Radio SERVICE DEALER

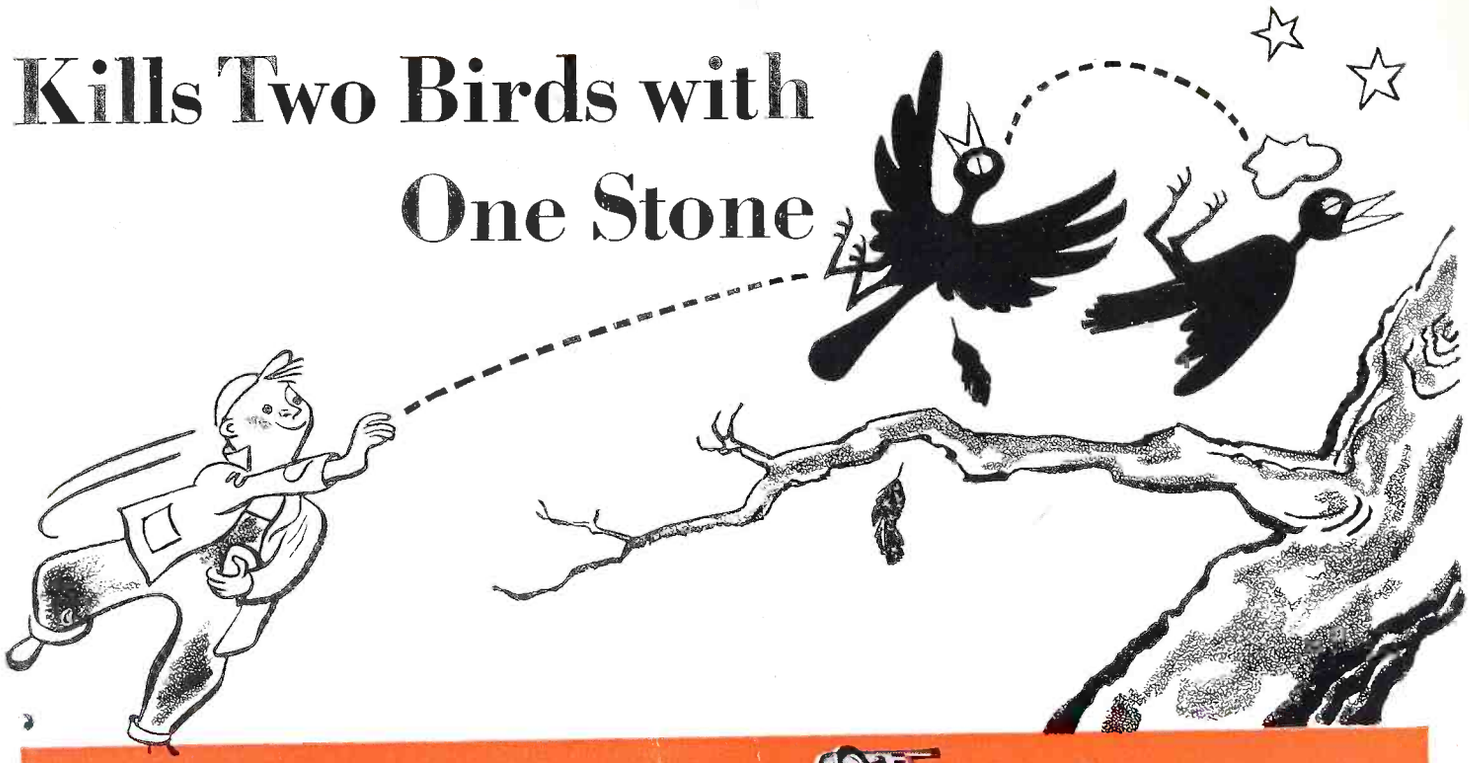
JUNE, 1949

N THIS ISSUE:

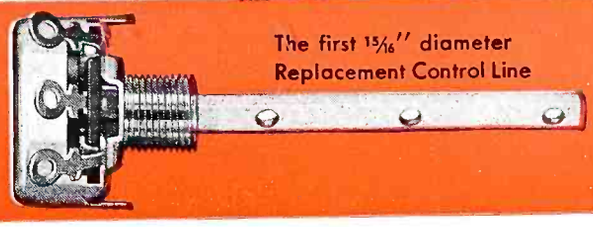
AM-FM-TV-SOUND

The Professional Radioman's Magazine

Kills Two Birds with One Stone



The Mallory Midgetrol



The first 15/16" diameter Replacement Control Line

You win *two* ways with the amazing Mallory Midgetrol.

First, it is ideal for servicing auto radios, portables and other sets requiring small size controls. Second, its husky electrical capacity allows you to use it in sets originally equipped with older, bulkier controls.

So when you stock the Mallory Midgetrol, you're actually able to handle more jobs with a smaller inventory. That's important these days.

LOOK WHAT THE MALLORY MIDGETROL OFFERS:

WIDER APPLICATION—The small size allows you to service portables, auto radios and small AC-DC receivers requiring 15/16" controls.

SIMPLER INSTALLATION—The new and unique flat shaft design of the Mallory Midgetrol saves installation time with *all* types of knobs.

LESS INVENTORY—Electrical characteristics allow you to use the Mallory Midgetrol to replace 1⅛" as well as 15/16" controls. Since no special shafts are required, you carry fewer controls in stock.

NEW SIZE	NEW SHAFT	NEW SWITCH	NEW CONTACT
NEW DESIGN	NEW EXTENSION	NEW ELEMENT	NEW TERMINAL
	NEW TWO-POINT SUSPENSION		

See your Mallory Distributor for this new standard in carbon controls

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

FOR EVERY RADIO SERVICEMAN!

The new Sylvania FM-AM Signal Generator Type 216

Supplies all signals necessary for complete stage-by-stage alignment of AM and FM receivers.

Frequency Coverage:

80 kc to 60 mc AM and 80 kc to 120 mc FM, continuously variable in seven bands on *fundamental frequencies*. Useful AM and FM harmonics to 240 mc.

For FM service:

±350 kc Sweep: up to 120 mc with 60 cps modulation.

±75 kc Sweep: up to 120 mc with 400 cps modulation.

In addition, sawtooth external modulation may be used.

For AM service:

±15 kc Sweep up to 61 mc with 60 cps modulation.

0 to 100% Modulated AM with 400 cps modulation.

In addition, external modulation may be used.

Check these Sylvania features! They're "musts" for complete FM and AM servicing:

AM modulation: 0 to 100%, continuously variable.

Accurate calibration: ½ of 1%.

High rf output: 1 volt on all ranges.

True rf meter for constant reference level.

Both step-by-step and smooth attenuator output controls.

Regulated power supply.

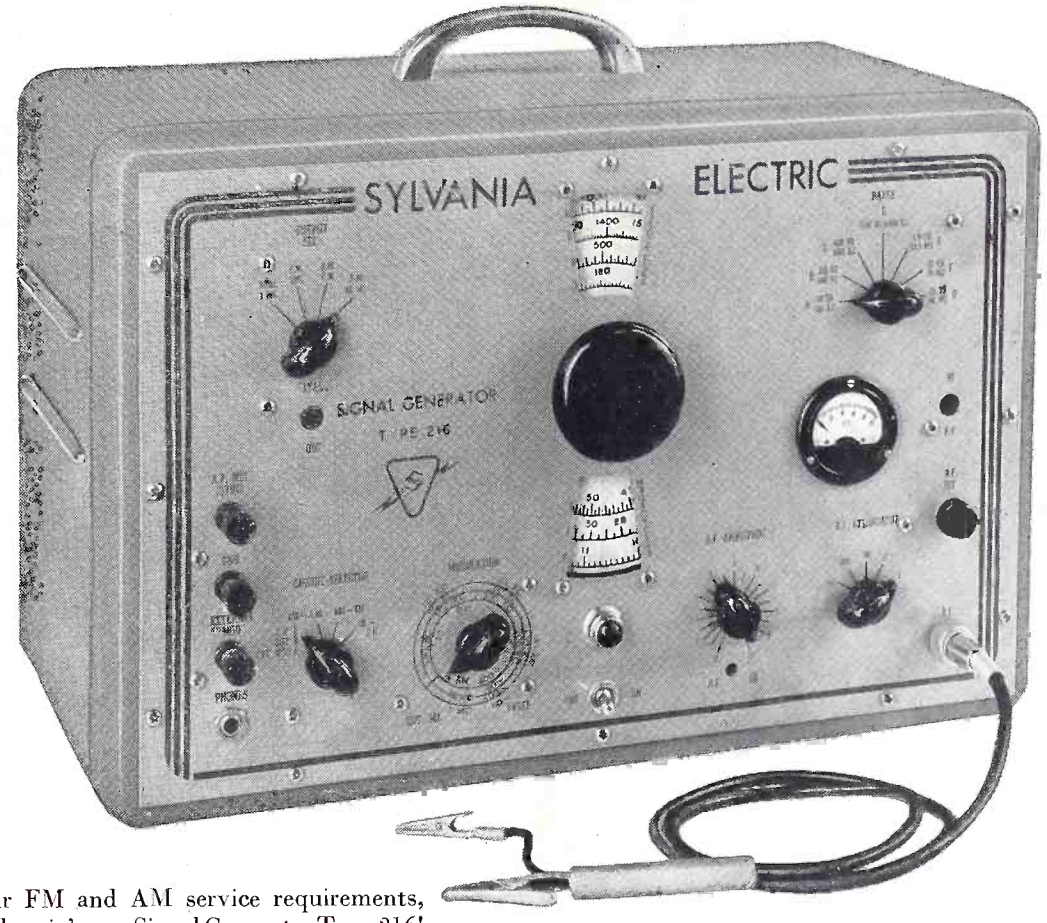
Oscilloscope synchronizing voltage output.

Crystal check point circuit.

Multiple shielding and filtered for minimum leakage.

Heterodyne detector for frequency comparison.

Mar-resistant, pearl-gray crackle finish baked on a treated steel case.



To meet your FM and AM service requirements, you'll want Sylvania's new Signal Generator Type 216! With it you can align the rf and if sections of all FM and AM receivers, adjust all types of FM detectors, and make overall receiver checks. Its high level output and accurate calibration make it also a valuable instrument for other service and laboratory uses requiring a high quality rf signal source. Beautiful styling in keeping with modern service shop environment. Dimensions: 11-3/8" x 17-1/16" x 10-5/8". Weight: 24½ lbs. Priced at $189.50. Mail coupon for complete details!

Sylvania Electric Products Inc.
Advertising Dept. R-1806
500 Fifth Ave., New York 18, N. Y.

Gentlemen: Kindly forward full details on your new Sylvania FM-AM Signal Generator Type 216.

Name.....

Address.....

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

SYLVANIA ELECTRIC

ELECTRONIC DEVICES; RADIO TUBES; CATHODE RAY TUBES; FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES; SIGN TUBING; LIGHT BULBS; PHOTOLAMPS

EDITORIAL

Price-Cutting Causing Chaos

In 19 sections of the country where there are telescasts radio retailers are indiscriminately, and practically without exception, selling all videosets far below established list prices. The common practice is to quote initially a potential TVset buyer about 10% off and then go higher, up to 25%, to avoid losing a sale. How well the public knows it! Many friends who used to ask me on occasion to get them some radio device wholesale now boast that they'd rather buy a TVset retail for it will cost them less and at the same time be backed up by the dealer who is inherently obligated to make good should something be amiss.

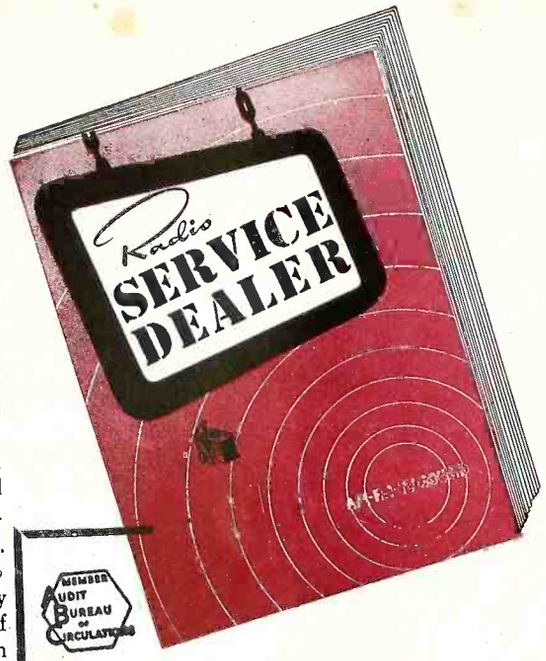
The situation is unbelievably ridiculous. Price-cutting retailers make up to 8% gross on a videoset sale, which means they make about 1% to 2% net, at most, if their overhead is very low. Experts in business management affairs tell us that retailers *must* earn over 4% net to justify risking their capital and that those who earn less than 3% are in actuality selling themselves right out of business. Ha! I'm rushing around saying "Goodbye" to many price-cutting retailers. They'll be ex-retailers in short order, unless they change their price-cutting policies.

The retailing fiasco has had its detrimental effect upon the servicing fraternity. Servicemen's income has dropped a bit where there is no TV because dealers have slashed AM set prices so much the average set-owner is reluctant to have a defective set repaired figuring he will get a new one cheaper than a repair bill would be if he just waits a while. Thus neither retailers nor servicers are getting their normal volume of business.

In contrast, where there is TVcasting, the service business is much more stable. Fair minimum price scales established during the past few years are being maintained—happily so—and not many servicemen are getting panicky, nor are they resorting to the old dodge of offering "free checkups" because they have learned from experience that such impractical tactics are not the proper solution to their problem. The use of better test equipment, speeding up repair work with less wasted time—more practical application of bookkeeping methods and less inventory wastage—these are factors in successful operations.

Stated another way, this present era of recession, price-cutting, readjustment or deflation, call it what you will, is, insofar as radiomen are concerned, primarily being enhanced and caused by radio retailers who are undermining the entire industry by their price-cutting tactics. If radio-TV receiver manufacturers were to get together and cooperate in a sincere effort to eliminate price-cutting on the part of retailers by establishing policies that would prohibit dealers from selling below list prices, under penalty of disenfranchisement at least, the quasi-chaotic condition now existing within this industry would be cor-

[*Continued on page 40*]



Sanford R. Cowan
EDITOR & PUBLISHER

Samuel L. Marshall
MANAGING EDITOR

COWAN PUBLISHING Corp.
342 MADISON AVENUE
NEW YORK 17, N. Y.

Vol. 10 No. 6

JUNE, 1949

SANFORD L. CAHN
National Advertising Sales Manager

HARRY N. REIZES
Advertising Manager

JEAN M. WHEELER, Circulation Manager
BRANCH: J. C. GALLOWAY 816 W. 5th St., Los Angeles 13, Calif., Mutual 8335

DAVID SALTMAN, Production Manager

RADIO SERVICE DEALER is published monthly by Cowan Publishing Corp., 342 Madison Ave., N. Y. 17, N.Y. Subscription price: $2 per year in the United States, U.S. Possessions & Canada; elsewhere $3. Single copies: 25c. Entered as second class matter Dec. 13, 1948 at the Post Office at New York, N.Y. under the Act of Mar. 3, 1879.

"KEN-RAD TUBES MEAN SATISFIED CUSTOMERS—INCREASED BUSINESS!"

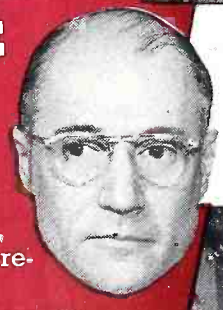
H. A. GEORGE, Carr Radio & Appliance Store, 7604 South Cottage Grove, Chicago, Illinois, is another serviceman who knows by experience that Ken-Rad Tubes are fast, dependable sellers.

"We've sold a lot of Ken-Rad Tubes in our shop through the years, so I know what I'm talking about.

"Believe me, Ken-Rad Tubes have what it takes to keep customers satisfied. A satisfied customer is a steady customer—and steady customers mean faster turnover, more money in the till.

"There's no substitute for quality—that means there's no substitute for Ken-Rad Tubes!"

"KEN-RAD TUBES ARE TESTED OVER AND OVER AGAIN—TO GUARANTEE SATISFACTION!"



ROBERT W. FIELD, Circuit Engineer, is in charge of special stroboscopic vibration test (below). This helps to determine the numerous tests Ken-Rad Tubes must pass before being approved and shipped to dealers.

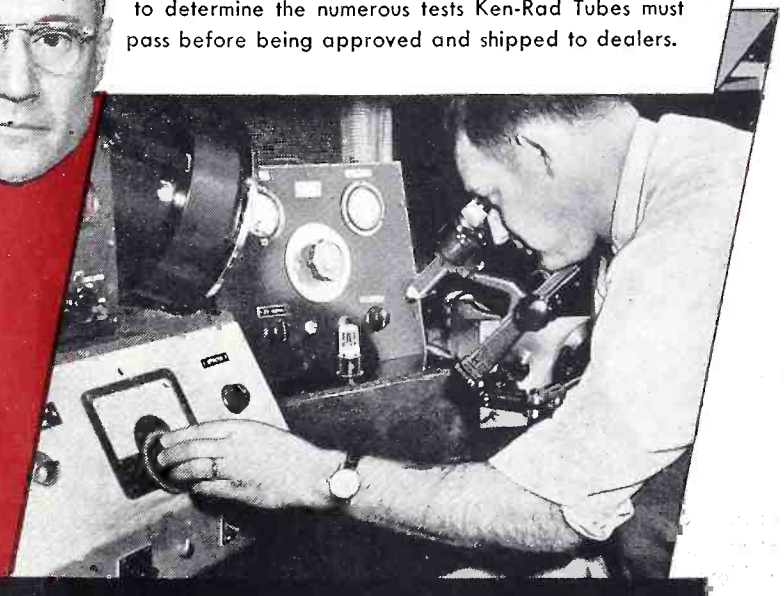
"From start to finish of production, Ken-Rad Tubes must pass one comprehensive test after another.

"These are based on work such as the special stroboscopic vibration check developed by General Electric engineers.

"Tubes are placed in a special spring-supported socket which is driven from a variable-frequency audio oscillator.

"A stroboscopic light then is used to illuminate the tube while it is studied for vibrating elements or loose parts under a high-power microscope.

"No wonder Ken-Rad Tubes satisfy customers!"



THE SERVICEMAN'S TUBE
. . . backed by profit-making sales aids which your Ken-Rad distributor gladly will show you. Phone or write him today!

KEN-RAD *Radio Tubes*

PRODUCT OF GENERAL ELECTRIC COMPANY

Schenectady 5, New York

182-HA4

Field Findings

A resume of Industry happenings here, there and everywhere

by S. R. COWAN

IN response to our April and May editorials proposing an RMA-NAB co-sponsored national "Preventive Maintenance Month" to be held later this year, and then if successful each succeeding year, we were formally requested to submit such a proposal to RMA on behalf of well over ten thousand service dealers who are members of various associations. Similar requests that the writer should act on their behalf are coming in daily from other technicians located throughout the country.

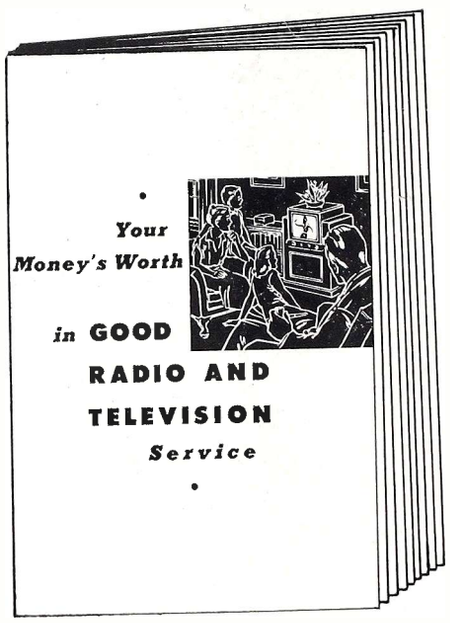
While the Radio Parts & Electronic Equipment Conference and Show was in progress at Chicago from May 16th to the 20th we had occasion to submit the proposal to the RMA through a member of its Co-ordinating Committee, and in addition the same proposal is being submitted through the RMA Service Committee because it is quite apparent that for the present, while RMA has heard our proposal, no action will take place for an indefinite time. In other words fellows, we are getting the customary run-around because the big set makers who throw a lot of weight around in RMA just don't give a hoot about the servicing profession.

