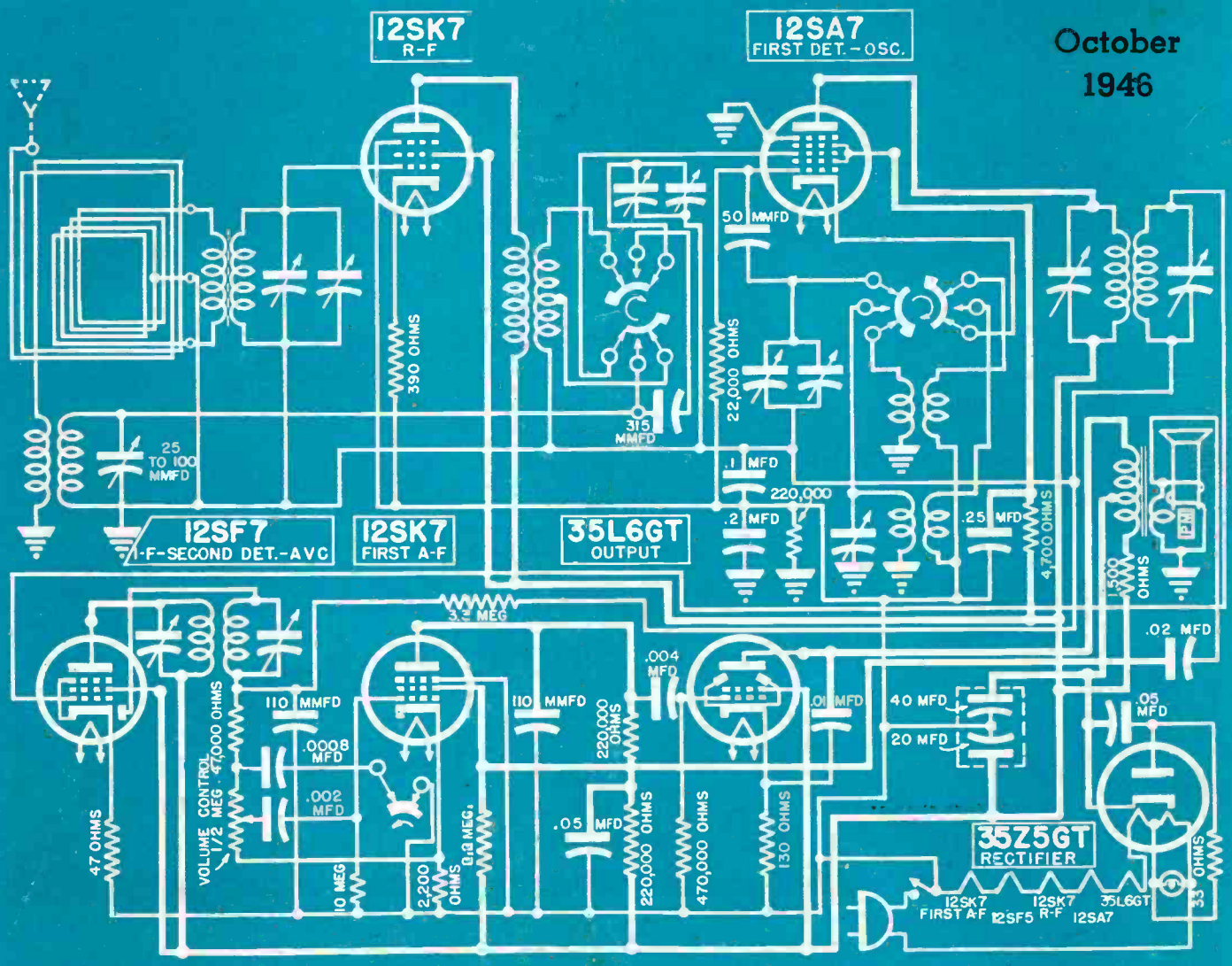
RADIO • TELEVISION • ELECTRONIC

SERVICE

October
1946



Balanced loop type receiver with loop tuned indirectly through close-coupled iron-core transformer.

[See page 26.]

THE TECHNICAL JOURNAL OF THE RADIO TRADE

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EDITORIAL

TELEVISION SERVICING received quite a thorough analysis during the recent TBA Conference in New York. Both manufacturer and Service Man presented their views on this important subject with the discussion centering on factory-trained factory-controlled servicing and factory or privately-trained but independently operating Service Shops.

Speaking for General Electric, W. L. Parkinson disclosed that Service Men of their distributors and franchised dealers will be trained to service and maintain television receivers. The distributors' technical group will be trained first, and then service courses will be held for dealers' Service Men. Discussing costs, Mr. Parkinson said that installation charges will run to about $50 and will include a one-year warranty service. Mr. Parkinson also revealed that General Electric believes that many independent Service organizations are capable of installing and servicing television receivers and, accordingly, they will not close the door to such Service Shops who can prove themselves capable of providing a guaranteed service.

Outlining the DuMont plan, Ernest A. Marx said that DuMont has established a school to train their dealers and Service representatives, and Service Shops. In the DuMont plan, all men are carefully screened for background. If approved, they receive a thorough training in television servicing. Commenting on the equipment required to service, Mr. Marx pointed out that the very best and the most complete test equipment available will be necessary for servicing.

In the RCA plan disclosed by W. L. Jones, it was learned that the RCA Service Company will arrange for the installation of television receivers. Operating in conjunction with the RCA dealers, the Service Men of RCA will not only install the receivers but maintain them for a full year and charge from $45 to $50 for 7" and 10" model installations, respectively.

Discussing television servicing and the Service Man, John F. Rider said that more independent Service Men should be given an opportunity to participate in television servicing. Analyzing the advanced technical knowledge required, Mr. Rider pointed out that many Service Men had studied the art carefully and would continue their studies. These men should have the right to service television receivers, he declared. He said that there is no technique in television receivers which is so complicated that it cannot be assimilated by the better grade of Service Man intelligence. In fact, he said, the goal of the design engineer must be such that the equipment is fool proof and simple to repair.

Mr. Rider stressed that the entire industry would profit greatly if it fostered the technical advancement of independent Service Men.

A complete report on the talks by Rider, Jones and Marx, and others who participated in the TBA television servicing panel will appear in the November issue of SERVICE. Watch for it.

THAT VICIOUS PRACTICE of overcharging appears to be on the loose again. Why some Service Men will insist on price gouging is difficult to understand. They know it's illegal, and can only result in complete loss of face, and yet the price juggle continues.

It's a pity, affects everyone and shames the industry.

Active Service Shops have demonstrated time and again that there's plenty of income available for the honest operator. The shady price packing operator never really profits and is always doomed to business failure.

Overcharging must stop and promptly!

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MODEL AP-11 SPEECH MASTER (Panel mounting). Similar to AP-10 but without base. Mounts in 4-27/64" cut-out; clearance eyelets for mounting screws. Depth 4½" from front panel. Screws and drilling template included. Voice coil impedance 4 ohms or 45 ohms; power rating, 5 watts.

MODEL AP-10 SPEECH MASTER (Desk or Wall type). PM design, desk or wall mounting. Complete with base and tilt adjustment. Double dustproofed. Rubber covered 36" cord. Internal mounting bracket for ½" x ½" transformer. Voice coil impedance 4 ohms or 45 ohms; power rating, 5 watts. Height 6-¾"; depth 5⅛"; diameter 5". Finish hammered gray with satin chrome trim.

MODEL NF-300 SPEECH MASTER (Navy Type). Developed for use as a loud speaker and microphone. Special case design over-rides wind and background noises for talk-back. Enclosed case and protective screen render this model proof against weather, dust and moisture *ALNICO 5* PM design. Power rating, 10 watts; voice coil impedance 12 ohms. Mounts in 5⅜" cut-out; six screw holes in rim. Overall diameter 6-7/16"; depth (from front of panel) 2-9/64". Finished in Munsel N4-5 gray enamel.

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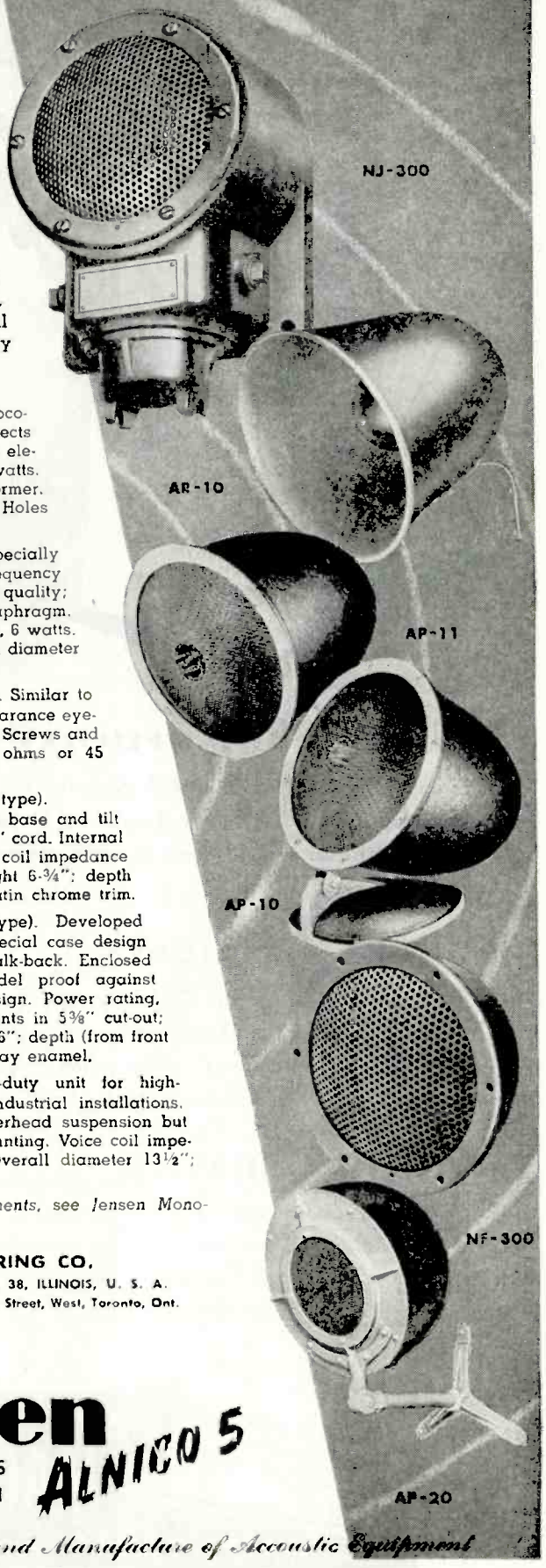

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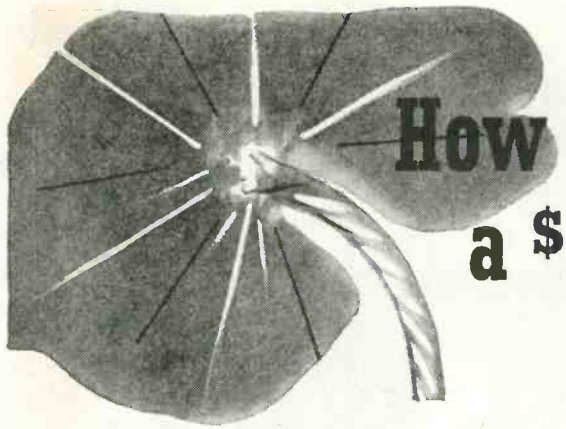

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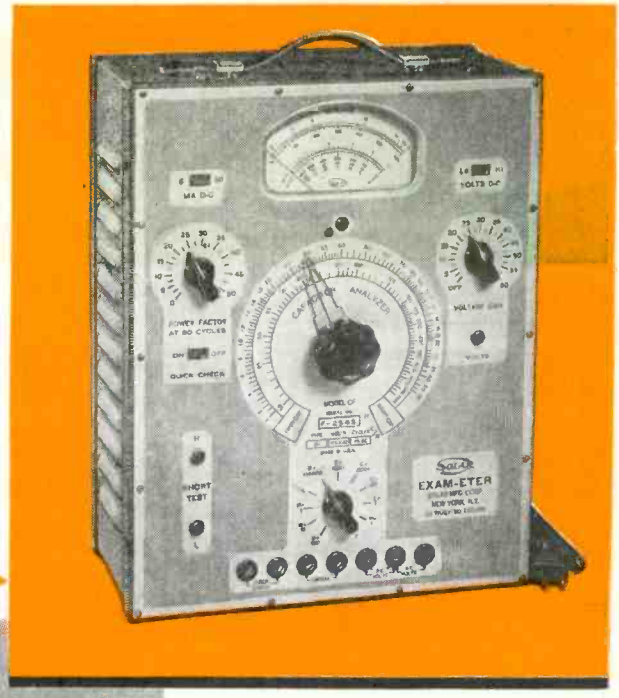

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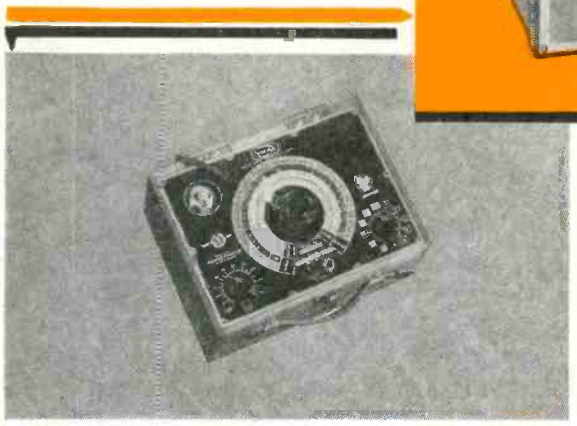

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- ✚ JAN Quality Components for Long Troublefree Service

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- Simplified Neon-Lamp circuit for visual check of insulation resistance and electrolytic leakage
- Resistance Bridge—50 ohm to 2 megohm range

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RADIO SERVICE EDITION

OCT. *Prepared by* SYLVANIA ELECTRIC PRODUCTS INC., Emporium, Pa. 1946

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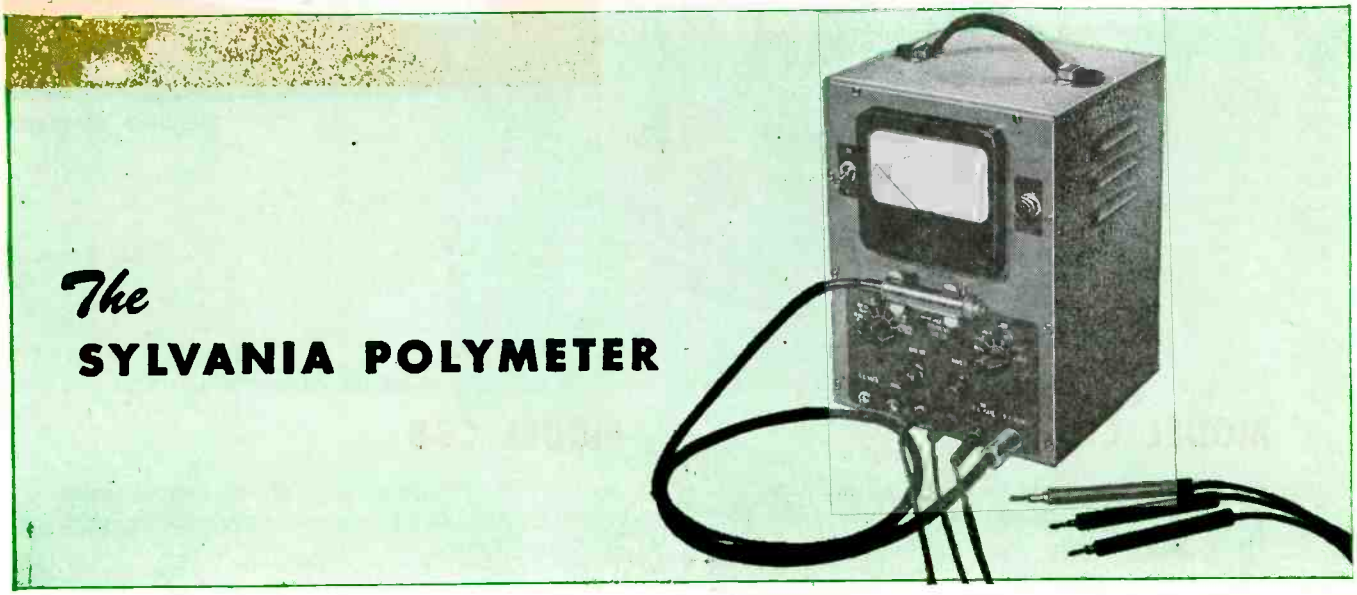
Electrical Measurements Made Easy With New Sylvania Unit!



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Measures D.C. from .1 to 1,000 volts in full scale ranges of 3, 10, 30, 100, 300, 1,000.

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Measures resistance from ½ ohm to 1,000 megohms in full scale ranges of 1,000, 10,000, 100,000 ohms and 1, 10, 1,000 megohms.

ACCURACY

D.C. ranges ±3% of full scale.

A.C. ranges ±5% of full scale up to 30 volts and ±7% above 30 volts.

R.F. ranges ±5% of full scale up to 10 volts; ±7% from 10-100 volts; ±10% on 300 volt range.

Ohms ±6% to the left of ½ scale; ±13% to the left of ¾ scale.

Current ±3% of full scale on all but 10 ampere scale which provides ±5% of full scale.

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SALES HELPS And the SERVICE MAN

by KENNETH C. BURCAW

Sales Manager, Jobber Division
Cornell-Dubilier Electric Corp.

I'VE TRAVELED THE COUNTRY widely on business missions and talked to dozens of neighborhood Service Shop owners, big ones and little ones, including many with freshly painted shingles. And practically everywhere there was excited talk about the shop's future and the potential healthy income in these times of shortages and run-down prewar sets. Some fellows were found to be doing a fine business because of an excellent shop location and, even more important, their sales aggressiveness in the community. Others, sad to say, were struggling along on pay-the-rent-and-taxes incomes, because of a complete disregard for *salesmanship*.

