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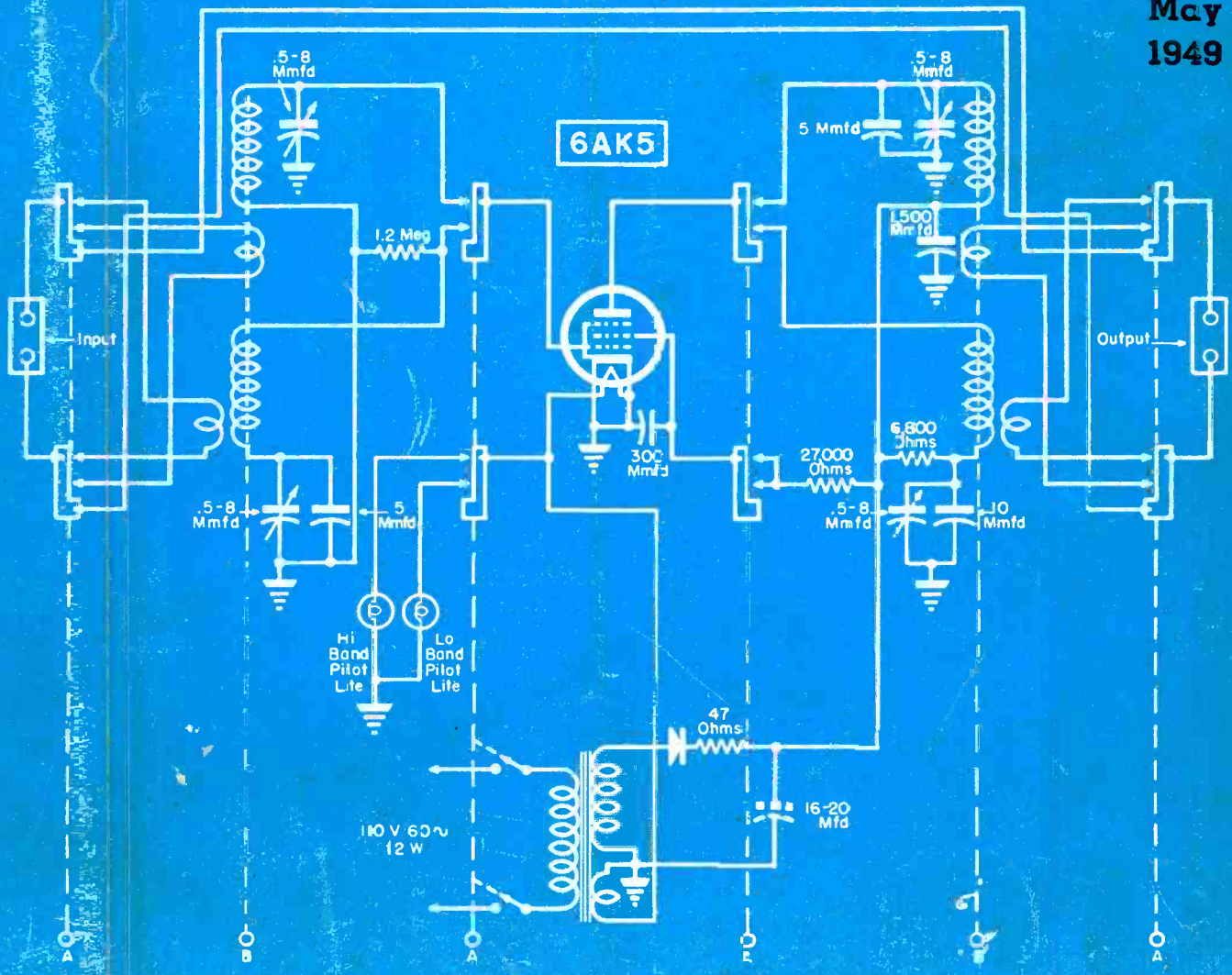

A one-tube iron-core tuned TV booster.

[See page 2]

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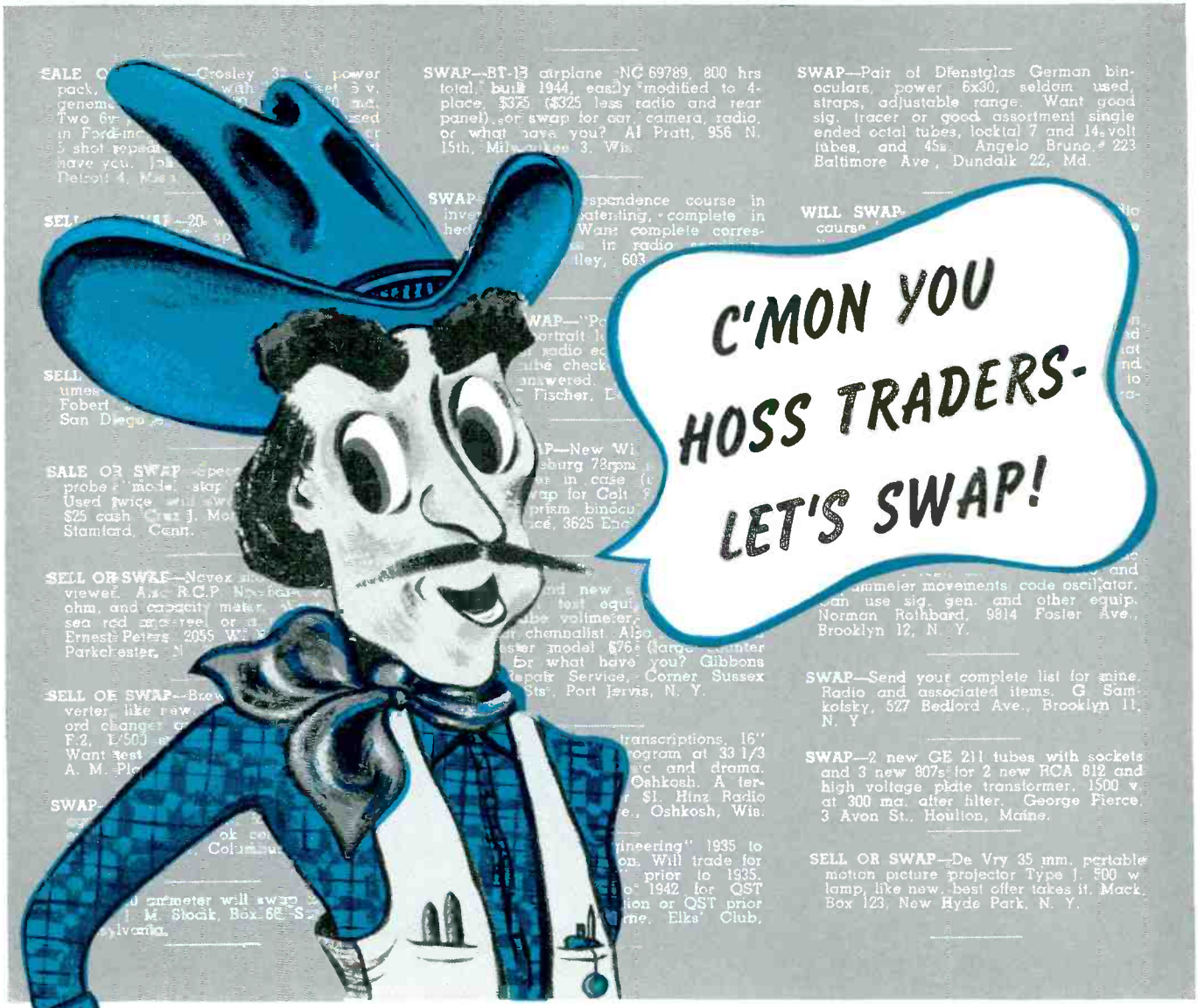

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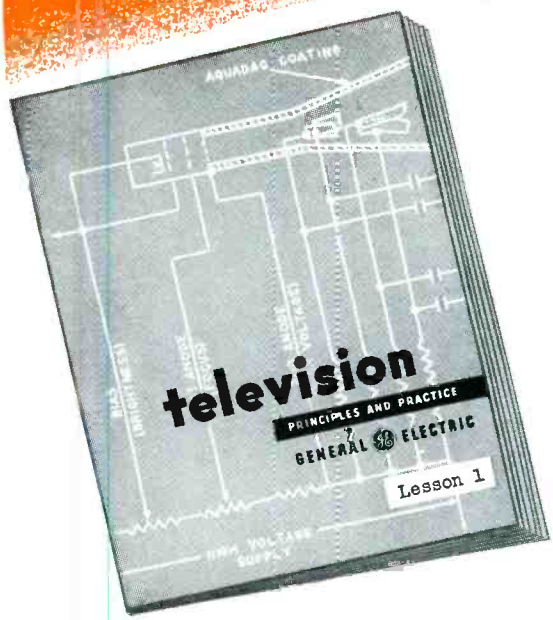

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Vol. 18, No. 5

RADIO · TELEVISION · ELECTRONIC
SERVICE

May, 1949

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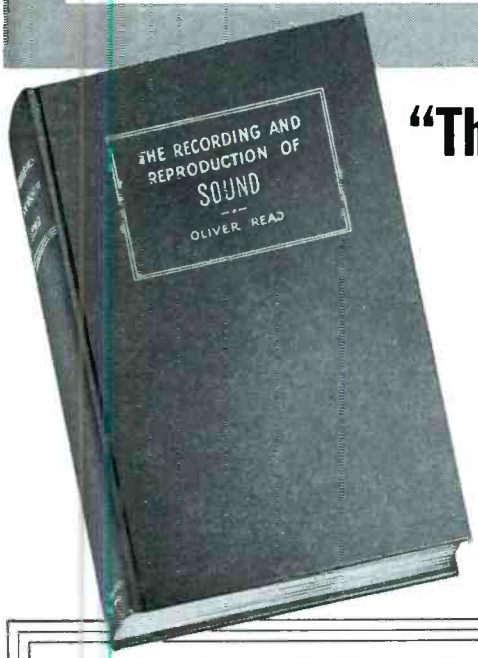

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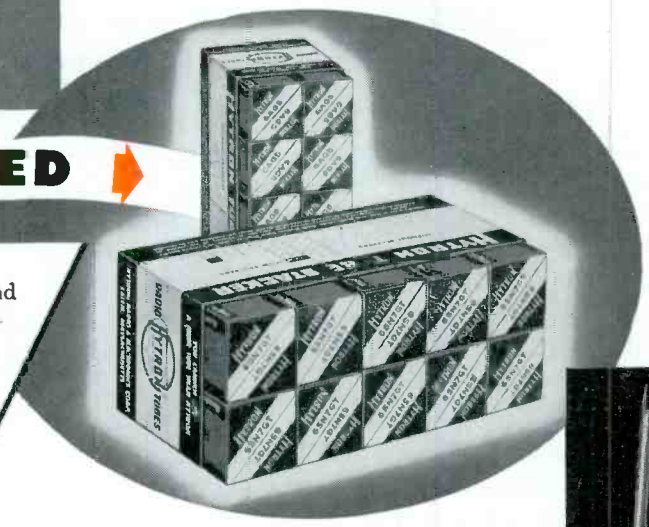

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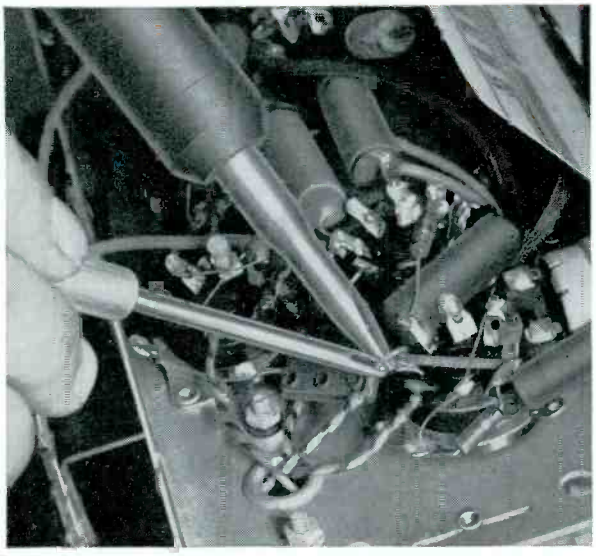

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While iron keeps joint hot, fork tip of Hytron Soldering Aid—like two tiny metal fingers—straddles and, with slight twist, grips end of wire. Effortlessly *unwraps* it. Shifting to other side of lug, it grips and pulls wire free.

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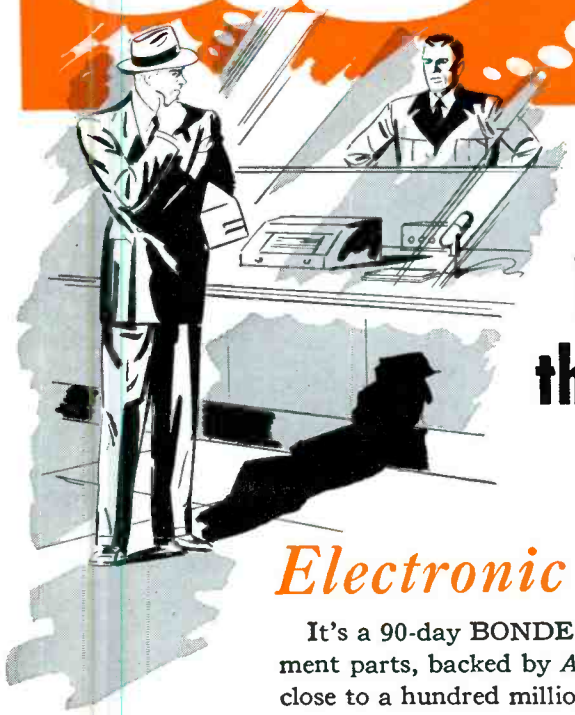

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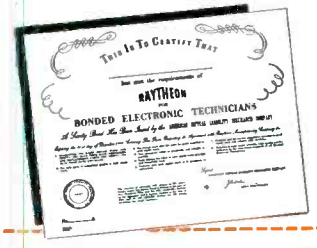

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JOTS AND FLASHES

THE GROWING POPULARITY of TV has been cited again, this time in a review of the market conducted by the research department of Sylvania Electric under the direction of Frank Mansfield. The study showed that new stations should make TV available to an additional 4,900,000 homes in 1949, adding up to a grand total of 22,300,000 radio homes which should be within reach of TV at the end of '49. In a questionnaire about whether or not a built-in antenna was a requirement for purchasing, only 3.5% indicated that they were withholding purchase for this purpose. . . . A special committee to make recommendations regarding the future programs of the Town Meetings has been set up by RMA. Members of the committee include: Robert C. Sprague of Sprague Electric, chairman; A. T. Alexander, Motorola, Inc.; John W. Craig, Crosley; J. B. Elliott, RCA Victor; Harry A. Ehle, IRC (chairman of the Town Meeting operating committee); G. M. Gardner, Wells-Gardner and Co.; H. L. Hoffman, Hoffman Radio Corp.; Leslie F. Muter, the Muter Co.; and L. E. Pettit, G. E. . . . In a recent interview, Charles Golenpaul, jobber sales manager of Aerovox declared that the keynote of the *Parts Show* this year will be quality. He said: "Many of us have become so used to having our products checked by government inspectors that we have taken to quality control like a duck takes to water. We have achieved amazing uniformity of product in some of our plants. Our postwar components offer excellent performance, dependability and life. Service records are tops." . . . Julius Fine, sales manager of Ward Products Corp., will be at the *Parts Show* to discuss a new line of television antennas. . . . The Jensen Mfg. Co., 6601 S. Laramie Ave., Chicago 38, Ill., have recently announced eleven new loudspeaker models, which include five ovals in the 6 x 9" size, five 7" speakers, and one 5¼" model. . . . Transvision, Inc., New Rochelle, New York, have been named exclusive national distributors of Du Mont Inputuners. . . . A. J. Saunders is now director of purchasing of Transvision, Inc. . . . Frank O. Staves has been named plant superintendent of Workshop Associates, Inc., Newton Highlands, Mass. . . . The RCA Service Co., recently released a booklet entitled *The Care of Television Customers*, which details how the Service Man should introduce and identify himself on first contact with the customer, how the Service Man should explain receiver operation, etc. . . . A television training course for Service Men which can be undertaken, either by correspondence or group study, has been announced by G. E. The course consists of eight lessons and is available through G. E. and Ken-Rad tube distributors. . . . Sam Bialek and Leon Adelman have been named Permoflux reps in the metropolitan New York area. . . . Almo Radio Co. has opened a new branch store at 6205 Market Street, Philadelphia. Pete Placido has been named manager of the new store. . . . Rex D'Agostino has been appointed national merchandise manager of Lafayette Concord Radio. . . . The Telrex line of antennas will be on display at the Morrison Hotel, Chicago, during the *Parts Show*. . . . Ab Waxman is now sales manager of the magnetic recorder division of Air King Products Co., Inc., Brooklyn. . . . A 116-page parts catalog has been issued by Radio Shack Corp., 167 N. Washington St., Boston 10, Mass.

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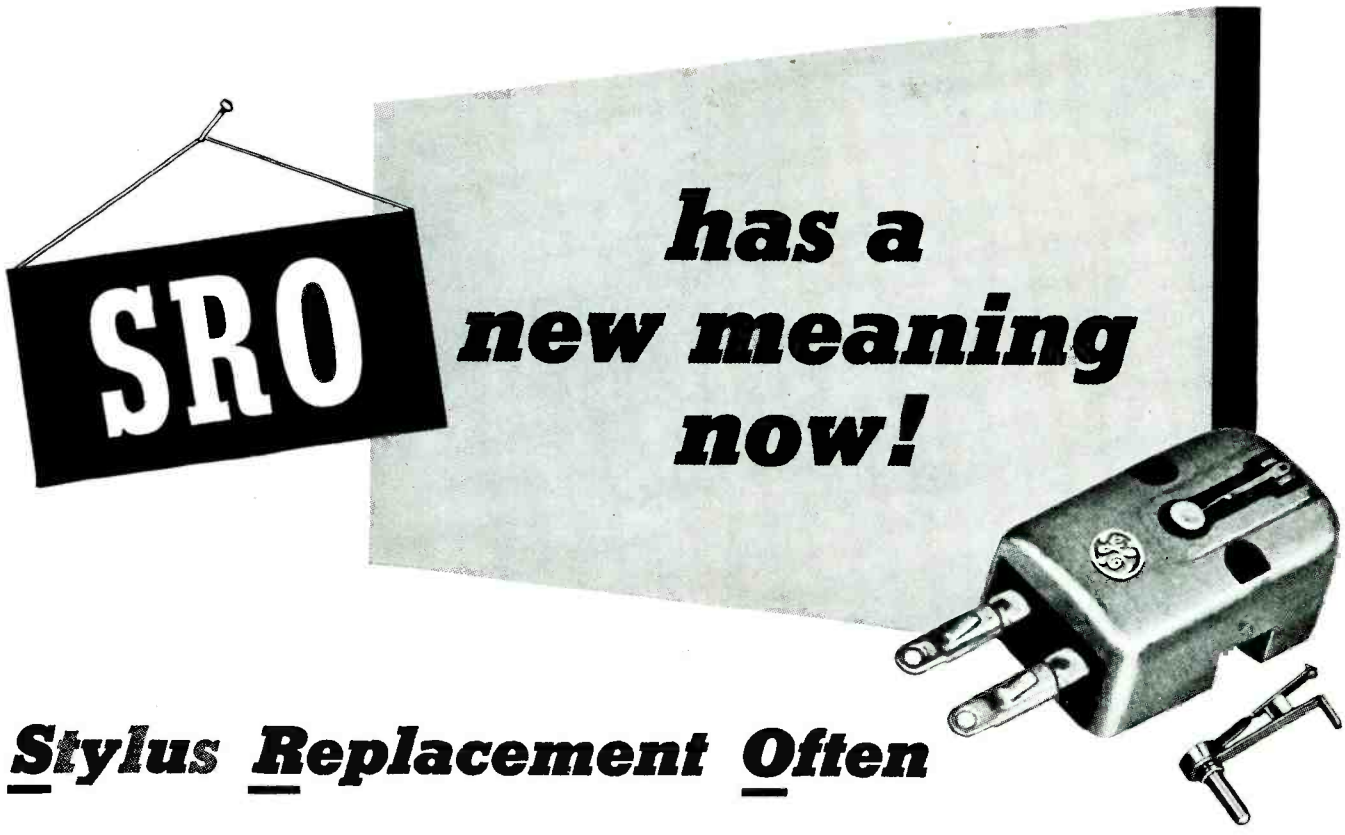

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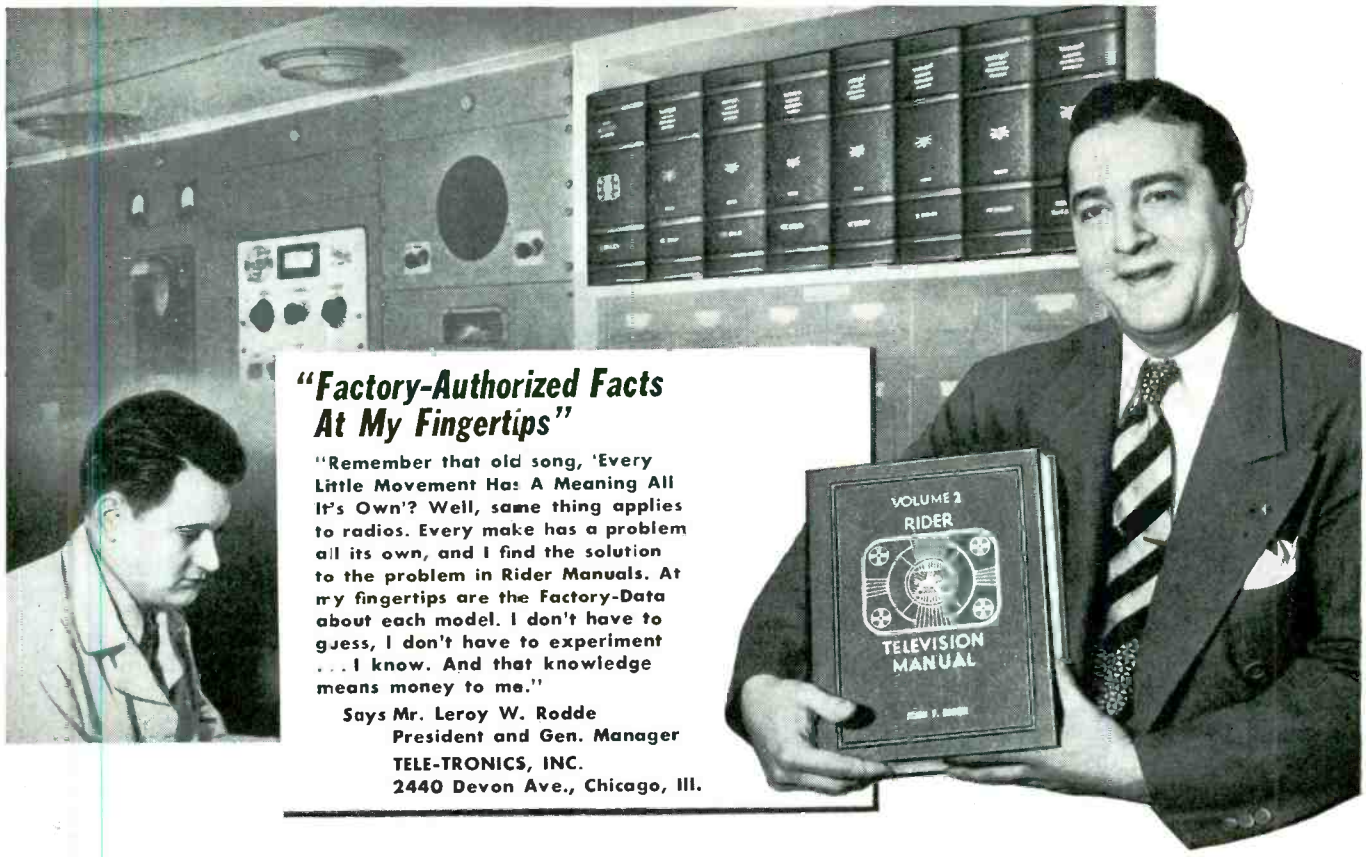

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NOTE: The Mallory Radio Service Encyclopedia, 6th edition, makes reference to only one source of radio receiver schematics—Rider Manuals.

ANOTHER NOTE: The C-D Capacitor Manual for Radio Servicing, 1948 edition No. 4, makes reference to only one source of receiver schematics—Rider Manuals.

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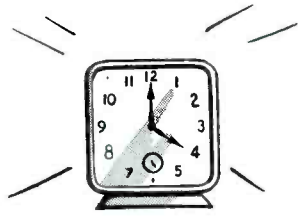
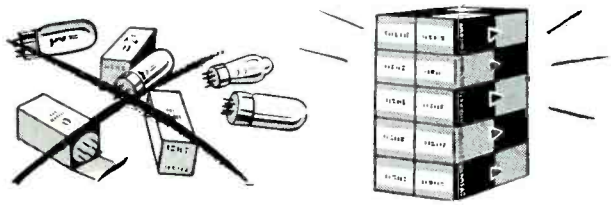
SAVE TIME!



SAVE MONEY!

SAVE SPACE!



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SERVICE

The Broadcaster and the Service Man

THE IMPORTANT AUDIENCE-BUILDING service, which the Service Man renders for the broadcaster, has been stressed on several occasions in these columns. Last month we revealed that the recent Harrisburg preventive maintenance program was co-sponsored by broadcasters who were convinced that such cooperation would produce more listeners for them. In Philadelphia, New York City, and several other large cities broadcasters have also extended this timely aid, aid which has more than compensated for the air time provided. There is now a move on to provide this type of air time on a national basis, an approach which we heartily commend. And in view of the new listening tendencies in those areas where TV has been spotlighted, the program assumes even greater significance.

Reporting on this point, Dave Krantz, PRSMA prexy and head man of the Pennsylvania State Federation group, said that the recent preventive maintenance program showed that the Harrisburg AM listening audience rose sharply during the campaign. He pointed out that every Service Man was actually a potential salesman for the AM and FM broadcaster. The waning listener audience can be recaptured through a repair program which will revitalize those receivers now either completely discarded or operating so badly that reception can be discounted completely. The suggested national program would call attention to the excellent programs available on FM and AM, and how a properly operating receiver would be able to receive these programs more effectively and with better quality. Service Men, broadcasters and the public, too, would be rewarded with mutually satisfactory results with this type of program in force.

We hope that preventive maintenance becomes a national theme and very soon.

TV Servicing

WITH THE SPIRALLING ACCEPTANCE of TV has come a variety of unusual plans to handle the servicing of the receivers. In New York, the Queens Electrical Appliance Merchants Association has set up a cooperative television servicing plan providing for the use of pooled video installation and service facilities. Thus far no standard fee plans have been set up, but a flat charge to every dealer entering the pool is under consideration. Subsequent charges for calls might be included in another flat charge for a specified number of calls or a per call charge approach might be used.

At present two crews are being used and plans calling for the addition of crews in various areas of Queens are expected to be added soon.

The association stated that any profits accruing, as a result of this service, would be rebated to the individual dealer at the end of the year.

In Chicago a *pay-as-you-go* service plan has been introduced by a large distributor. In this plan the TV set buyer is charged from $15.00 to $50.00 for the installation and receives a one-year parts warranty. Subsequent calls up to as many as eight are charged at a $4.00 flat rate, and if more than eight calls are required, the plan provides for a no-charge arrangement.