Town Meetings

The RMA committee that headed up Town Meetings of Radio Technicians turned in a glowing report on their 1948-9 accomplishments but, RMA's plans about future Town Meetings have not been decided upon as yet. One thing is certain, if the nation's technicians were given as much financial aid and support in having a "Preventive Maintenance Month" co-sponsored by RMA as that august body paid for publicizing the Town Meetings alone, well, it would be terrific. Yet we didn't ask RMA for a dime.

The Trade Show in Review

This year's trade show was below expectations in every respect. Attendance was low, many outstanding jobbers didn't attend. Aside from a few television items, hardly anything new was brought to light, and this despite the fact that more manufacturers exhibited than at any industry convention held heretofore.



One of the finest "plugs" for the radio service dealer we've seen in a long time. This booklet, prepared by The Sprague Elec.Co., North Adams, Mass., describes to your customer in simple and effective words and illustrations what the competent radio technician must know in order to service a receiver. Get your supply as fast as you can. They're worth their weight in gold.

Yours truly is going to review the show for you in the most concise manner possible. We will only cover new items and we'll take the exhibitors in alphabetical order as far as is practicable. Here goes: (if your parts jobber cannot supply you with the latest literature, write to us and we'll have the manufacturer send the material direct):

Advance Electric & Relay Co., offered some new antenna switching relays.

Aircraft-Marine Prods., Inc. introduced some handy new wire strippers, lug crimping tools and wire terminal connectors.

Air King Products Co., Inc. showed their new 16" metal tube TV consollettes stating a few dealerships are still available.

Alliance Mfg. Co. introduced a new "Tenna Rotor" having an orientation indicating control unit which tells the TV set owner at which compass position his antenna is beamed.

American Microphone Co. offered a new type combination 33⅓-45 rpm record player and a new type adjustable mike stand.

American Television & Radio Co. showed new interchangeable auto radio vibrators; battery eliminators and invertors.

American Phenolic Corp. introduced its new Hi-Lo "Piggy Back" TV antenna.

Anchor Radio Corp. showed a new and improved type TV Preamplifier, the model ARC 101-50.

Astatic Corp. showed the new "U" series crystal pickup cartridge for 33⅓, 45 and 78 rpm records; a turnover type pickup and new ceramic cartridges with changeable needle.

Atlas Sound Corp. showed the new "Tel-Optic" TV enlarging lenses added to their line of speakers and horns.

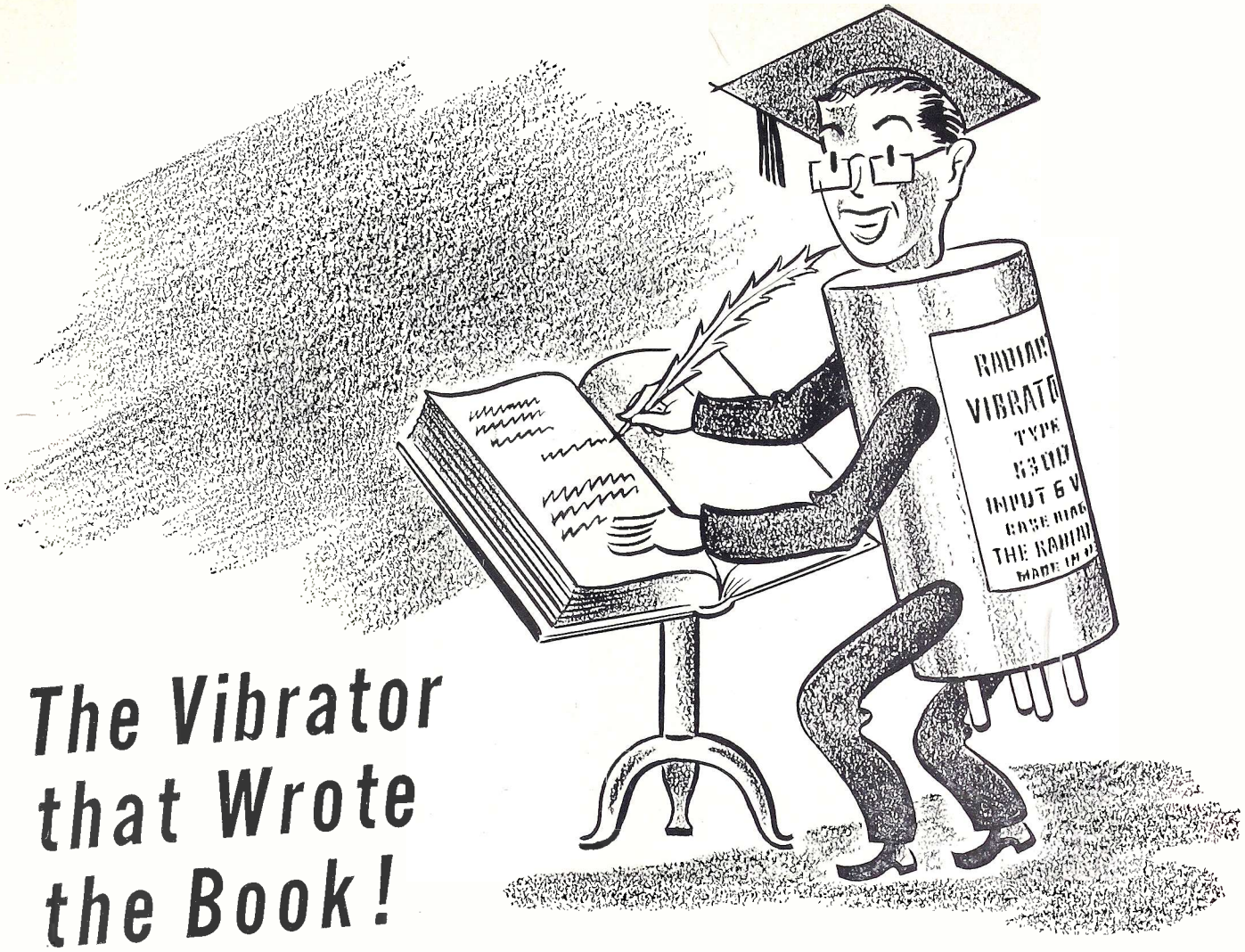
Bell Sound Systems, Inc. showed a new portable tape recorder-player available with and without built-in radio units. These nice new items are called "Record-O-fones".

David Bogen Co., Inc. showed some new inter-comm units and a new 50 watt P-A amplifier with built-in anti-feedback control.

Brush Devel. Co. showed a new line of mikes, some using colored plastic cases.

Bud Radio Co. showed a new line of TV accessories and a new booster.

Chicago Transformer Corp. introduced a new line of exact-replacement vibrator transformers and some new replacement TV types.

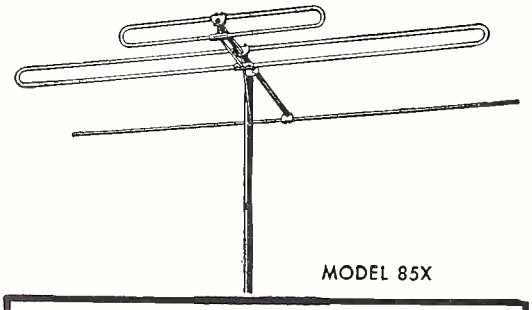


The Vibrator that Wrote the Book!

When books are written on vibrator performance . . . and dependability — RADIART RED SEAL VIBRATORS are the ones that do the writing!

Radiart has established and maintained leadership because of its many points of superiority! QUIET . . QUICK STARTING . . DEPENDABLE . . UNIFORM . . . precision manufacture plus the famous RED SEAL . . these are a few of the factors that make Radiart Vibrators the preferred vibrator with servicemen and jobbers everywhere! And the "best seller" book in the vibrator field is the Radiart Replacement Guide — the catalog and manual that has become the "bible" of the industry!

For the best deal you can give your customers . . . and for trouble-free service always . . . the best buy always . . RADIART!



MODEL 85X

RADIART TV AND FM ANTENNAS ARE THE FASTEST GROWING LINE IN THE COUNTRY... ....MAKING GOOD TELEVISION...BETTER

IT'S RIGHT WHEN IT'S RADIART!

THE RADIART CORPORATION
CLEVELAND 2, OHIO

MANUFACTURERS OF THE RADIART TV-FM ANTENNAS AND AUTO AERIALS

Cleveland Electronics, Inc. showed a new line of speakers called Cletron having Alnico magnets and aluminum voice coils.

Coastwise Electronics Co., Inc. showed their new line of test equipment which included a wide range AM-TV Signal Generator; a Signal Tracer - Electronic VOM having a sub-miniature 6K4 diode probe; an FM-TV Sweep Generator with 20 Mc sweep width; and a sine-square wave Audio Oscillator.

Centralabs showed new, tiny ceramic capacitors called Kolordisk (BC) Hi-Kaps, for by-pass and coupling applications.

Clarostat Mfg. Co., Inc. showed a new insulated and shock shielded control with plastic shaft especially designed for TV and high voltage circuits.

Crescent Industries, Inc. showed new portable 45 rpm automatic record players with self-contained amplifiers and speakers.

Drake Elec. Works, Inc. introduced a new type soldering gun.

Duotone Co., Inc. showed several new TV enlarging lenses; new replacement needles for both 33⅓ and 45 rpm pickups.

Electronic Instrument Co., Inc. showed a new VOM and a H-F Probe.

Ellar Woodcraft Corp. offered new TV console cabinets and plastic TV picture tube masks for custom TV applications and kits.

Electro-Products Labs., Inc. introduced the new Model B Power Supply having new type selenium rectifiers rated at 1-20 amps at 6 v.

Espey Mfg. Co., Inc. showed the new front end used in all their TV kits.

General Electric Co. showed a new and improved variable reluctance cartridge that uses a replaceable stylus. The new unit works on 78 rpm and long-playing records.

General Industries Co. showed their new 3 speed phono motor that handles 33⅓, 45 and 78 rpm records and several other dual-speed model players in combination of 33-1/3-45, 33-1/3-78, and 45-78 rpms.

Guardian Elec. Mfg. Co. showed new interchangeable relays and antenna switching relays.

Halldorson Co. showed a new line of TV replacement transformers.

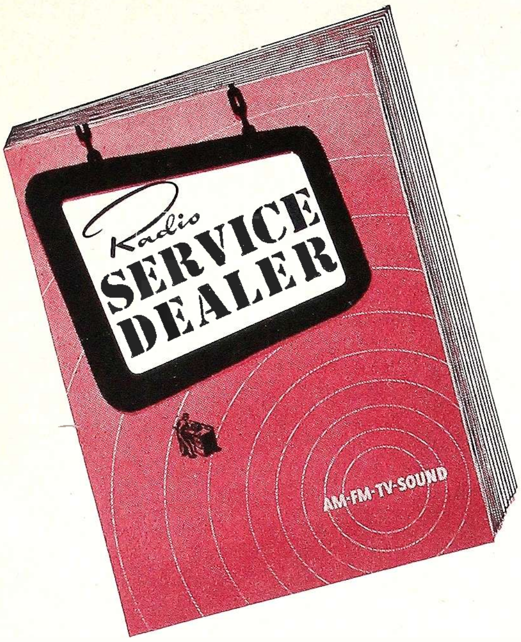
Industrial Conds. Corp. showed a complete line of replacement capacitors and special purpose units.

International Resistance Co. showed new resistor and control kits.

Jackson Elec. Equip. Co. showed a new TV-FM Sweep Generator Model TVG-1 with built-in marker genera-

[*Continued on page 38*]

Service Dealers Form A Group, Subscribe to "RSD"— SAVE Up to $1.00 each.



"The Professional Radioman's Magazine"—published monthly. All articles are exclusive and timely. Practically every issue is worth what an entire 1 year subscription costs.

★ The more in a group the bigger the savings. 6 men in a group save $1.00 each; 4 men groups save $ .75 per man. Present "RSD" subscribers may participate in or form a group with co-workers, or even competitors. Still active subscriptions are automatically extended 1 year. Start a Group today! The timely and exclusive technical data appearing in future issues of "RSD" will make this the best investment you ever made. The special Group Rate offer may be withdrawn at any time—so hurry.

Use This Coupon For Convenience

(The coupon below can be used for from 1 to 6 subscription orders. Use it today!)

TEAR OUT — MAIL TODAY

RADIO SERVICE-DEALER MAGAZINE
342 Madison Ave., New York 17, N. Y.

Please enter 1 year subscription orders for the names given below. Our remittance is enclosed.

NOTE: If you do not wish to tear this order blank out, just print or type the information on a single sheet of paper, following the style given. Each subscriber's occupation must be clearly described.

	In U.S.A. & Canada	Foreign Rates
☐ One 1-year subscription	$2.00	$3.00
☐ Two 1-year subscriptions, each	1.75	2.75
☐ Three 1-year subscriptions, "	1.50	2.50
☐ Four 1-year subscriptions, "	1.25	2.25
☐ Five 1-year subscriptions, "	1.10	2.00
☐ Six 1-year subscriptions, "	1.00	1.50

Name ....
Address ....
....
Describe Title or Position and Type of Business ....
....
State whether a New Subscriber ☐ or Renewal Order ☐

Name ....
Address ....
....
Describe Title or Position and Type of Business ....
....
State whether a New Subscriber ☐ or Renewal Order ☐

Name ....
Address ....
....
Describe Title or Position and Type of Business ....
....
State whether a New Subscriber ☐ or Renewal Order ☐

Name ....
Address ....
....
Describe Title or Position and Type of Business ....
....
State whether a New Subscriber ☐ or Renewal Order ☐

Name ....
Address ....
....
Describe Title or Position and Type of Business ....
....
State whether a New Subscriber ☐ or Renewal Order ☐

Name ....
Address ....
....
Describe Title or Position and Type of Business ....
....
State whether a New Subscriber ☐ or Renewal Order ☐

TRADE FLASHES

A "press-time" digest of production, distribution & merchandising activities

RMA Studies Service Meetings

RMA President Max F. Balcom today appointed a special committee to make recommendations to the Board of Directors regarding the future program for radio and television servicemen which has been operating under the name of Town Meeting of Radio Technicians.

G.E. Expands Pix Tube Production

General Electric will expand its electronics production facilities at Electronics Park here to include the manufacture of television picture tubes to meet the increasing demand, it was announced today by Dr. W. R. G. Baker, G. E. vice president and general manager of the company's electronics department.

Did You Get Your Certificate?

At the Town Meeting of Radio Technicians in Chicago a number of technicians in the audience turned in their lapel tags to indicate they had earned Certificates of Leadership in Television but unfortunately the registration tags were mislaid. If those technicians who are affected by this notice will send their full names and addresses to Room 805, 21 East Van Buren Street, Chicago 5, Illinois, they will receive their Certificates properly inscribed in short order.

TV Preamplifier

Anchor Radio Corp., Chicago, Ill. announces a new TV preamplifier designed principally to build up the signal applied to the receiver.

March Tube Sales

March sales of radio receiving tubes increased 1.8 million over sales in February but were 3.7 million under sales in March, 1948, the Radio Manufacturers Association reported today. Sales in March totalled 14,505,349 tubes compared with 12,643,788 in February and 18,208,842 in March last year.

Aerovox Resumes Publishing A.R.W.

The Aerovox Research Worker, a monthly publication featuring up-to-the-minute "know-how" on radio-electronic technique, is being published again on a regular basis.

Air King 12½" TV Receiver

Air King Shows New Line

Air King Products Co., Inc., manufacturers of a complete line of television, AM and FM receivers, and the Air King Wire Recorder, have recently given four day distributor-dealer showings of their line at the Park Sheraton Hotel, New York City; Boston, Mass.; Newark, N. J.; and Chicago, Ill. Further showings are contemplated for additional key marketing cities throughout the country. The showings already held attracted capacity turnouts in the various cities of distributors and dealers, according to Mr. Roland D. Payne, Sales Manager.

The Air King TV line consists of 10 and 12½ inch Table Model Consolette receivers, as well as a Console which includes the 12½-inch TV receiver, AM and FM radio, and three-way record player.

Sylvania Reduces Pix Tube Prices

For the second time in less than a month, Sylvania Electric Products, Inc. has reduced the price to equipment manufacturers of its 12½" size television picture tubes. In addition to a lowering of prices on the 12½" tube, Sylvania announced a 10 per cent reduction on 10" tubes to equipment manufacturers, also effective May 2nd.

Admiral Moves Service Department

The *entire* Chicago Service Department is being moved on May 9. Hereafter all correspondence to *all* mem-

[*Continued on page 26*]

Test Pointers

ON RESISTANCE MEASUREMENTS

Experienced radio and television technicians are aware of the usefulness of electronic ohmmeters in service work. Conventional non-electronic type ohmmeters serve well for some point-to-point resistance checks, but are not suited for measurements of the very high resistance values which are encountered when obscure faults are to be traced. In such measurements, electronic ohmmeters offer advantages; in addition, they also automatically protect the meter movement against burnout in case of accidental contact with live circuits.

Audio distortion may be caused by leaky blocking capacitors which do not show up in a point-by-point resistance check. This situation is illustrated in Fig. 1. Because the blocking capacitor and grid leak are in series with the plate-supply voltage, any current which leaks through the capacitor causes a voltage drop to appear across the grid leak, and, as a result, makes the normal grid bias more positive. For the example shown in Fig. 1, the blocking capacitor has a resistance of 80 megohms and the resultant leakage current through the grid resistor causes the tube to operate at zero bias.

Although it might be considered that the voltage drop across the grid leak could be measured with a conventional voltmeter, such is not the case. Even if an electronic instrument with an input resistance of 10 megohms were used, the scale indication would be a small fraction of one volt. The reason for this low indication is that the leakage current represents a voltage source with an internal resistance of 80 megohms, which is very high compared with the input resistance of the instrument. A point-to-point voltage check will indicate trouble, however, because the plate current of the tube will be abnormally high and, therefore, the plate-to-ground voltage will measure too low; or if cathode bias is used, the cathode-to-ground voltage will be too high.

A resistance measurement of the blocking capacitor should be made next. For the illustrated circuit, this resistance should be in excess of 500 megohms for proper operation. It will be seen that a value of 500 megohms will cause a one-half volt drop across the grid leak; a value of 1000 megohms will cause a one-quarter volt drop. Accordingly, suitable electronic service meters should be capable of measuring resistance values up to 1000 megohms.

Leaky blocking capacitors also impair the operation of avc circuits, because the avc voltage is obtained from a delay circuit which has a high internal resistance. The characteristics of tone- and volume-control circuits are usually sensitive to minute leakage currents through the associated blocking capacitors; in fact, leaky blocking capacitors are responsible for a large percentage of noisy volume-control potentiometers. In general, whenever a blocking capacitor connects into a high-resistance signal circuit, a leaky capacitor is a potential troublemaker.

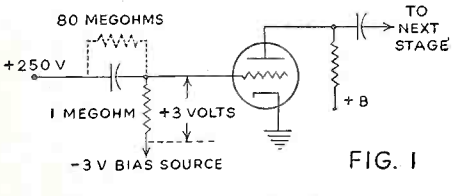


FIG. 1

GRID-TO-CATHODE BIAS = 0

Modern service ohmmeters should be able to measure very low values of resistance, as well as very high values. The normal resistance of transformers, deflecting yokes, speaker fields, peaking coils, and similar components is published in manufacturers' service data sheets. To measure such values, the ohmmeter range must extend down to approximately 0.1 ohm.