Many Service Men going into business for themselves have failed to realize the importance of selling. It's an old horse-sense axiom that, no matter how expert you are, customers just won't come to you if the fact is unknown. That puts the lie to the favorite mousetrap analogy. In Tibet there's an old ragged man who carves delicate ivory figures, so tiny they look like dandruff in your palm, yet each is a perfectly formed carving in every detail. Ever hear of him? Probably not. Salesmanship could have made him famous and prosperous even in Tibet.

You Must Be a Salesman

If you will think of yourself as a salesman as well as a Service Man, business will grow almost automatically. No one is really born with selling ability. It must be acquired. The same feeling of confidence you have in yourself must be instilled among your prospects. That's the whole essence of salesmanship. Doing that will gain more volume from a side street shop than a lackadaisical Service Shop owner on Main and Center Streets.

But there's a paradox. A busy Service Man does not have the time to keep plugging his services to the community and also maintain a steady output of repair jobs. Even a shop with several assistants requires personal attention and supervision. The problem can be solved with sales promotion helps that will stimulate repair business while you work in the shop. There is no time lost canvassing

(*Continued on page* 46)

Above
Assortment of sales helps available to the Service Man.

PORTABLE

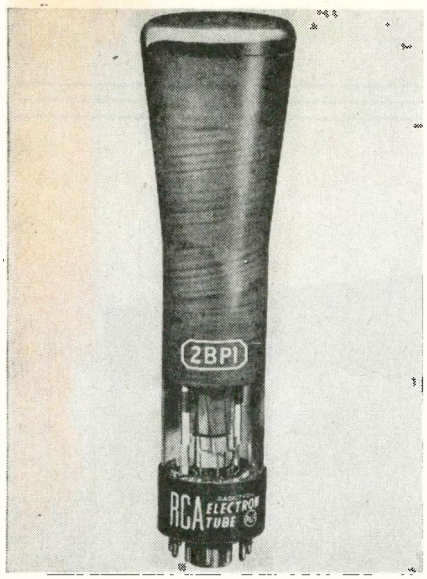


Fig. 1. A 2" cathode-ray tube recently developed for instrument application.

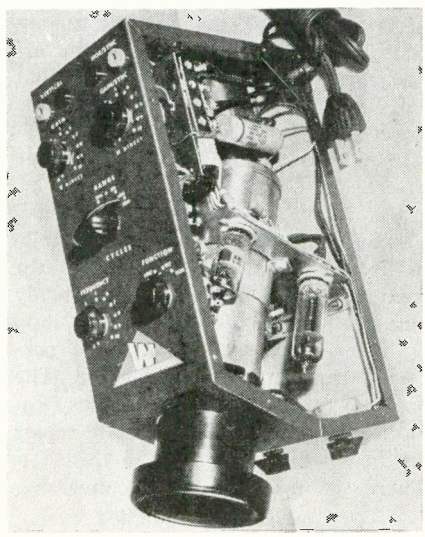
THE RECENT TREND TO MINIATURE test equipment has prompted the development of several unusual components, such as the recently-announced *2"* cathode-ray tubes. With these tubes it has been possible to design unusually small, yet very effective, c-r Service Shop test units.

With one type of c-r tube recently developed, the 2BP1[1], designers have been able to construct a portable tester with a screen image bright enough to photograph with an ordinary camera.

In this tube, an electrostatic deflection focus type, there is an improved electron gun with a grid (No. *2*) operated at high voltage so that beam current will not be affected by changes in the plate (No. *1*) voltage. It also has a plate which takes negligible current. As a result of these features, the spot can be sharply focused on the screen, both at the center and at the edges. Low plate current permits the use of a low-current voltage-divider system and hence the use of a small filter capacitor.

Having a separate base-pin connection for each of the four deflecting electrodes, the tube is intended primarily for use in balanced electrostatic-deflection circuits. However, it is also well suited for use with unbalanced deflection because of design features which minimize spot and pattern distortion characteristic of such operation.

View of oscillograph using 2" 2AP1-A c-r tube. (*Courtesy Waterman*)



Tube Installation Data

The base pins of the c-r tube fit a duodecal 12-pin socket which may be installed so that the tube will operate in any position. The socket alone must not support the tube; other support, such as a yoke or saddle arrangement near the screen end of the tube, must also be used.

It is necessary to enclose the bulb in a grounded shield when operated in the presence of strong magnetic fields. The shield must be made of high-permeability metal having low residual magnetism to minimize the effects of extraneous magnetic fields. When a grounded metal shield is used around the tube, it may be necessary to insulate the high-voltage end of the tube from the shield to avoid leakage currents.

The heater is designed to be operated at 6.3 volts. The mid-tap or one side of the heater winding should preferably be connected to the cathode. If necessary, the heater may be operated with a bias of not more than ± 125 volts with respect to the cathode.

The d-c voltages for the grid and the two plates may be obtained conveniently from a high-voltage vacuum-tube rectifier. Since this tube requires very little current, the rectifier system can be of either the half-wave or the voltage-double type. Likewise, the filter requirements are simple. A 0.1 mfd capacitor will ordinarily provide sufficient filtering. If this is inadequate, a two-section filter is recommended. If the electrode voltages are obtained from a bleeder circuit, a bleeder current of 0.2 milliampere usually is satisfactory. Considerably higher values may require more filtering than that provided by a single capacitor shunted across the d-c supply. In most applications, it is recommended that plate *2* be grounded in order that the deflecting electrodes may be operated at ground potential. With this arrangement, the heater and cathode at high negative potential with respect to ground.

In the use of cathode-ray tubes, it must always be remembered that high voltages may appear at normally low-potential points in the circuit due to capacitor breakdown or to incorrect circuit connections. Therefore, before any part of the circuit is touched, the power supply switch must be turned off and both terminals of any charged capacitors grounded.

Application Notes

Focusing of the fluorescent spot produced by the electron beam is controlled by adjustment of the ratio of plate *2* voltage to plate *1* voltage Ordinarily, the ratio is adjusted by variation of plate *1* voltage. For this purpose, a potentiometer is required in the voltage-divider circuit.

The undeflected focused spot is normally close to the geometric center of the tube face. However, to take care of variation from tube to tube, designers provide for each pair of deflecting electrodes, at least 19 volts for each kilovolt of plate *2* voltage. By adjustment of this d-c compensating voltage on each pair of the deflecting electrodes, the spot may be centered.

Electrostatic Deflection

Two pairs of electrostatic deflecting electrodes, producing fields at right angles, are located within the bulb neck to provide for deflection of the electron beam. The electrostatic field of each pair of deflecting electrodes causes deflection of the electron beam in the direction of the gradient lines of the field and perpendicular to the plane of the deflecting electrodes; therefore, the deflections caused by the two fields are at right angles within a few degrees.

Deflection Voltages

Each pair of deflecting electrodes are normally operated at an average potential the same as that of plate *2*. Each electrode of each pair is connected through a resistor of not more

[1]RCA.

OSCILLOGRAPHS With 2" C-R Tubes

by M. W. BEACAY

than 5 megohms to the plate *2* socket terminal. Under operating conditions involving high current to the screen or scanning beyond the limits of the screen, a small amount of current is collected by the deflecting electrodes. If the circuit resistance between each deflecting electrode and plate *2* is high, the current collected by the deflecting electrodes produces negative potentials on the deflecting electrodes. Such potentials distort or shift the spot on the screen. These effects are minimized by reducing equally the resistances of the deflecting-electrode circuits, by reducing the scanning width, by reducing the beam current, or by applying a small and equal d-c compensating voltage to deflecting electrodes DJ_3 and DJ_4. This voltage should be positive with respect to plate *2*.

Brightness

Line brightness of the 2BP1 is amply high for operation without shield in a well-lighted room at plate *2* voltages as low as 1,000. Line brightness is inversely proportional to the length of the scanned line and in grid-modulated service, is also directly proportional to the per cent of the time that the screen is scannned.

Brightness may be increased by reducing grid *1* voltage or by increasing plate *2* voltage. With reduction in grid *1* voltage, line width increases. Therefore, if narrow line width (good definition) is to be maintained, it is preferable to increase plate *2* voltage. This latter procedure, however, may not be always desirable since it results in reduced deflection sensitivity.

Screen Contrast

Screen contrast is an important factor in apparent screen brightness and in definition. It is the ratio of screen brightness to background brightness. The screen in the 2BP1 reduces background light to a minimum and, therefore, has good contrast. Contrast may be improved if glare is minimized by reducing external illumination on the tube face. When it is impractical to reduce external illumination, designers have minimized the glare by the use of a green filter such as Wratten No. 58.

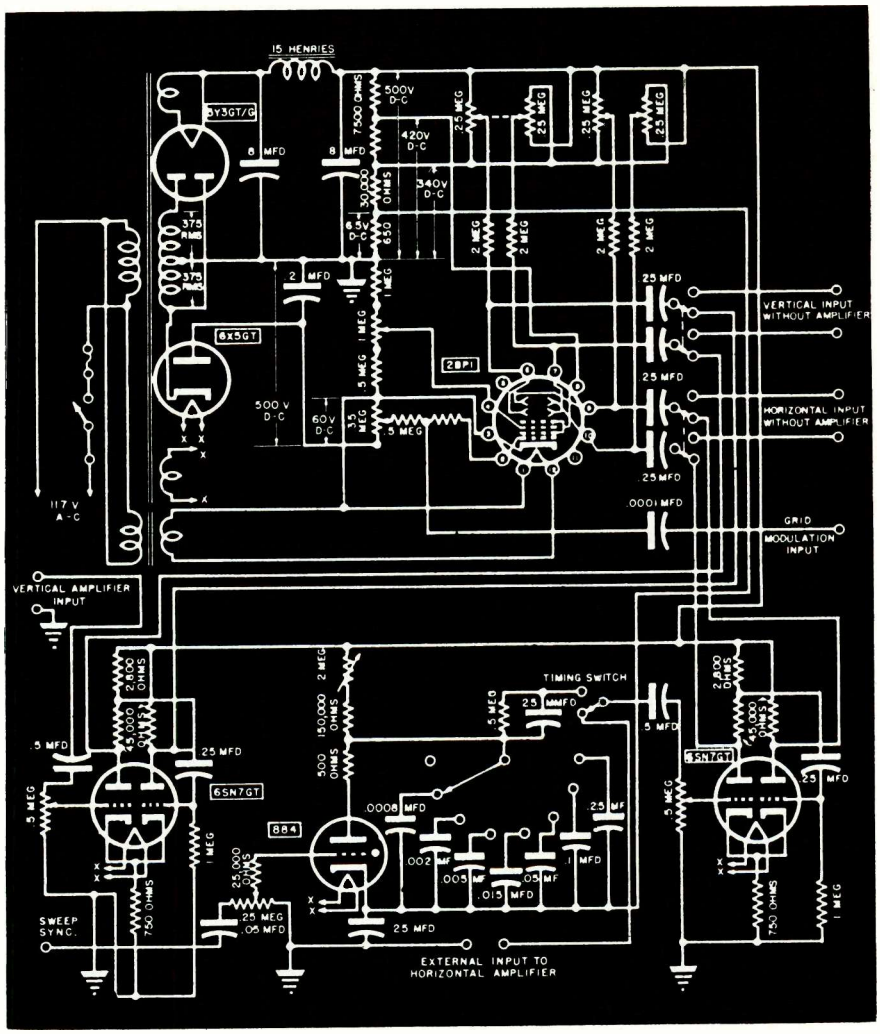


Fig. 2. Circuit featuring the 2" 2BP1 c-r tube. Controls in the upper right hand corner of the circuit are spot-centering controls. The C_4 capacitor referred to in the paper is the .0001-mfd unit connected between the *grid modulation input* and the center point of grid modulation potentiometer.

Photography and the Screen

Photographing should be done preferably in complete darkness to obtain as much contrast as possible between the fluorescent screen pattern and the screen. The time of exposure will depend on the speed of the camera lens, the kind of film or plate emulsion used, and the brightness of the pattern. Where transients are to be photographed, maximum brightness may be required because of the short duration of the phenomena; where recurrent waveforms are to be photographed, patterns having low brightness can be compensated for by longer exposure. The use of emulsions having high green sensitivity is recommended; orthochromatic types of film and high-speed films have been found to give excellent results.

High-Speed Photography

For high-speed photographic work involving non-recurrent phenomena, it

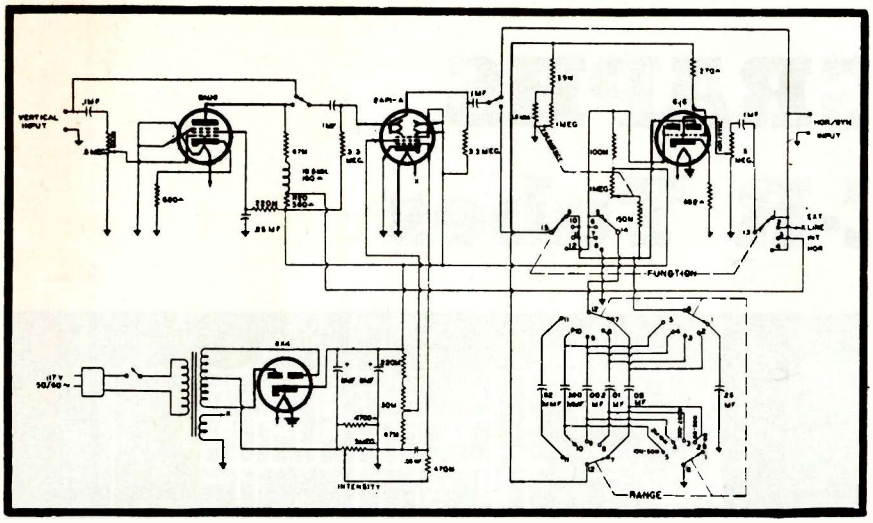


Fig. 4. Schematic diagram of the portable c-r test unit using the 2AP1-A type 2" tube.

is permissible to increase the trace brightness, for the short interval required to make the exposure, above that required for visual observation. The extent to which the beam current may be increased without harming the screen is proportional to the velocity of beam travel and pattern size, and inversely proportional to the duration of the phenomenon.

2BP1 Circuit

A circuit using the 2BP1 is shown in Fig. 2. This circuit includes desirable features for a laboratory instrument, such as balanced deflection, balanced spot centering, and provision for intensity (grid) modulation. Balanced deflection is recommended to minimize spot and pattern distortion. Spot centering is obtained by adjustment of ganged pairs of potentiometers.

Circuit Leakage

In this circuit, one side of the heater is connected directly to the cathode to prevent transformer or circuit leakage from developing any voltage between heater and cathode. A bypass capacitor of about 4 mfd may be used between the arm of the grid-bias potentiometer and cathode in case hum is present in the grid circuit.

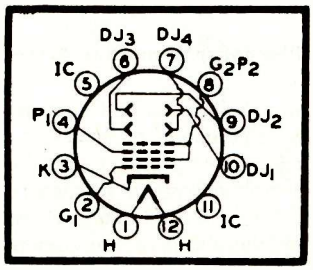
Intensity Modulation

Intensity modulation is accomplished by introduction of the signal through capacitor C_4 to grid *1*. This capacitor has a small capacitance since the modulating signal is usually a pulse having a steep wave front. Large values of capacitance for this capacitor may require better filtering of the high voltage supply for the cathode-ray tube since the grid signal is referred to ground. The capacitor must have low leakage and must be able to withstand the plate *2* voltage.

Voltage Supply

The voltage supply for the amplifiers and the sweep (timing) oscillator has been combined with that for the cathode-ray tube. This arrangement provides additional current for the centering potentiometers and makes possible a lower high-voltage, low-current supply for the 2BP1 than would be possible with separate power supplies.

Fig. 3. Bottom view of the socket connections for 2BP1. Pin *1*, heater; pin *2*, grid 1; pin *3*, cathode; pin *4*, plate 1; pin *5*, internal connections; pin *6*, deflecting electrode, DJ_3; pin *7*, deflecting electrode, DJ_4; pin *8*, plate 2 and grid 2; pin *9*, deflecting electrode, DJ_2; pin *10*, deflecting electrode, DJ_1; pin *11*, internal connections; and pin *12*, heater.



4-Tube C-R Portable

Another 2"-type c-r tube, the 2AP1, was recently incorporated in a 4-tube portable test instrument[2] using a 6AU6 miniature-type pentode for the vertical amplifier, 6J6 miniature twin-triode, and 6 × 4 twin-diode rectifier. The 6J6 serves a dual purpose. One section is used as a horizontal amplifier, with a stage gain of 24, for a horizontal deflection sensitivity of 1 volt rms per inch. The second section is used in a multivibrator circuit as a time base oscillator, permitting linear tracing from 10 to 50,000 cps.

Bypass Switches

By pass switches on amplifier gain controls permit direct connection to both vertical and horizontal deflection plates of the c-r tube. A function switch is provided for the use of external and internal or line synchronization. Line synchronizing voltage is provided by a 6-volt filament winding. External synchronization permits the use of an audio oscillator for the creation of lissajou figures. These figures may be used to determine the frequency of an unknown audio or radio frequency. Quite often, by knowing the frequency of a spurious oscillation in a receiver, its removal is aided.

Other Controls

Other controls included are intensity, focus, and variable synchronous frequency.

The amplifiers are said to be substantially flat from 20 to 100,000 cps, with a gradual 2 db loss between low and high frequencies.

The imput resistance for both vertical and horizontal amplifiers is 500,000 ohms, at a shunt capacitance of 36 mmfd.

Credits

The author is grateful to the commercial engineering department of the RCA Victor division of RCA and the the Waterman Products Co., Inc., for the engineering data supplied on the 2BP1 tube and S-10-A instrument, respectively.

[2]Waterman Products Company, type S-10-A.