Chicago, too, is a battle-ground for a TV licensing bill. A proposed measure provides that an examination on sixteen subjects must be passed before a certificate of registration can be approved for the TV Service Man. Many members of associations and industry have indicated that since the questions in the examination appear to be based, in the main, on subjects featured in certain trade schools in the Chicago area, veteran TV Service Men who have not attended these schools would find it difficult or perhaps impossible to pass such an examination. Association members, dealers and manufacturers accordingly have made strong protests against the bill, stating that passing of the proposed examination would in no way serve as the only basis of certifying Service Men as qualified and competent.

TV servicing was also a pertinent topic in RMA prexy Max L. Balcom's talk at the Chicago Town Meeting of Radio Technicians, Balcom declaring that in '49 the industry's income from TV set sales would exceed its return from standard receiver sales, which means that the Service Man is moving into a field in which the stakes of all concerned are very much higher. He said that the owner of a television set has a greater investment, in all probability, and thus will be even more anxious to keep it in tip-top working order.

Balcom reported that by 1951 we can expect at least six million TV sets to be in operation with a public investment in them of nearly two-billion dollars. Accordingly, he pointed out, the business of servicing these receivers is going to require an army of well-trained technicians and the returns from this exacting work will be substantially greater than has been the average Service Man's income from normal repair work.

Balcom emphasized that never before has the industry been so dependent on the Service Man for continued public satisfaction and good-will.

Discussing methods of television servicing, Balcom said: "I believe that the great majority of manufacturers would welcome the opportunity to rid themselves of the responsibility of installing and servicing the sets they make. However, they must first be convinced that the well-trained Service Men are able to undertake the job locally, and insure continued consumer satisfaction. . . . The training of Service Men and the maintenance of service organizations by the manufacturer are costly and rarely profitable. Many manufacturers feel that they have no place in the service business other than to insist that their receivers are properly installed and serviced. . . . Within the past two years the service trade has made great gains in accumulating technical knowledge and the day should not be far off when it can shoulder the job of servicing TV receivers alone. . . . In short, the Service Man is a liaison between the manufacturer and the consumer. He is equally important to the distributor and the dealer, for they, as well as the manufacturer, are primarily concerned in consumer satisfaction."

TV Antennas

IT APPEARS to be antenna lecture time for ye editor and Ira Kamen, who co-authored the book *TV . . . FM Antenna Installation*. The first of a series of talks on TV antennas was offered a few weeks ago at Philadelphia, where nearly 300 members and guests of PRSMA listened in. And during May and June, there'll be visits to the Federation of Radio Servicemen's Association of Pennsylvania groups throughout the state.

Hope we'll have the privilege of seeing you at these sessions.—L. W.

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Custom Audio Installations

High-Fidelity System Installation Opportunities Now at Peak for Every Service Man, Systems Affording The Answer to the Problem Created by Poor Reproducing, Though Costly Console Radio-Phonos and Good TV With Unsatisfactory Sound.

by IRVING GREENE

Sound-TV Manager

Sun Radio and Electronics Co., Inc.

THERE EXISTS today, a gleaming avenue of opportunity for every Service Man, an avenue which offers more substantial profits than ever before.

It's the avenue of *high-fidelity,* including both the conversion of existing receivers and the custom installation of quality home music-reproducing systems, consisting of matched audio components of high-fidelity design. These include specially selected tuners (FM-AM or FM only), amplifiers, speakers, and needed accessories. This is a most profitable source of revenue for the Service Man who acquires the necessary *know-how* and makes an attempt to investigate the needs of his customers.

Nature of the Market

Furniture Versus Radio: Many set manufacturers appear to have set up quite a definition for a receiver: "an article of furniture used to receive and interpret sound transmitted through space."

Foolish? Perhaps—but this belief is prompted and verified by the practice of those manufacturers who, living in a highly competitive market, concentrate on designing beautiful furniture, giving mere secondary consideration to the chassis and even less to the speaker.

Inasmuch as skyrocketing costs of lumber and hardware have made furniture a most expensive commodity, the manufacturer, striving to keep the cost of his set as low as possible, makes the needed sacrifices and comprises, not with what you see, but with what you hear. On the other hand, modern music-reproducing systems, installed unobtrusively in closets, bookcases, stairwells, walls, and existing furniture, eliminating the cost of furniture, offer the customer his full money's worth in *sound*. Another advantage is the choice the customer has of locating the speaker in a desirable, properly designed baffle, hidden behind a piece of framed needlepoint or other decorative piece.

High-Fidelity in Home Radios: The set designer is a practical man. He knows that the tuner and record changer must be located as high up in the cabinet as possible, because people do not like to stoop too low to operate the changer or tune the radio. The *speaker,* therefore, the only element which does not have to be accessible, goes into whatever space is left in the bottom of the cabinet. In many cases the space alloted is inadequate and not baffled at all.

Furthermore, the designer, being a practical man, knows that inasmuch as the speaker is permanently concealed in the bottom of the cabinet, he can select a speaker that will make the least possible dent in his budget. Thus the speaker, an instrument for the creation of sound, and a major component in a receiver, is given the least consideration in even some of the best radio-phonos. Obviously, many cannot even *approach* the realm of high fidelity.

Major advances in FM-AM transmission and recording have actually antiquated most of the *ready-made* radio-phono consoles on the market today, and both poor reproductive quality and high prices have combined to place them beyond public demand. This fact has been substantiated on many occasions. In a review of the reports of a consumer testing organization from May, 1947, to date, the writer found only two high-fidelity consoles that were rated *A; recommended.* These cost $1,125 and $1,175! The latter model was also avail-

A sound system layout with the speaker, amplifier and changer installed on a closet door and the tuner located beside an arm chair.

(Courtesy Altec-Lansing)

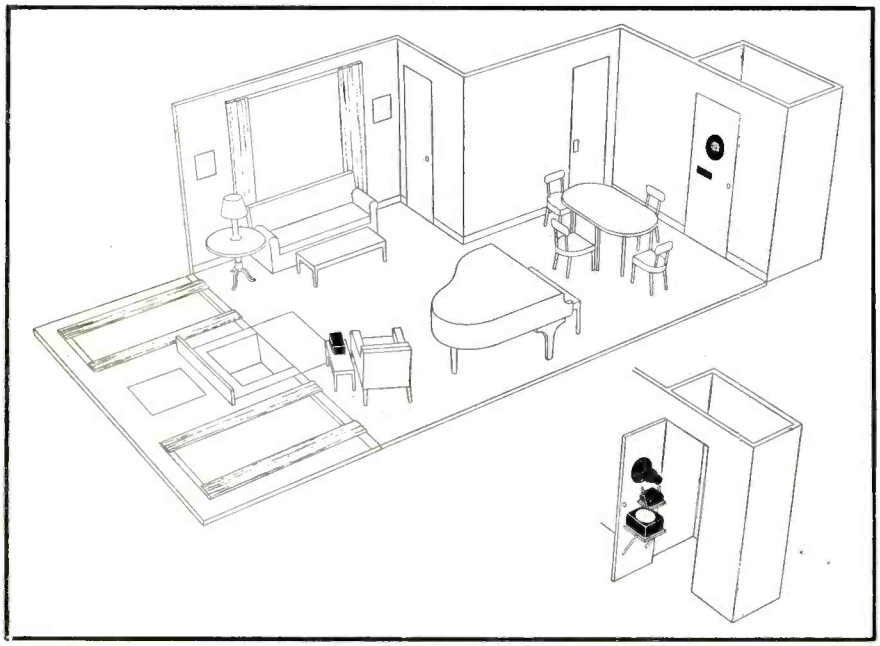

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Fig. 1. Sound-TV studio featuring a single control panel providing demonstration of an assortment of tuners, amplifiers, changers and speakers.
(Courtesy Sun Radio & Electronics Co., Inc.)

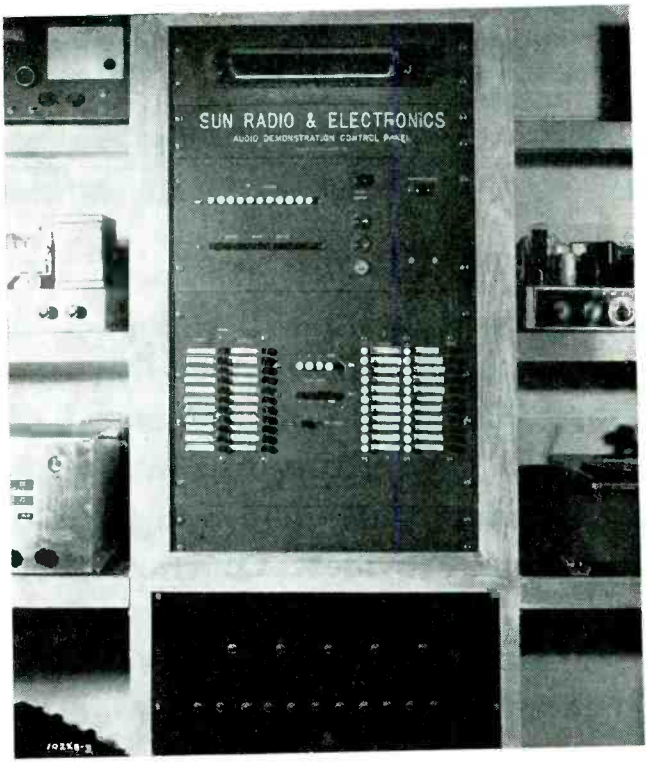


Fig. 2. Closeup of the control panel. The *ac* switch panel below the rack provides almost complete remote control of components. Note the impedance matching switches in the center of the push-button panel.

able in *bleached mahogany* for $1,280 ($105 for additional cabinetry!)

Yet this same organization recommended a phono-amplifier dual-speaker system for only $84.90 that was rated *A, recommended* and equal to the reproduction offered by receivers selling for at least $500. This economical sound system was composed entirely of high-fidelity components, and not furniture.

FM has been publicized and advertised primarily for its noiseless, static-free reception, but few people have ever experienced its *real* advantage: the beauty of natural, full-range music reproduction. The illusion of live performance rarely gets through the amplifier, and, in most cases, never past the speaker, because of the expediency of economical design.

The new full-frequency range recordings[1], another of the major advancements in the field, when used in conjunction with the newest developments[2] in audio, can provide the music lover, for the first time, recorded music with *concert hall* quality. As some of the cartridges can reproduce well over 10,000 cps, and the records themselves are capable of even a wider range, the listener who possesses the proper audio equipment can appreciate the beauty of *natural* reproduction. And, of course, the range of *live* FM broadcasts is limited only by that of the musical instruments themselves.

Yet the average high-priced combination, which offers FM and features an improved type cartridge, has a speaker that will not reproduce much more than 5,000 or 6,000 cps, and produces rumble and distortion below 100 cps.

What About Television?

Perhaps your reaction to high-fidelity is "So What?" After all, *television* is the big item these days. You may be doing so well with TV installations, service, kit-building, and conversions to large screens, that you don't have to consider the tremendous possibilities for further profit in TV. Of course, that is not the case.

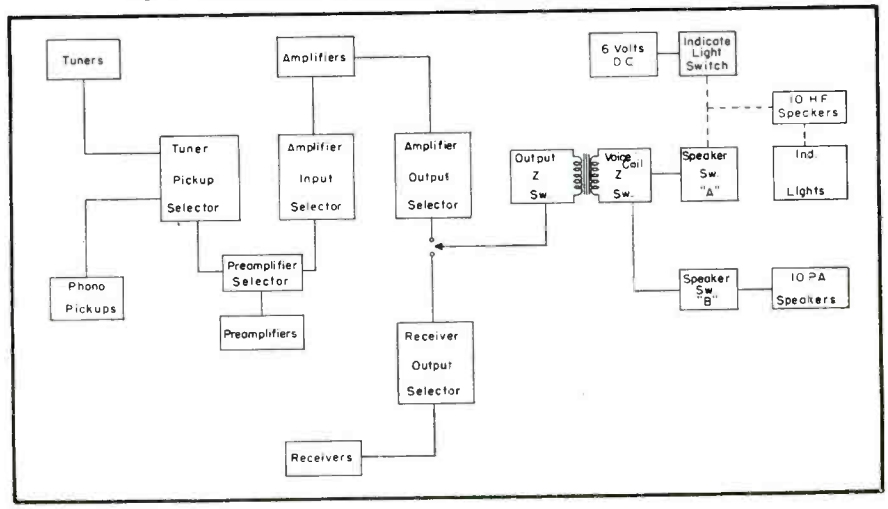
It is well known that the quality of sound in most television sets leaves much to be desired, and a rapid inspection of the cabinet's interior, the audio circuit and tiny speaker, will reveal why. The audio quality of most TV sets on the market is definitely *sub-standard*, and does no justice to the FM circuit. In fact, the audio reproduction of the average table model receiver selling for $375 has been found, in most instances, to be not much better than that of a table radio selling for about $20. The reason again is the manufacturer's competitive position. He's bucking other TV sets and he has to keep the cost down. Thus, once more the audio amplifier and speaker fall under the economical axe.

The tens of thousands of TV owners who want, and can afford, good sound in their TV sets represent a

(Continued on page 28)

[1]Such as Decca's FFRR, RCA's HMV and the London Recordings.
[2]Such as the variable reluctance pickups made by G.E., Pickering, Clarkstan, Astatic, etc.

Fig. 3. Block diagram of the audio demonstration control panel board.



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Stepping Up Your TV SERVICE INCOME

Streamlined System, Developed for the Service Departments of Dealers and Independent Service Shops, Offers Unusual Income-Building Opportunities. Program Minimizes Paper Work, Accelerates Scheduling and Field and Shop Productivity, Provides Constant Source of Cost Analyses Information and A Perpetual Inventory of Parts and Accessories to Facilitate Ordering and Avoid Shortages, and Assures Improvement in Morale of Service Men.

by R. J. GUILFOYLE

Sales Service Coordinator
Andrea Sales Corp.

THE RAPID GROWTH of TV during the past two years has introduced innumerable problems in servicing. Many dealers who installed their own service departments in the early days have seen their activities expand into a whirlpool of bewilderment. Many have found that they were actually losing money, even though their departments were swamped with work, because of the lack of system. In most cases, there had not been enough time to organize a smoothly operating unit.

Dealers have found that although service might not stand out as the primary activity in their setup, it is a particularly vital operation, in many instances as important as the sale itself. Service is an important promotional tool, good service bringing about increased sales. However, an inefficient service department, even though it renders good service and results in increased sales, may soon eat up a good portion of the profits derived from those sales, and become just a necessary evil.

In installing a system, it is necessary to organize the new department

Typical installation order form.

Installation Order — ABC TV SHOP — Tel. ——

Job No. 123456

Name | Date

Address | Phone No.

Near

☐ Installation | Service For Months | ☐ C.O.D. | ☐ Charge | Date Completed

Type & Make | Model | Set Serial No. | Tube Serial No.

Nature of Request

Part No. or Hours | Parts & Labor Description | Building Description & Location

No. of Stories

Class of Building: PRIVATE RES. · APARTMENT · HOTEL · TAVERN · OFFICE · RESTAURANT · INDOOR · OTHER

Type of Building: FRAME · BRICK · STONE · STUCCO · CONCRETE-REINFORC. · STRUCTURAL STEEL · OTHER

Type of Roof | Slope | Flat | Is Ladder Necessary To Reach Roof

Type of Ladder

Travel Miles | P.C.

Work Accepted as Satisfactory | Customer's Sign. | Serviceman's Signature

Time Start	Time Finished	Hours	2	4	5	7	9	11	13	Other

Code: E-Excell, G-Good, F-Fair, P-Poor, T-Ghosts, S-Snow, R-Elec. Inter

Remarks

List All Material Needed For Above Job On This Stub. Turn In At Stock Room

Req. No. 123456	Serviceman	Alternate

Installation order form with provision for call reports.

Installation Order — ABC TV SHOP — Tel. ——

Job No. 123456

Name | Date

Address | Phone No.

Near

☐ Installation | Service For Months | ☐ C.O.D. | ☐ Charge | Date Completed

Type & Make | Model | Set Serial No. | Tube Serial No.

Nature of Request

Part No. or Hours | Parts & Labor Description | Building Description & Location

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Class of Building: PRIVATE RES. · APARTMENT · HOTEL · TAVERN · OFFICE · RESTAURANT · INDOOR · OTHER

Type of Building: FRAME · BRICK · STONE · STUCCO · CONCRETE-REINFORC. · STRUCTURAL STEEL · OTHER

Type of Roof | Slope | Flat | Is Ladder Necessary To Reach Roof

Type of Ladder

Travel Miles | P.C.

Work Accepted as Satisfactory | Customer's Sign. | Serviceman's Signature

Time Start	Time Finished	Hours	2	4	5	7	9	11	13	Other

Code: E-Excell, G-Good, F-Fair, P-Poor, T-Ghosts, S-Snow, R-Elec. Inter

Remarks

First Call

Second Call

Third Call

Fourth Call

Fifth Call

Please Get New Card For Any Further Calls

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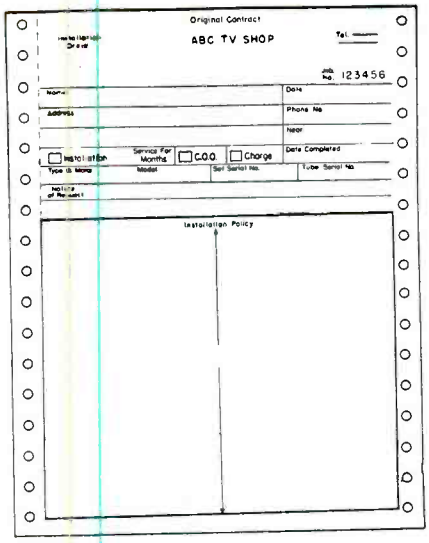


Installation policy form.

or shop as a specialized operation featuring installation and service *only*. The advantages in this approach will readily be seen in the simplification of cost analysis, as well as a supply of information which reveals at any given time just what type of service is being or has been rendered.

The most important aspect of any efficient organization is a smoothly-flowing paper-work system, which covers all phases and supplies a complete record of all transactions involved in the over-all plan in operation.

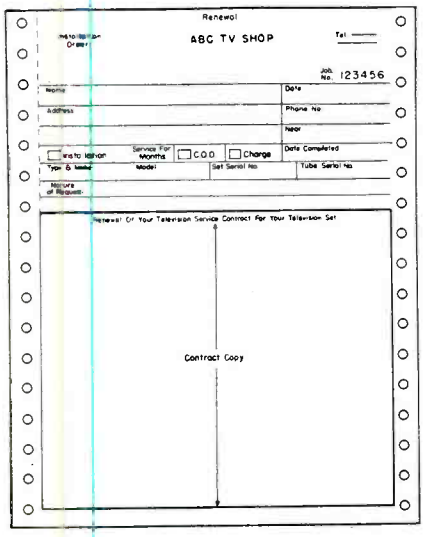
Since installation and service are the two basic services to be pro-

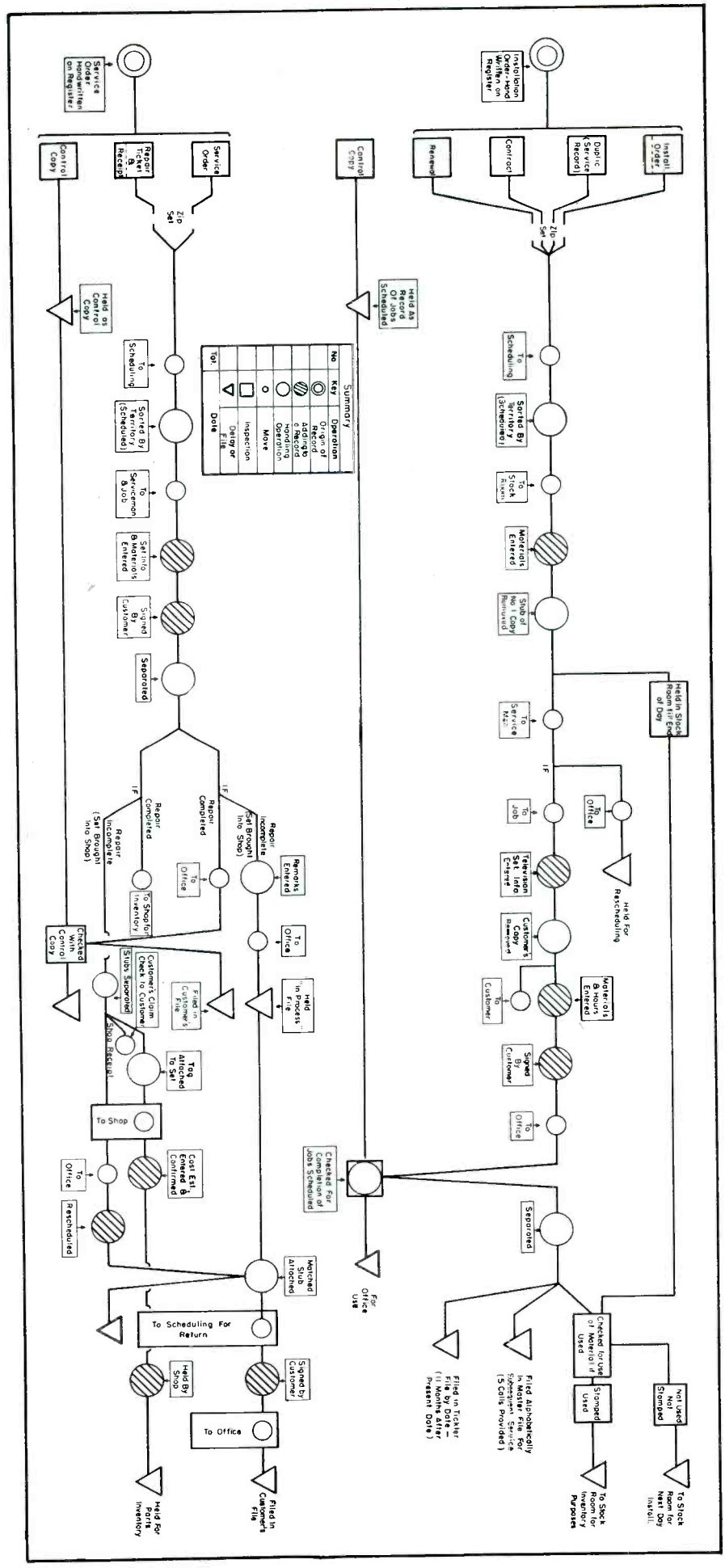
(*Continued on page* 31)

(Right)
Procedure flow chart.

(Courtesy Standard Register)

Renewal policy form.





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Auto Radio Servicing

How to Use Five Basic Pieces of Test Equipment . . . Testing Car Sets on the Bench . . . Power Supply Testing With a 'Scope . : . Voltage Testing . . . General Check Procedures . : . Alignment Techniques . . . How to Build and Apply Special Types of Test Accessories.

by JACK DARR

Ouachita Radio Service

SERVICE WORK on auto receivers can be easy with the proper tools and equipment. However, the rough treatment which most of the auto sets receive even in normal use does make extreme care in repairing imperative for best performance. And the inaccessibility of the units, especially in in the newest model cars, requires extensive use of bench facilities, which, can include several types of special test gear to expedite repairs.

Our power supply, a 6-volt storage battery[1] with a small charger, was chosen instead of the eliminator because of better regulation and for economy. The charger can also be used to conduct high-voltage condition tests. Turning on the charger during tests, it is possible to simulate high voltages such as might be encountered with an improperly-adjusted regulator, the voltage rising to around 7 to 7.5 volts. The battery in our setup is installed under the bench, and connected through heavy cables, to avoid voltage drop, to binding posts on the panel. A 30-0-30 *dc* ammeter is in one of the battery leads, an 0-8 *dc* voltmeter connected across the binding posts, and an 0-5 *dc* ammeter in the leads from the charger to the battery, reading the charging current.

The set connectors are made from heavy cable, flexible, with spade lugs on one end. The others are terminated in fuse holders, to fit the various types of fuses, 3AG, SFE, etc. The ground lead is terminated in a heavy battery-clip, of the spring type.

A regular test speaker may be used to avoid the necessity of removing separate speakers from the car. Ours has pin jacks, for the center-top primary winding, and the voice coil alone. A variety of speaker-connectors should be available. Each terminal of these should be connected to short test-lead tips, with about six-inch pieces of test-lead wire. These may be plugged into the test speaker, in whatever arrangement necessary, and the set's speaker plug connected to it.

About five or six jumpers of test-lead wire, with a small alligator clip on each end, should also be on hand. These come in handy for connecting speakers without plugs, or those which must be disconnected to permit access to other parts. Also required is a lead about 10″ long made from half-inch shielding braid, with a 10-ampere battery clip on each end. This is used to ground lids, etc., with speakers mounted on them, or to connect the two pieces of separate chasses.

Some old bakelite tuning-tools can be made into a handy set of *tuners.* Constructed of ¼″ rod, the ends may be filed to fit the different kinds of splines found on tuning capacitors, volume controls, etc. The tools should be about 6″ long with a knob on one end. This will permit tuning of the set without the need for removal of the control-head from the car, and eliminate the nuisance of dragging the control-head and a long mess of cables around the bench while working.

A discarded antenna rod can be used for tests, and mounted on one end of the bench. A shielded lead with a pin-type plug can be connected to it. These plugs can be converted to the *bayonet* type by slipping on one of the *adapters* furnished with all new antennas. For the special re-

[1]Water level in the battery should be checked on the same day each week. Make a little reminder-card and check it each time water is added. Battery life will be quite good, under these conditions.

Fig. 1. A correctly adjusted and loaded non-sync vibrator should show an almost perfectly square waveform as indicated in this plot.

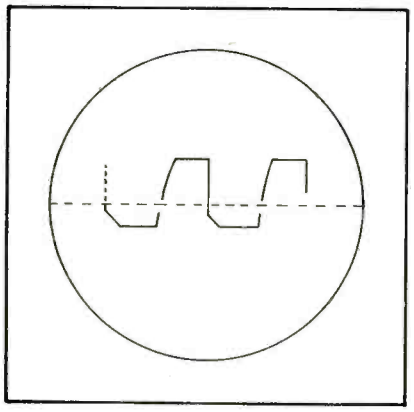


Fig. 2. Severe point bouncing will appear as a ragged top and bottom in the pattern as indicated below.

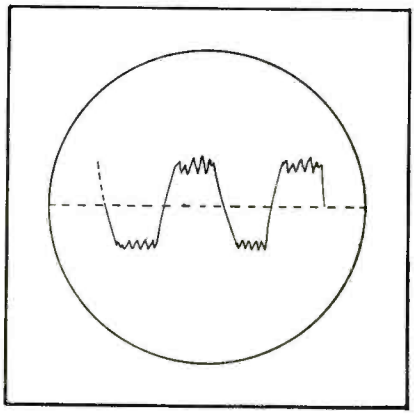
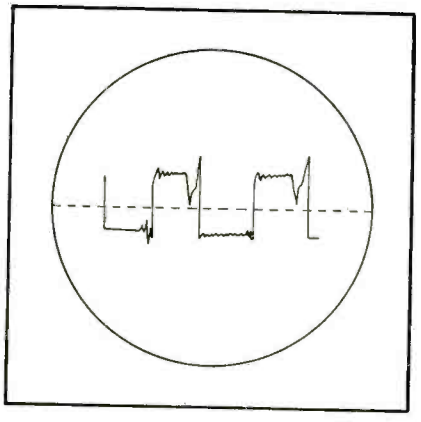


Fig. 3. Open or buffer which is too small will cause excessive peaking or pips on leading edges as indicated in this pattern.



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versible antenna plugs used on some Buicks, Wells-Gardner, etc., sets, a short test-lead can be placed in the socket. Incidentally, if your bench light happens to be a fluorescent, it will be wise to place the test antenna as far from the light as possible.