A good electronic ohmmeter saves hours of negotiable time each day in a busy shop, and eliminates the wasteful practice of replacing numerous capacitors and other components at random, in a desperate effort to locate an obscure circuit fault.

lens is not used at all; for this reason the lens area is larger in general than the tube face with which it is used. As shown in this illustration, the enlarging lens actually appears to become part of the tube itself. When viewed by the owner the picture actually appears to be coming from the tube face and seems to be bigger than it would be if viewed without the lens.

The size of the lens used with a given size picture tube depends upon the type and size of lens which the manufacturer recommends. All of the lenses in general use today are manufactured of transparent plastic material, Lucite or Plexiglas. This material is transparent and has an index of refraction (a measure of its ability to be used as lenses) very similar to that of glass. The lenses are made of two sections, the curved front and the plane rear surface. After being cemented together they are filled with oil which has an index of refraction similar to that of glass and the plastic material from which the lenses are made. When the lens is filled with this mineral oil, as far as the optical principles are concerned, the lens appears to be made from solid plastic. Of course, since the liquid mineral oil is less expensive than plastic, the entire lens is much more reasonably priced than a solid lens.

There are two properties about direct view enlarging lenses which should be familiar to the service technician. One of these features has already been mentioned: the amount of enlargement obtained with the lens. This will depend completely upon the

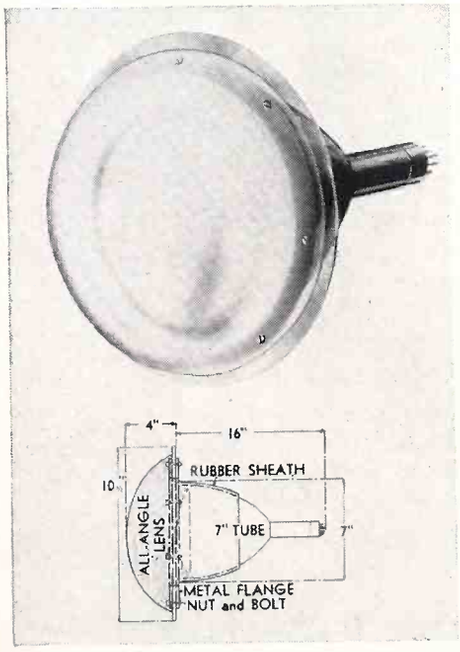


Fig. 2. All-Angle enlarging lens for 7-inch TV picture tube.

distance between the lens and the picture tube face. The customer may be shown that enlargement may be increased merely by increasing the distance between the lens and the tube face itself. Enlargement may be made greater or smaller depending upon the the particular use to which the lens happens to be put at the particular time. For example, on certain television programs featuring sports, users might like to have an extra amount of enlargement even though this means a portion of the picture is cut out. For most general uses however, the enlargement would not be so great as to blot out any of the available picture. There will be a slight light loss through use of the enlarging lens since some of the light is absorbed by the lens. However, in most cases this will not be noticed by the customer especially where the magnification is kept at reasonably low values.

Viewing Angle

The second important property of these lenses is the viewing angle. As

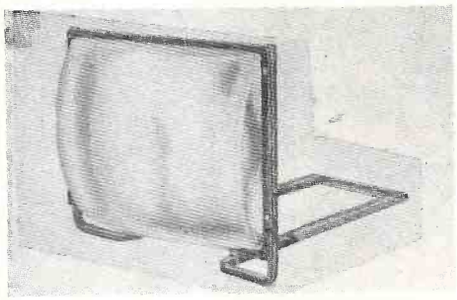


Fig. 4. Direct view enlarging lens used with 10 and 12 inch tubes.

shown in *Fig. 3* the viewing angle varies with the distance between the lens and the tube face. As the distance between the lens and the tube face is increased the viewing angle is decreased. In *Fig 3A* the enlarging lens is shown almost touching the tube face. In a position such as this the greatest possible angle of view will be obtained which is shown to be, by actual field test, approximately 70 to 75 degrees for the average enlarging lens of the type described in this article. This is the greatest possible angle of view which may be reasonably expected. The angle depends upon how great an amount of distortion might be considered acceptable.

It should be pointed out to any prospective customer or user of such lenses that angle of view is definitely cut down over what it would ordinarily be without the enlarging lens. Adverse factors such as a decrease in viewing angle should be carefully ex-

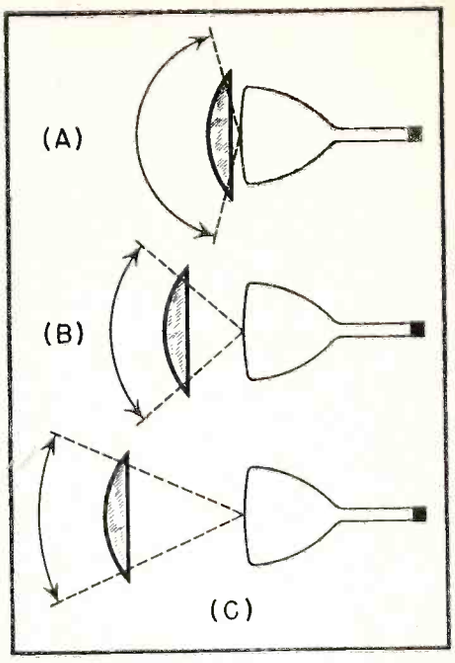


Fig. 3. Viewing angle changes with distance between lens and tube face as shown in (A), (B), and (C).

plained, for this is one way of promoting customer confidence and goodwill. A customer who buys a television accessory expecting more than the device can actually produce will not be a satisfied customer. As the distance between the tube and the enlarging lens is increased, as shown in *Fig 3B*, the angle of view becomes smaller. As pointed out, the increase in the size of the picture becomes greater as the lens is moved away from the picture tube but the viewing angle becomes smaller. Under conditions obtained with maximum enlargement and maximum distance between the lens and the tube face the angle of view will be so small as to prohibit its use except by an audience of perhaps 2 or 3 people.

Movable Lenses

There are various types and styles of manufacturers' construction which exist among the various lenses on the market. One of these, as mentioned, is the Transvision lens which is mounted so that there can not be a very convenient change of distance between the lens and tube face. This means that there cannot be any change in the amount of magnification. However, some manufacturers, as shown in *Fig. 4* have made provisions for changing the amount of magnification. This is a photograph of the MagnaVisor enlarging lens. This lens which is designed to fit either a 10 or a 12 inch tube has a metal mounting

[*Continued on page 28*]

Modern TAPE RECORDERS

by C. A. TUTHILL

PART 2

Concluding installment on the operation of modern tape recorders, which are rapidly gaining in popularity.

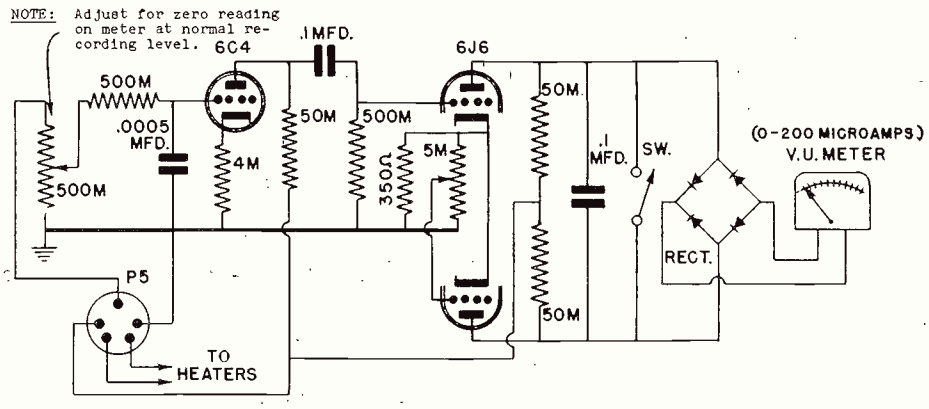


Fig. 7. Separate isolation circuit for VTVM

Recording Head

This type of unit serves both for recording and for playback. The head is formed into a small circular magnetic structure of high permeability nickel alloy steel. Its magnetic circuit is required to operate through a wide frequency range since, in addition to the audio spectrum, it must respond to a supersonic biasing current of approximately 50 kilocycles.

In this type of recorder the magnetic gap takes on strategic importance. This recording head employs 0.0003 inch gaps lined with heat-treated beryllium copper for optimum magnetic signal transfer to the tape during recording. This design has permitted an intimate yet light contact (20 grams pressure) between the tape and the head when it is used for playback. As a direct result we have the possibility of 5000 or more playbacks without noticeable deterioration of the tape.

For recording purposes these heads require but *one milliwatt of energy at 1000 cps.* The need for many watts of driving power is eliminated,—quite a talking point in itself. Instead the recording head is adequately driven by one triode (See Part 1, RSD, May 1949) section of a 6SN7 as shown in the schematic of *Fig. 3.* Professional results with less than 2% distortion is claimed when the recorder is driven by this method. It will be further noted from the schematic that a 50 kc supersonic bias oscillator utilizes another 6SN7 whose output is capacity coupled directly to the recording head through the .0005 μf capacitor (C-21). More on this later. Description of the Recording-Playback Head's characteristics and impedance values versus frequency is thoroughly completed if a study is made of the curves shown in *Fig. 5.* They are self explanatory.

Frequency Response

When MMM Scotch Sound Recording Tape is used with the above and following equipment; and when it travels at a speed of 7½ inches per second a signal to noise ratio of 50 db or better is obtainable. An overall frequency response for the recorder under such conditions should be within plus or minus 3 db between 50 and 9000 cps. This pertains to the use of the above recording tape, either paper or plastic base, in conjunction with the combined circuits of *Fig. 3.*

In the higher priced commercial models the speed of the tape travel is doubled. When this is true; and when the tape travels at a speed of 15 inches per second, a frequency response of plus or minus 2 db between 30 and 13,000 cps is claimed.

Recording Amplifier

The circuit recommended by the manufacturer of the Twin-Trax Tape Recorder for the driving of the recording head is reproduced in *Fig. 6.* Essentially it is a 4 stage resistance coupled amplifier having pre-emphasis designed for the greatest transfer of energy to the tape, or record, during recordings. We see it to include tubes *V-1* through *V-4.* Reference to the curves of *Fig. 5* is pertinent at this point.

With reference to the schematic,—the *upper input #1* is wired to receive a shielded output from either radio or from phonograph pickup. The *lower #2 input* is provided for high impedance microphone recording or P A work. In some cases the existing radio may be connected to *in-*

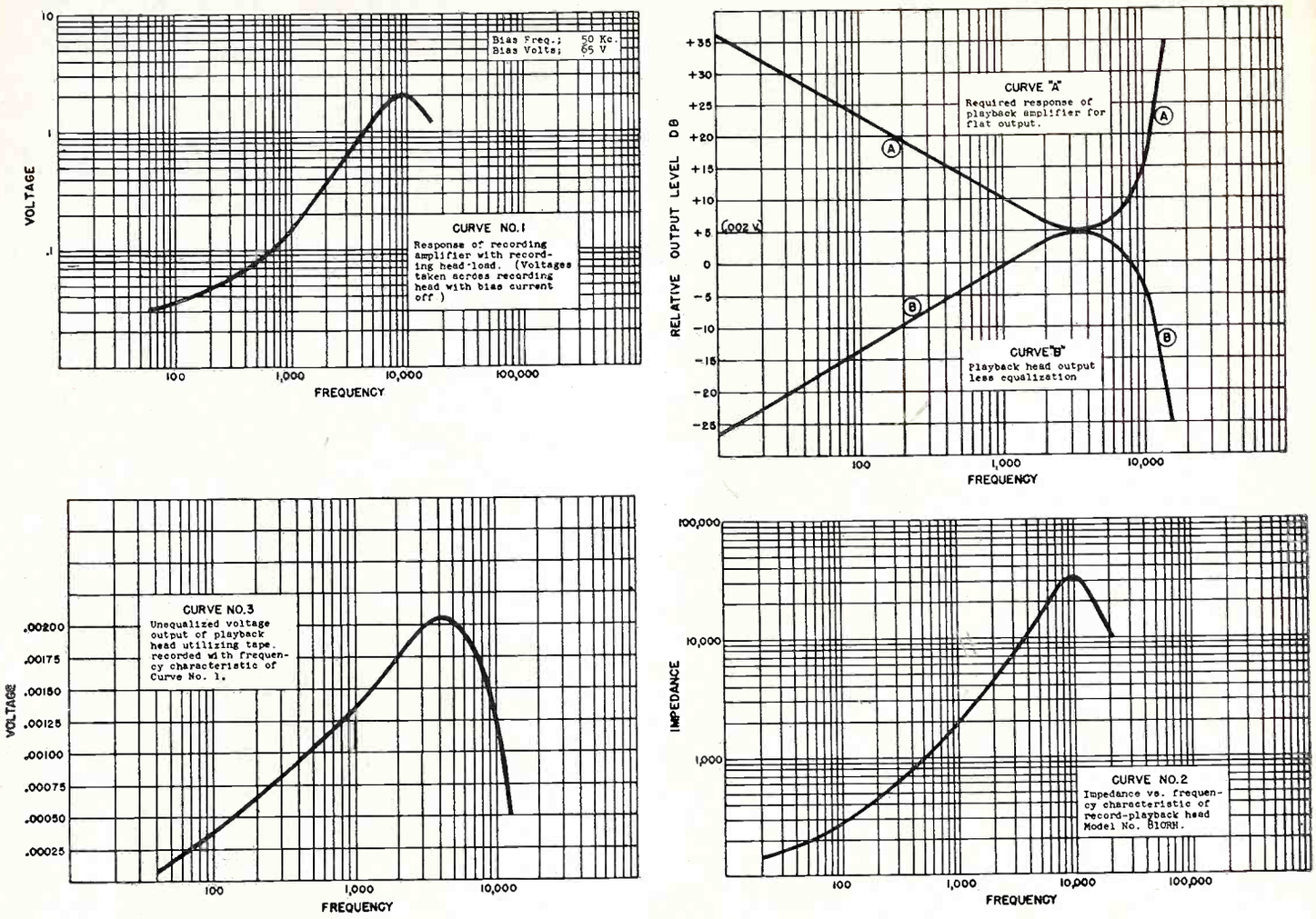


Fig. 5. Recording head characteristics, and impedance versus frequency values.

put #1 by a short shielded pair connected directly across the radio volume control. In cases where the volume control is in an a-v-c circuit and has negative bias applied to it, the connection should be made through a .01 μf capacitor. So as not to retard high frequencies the shielded connectors should be no more than 5 feet long unless low capacity cable is used.

The first 12SJ7 stage, serving as a pre-amplifier, should raise the input signal to approximately one volt. An RC filter network following the first tube serves as a pre-equalizer for that quantity of bass boost best suited to this individual requirement.

Adequate compensation gain for the insertion loss of the equalizer is provided through the use of one half of a 6SC7 in the following stage. Maintaining a wide frequency response, this second stage is RC coupled to a 6SN7 cascade amplifier. A constant current output from this dual stage is coupled through capacitor *C-12* and *R-24* directly to the Recording Head (RPH) via switch (*SW-2*) and plug connector (*S-2*) as seen to the left of the schematic. To the right of this output (*V4*) is a 6E5 which serves as a volume indicator. A basic VTVM circuit may be applied if an r-f choke is introduced to keep the supersonic erasing bias from entering the meter circuit. Such an arrangement should be wired through the "Play-Record" switch to avoid excessive current flow through the meter due to a change of load in the output circuit during playback. A variable resistor is also necessary for meter calibration due to level differences required for different types of recording tapes. A more elaborate isolation circuit for the use of a VTVM is shown in *Fig. 7*.

Supersonic Erase Circuit

Before considering the playback amplifier, shown at the base of the combined schematic, it is wise to give

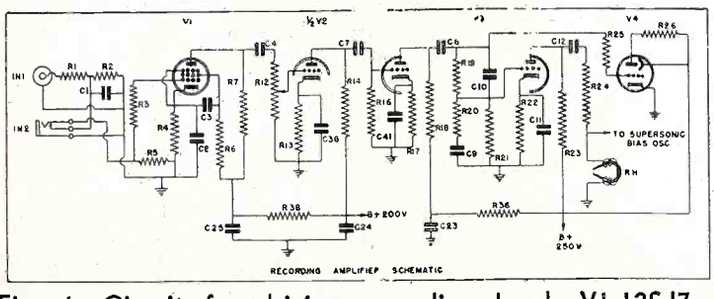


Fig. 6. Circuit for driving recording head. V1-12SJ7, V2-12SC7, V3-6SN7, V4-6E5, IN1-Phono/Radio, IN2-Microphone

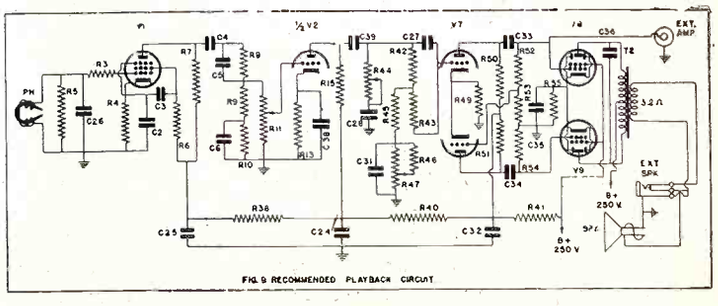


Fig. 9. Circuit of playback amplifier. V1-12SJ7, V2-12SC7, V7-6SL7, V8-6V6, V9-6V6

thought to the "Erase" circuit which in so many magnetic recorders, particularly those of the wire variety, do not thoroughly erase. A hangover echo often interferes with an otherwise clean record. In *Fig. 8* we see the recommended erasure circuit.

The method used in this instance employs a supersonic magnetic counteraction with a strength adequate to nullify previous magnetization in the audio spectrum. The schematic of *Fig. 8* will show that a well organized 6SN7 oscillator circuit drives a 6V6 supersonic power amplifier tuned to resonance. Such power is required for the development of sufficient supersonic output with minumum distortion. It is of absolute importance, for a minimum of background noise, that a pure sine wave bias source also be used for recording. Similarly the supersonic biasing circuit requires a pure sine wave for minimum distortion of a signal during recordings. A 50KC bias is fed from capacitor *C-21* to the recording head. A common su-

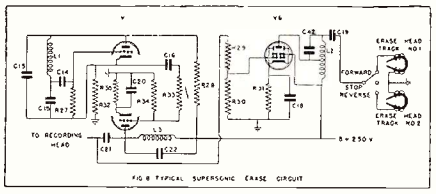


Fig. 8. Erase circuit. V5-6SN7, V6-6V6

personic bias oscillator may be used for stereophonic recordings possible with the dual tape. More follows on this under "Unique Applications".

There is room for experiment here. Erasure devices which will not physically harm the tape may be made up easily since any permanent magnet of sufficient strength will serve to erase if applied to coated or magnetized surface of the tape. Users are therefore warned to store finished records where they will not be subjected to magnetic fields of any nature. Partial erasure and damage to the recording might result. Values of all components appearing in the erasure circuit of *Fig. 8*, appear in Table I. The erase heads used here have 0.126 inch gaps. Otherwise they follow the general construction of the Recording-Playback Heads. There supersonic drive is of such content that one erasure is sufficient. Some equipments call for two erasures.

Playback Amplifier

No recording is any better than its playback amplifier. In view of this it is well to consider the playback circuits as recommended by the manufacturer. The recommended amplifier circuit appears individually in *Fig. 9*, although it was previously included in the combination schematic of the earlier *Fig. 3*. The first tube, a 12SJ7, serves as a preamplifier which boosts the product of the Playback-Recording Head to a practical working voltage. Here again the entire unit is an

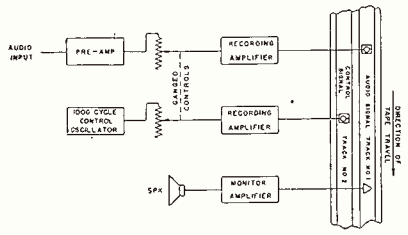


Fig. 10. Manual monitoring control of audio and pilot signal.