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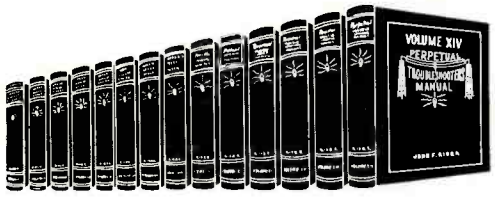

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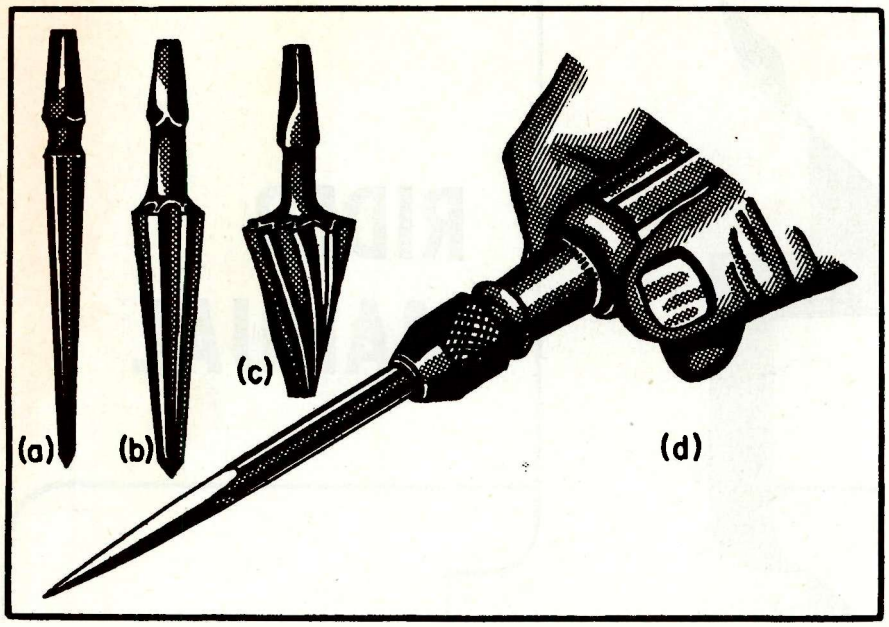


Fig. 1. Three useful sizes of tapered reamers; (*a*), (*b*), (*c*). A hand reamer (*Stevens Walden, Inc.*) is shown at (*d*).

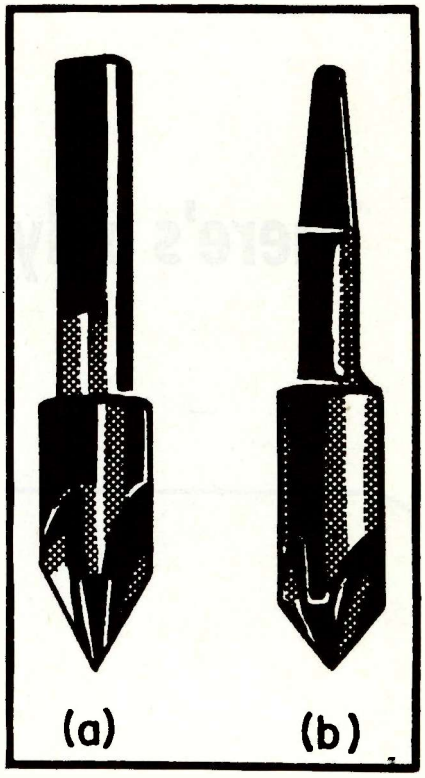


Fig. 2 (right). A round shank and a square bit shank countersink for holes that are to take flat or oval head screws.

TOOLS And ACCESSORIES For the NEW SERVICE SHOP

[*Part VI . . . Supplementary and Special-Purpose Tools*]

by ALFRED A. GHIRARDI
Advisory Editor

CONTINUING OUR DISCUSSION of the supplementary and special-purpose tools, we come to some of the smaller, but nevertheless useful, hand tools.

Reamers

For the Service Man who does not wish to make too large an investment for an assortment of large size twist drills and an electric drill or breast drill of sufficient size to accommodate them, there is an alternative that will enable him to drill large size holes whenever necessary—but it entails more work on his part. A few tapered reamers having a square bit stock shank that fits into an ordinary carpenter's brace will serve the purpose. It is only necessary to use a few large twist drills such as a ¼" and a ⅜" or ⅛" drill and use the tapered reamers to enlarge their holes to any desired size.

Three sizes of tapered reamers are useful; Fig. 1. In (*a*) appears one type with a slight taper, ranging in diameter from ⅛" at the point to a maximum of ½". The reamer at (*b*) will enlarge holes from ⅜" up to ⅞". The reamer at (*c*) will enlarge holes 5/16" up to 1½". As the latter has a rather sharp taper it is useful only on comparatively thin stock such as panels, chassis, etc

A very useful hand reamer, the *Reamawl*[1] is illustrated at (*d*). This is useful for quickly enlarging small holes by hand.

Countersinks

When drilling a hole for a flat-head or oval-head screw, it is necessary to countersink the hole to a taper of 82 degrees to fit the head, so that its top surface will be flushed with the work. Countersinks for this purpose are illustrated in Fig. 2. The model at (*a*) has a round shank so it can be used in the ordinary hand drill or electric drill. The one at (*b*) has a square bit shank for use in a carpenter's brace. Each can be used for countersinking either metal, wood, bakelite, etc. One of small size and having a round shank will be suitable.

Countersinks are also useful for removing burrs that are caused by drilling or punching. This must be done carefully, otherwise the hole will be countersunk.

[1]Produced by manufacturers of Spintite socket wrenches.

Large Hole Cutters

It is frequently necessary to cut round holes for replacement tube sockets, plugs, connectors and other receptables in either an old or a new metal chassis. If there is sufficient space in which to work, these holes may be cut by one of the fly-cutters that will be described later, but a more accurate and rapid job can be done (and in cramped quarters if necessary) with one of the hand-type chassis punches designed especially for the purpose. Fig. 3 illustrates the two forms in which these are made.

The punch at (*a*) is operated by hammering the top, *punch*, portion into the lower, *die*, portion (with the chassis in between the two) while the die is resting on an anvil or other solid base. A small guide hole must be

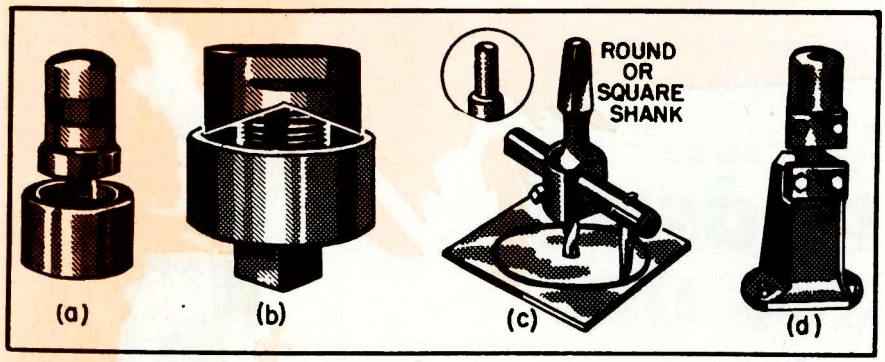


Fig. 3. At (*a*) and (*b*) are two types of chassis pinches (*General Hardware and Greenlee Tool, respectively*) for cutting socket holes, etc. In (*c*) we have an adjustable fly-cutter for cutting larger round holes. (*Courtesy Greenlee Tool Co.*) In (*d*) appears a shearing pinch for cutting holes of any shape. (*Courtesy Insuline Corp. of America.*)

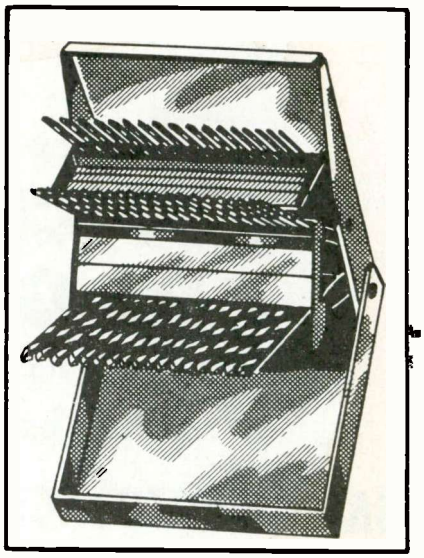


Fig. 5 (right). An automatic self-positioning drill case to keep all the twist drills conveniently in one place. (*Courtesy General Hardware Mfg. Co.*)

drilled in the chassis first to take the centering pin of the punch.

The screw-type punch works easily and more accurately and may be used more conveniently on assembled chassis. No hammering is necessary. A popular type is illustrated at (*b*).[2] The cap screw shown is inserted in a small centering hole previously drilled in the chassis and the shear punch is easily forced into the die by a few turns of the cap screw with an ordinary wrench. Smooth holes, requiring no filing or reaming, can be cut in metal up to ⅛" thick in 1½ minutes or less. Ten punches are available for cutting ¾", ⅞", 1", 1⅛", 1-5/32", 1-3/16", 1¼", 1⅜", 1½" and 2¼" holes.

For cutting round holes of larger diameter, such as would be needed for mounting a flush-mounting meter for example, and for cutting metal, bakelite or fibre, wood, etc., adjustable fly-cutters are very popular. These are made in several types and sizes, the one illustrated at (*c*) of Fig. 3 being typical. The cutter is equipped with its own twist drill for drilling the pilot hole. The high speed steel cutter carried on the adjustable arm does the cutting. These cutters are made with three styles of twist drill shank: 5/16" round shank, ½" round shank, and square shank, for use in either a breast drill, bench drill or hand brace. Several sizes are made; one adjustable to cut holes from ⅞" to 4" diameter will be about right for most radio uses.

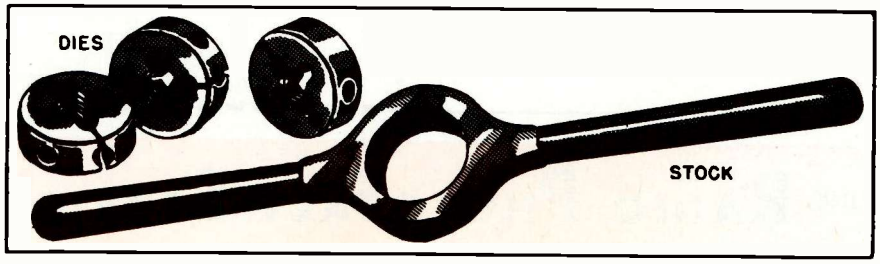
Round holes are not the only kind required. It is often necessary to cut small rectangular holes in chassis for replacement transformers, chokes, etc. These may be cut out by first drilling a hole at each corner and then using a keyhole hacksaw for sawing along the straight sides of the cutout. Or they may be cut out with a cape chisel. In shops where enough of this work is done to make the purchase advisable, the square hole shearing punch illustrated at (*d*) will be found very useful for doing such work more quickly and accurately. It permits the cutting of any size odd-shape hole (square, rectangular, hexagon, oblong, etc.) on any size panel or chassis.

Die Stock and Dies

Although they are not absolutely necessary, a few dies for the more commonly used machine screw sizes, and a die stock (die holder) to fit them, will form excellent additions, when finances allow. A set of 4-36, 6-32, 8-32 and 10-32 dies is recommended; Fig. 4 shows a die held in a die stock. They will be useful for cleaning up burred or otherwise damaged threads on machine screws of those sizes, and for other purposes.

[2]Greenlee Tool Co.

Fig. 4. A small stock and several removable dies of different sizes that fit into it. These are useful for threading rods or cleaning up damaged threads or screws.



The procedure for using dies correctly is similar to that for tapping. The work should be held firmly in a vise, and any burr on the end of the piece to be threaded should first be removed with a file. To start the thread, the *large* side of the opening in the die should be placed over the work and pressed down on the stock firmly, while turning it clockwise.

Twist Drill Case

For the Service Man who wants to keep a rather complete assortment of twist drills on hand and likes to have them all in one handy place ready for instant selection, a drill case of the type illustrated in Fig. 5 will solve the problem perfectly. A clearly indexed hole of proper size is provided for each drill. The case closes into the form of a compact box that protects the drills and can also be used for taking them on outside jobs. As soon as the cover is lifted, the drills automatically come up into position, the size of each drill being clearly shown by the index, as illustrated.

These drill cases are made in the following sizes: (*a*) for a set of *number-size* drills from No. 1 to No. 60; (*b*) for a set of *fractional-size* drills from 1/16" to ½"; and (*c*) for a set of *letter-size* drills from *A* to *Z*. The cases may be purchased from your hardware dealer. They are available either empty, with the complete set of drills, or with any particular drills you may select. No more fumbling in tool-filled drawers or tool boxes for the drill you want to use when you own one of these drill boxes.

Amphenol AND RADIO AMATEURS HAVE ALWAYS WORKED TOGETHER

Radio amateurs are the most versatile technical experimenters known—and so are Amphenol engineers. Amateurs have pioneered the greatest share of electronic developments since the dawn of radio—and Amphenol has pioneered in the development of components used by hams.

Amateurs have an appreciation of the electrical engineering problems in the production of components to give the best performance. They agree that Twin-Lead, pioneered by Amphenol, is one of the most important and useful new products in the field of electronics.

ACTUAL SIZE CROSS SECTION

75 OHM TRANSMITTING TWIN-LEAD

Amateurs asked for it — now here it is! It's the new *heavy duty* 75 ohm Amphenol Twin-Lead transmission line. Conservatively rated at 1000 watts for 30 mc or lower frequency. Available — now — at your distributor's.

	Megacycles	75 ohm DB per 100 ft.
Attenuation	3.5	0.29
	7.0	0.49
	14.0	0.82
	28.0	1.40

Receiving Twin-Lead is available in 75 ohm, 150 ohm and 300 ohm impedances. Get a copy of Amphenol's new Twin-Lead bulletin from your dealer.

Other Amphenol products of interest to amateurs available at your dealer's:

Radio Tube Sockets. Industrial, standard, miniature and sub-miniature—plugs and accessories. Octal angle sockets for cathode ray applications.

Connectors. All types, with fittings — from 1 to 50 contacts.

Cables. Coax and Twinax (also connectors). Microphone cables (also connectors).

Plastics for Electronics. Plastic sheets, rods and tubes. Flexible tubing and spaghetti. Coil Dope. Molded coil forms, stand-off insulators, knobs and dial pieces.

Antennas. UHF dipoles and arrays.

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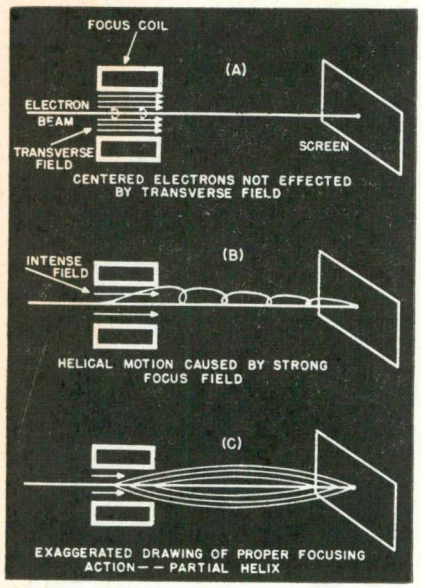


Fig. 2. Analysis of magnetic focusing.

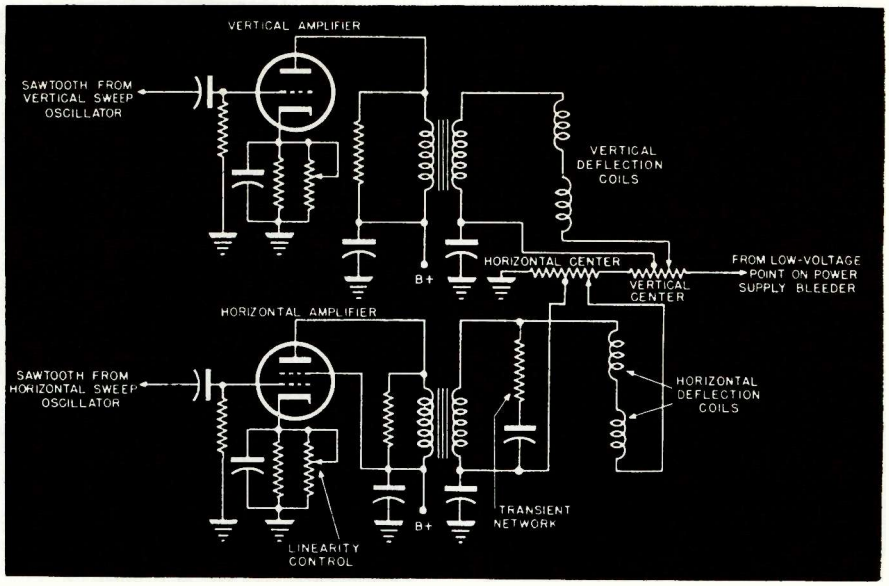


Fig. 1. Television receiver deflection amplifier.

ELECTROMAGNETIC DEFLECTION SYSTEMS In Television Receivers

by EDWARD M. NOLL

[Part II]

SO THAT WE MAY trace the horizontal and vertical deflection paths in a typical television receiver, the circuit shown in Fig. 1 is offered.