Test Equipment

Five basic pieces of regular test equipment will serve for most jobs: Tube-tester, preferably of the mutual-conductance variety, electronic volt-ohmmeter, signal generator, signal tracer and a 'scope. The 'scope is invaluable in testing power supplies.

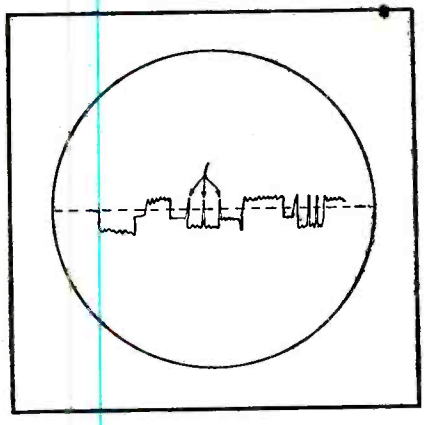
Testing Car Sets

In our shop routine for car-radio tests, the receiver is first set up on the bench, power lead, speaker and antenna connected and the power turned on. While the set is warming up, the tubes can be tested. This preheating saves several minutes. If excessive current drain is noted, the vibrator should be pulled out. A new vibrator should then be inserted, any defective tubes replaced and the set turned on. Battery drain should then be noted. From 6 to 8 or 9 amperes are normal, depending on the number of tubes. Anything over 10 amperes is a bit high. If the drain is excessive, it is best to switch off and investigate. Lids should be removed to expose socket connections, and a visual examination made for signs of overheating, wax leakage, charred resistors, etc. Then the resistance from filter input to ground should be checked. If this is normal, not too low, (about 15,000 to 20,000 ohms is enough) the hash-box cover should then be removed and buffer capacitor checked. This can be done by opening one end, and testing with at least 500 volts *dc*, in a *neon* type leakage tester. Over one flash per minute indicates too much leakage, for this particular capacitor. If the capacitor is good, the *dc* resistance of the high-voltage secondary winding should be checked for balance. A small difference is all right, due to variation in the distance of the two halves of the winding from the core, but anything over a 10-15 ohm difference should be viewed with suspicion. Then the set can be turned on, and the *ac* voltages measured at each plate of the rectifier tube, or each secondary point of a synchronous vibrator. These should be equal to within 3-5%. If the high current drain is still present, the input lead to the filter system must be removed and rechecked. If this doesn't cure it, the vibrator must be replaced. And if this fails, the transformer requires checking. A definite check may be made by disconnecting the set's transformer and temporarily connecting a replacement, on the outside. This is where those short leads with the clips on each end come in handy. If this cures the overload, the transformer must of course be replaced.

We recently encountered a new set, which played very well, but drew about 5 amps too much. Investigation disclosed a 50-volt unbalance in the secondary voltages, causing us to rightly suspect some shorted turns and trouble in the making. This was explained to the customer who agreed to a transformer replacement[2].

Receivers with OZ4 rectifiers should be checked carefully, since they are prone to sudden failure, without warning. If you cannot be sure by testing, then the tube should be replaced. When replacing a metal OZ4 with a glass OZ4G, you may have to add a shield, to eliminate the *rf* hash generated by the tube itself. A better cure is to add a wire to the *2* pin on the socket for filament voltage, and replace with a type 6X5GTG.

Fig. 4. Overloading or a shorted buffer will cause a pattern like this one. Note the extreme fuzziness of the wave and the numerous small extra pips between cycles.



The 'Scope in Power Supply Testing

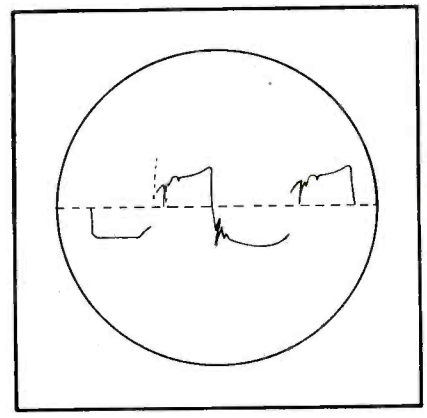
The 'scope can save hours of fussing around in locating troubles, since it provides a complete picture of everything that goes on inside any vibrator type power-supply, and in addition can indicate future troubles before they happen. With only two connections, a very accurate diagnosis usually can be be made in less than one minute.

In application the vertical plates of the 'scope should be connected across the primary points of the vibrator, at the socket. The set should then be turned on, and the controls of the 'scope adjusted for a stationary picture. The exact frequency is not important, as long as you have at least two cycles on the screen. If the picture refuses to stand still, the vibrator is not holding its speed constant, and should be replaced. A correctly adjusted and loaded vibrator should show an almost perfectly square waveform; Fig. 1. Any distortion of these patterns is an indication of trouble somewhere in the vibrator circuit. Bad contacts or *point bounce* will show up as a sloping of one side of the wave. Severe bouncing will show up as a ragged top and bottom of the pattern; Fig. 2. An open or too-small buffer will cause excessive peaking or 'pips' on the leading edges; Fig. 3. Overloading or a shorted buffer will result in the Fig. 4 pattern.

These tests are important because, as we cited earlier, will show up trouble before it actually happens. Improper wave-shapes indicate a defect of some kind in the vibrator, and they will appear in the 'scope patterns before they become serious enough to cause trouble. These may be shown to the customer, with the difference between them and a new vibrator's pattern readily demonstrated. If installation of a new vibrator cannot be sold, the customer can be warned to expect trouble and that you will not be able to take the responsibility for it. When the expected failure occurs, as it invariably does, your reputation

(*Continued on page* 33)

Fig. 5. Pattern which results from excessive buffering. Note the distortion of the wave form at the trailing edge of pattern.



[2]With all the difficulty attendant to getting sets into and out of the car, callbacks should be avoided, whenever possible by anticipating troubles of this type. When the customers return for repairs and adjustments under the guarantee, there is no recourse if you have to take the set out for a repair.

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Auto

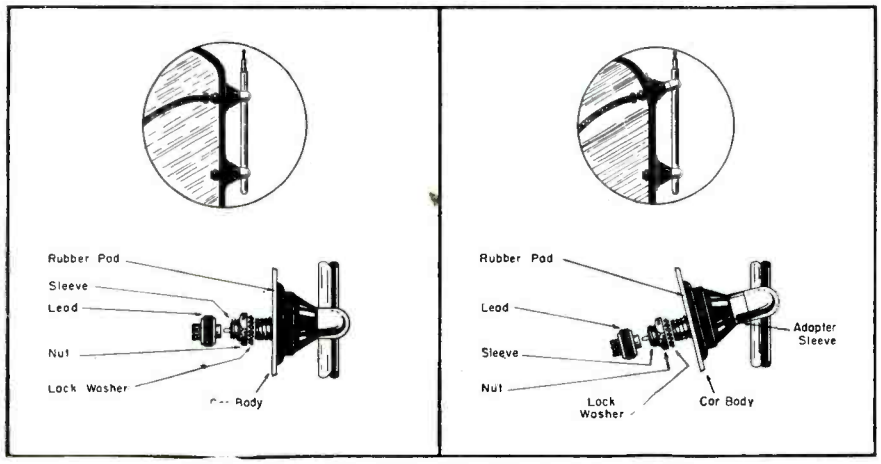


Fig. 1. How a four section side cowl antenna is installed.
(Courtesy Radiart Corp.)

IN AUTO RADIO installations, there are two basic operations: the actual mounting of the receiver, speaker, antenna, etc., and the elimination of electrical interference from the ignition system, wheels, and electrical devices on the car. Although each car offers its own individual problems, there are many points common to all. Development of a routine will make this once difficult job much easier.

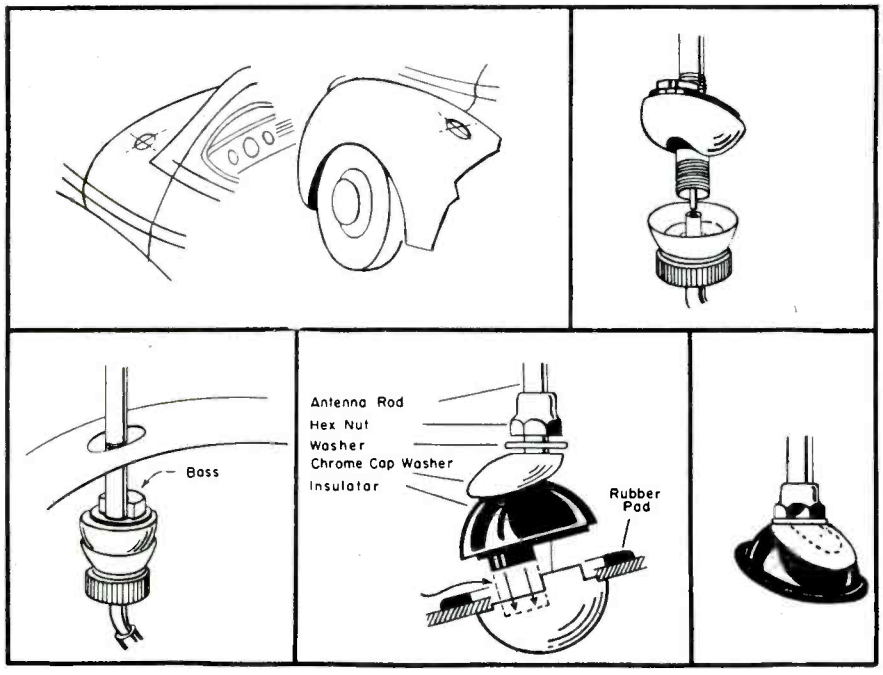
Antenna Installation

The antenna is the first item to consider in the installation. Then, we can attend to the control head and speaker, if these are separate, and finually the set, itself.

Almost all antennas will be found in either of three groups: *top-cowl, side-cowl,* and *top mount.* The top-cowl type is perhaps the most popular at present. This antenna is mounted on top of the cowling, just in front of the corner post of the windshield. The side-cowl goes on the side of the cowling in front of the windshield, and the top mount goes above the windshield, in the center of the top, at the front. The first two may also be mounted on the top or sides of the front fenders, if necessary, although this is a last resort. Here, they are much more liable to damage by mud, rocks, and water displaced by the wheels.

In installing a top-cowl antenna, it is necessary to select a location which is clear of all braces, etc., inside the body. On the General Motors and Chevrolet pickup trucks, the hood presents a problem, since it comes almost back to the windshield. The template furnished with most antennas, must be used each time to insure accuracy. It's a good idea to save up all the old templates; they often come in handy. The drilling of a ¼" pilot hole and finishing to size with a rotary file, has been found to be an effective pivotal operation. These handy little gadgets may be used in the ¼" electric drills to make any size hole, thus avoiding the use of the large ½" electric drill. With the rotary file, all burrs, paint and insulation should be cleaned from the inside of the hole. In the next step, all of the inside parts of the antenna should be assembled, and the leadin cable then connected. The latter step is important, since this part of the antenna is usually quite inaccessible after installation. In the following step the rod should be collapsed and the tip pushed up through the hole from the inside. The tip is then grasped and the antenna pulled up into place. It is important that the *angle-washer,* used to make the antenna mount vertically on a slanting surface, is in its correct position. The rubber gasket, top insulator and nut are then dropped in position, and assembled finger-tight. The rod should then be pulled up and backed off about ten feet, to check vertical adjustment. You can't tell if you're too close. The rubber gasket should be tightened down until it just begins to squeeze out. If the antenna has braces on the inside, they should be installed at this time.

Fig. 2. Top cowl or fender antenna hints.



Side-cowl antennas are mounted on the vertical portion of the cowling, if any. Most of these use two insulators, some only one. They run from 66" to 100" in length. When installing the extra long ones, the insulators must be at least 8" apart, to withstand the strain imposed upon them by the long rod. Insulators are in two sections, one outside, holding the rod, and the other inside the body. An eyebolt holds the rod and passes through both sections. The inside parts are built with a shoulder, which extends through the hole. When drilling the holes, they should be made just a trifle larger than a snug fit for the shoulder.

To much play will permit the insulator to wear, and too little will cause it to pinch and break when tightened. All paint, etc., should be cleaned from

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Radio Installation*

Practical Hints on Installation of Antennas, Speakers, Control Heads, Extension-Type Speakers, Under-Dash and Firewall Mounts and Custom Type Sets. Suggestions for Elimination of Noise Originating in Ignition or Generator System and Wheels.

by LEWIS MARTIN

inside these holes for perfect grounding. The leadins on this type of antenna usually terminate in a *snuff-can,* with a snap cover, to complete the shielding. Leadins may be connected to either top or bottom bolt, whichever is the most accessible. (Sometimes neither one is.) The single-insulator sidemount is installed in the same way.

The top-mount type of antenna is quite a bit more complicated to install and is a two-man operation. Fortunately, all new antennas of this type come with installation instructions. In the basic operation, it is necessary to locate and drill the hole from the top, and cut a small *X* shaped hole in the headlining. The antenna should be assembled inside the car, and the leadin fished down through the corner-post of the windshield. The antenna can then be worked up through the hole, and the locknuts put on from outside.

The leadin cables on practically all the new antennas are terminated in the *pin* type plugs. These may be quickly converted to the *bayonet* by slipping on an adapter, furnished with the antenna. Adapter should be soldered in at least three places, as it will be under quite a strain.

Continuity Tests

Upon completion of the antenna installation, it is then necessary to conduct a few tests carefully with a low-reading ohmmeter. From shield to ground, the measurement should be aboslutely zero resistance. From plug-tip to antenna rod, around two-three ohms can be tolerated; this is due to resistance of very small wire used as inner conductor. From rod to ground, the resistance should be infinity. Even 50,000 ohms here will cause trouble. Incidentally it's a good idea to shake the leadin while testing.

Even new antennas are not immune to intermittents!

Speaker and Control Head Installations

Before installing any of the receiver equipment, a bench-test is recommended. This will uncover any shipping-damage.

If the car is old enough, it might not have a speaker grille in the instrument panel. In that case the speaker is mounted in a small baffle located on the firewall. If the car has a grille, the separate speaker can be mounted behind this. If the speaker will not fit at least three of the bolts or screw-holes provided, two metal straps should be cut out, long enough to reach across the hole. The mounting holes then can be marked and drilled and the speaker assembled temporarily. The speaker should, of course, be centered over the hole, with its mounting holes struck on the strap. Then the holes can be drilled, speaker assembled to straps and remounted. A rubber baffle ring should be used for better tone. Straps may be crossed like an *X* for better rigidity, if necessary. All bolts must be tightened, since any looseness will result in an unpleasant rattle particularly at high volume levels.

Extension or *back-seat* speakers are becoming popular. These are usually spotted in a clear space in the package tray behind the back seat, a hole of the necessary size being cut at this point. After the mounting holes are drilled and the speaker installed, the two leads from the unit (these are *pm* speakers with only two leads) are routed around the top of the trunk, down the side, under the back seat, and along the sides of the car, under the floormats, to the switch, which is mounted under the dash. Wires should be fastened securely with cable-clamps, to avoid damage, especially in the trunk. This speaker and the sets' speaker both connect into the three-position switch, which in turn connects to the set's speaker-plug. This allows selection of either one or both.

Custom-control heads may be obtained to fit any car back to about 1941. These mount in the place provided in the instrument panel for the set sold by the car manufacturer. With the type of head containing the volume control, paint should be cleaned off to insure a perfect ground. It may also be necessary to bond the head to the chassis with a short, heavy braid, to avoid hum and noise pickup.

Under-Dash Mounting

Small single-unit sets are built to fit up under the instrument panel. Two side brackets at the front, and a strap on the back provide a three-point suspension. To install, the set is held up beneath the panel so that a location can be found; then two front holes can be tapped. They should then be drilled and the set suspended from the bolts while the hole for the back-strap is located. Usually, this drilling can be done from the outside, as the flexible strap may be bent to fit. When drilling any holes through the fire wall, it is imperative that you check this operation carefully and are sure that you're not coming out underneath the voltage-regulator or oil filter on the other side.

Some of the small sets have sepa-

(*Continued on page* 35)

*From notes prepared by Jack Darr.

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ASSOCIATIONS

ESFET

AT THE FIRST official meeting of the Empire State Federation of Electronic Technicians, in Binghampton, New York, an election was held and Max Leibowitz, president of the Associated Radio-Television Servicemen of New York, was named president. Other officers selected were: Margaret Sneider, vice president; Wayne Shaw, secretary and Ben de Young, treasurer.

Associations from New York City and Rochester, Endicott, Ithaca, Binghamton, Poughkeepsie and East Williston, all of New York, are members of the new federation. Many other New York groups have indicated that they will soon become affiliated with the State unit. The next meeting has been planned for June and probably will be held in Rochester. Delegates from the Buffalo association are expected to attend and discuss entrance into the State union.

Present annual dues in the federation are $20.00 a year.

LIT-RTG

THE LONG ISLAND Television and Radio Technicians Guild held a meeting recently in East Williston and selected their officers for the year: Gene Laper, prexy; Arthur Cyr, treasurer; Jack Wheaton, secretary. Joseph McNamara, Jr., was named publicity director.

AR-TSNY

JOHN ODEGAARD, member of the Associated Radio-Televison Servicemen of New York, demonstrated his leadin-standoff invention during a recent meeting of the group. John, a

(*Continued on page 37*)

Group of advertisements of dealers, distributors and members of the Radio Technicians Association of Kalamazoo, which appeared recently in the Kalamazoo press during the fourteenth-year celebration of the association.[1]

RADIO TECHNICIANS ASSOCIATION
members
CELEBRATING OUR 14th ANNIVERSARY

DAN'S RADIO SERVICE — Home and Auto — W. L. DANIELS — 5111 Hazel Ave. Ph. 5-4144
Compliments of JOHN OLY Member
Compliments of SETH E. LOVER Charter Member
G. E. APPLIANCES — RCA-VICTOR RADIOS — DILLON RADIO SHOP — L. R. DILLON — 1701 E. Main Phone 7-8318

F. G. RECTOR Member 1028 Mt. Olivet Rd. Ph. 7260
Compliments of "BUCK" WILLETT Member
Compliments of C. NICHOLS R. T. A.
Compliments of P. S. HERRICK Member 937 Streeter Ave.

BENNETT RADIO SERVICE — "CHIM" BENNETT — Charter Member — Auto Radio TELEVISION Home Radio — 721 Portage St. Phone 2-8532
"RADIO BILL" — West's Pioneer Radio Service — In Kalamazoo Since 1922 — Wm. G. West, Charter Member — 1927 S. Burdick St. Ph. 3-4994

We extend our compliments on a job well done!
GREEN RADIO AND REFRIGERATOR SALES — 1036 PORTAGE STREET — PHONE 5181
Harold Laurian — Our Technician
Congratulations of SEARS ROEBUCK & CO. — 161 E. Michigan — "Tony" Owsiany — Our Technician

Best wishes and continued success to the Radio Technicians Association. You men have improved the quality of the service and have put the work on a professional basis.
MEYER MUSIC STORE — 340 N. ROSE PH. 2-5480 KALAMAZOO, MICH — Mr. Paul M. Groecke, Tech.
DEPENDABLE RADIO SALES & SERVICE — Lowell Brown, Technician — 124 S. Main St. Ph. 5301 — Vicksburg, Mich.

TONY'S AIRCRAFT RADIO SERVICE — RADIO F.C.C. LICENSED R. T. A. Member TELEVISION — 511 Arthur Ave. Ph. 4-3203
ELECTRONIC SERVICE COMPANY — 2310 Adams Street Phone 3-5285 — KALAMAZOO 38, MICHIGAN — "10 YEARS A MEMBER"

Compliments TURNER R. HOWARD Member
Compliments H. REAMS Member
Compliments W. MOORLAG Member
Compliments S. J. GLACE Member

For Certified Service!
MATTESON SERVICE — Phone 4-6788 — F. H. Matteson, Technician
Compliments GEORGE M. MYERS Member Parchment
A Written Guarantee

Congratulations TO THE KALAMAZOO R T A RADIO TECHNICIANS ASSOCIATION ON 14 YEARS OF CONTINUOUS GROWTH AND RELIABLE SERVICE TO RADIO OWNERS IN THIS AREA
RALSTON'S — Radio Parts and Equipment Jobbers — 201 N. Park St. Phone 5189 Kalamazoo

Best Wishes and Congratulations to Kalamazoo RADIO TECHNICIANS ASSOCIATION on their 14th Anniversary
GENERAL ELECTRIC SUPPLY CORP. — 112-114 Parkway Phone 3-2645

Congratulations to RADIO TECHNICIANS ASSOCIATION on their 14th Anniversary!
STEVENS RADIO PARTS — Dewey Stevens — 713 Portage St. Phone 2-5720

TEN YEARS AGO

From the Association News page of SERVICE, May and June, 1939

THE SECOND ANNUAL convention of RSA was announced. It was a four-day affair during which an imposing series of papers on technical problems of the day were presented. Engineers from station WGN offered a lecture and demonstration on facsimile. . . . Test equipment for television was described by a group of experts from the Weston Electrical Instrument Corp. . . . Albert Preissman, who was then with the RCA Institutes, presented a theoretical discussion on the installation and service problems which would be encountered in television. Following the lecture an actual demonstration of television transmission and reception was held. This lecture and demonstration were co-sponsored by RSA and the Chicago Section of the IRE. . . . Douglas Fortune, the brilliant engineer who was with Thordarson Electric and who was killed in a 'plane accident a few years later, presented a talk on peak-limiting amplifiers. . . . A representative from Tobe Deutschman presented a talk and demonstration of radio noise and how it can be cured. . . . Bruce Burlingame who represented Supreme Instruments Corp. (and still does) offered a discussion of modern service instruments. . . . Members of Sylvania Corp., delivered a talk on tube developments. . . . Over 1,200 Service Men attended a meeting at the Capitol Hotel in New York. and heard talks on television installation and servicing equipment. The speakers included Norman Hall, television service manager, Du Mont Laboratories; J. K. Whitteker, chief instructor, RCA Institutes; O. J. Morelock, television engineer, and V. E. Jenkins, manager of radio sales, both of Weston Electrical Instrument Corp. . . . A minimum service charge plan was announced by the Detroit Chapter of RSA. Highlights of the plan were: work in the customer's home to be limited to simple repairs to exposed parts of the chassis and speaker, antenna and ground and the testing of tubes; service call charge was to cover removal of the receiver to the shop and return to the customer as well as a general test and inspection of the installation.

[1] Highlights of the celebration appeared last month on the *Association* news page. Inadvertently the association was referred to as the KTA, instead of RTA.

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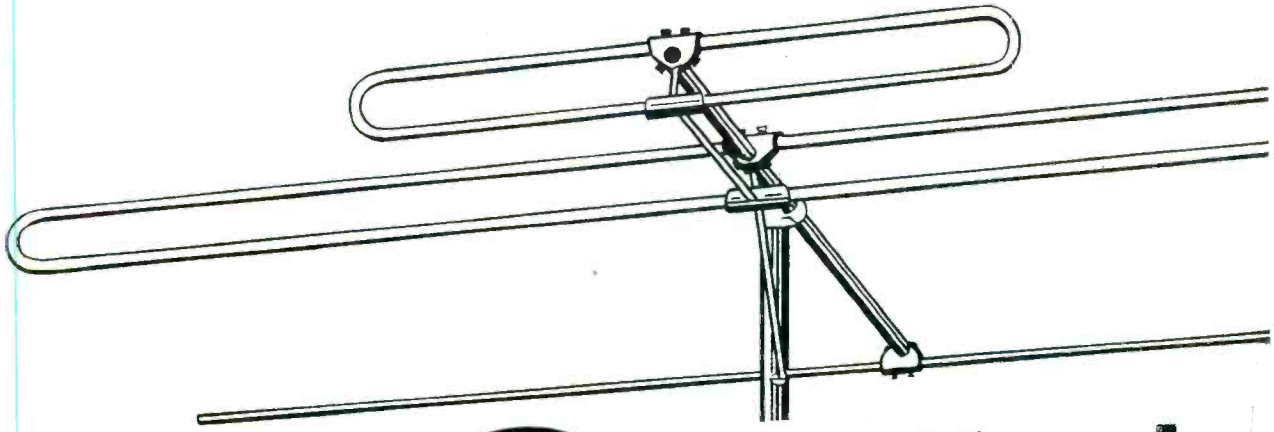
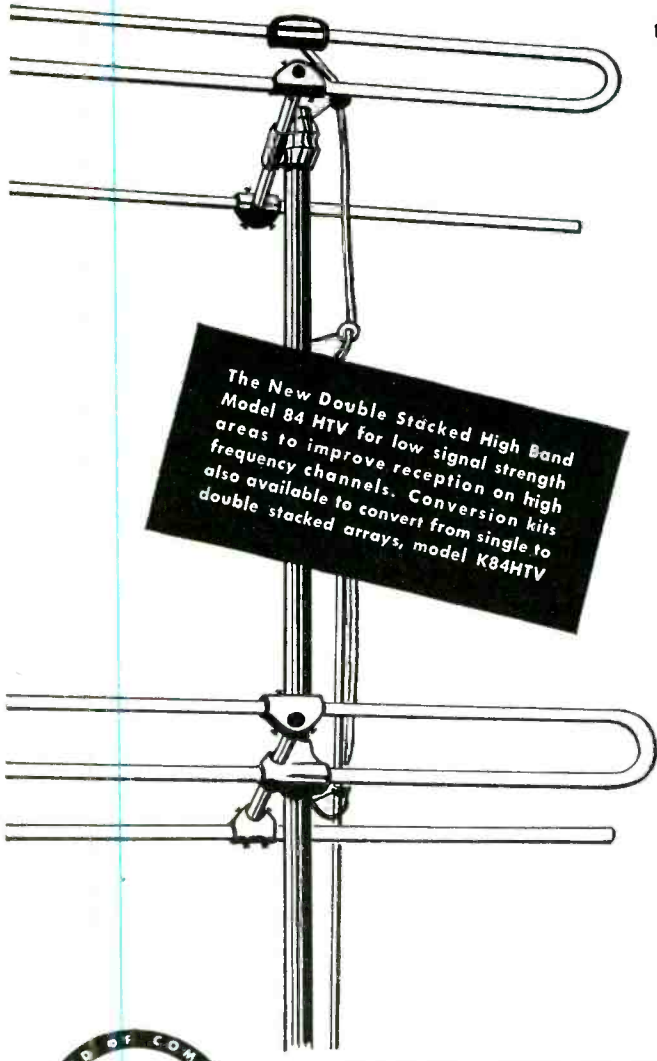


2 New Radiart TV-ANTENNAS



The New Double Stacked High Band Model 84 HTV for low signal strength areas to improve reception on high frequency channels. Conversion kits also available to convert from single to double stacked arrays, model K84HTV

The New Model 85X "in line" Antenna . . . . especially designed for use with Rotators . . . incorporating Radiart's now famous quick assembly design and superior electrical performance on all channels.

Here are the two "hottest" developments from the Radiart Laboratories. Skillfully engineered . . . sturdily constructed . . . these new types add even greater versatility to the popular Radiart TV and FM antenna line.

The New 1949 Vibrator Guide is off the press . . . Ask your Radiart jobber for your copy

IT'S RIGHT . . . WHEN IT'S RADIART

THE RADIART CORPORATION
CLEVELAND 2, OHIO
MANUFACTURERS OF THE FAMOUS RED SEAL VIBRATORS

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SOLDER and the Service Man

Production soldering.
(Courtesy Allen B. DuMont Laboratories and Ersin Multicore Solders, Ltd.)

by FRANKLIN S. HOFFMAN
Ersin Multicore Solders, Ltd.