RC coupled amplifier affording good wide spectrum coverage. Following the initial stage the amplifier is in essence comprised of three cascaded stages.

In the individual schematic of *Fig. 9*, a volume control (*R-11*) will be seen inserted to control the grid of the next stage. The second stage is one half of a 12SC7 whose counter part served as a bass boost pre-equalizer in the recording amplifier. Here again, because of the characteristics of tape recorders and the better to maintain a wide spectrum, this stage serves as a *post* equalization wherein the bass is again boosted.

The output of the second stage is capacity coupled through *C-39* to an independent and adjustable high and low frequency equalization circuit eventually coupled to a standard 6SL7

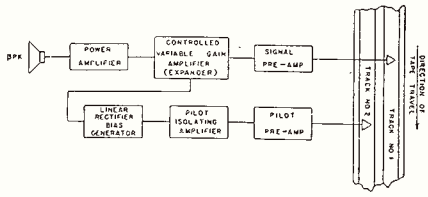


Fig. 11. Automatic pilot controlled expansion.

inverter. It is highly encouraging to see well engineered instead of makeshift equalization becoming a standard component within various equipments today. There has been a decisive and lamentable lack of tone control devices, or properly inserted compensation which did not introduce by its very presence an unacceptable degree of distortion. Equalization in the rather new field of tape recording has not been broadly scrutinized. Therefore it is well to experiment a bit for the best values to be applied to different tapes and different amplifiers attendant thereto. Realizing the worth of this, the manufacturers of this subject equipment have included variable compensation controls. Resultant insertion losses have been well taken into account and counteracted by the ample gain of two following stages.

The 6SL7 dual triode provides the necessary inverter facility prior to the following push-pull stage. One item of commendable forethought can be seen following the coupling capacitor *C-33*. From that point a takeoff to a jack provided allows ready connection to an extra or remote amplifier which might be used for any one of several practical functions. Here again RC coupling drives the out of phase grids of the 6V6 push-pull tubes.

The final output plates are the first to be connected to a transformer within the entire amplifier. Here any prac-

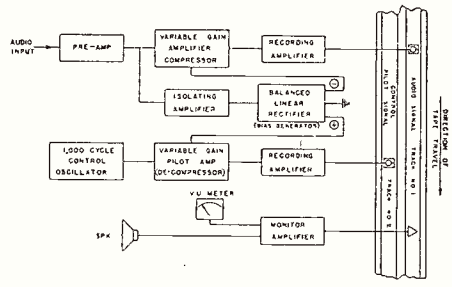


Fig. 12 Automatic controlled compressor with control pilot signal.

tical and adequate transformer may be applied to meet any specification. The standard output transformer produced for these tape recorder playback amplifiers includes two secondaries. One is for use in feeding a 500/600 ohm line or matched loudspeaker banks. The second winding offers a 3.2 ohm output for local loudspeaker monitoring. This lower value is jack-terminated while another jack is provided for headphone monitoring.

The final five watt output of the push-pull stage, when 6V6s are used, is said to have a distortion content no greater than 2%. Switching arrangements for the combined Recording-Playback amplifier circuits have been previously shown in *Fig. 3*.

Maintenance

Mishandling or carelessness may apply undue strain or misalignment to mechanical components. Precautions should be taken. Machines con-

[*Continued on page 35*]

TV QUIZ NO. 3

by **DAVID GNESSIN**

BEFORE ANSWERING THE QUESTIONS — READ THESE RULES:

This quiz, based upon information made available by courtesy of the Howard W. Sams Photofact Television Course will prove of value to all radiomen interested in reviewing TELEVISION. For those who possess the Sams course a reference to the page involved is given in parenthesis after each question number. Readers should *write* out the answers, *copy* the diagrams for practice, and circle correct answer if multiple choice is given.

After quiz is completed, compare with correct answers given on page 35 of this issue. Another TV quiz is now being prepared for early release.

1. (*p* 8, 9) Note *Fig. 1.* In electrostatic beam deflection the *spot* is moved horizontally or vertically by use of deflection plates. Combined, they provide the complete picture scanning. These plates work by virtue of:

(*a*) Their high potential. Since the instantaneous voltage is always highest at the deflection plates they exercise maximum effect on the beam.

(*b*) Their low potential. Since the instantaneous voltage is always lowest at the deflection plates they act to repulse the beam.

(*c*) Their constant potential. The *spot* tends to follow a steady potential, hence follows the beam-deflecting plates.

(*d*) Their varying potential. The *spot* is attracted when the plate is positive, repulsed when the plate is negative.

(*e*) None of the above. Since the plates operate at scanning frequency, their output is *r.f.* operating the *spot* by radiation means not explained by any of the reasons above.

2. (*p.* 8, 9) The electrostatic lines of force existing as a fixed electrical field at any instant direct the beam toward a given deflection plate. What happens immediately afterwards is best described as:

(*a*) The beam strikes the plate, causing light on the screen by radiation.

(*b*) The beam misses the plate by virtue of its own momentum.

(*c*) The beam, a direct current, is attracted by the higher potential of the barrier anode (not shown), returning to cathode through the power supply.

(*d*) The beam is *deflected* by the plate, striking the *emulsifier cathode,* setting up the secondary spot which strikes the screen, illuminating it.

(*e*) None of the above. Since these are deflector plates they are merely safeguards of the beam, much as a bumper on an automobile. They protect the screen from damage.

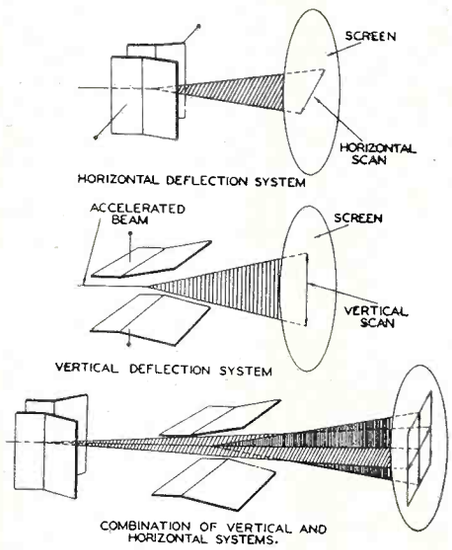


Fig. 1. Electrostatic beam deflection system.

3. (*p* 9) The deflection sensitivity of the C-R electrostatic electron gun assembly can be increased by: (*One* of the answers below is *incorrect. Which* is it?)

(*a*) Increasing distance between deflection plates and screen.

(*b*) Increasing deflecting voltage.

(*c*) Increasing length of deflection plates.

(*d*) Reducing the velocity of the electron beam.

(*e*) Increasing the cathode emission surface.

4. (*p* 9) Observe *Fig. 1.* Note that both horizontal and vertical deflection plates are bent to form a flare. This is a popular innovation. Perhaps examination of *Fig. 2* showing both focus and deflection surfaces installed in the C-R tube will give you a hint: Why the flare on the deflection plates? (You'll just have to write this one out. There is no multiple choice on this one.)

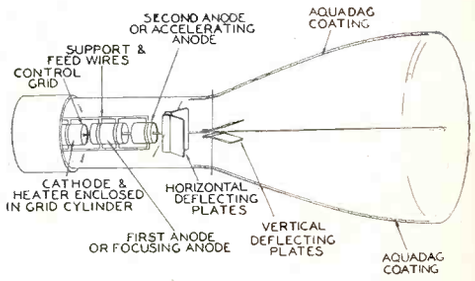


Fig. 2. Electrostatic focus and deflection.

5. (*p* 9) In television an electron beam is focused to a spot. Then this *spot* is *swept* back and forth from top to bottom of the C-R screen. Yet the observing eye sees only the all-over pattern. This is due to *persistence* of vision. Experimental data shows that even after an image disappears from view the human eye retains the picture. This persistence continues for:

[*Continued on page 00*]

Custom Building for HIGH FIDELITY

PART 2

by DAVID T. ARMSTRONG

Concluding installment in this series. The author discusses a few typical circuits that may be employed.

FM Circuit

Everything that has been said about the design and construction of the superhet above for the AM band applies equally well to the superhet for the FM band. But a few additional specifications are desirable. Miniature tubes are preferable for reduction of inter-electrode capacitance. Leads for all portions of the r-f, mixer and oscillator stages of the circuit must be as short as it is physically possible to make them. All grounds should be staged; this is something not done even on some of the very good commercial receivers available. It's a little troublesome, but it repays for the effort expended. The grid and plate leads should be dressed close to the chassis, as far from each other as possible, and, wherever possible, shielded from each other by some bypass or coupling condenser. When these condensers are of the small ceramic temperature compensation type they may be so mounted across the socket pins as adequately to provide capacitor shielding for the grid and plate leads.

Under no circumstances should an AM and an FM tuner be mounted on the same chassis, nor should the IF transformers be wound on a common form. There is too much stray capacitance to account for adequately in an FM tuner alone, without adding to this all the additional stray capacitance that is included when the AM and FM tuners are on the same chassis. The circuits shown in *Fig. 3* and *4* comprise the r-f and i-f sections of a standard high quality FM receiver.

Push Pull Amplifier

I should always recommend a high quality push pull amplifier built on a separate chassis. Since push pull has actually demonstrated its virtues I like push pull all the way through: push pull on the input with the 6SL7

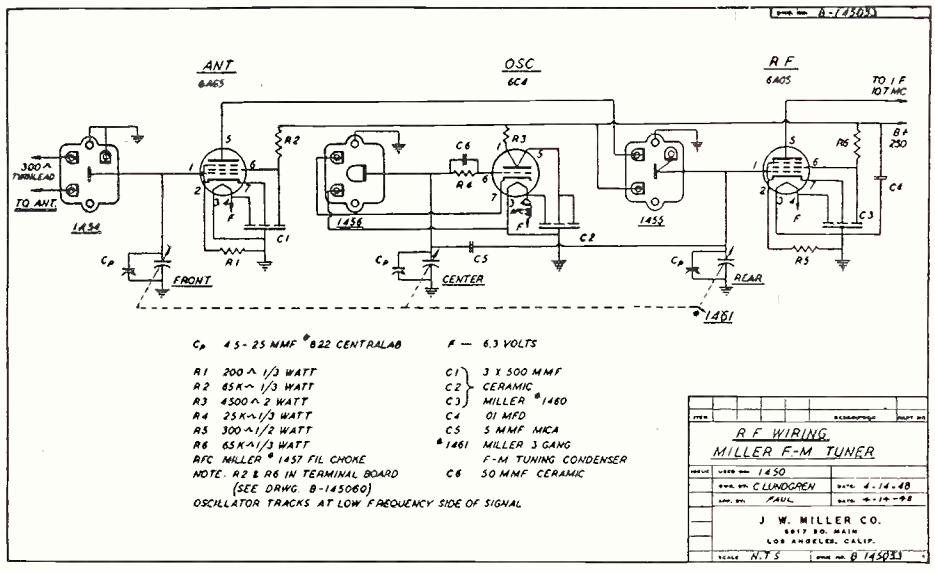


Fig. 3. R-F section of commercial tuner.

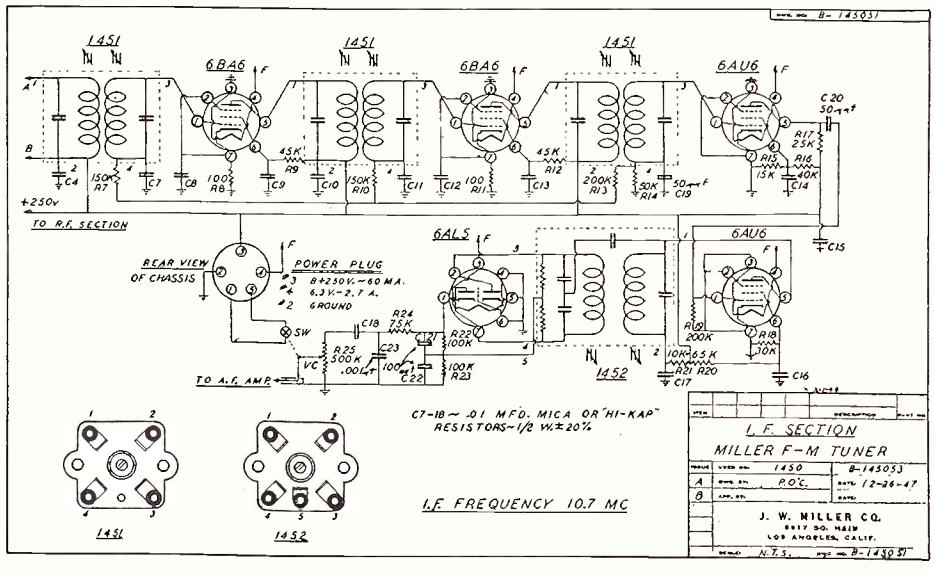


Fig. 4. I-F section of commercial tuner.

(see *Fig. 5*); in the phase inversion with the 6N7; and in the output with the 6L6's. One reason for the recommendation of the push pull amplifier is that it will deliver large quantities of power to a speaker with little distortion and it will reduce the amount of hum present to negligible proportions.

The use of high quality parts in the amplifier section is important for true high fidelity. The output transformer must be of the best type obtainable; the quality of this driver is a factor in the reduction and the overall dynamic range of the signal delivered to the speaker. For genuine and true high fidelity a good push pull amplifier is a *sine qua non*. Such an amplifier should be on a separate chassis.

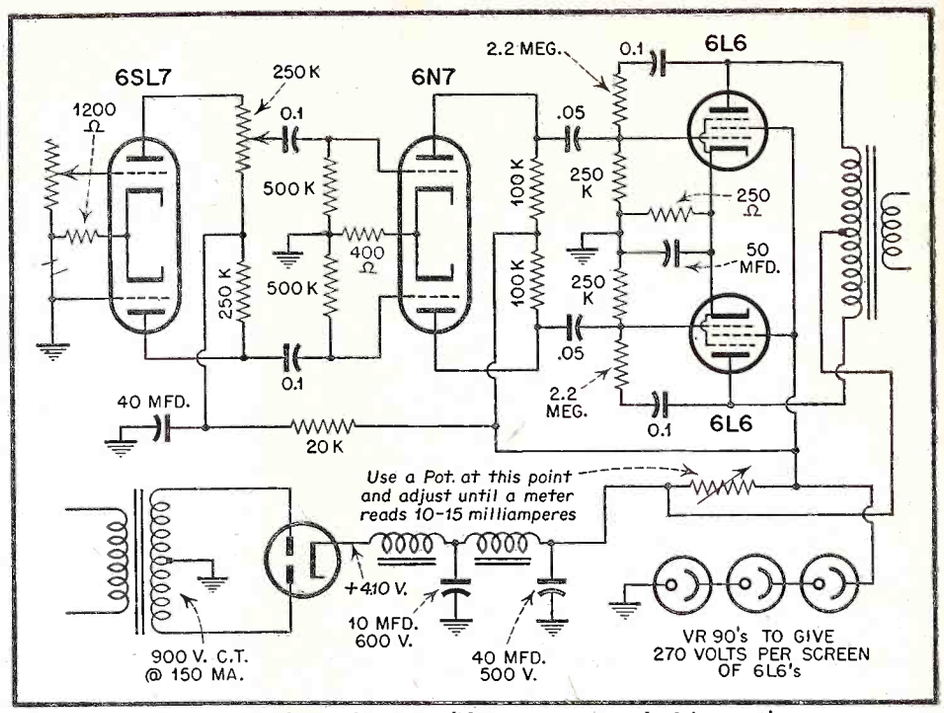


Fig. 5. High quality amplifier recommended by author.

Power Supply

The power supply should have double filtering of the B+ voltage so that the direct current is relatively ripple free. Only full wave rectification should be used with two chokes and capacitors of the electrolytic type. The addition of voltage regulator tubes will improve the quality of reception at all stages of the receiver, particularly at the oscillator where regulated voltage is an important factor in the stability of this critical stage. Regulated voltages for good push pull amplification and for the B+ of the oscillator pay back in quality output for all they cost to make up.

Comparatively little thought has been given to supplying direct current to the filaments, but this is a very desirable point for the reduction of AC hum and the consequent improvement of quality reception. Selenium rectifiers properly filtered provide excellent low ripple direct current. A 120 volts 150 Ma selenium full wave bridge will provide full wave rectification for nine of the 12 volts type tubes since these will require 108 volts of direct current and 150 ma of current when they are connected in series. There will never be trouble with a rectifier tube in such a power supply setup for the filaments. Figure 6 suggests a method of supplying direct current for the filaments.

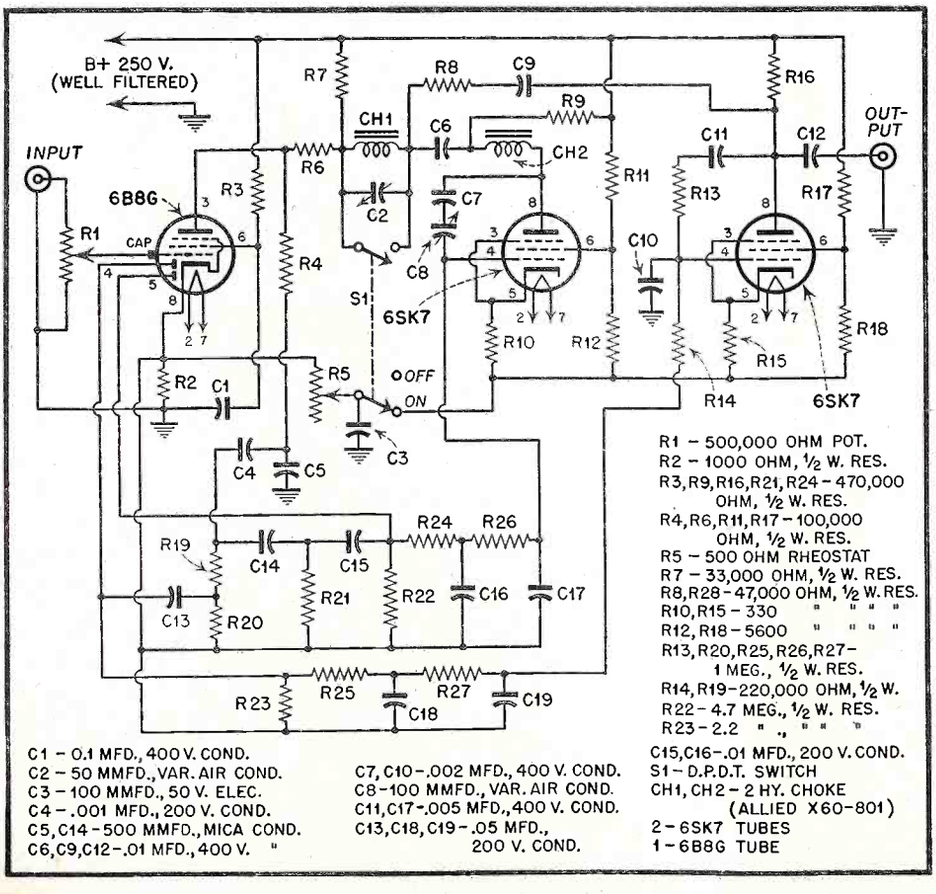


Fig. 7. Schematic version of Scott Dynamic Noise Suppressor.

Dynamic Noise Suppression

People who want high fidelity want it in their record reproductions also. H. H. Scott is marketing a small three tube noise suppressor which may be connected between the phonograph pickup and the amplifier. This will reduce background noise with negligible loss of depth and brilliance. The unit works equally well with regular records and with the new long playing discs. These are available as built up units, or they may be made in the shop by any serviceman provided he pays a licensing fee to Scott for use of the circuit. A version of the noise suppression circuit that may be easily constructed by the serviceman with the requisite skill is shown in *Fig. 7*.

Custom Building

Each of the separate units described above should be made on a separate chassis. The TRF or superhet for AM should be on one chassis and include the first stage of audio amplification; the FM tuner should be on a separate

[*Continued on page 33*]

SHOP NOTES

Write up any "tricks-of-the-trade" in radio servicing that you have discovered. We pay from $1 to $5 for such previously unpublished "SHOP NOTES" found acceptable. Send your data to "Shop Notes Editor".