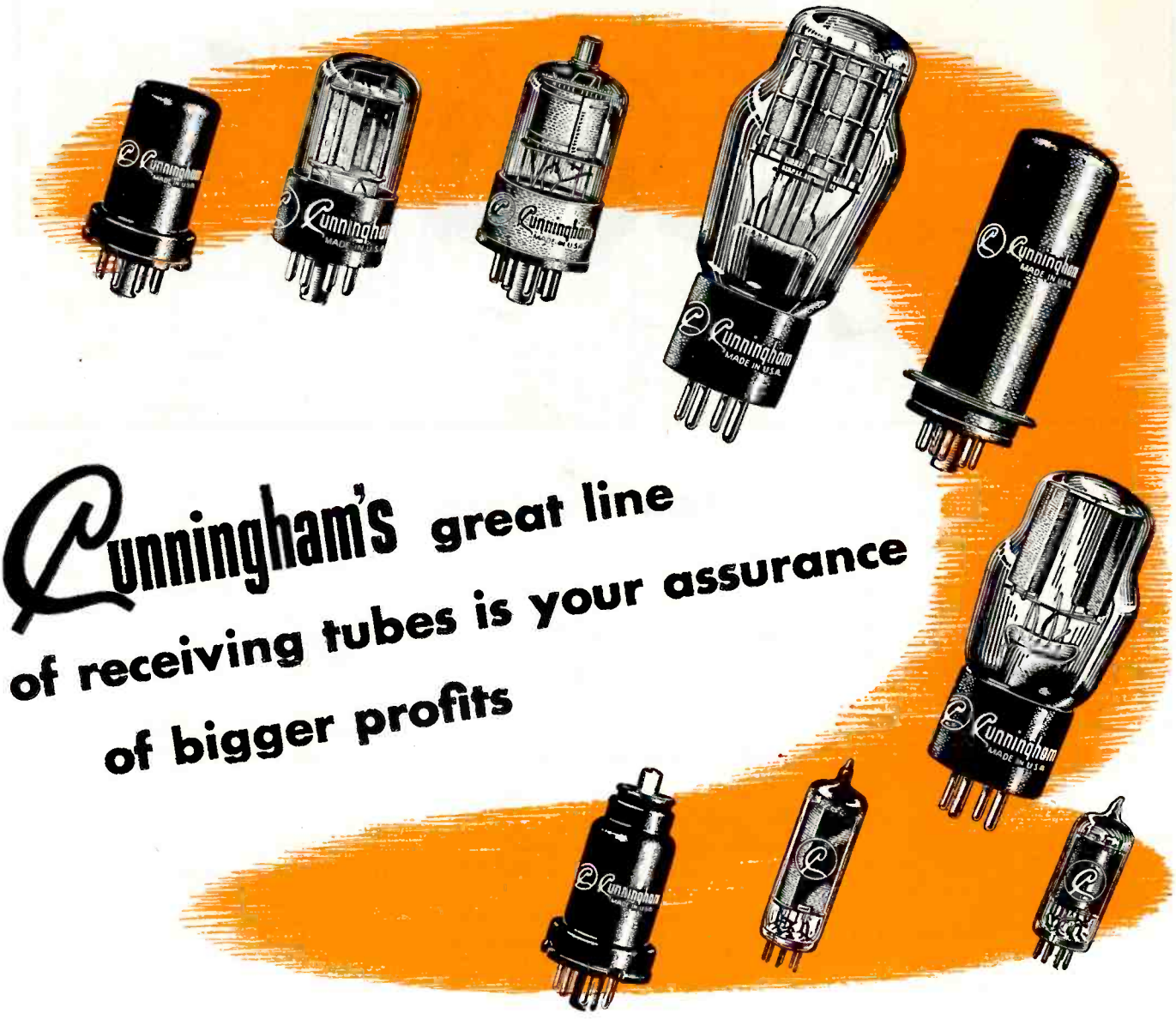
In the electromagnetic deflection amplifier the output is transformer-coupled to the deflection coils. Inasmuch as an appreciable current must flow through the coils, the amplifier is considered to be a power amplifier similar to the audio power amplifier which drives a speaker. A small variable d-c current is used for proper centering. This current is obtained by tapping across two small resistors which are inserted across the low-potential end of the low-voltage power supply.

In the cathode circuits of these amplifiers are special linearity networks which correct the small curvature still present on the sawtooth waveform. The waveform is made more linear by biasing the deflection amplifier to a non-linear portion of its characteristic. This bias must be precisely set at the proper point on the transfer characteristic to compensate for the non-linearity of the sweep waveform applied to the grid. The opposite curvature of the characteristic produces a linear change in plate current as the sawtooth voltage rises and, therefore, a linear sweep.

Still another defect arising particularly in the horizontal sweep amplifier, which causes distortion of the waveform, are high-voltage transients. Since the horizontal sweep consists of its high fundamental frequency plus frequency components up to at least the tenth harmonic, the reactance of transformer windings and deflection coil is very high. Consequently, high-transient voltages are developed across the reactances, particularly at the start of the horizontal retrace when the change in current is very fast. These voltages often shock-excite the windings into a series of damped oscillations which modulate the sweep. To prevent high voltage transients, the secondary of the horizontal output transformer and horizontal deflections coils are shunted by a low-value resistor combination which load the industors heavily at high frequencies. Thus the fast retrace currents are shunted off through the resistors and do not develop transients across the high inductive reactances.

The horizontal deflection transformers and circuits must have a frequency response reasonably linear up to 150,000 cycles. Transformers must be carefully constructed to have such a high frequency response with a minimum of self-resonant tendencies. The vertical deflection amplifier is of much lower frequency and not so critical of design. The vertical sawtooth is also of greater amplitude as applied to the grid of the vertical amplifier and, consequently, a low-impedance triode has sufficient gain to develop the required current variation through the vertical deflection coils. An added advantage

(Continued on page 45)



Cunningham's great line of receiving tubes is your assurance of bigger profits

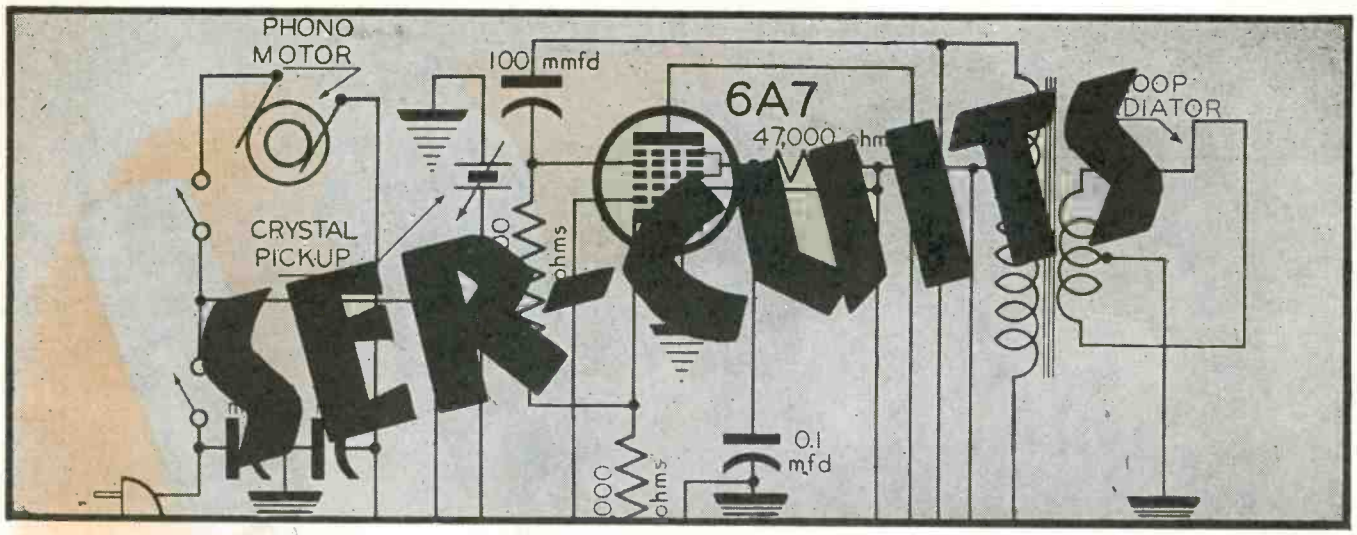
CUNNINGHAM'S line of metal, glass, and miniature receiving tubes meets practically every service requirement. With Cunningham tubes you won't need to carry additional lines to round out your stock—and you'll seldom have to turn away a customer.

And you can be sure that Cunningham has or will have the right type tubes for the new AM, FM, and television receivers that are on the way—because Cunningham is backed by the engineering leadership of the Radio Corporation of America.

Remember, too, that Cunningham Electron Tubes are *built for service.* They've been famous for over 30 years for their *consistently* high quality, long life, and top performance. That's why customers look for the big "C" in your store window when they need new tubes.

LISTEN TO "THE RCA SHOW," SUNDAYS, 2:00 P. M., EST, NBC NETWORK

A QUALITY PRODUCT FOR RADIO SERVICEMEN AND DEALERS BY THE RADIO CORPORATION OF AMERICA



IN RESPONSE TO MANY REQUESTS, we offer additional data on portable and farm-type receivers this month.

by HENRY HOWARD

Admiral 4A1

An interesting permeability-tuned type portable Admiral 4A1, is shown in Fig. 1. An external antenna is capacity coupled to the input circuit in a manner similar to Belmont 4B17, but the values differ considerably, a .005-mfd capacitor appearing across a 250-mmfd capacitor giving much tighter coupling. The antenna shunting resistor is 15,000 ohms and the avc filter resistor, 470,000 ohms.

An ultraudion oscillator circuit is used with the oscillator grid at one end of the single coil and the plate grid at the other. A trimmer is connected from the grid end to ground; 250 mmfd from the plate end to ground. An r-f choke in the *B* supply completely isolates the 1A7 from the remainder of the set. Bias for the i-f amplifier is obtained from a 4.7-megohm grid leak. Only the 1A7 receives avc bias. An economizer switch located on the top of the chassis inserts a wirewound .75-ohm resistor in series with the positive leg of the *A* battery. It is labeled *New Battery* in the open position (resistor in the circuit) and *Old Battery* in the closed position.

Zenith 4K016-4K035

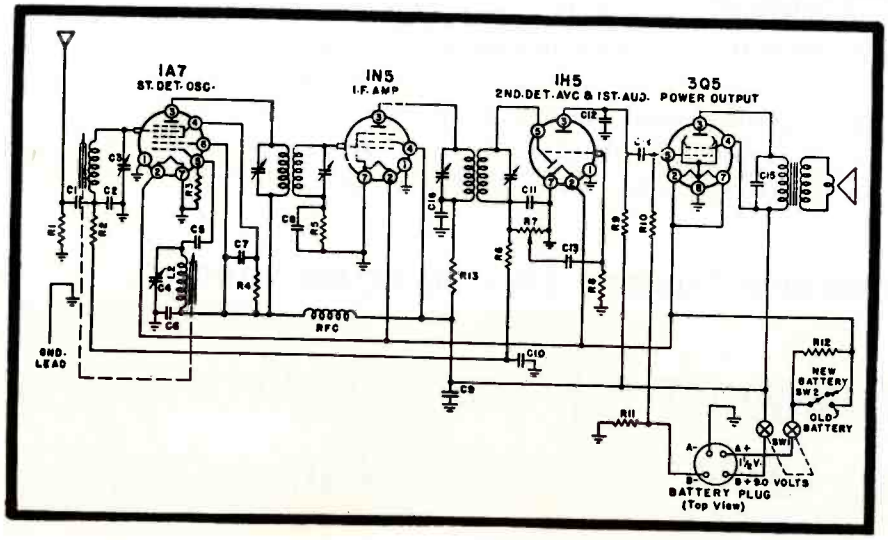
Fig 2 shows another 4-tube battery set with external antenna, Zenith models 4K016-4K035, chasses 4C52-4C53. Equal avc bias is supplied to a 1A7 converter and 1N5 i-f amplifier. The power amplifier is a 1C5 instead of the usual 3Q5. The *C* bias resistor is 820 ohms.

Crosley 56FA

A 5-tube, 2-band farm-type receiver, Crosley models 56FA, 56FB, is shown in Fig. 3. A 1N5 t-r-f amplifier is used on the broadcast band only. The waveband switch connects the signal grid of a 1A7 to the interstage transformer for broadcast or to the secondary of the short-wave antenna transformer and oscillator grid from broadcast to the short-wave oscillator coil. Switch also connects a 480-mmfd padder in series with the oscillator tuning capacitor; shorts secondary of the broadcast antenna transformer for short waves and bypasses the broadcast feedback coil for short waves. The 1N5 i-f works into an iron core output i-f transformer. In a 1H5 detector-avc-audio circuit we have an unusual avc and detector load arrangement. The load consists of 150,000 ohms in series with a 1-megohm volume control, in series with 3300 ohms. The latter prevents turning the volume completely off with the set turned on, thus saving many a battery.

The avc system operates through a

Fig. 1. Portable, Admiral 4A1, using an ultraaudion oscillator circuit. List of parts at right.



CONDENSERS

Symbol	Description
C15	.002 mfd. 600 Volt
C1, C7	.005 mfd. 600 Volt
C10	.01 mfd. 400 Volt
C5	.05 mfd. 200 Volt
C11. C12	.0001 mfd.
C2, C6	.00025 mfd.
C8	.0008 mfd.
C9	4. mfd. 150 Volt
C3, C4	Dual trimmer
C13, C16	.01 mfd. 400 Volt

RESISTORS

R12	.75 ohm ¼ w (wire)
R11	390. ohm ¼ w
R13	2200 ohm ¼ w
R1	15,000 ohm ½ w
R4	33,000 ohm ½ w
R3	220,000 ohm ½ w
R2	470,000 ohm ¼ w
R9, R10	1,000.000 ohm ¼ w
R6	2,200,000 ohm ¼ w
R5, R8	4,700,000 ohm ¼ w

10-megohm resistor to the i-f and r-f stages and through another 100,000 ohms to the converter on the broadcast band only. On short waves, the converter is biased solely by a 3.3-megohm leak bypassed by 600-mmfd capacitor. The avc bus is shunted to ground through a 4.7-megohm leak. Bias for the 1LB4 power amplifier is obtained from a 1000-ohm resistor in the *B*— lead. The *B* supply is bypassed by a 15-mfd capacitor, and an additional isolation filter of 4700 ohms and 15 mfd serves the 1A7 plate and oscillator circuits and the 1N5 and 1A7 screens.

Zenith 6G001

Another 3-gang 5-tube battery model, Zenith 6G001, using lock-in tubes, is shown in Fig. 4. A 1LN5 r-f amplifier has a 2.2-megohm resistor for bias and 22,000 ohms in series with the primary of the interstage transformer. A 1LA6 converter is tapped down on the secondary of this transformer, giving higher *Q* and sharper tuning. A tickler feedback oscillator uses a grid capacity winding with 220 ohms in series.

DeWald A500 Series

DeWald 4-tube and rectifier models, A500 to A503, are shown in Fig. 5. Many interesting fundamental circuit requirements have been met in these models. An antenna-resistor and capacitor has been included to eliminate resonance in the antenna. Thus i-f or image interference is minimized. The capacitor also prevents connection of the antenna to the line plug. In the i-f stages one bypass is placed across the detector load resistor which is also the volume control. A-f blocking capacitors and suitable grid leak bias are used for the 12SQ7. A 150-ohm cathode bias is in the 50L6 circuit.

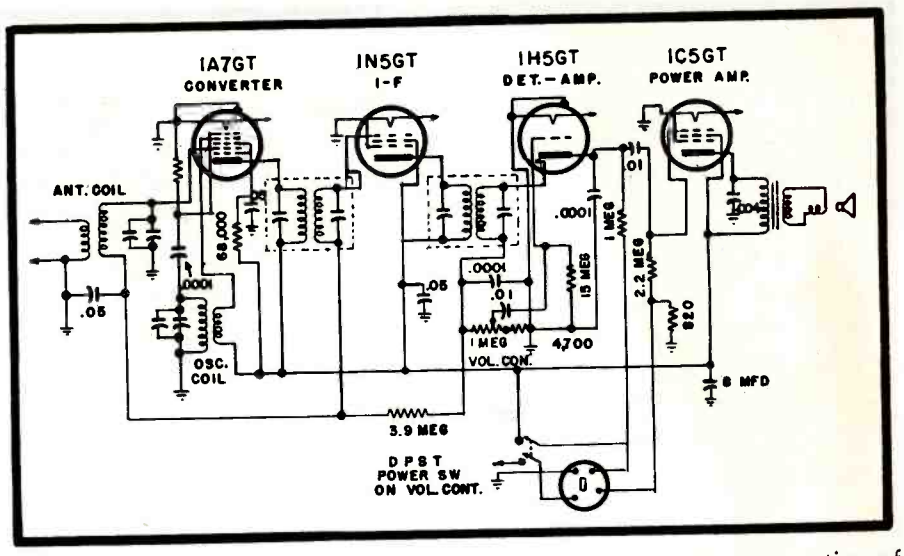
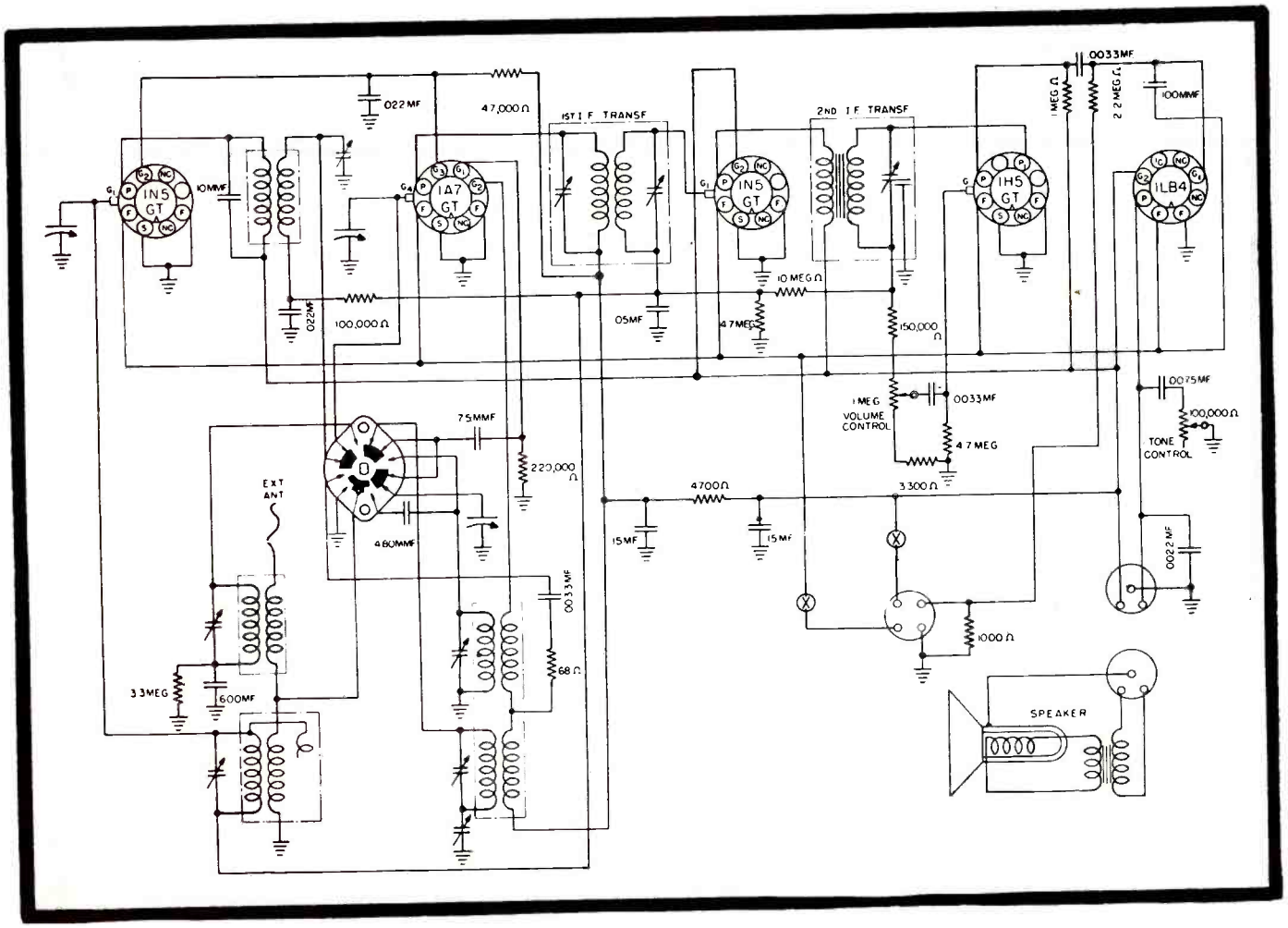


Fig. 2. A 4-tube battery set using an external antenna, Zenith models 4K016-4K035.