CONSIDERING THE amount of solder that is used both in the manufacture and in the repair of radio and electronic equipment, it is amazing how little attention has been paid to this important component.

The number of times that solder is used and the amount of money spent on it, make it a product which the Service Man really ought to know something about. All too frequently, a Service Man will ask for . . . *"a pound of solder"* without any regard to the type, the gauge or alloy of the solder he is using. More recently additional attention has been focused on the all-important role solder plays in a Service Man's reputation and in the repair of any particular apparatus.

Due to continuous research in the development of better solders the quality of both solder and flux in the past few years have been improved considerably. A thorough working knowledge of what solder is and what it can do will prove very helpful in all types of servicing. The greatest care taken in the selection of a transformer or a capacitor or a resistor, can readily be wasted if the component is connected with an improper solder.

Solder should not be accepted as just a means of mechanically holding two parts together. Solder can and should do more than that.

Basically, solders are metallic substances of lower melting point than the metals they are being used on and they act by: (*a*) Flowing between the metal surfaces which remain unmelted; (*b*) filling completely the space between the surfaces; (*c*) adhering to the surfaces; and (*d*) solidifying.

Examination under a microscope reveals that in the action of wetting metals, the metal surface and the solder react together, forming a layer of chemically distinct substance, an intermetallic compound phase. It is, therefore, an important feature of any soldered joint, that each of the joined surfaces is wetted by a film of solder and that the two films of solder are continuous with the solder which fills the space between them.

The knowledge of what a solder can do is particularly important to a Service Man because he often finds that he has to make soldered connections on chassis or lugs which have become oxidized, and very frequently in places where the connections have been soldered and resoldered several times. It is obvious that there must be no chance of a poor connection which could throw off the critical values of component parts. The Service Man must have complete confidence that the solder he uses will make the proper bond initially and will hold up after he has completed the repair. At the same time it is important that the repair be made as rapidly and as economically as possible.

Importance of the Proper Use of Solder and Flux in Servicing. Pitfalls in Application of Improper Solder.

Solder Characteristics

Rapid Melting at Low Temperature: This is very desirable for two reasons: First, this feature saves time second, it minimizes the danger of running adjacent components when excess heat is close to them for a long period of time. When soldering adjacent to the crystal controlled 'scopes, electrolytic capacitors, pick-ups or some similar component, it is not wise to keep a hot iron close to these components any longer than is absolutely necessary. Consequently, a solder that melts rapidly is quite essential. One could recommend a high-tin

(Continued on page 39)

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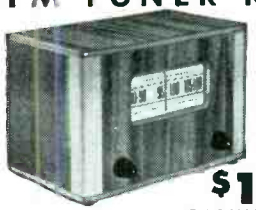
New HEATHKITS and ACCESSORIES

New Heathkit FM TUNER KIT



$14.75
CABINET EXTRA

A truly fine FM Tuner with the coils ready wound, all alignment completed — all that is necessary is wiring and it's ready to play — uses super regenerative circuit — 110 V. 60 cycle transformer operated — two gang tuning condenser — slide rule calibrated dial — two tubes — complete instructions including pictorial enable even beginners to build successfully. Shipping Wt. 4 pounds.

Beautiful mahogany cabinet for FM Tuner (shown above) extra **$3.75**

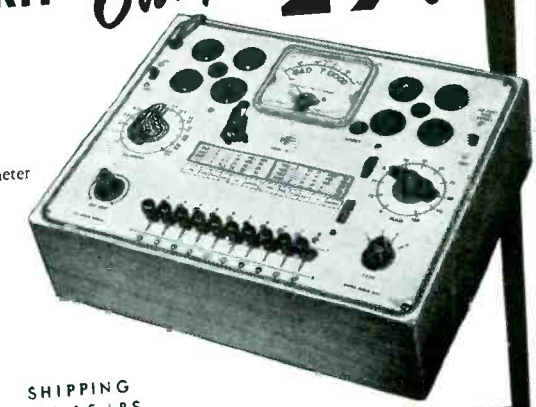
Heathkit TUBE CHECKER KIT

Nothing ELSE TO BUY

Only **$29.50**

Features

1. Measures each element individually.
2. Has gear driven roller chart.
3. Has lever switching for speed.
4. Complete range of filament voltages.
5. Checks every tube element.
6. Uses latest type lever switches.
7. Uses beautiful shatterproof full view meter
8. Large size 11"x14"x4" complete.



Check the features and you will realize that this Heathkit has all the features you want. Speed — simplicity — beauty — protection against obsolescence. The most modern type of tester — measures each element — beautiful Bad-Good scale, high quality meter — the best of parts — rugged oversize 110 V. 60 cycle power transformer — finest of Mallory switches — Centralab controls — quality wood cabinet — complete set of sockets for all type tubes including blank spare for future types — fast action gear driven roller chart uses brass gears to quickly locate and set up any type tube. Simplified switching cuts necessary time to minimum and saves valuable service time. Short and open element check. No matter what arrangement of tube elements, the Heathkit flexible switching arrangement easily handles it. Order your Heathkit Tube Checker today. See for yourself that Heath again saves you ⅔ and yet retains all the quality — this tube checker will pay for itself in a few weeks — better build it now.

Complete with detail instructions — all parts — cabinet — roller chart — ready to wire up and operate.

SHIPPING WT. 15 LBS.

New Heathkit BATTERY ELIMINATOR KIT

$22.50
SHIPPING WT. 18 LBS.

Now a bench 6 Volt power supply kit for all auto radio testing. Supplies 5 - 7½ Volts at 10 Amperes continuous or 15 Amperes intermittent. A well filtered rugged power supply uses heavy duty selenium rectifier, choke input filter with 4,000 MFD of electrolytic filter. 0-15 Volt meter indicates output. Output variable in eight steps. Excellent for demonstrating auto radios. Ideal for servicing — can be lowered to find sticky vibrators or stepped up to equivalent of generator overload — easily constructed in less than two hours. Complete in every respect.

Nothing ELSE TO BUY

$34.50
SHIPPING WT. 12 LBS.
Nothing ELSE TO BUY

New Heathkit BATTERY OPERATED VACUUM TUBE VOLTMETER KIT

The famous Heathkit VTVM now in battery operated type. Use it anywhere — carry it out for work on auto radios — aircraft — boats — any place where 110 V. house current is not available — instant warmup — turn the switch and it's ready to operate. Same quality features, six linear D.C. ranges 0-3V.-10V.-30V.-100V.-300V.-1000V. High voltage extended to 10,000 Volts with probe listed below. Large 200 microampere meter with shatterproof plastic face. Ohmmeter measures from 1/10 ohm to one billion ohms with internal battery. 11 megohm input resistance on DC. AC is copper oxide rectifier type with ranges as above except no 3 Volt range. Complete with all parts, cabinet, 2 color panel, tubes, batteries, test prods and detailed instruction manual.

New Heathkit TOOL KIT

Now a complete tool kit to assemble your Heathkit. Consists of Krauter diagonal cutters and pointed nose assembly pliers, Xcelite screwdriver, 60 Watt 110 V. soldering iron and supply of solder. Shipping Wt., 2 lbs. Complete kit. **$5.95**

RF Crystal Test Probe Kit

No. 309. Kit to assemble. RF probe extends VTVM range to 100 MC. Complete with IN34 crystal. Shipping weight, 1 lb. **$6.50**

10,000 V H.V. Test Probe Kit

No. 310. Extends range of any 11 megohm VTVM to 3,000 and 10,000 Volt ranges. A necessity for television. Ship. wt., 1 lb. **$4.50**

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HEATH COMPANY
BENTON HARBOR, MICHIGAN

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SHIP VIA
___Parcel Post
___Express
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___Best Way

Quan.	DESCRIPTION	Price	Total

Enclosed Find ☐ Check . . . ☐ Money Order for_____. Please Ship C.O.D. . . Postage Enclosed for_____lbs.

The HEATH COMPANY
. . . BENTON HARBOR 11, MICHIGAN

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PHONO installation and service

A New Monthly Feature, Covering All Types of Receiver Phono Systems and The Variety of Initial and Replacement Accessories and Components Now Being Produced, and Detailing Their Design and Operational Characteristics to Facilitate Installation and Servicing. Presented This Month are Data on Receiver Phono Systems Using 2 and 3-Speed Record Changers, and Recently Announced Standard and Long-Playing Phono Motors, Pickups, Tone Arms and Record Changer Units.

by KENNETH STEWART

THE ADVENT of the long-playing, microgroove type recordings has initiated an intriguing cycle of development, resulting in new types of variable speed phono motors and cartridges, pickup arms and needles which can be used in fine-line playback work.

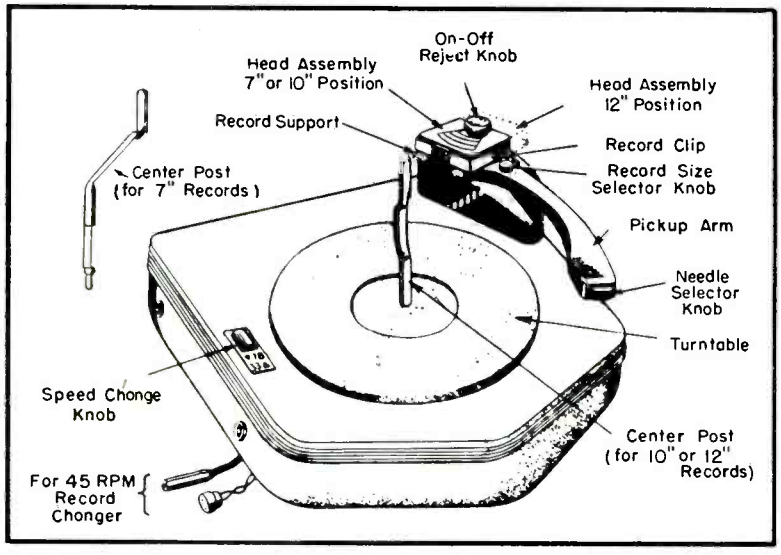
Many set manufacturers have begun to include these slower-speed improvements in their newer models, and applied these new innovations in a variety of interesting forms.

In the Admiral RC210 and RC211 models, for instance, it is possible to play a series of ten 7", twelve 10" or ten 12" records of either the 78 rpm or 33⅓ rpm type; the records must be of one size and type for each loading. These models can also be used, in connection with a 45 rpm record changer, to play the 7" records.

The turntable speed of these record changers is changed mechanically. When a speed change knob is moved to the *33* position, a speed change arm moves. This causes the 33 *rpm* drive shaft to pivot and ride against an idler wheel. When the speed change knob is moved to the 78 *rpm* position, the speed change arm causes the 33 *rpm* drive shaft to pivot away from the idler wheel.

The 33 *rpm* drive shaft is driven by the 78 *rpm* drive shaft by means of a rubber belt. This belt must be clean and free from oil; if the belt is greasy or stretched, it might possibly slip which would cause the turntable speed to vary.

Admiral Model RC210 and RC211 two-speed record changer with provision for connection to a 45-rpm system.



The cartridges used in these record changers are especially designed, as they are for most of these new systems, and there are many important operational procedures which should be observed when replacing the cartridge, needles, or pickup arm cable.

When replacing either needle, the correct needle must be inserted in the proper *side* of the cartridge. The needle for 33 *rpm* records is osmium tipped, the radius of the point being only ⅓ of the radius of the point of a standard needle. If this sharp needle is used on standard 78 *rpm* records, it will have a tendency to *wobble* in the record groove and possibly damage the standard record groove. A needle for 78 *rpm* records may possibly damage 33 *rpm* records because of its tendency to *skate* across.

In the Admiral models the needles are colored to identify their speed-application.

The needle for 33 *rpm* records is painted red. The needle guard on the 33 *rpm* side of the cartridge has red color dots to distinguish it from the 78 *rpm side* of the cartridge.

The Admiral record changer is designed so that when the needle point rests ¼" above the changer pan, the pickup arm will automatically lift high enough, during change cycle, to clear the top record of a stack of ten 7", twelve 10", or ten 12" records on the turntable. With proper pickup arm

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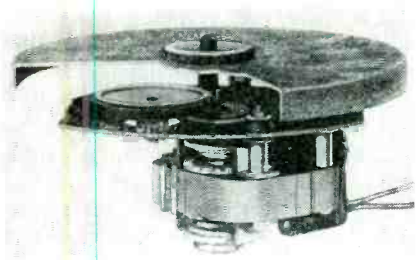
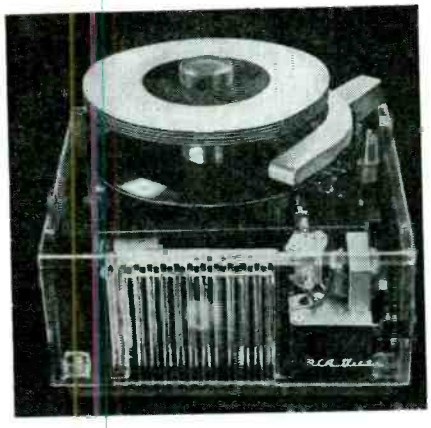
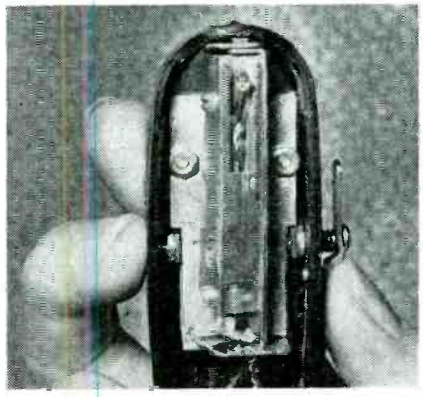


A 45-rpm single-play record player *phonomotor* assembly.
(Courtesy Alliance)

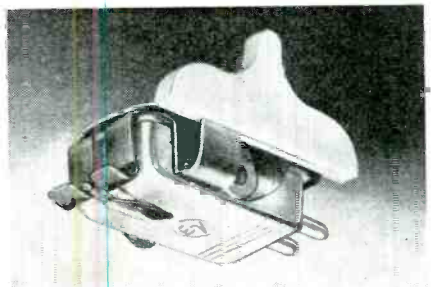


Transparent demonstration model of 45-rpm record changer with built-in amplifier and speaker.
(Courtesy RCA)



Titone type-dual needle pickup using piezo-electric ceramic element which can be employed for the standard and fine-line records.
(Courtesy Sonotone)

Twin-Tilt type pickup.
(Courtesy Electro-Voice)



height setting, the pickup arm will not lift high enough to strike the bottom record of the stack to be played.

Bendix Dual Systems

The Bendix phono model, V800D, also features standard and fine-line record provision.

The changer in this model is a drop type with center record support, operated by a mechanism commonly referred to as a barrel cam or reversing worm. This model provides playing and automatic changing of a series of twelve 10″ or ten 12″ records of standard dimensions, both standard 78 *rpm* or 33⅓ *rpm*, not intermixed. Type also permits manual operation to singly play lateral cut records in dimensions up to 12″ in diameter.

A shaft and cam assembly operates the rotary switch that turns the motor on, and actuates the reject mechanism. The motor operates the changer turntable by means of a friction drive wheel. All functions of the change cycle are governed by a barrel cam gear and the follower it actuates. Changer will continue to cycle and replay top record until control knob is placed to *off* position. An eccentric tripping groove on record is required to initiate cycling in some V800D record changers, since automatic trip mechanism is of a pawl type. Other V800D mechanisms employ a positive trip in conjunction with the pawl trip mechanism.

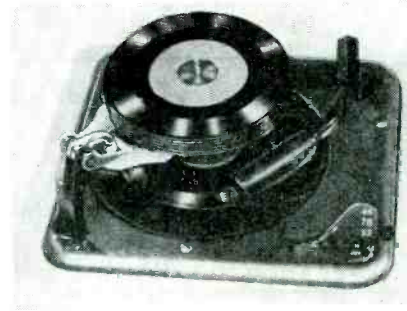
The turntable, rim-driven by the friction drive wheel of the motor, is the motor's only load except during the cycle operation.

The two-speed facility of the V800D record changer requires a mechanism for modifying the drive wheel speed and the needle setting. These are accomplished by control and linkage. When a duo-speed indexed motor control knob is turned to either *std* or *slow* position, a shaft and arm assembly moves a link, which in turn is connected at the motor to a cam lever that positions the friction drive wheel to engage either the small or large section of the armature shaft. The small section of the motor idler shaft causes slow rotation of the turntable and the large section causes standard rotation. Simultaneously a cartridge reversing lever must be turned to either the *slow* or *std* position to correspond with the setting of the duo-speed control. A small plastic cartridge reversing lever is connected to a forked bracket which is secured to a crystal cartridge. In turn, the crys-

(Continued on page 38)

Recently announced 45-rpm record changer.
(Courtesy Crescent Industries, Inc.)

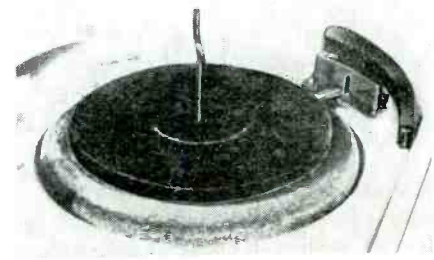
A 45-rpm portable automatic phono unit with a built-in amplifier and 5¼″ dynamic speaker.
(Courtesy Allied Radio Corp.)



Three-speed changer.
(Courtesy General Instrument Corp.)

Turn-over type pickup for standard and micro-groove record playing.
(Courtesy Astatic)

Adapter kit for slow-speed applications.
(Courtesy Micro-Verter)



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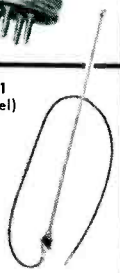

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The case is 8" high x 5" wide x 14" long, attractively finished in "hammered" opalescent blue enamel. Operates on standard 110 volts—60 cycles—40 watts. Tubes, 3BPI—6AC7—6SJ7—6X5—5Y3—884. Instructions included. Complete specifications upon request. Satisfaction or your money back.

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RADIO SUPPLY & ENGINEERING CO., Inc.
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Custom Audio

(*Continued from page* 15)

rich, untapped market for Service Men. Many have spent as much as $75 or $100 to convert their screens to larger sizes, yet where is the Service Man who has advertised to convert a receiver so that the consumer may enjoy, along with his fine picture, rich, theatre-quality audio reproduction? With miniature tubes perfected to substitute for almost any conventional tube, problems of limited space can be overcome, and conversion to push-pull high-fidelity output can be accomplished. Imagine the tremendous possibilities for profit in converting the audio sections of TV sets to high-fidelity! The Service Man with average technical skill and a little selling ability is fully equipped to do it.

The Market in Dollars and Cents

Thanks to the interest stimulated by the consumer testing organizations, radio and music columns, the advertising of some manufacturers in the high-fidelity field, and the growing realization among listeners themselves that they are not getting the most out of the receiver, the market is literally as broad as the borders of the United States. No longer the exclusive property of engineers, audio enthusiasts, and avid long-hairs, high-fidelity has caught the fancy of the public. They are becoming tone conscious and learning to realize that music is heard, not seen. It adds up to a huge market for fine amplifiers, loudspeakers, tuners, turntables, tone arms, and dynamic noise suppressors. Both sales and service can keep the cash register ringing.

One manufacturer[3] has estimated that 50,000 custom-built home installations will be made in 1949, at prices ranging from less than $200 to over $1,000 each. These installations will total more than $40,000,000. And this money will be spent for equipment and installation, not furniture.

It is interesting to note that in selling and installing high-fidelity, you do so without competing with conventional set dealers, and without having to cope with irrelevant objections to style, shape, and finish of the cabinetry, because there is none.

Selling High Fidelity

The major requisite of high-fidelity selling is that the customer *must hear* before he can be sold. Preferably, he must be given the opportunity to compare *hi-fi* with conventional radiophonos. Even the *tin ear* becomes instantly aware of the acute and impelling difference. There is no doubt that proper demonstration and comparison is the primary selling force of high-fidelity. Above all, however, it is up to the Service Man to actively promote *hi-fi* and make his prospects aware of its very existence.

The independent Service Man has the choice of either constructing a sound demonstration room, setting up a portable *display and demonstration rig,* or utilizing the facilities of an existing studio.

Service Men in the New York area can take advantage of a completely equipped 1,000 square foot studio[4] where they can bring their customers in and demonstrate the components, privately discussing price and intallation. Free technical assistance is given when requested. They may use these facilities to demonstrate to their customer more than 2,600 different combinations of audio components. And Service Men interested in constructing their own demonstration

[3]Altec-Lansing Corp.

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studios can adapt to their own needs the techniques used in this installation.

Sales and Demonstration Techniques

The New York studio, which features *self-service* sound demonstration, enables instant comparison between ordinary sound reproduction and full-color high-fidelity reproduction, as well as between various combinations of *hi-fi* units.

The ancient maxim, "If you want to sell it, let the customer take it in his hands," has been improved upon. By pushing a button, the shopper himself may select from 2,600 possible combinations of audio components. So quickly is switching accomplished that memory of the last combination heard is easily retained and selection dilemmas are rapidly resolved into a choice.

Focal point of the studio is a push-button control panel which controls the selection of any one of twenty speakers, eleven inputs (five radio tuners and six phono turntables), and eleven amplifiers. There is also provision for listening to any one of eleven custom-built receiver chassis through any of the speakers. Push-button selection of amplifiers to TV tuners is another feature of the control board.

In designing this studio all precautions were taken to overcome the fears, doubts, inhibitions, ignorance, and timidity that might conceivably beset the consumer in his quest for high-fidelity components.

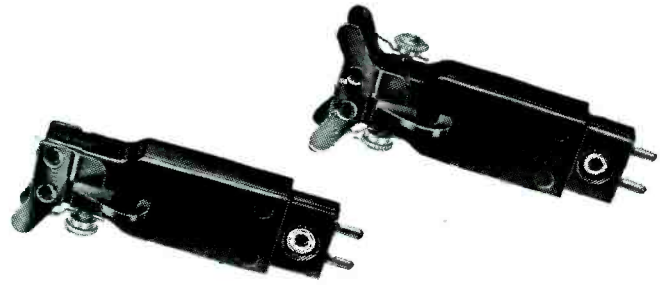
First, it must be understood that the average prospect is not a technician, and nothing frightens him more than an exposed radio chassis. He may have trouble, real or anticipated, in properly operating these many tuners and amplifiers. However, through the demonstration control panel, the customer can operate it as easily, if not easier than a ready-made console combination. It is only necessary to push the buttons and switch from tuner to tuner, phono to phono, amplifier to amplifier, and speaker to speaker. The customer is impressed with the simplicity of tuning in, and is left to concentrate upon the equipment he wishes to buy.

The technically minded person, on the other hand, has the rare opportunity to compare various types of pick-ups, relative advantages of triodes and pentodes, value of output transformers, etc. Panel cutouts automatically light

(*Continued on page* 30)

[4]Sun Radio and Electronics Co.

The little SHURE cartridges that fill the Big need for High Fidelity Phonograph Reproduction . .



THE NEW SHURE "VERTICAL DRIVE"

CRYSTAL PICKUP CARTRIDGES

Big things often come in little packages . . . So it is with the superlative new Shure "Vertical Drive" Crystal Cartridges. They reproduce *all* the recorded music on the new fine-groove recordings—a reproduction that meets the strict requirements of high compliance and full fidelity. The "Vertical Drive" cartridges are requisite for the critical listener—the lover of fine music. They are especially recommended for those applications where *true fidelity* is essential.

SINGLE MODELS:	**W23A** for standard width - groove records. **W21A** for fine-groove records.
TURNOVER MODEL:	**W22A** for both standard and fine-groove recordings.

Unusually highly compliant, these "Vertical Drive" Cartridges will faithfully track standard records with a force of only 7 grams—micro-groove records with a force of only 5 grams (an added protection for treasured recordings). Will fit standard or special mountings. Have more than adequate output for the average audio stage.

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Custom Audio

(Continued from page 29)

up directly underneath the components in operation, for immediate recognition.

With pictures and words, the prospect is shown the many ways in which he himself may make custom intallations at home. He is shown the simplicity and advantages of assembling, for example, his own record reproducing system. He is given ideas on how it may be incorporated into existing home furniture, behind closet doors, or in bookcases, the *new look* in radio today.

A full selection, in all price ranges, of the various components is made available for demonstration.

Considerations in Constructing a Studio

The average Service Man's sound studio, of course, need not be as large and all-inclusive as the room just described. For instance it is possible to get along very well with a *studio* rigged up in a corner of your service shop, with a working display of one or two good *packages*. Actually, your primary problem is showing the customer that his choice lies between high-fidelity installation and conventional radio, not between two different *hi-fi* installations. If you display more than one high-fidelity package, they should be in different price ranges.

Service Men should keep in mind that *custom installation* is a supplement and not necessarily a replacement for their regular service and TV business. In fact, this approach to high-fidelity may prove to be an excellent source of contacts for your television sales and service. And demonstrating television sets with excellent audio circuits added may be, in many cases, a superb sales *clincher*.

•

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Mobile TV antenna laboratory designed to field test antennas under all types of transmitting conditions and all urban and rural topographical situations. Equipped with *hf* signal generators, transmitters, cable, etc.
(Courtesy Ward Products Corp.)

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				5	3

Fil. Wdgs. Volts	Amps.	Mtg. Centers	Dimensions H	W	D	Mtg. Type
6.3	.6	3x3¾	3¾	4½	5⅝	C
6.3	8					

VERTICAL OUTPUT TRANSFORMER

Type No.	List Price	Turns Ratio Primary to Secondary	Mtg. Centers
A-3035	$5.25	10:1	1 19/32x2

Dimensions H	W	D	Mtg. Type
3⅛	2 11/16	2½	EV

HORIZONTAL BLOCKING OSCILLATOR TRANSFORMER

Type No.	List Price	Turns Ratio Primary to Secondary	Mtg. Centers
A-4002	$3.00	2:1	1 15/16

Dimensions H	W	D	Mtg. Type
1¾	2 5/16	1½	J

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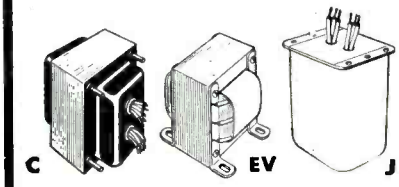
All catalog items in stock.



PRODUCTS OF MERIT

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TV Income

(*Continued from page 17*)

vided, the system must provide for each function.

System for Control of Installation

The first person concerned in the operation of this system is the person making the sale. It is necessary for him to fill out a rough pencil copy of an installation order completely showing all facts pertaining to the type of building, location, type of roof, etc. This installation order, normally handwritten, must be sent to the service department or organization. It is very important that the salesman, whenever possible, refrain from offering an installation date, but refer the customer to the installation-scheduling department. If this presents a problem, the salesman should always consult the installation scheduling department before making a promise. A tentative promise can always be made if the salesman is always kept well informed of the situation existing with the scheduling of installations.

In the second step, the installation scheduling department must study the installation order and proceed to fill out a master form which consists of five parts, as illustrated on pages 16 and 17.