G. E. Models 810, 811, 814,

G. E. Television Service Bulletin, Jan. 1949, supplies us with the following information.

Bias has been added to the converter grid (pin 7 of V2-B) by the addition of *R120*, *R121* and *C113*, as shown in *Fig. 1*. Add a terminal board to the underside of the main chassis near the r-f unit. The board should be mounted so that short leads can be used. Remove *R4* from ground under the oscillator trimmer *C80* and connect to the junction of *R120* and *R121* on the

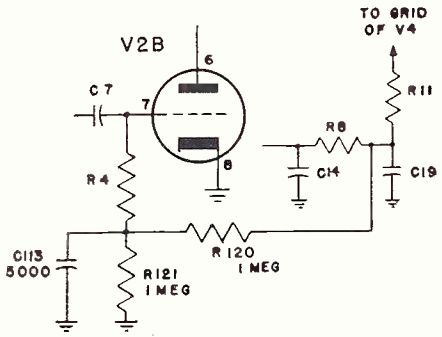


Fig. 1. Adding bias to receiver

new terminal board. Connect *C113* from junction of *R120* and *R121* to the ground point on the r-f chassis under the oscillator trimmer *C80*.

NOTE: (Dress *C113* as far away as possible from the oscillator trimmer *C80*).

This addition of bias to the converter grid was sometimes necessary when the receiver was used in areas of strong signal strength, especially on the high frequency stations. The peaks of the signal, which are the vertical pulses, were causing the grid to draw grid current which, in turn, frequency-modulated the oscillator voltage at the vertical pulse rate (60 cps). This appeared in the audio as a buzzing sound.

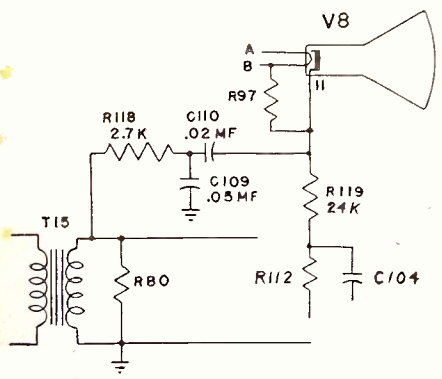


Fig. 2. Models 810, 814 changes

The circuit shown in *Fig. 2* has been added in late production—Models 810 and 814—to remove the vertical retrace lines which appear when the contrast control is used at a low setting or the brightness control is used at a high setting.

To remove a slight wiggle in the model 814 at the left-hand end of the first few lines at the top of the raster, a resistor R116, 330 ohms, ½ w, Cat. No. URD-037, was added in parallel with C83. This resistor was added in late production 814's.

Kaiser & Frazer 1949 Auto Radio

Control Shaft Fitting

In cases where the volume and tuning control shafts appear too short to accommodate the shaft parts and knobs, a formed lip which is bent forward in the escutcheon opening of the instrument panel will be found to obstruct receiver installation. This lip may be removed by either filing or bending it back.

In instances where the hole for the receiver mounting bracket has not been accurately located, it is possible that the receiver is positioned a bit too far toward the front of the car to allow the receiver control shafts to come through instrument panel holes to their maximum extent. If the "knock out" hole for the mounting bracket screw must be drilled, make certain it is accurately positioned.

Pushbutton Sticking

Check for and remove any burrs from the bottom of the cast grille for pushbutton openings. A binding tuning shaft will also cause the pushbuttons to stick or fail to return to their normal positions. To clear shaft from binding, enlarge the tuning shaft opening using a reamer, or a rat tail file.

Dead Receiver

1.) Check installation wiring to make certain the correct lead is connected to the ignition and instrument light switch respectively. Instructions are illustrated in your Operator's Manual ER-1-233 and Service Data ER-S-233. If the receiver lead that should go to the instrument light control is connected to the ignition switch, the receiver will not operate though pilot lamps will light.

2.) Check the loudspeaker plug connection. Though the plug pin receptacles in the speaker lead connector are arranged in such a manner to be polarized, it is often that the operator neglects to align the receptacles with respect to the male plug pins at the speaker. Forcing together of the incorrectly aligned parts is liable to cause the male pins to break through into the thin walls of the non-conducting adjacent holes of the speaker plug, resulting in open circuit wiring to the loudspeaker.

3.) Exposure of the radio receiver to such dampness as water drain-leaks upon the receiver components and wiring, results in voltage breakdown at tube sockets (especially the 6V6 output tubes), or the shorting of capacitors and resistors. The r-f trimmer strip at the center of the receiver will also be affected, causing the radio to become weak or dead. Water-leaks around the windshield, and screw head holding the set mounting bracket to the cowl should be well sealed against water draining upon the receiver. A thorough check for probable leaks and the necessary steps taken to prevent their occurrence should be taken at the time of the initial radio receiver installation.

4.) A lower than normal battery voltage can be the cause of the radio to be weak or fail to operate. The receiver will not function properly if the battery voltage measures less than 5.8 volts.

Noise Rattle

Noise in the form of rattle can be attributed to mechanical insecurity of parts, loose fittings, and screw fastenings, etc. Some of these are:

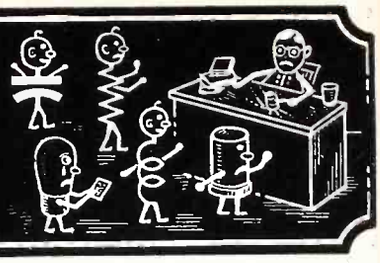
1.) Loose tone control knobs, and loose tone and volume control shafts may rattle against the cast grille. The keyway in the tone control shaft may be spread slightly to provide a tighter fit to the control knob.

2.) If the shaft assembly seems loose or tends to rattle within the grille mounting hole, a ¾ inch length of #1 spaghetti (fabric or cambric tubing) may be slipped over the shaft assembly and into the bushing. This will displace the loose fitting and cushion against rattle.

3.) Vibration of the screen which is set behind the cast instrument

[*Continued on page 32*]

CIRCUIT COURT



Westinghouse Models H-202, H-204

These sets are six tube, a-c/d-c instruments utilizing a dry-disc type of rectifier. Both the standard broadcast and FM bands are covered. Of interest is the method of amplification of FM signals and conversion on both bands. A partial schematic illustrates details to be discussed.

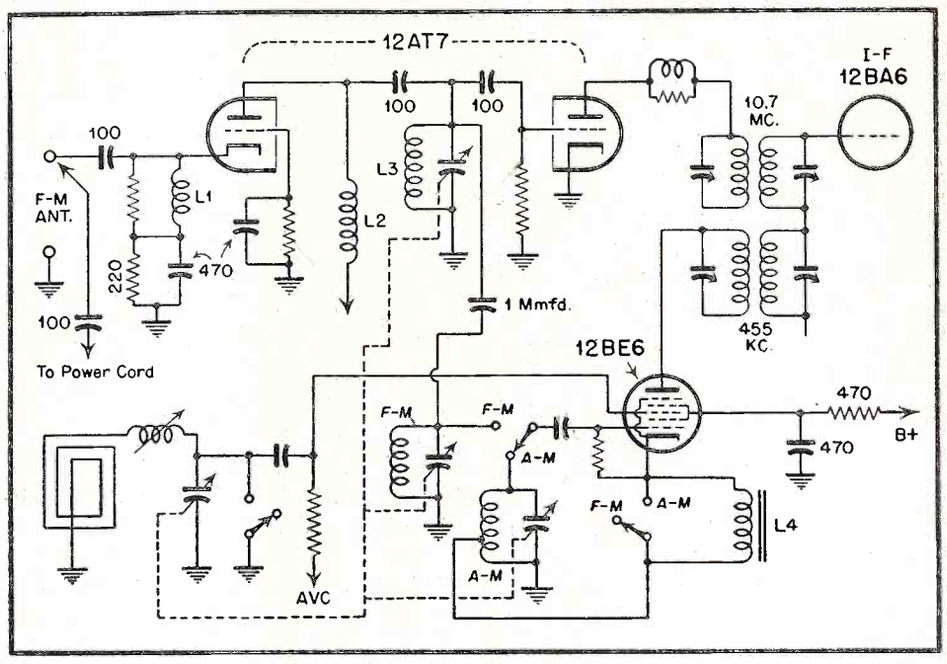
A new miniature tube, type 12AT7, is used as a grounded-grid signal amplifier and convertor for FM. This nine prong tube is designed for efficient high-frequency performance. The AM convertor, and FM oscillator functions are handled by a type 12-BE6 pentagrid convertor.

Inspection of the diagram, shown in the FM position, will disclose the path followed by such signals as far as the first i-f stage. Signals are picked up on an external antenna or the line cord. Voltage is developed across coil *L1* in the cathode of the first triode section of the 12AT7. Bias is developed across a 220 ohm resistor. The grid of this section is at ground potential for r.f. by virtue of the 470 $\mu\mu$f capacitor from grid to ground.

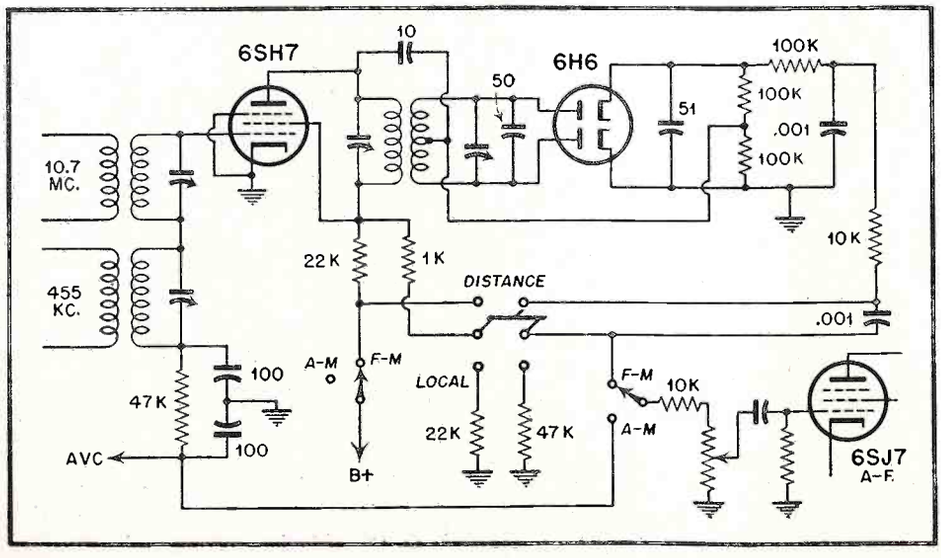
Plate voltage is fed to the triode through an r-f choke, *L3*. The signal is coupled to the first variable tuned circuit consisting of *L3* and a section of the gang. Oscillator signal is applied at this point, and the two signals appear on the grid of the second triode section of the tube. Mixing action takes place and a 10.7 mc i-f voltage is developed across the primary of the first i-f taansformer.

During AM operation the loop and its associated series coil are tuned by the gang and apply the signal voltage to the number three grid of the 12BE6 converter. The 455 kc i-f signal appears across the primary of the first AM i-f transformer.

Turning to the oscillator functions, it will be evident that on AM the 12-BE6 oscillator grid is switched to a tuned circuit which is tapped for the cathode in the usual manner. The coil *L4* in the cathode circuit is shorted by the switch. During FM operation an appropriate coil and tuning condenser are switched to the oscillator grid and the short across the cathode coil opened. Oscillation then takes place by virtue of the impedance inserted in the cathode by the inductance.



Westinghouse Models H-202, H-204, Front end.



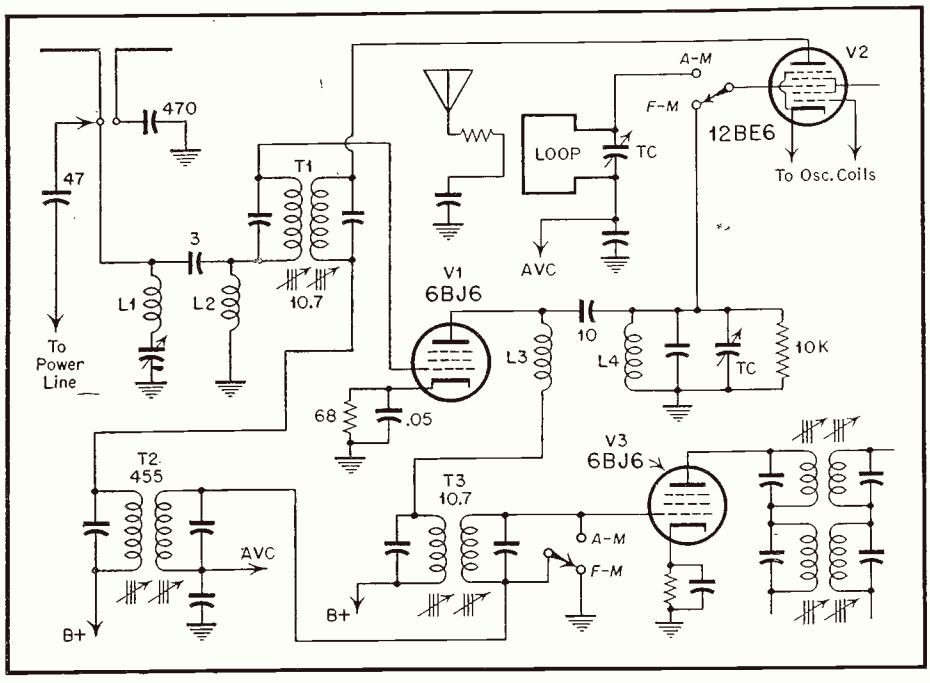
Crosley Models 88TA, 88TC, AM and FM switch.

Crosley Models 88TA, 88TC

This eight tube, a-c/d-c receiver, in its revised form, makes use of a switch to provide local or distance reception in the FM position. Broadcast operation is not effected by the switch.

The circuit utilizes the familiar Armstrong system of FM detection and limiting. A partial schematic is shown illustrating the limiter and discrimiter stages. It is in these circuits that the switch functions.

AM detection takes place in the 6SH7 tube, which has its plate and screen voltages removed for the function. The result is a diode rectifier with the grid and cathode as the active elements.



General Electric Models 210, 211, 212, reflex circuit

Action of the local-distance switch is two-fold. One section of the double-pole, double-throw switch shunts 1000 ohms across the 22K dropping resistor in the supply to the 6SH7 plate and screen, in the distant position. Limiting action is thus decreased and greater signal is delivered to the discriminator. At the same time, the noise reduction feature is hampered.

In the distant position, the other section of the switch shorts the .001 μf audio coupling capacitor providing full input to the 6SJ7 first audio tube.

In the local position, the plate supply to the 6SH7 is materially decreased by shunting a 22K resistor to ground, and the audio voltage is dropped by opening the short across the coupling capacitor and at the same time shunting a 47K resistor to ground in that circuit. Signals will be reduced in intensity, but limiting action will be considerably improved.

General Electric Models 210, 211, 212

An interesting variation of reflexing appears in this seven-tube, a-c/d-c series of receivers. Coverage of regular and FM broadcast bands is provided for. A partial schematic indicating details pertinent to the discussion is shown.

AM pick-up is obtained by a loop, to which a link is coupled for increasing signal strength. One section of the condenser gang tunes the loop. The signal is applied to the signal grid of *V2*, a 12BE6 pentagrid convertor, via one portion of the range switch. AVC is applied to the tube.

The oscillator circuits are substantially conventional and are not shown. The 455 kc signal developed in the plate circuit of the convertor passes through the low impedance secondary of *T1* and appears across the first AM i-f transformer, *T2*. The secondary of *T2* connects to the signal grid of the i-f amplifier tube V3, a 6BJ6. A section of the range switch shorts the secondary of *T3* during this function. The 455 kc signal is developed across the appropriate transformer in the plate of the i-f tube.

During FM operation the circuit acts quite differently. The signal picked up from either an external dipole or one side of the power line is first applied across *L1* and its series trimmer where any 10.7 mc signals are trapped. The signal continues through a small coupling capacitor to develop a voltage across *L2* which is resonant to the midpoint of the FM range.

The signal thus developed passes across the capacitor in the primary of *T1* to the grid of *V1*, the 6BJ6 r-f amplifier. The amplified voltage is kept to its proper path by *L3*, and is coupled to the tuned convertor grid circuit consisting of *L4* and associated components, thence through the range switch to the convertor tube.

The 10.7 mc signal at the plate of the convertor is coupled back to the grid of *V1* through *T1*. After amplification, the signal passes through the small inductance of *L3* to *T3* which now has the short removed from the secondary, thus feeding the voltage to *V3*, the i-f tube. A 10.7 mc transformer in the plate circuit of *V3* provides for further action.

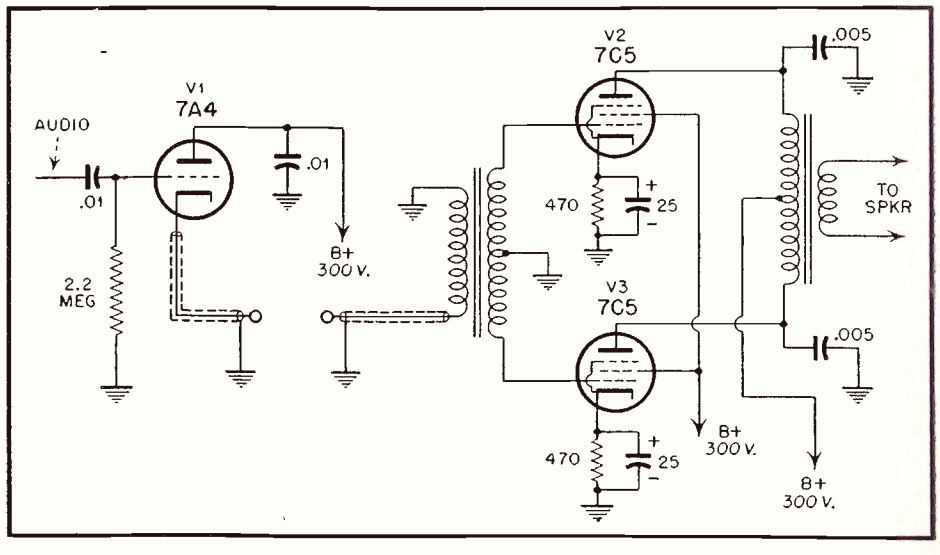
Phillips Model 3-81A

Uncommon in present receiver design is the use of transformer coupling in audio circuits preceding the plates of the output tubes. Several factors, including cost, weight and fidelity favor the use of R-C coupling. It is certainly true, however, that with present knowledge of transformer design and improved core materials, the use of such coupling units is very attractive.

A current example of the use of transformer coupling is found in the Phillips model 3-81A. This is a high quality instrument, incorporating 13 tubes and operating on regular broadcast, short-wave and FM reception. The first audio stage employs a type 1273 pentode tube. This stage is coupled in the usual RC manner to 7A4 triode tube.

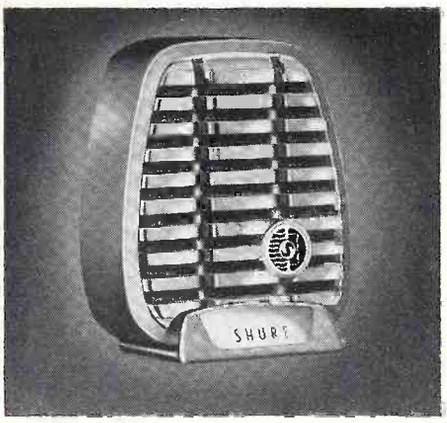
It is after the 7A4 stage that the new feature is found. The partial schematic illustrates the details. It will be observed that the plate of the 7A4 is connected directly to the posi-

[*Continued on page 33*]



Phillips Model 3-81A, transformer coupling circuit

NEW PRODUCTS

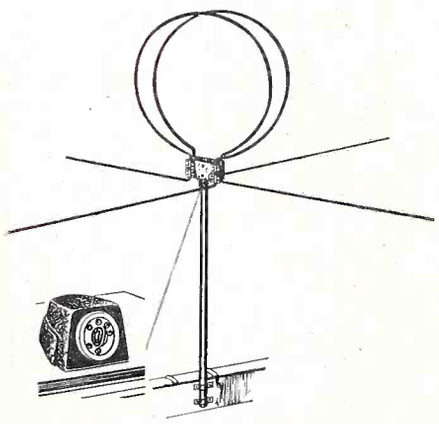


NEW MICROPHONES

The "Hercules", Model 510, a revolutionary new controlled reluctance microphone, and the "Rex", a hand-held crystal microphone are being offered by Shure Brothers, Inc., of Chicago, Illinois.