Fig. 3. A 5-tube, 2-band farm-type receiver, Crosley 56FA and 56FB.

Other Circuit Features

The filament string has a 35Z5 pilot lamp and an 18-ohm surge resistor. A dual 30-mfd and 2,700 ohms for filter



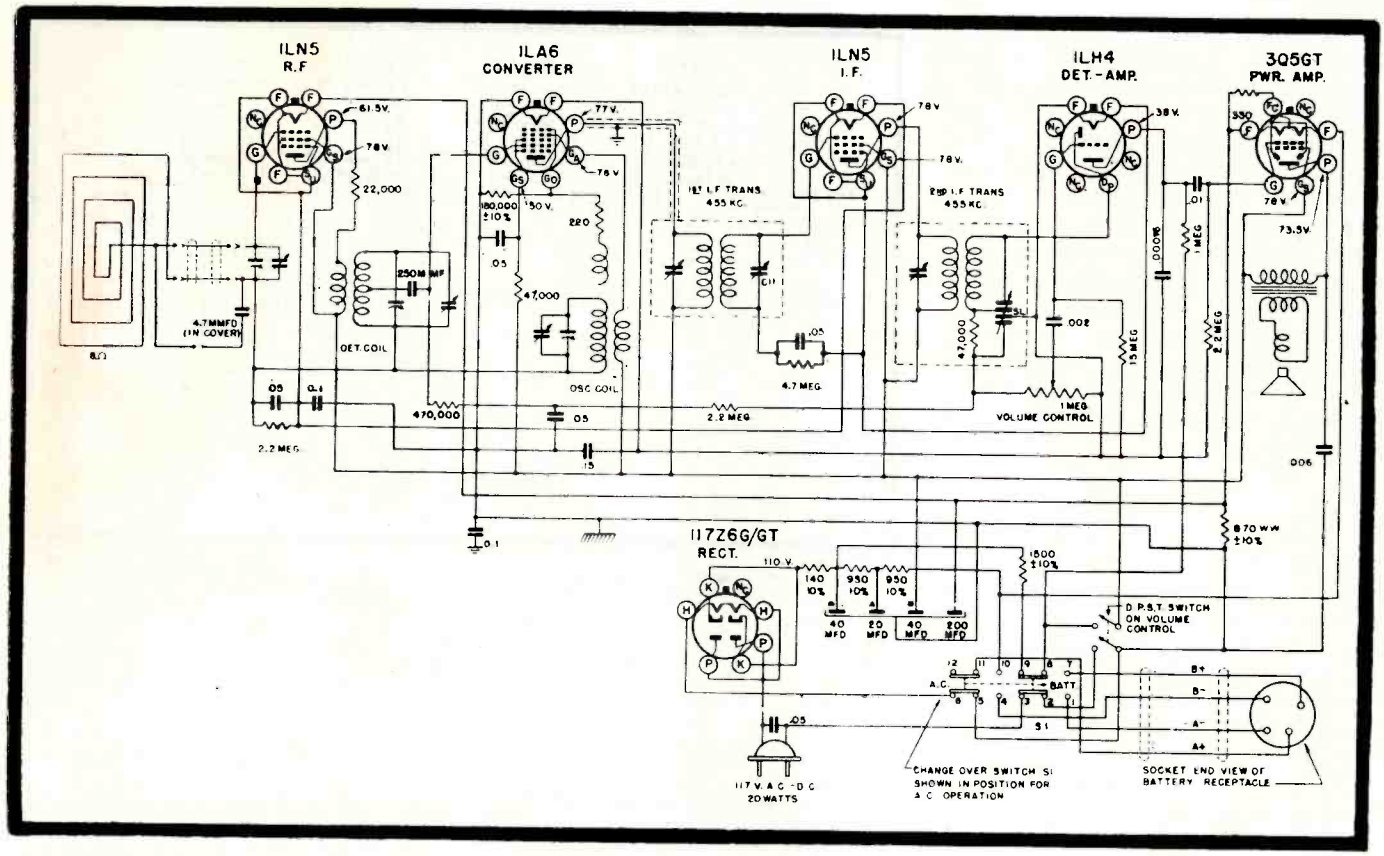
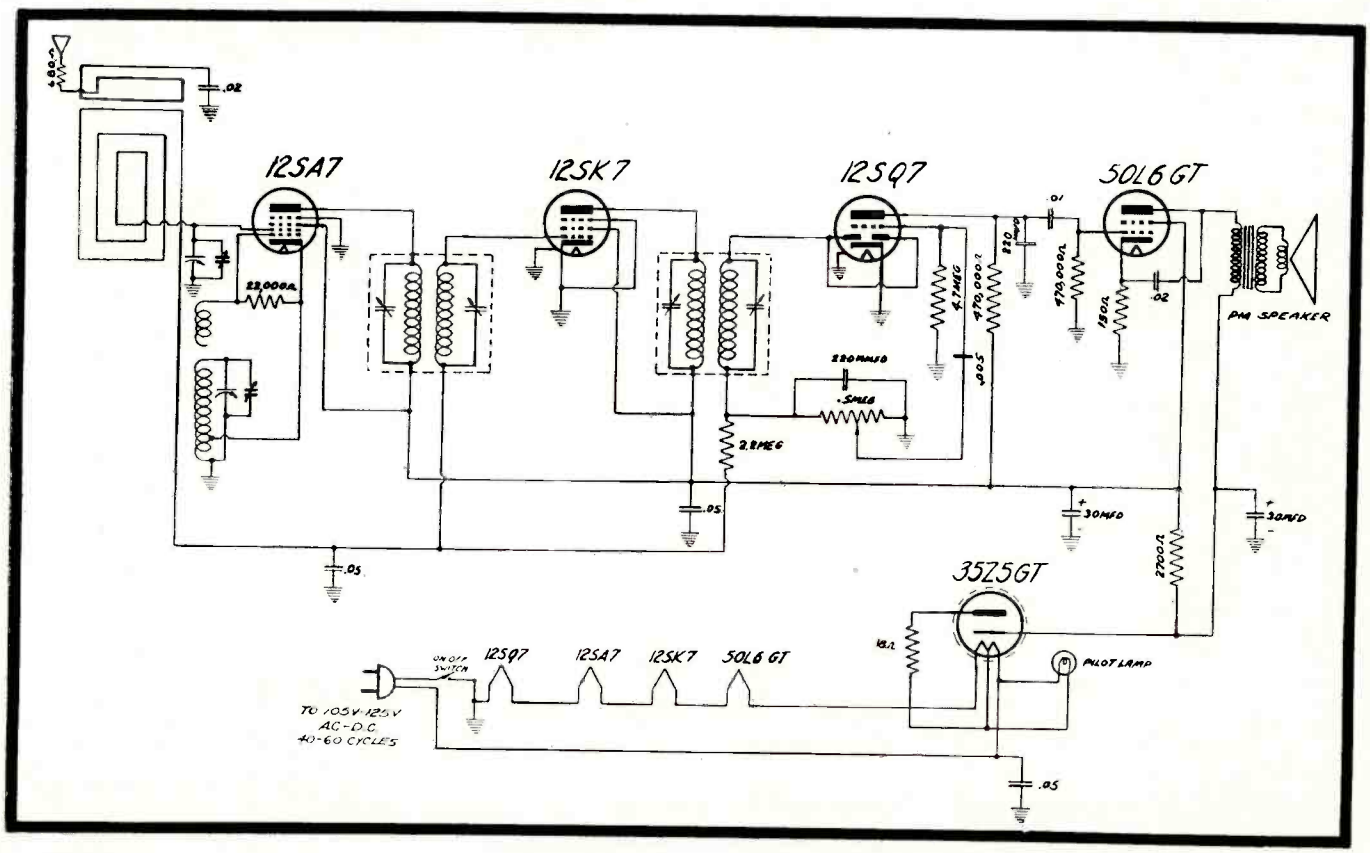


Fig. 4. A 3-gang 5-tube battery a-c/d-c model using lock-in type tubes, Zenith 6G001.

are also included. A .05-mfd r-f bypass is connected across the filter output. This is an important capacitor, for as the electrolytic capacitor dries up and the resistance increases, feedback through the supply, producing oscillation, may result. This capacitor prevents this possibility. To prevent modulation hum, a .05-mfd capacitor is connected to chassis.

Fig. 5. DeWald 4-tube and rectifier, A500 and A503, with an antenna resistor and capacitor to eliminate antenna resonance and minimize i-f or image interferenee.



29 DIFFERENT RECTIFIER TUBES *Now Replaceable*

WITH THE FEDERAL SELENIUM RECTIFIER

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IT'S SMALLER...

COSTS LESS...

LASTS LONGER...

RUNS COOLER...

READILY INSTALLED!

—FIRST OF ITS KIND IN THE INDUSTRY!

NO less than *twenty-nine* different types of rectifier tubes are now replaceable with Federal's new, miniature, 5-plate rectifier. Available now, this replacement is also an *improvement!* For not only does it subtract from your own manufacturing costs, it adds to product quality as well . . . and to consumer satisfaction. Here's how:

- **Saves space — only 1¼ x 1¼ x 11/16 inches — fits where tube won't**
- **Costs less than tube and socket it eliminates**
- **Long life — built to last the life of the set**
- **No warm-up period — starts instantly, runs cooler**
- **Installed in less time than tube — only two soldering jobs**
- **Sturdy, all-metal construction — not easily damaged**
- **Withstands overloads — even when charging deformed electrolytic condensers**

Every one of Federal's line of "Center Contact" Selenium rectifiers is designed to give the full measure of performance that have made them the standard of the industry. A Federal engineer will show you how to put this latest model into your circuits. Write for details to Department F456.

Replacement for these Tubes:

5T4	5Y3	6Y5	25Z6	50Y6
5U4	5Y4	6Z5	35W4	50Z7
5V4	5Z4	12Z5	35Z3	117Z3
5Z3	6X5	7Y4	35Z4	117Z6
5W4	0Z4	12Z3	35Z5	0Y4
5X4	80	25Z5	35Z6	

Electrical Characteristics:

Maximum RMS Voltage	130 Volts
Maximum Inverse Voltage	380 Volts
Maximum Peak Current	1200 ma.
Maximum RMS Current	325 ma.
Maximum DC Output	100 ma.
Approximate Rectifier Drop	5 Volts

Two Federal Miniature Rectifiers in a voltage doubler circuit give 250 volts and 80 milliampere output from 117 volt AC power source.

Federal Telephone and Radio Corporation

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Newark 1, New Jersey

Balanced-Loop Receiver

(See Front Cover)

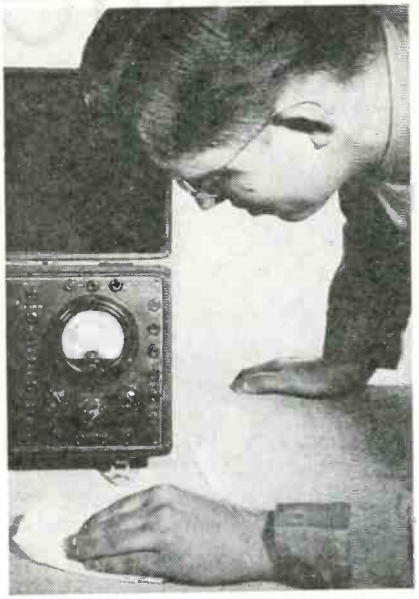
BALANCED LOOP-ANTENNAS, described a few months ago in Ser-Cuits, have become a design feature of many receivers. In the circuit shown on the cover this month appears a balanced-loop application for the Stewart-Warner 9014-E model. The loop is tuned indirectly through a close-coupled iron-core transformer which feeds a 12SK7 tuned r-f amplifier. The loop center tap is grounded to the avc bus, minimizing hum pickup. The external antenna feeds the loop primary and short-wave primary in series. The r-f stage, used on b-c only, uses a 390-ohm bias resistor without by pass. An interstage r-f transformer operates at a high Q by virtue of a reduced loading secondary tap for the 12SA7 signal grid (*3*). The tuning capacitor is connected across the entire secondary. On s-w, the signal grid is switched to the short-wave transformer, eliminating the r-f stage entirely. The tuning capacitor is connected in series with 315 mmfd to limit the tuning range.

A tuned-grid cathode-feedback oscillator is used with a grounded plate (screen grid) on both b-c and s-w, the grid and cathode being switched from one oscillator to the other. Unused coils are left open.

The i-f amplifier uses a 12SF7 with a 47-ohm cathode resistor and conventional transformers. The diode detector-avc bus is biased slightly positive through the detector-load resistance to the 12SK7 audio cathode by the *RI* drop in the 2,200-ohm cathode bias resistor. The load resistance consists of 47,000 ohms in series with a ½-megohm volume control. A tone control shunts the volume control with a .0008-mfd capacitor. The first a-f amplifier is unusual in several ways. First, it has a remote cut-off pentode. In addition the potentials of the elements and circuit constants are quite unique. There is, for instance, a 2.2 megohm screen-supply resistor. Degenerative feedback from voice coil to screen is provided by a .02-mfd capacitor which also serves as a supply bypass. A separate supply filter in the plate supply consists of 220,000 ohms and .05 mfd. The plate load resistor is also 220,000 ohms.

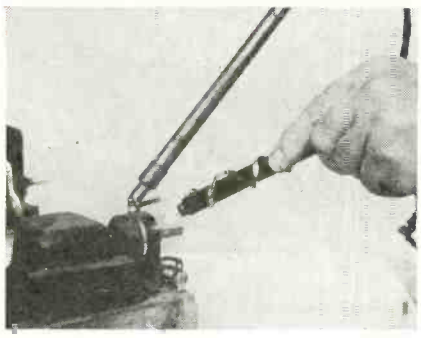
A 35L6 output stage operates into a tapped output transformer with the *B* load of the remainder of the receiver tied to the other end.

SERVICE AIDS



Removing Meter Face Static Charges. When polishing the glass face of sensitive meters the pointer will often move over a portion of the scale and appear to remain at a certain position. This is caused by a static charge being developed by rubbing the cloth over the glass. The charge may be neutralized by blowing one's breath on the dial face of the meter and the pointer will return to its original position.

Loop in Cover of Tester As Antenna. A small loop attached to the lid of a test unit with tape makes a convenient antenna for test purposes. As shown a test lead is connected from one terminal of the loop to the antenna post of the receiver, in which case the loop is used as a single wire antenna. It also may be easily connected in place of regular loop.

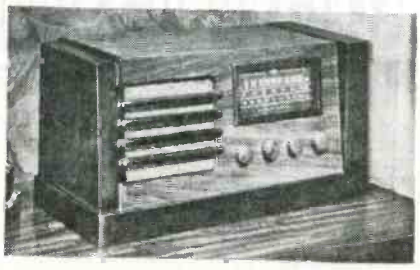


Light to Simplify Repairs. When soldering parts in dark places it is difficult to hold solder, iron and a lamp. A strip of solder wrapped around a pen lamp will solve the problem, the lamp guiding the solder to the desired point. This leaves the one hand free to apply the soldering iron.

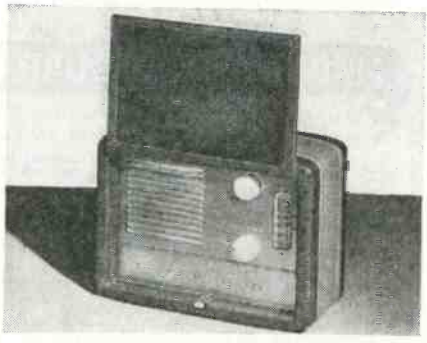
NEW MODELS

U. S. Television projection-type television receiver providing a 16" x 21" image.

Emerson model 512 a-c/d-c model with a built-in loop.



Stewart-Warner 9013-A five-tube three-band a-c receiver designed for the export market. Bands covered are: 530 to 1650 kc; 2 to 7 mc and 7 to 22.2 mc.



Garod 5D a-c/d-c battery 5-tube miniature, three-way portable. Loop antenna in front-raising lid. Alnico V p-m speaker.

OLD TIMER'S CORNER

by SERVICER

DROPPED INTO PAUL'S MODERN and well-stocked radio and electronic shop the other evening and found him in a very blue mood. I knew it could not be the store and its contents which were worrying him, because of all the shops in our town, his was the best stocked. He had the same sales personnel he always had; and Paul was in the habit of making a pretty penny each year, as his income tax payments attested. So it was with considerable curiosity that I asked Paul to tell me what was the matter.

"Well," he said sorrowfully, "I have *prize trouble.*"

What do you mean by *prize trouble?*" I rejoined.

"Well, last week a member of the Ladies Evening Society came in and asked me to contribute to their affair. I refused because I have been consistently victimized and because I felt there was not much good to be achieved from their Society.