(a) Installation order with material requisition stub attached
(b) Customer's contract
(c) Renewed contract
(d) Original record card (additional single copies are supplied)
(e) Audit copy

Analyzing Form Data

After the information has been entered on the form, the scheduling department gives the installation order and the customer's contract to the installation man. By analyzing the information on the order this man can determine approximately what materials will be required on the job. The requisition stub can be filled out accordingly and presented to the stock clerk who will issue this material to him. The renewal contract then must be immediately filed in the office to permit solicitation of renewals one month previous to the expiration of the original contract. A folder, containing either the customer's name or ledger number and the service record, is prepared and then filed away. Upon completion of a day's work, the instal-

(*Continued on page 32*)

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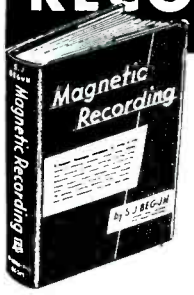
Complete, practical data on

MAGNETIC RECORDING



By S. J. Begun
Chief Engineer, The Brush Development Company
300 pages, 6x9, 130 illus.
$5.00

HERE at last is the "low down" on one of the fastest growing electronic developments in all of its design, engineering and experimental phases. MAGNETIC RECORDING acquaints you with every detail of modern equipment, brings you the latest information on applications ranging from home entertainment to movies, broadcasting, professional and amateur radio, and special uses such as military speech scrambling.

IT PAYS TO STUDY THE NEW DEVELOPMENTS!

Acoustic and magnetic factors are carefully explained. A-C and D-C biasing methods, distortion factors, reproducing heads, drive mechanisms, and the various recording media and methods of recording, reproducing, and erasing are discussed in detail. Particularly valuable are a complete outline of recording devices and how they are used; a helpful study of instruments for determining recording performance; and a clear discussion of magnetic versus other recording methods. Contains more than 130 illustrations. Use coupon for 10 days' free trial.

Check These 10 Helpful Chapters

1. Short History of Magnetic Recording
2. Acoustic Factors
3. Magnetism
4. Theory of Magnetic Recording
5. Components of a Magnetic Recording System
6. Magnetic Recording Equipment
7. Applications of Magnetic Recording
8. Instrumentation and Magnetic Recording Measurements
9. The Magnetic Phonograph
10. Helpful Glossary of Magnetic Recording Terms

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NAME .....
ADDRESS .....
CITY, ZONE, STATE .....
OCCUPATION .....

TV Income

(*Continued from page* 31)

lation orders are turned in; those which are completed are processed and checked against the stub which has been sent up by the stock room. Provided everything is in order, the stub can then be stamped *used* and returned to the stock clerk. On incompleted jobs the stub is returned to the stock clerk unstamped and the installation order goes through rescheduling. When this order is reissued, the intaller then knows that the stub is in the stock room and he has to draw his equipment against it. This method enables the stock clerk to make sure that all unused material is turned in. If it hasn't been turned in, he knows where it is, and the man who originally signed for it can be held responsible. When the installation order is completely filled in, and the job is completed, this order is filed.

Perpetual Inventory

The stock clerk must keep a perpetual inventory cardex of some sort. When an audit is made he must either show used stubs, unused stubs where material has not been returned, or remaining stock. On incidental materials such as lead anchors, standoff insulators, etc., a weekly issue can be made to the men and a record can be kept showing a total quantity being used for a certain group of job numbers. Any antenna rework must be treated as a regular service call and charged up against service. One of the most costly functions of a service department is the repeated reworking of an installation. Every effort must be made at the time of the original installation that the job is as near perfect as possible. In the long run it will be found economically wise to have crews complete perhaps only two perfect installations a day with no call-backs, than five and create the possibility of many call-backs. It is the responsibility of the service manager to see to it that this factor is accented. Warning the crew that a periodic inspection will be made of their work is one way, although severe, of minimizing rework calls.

[*To Be Concluded in June SERVICE*]

•

PARTS STORE ON WHEELS

Interior of truck, with parts and accessories, which is now being put in operation by Philco distributors throughout the country. More than $16,000 worth of parts can be stored and displayed in the trays and shelves.

These trucks will make regularly scheduled calls on Service Men.

In view above appears Walt Fieldsa, parts and accessories salesman of Electric Sales & Appliances, Miami, Florida, discussing the facilities of the truck with one of his regular service customers.

YOU CAN PUT ALL YOUR EGGS IN THE QUAM BASKET! . . .

In spite of the old adage, you will find it pays to specify Quam Adjust-A-Cone Speakers for all your replacement jobs.

The Quam Line is complete; there is a speaker for every standard receiver. Quam Speakers are listed in the Radio Industry Red Book for your convenience.

Quam Speakers are built by a reliable organization that has been manufacturing quality speakers for over a quarter of a century.

Customer Goodwill is important in your business. You can be sure of building it when you install Quam Speakers. Their fine performance and trouble-free service reflect to your credit!

It *pays* to replace with Quam!

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526 East 33rd Place
Chicago 16, Illinois

Please send QUAM Catalog.

Name .....
Address .....
City ..... State .....

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Auto Radio Servicing

(*Continued from page* 19)

as a prophet will be considerably enhanced.

Unknown buffer sizes may be readily determined with the 'scope. Different sizes can be tried until one is found that gives the correct pattern, with the smallest pips on the leading edge. Excessive buffering is indicated by patterns similar to Fig. 5. Capacitors of at least 1600-*wv* should be used for buffer replacement.

Generally, readjustment of vibrators is not recommended, because if a vibrator has been run long enough to give trouble, the points are pitted, etc., and the unit will probably give more trouble in a short while. Special types or rare vibrators however, may be accurately adjusted with the 'scope. Points should be adjusted for proper starting, and again adjusted while running, for the best pattern. Occasionally, a new vibrator will be found which refuses to start or runs erratically. Checking these with the 'scope will usually disclose one set of points which is not making contact. A momentary short with a screwdriver will sometimes clear this, or about a five-minute run-in. The trouble usually is caused by a glaze on the point surfaces, which will usually wear off after a short run-in.

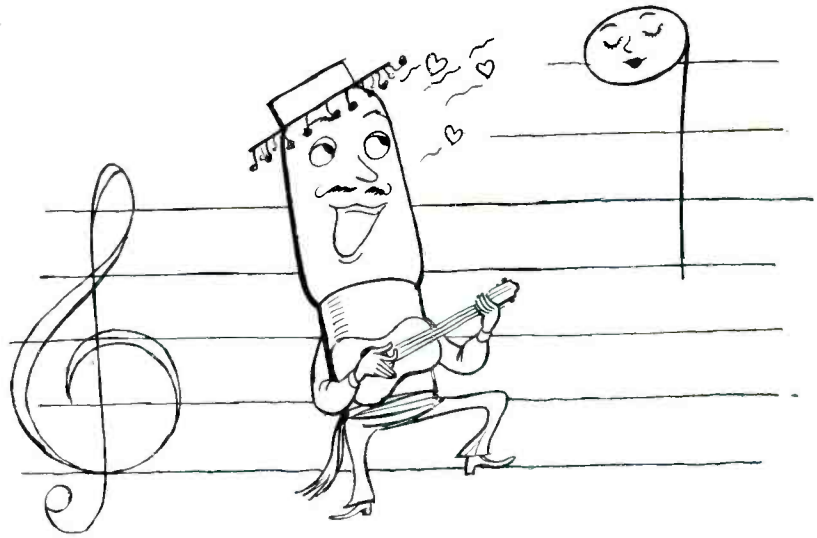
Voltage Testing and General Checking

Voltage and continuity testing in auto sets are identical with the procedure used in testing home sets. High-voltage, will run from 200 to 250 volts, average. Replacement capacitors should be at least 600 *wv* rating, as they will give much less trouble from leakage. The extreme sensitivity of auto receivers makes the use of low-low replacement components imperative. Coupling capacitors should be checked very carefully for leakage, and any that show the slightest leakage replaced.

When mounting replacement parts, especially bypass and filters, they should be clamped or strapped to nearby parts with string or tape. Capacitors should never be allowed to hang by their leads, nor should *floating* joints be made with several wires. A small *tie-point* which may be soldered to the chassis facilitates soldering.

Dampness in *spark-plates* can cause leakage and should be detected. Some late sets use this type of capacitor in the high-voltage circuits, as *rf* bypass units, and if the radio has been wet,

(*Continued on page* 34)

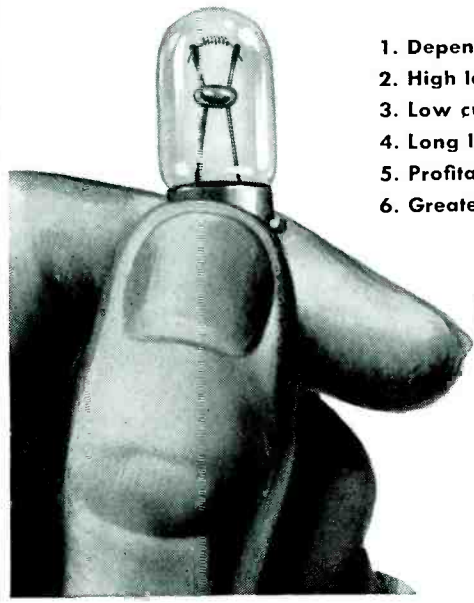


The little lamp that learned to love "high C"

A SOPRANO'S "high C" can be just too much for many dial lamps. Severe vibrations caused by such high notes are often sufficient to tear an old-style lamp filament apart. General Electric engineers found a simple way to minimize this cause of early lamp failure. By making the filament supports longer and moving the bead closer to the coil, they greatly reduced the effects of vibration.

That's why G-E dial lamps have actually learned to like "high C"... and to give long life in spite of the continuous vibration.

For information on prices and types of G-E miniature lamps, call your nearby G-E Lamp office. Or write to General Electric Company, Div. 166-S2, Nela Park, Cleveland 12, Ohio.



1. Dependable, trouble-free performance.
2. High level of maintained light output.
3. Low current consumption.
4. Long life.
5. Profitable to handle.
6. Greater dealer acceptance.

GE Radio Dial Lights

G-E LAMPS

GENERAL ELECTRIC

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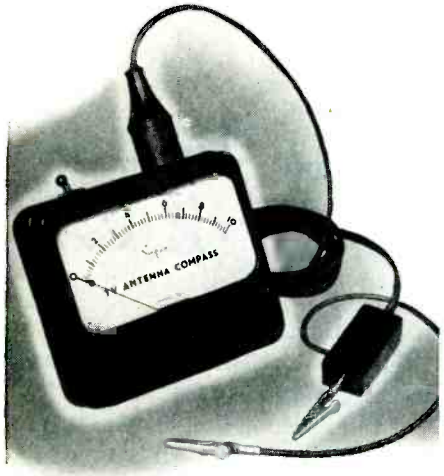
CAN ORIENT A TV ANTENNA QUICKER and BETTER!



with the New SIMPSON TV Antenna Compass

Simpson Model 351 is a ruggedly built pocket size meter which connects to the video input of the cathode ray tube in a television receiver. By an extension cord it is carried to the antenna site. With a test pattern tuned in on the area's weakest station, the antenna is simply rotated for maximum deflection of the TV Antenna Compass! Identifies ghosts, too. Much more accurate than the old-fashioned method—and *one man does it in one-third the time two men used to take!* Dealer's net price only $16.35. Your Parts Jobber has them *NOW*.

1949 IS TV YEAR

Simpson

INSTRUMENTS THAT STAY ACCURATE

SIMPSON ELECTRIC COMPANY
5200-18 WEST KINZIE STREET
CHICAGO 44, ILLINOIS
In Canada:
Bach-Simpson Ltd., London, Ontario

Auto Radio Servicing

(*Continued from page* 33)

there may be trouble ahead. Replacement with ceramic or mica units, mounted on tie-points, is recommended.

Pilot lights in car-radios are usually inaccessible in the car. In some sets, they will be found on long brackets, which can be removed by taking the back off of the case. It's a very good idea to check pilot lights whenever the set is torn down for service, replacing any that show signs of blackening from age.

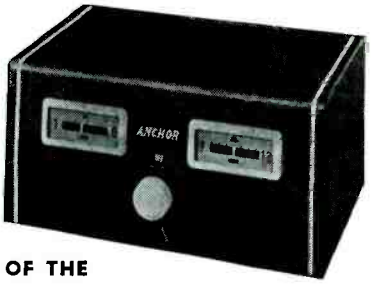
Alignment

The ideal test setup for a car-radio would feature the same capacitance to ground, antenna, etc., as the set had when installed in the car. This is more or less impossible to obtain on a practical basis. This ideal can be approached by isolating the set as far as possible from everything except the battery. It is imperative that all meter ground leads, etc., be removed from the chassis for final tests, as they cause misleading sensitivity readings. A *dpst* switch in the primary of your charger is quite a handy item, serving to disconnect the unit entirely from the *ac* line, even through its capacitance.

Actual alignment is conventional, except for the final trimming adjustments. The signal generator is connected to the mixer grid for *if* alignment. A signal tracer tuned to the *if* frequency and connected to the diode plates will work very well, except on some United Motors sets, which require an output meter, since the probe apparently detunes the *if*. The *if* frequencies seem to fall in the 450-460 kc band. There are a few 260 kc sets. For *rf* and *osc* adjustment, connections should be made through a very small dummy to the antenna lead. High and low-frequency adjustments should be tuned and then the signal generator lead disconnected, placing it close enough to the antenna to pick up some signal without actual contact. Final adjustments to *rf* and antenna trimmers can be made by ear. The antenna trimmer, of course, must be readjusted after installation in the car, but it can be set very close by this method.

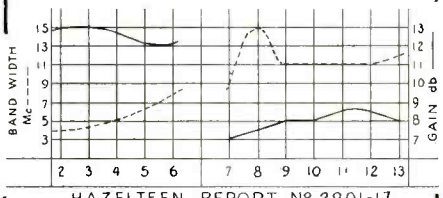
After alignment is completed, an air test should be run, noting especially the response to stations at the extreme high and low ends of the band. The set should be jarred with your hand, while playing, to check for possible loose connections. You

COMPARE ACTUAL PERFORMANCE CURVES . . .



OF THE

ANCHOR TV-PRE-AMPLIFIER



HAZELTEEN REPORT Nº 2801-17

The ANCHOR PRE-AMPLIFIER is engineered to *amplify the signal only,* not the noise. Furthermore, the inherent noise of this unit is not measurable.

The ANCHOR Booster provides maximum gains possible from the 6AK5 tube with excellent band widths.

It increases signal strength without loss of picture detail.

The outstanding acceptance of the ANCHOR TV-PRE-AMPLIFIER by Service Engineers and Dealers is the best testimonial to its quality.

Engineered for modern and the best TV reception. Priced right for profits. Get details now.

See your jobber or write us.

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FOR T-V SERVICING

Investigate the Mega-line of instruments:

MEGA-SWEEP
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Request Catalog

Kay Electric Company
19 Maple Ave., Pine Brook, N. J.

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might even pick up the set about eight inches off the bench and drop it. If this test has no effect, you can be quite certain that the set is ready for reinstallation. If it jars off station when dropped, it might be wise to increase the tension of the gang or tuner, as it might bounce off-station on rough roads.

Very careful service work on auto sets will not only decrease the percentage of call-backs, but will greatly improve your reputation. This is a very profitable business, and it can be had, if you'll go after it!

•

Auto Radio Installation

(*Continued from page* 21)

rate speakers to permit use of a larger speaker.

Firewall Mounting

Almost all sets, except the custom built are mounted on the firewall. *J* bolts, which hook into holes in the set's case, seem to be about the most popular mount method. In mounting, the chassis is held up in position, or a template can be used to check for clearance of controls, etc. When this has been done, the holes can be drilled, the mounting bolts inserted and the set hooked up on them. In some installations, it will be much easier to connect speaker and antenna plugs and control shafts before placing the set in place.

If the control cables take too sharp a bend, when leaving the set, (never less than 6" radius) the set should be padded with scraps of celotex or wood, and then the mounting bolts can be drawn up tightly. To correct dial calibration, the pointer should be turned to either end of scale and the tuning drive on the set adjusted the same way until a stop is felt. All control cables must be tightened securely, as a loose or poorly-grounded cable will occasionally pick up noise and carry it into the set. All plugs should be firmly seated too.

Custom Installations

Custom-built sets, as furnished by the car-manufacturer, are usually quite easily installed, since all holes are drilled, and a very complete set of instructions furnished. Usually, the control shafts come through the dash, and are fastened with nuts on the outside, the back end of the set being held by a brace or strap.

After all units are mounted, the speaker, antenna and power leads can

(*Continued on page* 36)

CHICAGO

EXACT REPLACEMENT

VIBRATOR TRANSFORMERS

For Quicker, Easier, Better, More Profitable Servicing

This new CHICAGO stock line fills the serviceman's long-standing need for *exact replacement* Vibrator Transformers designed for application in a wide range of popular makes and models of auto radios. Exact replacement units in the line provide mountings and characteristics identical to those of the original transformers. For many other sets, CHICAGO Vibrator Transformers are available with electrical characteristics equivalent to the original parts, and readily adaptable for quick, easy mounting. The typical units listed below incorporate famous CHICAGO engineering and quality manufacture—your assurance of top performance. Available *now* at leading jobbers.

CAT. NO.	A-C Sec. Volts	D-C Load Current	LIST PRICE
VT-1	250-0-250	50 MA	$7.00
VT-2	265-0-265	50 MA	7.25
VT-3	270-0-270	60 MA	7.50
VT-4	300-0-300	60 MA	7.75
VT-5	295-0-295	70 MA	8.00
VT-6	280-0-280	80 MA	8.50

Write for descriptive catalog folder

You get these exclusive advantages with CHICAGO Exact Replacements . . .

1. Electrical characteristics identical to the original vibrator transformer. Because plate voltages and characteristics are the same as originally specified by the manufacturer, no extra condensers or resistors are required. CHICAGO Exact Replacements save you time and money.
2. Mountings are *exactly the same*—no need to drill new holes, no alteration of chassis required. Customers see an exact size replacement—no need to explain away a transformer either larger or smaller than the original.
3. Your services are easier to sell when you can assure the customer in advance that replacements will be made with exact duplicate parts.
4. The original quality performance you achieve in your finished installation means satisfied customers and repeat business.

Look for CHICAGO Transformers in Sams' Photofacts

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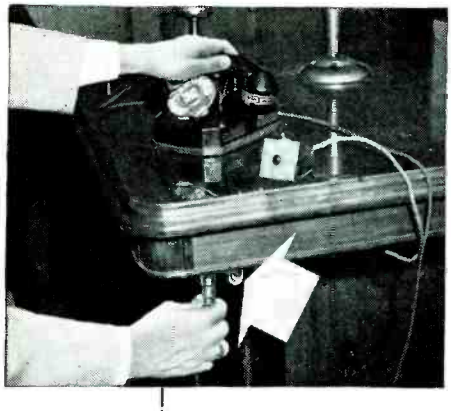
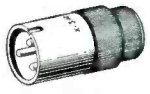


"X" MARKS THE SPOT

. . . where the X-3-42 Receptacle *(shown just above)* unobstrusively reposes underneath the table top so that the intercommunication phone may be moved around the executive conference table. The Type "X" Series is particularly adapted to plug-in intercom systems such as shown above, and is also widely used in sound service, instruments, radio and public

X-3-11 Plug
$1.75 List



X-3-12 Plug
$1.25 List

address systems. Two plug and 3 receptacle types are available with 3 different insert arrangements (interchangeable): one 15-amp.; three 15-amp.; and three 10-amp. and one 15-amp. contacts. Shells are diecast zinc

X-3-13 Receptacle
$1.75 List

X-3-14 Receptacle
$1.25 List

with bright nickel finish, and have accommodation for 3/16" to 9/32" cable. Friction engagement. Available direct from more than 225 distributors over the U.S.A. or from factory.

Listed and priced in the RJC-2 and C-47 Condensed Catalogs. Engineering drawings of the "X" in P&O Bulletin. Specify bulletin desired. Address Dept. E-268.

SINCE 1915

CANNON ELECTRIC

CANNON ELECTRIC
Development Company

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CANNON ELECTRIC CO., LTD., TORONTO 13, ONT.
WORLD EXPORT (Excepting British Empire):
FRAZAR & HANSEN, 301 CLAY ST., SAN FRANCISCO

(*Continued from page* 35)

be connected. The leadin should be dressed up and over emergency brake ratchet, to avoid damage, and tied in place with tape, if necessary. The *A* hot lead is connected to the load side of the dash-ammeter (the side which shows a deflection when the set is turned on) or to the *accessory* bolt of the two-way type of ignition switch. Then the ammeter capacitor can be connected. This is a paper-bodied, .5-mfd unit which has two pigtail leads, with spade lugs. One of the leads is connected to the end of the hot lead at the ammeter or switch, and the other under the nearest bolt or screw, for a ground.

In checking the set, a station around 1400 kc is tuned in. If there are none at that end, the shop signal generator should be used and connected to your outside antenna. The gain is turned up until a signal can be received in car. Then the antenna trimmer is tuned for maximum volume. This trimmer is usually located near the antenna socket, through a hole in the chassis, and sometimes has a snap-cover in the hole.

Noise Elimination

Noise comes from three sources: Ignition, generator and wheels. Ignition or *plug-noise* is a popping noise, changing in frequency with engine speed, one *pop* every time a plug fires. Generator noise comes from the brushes and commutator. It may be howl or whine, depending on engine speed. Front-wheel static is an intermittent or regular scratching noise, caused by the front wheels breaking contact with the rest of the car.

Some noise elimination devices will be needed on every car. A distributor suppressor, which is a carbon or wire-wound unit of about 10,000 ohms, will be found quite effective and can be installed in the high-tension (center) lead of the distributor, as close as possible to the cap. This resistor acts to damp out the *rf* wavetrains which are plug-noise. Often this single unit is all that is needed to remove this particular trouble. For generator noise, it is necessary to use a *generator-capacitor*, a metal-cased unit with one pigtail lead and a mounting lug on the can. The lug is placed under a bolt on the generator housing, and the pigtail connected to the armature lead. Bypass units should never be connected to the *field* terminal of a voltage-regulated generator, since they will upset the regulator's action.

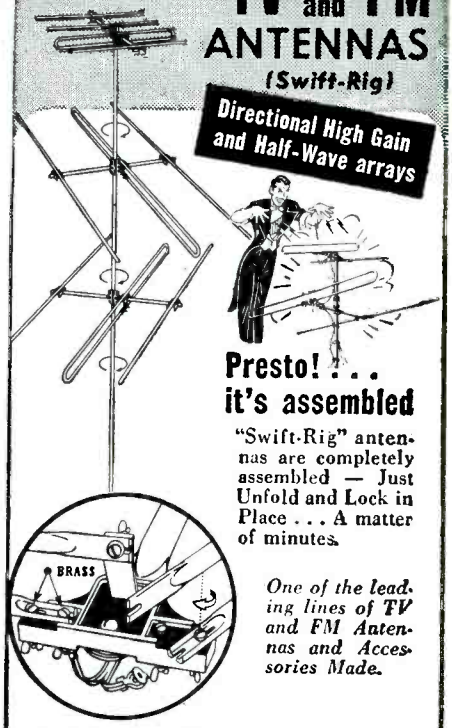
Front-wheel noise may be eliminated by inserting grounding springs in each inner hub-cap to remove the possibility of an intermittent contact. Sometimes tire-static will show up, sounding somewhat like front-wheel noise. To cure, tires must be deflated and graphite powder blown into each one.

The hood and front fenders must be well grounded. If not, they will pick up noise from the ignition and re-radiate it into the antenna. Heavy, flexible braid may be used to bond them all together and to the body, or hood-grounding springs may be inserted in the back hood-lacing. Choke and throtle rods, etc., may also carry noise into the car. To remedy, a piece of narrow braid can be fastened

Camco

TV and FM ANTENNAS
(Swift-Rig)

Directional High Gain and Half-Wave arrays



Presto! . . . it's assembled

"Swift-Rig" antennas are completely assembled — Just Unfold and Lock in Place . . . A matter of minutes.

One of the leading lines of TV and FM Antennas and Accessories Made.

Outstanding Features

- PERMANENT LOW RESISTANCE . . . nickel plated brass screws and "SWIFT RIG" LUGS at electrical contacts
- SEPARATE STACKED ARRAYS . . . Directional High Gain antennas for each band of frequencies

Send for catalog showing complete Camco line of antennas and accessories including Roto-Matic Window and Hy-Gain Indoor Antennas, Combination Screw Eyes for 300 ohm line and coaxial cable, Mast-Mounting brackets (chimney, vent pipe, wall-mount), "Swift-Rig" Lugs, etc.

CAMBURN • INC.
32-40 57th St., Woodside, L. I., N. Y.

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under a screw at one side, wrapped around each rod at least once, and then grounded on the other side.

Fuel gauge tank units may cause a ripping noise when the car is jarred. This can be cured with a .5-mfd bypass installed directly on the unit at fuel tank. Oil-gauges, etc., should be bypassed at the units, not at the indicators or the instrument panel.

Poor grounding on antenna leadin will cause noise pick up. To check, leadin should be pulled from set. If noise stops, it is either being picked up on the leadin or the antenna itself. To check antenna should be grounded to body with screwdriver, outside body. If noise still continues, ground on leadin should be removed and cleaned, especially where the leadin comes out of the body.

There are some extremely noisy cars. These can be cured eventually by trying all the remedies, one at a time. Bypassing the *battery* side of the ignition coil will help in stubborn cases. A set of resistor-type spark plugs will improve almost all cars, for noise.

The universal remedy for difficulties encountered in auto-radio noise work is just patience! If you keep pluggin' away, you'll eventually find the cure.

•

Association News

(*Continued from page 22*)

veteran Service Man, declared that he often found a need for a simple standoff and thus developed this new item, which consists of an aluminum nail and a punched 2"x¾" piece of polyethylene, through which the leadin is slipped.

Everyone at the meeting thought the item had excellent possibilities.

TTA

EX-STUDENTS of radio-electronic schools in the Detroit area, who recently formed a Television Technicians Association, are reported to have a very popular group, with nearly fifty on their membership roster.

Officers of the group include: Lee Langston, president; Francis Kinney, vice president; Raymond Edwards, secretary and Herman G. Kienle, treasurer.

You're backed by DUMONT when you do your servicing with a

DU MONT TYPE 274-A Cathode-Ray Oscillograph

★ These advantages are worth remembering when it comes to your oscillograph investment:

1) The Du Mont guarantee is an *absolute* guarantee. No strings attached! It entitles you to a full year of expert, quick, FREE service.

2) Exclusive of any service, the normal life of a Du Mont oscillograph is many times that of the guarantee period. Such long-life expectancy reflects Du Mont's superior engineering, conservatively-rated components, excellent workmanship.

3) Du Mont's advisory service is yours for the asking. A postcard brings prompt technical advice on your Du Mont oscillograph problem.

4) The cathode-ray oscillograph business is a specialty business. And Du Mont is in this business to stay. This means replacement parts will always be available for Du Mont oscillographs; service will continue; technical guidance will be maintained; refinements and accessories will provide for still better oscillography.

5) For your purse and purpose, Du Mont Type 274-A is your best buy. It's capable of performing most radio and television servicing jobs. And it's portable, low-priced, GOOD.

6) And if you require more elaborate equipment, Du Mont offers voltage calibrators, wide-band oscillographs, choice of tube screens, etc.

Consult us **now about your radio and television servicing requirements.**

DU MONT *for Oscillography*

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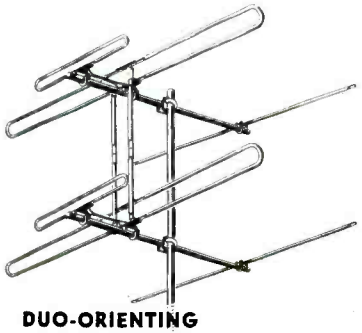
★ FOR Star Performance IN REMOTE AREA RECEPTION

JFD

"DOUBLE STRAIGHT-LINE" TV ARRAY

No. TA151 (¼ wavelength stacked)
No. TA152 (½ wavelength stacked)



DUO-ORIENTING STRAIGHT-LINE FOLDED DIPOLES

- Stronger signal pick-up and sharper directivity on all channels.
- Stacked bays deliver exceptional all-channel response. Each bay can be individually oriented for separating overlapping signals and eliminating station interference.
- Exclusive JFD Adjustable "U-Bolt" Clamp design permits dipoles and reflectors to be shifted both vertically *and* horizontally for razor-sharp tuning.
- Exclusive "U-Bolt Wrap-Around" construction provides unexcelled structural strength.
- Higher DB gain on both bands, with fewer ghosts.
- Supplied complete with 10 ft. mast, All-Angle Base Mount, and Jumper Bars.
- ALSO AVAILABLE: No. TA150, Single Bay.

