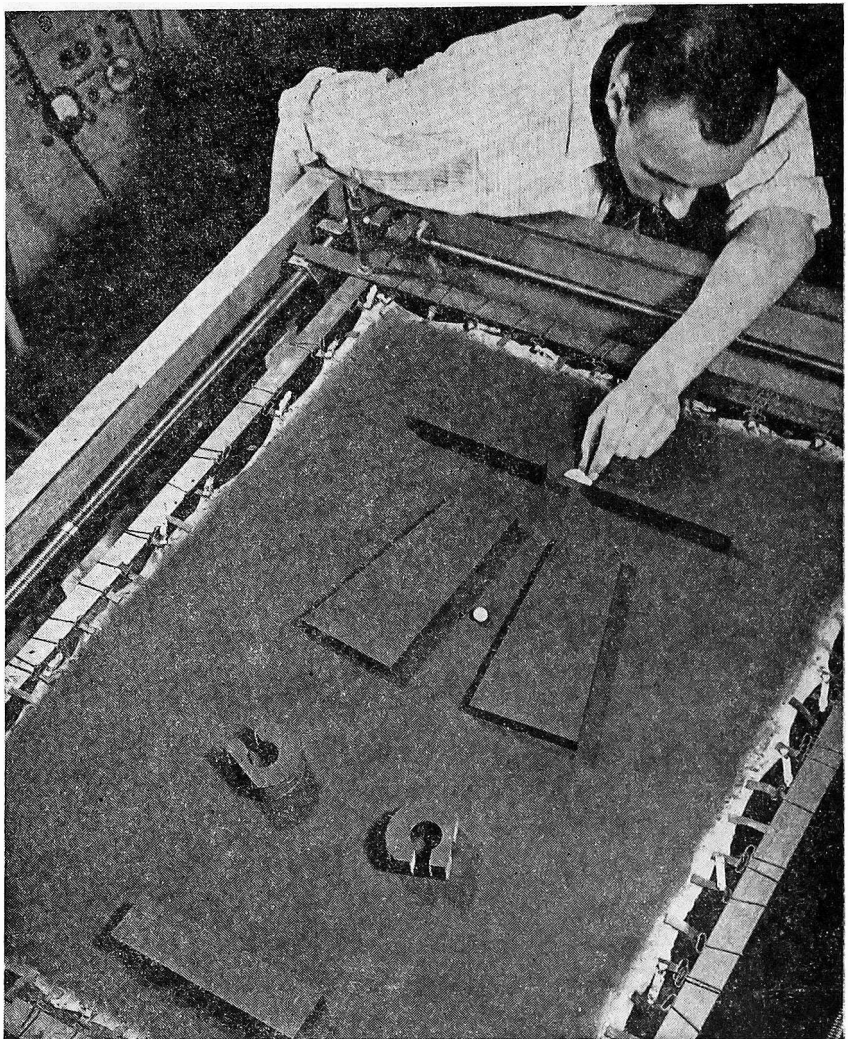


*Successful*  
**SERVICING**

JANUARY - FEBRUARY  
1948

**REPORT  
ON  
TELEVISION  
SERVICING**

By  
**JOHN F. RIDER**



*Courtesy Westinghouse Elec. Corp.*

**F**AR and wide among servicemen you may hear the question, "What is happening in television servicing?" In fact, even the men who are far removed from television transmitters are asking such questions as: "What will the independent serviceman do when television becomes an actuality in his area? What has been the success of factory service branches? Does their existence forestall the possibility of successful private enterprise?" These and many more problems plague the independent who is looking towards the future.

We shall try in the limited space available in this issue to examine the past year of television servicing activity and to render a report. From recent experience it is possible to hazard a conclusion about what may happen in the next year or two—not longer—provided there is no major recession, which economists seem to feel will not occur within that time.

The past year has demonstrated the relative merits of four different arrangements of television servicing:

1. The factory service branch.

2. The distributor-operated service facility.

3. The large independent service shop, which is also a television set dealer.

4. The independent service shop operating under a television servicing contract issued by either the manufacturer or his distributor.

Each of these means imposes a limitation on more than just television servicing operations by the average small independent service shop, primarily because some television sets have more than just television receiving equipment in the cabinet, and secondarily, because the public will call on the television servicing outfit for the repair of other radio and allied equipment.

At the outset of the activity, the entire servicing industry looked askance at such television servicing planning, because it threatened the very life of the nationwide independent repair field—not so much because of the immediate limitation, but because of the general belief that the short-term need would be the basis for long-term planning. Fortunately a year of effort has demonstrated not only the weakness of the short-term need

as a long-term plan, but also the benefit which can be derived from open thinking and the manufacturers' attempt to resolve the problem by the appreciation of different methods of serving the public.

In this connection it is interesting to note that Belmont, which is announcing the lower-priced television receiver, does not contemplate contract service; instead the company will establish a chain of authorized independent service stations with both educational and equipment requirements. So here is the first step towards that ultimate goal of television service by authorized independent stations without service contracts. It is likely that some sort of uniform price structure for different types of installation and service operations will develop, but at least, the trend is in the proper direction.