"Today I find that I sent a refrigerator to one of the Society members on approval, for testing, against a well-known gas model, and she has returned it with the statement that if I can't help her Society, I can't sell her anything. And that's not all. I have been told by a number of my better customers that they know all about my refusing their Society and that they will govern themselves accordingly.

"In the past five years I have given to each and every organization that came along. They have had all sorts of prizes from me, without charge. I never learned the names of the winners, except by accident, and I finally got the idea that this was just a polite form of blackmail, and that I would have no more of it. Then, with the first refusal, this happened," he ended sorrowfully.

"Looks like you're in a pickle," I said, "but wouldn't you be interested in contributing to various affairs if you knew you could turn the gift into a nice selling campaign?"

"I've thought about that," Paul replied, "but I haven't been able to hit on any particular way that I could turn the award into more business. If I could get a bit of publicity or advertising out of the gift, beyond having my name appear on the program of the affair, and having it read over the loudspeaker at the shindig, I would reconsider the whole thing.

"It's not that I begrudge giving something which may be worth anywhere up to $25, but I do resent the pressure put upon me that if I don't give, I'll be made to suffer. That I can't stand; it goes against my grain!" Paul declared.

"Well," I said, "if that's all that's

(Continued on page 32)

INDUSTRIAL INTERCOMMUNICATIONS

by MAURICE F. KERR

Fig. 1. View of dial-controlled intercommunications unit.

DURING THE PAST TEN YEARS thousands of intercommunication systems have been installed in offices, factories, warehouses and similar establishments. Nearly all of them have been of the conventional type employing one or more amplifiers with direct manual switching of desired circuits or stations. This method of operation in small systems, generally of ten stations or less, has proved very practical, providing efficient, rapid, voice communication at reasonably low cost.

In analyzing the overall requirements of a communication system for larger plants, however, many items must be considered in addition to the requirements of a smaller system. Such a system should provide:

(*1*) Fully selective instant voice communication to any required number of stations.

(*2*) Provision for answering from any station selected without going to instrument to answer.

(*3*) Selective hi-power paging, properly distributed to any selected area or areas.

(*4*) Provision for any desired number of simultaneous two-way conversations without cross talk or other interference.

(*5*) Automatic priority from certain points of origin for emergency calls, warning signals, alarms or other messages over the system.

(*6*) Simplicity of operation to facilitate correct use by inexperienced operating personnel.

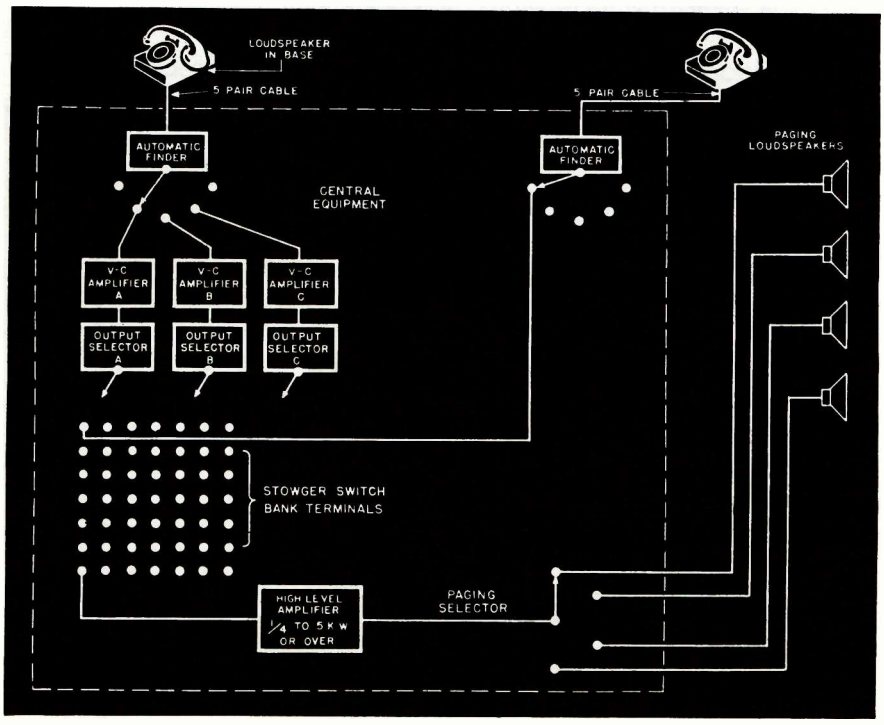
(*7*) Privacy of communication through automatic lockout circuit when station is in use.

(*8*) Ability to work through severe or high noise level at either end.

(*9*) Dependability of service, with routine maintenance requirements concentrated at one central point.

(*10*) Ability to add to system as required in future without rewiring or obsolescence of installed equipment.

Fig. 2. Block diagram for a typical dial-controlled intercommunications system.



During the war a system[1] offering the foregoing features was developed. Recently technical highlights on the system were released.

In simplest form the equipment can be controlled from any desired number of instruments similar in appearance to a standard desk telephone (Fig. 1). From any of these identical stations the following service is possible:

(*a*) Instant two-way voice communication to any other station *regardless of number.*

(*b*) Hi-power paging to any selected area or an entire plant if desired.

(*c*) Origin of code, tone signals for routine work or alarm signals in emergency.

(*d*) Automatic return selection on answering of paging calls to

(*Continued on page 39*)

[1]Dial controlled Intervox; Radio Laboratories, Inc., Seattle, Wash.

utc

FOR
HEARING AIDS
VEST POCKET RADIOS
AIR BORNE DEVICES

UTC
SUB-OUNCER SERIES

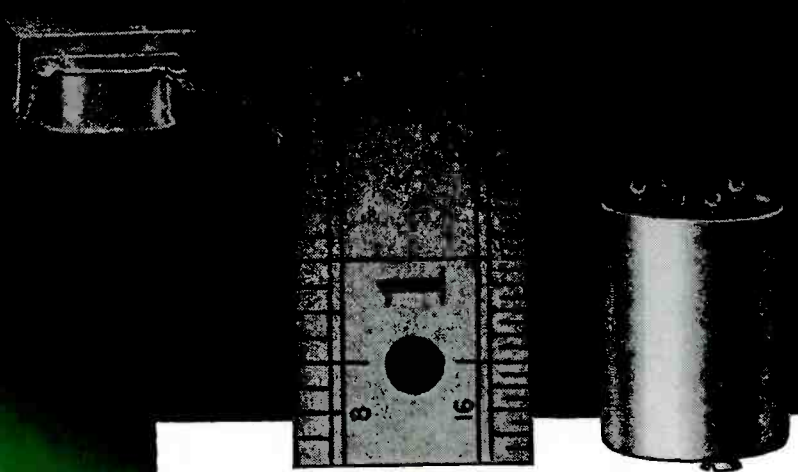
UTC Sub-Ouncer units are 9/16" x 5/8" x 7/8" and weigh only 1/3 ounce. Through unique construction, however, these miniature units have performance and dependability characteristics far superior to any other comparable items. The coil is uniform layer wound of Formex wire . . . On a molded nylon bobbin . . . insulation is of cellulose acetate . . . leads mechanically anchored (no tape) . . . core material Hipermalloy . . . entire unit triple (waterproof) sealed. The frequency response of these standard items is ± 3 DB from 200 to 5,000 cycles.

Type	Application	Level	Pri. Imp.	D.C. in Pri.	Sec. Imp.
SO-1	Input	± 4 V.U.	200 50	0	250,000 62,500
SO-2	Interstage/3:1	± 4 V.U.	10,000	0	90,000
SO-3	Plate to Line	± 23 V.U.	10,000 25,000	3/1.5 mil.	200 500
SO-4	Output	± 20 V.U.	30,000	1.0 mil.	50
SO-5	Reactor 50 HY at 1 mil. D.C. 3000 ohms D.C. Res.				

UTC
OUNCER SERIES

The standard of the industry for seven years. The overall dimensions are 7/8" diameter by 1-3/16" height including lugs. Mounting is effected by two screws, opposite the terminal board side, spaced 11/16". Weight approximately one ounce. Units not carrying D.C. have high fidelity characteristics being uniform from 40 to 15,000 cycles. Items with D.C. in pri. are far voice frequencies from 150 to 8000 cycles.

Type	Application	Pri. Imp.	Sec. Imp.
O-1	Mike pickup or line to 1 grid	50, 200, 500	50,000
O-4	Single plate to 1 grid	8,000 to 15,000	60,000
O-5	Single plate to 1 grid, D.C. in Pri.	8,000 to 15,000	60,000
O-6	Single plate to 2 grids	8,000 to 15,000	95,000
O-8	Single plate to line	8,000 to 15,000	50, 200, 500
O-9	Single plate to line, D.C. in Pri.	8,000 to 15,000	50, 200, 500
O-12	Mixing and matching	50, 200	50, 200, 500
O-13	Reactor, 200 Hys-no D.C., 50 Hys-2MA D.C., 6,000 ohms		



Manufacturers: Our experience in building hundreds of thousands of ouncers and sub-ouncers is yours for the asking. Special types, and mountings are readily available. U.T.C. engineers can help you save weight and space in the design of miniature equipment.

United Transformer Corp.

150 VARICK STREET • NEW YORK 13, N. Y.

EXPORT DIVISION: 13 EAST 40th STREET, NEW YORK 16, N. Y., CABLES: "ARLAB"

OLD TIMER'S CORNER

(*Continued from page 29*)

bothering you, I have an answer to your woes."

"Give, chum, give!" Paul grinned.

"Instead of giving away some definite item, why not give away a gift certificate for the face value of the item you were going to give away in the first place?" I stated triumphantly.

"I tried that," Paul said, "but it didn't work any too good. They came in and got their prize and there I was the same as before; no publicity and no advertising."

"You didn't let me finish, my fine feathered friend," I exclaimed forcibly. "There's more to it than that!"

"Continue," said Paul, "but it had better be good—very good."

"One of the prerequisites of the prize award as written on the back of your gift certificate is that the winner must permit you to take his picture receiving the gift at your store. And you should also include in writing on the back of the certificate award, that the winner must permit you to use his picture and some quotation by him about the award in your advertising."

"I begin to see some light," Paul said, interrupting.

"Then when the winner comes to your store for the choosing of the prize," I went on, ignoring his remark, "you get a good commercial photographer and take a picture of the person choosing the prize and receiving it from you. Then you write a caption that might say: 'Mrs. Sadie Prey, of 1333 Pine St., choosing a fine Red Star Midget from Paul's Radio Shoppe, 100 Broadway Ave. Mrs. Prey was the lucky winner of the Blotto game at last night's meeting of the Ladies Evening Society Bazaar, and received as her prize a gift certificate donated by Paul Prime, proprietor of the radio shop.'

"The newspaper editor will probably rewrite your caption to fit the space he wants to use, and he will probably cut the picture down to a small size, but he will probably run it. That's the important thing.

"Then you can cut the clipping from the paper and paste it on your window. That will attract some people. I would also cut out a copy to send to Mrs. Prey and another to send to the president of the Ladies Evening Society. They will appreciate your thinking of them.

"Finally, I would follow up on Mrs. Prey with a service call to see that her prize item worked properly. I would explain to her that merely because you had given her the item as the result of her winning a prize certificate, you would not thereby deprive her of the same superior service that every customer of your store gets. That creates good will.

"If the paper does not print the item, and sometimes they won't, then I would still take advantage of the situation. Paste the picture on the window with a personally written caption. Send copies to both Mrs. Prey and the president of the Society with the comment that you thought they might like to have a copy.

"And I would use Mrs. Prey's picture in advertising placed in the local paper. Moreover, you could design an

envelope stuffer built around the award and the picture of Mrs. Prey. You might use a headline saying:

**Mrs. Sadie Prey Was Lucky . . .
And You Will Be Too . . . If You Trade at
Paul's Radio Shoppe
Because
Here You Will Find the Best Equipment and
Service at the Best Prices!**

"And I would use Mrs. Prey's picture to illustrate the story. Then I would send these stuffers out to as many customers and prospects as I could dream up.

"One thing, though. If you are going to use Mrs. Prey's picture in advertising or even on envelope stuffers, you'll need a release from her. This is a statement that she will permit you to use the picture as you see fit. You don't need any lawyer to write the release for you. Just have Mrs. Prey sign a statement that reads something like this: 'In consideration of receiving the prize for which I hold a certificate, I hereby permit Paul's Radio Shoppe to use my name and picture in advertising and publicity as it may see fit.' Have her sign her name and date it, and that's that."

"That is a most unusual way to handle what is really a pesky situation," Paul said, "but I think I'll give it a try. But what if nothing happens and I don't get any new business?"

"That's the chance every advertiser takes. The fact that you might not be able to get customers hasn't stopped you from opening your store, has it? Well, you will find that if you try publicity and advertising, even if the results don't show right away, they will eventually."

"What about the gyp affairs?" Paul wanted to know.

"Well," said I, "I don't know how any business man can get out from under having to use his head and brains if he wants to stay in business. It's up to you to find out which are the gyps and which are not. One good way is to ask your bank about it, mentioning who's backing the affair. Nearly always the banker will know as he probably will have been solicited also. Then again, if the approach is by mail, you can ask the local postmaster; it being against the law to defraud by mail.

"There are many ways to find out. The local pastor, rabbi or father will know the answer if the affair is allegedly religious. You can't just make up your mind they are all gyps because one or two might be. That would be sort of like saying all men are murderers just because some men have been convicted of the crime."

"Roger!" said Paul, as he reached for the phone to tell the Ladies Evening Society that he would contribute a gift certificate worth $25.00 for their affair.

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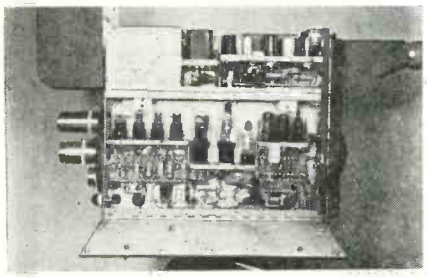
TELEVISION CAMERA



Interior of RCA television camera; pre-amplifier compartment (lower section), electronic view finder (upper section), image orthicon pickup tube (center compartment).

SERVICING HELPS

by FRANK C. KEENE

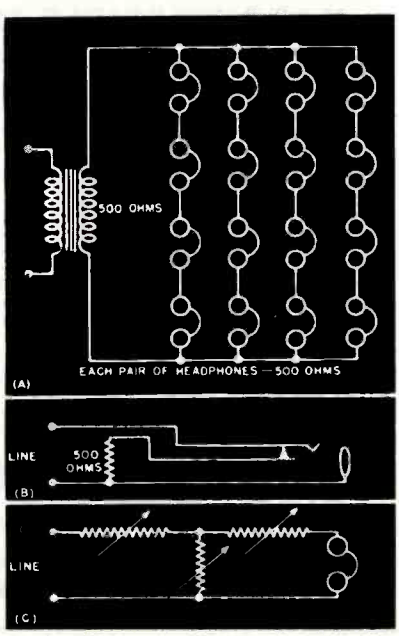
I PLAN TO INSTALL *a multiple headphone system in a hospital and would like to have circuit showing a hookup for this. Can you help?—C. H. Carrier.*

The simplest and most satisfactory type of system for bedside reception would be one using an audio supply unit with a 500-ohm line to feed headphones at each bed. Radio type systems are unsatisfactory where high r-f noise levels are present.

A typical system is shown in Fig. 1 (*a*). Constant load can be maintained by using a three-circuit jack (*b*), which would provide for the insertion of a resistor of equivalent load value to the headphone when the headphone is disconnected. A further refinement would be a T-pad attenuator, (*c*), so as to reduce the volume in the headset, yet maintain constant load impedance and match, between headphone and line.

The carrier-current type system can be used but this requires a complex setup. Needed are a standard receiver to feed a local mixer which would convert the receiver signal to some secondary frequency, such as an i-f frequency. This signal would then be fed to a r-f amplifier tuned to the

Fig. 1 (*Carrier query*). In (*a*) appears an audio supply system for a hospital receiving arrangement, using a 500-ohm line; (*b*), maintaining constant load with a 3-circuit jack; (*c*), T-pad attenuator hookup for constant-load impedance and matching between headphones and line.



new frequency. The amplifier required is a class *A* type.

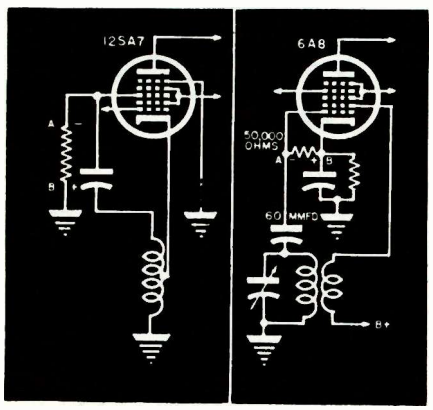
What would cause a receiver to pick up static, but no signal?—Jack L. Seib

This condition can almost always be traced to an inoperative oscillator.

In checking oscillator circuits, it is first necessary to determine whether the circuit is oscillating or not. This may be done by either of two methods. The first is by use of a v-t-v-m. If the circuit is oscillating, a voltage should appear across the oscillator grid shunt resistor. This voltage should be on the order of 3 to 12, depending on the tube used. The other method involves the use of a second receiver. The receiver under test is first tuned to some known frequency, preferably at the low-frequency end of the dial. The antenna wire of the second receiver is then placed somewhere near the oscillator coil. The second receiver is then tuned to the vicinity of the first receiver plus the i-f frequency of the receiver under test. For example, if the defective receiver is tuned to 500 kc, and uses an i-f of 465 kc, the second receiver should be tuned to 500 + 465 kc, or 965 kc. If the oscillator is functioning, a hush will be heard. If the second receiver uses a b-f-o, the signal of the first receiver should establish a beat note.

The most usual trouble encountered in oscillator circuits, in the order of their frequency, is defective tube, no oscillator plate voltage, broken wires on the oscillator coil or poor connection on the coil, open grid resistor, or open cathode resistor. Usually, once it has been established that the oscillator is not operating, the trouble will be obvious.