Write for Complete New Catalogue

FREE OFFER!

No. TL125-350 No. BR18TL3

Get 2 FREE JFD Antenna Accessories with Every JFD TV Antenna You Buy!

HERE'S WHAT YOU DO! Simply cut out JFD "Bonus" Coupon found on outside of each JFD antenna carton. Take it to your nearest JFD Distributor and receive absolutely FREE one JFD *Mast Clamp Lead-In Support, No. TL125-350* (1¼" Clamp — 3½" Screw Eye) PLUS one *JFD Twin Lead Screw Eye Stand-Off, No. BR18TL3.* Start saving your JFD "Bonus" Coupons now and cash in on this amazing offer!

JFD MANUFACTURING CO. Inc.
6119 16th Avenue
Brooklyn 4, N. Y.

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Phono Service

(*Continued from page 27*)

tal cartridge is fastened to the strengthener plate and pivot assembly by means of a small machine screw.

Accessories, Parts and Kits

The slow-speed principle has also been applied to replacement type accessories, components and adapter kits.

In one adapter kit[1] there's a speed reducing table which is set on top of the regular turntable with spindle through the center hole. This auxiliary table reduces the 78 *rpm* rotation of the standard turntable to 33⅓ *rpm* by means of a planetary mechanism. The speed reducing table can be put on or taken off at will. Either type record can be played with the speed reducing table in position, by the snap of a switch, which automatically disengages the speed reducing mechanism and switches the proper pickup into the circuit. The extra table will reduce the capacity of the record changer by approximately six records. Therefore, when full capacity of the changer is desired, this auxiliary table must be lifted off.

The kit is equipped with a pickup arm assembly[2] which is designed especially for the long-playing records. The pickup arm operates at 5 grams (approximately 1/5 ounce) needle pressure. The stylus has a .001" tip radius.

The pickup assembly requires a minimum cabinet space of 7¼" from turntable spindle for an arc length of 7" around the outside of 12" records. The base assembly of the unit has a built-in switching arrangement which automatically disengages the speed reducing mechanism and switches the proper pickup into the phono input of the audio amplifier. Height of pickup is adjustable to accommodate variation of turntable height above motorboard by means of set screws.

The assembly is equipped with a three-conductor shielded cable 30" long, to provide for use in various circuits, including *ac-dc* applications. The purpose of two of the conductors (red and yellow) is to switch either the standard changer pickup or fine-line pickup into the circuit by means of a *spdt* switch which is a part of the assembly. A black conductor provides a ground circuit between the pickup

(*Continued on page 40*)

[1]Micro-Verter.
[2]Astatic FLC pickup and LP-33 crystal cartridge.

Announcing-

THE THORDARSON "24" Replacement Line

Better Quality Transformers At Standard Replacement Prices

Everyone appreciates quality! It means satisfied customers — profitable repeat business. THORDARSON'S new "24" line of replacement power and output transformers meets — or exceeds — RMA standards. These high quality replacement transformers are exact replacements for all popular transformers used in the industry . . . yet they cost you no more than "run - of - the - mill" replacements!

Enjoy the best — it costs no more! "24" Output Replacements

Specific duty transformers available in four models, 2,000 to 25,000 pri. imp. with 5 watts output.

Two models universal output replacements, four or eight watts output, pri. imp. 4,000 to 14,000, sec. imp. .1 to 29 ohms.

New Universal Line to V. C. With 70 v. Output Taps

10 watts with secondary taps from 1/4 to 10 watts.

ATTENTION, SOUND SPECIALISTS:

Write for your Free Copy of the "THORDARSON REPLACEMENT AND TRANSFORMER GUIDE FOR PRESENT-DAY AMPLIFIERS, TUNERS AND COMMUNICATIONS RECEIVERS".

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Manufacturers of Quality Electrical Equipment Since 1895

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"TAB" THAT'S A BUY!

HELLER TELEVISION Cable TACKER For Speedy TV
Twinex Cable Installation.... $3.98
5000 Boxed Staples..$2.49

New Sound Powered HEADSET & CHEST MIKE Simplifies TV Ant. Alignment
Incl. Carbon Throat Mike and battery container ... $10.98
Per Pair (2).....$19.49
NEW 115V ISOLATION XFMR 150W/60cy....$2.98

ELECTROLYTIC CONDENSER BARGAINS!
50mfd/350WV Sprague 'FP'.21¢
30-15-10mfd/250 WV Mallory.36¢
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Solder

(*Continued from page 24*)

content solder but this is impractical both because the cost is very high and because current Government regulations make it impossible to use a high tin alloy. A solder with multicore construction has been found to serve as a practical solution. This type which features thinner walls than a single cored solder of the same gauge, will *break down* and melt rapidly.

Oxidized or Tarnished Surface Joints: Oxidation is usually found in old sets although it may even be found on new equipment which has been exposed to humidity. If in soldering such a surface you don't get a perfect bond, an *hr* (high resistance) joint will result. To eliminate this possibility, a solder with an activated flux should be used. A good non-corrosive activated flux will not only remove surface oxides, but will actually prevent their further formation during soldering.

Difficult Metal Joints: A solder which will bond on difficult metals is extremely important, affording a saving in time and labor. For instance, metals like nickel are difficult to solder and may result in a high resistance joint. Experiments with multicore solder have indicated that free-flowing, rosin-cored solder can successfully solder nickel plated tags.

Continuity of Flux Stream: Occasionally in the production of solder, an air bubble will appear in the core where we should have the flux. When the solder wire is drawn down to the gauge in which it is eventually bought, it is found that what started out to be a small air bubble, now means as much as two feet of solder without any flux content. A joint made with such solder would of course be a *dry joint* and would have a high electrical resistance resulting in disconnected or intermittent service. In solders, using three-core construction, the bubble possibility is minimized, since it is unlikely that an air bubble formed in the process of manufacture, would be present on all three cores.

Hardness and Stickiness: The use of some solders will often produce a solder joint which is sticky and not quite hard. The use of inferior flux occasionally results in a soft, sticky residue. This residue will of course, tend to accumulate dirt. Therefore, the Service Man must be careful to use a solder which leaves only pure rosin on the joint.

Non-Corrosive Problems: Solder should of course, be non-corrosive. There have in the past years been available certain *activated* fluxes which were highly corrosive. As a protection, the Government set up standards, with a type identified as *QQ-S-571b* being selected as non-corrosive. In purchasing, therefore solder which measures up to this specification may be considered in effect, as non-corrosive.

From the foregoing it is quite obvious that solder is an important tool of the Service Man. The few bits of solder used in a repair job can easily spell the difference between a successful job and a good reputation, or a shop-return and a poor reputation. A few extra pennies spent on the initial purchase of solder may mean money saved in the actual soldering process. The use of a desirable solder involving a slightly higher initial investment will prove to be most economical in the long run.

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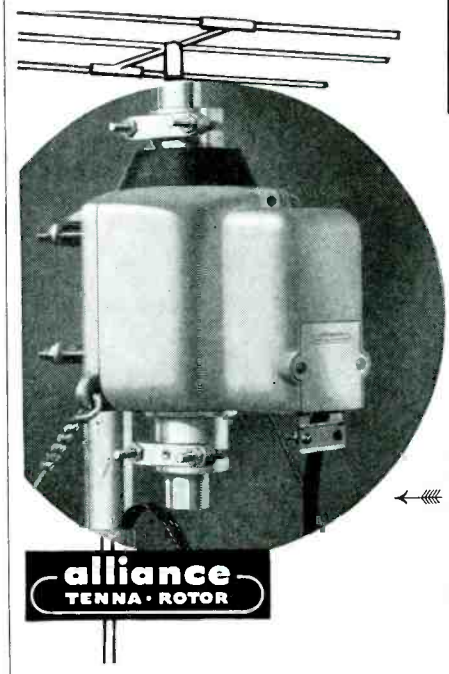

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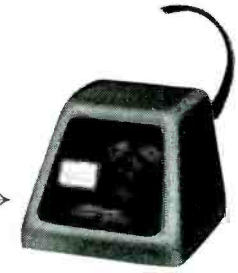

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Phono Service

(*Continued from page 38*)

and amplifier chassis. The shield completes the pickup circuit independent of the chassis ground.

To simplify installation, the cable terminates in a three-contact terminal strip. To connect, the present pickup cable is cut and the cut ends connected to the screw connections of the terminal strip. One terminal (yellow) represents the output of either pickup, depending on the position of the kit switch. The grid wire leading to the amplifier is connected to this terminal. The cut ends of the shield or ground wires are connected to another terminal (shield). The grid from the present pickup is connected to a third terminal.

Three-speed record changers have also been developed for initial and replacement applications. One model[3] uses the same *pickup* arm for all records.

The changer has a conventional spindle diameter, and the problem of the large hole diameter of the 45 *rpm* record has been overcome by use of plastic adapter buttons. These buttons are inserted in the centers of the 45 *rpm* records, reducing the hole diameter to the size of the standard spindle, which is used for all other records.

Control for adjustment of turntable speed is in the same position as on previous two-speed models. The design permits all record sizes and speeds to be played with one low needle pressure, provided, of course, the proper pickup cartridge and needle are chosen. The proper needle tip diameter for the selected record type is brought into operating position by rotating a knob located at the tip of the tonearm.

Featured in this model is a velocity trip mechanism which eliminates the pulsing noise that may be reproduced in the loudspeaker.

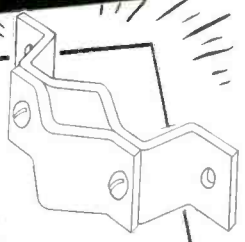
Pickups which will permit playing of the 78, 45 and 33⅓ *rpm* records have also been produced. One model[4] uses one cartridge with a single *twin-tip* replaceable needle and with a tracking pressure of 6 grams on either needle-tip. With snap-action, the needle is tilted to select a one-mil (.001) or three-mil (.003) needle-tip, for fast or slow speed records.

The pickup is available in crystal and variable reluctance magnetic types, with replaceable twin-tip .001 sapphire and .003 osmium needles.

[3]General Instrument 700F33-45.

[4]Electro-Voice Torque Drive Twin-Twilt.

Another PHOENIX Speed Mount
WALL BRACKET
Type PAB-8



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In another three-speed pickup cartridge[5], a ceramic element is used. Using a turnover pickup principle, 33⅓, 45 rpm, or standard records are played at eight grams needle pressure.

The cartridge employs a needle known as the type *G*, with either sapphire or precious metal tip, which is available with one-mil tip radius for 33⅓ or 45 rpm recordings, or three-mil tip for standard 78 rpm records.

The pickup, which can be mounted 7" from the turntable center, uses a double-needle cartridge[6] and is equipped with a knob at the front end, identified to show which needle is in playing position when turned.

[5]Astatic 6D.
[6]Astatic LQD-1J.

•

SER-CUITS

In our analysis of the *agc* circuit in the Westinghouse H-196 TV receiver, last month, it was indicated that the circuit was unique since a portion of the horizontal sawtooth sweep voltage from the horizontal sweep circuit is amplified, rectified and then applied as *dc* to the 6BH6 *rf* amplifier and the input and first video *if* amplifiers as control grid bias. The amplification of the sweep voltage by the 6AT6 is controlled by the amplitude of the positive *dc* voltage supplied by the *agc* rectifier portion of the 6AL5.

Now, the positive voltage developed by the *agc* rectifier is applied to the 6AT6 control grid. To counteract this positive grid voltage, a greater positive voltage is applied to the cathode by connecting it to a tap on a 5,000-ohm/1,000-ohm/82,000-ohm voltage divider network (R_1, R_{2a} and R_{5a}) across B+ supply. Since placing a positive potential on the cathode is the same as applying an equal negative potential to the grid, the actual grid-to-cathode voltage is negative. This arrangement serves to establish the operating grid voltage of the 6AT6 and, through this, the gain of the amplifier. The sawtooth of voltage from the horizontal sweep is applied to the control grid of the 6AT6 through a .01-mfd capacitor. This sawtooth voltage is amplified and applied to the 6AT6 diode plates through a 0.1-mfd unit. The rectified sawtooth voltage causes a current to flow through a pair of 470,000-ohm resistors, establishing a voltage drop across these resistors. This pulsating voltage is filtered by the long time constant networks, which contain a pair of 1-megohm resistors and .1-mfd and .5-mfd capacitors, the resultant *dc* voltages be-applied as bias to the circuits under *agc*.

The biasing voltages across these networks depend upon the amplitude of the incoming signal. If the signal amplitude decreases, less positive voltage will be applied to the 6AT6 grid and the amplification of the tube will be reduced. As a result, the sawtooth voltage will be amplified less; less negative *agc* voltage will be developed across the 470,000-ohm resistors, and less negative bias voltage will be applied to the 6BH6 *rf* and *if* amplifiers. Therefore, the gain of these tubes will rise.

When the amplitude of the incoming signal increases, the amplitude of the positive voltage from the *agc* rectifier will rise. This, in turn, increases the amplification of the sawtooth voltage in the 6AT6, resulting in a higher rectified voltage drop across the resistors, and more negative bias voltage

(*Continued on page* 42)

The MOST COMPLETE Transformer Catalog in the Industry!

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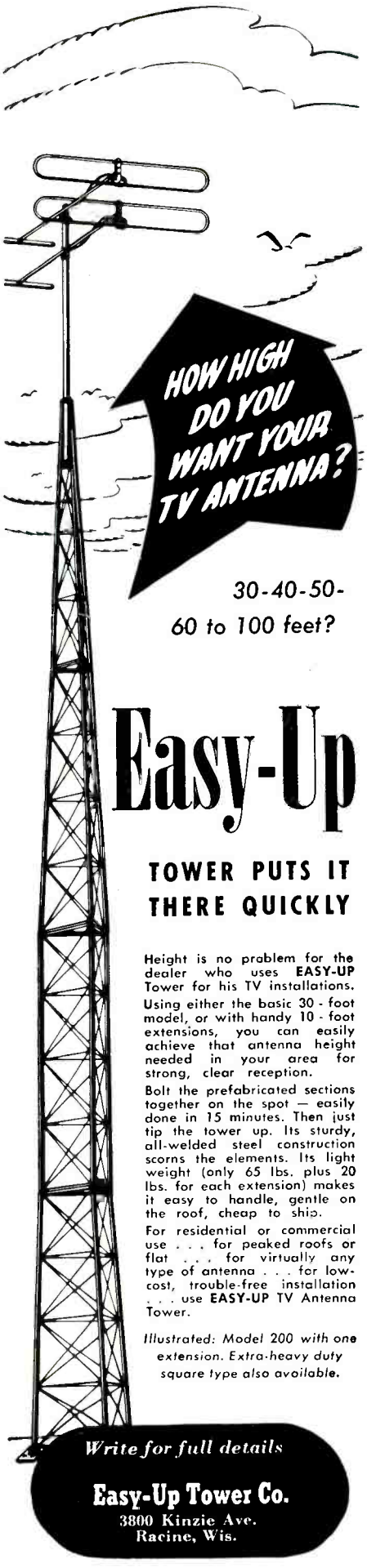

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Illustrated: Model 200 with one extension. Extra-heavy duty square type also available.

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Ser-Cuits

(*Continued from page* 41)

will be applied to the tubes under *agc*. The gain of the *rf* and *if* amplifiers under *agc* will decrease. In this manner effective control is maintained over the video signal level at the output of the detector. The *agc* action is especially desirable when switching from a very strong station to a weak one. Ordinarily, the *agc* (sensitivity) control in this model is adjusted for approximately 0.6 volt from *agc* line to ground without the presence of a signal.

Video Amplifier and Noise Clipper

One section of a 12AT7 dual triode functions as the first video amplifier. The video signal is fed to the control grid of this tube through a .05-mfd coupling capacitor. Approximately 2 volts of bias are developed by the current flowing through a 10-ohm resistor, which forms part of a series network between the center tap on the low-voltage power transformer and ground. This voltage is applied to the grid of the first video amplifier through a 470,000-ohm grid resistor. The cathode is connected directly to ground.

In this circuit a pair of series and shunt-peaking coils are used (L_{21} and L_{23}). The purpose of L_{21} is to divide the shunting capacitances (the output capacitance of the 12AT7 and the input capacitance of the 6AQ5) which would be in parallel without the addition of L_{22}. Thus, instead of the total shunting capacitance being entirely across L_{23} and the 4,700-ohm resistor, the capacitance value is much lower and it is possible to use a higher resistance value. The purpose of L_{23} is to extend the high-frequency response

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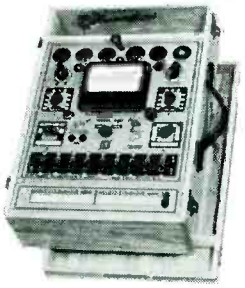

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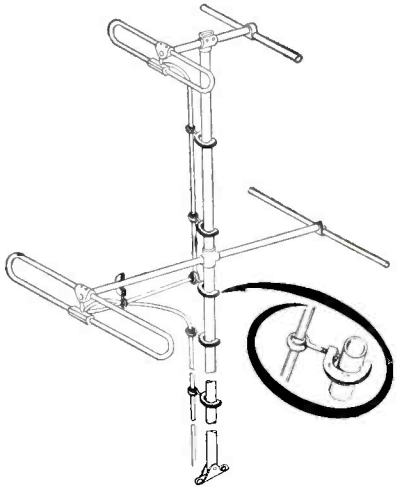

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of the video amplifier by effectively canceling out some of the shunting capacitance at high frequencies. Actually, the tube capacitances, the peaking coil L_{23} and the load resistors form a resonant tank circuit at some high frequency. This frequency has been chosen to be slightly above the cutoff point of the circuit. When the circuit response starts to drop off, the tank becomes resonant and the load impedance remains high. The 6AQ5 cathode bias resistor (220 ohms) is bypassed by a 470-mmfd capacitor, the purpose of which is to introduce some degeneration into the circuit at low frequencies. At high frequencies this capacitor has a low reactance, thus limiting degeneration and increasing the gain at these frequencies.

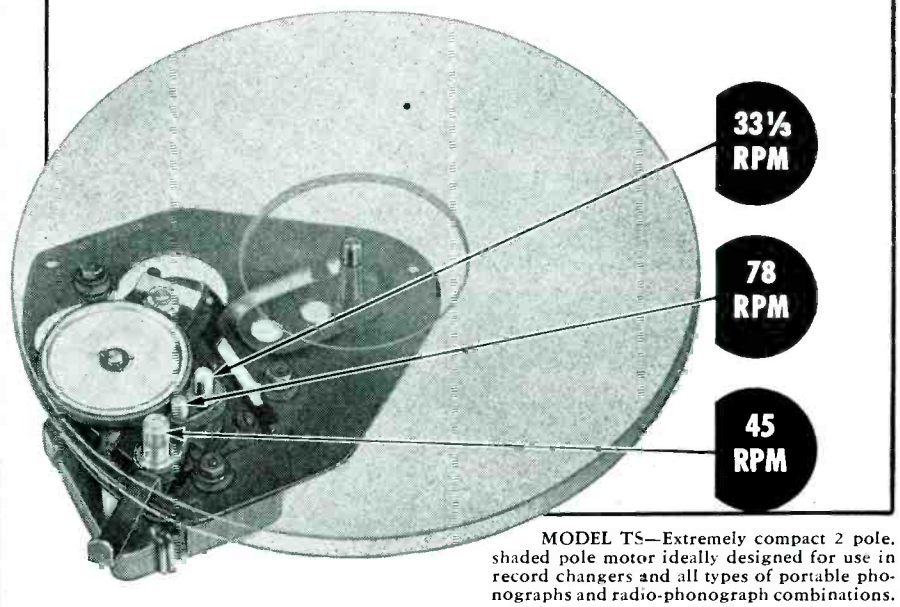
L_{24} and L_{22} perform in a manner similar to that of L_{21} and L_{23}. L_{24} is shunted by a 10,000-ohm resistor to reduce the Q of the coil and prevent a sharp resonance peak in the amplifier response curve. The 3,300-ohm 6AQ5 load resistor is a much higher value than could be used without L_{22} and L_{24} in the circuit. The video signal is fed to the picture tube control grid through a .05-mfd coupling capacitor.

One-half of a 12AX7 functions as a noise clipper. It is connected as a diode with plate and grid connected to the first video amplifier plate line through a .05-mfd capacitor. The sync pulses at the 12AT7 plate are positive with respect to ground and drive the plate of the 12AX7 noise clipper positive. When the plate swings positive, current will flow through the diode and the .05-mfd capacitor will charge to nearly the peak amplitude of the sync pulse. After the sync pulse passes and the plate of the diode is no longer positive, this capacitor discharges to ground through a 470,000-ohm resistor, applying a negative potential to the diode plate. The time constant of the resistor and capacitor is long as compared to the sync pulse repetition rate; therefore, the .05-mfd unit discharges only slightly in the interval between sync pulses. As a result, the 12AX7 plate will swing positive and conduct only on the tips of the sync pulses. Any noise appearing on the tops of the sync pulses will be rectified and clipped.

The DC Restorer

The video amplifier is an *ac* amplifier; therefore the *dc* component of the transmitted video signal representing average illumination of the original scene will not be passed. To maintain proper scene illumination, this *dc* component must be restored.

NOT ONE..NOT TWO..*But* 3 SPEEDS



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In the restorer circuit, the sync pulses are negative in polarity at the plate of the 6AQ5. The signal voltage drop across the 3,300-ohm resistor is such that the plate end of the resistor is negative and the B+ end is positive. Electrons are forced from the plate of the .05-mfd capacitor which is connected to the cathode of the 12AU7 diode. Since the cathode of the diode is then negative with respect to the plate, the diode conducts.

After the sync pulse passes, the 6AQ5 plate voltage swings in a positive direction, and the capacitor discharges slowly through the path. During the sync pulse period, the capacitor was charged to approximately the peak amplitude of the sync pulse. The discharge of the capacitor will create a positive voltage drop across the 22-ohm and 1,000-ohm resistors, with respect to ground, which will be practically equal to the sync peak amplitude. This voltage is then applied to the picture tube through the grid return resistor.

A brightness control permits the picture-tube operating grid bias to be adjusted so that the black level (pedestal top) is aligned to the cut-off point on the picture tube characteristic curve.

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1-Tube TV Preamp

[See Front Cover]

ON THE COVER this month appears the circuit of a TV preamp, using a 6AK5, which operating at low voltage, has a zero bias. To obtain maximum gain from the 6AK5 the grid and plate circuits are tunable, with a permeability arrangement.

This type of tuning is very effective providing broad tuning and comparatively noise-free performances.

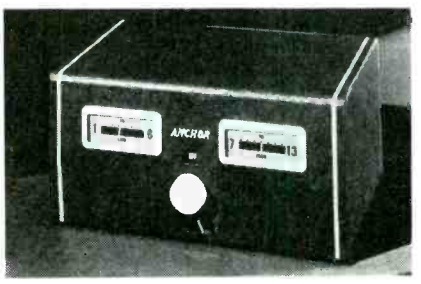
The coupling coils are tightly coupled to the resonant circuits. They are full floating (eliminating shock hazard) and connected to the respective circuits through a wafer switch. Missmatched reactances are reflected directly into the resonant circuits, through the tight coupling and can be cancelled out by tuning.

Bandwidth requirements are not met by superficial circuit loading, but by the tube and coupling circuits. All of the resonant circuits have a reasonable high L to C ratio. Since the grid is in a series-resonant circuit a broader response is available. The plate circuit is parallel resonant, and thus has a narrower response which contributes mainly to the gain of the amplifier.

The low-band resonant circuit consists of a permeability tuned coil in parallel with the tube and trimmer capacity. To maintain iron-core Q and frequency coverage on the high band, the effective capacity across the resonant circuit has to be lower than that of the tube. Therefore, the resonant circuits in the high band are shunt fed and the trimmer capacity is in series with the tube capacity.

The *ac* supply is in a floating circuit and connected through a double-pole, single-throw switch. Antenna connections are such, as to shunt across input and output terminal points, whenever the switch is in the *off* position.

[1] Anchor ARC-101-50.



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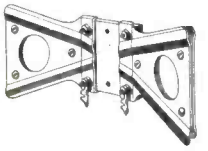

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NEWS

SAMS AUTO RADIO MANUAL

A 392-page *Auto Radio Manual* with service information on more than 100 postwar auto receivers has been announced by Howard W. Sams & Company, Inc., Indianapolis, Ind.

Manual includes special sections which cover standard parts replacement information on vibrator buffers, special purpose capacitors, vibrators, speakers and transformers for automobile receivers. Featured also is a chapter covering the layout and operation of a complete auto radio service shop.

Price, $4.95.

* * *

JFD OPENS NEW PLANT

The office and plant facilities of the JFD Manufacturing Co., Inc., are now located in a block-long 3-story building at 610 16th Ave., Brooklyn, N. Y.

JFD now makes over 40 types of TV and FM antennas, fifty antenna brackets and accessories and nearly 4,000 individual service components.

Left to right: Albert Finkel, vice president; Julius Finkel, president, and Ed Finkel, secretary-treasurer of JFD.

* * *

SYLVANIA REPLACEMENT TUBE PACKAGE

Sylvania replacement tubes are now being supplied in a 10-lot merchandising carton.

Carton consists of a two-color topless external carton in which are packed 10 individual tube cartons of a single type.

* * *

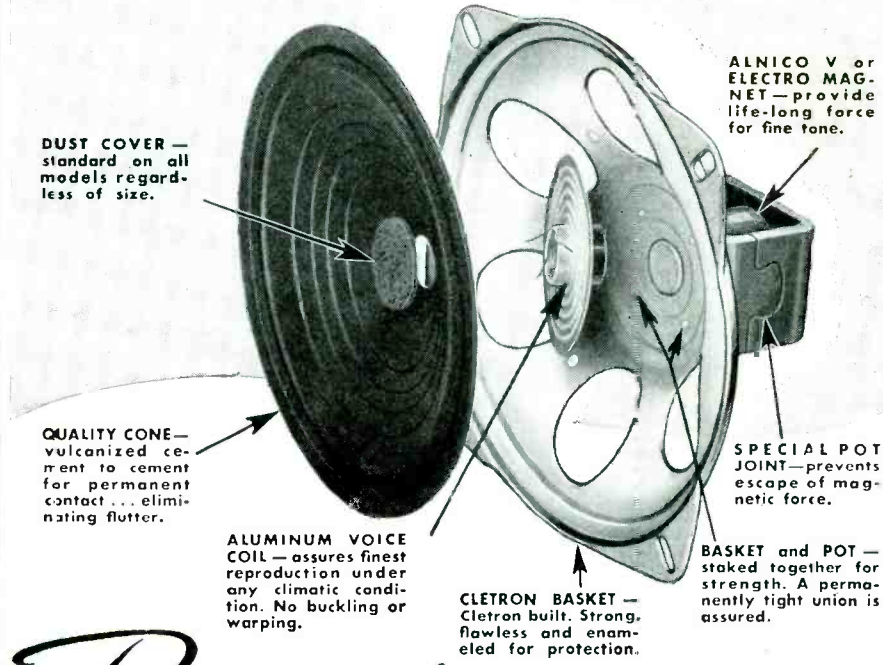
AMPHENOL CONDENSED CATALOG

A condensed catalog has been issued by the American Phenolic Corp., 1830 S. 54th Ave., Chicago 50, Ill.