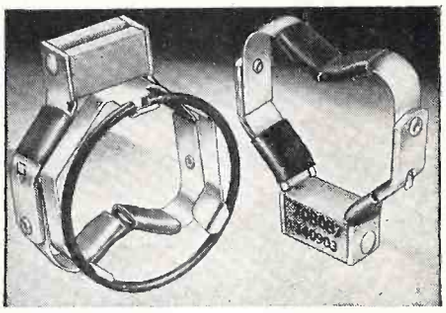
SOUND-POWERED PHONES

A communications instrument of considerable interest to TV and FM installers is the Wheeler Sound-Powered Telephone Handset, offered to jobbers by The Wheeler Insulated Wire Company, Inc., of Waterbury, Connecticut.



NEW TV ANTENNA

The Quad-Loop, one of a complete line of TV and FM broad-band antennas, is manufactured by the Square Root Manufacturing Corporation, Yonkers, New York.



NEW BEAM BENDERS

Two new types of TV-tube beam benders TV-2 and TV-3 aimed at lowered cost, are offered by Clarostat Mfg. Co., Inc., Dover N. H.

NEW CAPACITOR

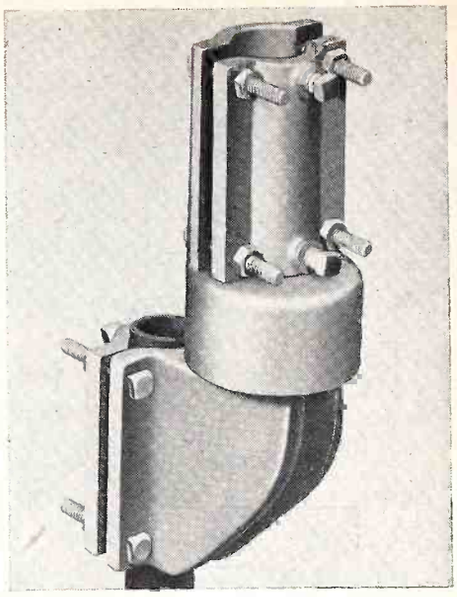
"Resonant" paper tubular capacitors are now available to radio servicemen from distributors of the Sprague Products Company, North Adams, Mass. This new type of capacitor is widely used in many late receiver models by leading manufacturers.

NEW VOM

Triplett Elec. Inst. Co., Bluffton, Ohio. A new Pocket-size Volt-Ohm-Mil-Ammeter, Model 666-R with the latest specialized features.

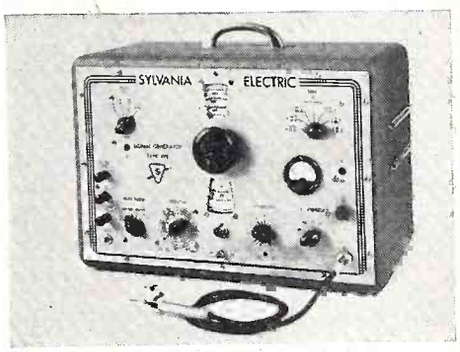
TV SPECTACLES

"Tele-Spex", Television spectacles that eliminate TV glare, have been developed by Radio Merchandise Sales, Inc., New York, N.Y.



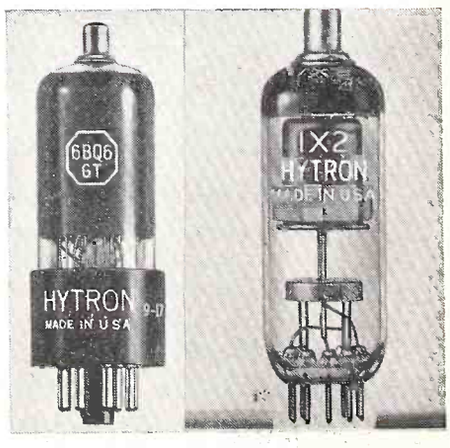
TENNA-ROTOR ACCESSORY

Alliance Manufacturing Company has announced the addition of an accessory to the Alliance Tenna-Rotor. This is a "Thrust Bearing Bracket" Model TBB to be used in conjunction with the Tenna-Rotor for facilitating the support of heavier type TV and FM Antenna.



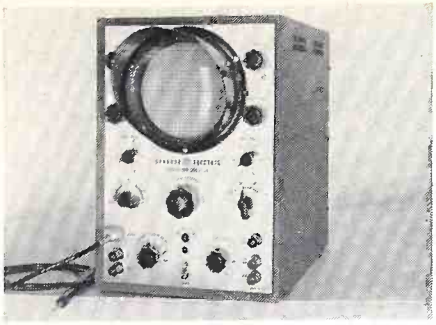
FM-AM SIGNAL GENERATOR

A new FM-AM signal generator providing a high level, accurate radio frequency signal source ranging from 80 kc to 120 mc for the alignment of FM and AM radio receivers, has been announced by the Radio Division of Sylvania Electric Products Inc., 500 Fifth Avenue, New York, N. Y.



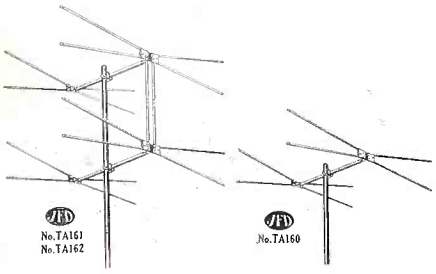
NEW TV TUBES

Hytron Radio & Electronics Corp. has just announced another two in its line of special tubes for low-cost television receivers. Designed in collaboration with leading TV set makers, miniature. The new Hytron horizontal deflecthe Hytron 1X2 is a compact, T 6-½, 9-pin tion amplifier tube type 6BQ6GT is at the left. Not shown is the 25BQ6GT which has the same characteristics as the 6BQ6GT except for filament voltage and current.



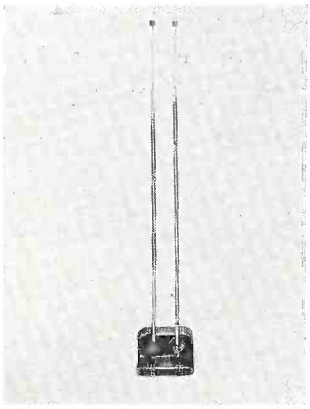
NEW TV CRO

A new five-inch oscilloscope, Model ST-2A designed especially for use in television work and general laboratory applications has been announced by the Specialty Division of the General Electric Company at Electronics Park, Syracuse, N. Y.



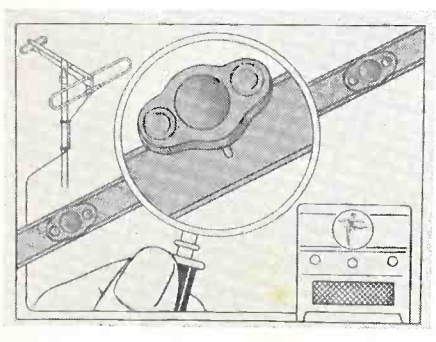
NEW TV ANTENNA

The JFD Manufacturing Co., Inc., B'klyn, N. Y. is now producing a new broad band conical Television Antenna line known as the "D-Xer".



TV INDOOR ANTENNA

The Ward Products Corporation, a Division of the Gabriel Co., 1523 E. 45th St., Cleveland 3, Ohio, is now merchandising their newly designed TVI-49 indooor antenna.

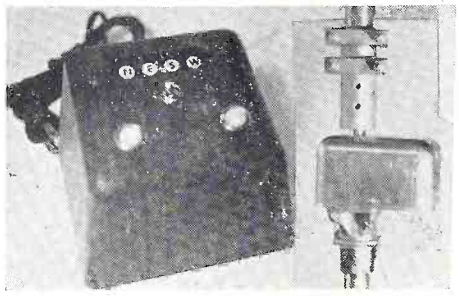


TV-FM WIRING NAIL

Servicemen and dealers are adding a new touch to television and FM installations by using the new Walsco wiring nail.

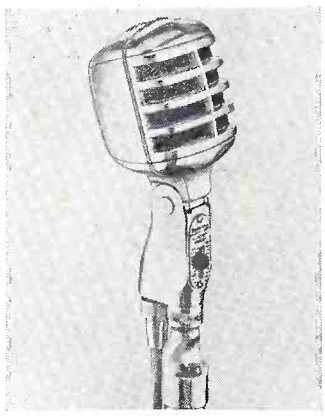
TV REMOTE CONTROL UNIT

Transvision's new Remote Control Unit is designed to operate and control ANY Television Set from a distance up to 50 feet. It turns the set on, tunes in stations, controls contrast and brightness, and turns the set off.



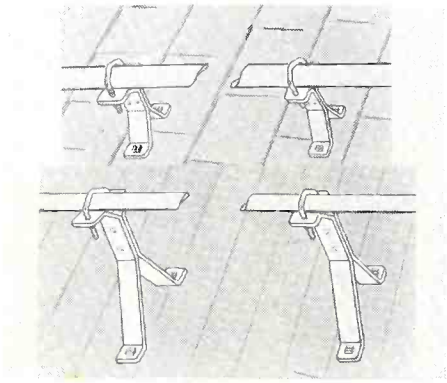
NEW TV ANTENNA ROTOR

A new TV antenna rotor with "compass" control has just been announced by the Radiart Corp., Cleveland 2, Ohio.



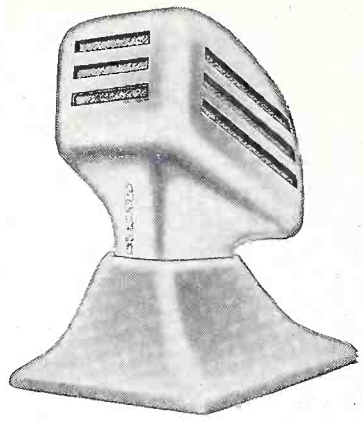
NEW MICROPHONES

A new value in low-cost general-purpose crystal and dynamic microphones Models 611 and 911, has been created by Electro-Voice, Inc., Buchanan, Michigan.



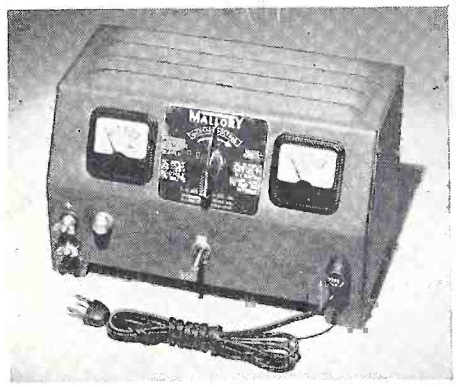
ANTENNA WALL BRACKETS

The South River Metal Products Company, Inc. of South River, New Jersey announces the availability of its new Duo Wall Brackets which are used to support television and FM antennas.



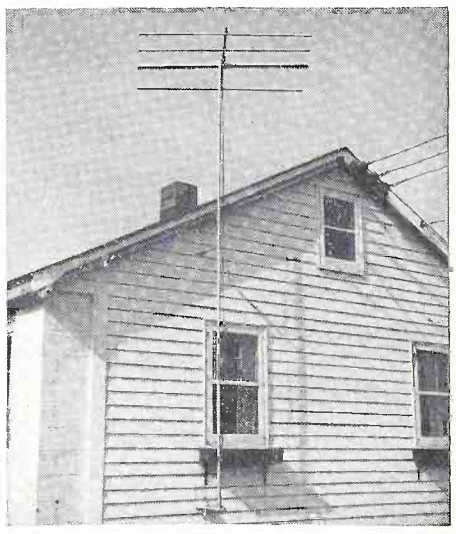
NEW MIKE STAND

The new Amperite Microphone Stand has been designed for pulpit and footlight use. It can easily be adapted for use with the standard Amperite Ribbon Microphone. This permits the speaker to walk quite a distance from the microphone with little change in output.



6 VOLT POWER SUPPLY

P. R. Mallory & Co., Inc., Indianapolis, Ind., announce a 6 Volt Bench Power Supply of special interest to the radio service trade. The new unit, Mallory 6RS10, has been designed as a convenient source of DC current wherever 110-115 Volt AC current is available.



NEW TV ANTENNA

La Pointe-Plascomold Corporation, Unionville, Conn., manufacturers of Vee-D-X Television accessories announces production of a four element Yagi array cut especially for each particular channel.

ASSOCIATION • NEWS •

Empire State Federation of Electronic Technicians' Associations

The first annual meeting of ESFETA was held in Binghamton, N. Y. on Sunday April 24, 1949. Delegates were present from New York City, Rochester, Binghamton, Ithaca, Poughkeepsie, Endicott, Corning, and Long Island. The following members were elected as officers (see below) and members of the Board of Directors: President, Max Leibowitz; Vice-President, Miss Margaret Snyder (a full-fledged radio technician); Secretary, Wayne Shaw; Treasurer, Ben DeYoung; Sgt.-at-Arms, Arthur J. Blakely. Members of the Board are: Richard Newcombe, Warren Fribley, and John A. Wheaton. Ed Fisk was appointed as Publicity Director.

Any organization in New York State is eligible for membership in ESFETA upon proof of their existence and pledge to the principles of the organization. A statewide TV training program is being planned for 1949-50 under the chairmanship of Sam Marshall, Program Director.

Endicott Radio-Television Association, New York

Meet 2nd and 4th Wednesdays at 7:30 P.M. at the Endicott American Legion Post #82. They recently elected: Richard Wheet, President; Ernie Marshall, Vice President; Richard K. Newcombe, Secretary; Walter Porznick, Treasurer. The best of luck to this new organization!

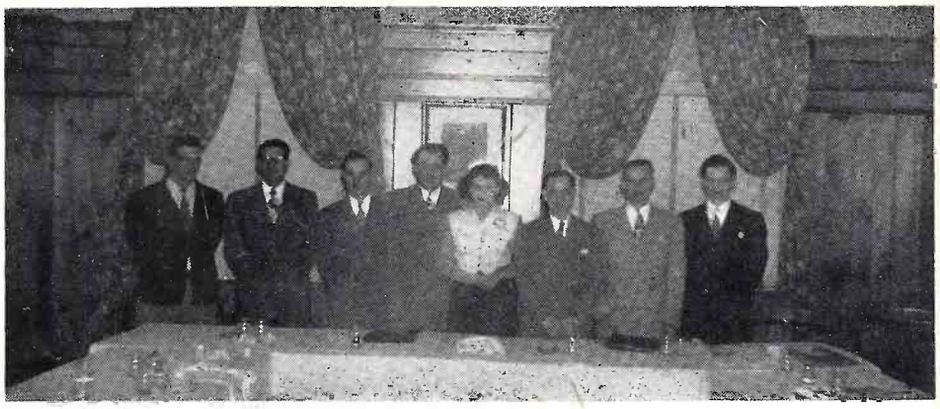
Associated Radio Service Dealers of Columbus, Ohio

Scheduled talks on Antenna Inspection by Columbus Supt. of Police & Fire Communications is in the offing. Inspection of TV antennas will be handled by this department. WBNS-TV equipment installation will be started by July 1st. Skyways Inc. starts construction of 3rd TV station at once—Channel 6.

Thanx to our Brothers from Columbus for this one:

An American resident of China took her houseboy to task for bringing her linen into her bedroom without knocking.

"That all right, Missy," said the native. "Every time come, lookee in keyhole. Nothing on, no come in."



Newly elected officers of the Empire State Federation of Electronic Technicians' Associations. From left to right: Arthur J. Blakely, Warren Fribley, Richard Newcombe, Ben DeYoung, Miss Margaret Snyder, Max Leibowitz, Wayne Shaw, and John A. Wheaton.

Long Island Television and Radio Technicians Guild, New York.

A new star in the firmament of radio technicians' organizations has just made its debut. Appearing below, from left to right are: Joseph D. McNamara Jr., Publicity Director; Arthur Cyr, Treasurer; Gene Laper, President; and Jack Wheaton, Corresponding Secretary.

Associated Radio-Television Servicemen of New York

The New monthly periodical, ARSNY News is going great guns, and bids fair to become a powerful influence in the interests of service technicians in the Metropolitan Area. The May 18th meeting held at Central Commercial High School was highly interesting mainly because of Henry Levine who gave the boys a down to earth talk on the Television Assembly Kit circuits. Another highlight of the evening was the "Talent Quest," in which members of the audience were invited to speak on any phases of TV with which they have had experience. The prize was a copy of Rider's TV Manual No. 1. The ARSNY Softball baseball team through its Director, Roy Day challenges any association to a game.

Lackawanna Radio Technicians' Association of Pennsylvania

Reports that their smoker was a great success. See tag below. Committee members were: Austin Renville, Mylan Krupa, Wilbur Treet, Marino Ruggere, Ernest Ludwig, Merril

[*Continued on page 31*]

MEET

John Doe

From Scranton-W-Barre

AT THE

Joint Smoker

For the membership of

LUZERNE

and

LACKAWANNA

Radio Technicians Association

JR. BALLROOM

HOTEL JERMYN

April 20 8 p m Exp. ~~$3.50~~

TV EXTRA EDITION

WARD MINUTE MAN

1949 IS TV YEAR

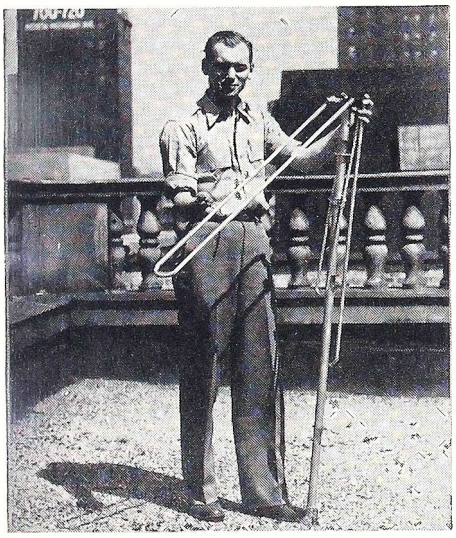
WARD PRODUCTS CORPORATION • 1523 E. 45TH ST., CLEVELAND, OHIO • JUNE 1949

WARD SMASHES TV ANTENNA INSTALLATION COSTS!

IT COSTS ONLY 6c IN LABOR TO ASSEMBLE WARD'S SENSATIONAL MINUTE MAN ANTENNA

(WP) CLEVELAND, OHIO

The Chief Engineer of the Ward Products Corporation states that the new sensational Minute Man antennas are being made of PERMA-TUBE — a newly perfected non-corroding coated steel tubing, created especially for Ward by the Jones and Laughlin Steel Corp., Pittsburgh, Pa. Independent laboratory tests on over 30 metals commonly used for antennas have proved PERMA-TUBE the best for all weather installations. Aluminum is too weak and other types of coated steel corrodes. Ward is the only manufacturer using PERMA-TUBE in constructing antennas. See your Ward Distributor today.



Dick Moss, television engineer, flicks up dipole in assembly operation of Ward Minute Man antennas. (Model TV-46).

A few seconds later and Dick snaps the high frequency dipole into position. It costs only 6c in labor to assemble this Ward Minute Man antenna.

FLASH!

WARD USES PERMA-TUBE IN CONSTRUCTING MINUTE MAN ANTENNAS.