Fig. 2 (*Seib query*). Two typical converter circuits. Right, below, the conventional plate tickler feedback circuit. The grid voltage is developed between points *a* and *b* on the oscillator grid resistor. This voltage can only be measured with a v-t-v-m. A likely point of trouble is the ground connection on the grid coil. Left, below, the cathode type of oscillator circuit. Here, the cathode is connected to a tap on the oscillator coil. The screen grid of the circuit is actually the oscillator plate, but a by-pass capacitor places it at ground r-f potential. Grid voltage is developed across the grid resistor.



NEWS

BONOT NEEDLE DISPENSER

A self-service type of needle dispenser has been announced by the Bonot Company, Stamford, Conn.

* * *

LAIRD NOW EPEM CHAIRMAN

Roy S. Laird, sales manager of Ohmite Manufacturing Company, Chicago, has been elected chairman of the Association of Electronic Parts and Equipment Manufacturers. He succeeds J. A. Berman, sales manager of Shure Brothers.

Les A. Thayer, assistant sales manager of Belden Manufacturing Company, Chicago, is now vice chairman. Miss H. A. Staniland, sales manager of Quam-Nichols Company, Chicago, continues as treasurer for the seventh consecutive year, and Kenneth C. Prince, Chicago, attorney, continues as executive secretary.

* * *

TRI-CORE BULLETIN

A 4-page bulletin describing Tri-Core has been issued by Alpha Metals, Inc., 359 Hudson Ave., Brooklyn, New York.

Tri-Core is said to be a self-fluxing solder, with three cores located just beneath the outer surface of the wire.

* * *

MORRIS NOW SNYDER G-S-M

Dick Morris has been appointed general sales manager for the Snyder Manufacturing Company, Philadelphia.

Mr. Morris has been with the Snyder company for eight years.

* * *

GOLENPAUL AND JABLON NAMED PARTS SHOW DIRECTORS

Charles Golenpaul, Aerovox Corporation, New Bedford, Massachusetts, and Walter Jablon, Hammarlund Manufacturing Company, New York City, have been named directors for the 1947 Radio Parts and Equipment Trade Show.

Mr. Golenpaul and Mr. Jablon will represent the Sales Managers Club. Mr. Golenpaul was a director and the vice

president of the 1946 show. Mr. Jablon succeeds R. P. Almy.

* * *

KAHN OF AEROVOX RECEIVES ASA CERTIFICATE OF APPRECIATION

Louis Kahn, assistant chief engineer of Aerovox Corporation, recently received the American Standards Association Certification of Appreciation for volunteering his time and experience in the War Committee Work of the A. S. A.

* * *

BRENDEL BECOMES HALLICRAFTERS GENERAL SERVICE MANAGER

Lynn Brendel has been appointed general service manager of the Hallicrafters Company.

Mr. Brendel, who joined Hallicrafters in 1945, will be responsible for the servicing of all Hallicrafters equipment and the operation of the company's six service centers throughout the country.

Mr. Brendel was formerly with United Motors Service as a sales and service engineer, and with the Bendix Radio Corporation in Detroit as a sales and research engineer.

* * *

STROMBERG-CARLSON P-A FOLDER

A four-page folder describing sound systems, power amplifier cabinets, amplifiers for one, two and three-microphone inputs, p-a portables, speakers, microphones, driver units and alnico V cone speakers, has been released by the sound division of Stromberg Carlson, 100 Carlson Road, Rochester, New York.

* * *

WARD LEONARD RELAY DATA

A 4-page booklet, bulletin 104, covering midget metal-base relays, has been announced by Ward Leonard Electric Co., 31 South Street, Mount Vernon, New York.

Bulletin includes coil and contact data, contact arrangement diagrams, dimension skeches of front and rear mounted units and enclosing cover data for both standard and heavy duty relays; relays designed for use in small transmitters, aircraft control circuits and applications where space is limited.

* * *

LARRABEE AND TWYMAN NOW JFD SALES REPS.

Fred H. Larrabee has been appointed sales representative for Kansas, Nebraska, Iowa and Missouri by the JFD Manufacturing Co., 4117 Forth Hamilton Parkway, Brooklyn 19, New York. Sales headquarters are located at 6033 Main Street, Kansas City, Missouri.

B. G. Twyman & Associates, 6406 North Fairfield Avenue, Chicago 45, Ill., have been assigned the state of Illinois by JFD.

* * *

REEVES CATALOG

A catalog describing instantaneous recording discs has been announced by Reeves Soundcraft Corporation, Reeves International Building, 10 East 52nd Street, New York 22, N. Y.

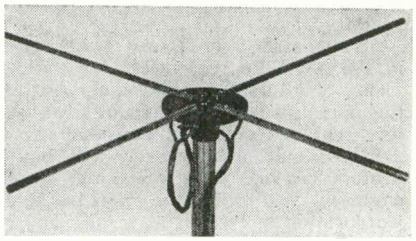
NEW PRODUCTS

HI-PAR F-M ANTENNA

A non-directional f-m antenna has been produced by the Hi-Par Products Co., Fitchburg, Massachusetts.

Collector rods of aluminum alloy. Varnished hardwood support.

Antenna said to match any standard leadin.



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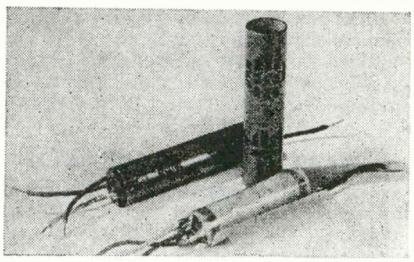
SOLAR DRY ELECTROLYTICS WITH PLASTIC-FILM INNER WRAP

Solar cardboard-tube dry electrolytic capacitors now feature a plastic film wrap in place of the Kraft paper liner.

The plastic film is said to keep the electrolyte from drying out in high ambient operating temperatures, and also keep external atmospheric moisture, which may contain many impurities, from being introduced into capacitors under the alternate heating and cooling which is normal in actual service in receivers.



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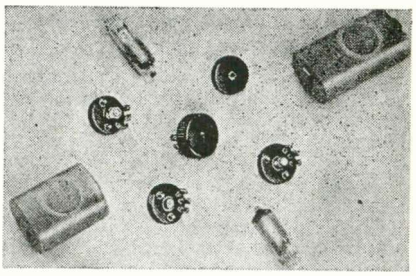
CENTRALAB MINIATURE RADIOHMS

A volume control, model 1 radiohm, that is said to be smaller than a dime, has been announced by Centralab, 900 E. Keefe Ave., Milwaukee 1, Wis. Unit will be available in 500 ohms to 5 megohms with six tapers.



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MASCO P-A SYSTEMS

A 50-watt amplifier that is said to operate from 2 to 12 speakers has been announced by the Mark Simpson Manufacturing Company, Long Island City,

(Continued on page 42)

INTERCOM SYSTEM

(*Continued from page* 30)

station originating, without called party even knowing point of origin.

(c) Either two-way, voice controlled, intercom service, or upon lifting handset at called station, telephone privacy is available. Through anti-side tone circuits ability to work through severe noise level is provided.

No ringers or other signals are required; each instrument has built-in loudspeaker adequate for office or similar coverage.

On systems up to 100 stations two-digit dial operation allows direct talking to called area as soon as dial stops on second number.

Three digits are used on up to 1000 stations. Three or four digit selection is employed on more complex paging selection.

In a typical installation all amplifiers, tubes, relays, power supplies, selectors, etc., are located in a dust sealed and locked steel cabinet located in any convenient central point. All maintenance therefore is concentrated at one location, avoiding necessity of replacing tubes or other maintenance in offices, salesrooms, warehouses, etc., with its attendant high cost and inconvenience.

Operation

Upon lifting of handset on *station 11* (Fig. 2) an automatic finder (*11*) locates and connects to an amplifier and output selector not being otherwise used. This finder may check through twenty or more amplifiers before the handset is raised to ear level, automatically stopping and connecting to the first unused circuit. The user may immediately dial two digits for the desired station in accordance with prearranged listing of all circuits or functions.

The output selector *A* instantly follows the dial pulses, selects and connects to desired station. As soon as dial has stopped, therefore, the user may speak through the loud speaker at the selected station. Upon ceasing to speak the two-way voice controlled amplifier reverses, permitting a voice answer from the called station to be transmitted and amplified back to earpiece at the originating station.

If the called station is already in use on another call, no connection would

(*Continued on page* 40)

INTERCOM SYSTEM

(*Continued from page 39*)

be made, but a busy tone would be heard in the calling station earpiece.

When private conversation is desired without loudspeaker reproduction, the called party may raise his handset and a two-way telephone service is available. For executive office, a privacy key may be installed on the instrument, that when operated, prohibits any party from calling in by voice or listening to that point. An attempted call then produces a one-second low musical tone in the loudspeaker and to the party calling, whereupon the called party may answer or in any case, the caller knows of the called party's desire for privacy. Loudspeaker volume is controlled and set to the desired level at the receiving point regardless of what channel or amplifier the voice may pass through. Earpiece volume is controlled by multiple stage limiters and compressors holding earphone volume to an optimum level even for wide levels of voice input, to insure adequate amplification for an answer remote from the pickup or answer microphone, yet preventing objectional loudness on close talking or high noise. Automatic voice control amplifiers adjusted by oscilloscope pattern timing, operates on a fraction of a syllable, permitting instant answer or breakin.

When hi-power paging is to be used, calls are placed in same manner as calling another station except that additional numbers are dialed, to select the area or areas to be covered. Any required amount of audio power can be thus controlled from any station or selected group of originating stations.

Any station in use is automatically locked out against interference from any other calls. Upon returning handset to cradle all circuits automatically reset for next usage.

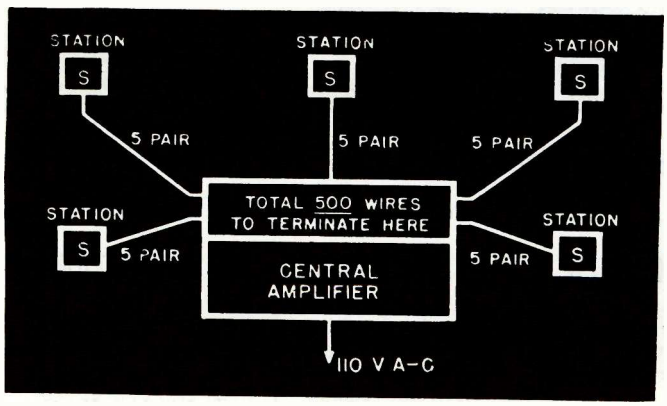
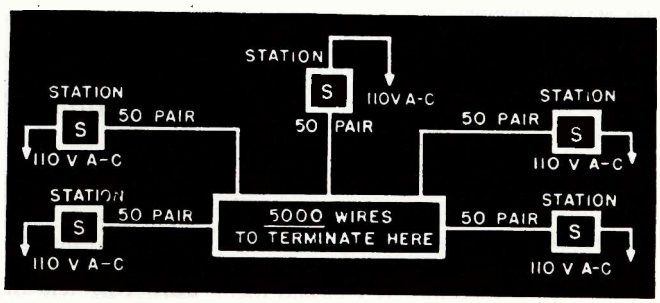
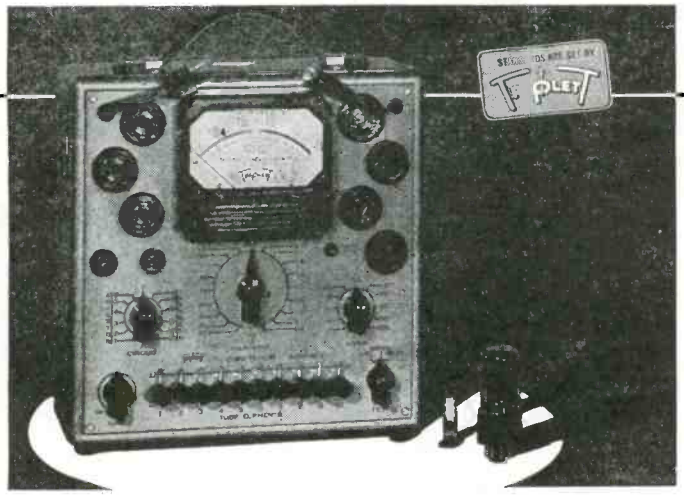


Fig. 3 (below). Setup for a conventional 50-station intercom system.

Fig. 4. Setup for a dial-type 50-station system.





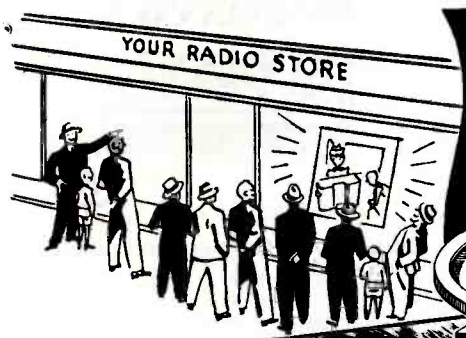
A New
TRANSCONDUCTANCE READING
Tube Tester

For the Man Who Takes Pride in His Work

Microhmo (Dynamic mutual conductance) readings and simplified testing—are two of the 20 exclusive features found in the new model 2425 tube tester. Transconductance readings are made possible through a simple measurement directly proportional to Gm and a properly calibrated measuring instrument. No possibility of grid overloading. "Short" and "open" tests of every tube element. Gas test rounds out full check of *all* tubes. New Easy-Test Roll Chart. These exclusive features, amplified by Triplett Engineering, make Model 2425 the outstanding 1947 tube tester.

Precision first **Triplett** *...to last*

ELECTRICAL INSTRUMENT CO. BLUFFTON, OHIO



COMIC POSTER FREE

OLSON

TO DISPLAY IN YOUR WINDOW!

A crowd-pulling cartoon, size 17"x17", drawn especially for OLSON RADIO WAREHOUSE to give you. It's yours for the asking, absolutely FREE and postpaid. Display it in your window or Service Dept. for laughs — and sales!

Why do we make this offer? Because we want you to become acquainted with Olson Bargains. We will send you a Free Catalog with the poster; this Catalog lists nationally famous Radio Parts at prices that will save you plenty!

Paste this coupon on a postcard and MAIL TODAY

OLSON RADIO WAREHOUSE
73 E. MILL ST., DEPT. 59 · AKRON, OHIO

Yes sir! Send me the Comic Poster *free.*

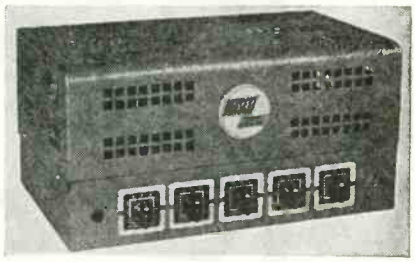
NAME .....
ADDRESS .....
CITY.....STATE.....

NEW PRODUCTS

(*Continued from page* 38)

New York. Other features include individual bass and treble equalizers; two high-impedance microphone inputs and one for phono pickup.

Sound systems from 12 to 80 watts are also available.



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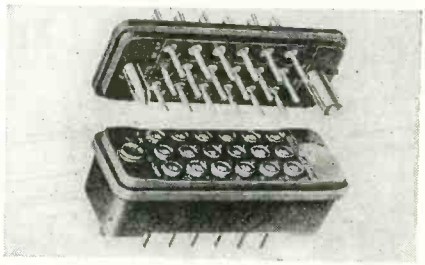
MONOBLOCK CONNECTORS

A multiple-contact connector has been announced by The Winchester Co., 6 East 46 Street, New York 17, N. Y.

Molded of Melamine plastic. Two guide pins, acting as ground contacts, perform additional functions of alignment and polarization.

Multiple telescoping barriers serve to isolate contacts, increase both surface creepage and air gap between adjacent contacts. Minimum air gap of ¼" maintained between all contacts. Contacts are designed for use with a maximum wire size of 16 AWG.

Available in two sizes: 18 contacts (RE18S) and 12 contacts (RE12S).



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BRUNO TOOLS HOLE-CUTTER KIT

A kit, 790, for cutting holes of various diameters in wood, metal or plastics has been announced by Bruno Tools, Beverly Hills, California.

Kit contains one adjustable hole cutter (with ¼" shank) for cutting holes ⅝" to 1¼" and another cutter (⅜" shank) that cuts holes 1" to 2½".

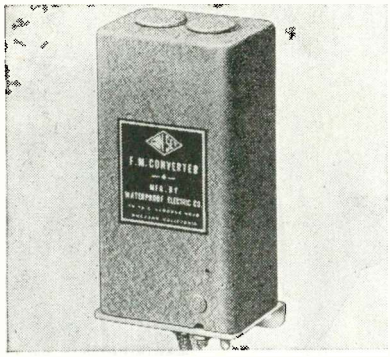
* * *

F-M CONVERTER

A unit to convert f-m receivers from 42-50 to 88-108 mc has been announced

by the Waterproof Electric Company, Burbank, California.

No adjustment or tuning operations are said to be necessary with the unit itself. Size, 1½" x 2" x 4".



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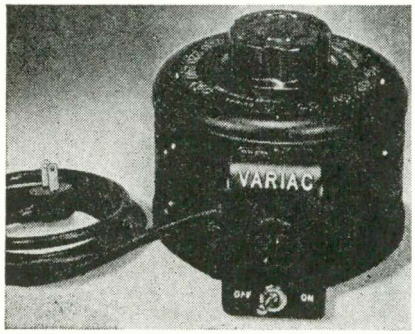
G. R. 10-AMPERE VARIAC

Adjustable autotransformers, type 10 Variac, for 115-volts, rated at 10 amperes, with a 15-ampere maximum, coinciding with the capacity of commonly-used outlets, plugs, cords, and No. 14 wire lines, have been announced by General Radio Company, 275 Massachusetts Avenue, Cambridge 39, Massachusetts.

Output voltage continuously variable from zero to 17% above line voltage. Available in 6 models, 115-volt and 230-volt service.



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NEWCOMB PORTABLE SOUND SYSTEM

Portable sound systems ranging from 10 to 60-watts power output, have been announced by Newcomb Audio Products Company, 2815 S. Hill St., Los Angeles 7, California.

One type, a 3-case system, includes a 30-watt amplifier, with two 12" loudspeakers.