Catalog illustrates *rf* cable and *rf* connectors, the most popular sizes and dimensions of polystyrene sheets, rods and tubes, microphone connectors used in audio applications, measuring instruments, alarm systems, electric coin machines, photoelectric devices, etc.

Also contained in the catalog are descriptive listings and illustrations of Amphenol TV and FM antennas and all accessories for antenna installations such as extension masts, stand-off insulators, insulator clamps and mounting bases. Also listed are Amphenol twin-lead transmission lines in both the conventional flat and the new tubular weatherproof styles.

CLETRON SPEAKERS are built for longer life



Permanently **FINE REPRODUCTION**

You may ask, "Why is such extreme care given to Cletron construction?" Our answer . . . the fidelity, performance and durability of a speaker are only truly proved after years of use. Cletron Speakers are built for continued satisfaction and pleasant listening throughout the years. Write for sample.

Cletron **RADIO LOUDSPEAKERS**

CLEVELAND ELECTRONICS, INC.
6611 EUCLID AVENUE
CLEVELAND, OHIO
MORHAN EXPORTING CORP.
458 BROADWAY, N. Y., N. Y.

DUMONT CATHODE-RAY TUBE BOOK

A new 63-page edition of a booklet describing the *crt* entitled *The Cathode-ray Tube and Typical Applications*, has been published by Allen B. Du Mont Laboratories, Inc., 1000 Main Ave., Clifton, N. J.

In addition to material on the *crt*, there are chapters on the 'scope, TV and radar.

In addition, a full-page frontispiece reproduction of a wall chart depicting the modern cathode-ray tube is included.

Price, fifty cents.

* * *

VERI-BEST CATALOG

A 4-page catalog describing a *universal*-type TV antenna has been released by Veri-Best Television Products, Inc., 8-10 Forrest St., Brooklyn, N. Y.

Also avilable is a bulletin on an *instantenna* for all-channel TV work.

RIDER MANUAL VOLUME XIX NOW AVAILABLE

Rider Manual Volume 19 with over 2,100 pages has been announced by John F. Rider, Publisher, Inc., 480 Canal St., New York 13, N. Y. Contains service data on AM, FM, auto and communications receivers made by over 100 manufacturers. There's also a special section devoted to record changers. To keep data on previously published models up to date, the latest manufacturers' revisions are noted in a *Changes* section.

A companion *How It Works* book, explaining the circuit theory of new systems is a feature of Volume 19.

Price, $19.80.

* * *

S. B. WILLIAMS NAMED SYLVANIA PUBLIC RELATIONS MANAGER

S. B. Williams has been appointed manager of public relations of Sylvania Electric Products, Inc.

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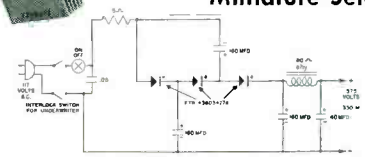
ARE YOU RECTIFIER-WISE?

WIN A VALUABLE PRIZE

With your Circuit Designs Using Federal's Miniature Selenium Rectifiers



Here is your opportunity to convert your circuit ingenuity into a useful and valuable prize. Federal, the originator of the Miniature Selenium Rectifier, is interested in your ideas on the use of this revolutionary circuit element.

A multitude of circuits have been built around the outstanding characteristics of Federal's complete line of Miniature Selenium Rectifiers—audio amplifiers, home radios, television receivers, 'ham' transmitters, FM adapters, phonograph amplifiers and many other electrical and electronic circuits. They all capitalize on the long life, high current capacity, instantaneous starting and great efficiency of these rectifiers. This compact, lightweight television power supply is typical.

These are but a few applications. The uses of these Miniature Rectifiers are almost unlimited. Get your idea down on paper and send it in today. It may be a prize winner!

CONTEST DETAILS

1. All entries must be original circuits.
2. All entries become the property of Federal Telephone and Radio Corporation.
3. Federal engineers will judge entries on basis of novel and useful applications and select winning circuits.
4. Five winners will be selected from the entries received during each month of the contest. A grand prize will be awarded to the outstanding entry of the contest.
5. All entries for this month's judging must be received by June 30. Next month's entries must be received by July 31. Contest closes July 31.
6. Winners will be announced.

FIVE MONTHLY PRIZES AND A GRAND PRIZE

The five monthly winners will each receive, FREE, a Federal FTR-1342-AS Selenium Rectifier Power Supply-Battery Charger. This compact unit, with its 6-volt, 6-ampere DC output, has many uses in home and shop. It comes equipped with a handy under-dash mounting socket for automobile battery charging.

The grand prize, a Federal FTR-3246-BS Radio Service Power Supply, is invaluable as a source of heavy duty, filtered DC power. Its 6-volt, 10-ampere DC output will handle auto radio testing and many other test and permanent power requirements. List price $74.50.

MAIL YOUR ENTRY TO: MINIATURE RECTIFIER CONTEST

Federal Telephone and Radio Corporation

SELENIUM INTELIN DIV. · 900 PASSAIC AVENUE · EAST NEWARK, NEW JERSEY

ILLINOIS CONDENSER

Presents

A Greatly Expanded Line

NEW CATALOG NOW AVAILABLE

Customer acceptance — proven by 15 years of high quality production — has made Illinois condensers one of the fastest sellers in the field.

They are reliable, even in the most humid climates . . . they are long lived under brutal heat conditions . . . they are manufactured under the strictest quality control methods in the industry . . . they are backed by a one year guarantee!

From Radio to Television

There is an Illinois condenser to meet every modern need . . . original application to replacement. An expanded line has been developed to serve the entire electronic field — from radio to television.

A new and greatly expanded ILLINOIS CONDENSER catalog is now off press. Write for your free copy today!

ILLINOIS CONDENSER CO.

1616 NORTH THROOP STREET • CHICAGO 22, ILL.

STANCOR CATALOG

The 1949 edition of the Stancor catalog has been announced by Standard Transformer Corporation, 3580 Elston Ave., Chicago 18, Ill.

Catalog includes electrical and physical specifications of more than 400 items. Described are audio and power transformers, chokes and related components for radio, television and other electronic applications. Charts include listings of transmitting and rectifier tubes, driver-modulator combinations, matched power supplies, output transformer-tube combinations and detailed dimensional drawings.

* * *

SAMS PUBLISHES READ'S BOOK ON SOUND

Oliver's Read's 304-page handbook, *"The Recording and Reproduction of Sound,"* has been published by Howard W. Sams & Co., Inc., 2924 East Washington St., Indianapolis 6, Ind.

Book provides coverage of acoustical systems for the reproduction of sound and a complete analysis of the various types of amplifiers, together with their individual applications.

A complete history of sound and the behavior of sound waves, basic media for making recordings and a detached analysis of their respective merits are offered.

Oliver Read

* * *

CLETRON CATALOG

A catalog covering a replacement loudspeaker line has been announced by Cleveland Electronics, Inc., 6611 Euclid Ave., Cleveland 3, Ohio.

Listing includes speakers for use in the home and in auto, FM and television sets, and for sound work in labs and in *pa* systems.

Cletron speakers feature aluminum voice coils.

* * *

AEROVOX CAPACITOR DATA

A bulletin describing molded tubulars, high-voltage tubular paper capacitors, high-voltage hermetically-sealed oil-filled tubulars, high-voltage tubular aluminum can electrolytics and high-capacitance low-voltage capacitors in miniature tubular aluminum cases, has been released by Aerovox.

* * *

G.E. TECHNI-TALK

A bi-monthly illustrated publication, *Techni-Talk*, for radio and TV Service Men and dealers, has been announced by the tube division of G. E.

Available through G. E. and Ken-Rad distributors, the first issue featured the beginning of a group of articles on the installation and servicing of TV receivers. The initial issue also carried an article on the volt-ohm-milliammeter. The magazine also contained photographs of new equipment, circuit diagrams, and a question and answer department.

www.americanradiohistory.com

New TV Parts... Accessories

METALACE ANTENNA MOUNTS

Two antenna mount accessories have been announced by Metalace Corporation, 2101 Grand Concourse, New York 53. One item, model MJ-2, a *mast joiner,* affords a joining of masts of equal or unequal diameter (varying from ¾" to 2½"). Steel construction, with four guying points available.

The second item, model ME-8, a *mast extender,* holds any two masts of equal or unequal diameter (varying from ¾" to 2½") within vise-type clamps. Of solid steel construction with six guying points available. Permits a 4" bite on each mast. Model ME-16, a larger model of similar design, permits an 8" bite on each mast.

* * *

AMPHENOL TUBULAR TWIN-LEAD

A tubular 300-ohm twin-lead, No. 14-271, has been announced by the American Phenolic Corp., Chicago 50, Ill.

The tubular shape of the twin-lead is said to prevent deterioration caused frequently with conventional flat twin-lead by the collection of moisture or a combination of moisture and dirt on the surface of the polyethylene insulation; the tubular design holds moisture or dirt outside the concentrated field between the conductors and, therefore, is said to eliminate possibility that the transmission line impedance will be varied or the dielectric losses increased by any abnormal condition in weather or collection of soot or other dirt.

The conductors are seven strands of 28 copper wire. The outside diameter is approximately $\frac{5}{16}$".

* * *

PEEK INDOOR TV ANTENNA

A *Tele-Tape* TV antenna designed for mounting under rugs, on baseboards, cornice boards, window panes, etc., has been announced by Walter E. Peek, Inc., 2842 W. 30th St., Indianapolis 22, Ind.

Equipped with adhesive backed metallized tape.

Packaged with terminal board and leadin.

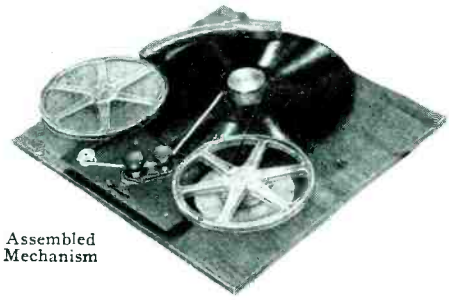
THREE WAYS TO CAPTURE RECORDER PROFITS

Announcing The New High Fidelity tapetone

Tops in Magnetic Tape Sound Recorders

HERE IS A GRAND OPPORTUNITY to get in on the ground floor of the vast sound recorder market. High Fidelity TAPETONE is now available to you *three different ways* — each spelling profits! Sell TAPETONE completely assembled . . . in Kit Form . . . or order the assembled mechanism separately for use with a pre-amplifier and oscillator to work with existing public address systems.

Demonstrate and sell TAPETONE! It is an essential instrument for the teacher, student, musician, clergyman, physician, etc. Has unlimited uses in industry and business. Of course it is packed with entertainment value when used in the home.



Assembled Mechanism

Tapetone Has These Great Features:

● Reproduces voice and music with high fidelity equal to the finest console radio. ● Records on magnetic paper tape, many times stronger than wire. Tape may be edited, titled, used over and over again—or the recording can be kept indefinitely if desired. ● Provides ½ hour recording time or *can be equipped for full hour's playing* with special drive using standard length tape. ● Has microphone and radio inputs and record player. Can be hooked up to telephone to record two-way conversations. ● Precision-built, portable, free from distortion . . . simple and easy to operate. *Anyone* can get professional results with TAPETONE.

Write now for complete details!

tapetone

TAPETONE MANUFACTURING CORP.
Dept. C, 202 Tillary St., Brooklyn 1, N. Y.

VERTROD TV ANTENNA

A *4 'n 1* antenna, which, by means of jumper links, provides a straight dipole, folded dipole, 72-ohm line or 300-ohm line, has been announced by Vertrod Corp., 11 Park Place, New York City.

As a straight dipole antenna has a broadband characteristic; its antenna elements have an effectively larger cross-sectional area.

All components and assembly units are pre-captured at the factory.

Mast is available with 5' or 10' sections of 1" diameter plated steel lock-seam tubing. All tubular elements are made of weatherproof hard tempered ⅜" diameter aluminum. Insulators are of non-hygroscopic bakelite. Terminals are designed for "strain-relief" at transmission line and wire connections.

PHILCO INDOOR ANTENNA

An indoor TV antenna has been announced by Philco.

Has two dipoles, each of which can be extended to a length of 44".

Supplied with 12' of 300-ohm connecting lead.

* * *

WORKSHOP ASSOCIATES TV ANTENNA SWITCH

A single-position, four-throw switch, model R-4A, for use with coaxial cable, has been announced by Workshop Associates, Newton Highlands, Mass. Switch, designed especially for use with transmission lines, can be used for any *rf* application up to 350 mc, and in low-level audio systems.

www.americanradiohistory.com

Here's Why ASTATIC MICROPHONES with CERAMIC ELEMENTS ARE GAINING WIDE, ENTHUSIASTIC PREFERENCE

OVERSHADOWING even the important technical advantages is one simple but undeniable fact—sound transmitted by Astatic Ceramic Microphones is the MOST NATURAL you've ever heard! Everyone has different words to describe the remarkable quality of voice reproduction . . . all agree that it is more NATURAL than anything they've heard. Try it. Judge for yourself. Of course you'll also be interested in the immunity of Astatic Ceramic Mikes to tropical heat or arctic cold, high humidity or dryness. Frequency response is unaffected through wide temperature range. They're amazingly rugged against accidental shocks and stresses, operational abuses which shorten or impair the service life of other types. Adaptable to existing hook-ups without requiring other changes in equipment.

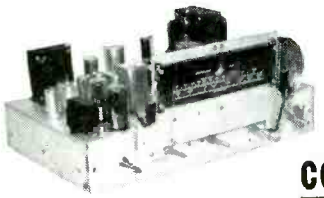
Model	List Price	Cable Length	Output Level*	Range cps
D-104-C	$24.60	7'	—58 db	30 to 7,500
JT-30-C	16.15	7'	—62 db	30 to 10,000
JT-40-C	16.15	7'	—62 db	30 to 10,000
T-3-C	25.55	7'	—62 db	30 to 10,000
VC	13.15	7'	—62 db	30 to 10,000
VC-1	13.15	7'	—62 db	30 to 10,000
CC	8.95	7'	—62 db	30 to 10,000
CC-1	8.95	7'	62 db	30 to 10,000

*0 Reference Level = 1 volt per bar

Astatic Crystal Devices manufactured under Brush Development Co. patents

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

The Meissner 9-1091-C AM-FM Tuner



. . . THE IDEAL COMPONENT FOR CUSTOM INSTALLATIONS

COMBINES FIDELITY WITH STABILITY

Servicemen and others interested in custom installations will be quick to appreciate the many top features of the MEISSNER 9-1091-C AM-FM Tuner.

Here is real quality — precision workmanship — outstanding design, all combined to give you the very highest fidelity reception and at remarkably low price.

Frequency response — sensitivity both are phenomenal! Compare the specifications below and your choice will be the MEISSNER 9-1091-C Tuner.

MEISSNER is designing a high fidelity amplifier for this tuner. Watch for the release announcement.

See The 9-1091-C Tuner At Your Jobber
Or Write For New Meissner Catalog

Features

- Frequency Response flat with plus or minus 2 db 30 to 15,000 cycles
- Bass Control provides 10 db boost at 40 cycles
- Treble suppression of 12 db at 8,000 cycles
- Input Jack for Crystal or high level magnetic type phono pickup
- Sensitivity less than 10 microvolts
- "Broad" or "sharp" selectivity for AM
- Hum level 60 db below full output
- Output 11 volts high imp. terminals, 2 volts on 500 ohm terminals
- 300 ohm FM antenna input. FM antenna and line act as efficient AM antenna

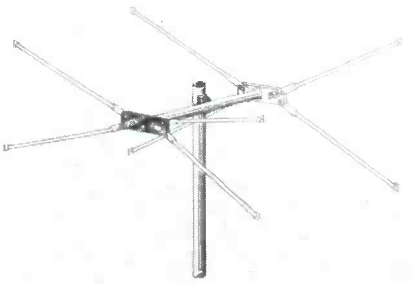
MEISSNER MEISSNER MANUFACTURING DIVISION
Maguire Industries, Inc., Mt. Carmel, Illinois

OAK RIDGE CONICAL ANTENNA

A conical TV antenna array, the Fringemaster, has been announced by Oak Ridge Antenna, 239 East 127 St., New York 35, N. Y.

Said to have a four-to-one front-to-back ratio.

Employs a universal U bolt assembly. Available with or without mast. Mast consists of two 5' sections of 1¼" stock which is rust resistant.



* * *

AMPERITE TV BALLAST TUBE

A TV ballast tube which is hermetically sealed and filled with helium, has been announced by Amperite Co., Inc., 561 Broadway, New York 12, N. Y.

Tube is produced with five separate controlling elements. To withstand the possible overload in television receivers, some of the 2.5 watt elements are designed to withstand 40 watts. Voltage breakdown between elements is said to be 1,300 volts *dc*.

Diameter of the tube, 1¼"; seated height, 3".

* * *

STANCOR TV TRANSFORMERS

Two horizontal output transformers have been added to the *Stancor* line of television replacement components made by Standard Transformer Corporation, 3580 Elston Ave., Chicago 18, Ill. These new units, the A-8117 and A-8118, are designed for replacement in leading brands of TV receivers.

A four-page illustrated catalog, bulletin DD337R, with detailed specifications and prices of all *Stancor* TV components, is available.

* * *

TAC TV KITS

Television kits for direct view tubes from 10" up to 20" are now being supplied with all major components mounted, including a prewired *if* picture and sound strip, by Television Assembly Co., a subsidiary of Snaider Television Corp., Brooklyn, N. Y. Front ends are also being supplied in prewired form.

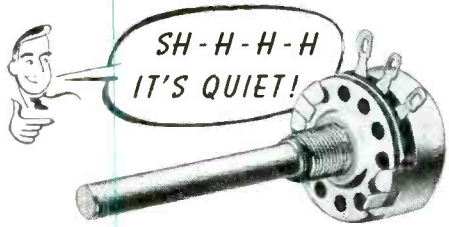
www.americanradiohistory.com

OHMITE

Little Devil

INSULATED COMPOSITION RESISTORS

In critical television applications, Little Devil Resistors can be depended on for longer, trouble-free service. These tiny, rugged units give quiet performance and are ideal for sensitive RF circuits. Moreover, they are available in ± 5% as well as ± 10% tolerances — in ½, 1, and 2-watt sizes; standard RMA values.



NOISE-FREE TYPE AB POTENTIOMETER

Continued use has little effect on the resistance of this unit because the resistance material is solid-molded—not sprayed or painted on. In fact, the noise level often becomes less with use. The unit has a 2-watt rating with a good safety factor.

SEND NOW for Catalog No. 21

OHMITE MFG. CO.
4879 Flournoy St., Chicago 44

Be Right with...

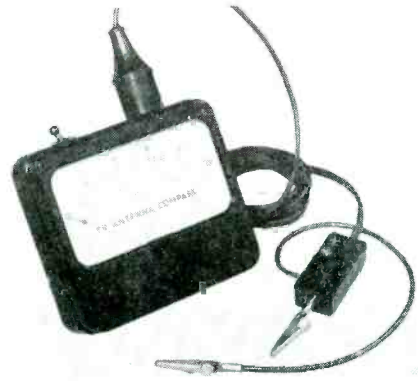
OHMITE
RHEOSTATS · RESISTORS · TAP SWITCHES

SIMPSON TV ANTENNA COMPASS

A TV antenna compass, model 351, has been developed by the Simpson Electric Co., 5200-18 W. Kinzie St., Chicago, Ill.

Compass takes the form of a pocket-size meter which is connected by an insulation-piercing alligator clip to the video input of the picture tube in the television receiver. By an extension cord, it is carried to the antenna site. With a test pattern tuned in on the area's weakest station, the antenna is then rotated for maximum deflection of the TV antenna compass.

Instrument also affords peaking of the *rf* and oscillator systems right on the station itself.



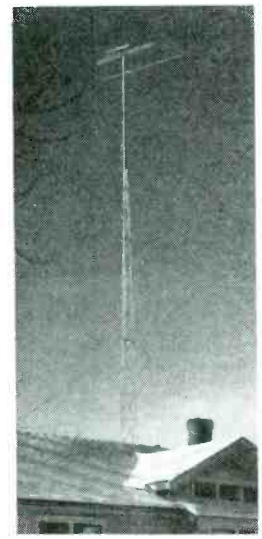
* * *

EASY-UP TV TOWER

A triangular type, prefabricated steel tower, model 200, designed for either residential or commercial use, has been announced by Easy-Up Tower Co., 3800 Kinzie Ave., Racine, Wis. Antenna height of 40' above rooftop is achieved with basic 3-section tower anchoring a 10' pole. Where still greater height is desired, one to five 10' extension sections can be added.

Hinged feet at the base permit mounting and raising on either a peaked or flat roof.

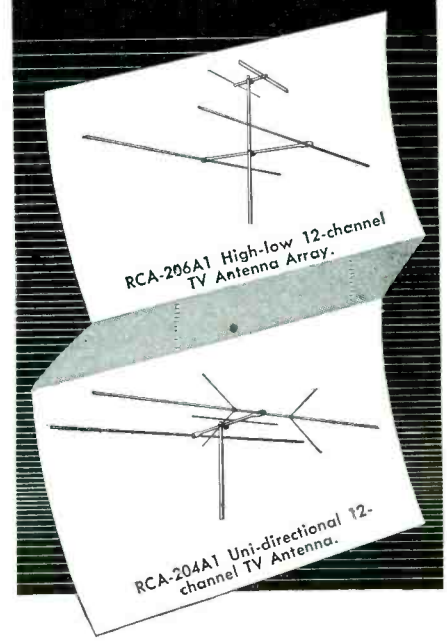
All-welded construction, with closely interlaced cross-members. Total weight of the tower itself is 65 pounds. Shipped in three nesting sections.



RCA

TELEVISION ANTENNAS

NEW DESIGNS
EASILY ASSEMBLED
IMPROVED PERFORMANCE



• Completely new in design—these sturdy, quickly assembled aluminum antennas answer your TV installation problems. Additional elements may easily be combined with either 12-channel antenna for improved reception.

RCA-206A1 is a 12-channel antenna array designed especially for locations where the high and the low channel stations are widely separated in direction.

RCA-204A1, a 12-channel uni-directional antenna which utilizes the unique RCA-developed "V" attachments to provide improved reception on channels 7 to 13, is an unusually simple and efficient antenna for all-channel reception.

Designed for use with 300-ohm balanced transmission line, they require no external line-matching transformers.

Always keep in touch with your RCA Distributor

TURN TO NEXT PAGE

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

www.americanradiohistory.com

Regulate Your Line Voltage to fit Your Needs

- On 117 V. line, variable from 95 to 145 Volts. If line drops to 90, variable from 75 to 115 Volts.
- Output adjustable in 1½ volt steps.
- Metered out-put Voltage.
- 140 Watts, max., 50-60 cycle.

Here is a Voltage regulating *isolation transformer* that will make your bench test voltage exactly what you want . . . Only $15.00 . . . Capacity 140 Watts max. Every service engineer needs it for more accurate work and time saving short cuts.

Vari-volt Junior . . . $15.00 DEALER NET

PARTIAL LIST OF USES

Radio and Television receiver testing at under or over voltage.

Speed up or retard heating of light soldering irons.

Excellent control for primary of high voltage breakdown transformers.

Controlled voltage for meter calibration.

To isolate "hash" and live ground from AC-DC Equipment.

For Schools and educational laboratories.

Adjusting line voltage to photo lamps for uniform exposure, and many other uses.

For more complete information write

THE HALLDORSON CO., 4500 Ravenswood Avenue, Chicago 40, Ill.

Halldorson
Vacuum Sealed Transformers

NEW!

AMCON TWISTED LUG ELECTROLYTICS

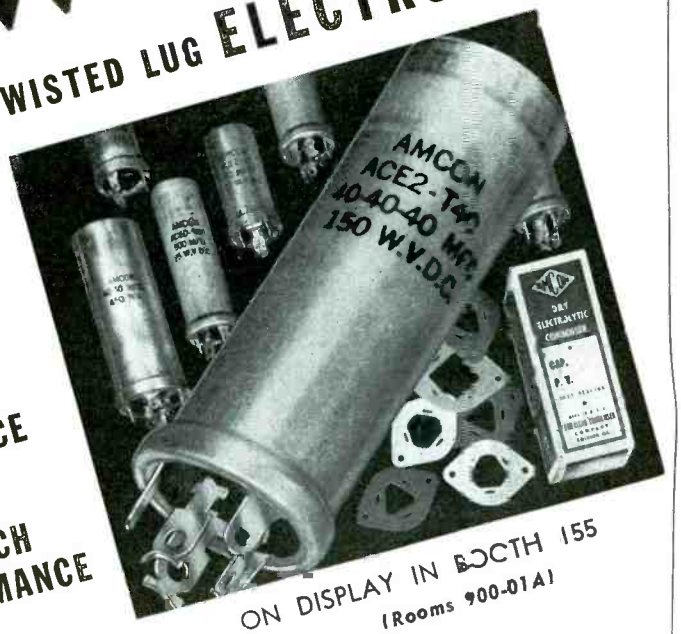
FASTER CHASSIS ASSEMBLY

•

IMPROVED APPEARANCE

•

TOP-NOTCH PERFORMANCE



ON DISPLAY IN BOOTH 155
(Rooms 900-01A)

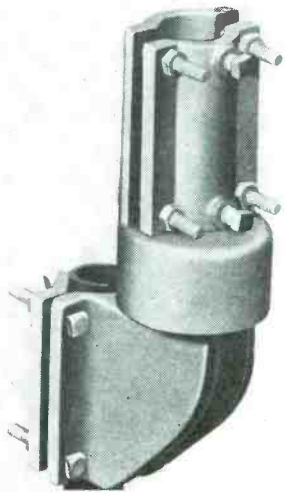
Write for Catalog and Prices

AMERICAN CONDENSER CO.
4410 N. Ravenswood Ave., Chicago 40, Illinois

ALLIANCE TENNA-ROTOR ACCESSORY FOR HEAVIER TYPE TV-FM ANTENNA

A *thrust-bearing* bracket, model TBB, to be used in conjunction with the *Tenna-Rotor* for facilitating the support of heavier type TV and FM antennas, has been announced by the Alliance Manufacturing Co., Alliance, Ohio.

Accessory is made from a high corrosion resistant aluminum alloy. Ball bearing is packed with a low temperature grease, and like the Tenna-Rotor unit, the bracket is made for all weather operation.



* * *

DURABLE FORMED MAGNIFYING LENS

A filter magnifying lens has been developed by Durable Formed Products, Inc,. 6 Greene St., New York 13, N. Y. Lens contains blue tinted oil.

Lens supplied with brackets, which enable the lens to be fitted to any set, and permit the viewer to slide it forward or backward for proper focusing and enlarging. Tilting feature enables the lens to fit any shape set and also permits the doors to be open and closed.

* * *

TACO INDOOR ANTENNA

An indoor TV antenna, number 975, which features horizontal and vertical orientation, telescopic dipoles, and 300-ohm leadin attached, has been announced by Technical Appliance Corporation, Sherburne, N. Y.