(WP) CLEVELAND, OHIO

The Ward Products Corporation, a Division of the Gabriel Company, disclosed today their new Minute Man line of TV antennas. These 13 antennas, ranging in list prices from $2.45 to $49.95 are completely pre-assembled. Where it formely took two installation men three-quarters of an hour (or approximately $7.50 in labor) to assemble the ordinary TV antenna, one man can assemble any Ward Minute Man antenna in a few minutes. This is the greatest technical engineering improvement in the antenna field and the Ward engineers are to be congratulated on its achievement. They have spent many months in their laboratory perfecting the many ingenious construction features. See your Ward distributor today.

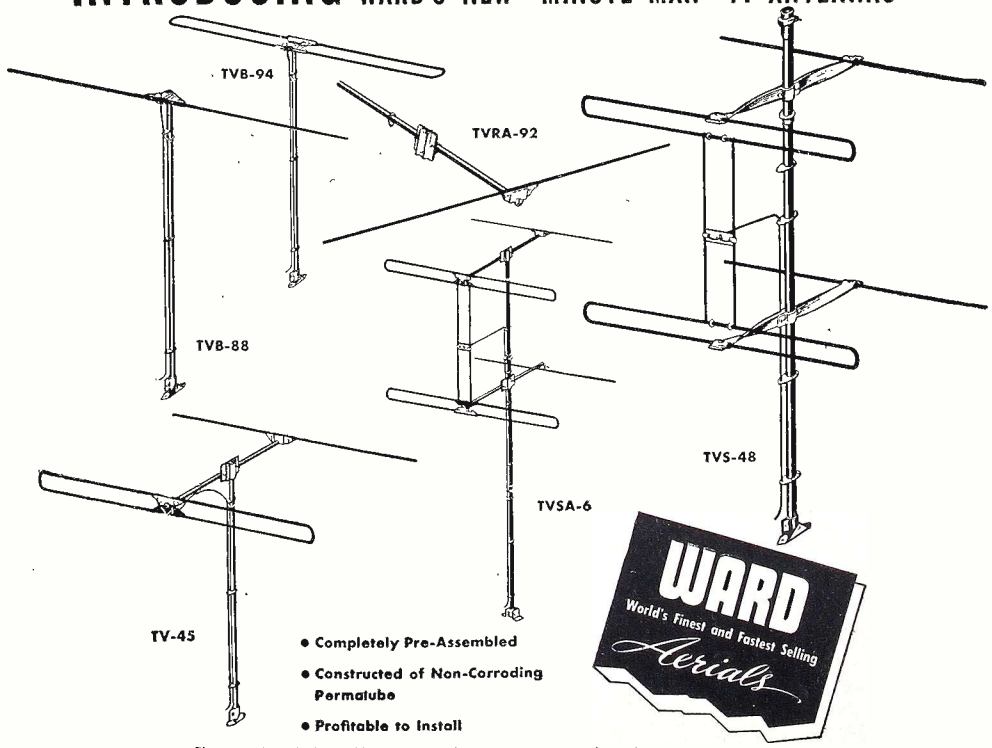
GREATER INCOMES AND PROFITS REALIZED BY INSTALLING WARD ANTENNAS.

(WP) NEW YORK, N. Y.

Now you can make big money on a standard installation fee. It has been reported that servicemen and retailers are realizing greater profits by installing Ward Minute Man Antennas. The quick 3 minute installation makes the big difference. It means more installations per day and at greater returns. No consumer complaints have been registered by big labor bills. See your Ward distributor today.

See Your Ward Distributor Today

INTRODUCING WARD'S NEW "MINUTE MAN" TV ANTENNAS



- Completely Pre-Assembled
- Constructed of Non-Corroding Permatube
- Profitable to Install

There are Ward Minute Man Antennas for every purpose and use from any distance from the transmitter. See your distributor today.

TRADE FLASHES

[*from page 8*]

bers of the Service Department should be addressed to the new address which is as follows: Admiral Corporation, 201 E. North Water Street, Chicago 11, Illinois. Telephone: Mohawk 4-4622.

6,000,000 TV Sets By 1951

By 1951 there will be six million television receivers in operation in the United States, President Max F. Balcom of the Radio Manufacturers Association said recently in his annual report to members at the Stevens Hotel.

Hytron Produces TV Pix Tubes

Since February of this year, Hytron Radio & Electronics Corp. has been producing TV Picture Tubes in steadily increasing quantities. Shipments are now being made to a broadly representative group of leading manufacturers of TV receivers—as well as to Hytron distributors.

Coastwise Conducts TV Clinic

Radio-TV service dealers, repairmen and engineers in twenty-one metropolitan areas from coast-to-coast will attend the series of clinical meetings to be conducted by Henry M. Joseph, chief engineer of Coastwise Electronics Company, Los Angeles, manufacturers of Ferret equipment, during the next twelve weeks.

Raytheon Producing TV Pix Tubes

Production of a quality line of Raytheon cathode ray tubes for television requirements is now well under way according to an announcement by President, Charles Francis Adams, Jr. Raytheon is now supplying a complete line of all of the popular television types supplementing its receiving, power, microwave, special purpose and subminiature tubes.

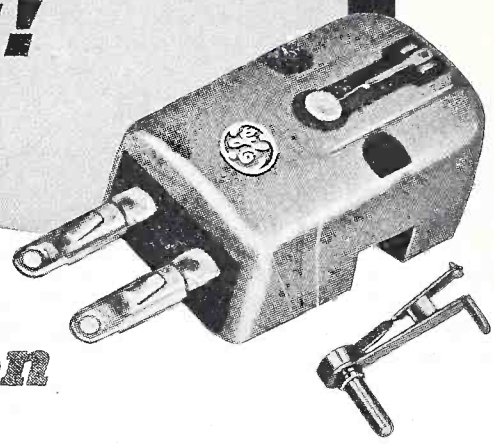
New Permoflux Speaker

The Permoflux Corporation of Chicago, manufacturers of a complete line of speakers, announces the addition to their line, of an 8" speaker with an 87 ohm field. This is an exact replacement for Motorola TV sets, their model numbers VT-107; VT-121; 12VT-16.

G.E. Offers TV Course

Recognizing the need for trained technicians to install and service television receivers, the General Electric Company is offering radio men a training course in the principles and practices of television maintenance, it has been announced by the Electronics Department's Tube Division, Schenectady, N. Y.

SRO has a new meaning now!



Stylus Replacement Often

WHEN the big attraction hit town they hung the "Standing Room Only" sign—it meant overflow business.

It still means that, but the big attraction now drawing overflow business for distributors and dealers is the G-E Variable Reluctance Cartridge with the Replaceable Stylus.

Why? Because record fans who know their records best wanted the finest reproduction possible. The G-E Variable Reluctance Cartridge gave them just that. To secure peak performance they often replaced the cartridge when the stylus was only slightly worn.

Now, with the Replaceable Stylus, cartridge replacement is no longer necessary. In four easy steps the cartridge can be removed from the tone arm, the stylus changed and listening pleasure increased.

Economy is the big feature but this redesigned cartridge has many other advantages. Smaller in size, it can be adapted to many more tone arms. Higher lateral compliance provides more faithful tracking, hence better fidelity. Frequent stylus replacement reduces record wear and adds hours of top listening pleasure. Needle talk and needle scratch are negligible, giving cleaner, finer reproduction.

Best of all, the cartridge is available for either the new LP records with 1 mil stylus or for conventional records with the 3 mil stylus.

The counter sized dispensing unit for greater sales—7¾" long, 5½" wide, 4¾" high at the back.

Now for the *Big Extra* to step up sales! A neat dispensing unit for the counter with two cartridges and six stylii recessed in a gold-flocked panel to catch the eye. The entire unit is finished in an attractive blue and has a compartment in the rear for additional stock. It is a silent salesman that keeps selling. See your distributor right away for details.

For complete information on Variable Reluctance Cartridges and Replaceable Stylii write to: *General Electric Company, Electronics Park, Syracuse, New York.*

You can put your confidence in—

GENERAL ELECTRIC

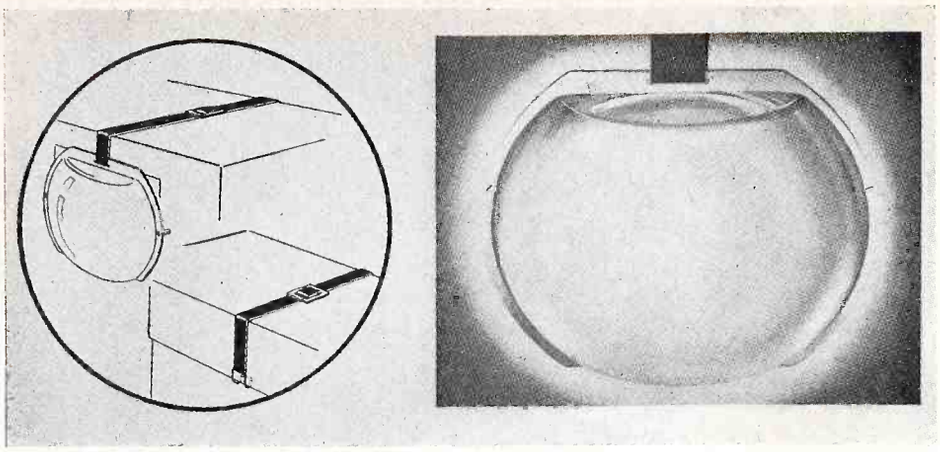


Fig. 5—Another method of mounting lens on receiver

Transvision Exclusive Inputuner Dist.

The appointment of Transvision, Inc., New Rochelle, N. Y., as exclusive national distributors of Du Mont Inputuners through jobbing, amateur-supply and retail channels is announced by Paul Ware, Manager of the Electronic Parts Division of Allen B. Du Mont Laboratories, Inc.

Andrew Closes N. Y. Office

Until further notice the New York City office Andrew Corp. at 421 Seventh Avenue will be closed. Until other arrangements are made send your inquiries directly to our main office at 363 E. 75 St., Chicago, where they will receive prompt attention. Re-establishment of the eastern office will be effected at the earliest possible moment.

DIRECT VIEW LENS

[*from page 12*]

frame so designed that the lens may be pulled out on an extension bracket: The bottom of this mounting frame fits under the television receiver. When used in this fashion the lens may be adjusted, while the picture is being seen, by moving the frame in or out. As the lens is moved out the picture size will apparently become larger and the angle of view smaller. As the lens is moved back in the angle of view becomes greater and the magnification smaller. This might be a more convenient type of lens depending upon the use that the prospective customer has in mind.

A more elaborate set up may be obtained by mounting the same lens on an adjustable stand, somewhat like a music stand, which is placed in front of the television receiver. The actual height is adjusted on the stand as well as the distance between the lens and the picture tube itself. By the very nature of this stand it is designed to be used with any television receiver and of course may be removed from its position so that the receiver may be used without an enlarging lens.

Fig. 5 illustrates another product, the Hunton Plastics Company lens showing their method of mounting the lens. A plastic strap is attached to the top of the lens; this strap is adjustable and has a fastening arrangement at the end which allows the lens to be adjusted for any television receiver. The strap is placed over the receiver and hooked on to the back. In any receiver there is an opening in

ing may be utilized to mount the enlarging lens. The strap is made adjustable so that this lens may be used with virtually any receiver. An added feature of this lens is the convenience with which it may be de-mounted. To provide for a changeable degree of enlargement, adjustable feet are provided with this lens so that the lens may be moved toward the tube face or away from the tube face dependng upon the user's convenience.

Fresnel Lens

In the RCA 8PCS41 projection television receiver a unique type of directional screen is used. This screen, made of three sheets of plastic, has incorporated in it a lens which is known as the Fresnel type. This lens, shown in *Fig. 6,* is actually a thin sheet of plastic with a series of concentric circles. An enlargement of these circles is shown in *Fig. 6B* which is a detail of the completed lens itself. These circles actually are ridges or cuts made in such a fashion so that the lens actually operates optically as a thick plano-convex lens. The large dotted circle represents the effective radius of this Fresnel lens. By means of these ridges, or cuts, a thin plastic sheet is the same optically as a thick lens.

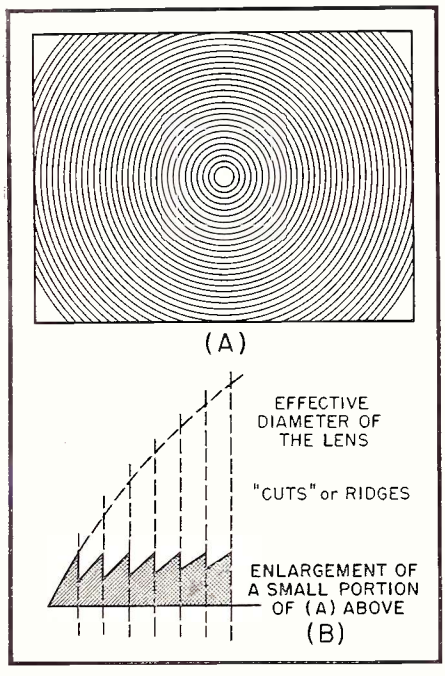


Fig. 6. Fresnel lens

The Fresnel lens is only one portion of the RCA directive projection screen; this lens is being manufactured for use as a direct view enlarger by the Wilson Magazine Camera Company. This lens, under its trade name Planar, is made in two different sizes. One is made 9 x 12 inches, and has an effective focal length of between 18 and 22 inches. It magnifies the pic-

He started retiring today!

...and it feels good!

It's going to take time, but the point is . . . he's taken that all-important *first step* . . . he's found a way to make saving a sure, automatic proposition . . .

He's buying Savings Bonds, the safest investment there is, through the Payroll Savings Plan!

This makes saving an absolute certainty! You don't handle the money to be invested . . . there's no chance for it to slip through your fingers and . . . U. S. Savings Bonds pay you *4* dollars for every *3* invested, in ten years!

Think it over! We believe you'll agree that bonds are the smartest, surest way there is to save.

Then—sign up for the Payroll Savings Plan yourself, today! Regardless of your age, there's no better time to start retiring than *right now!*

P. S. If you are not eligible for the Payroll Savings Plan, sign up for the Bond-A-Month Plan at your bank.

Automatic saving is sure saving—U. S. Savings Bonds

Contributed by this magazine in co-operation with the Magazine Publishers of America as a public service.

ture approximately two times. A model of this lens is available in the 8 x 10 inch size. A larger lens, 11½ x 16 inches has an effective focal length of between 24 and 30 inches and also has an approximate magnification of 2. All of these Planar lenses are flat sheets of plastic with the ridges, characteristic of the Fresnel lens, cut out from their rear surface. These lenses are quite similar to those used with the RCA projection television screen.

The Liquid Lens Company manufactures a unique lens with a rubber sheath mounting. This sheath fits around the tube face and the space between the tube face and the oil-filled lens is also filled with oil. This allows a greater angle of view, up to and including 140 degrees; this seems to be a very large angle, however, a suitable picture will be found at this angle. An image on the tube face can be seen almost from the side.

Since the space between the tube face and the lens is filled with oil there is less reflection from the tube face, and very little light is lost.

ASSOCIATIONS

[*from page 24*]

Greene, Ferdinand Yax, Howard Greene, and Leon J. Helk.

According to Brother Helk, "Movies and a demonstration of the Fringed Area highlighted the evening."

Philadelphia Radio Servicemen's Association, Phila., Pa.

The April 5th meeting at Franklin Institute featured S. R. Cowan, Publisher of Radio Service Dealer who spoke on TV Detectors and Video Amplifiers, and C. M. Chorpening of Astatic, who spoke on Microphones. Rumor has it that Mrs. Dave Krantz, Mrs. Dick Devaney, Mrs. Stanley Winiarski, and Mrs. Larry Oebbecke are going to form a PRSMA Ladies' Auxiliary Chapter to be known as "Missing Husbands Chapter."

Long Beach Radio Technicians' Association, Inc., California

March Report—Hoffman Radio sponsored the first technical meeting. R.C.A. did the honors at the second meeting, at which function the operation of the 45 RPM player was explained. Harry Ward, of public relations, feels that u.h.f. TV is still many years in the offing.

Erie Radio Service Association, Erie, Pa.

George E. Toles of Hamburg, N.Y. writes us that the Erie Radio Service Association has been organized by a group of radio and television service men of Erie, Pa. The purposes of the new organization are stated as:

1. Not to set high prices for radio service . . . but to protect the customer against fraudulent and incompetent service.
2. To pledge all members to practice fair and honest business methods.
3. To adopt minimum price schedules.
4. To establish training programs acquainting all members with existing service problems today so they will be better able to serve the public.

The associaion is using institutional newspaper ads to acquaint residents of Erie with the new group and urging them to "insist upon the serviceman with ERSA credentials, for honest, competent and reasonable service."

Good Luck, Erie.

Television & Radio Technicians, Kansas City, Missouri

This association has recently been formed. It already has under way a course in TV of several months duration. The project is a cooperative affair sponsored by various interested groups. Smooth Sailing, TRT.

Radio Technicians' Guild of Rochester, N. Y.

Scheduled for May 3, was a talk by

Larry Kline of Ward Antennas. The following slate of officers were nominated at the Regular Stated Business meeting for that purpose on April 26: for President: T. Lawrence Raymo and Harold M. Eskin; for Vice-President: Richard Nash and Robert A. Bryan; for Secretary: Margaret Snyder and Donald Lissow; for Treasurer: William A. J. Frenzel. According to the Municipal Code of the City of Rochester TV antenna installations are subject to Municipal regulation in the following respects:

"Antenna structures. Notwithstanding the foregoing provision of the section, antenna structures for radio television reception, not exceeding sixteen feet in height, may be erected and maintained without a building permit, upon a roof of a building: provided such antenna structure is set back from any side of such building which side is within sixteen feet of any lot line of the lot on which the building, if situated a distance not less than the height of such antenna structure. The construction or maintenance of any such structure, which does not strictly comply with the foregoing requirements without a building permit is prohibited. The application for a building permit for an antenna structure shall be accompanied by detailed drawings of the proposed structure, and in such form and giving such additional information as shall be required by the superintendent of buildings.

"All antennae and masts shall be of substantial incombustible material and construction shall be supported in a rigid manner, and shall be grounded in an approved manner. The antenna structure may be designed with a special heavy base of dimensions to make the mast self-supporting. All antenna structures ten feet or over in height, with the exception of the self-supporting type, must be securely guyed."

SHOP NOTES

[*from page 19*]

panel grille causes a buzz sound when loose. The screen may be shimmed at its four corners to stabilize its mounting.

Circuit and Pick-Up Noise

1.) The former condition can be improved by antenna selection and careful peaking of the Antenna Trimmer to increase sensitivity and reduce noise. For metropolitan areas, a 62-inch antenna is quite adequate, while in outlaying country areas the antenna length of 93 inches is recommended.

Adjustment of the antenna trimmer is important and should not be overlooked. Every receiver installation should be adjusted for normal operation after the receiver has been operating approximately 15 minutes to reach normal operating temperatures, and with antenna fully extended. Tune in one of the weakest stations at approximately 1200 kc, or near the higher frequency end of the dial scale. Adjust trimmer for minimum noise level and maximum clarity on station used for test.

2.) Noise pick-up may come from various sources, chiefly from ignition circuits of the car. It is reminded that the recommended noise suppressor, and noise filter capacitor units be checked, as indicated in the instructions given in publications ER-I-233 and ER-S-233. To eliminate wheel static (heretofore not mentioned in the above literature) insert about ½ ounce of powdered graphite through the valve of all four tire tubes. This will provide a ground leakage path to efficiently dampen static radiation.

CIRCUIT COURT

[*from page 21*]

tive 300 volt source. The cathode terminates in a socket to which attaches a plug from the separate power-audio output chassis.

In the power chassis the input lead, shielded to prevent hum pick-up, connects to the primary of the input transformer. The other side of the primary connects to ground, completing the d-c cathode circuit of the 7A4 stage. The split secondary feeds the grids of the 7C5 output tubes in push-pull. The output stage is conventional except for the use of separate cathode bias resistors for each tube.

