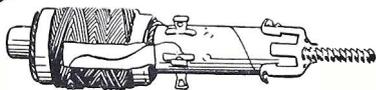
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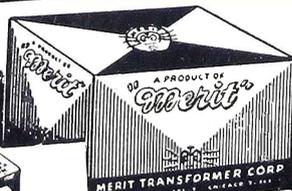


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ROTATORS

[from page 16]

quired. Gears in the train may be fabricated of brass, steel or plastic materials, or a combination, to achieve the required results.

The tensile strengths of the above materials are different and care must be used in determining at what position in the gear train a certain type of material may be used. Steel, of course, has the highest tensile strength of the above named materials.

The housing of the rotator unit presents design problems, since it must basically be a structural member. Because it is also the only part of the rotator the ultimate user sees, the housing must be appealing in appearance, easy to fit into various surroundings. Commonly used housings are constructed of aluminum, steel sheet, zinc die castings or aluminum die sand or permanent mold castings, alone or in combination. Of course, a prime factor of consideration is the use of materials which will provide the greatest resistance to corrosion under all types of weather conditions. Other important considerations are strength to weight ratios and ease of installation. The Tele-Rotor is high pressure die cast of high strength aluminum alloy (Fig. 3.)

Two basic types of construction are

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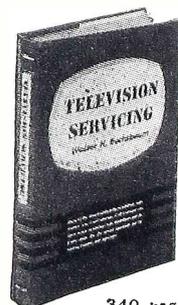
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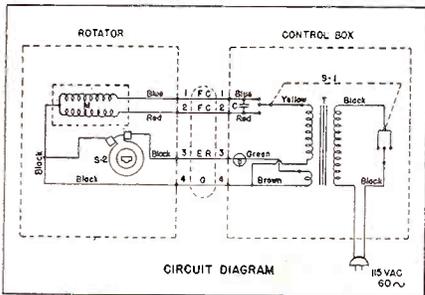


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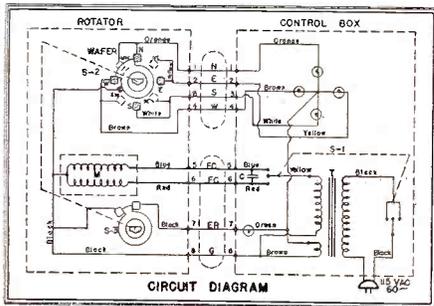


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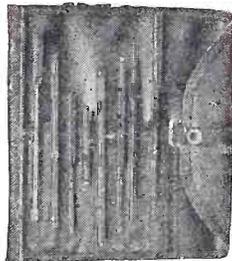
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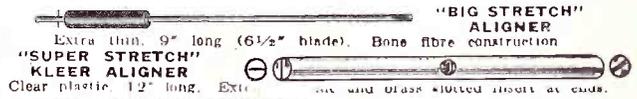
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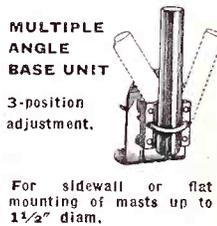
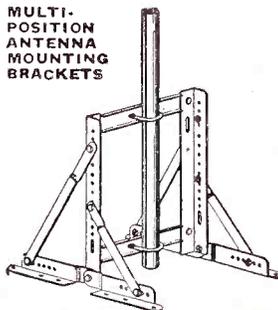


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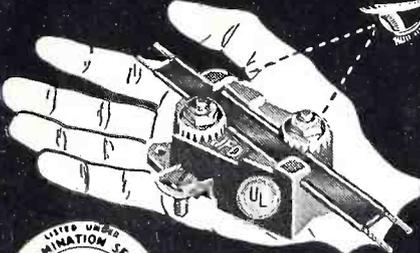
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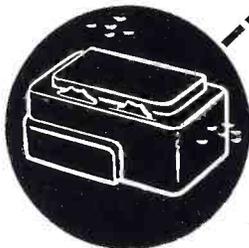
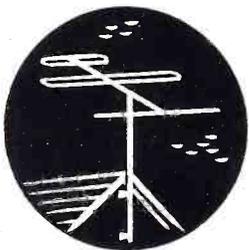
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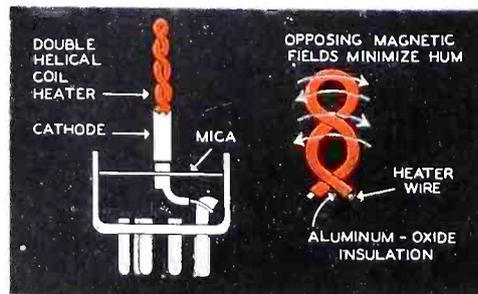
The double helical coil heater—shown in red—is designed so that the heater current flows in one circular direction to the top of the heater and in reverse circular direction to the bot-

tom of the heater. Thus, the current flowing through the heater sets up opposing magnetic fields which effectively neutralize each other.

In addition to the helical coil construction, each tungsten or tungsten-alloy heater is coated with a pure aluminum oxide having extremely high insulation qualities, and pioneered by RCA. The use of this insulation is a major factor in reducing heater-cathode leakage—another cause of hum.

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