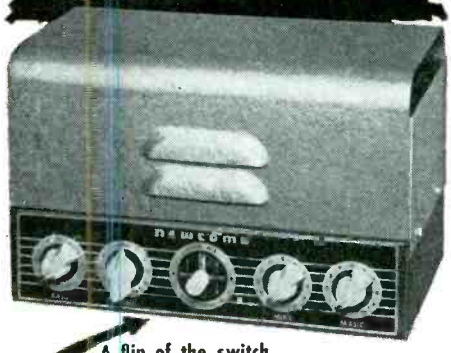
Bronze springs are used for contact between dipole and leadin in base.

www.americanradiohistory.com

MUSIC AND PAGING

NOW ALL IN ONE PACKAGE

FOR RESTAURANTS, SMALL FACTORIES, RETAIL STORES AND DISPLAY ROOMS



A flip of the switch stops music, adjusts response and opens paging for entire area or only a portion as desired.

List Price with Tubes and Cover

$79.50

The Newcomb Model PM-10 delivers a full clear 10 watts. Includes bass boost and treble boost or attenuation controls. Selective paging switch saves hours of installation time. With Micro-Groove changer provides lowest cost good music for commercial use PLUS desirable paging feature.

Look to the complete Newcomb line of amplifiers for more easy-selling features, more models to choose from, wider price range, greater quality at any price . . . all combined to help you make more repeat sales, more profit.

See your Newcomb distributor or write for specifications of the PM-10. It's another example of Newcomb leadership in the sound equipment field.

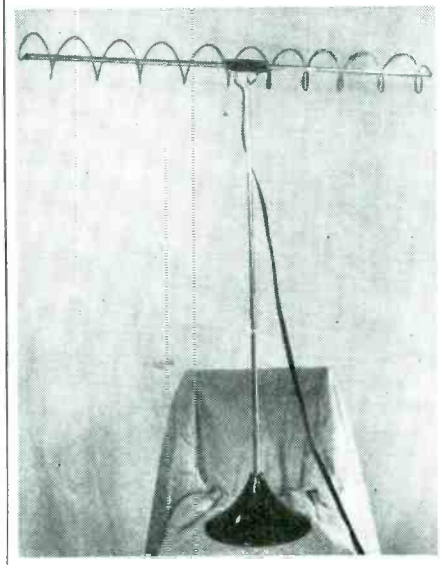
NEWCOMB
AUDIO PRODUCTS CO.
DEPT. E. 6824 LEXINGTON AVE.
HOLLYWOOD 38, CALIFORNIA

FERRIS TV ANTENNA

A *hi-lo* indoor television antenna for 12-channel coverage has been announced by Ferris Television Laboratories, 1057 Wellington, Chicago.

Antenna is designed on principle of a straight dipole which is peaked to channel 9 and surrounded by an inductance peaked on channel 4, the combination of which is said to afford broad band tuning over the 12 channels.

R. M. Karet Associates, Inc., 510 N. Dearborn St., Chicago, are national representatives for the antenna.



* * *

PRECISION APPARATUS 'SCOPE

A 5" lab type 'scope, series ES-500, with extended range, voltage regulated amplifiers for multi-purpose AM, FM and TV applications, has been announced by Precision Apparatus Co., Inc., 92-27 Horace Harding Blvd., Elmhurst, L. I., N. Y.

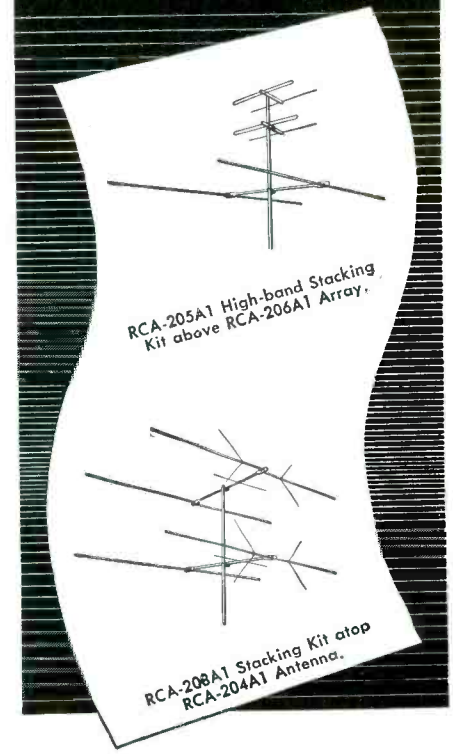
'Scope features vertical amplifier response to 1 mc. 2-megohm input resistance; approximate, 20-mmfd input capacity. Also has a 20-millivolt vertical amplifier sensitivity which permits direct alignment or adjustment of low gain circuits. Has a calibrated, frequency compensated, wide band *V* input step-antenuator, x 1, x 10, x 100, and horizontal amplifier response to .5 mc; 500,000 ohms input resistance, approximately 20-mmfd input capacity.

Direct linear internal sweep coverage from 10 cycles to 30 kc.

RCA

TV ANTENNA STACKING KITS

MORE gain
EASY to attach
SIMPLE to adjust



● Now . . . with new RCA stacking kits, you can "tailor" the basic RCA TV antennas to fit local receiving conditions.

RCA-205A1, when stacked above RCA-206A1 array, increases gain on channels 7 to 13.

For improved fringe-area uni-directional reception on all 12 channels, use RCA-208A1 in conjunction with RCA-204A1.

When you use the new RCA stacking kits, you are assured of lasting, dependable performance and increased customer satisfaction. RCA offers you the best in TV antennas to ensure the best in TV reception.

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TURN TO NEXT PAGE

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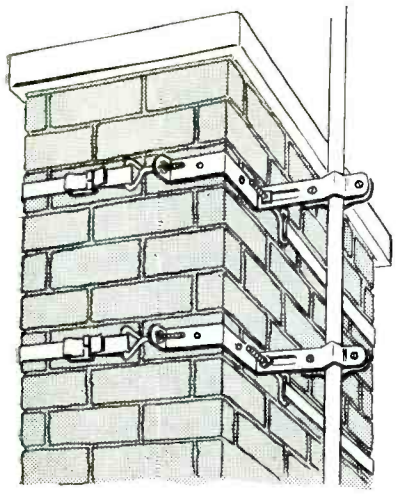

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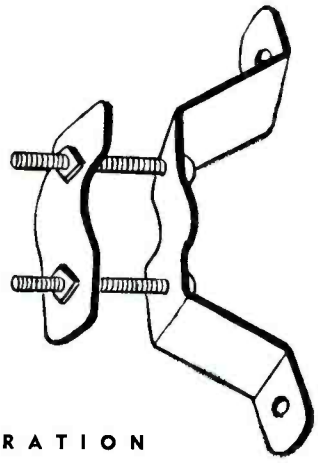
Metalace offers the best buy without sacrifice of quality because of our mass production. A mount for every purpose . . . NOW 24 different types.

Model WM-2 Wall Mount for in-close mounting allowing a 2" stand-off.

$1.50 PER PAIR List

Model CM-4 (illustrated). A low priced Chimney Mount of top quality. Of rust-proof, heavy gauge steel with extra reinforcement...with two 12' rolls of strap. **$4.00 PER PAIR List**

Model CM-X. As above but without straps for direct mounting on chimney, corner of building, etc. **$2.75 PER PAIR List**



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- **WALDOM CONE ASSEMBLIES** are guaranteed unconditionally as to construction and performance. Only the very finest voice coils and spiders, precision made to exact specifications, are used.
- **WALDOM CONE ASSEMBLIES** carry full R. M. A. Warranty.

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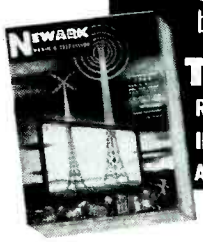

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New Parts, Accessories

HYTRON SOLDERING AID

A soldering aid, the first of the shop tools produced from the winning entries in the recent Hytron contest, has been announced by Hytron Radio and Electronics Corp., Salem, Mass.

In operation while iron keeps joint hot, fork tip of tool, like two tiny metal fingers, straddles and, with slight twist, grips end of wire, and unwraps it. Shifting to other side of lug, it grips and pulls wire free.

Spade-type-reamer tip clears lug hole of solder, or pushes other wires aside for new wire. Fork tip next guides new wire through and around lug. Holds it in place while soldering.

* * *

MALLORY BIAS CELLS

Miniature type grid bias cells, have been announced by P. R. Mallory & Co., Inc., Indianapolis 6, Ind.

Cell provides a constant bias potential, where no current is required of the cell. Available in two voltages, 1.5 and 1.75. Since it is a potential device only, its *emf* is lowered by even a fraction of a microampere drain; however, it is said to be unaffected by alternating current of any frequency. At audio frequencies, the cells have a non-reactive impedance of between 250 and 1,500 ohms. Satisfactory operation is said to be available over a range of –60° C (–76° F) to +60° C (140° F).

* * *

OLIN DRY BATTERIES

Dry cell batteries for portable sets featuring interlocked construction have been announced by the Electrical Division of Olin Industries, Inc., New Haven, Conn.

Batteries are of 90-volt *B* and 4½-volt *A* type.

The *B* battery (No. 1713) is made up of three stacks, each of 20 plastic flat cells. Each of the 20 cells in each stack interlock to make electrical connection. The only soldered connections are between the three stacks.

* * *

WEBSTER-CHICAGO 45 RPM ADAPTER KIT

A 45 rpm adapter kit for conversion of any of the Webster-Chicago dual-speed record changers has been announced by Webster-Chicago Corp., 5610 W. Bloomingdale Ave., Chicago 39, Ill.

Kit, RM-45, consists of a small drive bushing which may be fitted on the 33⅓ drive sleeve of the dual speed record changer, and a spindle spacer which takes up the center 1½" holes so that the new 45 rpm records may be played manually.

* * *

PARK METALWARE REAMER

A reamer which fits into the handle of regular and stubby *XceLite* type combination screwdrivers, as well as No. 14 regular or hollow shaft nut drivers, has been announced by the Park Metalware Co., Inc., Orchard Park, N. Y. A ball fastener permits changing from screw driving to reaming, or vice versa.

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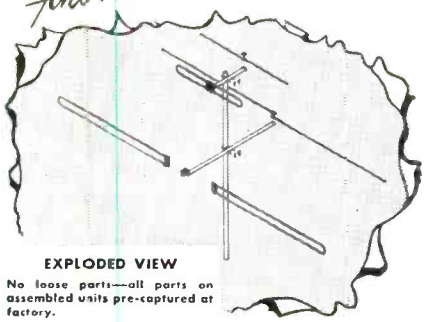
CLEAR THE ROOFTOPS FOR...

Another Vertrod First!



EXPLODED VIEW

No loose parts—all parts on assembled units pre-captured at factory.

SENSATIONAL

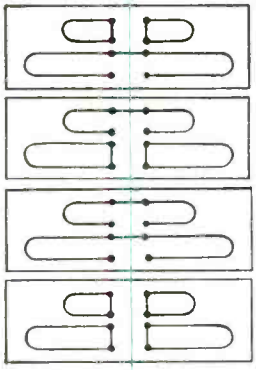
"4 'n 1"

TV ANTENNA

1. folded dipole
2. straight dipole
3. 72 ohm line
4. 300 ohm line

ASSEMBLES IN *RECORD TIME*—
NO TOOLS REQUIRED!
(— that's right! Not even a screwdriver!)

ALL IN ONE—SETS UP AS REQUIRED BY SIMPLE ADJUSTMENT OF JUMPER LINKS



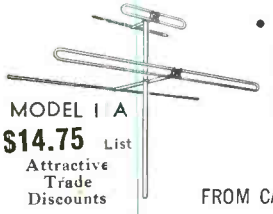
HF straight dipole
LF folded dipole

HF folded dipole
LF straight dipole

HF and LF folded dipole

HF and LF straight dipole

- Plated steel lock-seam 1" dia. tubing. Models available with 5 and 10 foot masts. (Furnished with two mounting clamps.)
- All tubular elements of hard tempered aluminum.
- Bakelite insulators which are non-hygroscopic.



MODEL 1 A

$14.75 List

Attractive Trade Discounts

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For information, contact your distributor or write direct: DISTRIBUTORS: Exclusive franchises available in some territories. Write for details.

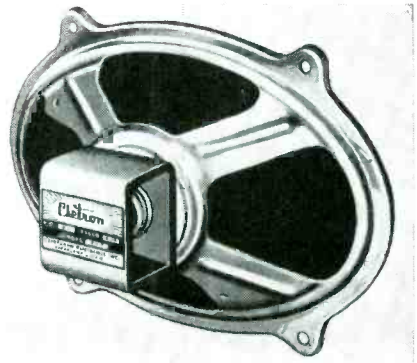
Vertrod Corp

11 PARK PLACE • NEW YORK 7, N. Y.

CLETRON REPLACEMENT SPEAKERS

A line of replacement speakers for sale to jobbers has been announced by Cleveland Electronics, Inc., 6611 Euclid Ave., Cleveland 3, Ohio.

Speakers are being manufactured in many sizes and types including both electrodynamic and permanent magnet types for use in the home set and auto, television, outdoor movie, public address, FM and laboratory sound applications.



* * *

TAPETONE RECORDERS

Magnetic tape sound recorders, in kit and factory assembled form, have been announced by Tapetone Manufacturing Corp., 202 Tillary Street, Brooklyn 1, N. Y., a division of Daco Machine & Tool Co., Inc.

The recorders are also provided with a built-in turntable to record from regular phonograph discs to the tape. Play-back from the tape is through a 8" speaker.

Medium for reproduction is Scotch recording tape. A slow-speed capstan is said to supply an extra half-hour on standard length tape.

Besides its primary function as a sound recorder, the unit can be used as a public-address system, record player, and as an amplifier for a radio tuner.

* * *

E-V 4-WAY BANQUET AND FLOOR STAND

A combination 4-way banquet and floor stand, model 432, has been announced by Electro-Voice, Inc., Buchanan, Michigan.

Banquet stand height is 19" retracted to 34" extended. Chair-height stand is 26" retracted to 41" extended. Floor stand height is 44" retracted to 59" extended.

For further information write for bulletin No. 149.

RCA

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For Speedy Installation
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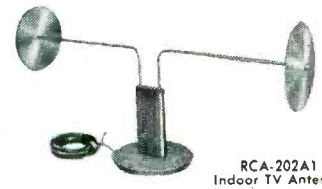
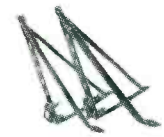
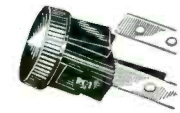


RCA-202A1 Indoor TV Antenna



RCA-227A1 Antenna Mast Mounting Brackets



RCA-206X1 Twin-Lead Lightning Arrester

RCA-201A1 "Bright-Picture" Transmission Line

RCA-209A1 "V" Attachments

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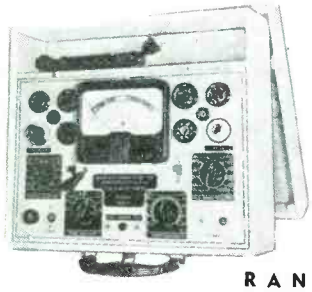
COMBINATION TUBE TESTER
SET TESTER and CONDENSER TESTER MODEL 802NA

— EASY OPERATION — UP TO DATE —

— Only 5 switches for operating both Tube and Set Tester —



Tube Tester has speedy leakage-short tests between all elements. Separate noise test for tubes that otherwise test "good." Large scale 4½" meter protected against burn out by special meter fuse for both multitester and tube tester. Complete unit also protected by separate fuse. Tests new and old types of tubes as well as ballast tubes. New gold plated copper oxide rectifier used for A.C. voltage measurements. Multipliers are matched for 1% tolerance.

RANGES

DC Voltmeter: 0-10-50-500-1000 at 1000 Ohms per Volt.
AC Voltmeter: 0-10-50-500-1000.
DC Milliammeter: 0-1-10-100-1000.
DC Ammeter: 0-10 Amperes.
Ohmmeter: 0-500-5000-1 Meg.-10 Meg. Low center scale.
DB Meter: —8 to +55 decibels in four ranges.
Four range output meter: Same as AC volts.

Model 802NA—supplied in handsome hardwood case, with special compartment for small tools, test leads (Included), etc.
Size: 12¾" x 12" x 5¼". Weight: 11½ lbs.
Complete with self-contained batteries, ready to operate.
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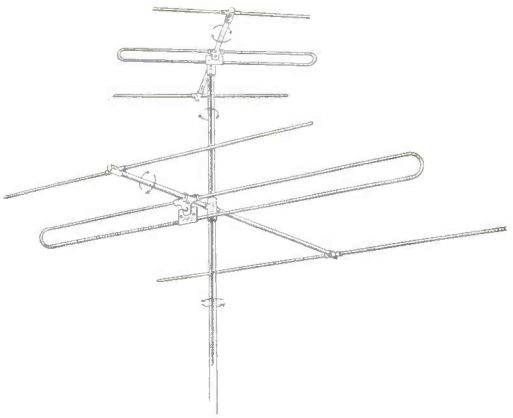

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Where signal is weak.
Where noise level is high.
Where ghosts "haunt" your screen.

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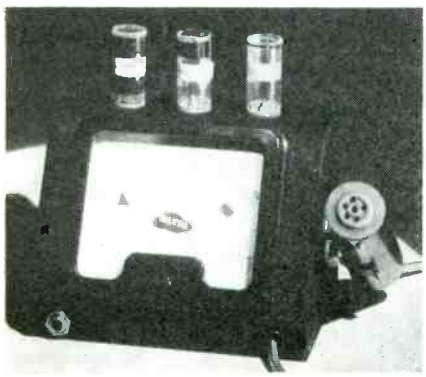
SILVER RESONANCE INDICATOR UNIT

A test instrument which converts a signal generator or test oscillator to a direct-reading resonance indicator has been announced by McMurdo Silver Co., Inc., Hartford, Conn. Model 915 (patent pending) and specially designed for use with Silver model 906 signal generator, this instrument has a frequency range of 100 kc to 300 mc, using three especially designed probe coils.



WINCHARGER TOWERS

Self-supporting towers for roof mounting of TV and FM receiving antennas have been announced by Wincharger Corporation, Sioux City, Iowa.

The towers are built in two heights, designed to accommodate a pipe extension which can be raised and lowered to facilitate installation and service. Inclusive of the pipe extensions, these towers will support TV or FM receiving antennas 10' or 20' above the roof, respectively.

Towers can be installed on either sloping or flat roofs.

* * *

HERMAN H. SMITH CLAMP STAND

A clamp standoff for antenna masts has been announced by Herman H. Smith, Inc., 405 44th St., Brooklyn 20, N. Y.

Clamps are supplied in two sizes. One size fits over either a ⅞" or a 1" diameter mast and the other size fits over a 1⅛" or a 1¼" diameter mast.

Available with 3½" screw eyes. Inserts are molded polyethylene.

RCA DIODE PROBE

A twin-diode probe (WG-275) for high-frequency measurements and adjustments, is now available as a separate item for use with the RCA Master Volt-Ohmyst Meter (WV-95A).

Probe is said to have a substantially flat frequency response from 30 cycles to 250 mc, and reads sine-wave voltages directly in *rms* values. Peek-to-peak voltages of both sine and complex waveforms may be obtained by multiplying the meter-scale reading of these instruments by 2.83.

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THE ONLY 3-CORE SOLDER IN THE WORLD MADE WITH NON-CORROSIVE, EXTRA-ACTIVE ERSIN FLUX!

PROVEN PERFORMANCE! Selling for more than 13 years in same composition. Now imitated but still unequalled.

AT YOUR JOBBER

Write for Sample and Helpful Booklet "Solders and Soldering".

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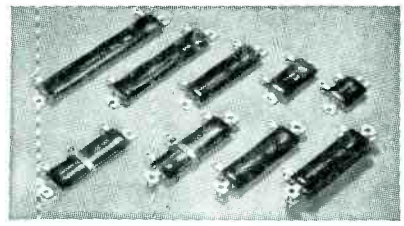
315 Broadway, New York 7, N. Y.

OHMITE THIN RESISTOR

A wire-bound, vitreous-enameled, thin-type resistor, 1" wide and ¼" thick, has been announced by the Ohmite Manufacturing Co., 4835 Fourney St., Chicago.

Equipped with either a single-unit mounting bracket, which allows the resistor to be mounted close to the mounting surface, or with a stud bracket, which, in addition, provides for the stacking of two or more units. The brackets, which extend the entire length of the resistor core, are said to tend to spread developed heat evenly throughout the resistor and quickly conduct heat to the air and mounting surfaces. Resistors, with either kind of bracket, are made as fixed units, and as adjustable lug units.

Lengths of these new resistors vary from 1¼" for the 30-watt size to 6" for the 75-watt size. Five wattage sizes are available.



* * *

JACKSON TV/FM SIGNAL GENERATOR

A TV/FM signal generator, model TVG-1, has been announced by The Jackson Electrical Instrument Co., 18 South Patterson Boulevard, Dayton 1, Ohio.

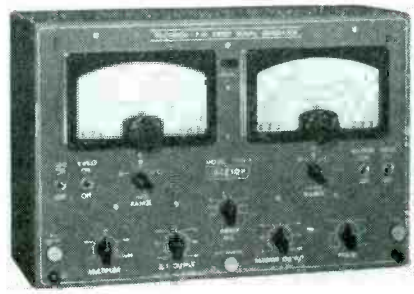
Provides sweep frequencies from 2 to 216 mc in three ranges, all on fundamentals. Sweep width adjustable from 100 kc to 12 mc bandwidth; narrower width for FM set adjustment. Has a marker oscillator which provides a visual *pip* on the 'scope screen on any fundamental frequency from 4 to 42 mc; calibrated dial ranges are 4 to 8 mc, 10 to 20 mc, and fundamentals of 20 to 42 mc.

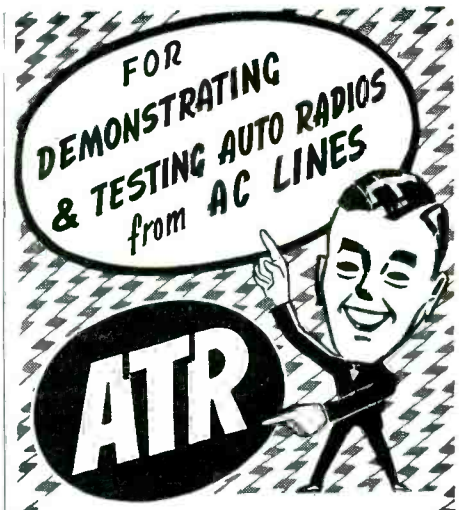
A calibrating crystal jack is also provided for calibrating marker or providing crystal calibrated marker pip.

Has 400-cycle modulation for use with marker generator in adjusting TV and FM sound channels and traps by the audible or meter methods.

A phased sinusoidal voltage is furnished by the generator for the horizontal timing axis of the 'scope.

The *rf* output is controllable with output control and multiplier; provides impedances of 10 and 30 ohms.





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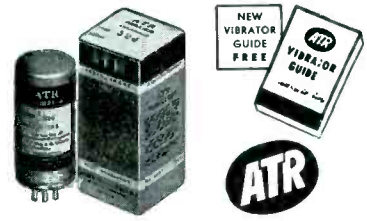

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DECIBELS: (5 ranges) —10 to +52 DB

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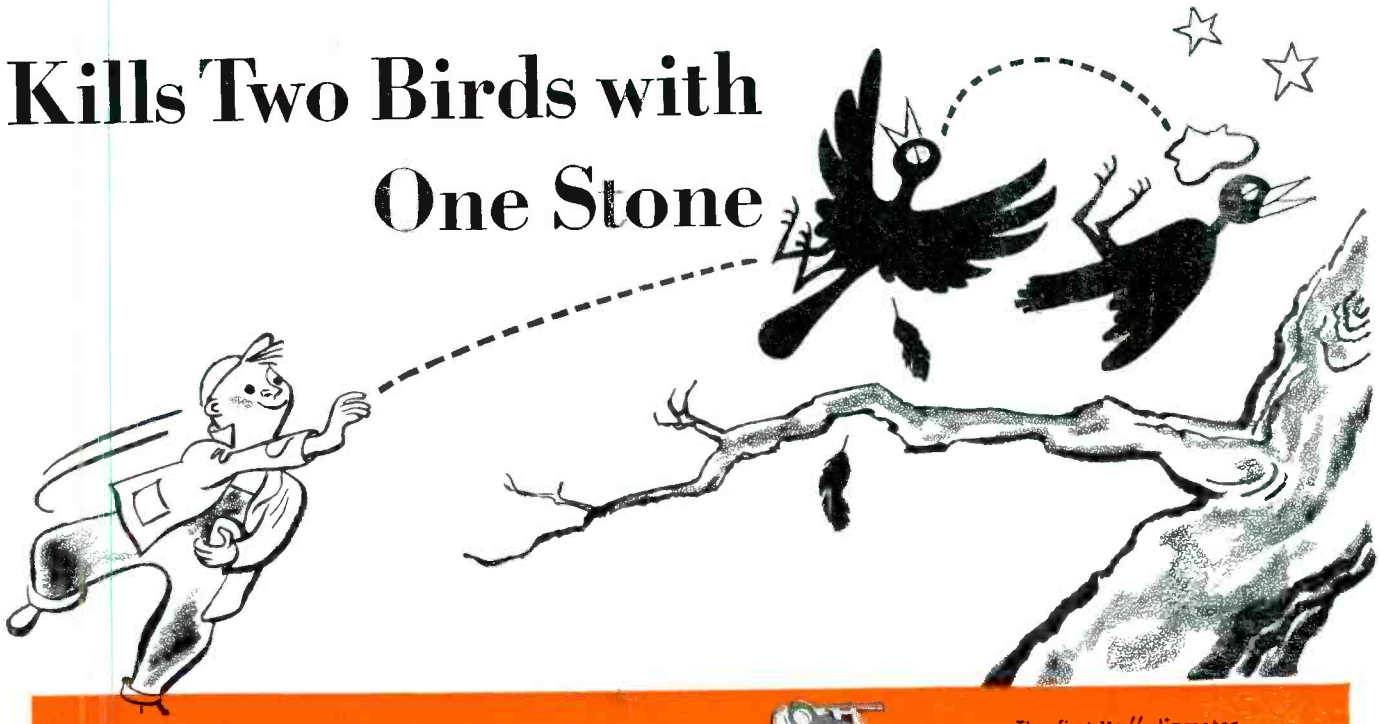
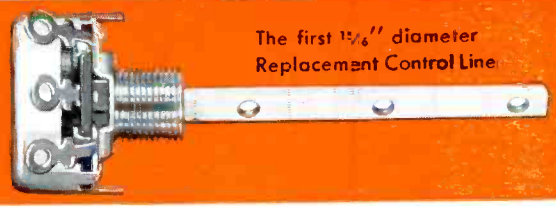
Kills Two Birds with One Stone



The Mallory Midgetrol



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

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

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

LOOK WHAT THE MALLORY MIDGETROL OFFERS:

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

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

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

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

See your Mallory Distributor for this new standard in carbon controls

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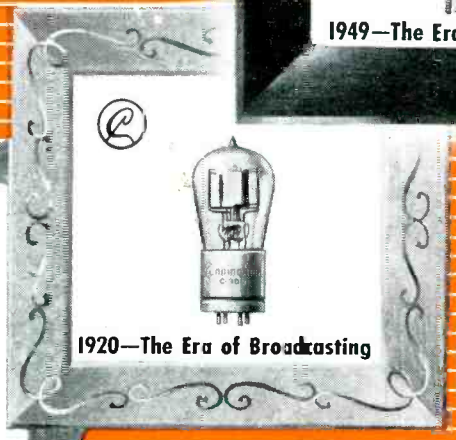

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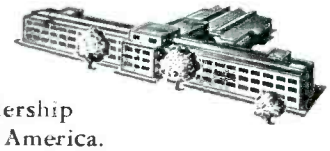

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