CUSTOM BUILDING

[*from page 18*]

chassis and include the first stage of audio amplification. The amplifier should be on a separate chassis which may include the Scott dynamic noise suppressor circuit shown above. The power supply should be on a separate chassis.

These units may be built up for shop samples over a period of time depending on how much free time is available for such creative work. When they are carefully constructed and neatly wired they may be demonstrated as they are as chassis and the point made to the quality minded customer that he may plan a long term installation and get one section at a time. Of course it may be necessary to make arrangements with some cabinet maker in the neighborhood to supply the cabinet or to do the cabinet work in the customer's own home for a reasonable fee. It is surprising how many cabinet makers welcome this type of work. It gives them a chance to exercise their own ingenuity and skill and cooperate in an important venture. The author sold the cabinet maker an installation for himself. Details of such arrangements can be mutually worked out.

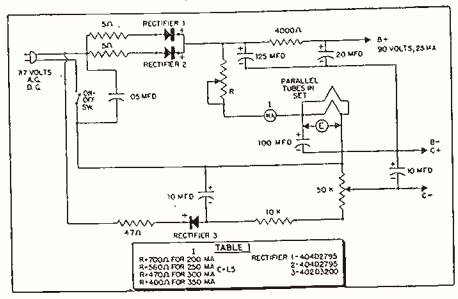


Fig. 6. Method of supplying directo current to filaments

Of course it will be necessary to have some temporary power supply for the separate units during the early stages of such a long term planning, but this can be of a simple type that will be replaced by the regulated power supply in its own time and in its own

own place of the completed installation sequence. Contract arrangements will protect both the customer and the serviceman here. Since each unit contains one stage of audio amplification this will be sufficient to operate a speaker temporarily until the amplifier and power supply and loud speaker are finally added. The loud speaker of course should be separate from the other component parts. It is only in the small units that it is part of the chassis. This is poor design from the sound reproduction angle. The loudspeaker should be good quality, properly baffled, and for best results should include two speakers, one a woofer and the other a tweeter with some cutoff point at about 800 to 1000 cycles.

Conclusions

These, then, are some concrete suggestions as to how to improve business without too much outlay for materials and time. You simply make more use of your skill, better budgeting of your time, and use the component parts available in your own shop. Even if you never sold one of the units you built, you yourself would have a good set of radio receivers. But, if you do your designing and wiring well, you will get the kind of results that many quality minded customers will pay you good money for. I ought to know; I don't have any receiver around that I built working out these ideas. If there were a sufficient demand for plans for making these high quality receivers I might be willing to undertake writing out the detailed instructions. But that's up to you. You carry the ball now. I just threw it to you.

TV QUIZ

[*from page 16*]

(*a*) One-thousandth of a second
(*b*) One-hundredth of a second
(*c*) One-tenth of a second
(*d*) One-quarter of a second
(*e*) One-eighth of a second
(*f*) One-sixteenth of a second

6. (*p* 9) Since the *spot* moves literally faster than the eye can follow it, the observer sees not a single spot moving, but an entire illuminated screen. This pattern is called:

(*a*) Scanning
(*b*) Emission
(*c*) Phosphorization
(*d*) Raster
(*e*) Persistence
(*f*) Frame Symmetry

• • •

ANSWERS ON PAGE 35

ANSWERS TO TV QUIZ

1. (*d*) It is true that the deflection plates operate at a normal high d-c potential, a form of positive bias. However, as the sawtooth voltage is applied the deflection plates their net voltage varies alternately positive and less positive (practically positive and repulsed by the opposite plate which is charged *less positive* (in the negative direction) by an equal amount. Since the sawtooth scanning voltages alternate, a varying potential exists on the deflection plates.

2. (*b*) The electrons are travelling at such high speed that when they cross the deflection static field their momentum tends to keep them going in their same line of travel. Nonetheless these lines of force bend their direction of flight so that the beam belatedly and begrudgingly changes its direction. In all this time the beam had been moving along the longitudinal axis, consequently by the time it has moved enough to strike the plate it is already beyond that point. (To assure this safety the trailing ends of the deflection plates are sometimes flared out, as may be seen in *Figs. 1* and *2.*)

3. (*e*) Increasing the cathode emission surface might conceivably provide more electrons (although with other factors unchanged these additional electrons, while available, would never be used), still this factor would hardly affect the distance the *spot* is moved across the screen with one volt applied across the deflection plates.

4. Answer (*2*) covers this. To take advantage of the increased deflection sensitivity created by lengthening the deflection plates, the ends are flared out to avoid being struck by, or causing distortion to the electron beam.

5. (*f*) Since the eye retains an image $\frac{1}{16}$ of a second after it disappears it is certain the eye will remember a *frame* 1/30 of a second later. Therefore the frequency of 30 frames per second has been standardized for American television.

6. (*d*) You might as well memorize the word. It's a television original.

TAPE RECORDERS

[*from page 15*]

stantly active in a commercial field should be periodically cleaned with carbon-tetrachloride or, in lieu of it,

alcohol. Coating from tapes tends to rub off upon surfaces it contacts. These should be cleaned to avoid overall level loss and retardation of higher frequency response. However, extreme care must be exerted to see that no cleaning fluids contact and consequently *dissolve* the coating upon a recording tape. Oil should be kept clear of rubber components. Reels should be flat and not wobble. Excessive tape sticking or scraping of tape against reels will cause flutter.

After long periods of inactivity, clutches may need adjustment due to dormant packing of the felt therein. If so, loosen the locknuts at the bottom of each reel shaft. Next tighten each thumbscrew until a nine-inch-ounce torque or its equivalent is effected.

Stereophonic Applications

One form of stereophonic recording is possible because of twin track feature. To achieve the effect two complete channels are used:—two microphones, two amplifiers, two recording heads and both tracks. It is stated that for the most dramatic effect one channel should be played back into receiver of a double head-phone set while the second channel is simultaneously played into the second headphone of the set. For this purpose the microphones should be separated a distance equal to that between the human ears.

For auditorium work, each microphone should be positioned from either side of the stage at a distance equal to ¼ of the total stage width. During playback, when loudspeakers are substituted for the microphones and identically positioned, it is possible to follow a sound laterally across the stage. This has interesting possibilities when travelling action is recorded and reproduced.

When a third playback record head is substituted for the second erase head it may be used to drive a monitor system for either of the two tracks during such dual channel or second dimension recording.

Corrective Re-Recording

Frequently discrimination or erratic levels extant in either disc or tape recordings may be re-recorded to a new tape with cued corrective equalization to considerable advantage. Substitution of *Erase* heads with *Recording* heads permits:

(*a*) Direct cross-over from one track to another on the same tape; the second track improved by properly cued equalization and level compensation.

(*b*) Monitoring during the process. Pickup through a third head can serve either headphone or loudspeaker monitoring which can be switched between tracks for comparison during the process.

Controlled Compression or Expansion.

The second track causes many unusual and synchronized functions to prove a matter of simplicity. For ex-

ample, the generally complicated problem of synchronization between two recordings simply does not exist. Two records are laid down inseparably locked in sync upon one piece of tape. Their relationship cannot change if they are picked off for playback as they are laid down in recording.

The double track permits that a pilot or control track may be synchronously recorded with an original. These are useful commercially in many ways. One scheme will now be described.

Two channels are used and they are inter-related. Channel #1 records the program or conventional audio signal in the conventional manner. (*See Fig. 10*). Channel #2 amplifies tone from an audio oscillator, say 1000 cps, to a sufficient level that it may be recorded in the second track of the same tape. The volume control or mixer of *channel #1* is mechanically ganged to the volume control of *channel #2*. During the recording of *channel #1* a control operator or engineer *rides gain* as in broadcasting. Manually he helps along the lower passages of music or speech and moderates the crescendos or blatant deliveries. But the important item is that every move he makes is duplicated in the parallel tone record because of the fact that his control knob is ganged to the control of the tone record which becomes then a control or pilot recording.

Now, when the resultant two tracks are played back through the circuit and equipment shown in *Fig. 11*, automatic volume control is introduced into the material reproduced by the loudspeaker. Here the original audio signal or program material is fed through a pre-amplifier to a variable gain expander. The 1000 cps tone track pickup is fed to a preamplifier, an isolation amplifier, and thence to a linear rectifier so that a variable d-c voltage is derived which corresponds to amplitude variations of the original program material. The d-c voltage so obtained controls the gain of the signal expander. But this is only the beginning.

Automatic compression may be introduced into a program originating from an external microphone, line, or other source while the program is being recorded. In addition a 1000 cps pilot or control track, following automatically, may simultaneously be recorded upon the second track of the same tape. All of this is achieved without the aid of any manual control if the scheme of *Fig. 12* is employed with a Twin-Trax tape recorder.

The initial preamplifier feeds a standard compressor and an isolating

amplifier. The latter feeds a balanced rectifier which consequently produces both a positive and a negative voltage output directly proportional to the amplitude of the program material. As the program level increases a higher negative voltage is produced and fed to the compressor. Resultant action therein decreases the output toward the recording amplifier.

While the above action takes place a positive voltage is simultaneously fed to a variable gain decompressor. The action of this latter unit increases the output of the 1000 cps control channel which is synchronously recorded upon the second track of the same tape. The resultant dual recording may be played back through the circuit arrangement of *Fig. 11*. The result should be gratifying.

It can be seen that apart from experimentation, many commercial applications can be worked out around these twin tracks. Overlapping arguments in debates with realistic interruptions; musical accompaniment timed behind descriptive narration; these and many other possibilities present themselves.

Summation

It is only fitting that dealers consider magnetic tape recording machines rather seriously for they already have been accepted commercially in no small manner. The PM-61 model developed by RCA for RKO Pictures has been used on locations remote from regular studio facilities. They are much simpler than previous photographic sound recorders; they eliminate the need for film development laboratories with their attendant time delay; they offer immediate playback on location or elsewhere.

The RCA model is a converted 35 millimeter sound on film recorder. Iron oxide powder is applied along one edge of the conventional 35 mm film stock with the result that playback and editing is immediate and simple. This is but one tangible proof that magnetic tape recording has commercial possibilities and this can serve as a good talking point toward the capture of customers in this new market.

FIELD FINDINGS

[*from page 6*]

tor and crystal calibrated oscillator.

Jensen Mfg. Co. introduced several new co-axial high fidelity speakers in sizes from 5 to 15 inches.

J.F.D. Mfg. Co., Inc. showed several new types of TV and FM anten-

nas, including conical types; also a complete line of TV antenna hardware and mounting accessories.

Kester Solder Co. showed new solder packages of alloys suited for radio-electronic use.

LaPointe Plascomold Corp. showed improved model VEE-D-X antennas; towers, masts and TV antenna accessories.

Masco TV Boosters were shown by *Mark Simpson Mfg. Co.*

McMurdo Silver Co., Inc. showed a new multiplier probe suitable for converting a Vomax to a TV Kilovoltmeter and also a new unit called the "Tenn-Aligner" which permits orienting a TV antenna by one man.

Permoflux Corp. showed several new type replacement speakers.

Premax Prods. showed several new types of TV and "ham" antennas.

Quam-Nichols Co. announced new replacement speakers with the Adjust-a-Cone suspension.

Racon Elec. Co., Inc. introduced several new type high fidelity tweeters and horn mounting brackets, and multiple horn connectors.

Rad-El-Co showed new Hi-Lo TV antennas.

Radiart Corp. showed a new "Tele-Rotor" unit which orients TV antennas giving the set operator visual indication in which direction and at what compass point the antenna is pointed.

Radio Craftsmen, Inc. showed the RC-100 Video Tuner which is claimed to eliminate all external disturbances from marring a TV signal.

The new Volume 18 Rider Manual and new Rider TV Manual were displayed by *John F. Rider Publisher.*

A book, "The Recording and Reproduction of Sound" by Oliver Read, was shown by *Howard W. Sams & Co., Inc.*

Shur-Antenna-Mount, Inc. showed new flip-up antennas and new roof mounting brackets.

Shure Brothers, Inc. introduced several new type microphones and pickup cartridges featuring the "Hercules" controlled reluctance mike, and the "Rex" a crystal hand-held type unit. Also shown were new replaceable long-play needles.

Simpson Elec. Co. featured their new "TV Antenna Compass' which allows a TV antenna installer to orient the antenna at the mast without assistance. New type multimeters in colored plastic cases were also shown.

SNC Mfg. Co. announced new TV replacement transformers.

Sola Elec. Co. introduced their new plug-in type constant voltage transformer which eliminates flicker on the

picture tube caused by line current irregularities or other types of electrical interference.

Spirling Products Co. Inc. showed two new TV table top antennas.

Standard Transformer Corp. showed a new line of TV replacement transformers and a new line of exact duplicate auto radio vibrator transformers. A new output transformer characteristic chart was also shown.

Supreme Inc. showed several new test instruments for TV.

Technical Appliance Co. showed new conical type antennas.

Tricraft Prods. Co. showed new indoor and outdoor TV antennas.

Triplett Elec. Instru. Co. introduced a new Sweep Signal Generator with built-in markers; one with external marker; a new TV-FM Crystal Marker; a new absorption TV-FM Marker and a new 5" TV-FM wide-range oscilloscope.

Walco showed new enlarging lenses with and without built-in filters.

Ward Products Co. showed several new types of indoor and outdoor TV antennas and a new line of antenna accessories.

Weller Mfg. Co. showed an improved model soldering gun.

V-M Corp. offered a new 3-speed record changer unit.

Wincharger Corp. showed new TV antenna supporting towers.

Workshop Associates, Inc. introduced a TV master antenna system for radio dealers; new matching TV antenna transformers and new antennas.

EDITORIAL

[*from page 2*]

rected and a real blow-up would be averted. Shall we requote that old adage: "A Stitch In Time, etc."

Licensing Again Threatened

From Los Angeles comes word that the municipal authorities are considering a License Bill for radio technicians, just as New Yorkers were threatened with recently. Perhaps the California law-makers are taking a leaf out of the Easterner's books. The gyppery and malpractice that existed in Gotham was no greater than in any other industry. Notwithstanding, when the lawmakers gave the servicing profession time and the chance to "clean their own house", they did weed out the few that were giving the servicing profession a black eye. We hope the Los Angeleans will do likewise. The radio servicing profession there can and will correct faulty conditions if but given an opportunity by the lawmakers. It is axiomatic, you can't make a dishonest man become a saint by giving him a license. However, you can correct evil practices and corruption by self-examination and self policing.

AD INDEX

Relax! LET NEW HYTRON TUBE LIFTER DO THE WORK

Give your nerves, sweat glands, and fried fingers a rest! *Lift* 'em all the e-a-s-y way from meanest sockets. Tubes – GT, G, standard, metal, lock-in. Also vibrators and plugs – Jones, Amphenol. And snap-in trimounts holding back covers of radios, etc. Handy knob puller too.

Stainless steel. Comfortable rolled edges. Another Hytron time-and-money saver by and for servicemen. *Only* 15¢ from Hytron jobbers. Get your Hytron Tube Lifter today.

15¢ net

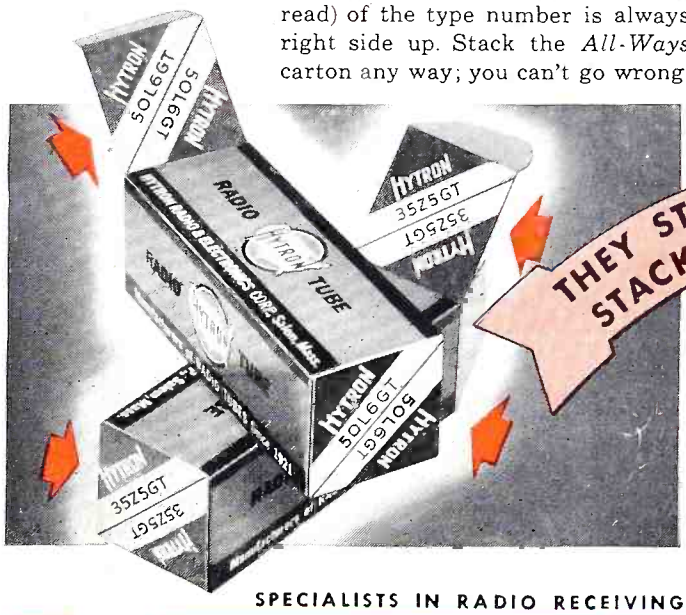
IMPLE AS ABC – Disconnect set from line. Tip tube vibrator or plug) slightly. Insert tapered end of ifter under base with one hand. With other, guide ube vertically. Press Lifter handle backwards or idewise. Effortlessly, out comes tube pronto!

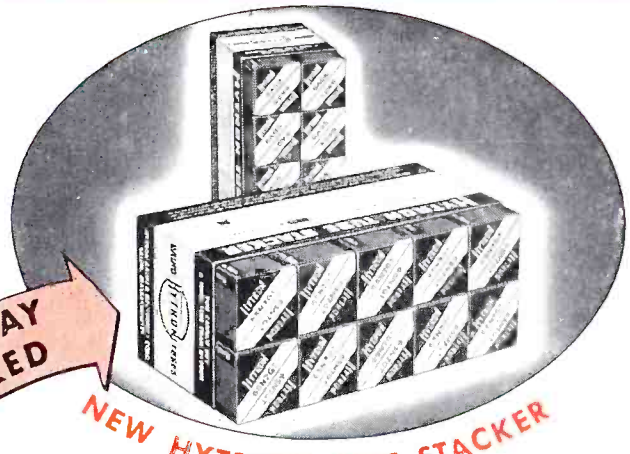
ight-angle end of Lifter for compact auto radios. ulls knobs when hooked around back of knob with thumb and forefinger steadying sides of knob.

Slotted 45-degree-angle end reaches tubes from rear of cabinet. Slot fits around one pin of lock-in applying leverage near center of metal base – safely away from glass seals. This end lifts snap-in trimounts. And stubborn knobs, if cabinet is protected from heel of angle by cardboard.

NEW HYTRON *ALL-WAYS* CARTON

as type number of tube imprinted *twice* on *both* ends. Half the dual imprint (generously large, easily read) of the type number is always right side up. Stack the *All-Ways* carton any way; you can't go wrong.





NEW HYTRON TUBE STACKER

Handy way to buy and stack tubes. Holds 10 cartons neatly – safely – compactly. Inventory where you can see it. Choice of horizontal or vertical stacking. Removal of cartons leaves shelves still neat; yet reminds you to re-order. Two Stackers: For miniatures; for GT, metal, lock-in. *Free* from your Hytron jobber.

SPECIALISTS IN RADIO RECEIVING TUBES SINCE 1921

by SERVICEMEN A HYTRON TOOL for SERVICEMEN

HYTRON

RADIO AND ELECTRONICS CORP.

MAIN OFFICE: SALEM, MASSACHUSETTS

HYTRON RADIO TUBES

RCA has pioneered the development of miniature tubes

One high quality—for TV-FM-AM —at no extra cost

In TV and FM—*where tube quality counts*—RCA tubes more than meet the critical requirements. That's because the *quality level* of RCA tubes has been continually advanced in step with circuit progress. Improved design... more rigid control over manufacture and inspection . . . and more exacting tests, account for these higher quality standards. They apply to *all tubes* of a type . . at no extra cost.

This *single standard* quality benefits all users. This extra quality cuts down costly service call-backs . . . builds customer confidence . . . brings you *more business.*

When you push RCA tubes you're selling the brand that holds top customer acceptance. So—*push RCA tubes and watch your business grow!*

NEW . . .
handy miniature package

Now RCA miniatures come neatly packaged, five of a type, in attractive, expendable cartons. They're easier to handle, easier to stock, and a great aid in keeping track of your inventory. No extra cost . . . but plenty of extra convenience!

ALWAYS KEEP IN TOUCH WITH YOUR RCA TUBE DISTRIBUTOR

RADIO CORPORATION of AMERICA
ELECTRON TUBES **HARRISON, N. J.**