* * *

NHI LINE FILTER

A line filter with six bypass capacitors, two iron-core chokes and two r-f chokes has been announced by New Home Industries, 216 Eldridge Street, New York 2, N. Y.

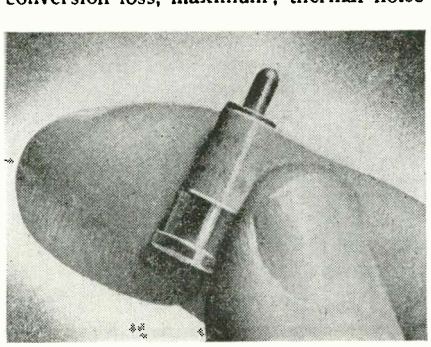
Filter design said to provide filtering of line noises, fluorescent, elevator, and r-f noises which are superimposed on the line.

* * *

SYLVANIA SILICON CRYSTAL CONVERTERS

Silicon crystal converters, types 1N21B, 1N23B and 1N25, for use as first detectors in high-frequency superheterodyne receivers, have been announced by the electronics division, Sylvania Electric Products, Inc. The crystals which are permanently preset in a cartridge approximately ¾" long and ¼" in diameter are available in three types designed for frequencies up to 10,000 mc.

Type 1N21B, designed for frequencies in the region of 3000 mc, has a 6.5-db conversion loss, maximum; thermal noise ratio of 2.0, maximum; and 1-f resistive impedance of 200 to 800 ohms. Corresponding characteristics for types 1N23B and 1N25 crystals are: 10,000 mc and 1,000 mc; 6.5 db and 8.5 db; 150-600 and 100-400 ohms.



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CONCORD RADIO UNIT AMPLIFIERS

Add-A-Unit type amplifiers, with plug-in type power supplies, have been announced by Concord Radio Corporation, Chicago, Ill.

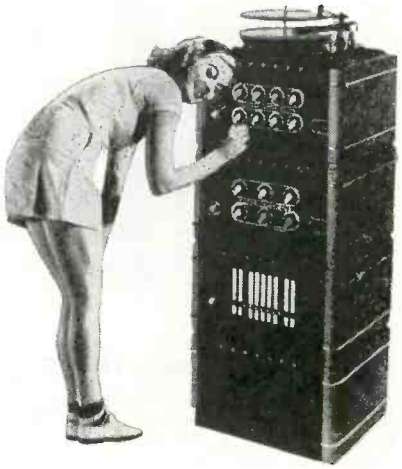
Plug-in power supplies are said to provide power output increase from two to nine times. Additional output stages, to a total of six, can also be added. There is also provision for a phono-

(*Continued on page* 44)

NEW PRODUCTS

(*Continued from page* 43)

player, record changer, and output volume indicator. Portable carrying cases are available.



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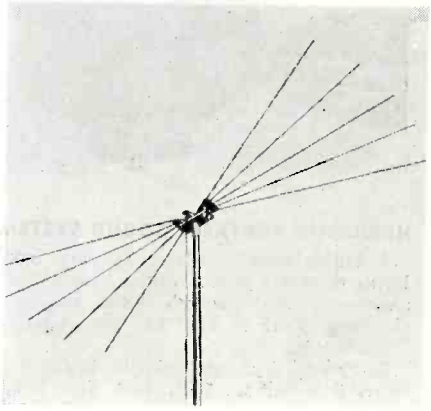
ANDREW F-M/TELEVISION ANTENNA

An antenna for f-m and television reception, the Di-Fan, which consists of two sets of five elements extended in two different directions, has been announced by the Andrew Co., Chicago 19.

Impedance of the Di-Fan is said to be matched to the impedance of transmission line, preventing ghost images.

Unit uses high-strength aluminum alloy elements. Supporting members are of plated steel. Available with mounting brackets for chimney or roof.



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G. E. COMPOSITION RESISTORS

Composition resistors have been announced by the specialty division of G. E.

Resistors are available in standard RMA resistance values and in sizes of one-half, one and two watts.

Other characteristics of the composition resistors are said to be: High resistance to humidity; pigtail leads; and ample insulation.

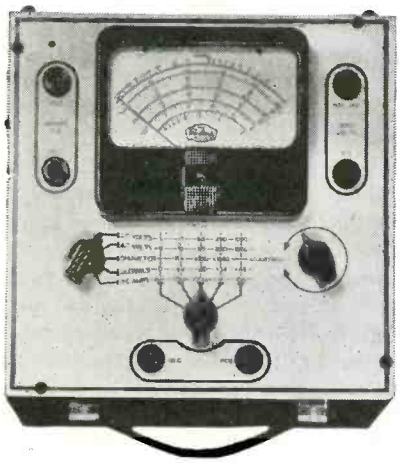
* * *

STERLING ELECTRONIC TESTER

A portable, graphic type servicing instrument has been announced by The Sterling Manufacturing Company, 9205 Detroit Avenue, Cleveland, Ohio.

The desired function and range are selected by means of two switches of a

graphic selector system. A function switch, is set for the *type* of measurement desired; the range switch, is set for the *range* of the type of measurement indicated by the function switch. Adjustment knob is used to set the meter pointer to zero ohms for the three ohmmeter ranges.



* * *

CANNON ELECTRIC LOW-LEVEL CONNECTORS

Multi-contact electric connectors for low-level sound uses, XL series, have been developed by Cannon Electric Development Co., 3209 Humboldt Street, Los Angeles 31, California.

Size: 2 3/32" overall length, diameter 5/8"; provides polarized contact. Has three 15-ampere silver-plated brass contacts in phenolic insert to accommodate No. 14 stranded wire.

* * *

CLARK P-A AMPLIFIERS

Ten, twenty and thirty-watt amplifiers using terminal-strip component mounting structure, have been developed by Clark Radio Equipment Corporation, 4313 Lincoln Avenue, Chicago 18, Ill.

Terminal strips are mounted so that every part is accessible to test prods and soldering iron. Amplifiers are said to have a 30 to 15,000-cps response.

•

TELEVISION RECEIVERS

(*Continued from page 20*)

of the low-impedance triode is that its plate load is essentially resistive and transient troubles are non-existent.

The horizontal amplifier must be a high-impedance pentode which has sufficient power sensitivity to convert the relatively low amplitude horizontal waveform to a large current variation through the deflection coils. A high-impedance tube, with no damping of inductive circuits, has a plate load which is reactive and, therefore, becomes a circuit vulnerable to transients, which is another reason for highly damping the horizontal output circuit. In some receivers, a small amount of inverse feedback in the last stage is used to reduce the effective impedance of the pentode.

Electromagnetic Focusing

Similar magnetic principles are used in focusing a beam of electrons. In this task, however, we rely more on the characteristic that there is *no reaction* between perpendicular magnetic fields but as soon as the angle departs from 90° there *is reaction*. The focus coil is mounted on the neck of the tube in a position which produces a transverse magnetic field; that is, lines of magnetic force parallel to electron beam. This means the magnetic field surrounding the electron beam is perpendicular to the focus field and there is no interaction. Thus those electrons which move in a straight line through the electron gun toward the fluorescent screen are not affected by the focus field, Fig. 2 (*A*).

However, when any electrons depart from this straight line path their surrounding field is no longer perpendicular to focusing field and the motion of the beam is affected. The electrons now move in an arc and finally make a complete arc returning once

(*Continued on page 46*)

TELEVISION RECEIVERS

(*Continued from page* 45)

again to the straight line path. The spot at which all electrons converge is the focused point, by proper setting of the current through the focus coil and proper positioning of the focus coil on the neck of the tube. The focus coil functions, therefore, as the second lens of the electron gun, first lens remaining conventional.

Were it not for the original forward velocity imparted to the electron, the divergent electron would make a complete circle and return to the center. However, its forward attraction causes it to follow a so-called helical path, Fig. 2 (*B*) which is a resultant of the forward attraction and the circular motion. Thus it can be seen that a number of points of convergence occur, each of which could be called a focus point. In practice, the beam is only under the influence of the focus field for a short interval at which time it is given a sufficient whirl to have the majority of electrons return at the fluorescent screen Fig. 2 (*C*).

SALES HELPS

(*Continued from page* 11)

around for trade or waiting months and months for people to hear of the Shop through the community grapevine. And no man has enough friends or relatives to keep a business alive.

Relative Value of Sales Helps

To bring in business and to establish prestige in the community, a variety of sales helps are available from local jobbers: newspaper mats, illustrated direct-by-mail postcards, window displays, counter cards. decals, stationery, shipping labels and match books.

Of course, no amount of sales promotion will do much good unless the Service Man has made an intelligent survey of his local opportunities. If the locality warrants a Service Shop, however, then the shop warrants sales promotion too. A primary source of radio repair business can be developed through the newspapers. For instance, a local paper with a circulation of 50,000 usually charges about $10 to run a small mat ad. Figuring inquiries at ½ of 1%, or 250 prospects, makes the ad an excellent investment at such low cost. If only 10% of inquiries is converted, the Service Man

would get 25 customers spending $5 or more on the average.

Use of Postcards

Let us evaluate penny postcards. There are usually several types to select, each elaborating on the theme that the Service Man, whose imprint appears on the card, is an expert in radio repair work. The Service Man pays only the 1¢ postage for each card, and in our program can order them from his jobber in minimum quantities of 100 for any one card style. Thus, for $1.00 it is possible to reach 100 carefully selected prospects. Let us assume that 10% is converted into actual sales, each sale totaling $5 or more. Therefore, the Service Man gets about $50 in business, certainly a good return. Naturally, larger mailings do not increase the percentage but they do increase the sum total in dollars received. Considering the returns, both mats and postcards are strongly recommended as primary sales promotion material for the Service Shop. Not only do they sell individually, but they support each other's selling efforts.

Choosing Displays

Unfortunately some Service Shop windows I've seen in my travels look like Indian medicine shows of the old days. Everything in it but the tom-tom, and sometimes that too. A simple display sells better. It is wiser to show several good, attractive items that please the eye than a window piled up like a stockroom. After all, the space is a show window to the public which judges the Shop's ability on appearances first. No more than two display cards should be placed in any window. Too many confuse prospects.

Only one or two decals to a door! I've seen some radio shop doors that looked like the tattooed lady. The point to remember about any display is that if your customer sees too much he will remember nothing. Decals, offered to you by jobbers, should be mounted tastefully but not to obstruct the view of the shop's interior. The selections should best represent your reliable service to the community.

Interior displays must be carefully chosen too. Some interiors look like anything but a Service Shop, with cards and streamers hanging everywhere to fill in bare counter space or to hide cracks in the wall. If a display sells your service, and sells it well, then it should be used. But don't confuse the issue with umpty-nine different signs, some of which *look nice* but deliver no sales message for you at all. Remember, what sells for you is good for your business.

JOTS AND FLASHES

THE WEEK OF NOVEMBER 24TH TO 30TH will be known as National Radio Week. The National Association of Broadcasting and RMA are planning quite a sales-promotion campaign for that week. . . . The National Electronic, Radio & Television Exhibition scheduled for Grand Central Palace on October 14th to 19th was postponed to the early part of 1947. Curtailment of production and corresponding lack of receivers and parts was given as the reason for the postponement. . . . Television-antenna installation methods are now being planned for Chicago by R. Cooper, Jr., Inc., Commonwealth Edison and Television Associates. The latter unit was organized by Captain Bill Eddy, station manager of telecast station WBKB. The Cooper Company are G. E. distributors. Proposed installation charges will vary from $50 to $60. . . . Bernard Benson has been named purchasing agent for the Utah Radio Products Division of International Detrola Corporation. . . . Don G. Mitchell, president of Sylvania Electric, has been named to serve on the National Distribution Council. . . . Major Bernard L. Cahn is now executive assistant in charge of sales and promotion at Insuline. . . . Samuel McDonald, Jr., has been appointed to the sales staff of the radio tube division of Sylvania. He will serve in the New York and Philadelphia area. . . . Rex L. Munger has resigned as sales manager of Taylor Tubes, Inc., 2312 Wabansia Avenue, Chicago. . . . Record receiver production was established during August when over 1,500,000 sets were produced. Of these over 1,000,000 were table models and over 100,000, console and radio-phonograph models. About 20,000 f-m sets were also produced in August. . . . Barker & Williamson have leased a new plant in Bristol, Pa. The present plant at 237 Fairfield Avenue, Upper Darby, Pa., will be retained. . . . The annual convention of Hoffman Radio distributors will be held on November 6th, 7th and 8th at the Mayfair Hotel in Los Angeles. . . . The current issue of the Centralab jobber house organ contains a list of price changes on volume controls and accessories. . . . M. W. Gasner, 71 Front Street, East, Toronto, Canada, has been named Canadian representative of the National Electronic Mfg. Corp., Long Island City, N. Y., who produce auto antennas and components. . . . Elliot A. Witten is now with the advertising department of Radio Wire Television, Inc., N. Y. C. . . . E. A. Ossmann has been named factory representative for Allen B. DuMont Labs. He will operate out of Rochester and cover New York State with the exception of metropolitan New York and Long Island. . . . WABC will use new call letters, WCBS, after November 1st. The call letters of the f-m and t-v stations of CBS will also be changed to WCBS-FM and WCBS-TV. . . . Chester J. Frey has been named eastern district sales representative for the Belden Mfg. Corp., Chicago. . . . Lawrence M. Braun has resigned as vice president of ECA and ECA International to form a metal and plastics component manufacturing company, the Rich-Marc Mfg. Co., Inc., 42 W. 28th Street, N. Y. C. . . . Quam-Nichols has become an Illinois corporation. James P. Quam is president; Matt Little, Jr., vice president; P. L. Dawes, secretary and assistant treasurer and Helen A. Staniland, treasurer and assistant secretary.

ADVERTISERS IN THIS ISSUE

SERVICE INDEX—OCTOBER, 1946

"Cardyne" Cardioid Dynamic
Models 731 and 726

"Cardax" Cardioid Crystal
Model 950

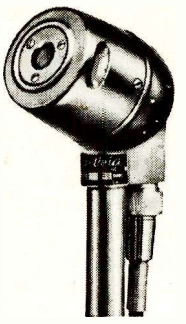
Bi-Directional Velocity
Models V-3, V-2, V-1

Differential Carbon
Hand-Held Model 205-S

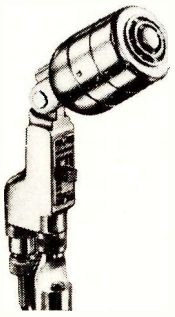
Model 610 Dynamic
Model 910 Crystal

No finer choice than Electro-Voice

TODAY'S MOST COMPLETE LINE OF MICROPHONES



Differential Dynamic
Model 606

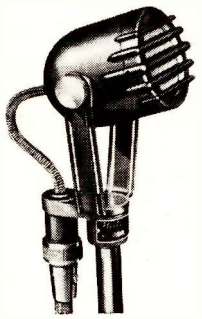


High Fidelity Dynamic
Model 630

WITH important E-V developments such as the *Mechanophase* Principle,* the *Differential† Principle,* the *Acoustalloy* Diaphragm... ELECTRO-VOICE brings you the widest selection of quality microphones, for both general and specific applications. In the complete E-V line of uni-directional, bi-directional, and non-directional types, you can easily find exactly the right microphone to give you the sound pick-up and reproduction you want. A few models are shown here. ELECTRO-VOICE engineers are glad to help you on any special problems. *Send now for new E-V Catalog No. 101.*

*Patents Pending †Patent No. 2,350,010
Crystal Microphones Licensed under Brush patents.

Hand-Held Dynamic Model 600-D
Differential Dynamic Model 602



Versatile Dynamic
Model 640

General-Purpose Dynamic
Model 605

Differential Handset
Model 260 Carbon, Model 660 Dynamic

Comet Crystal
Model 902

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EXCLUSIVE RADIO MERCHANDISING PLAN for Service Engineers

PRESENTATION MODEL No. G619. *6 Tubes. AC-DC. Tuned R.F. Stage. Superheterodyne Circuit. Loop Aerial. Automatic Volume Control. Illuminated Slide-Rule Dial. Standard American Broadcasts. Mahogany Veneer All-Wood Table Cabinet, 13" x 8¾" x 6½".*

COMPANION MODEL No. 571. *5 Tubes. AC-DC. Superheterodyne Circuit. Built-in Antenna. Automatic Volume Control. 2-Gang Air Condenser Tuning. Illuminated Slide-Rule Dial. Standard American Broadcasts. Walnut Veneer All-Wood Table Cabinet, 13⅝" x 7⅞" x 8⅛".*

HERE IT IS AT LAST! The radio line thousands of service engineers have been waiting for—yes, the radio that has *everything* the service trade needs to cash-in on today's big pent-up new set demand.

And who else but National Union could provide a merchandising plan for radio sets—so perfectly fitted to the service engineer's special needs?

For over 15 years National Union products, plans and policies have been shaped for the exclusive benefit of service dealers.

And now N.U. RADIO SETS are here—for the same service men who have so long known and used other N.U. products—and have found the N.U. way of doing business a better, more profitable one for their special type of operations.

THE LINE—5 models, of which one 5-tube and one 6-tube model are now ready; three others available in 90 days.
THE PRODUCT—Top quality throughout; precision-built chassis; beautiful cabinets in modern designs.
PERFORMANCE—Thoroughly up-to-the-minute; N.U. sets compare with the best in their class.
PRICES—Competitive with established brands.
VOLUME REQUIREMENTS—None! N.U. sets are not sold on a franchise basis. Order whatever quantity you need.
DISTRIBUTION—Sold only through N.U. Distributors and Service Dealers.

OTHER MODELS NOW BEING PLANNED

- A 3-Way (AC-DC-Battery) Portable Model.
- A Combination Table Model Radio-Phonograph with Automatic Record Changer.
- A 6-Tube Battery-Powered Farm Radio Table Model.

Here, for the first time, is a practical post-war radio line for the service engineer to handle—a group of fine modern radio sets—but *above all* a proven merchandising plan which *fits*. Ask your N.U. Distributor for the complete facts today!

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Panel Lamps • Flashlight Bulbs • Radio Sets • Auto Vibrators • Ballasts • Batteries