Much more can be said, but unfortunately space does not allow it; however, let it suffice to say that in the opinion of the writer, the contract service arrangement as used at present will decline in importance within a year or perhaps 18 months, and more and more noncontract

*Please turn to page 4*

**RCA QU61**

The following circuit modifications have been made in RCA Model QU61, the schematic of which appears in *Rider's Volume XV* on page 15-55:

1. In some sets, a modification has been made in the "Radio-Phono Switch and Tone Control Strip," the diagram of which appears on page 15-58. The modified diagram appears in Fig. 1. In these sets, R9 (Stock No. 30648) has been omitted and C57, 120  $\mu\text{f}$  (Stock No. 39630) has been changed to 47  $\mu\text{f}$  (Stock No. 35644). A 220,000-ohm resistor (R33, Stock No. 14583) has been added from terminal 12 of S7 to the ground terminal of R11.

2. In some sets, a modification has been made in the bias supply to the output tubes. The schematic for the unmodified diagram appears on page 15-55 of *Rider's Volume XV*, and the modified diagram is shown in Fig. 2. A 120,000-ohm resistor (R25, Stock No. 30180) has been added in series with the supply and a 0.05  $\mu\text{f}$  capacitor (C56, Stock No. 70615) has been added from the output tube side of the 120,000-ohm resistor to ground.

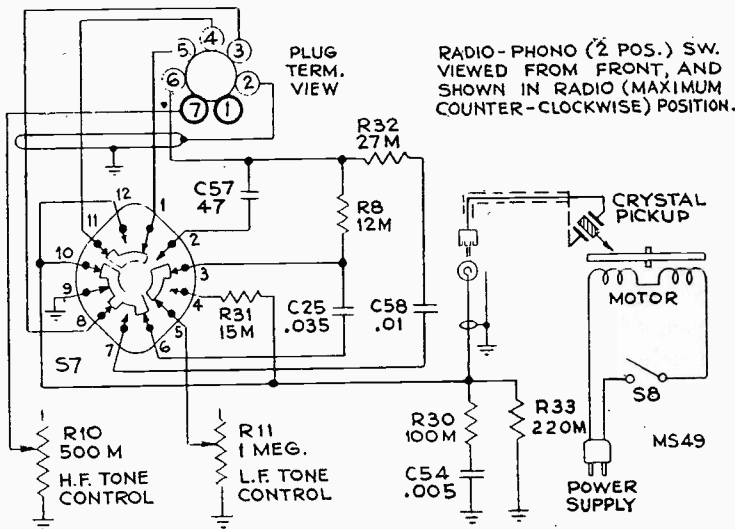


Fig. 1, above. Modified schematic of phono switch and tone control strip in RCA model QU61.

Fig. 2, below. Modified schematic of output tubes bias supply.

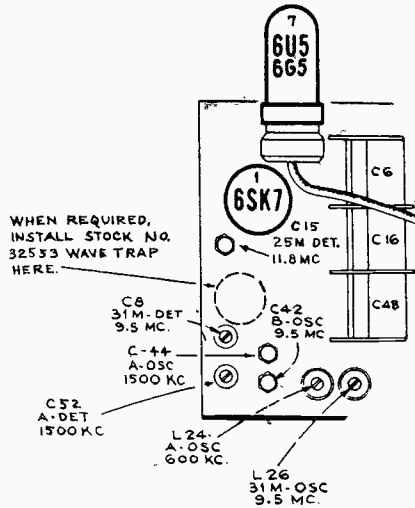
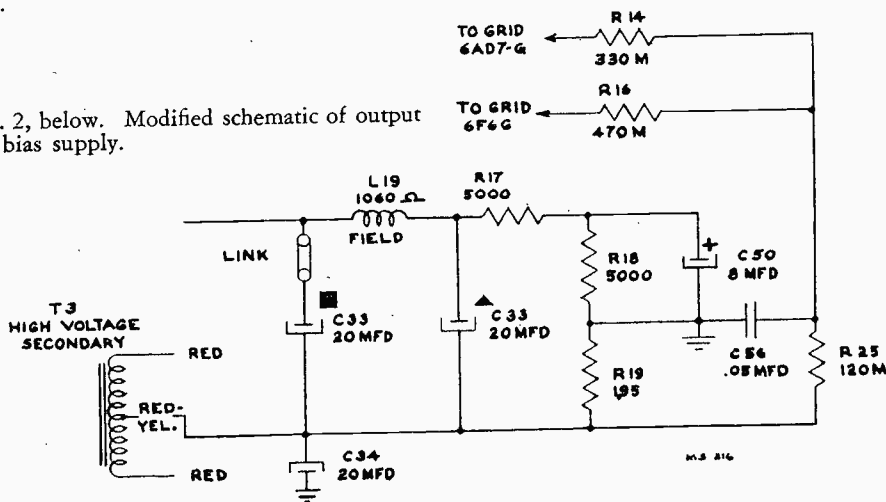


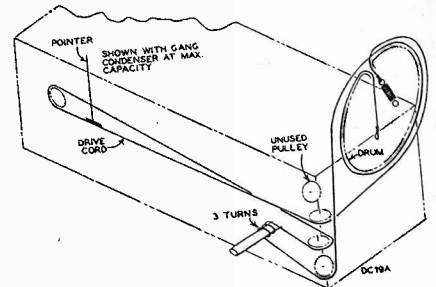
Fig. 3. In case of interference, a wave trap can be installed as shown in the RCA model QU61.

3. Should interference from a powerful near-by station require the use of a wave trap, install RCA Stock No. 32553 trap as illustrated in Fig. 3. The complete chassis view is found on page 15-58 of *Rider's Volume XV*. Connect the coil leg to the receiver antenna connection;

ground connection is made to the chassis through coil mounting foot. Adjust the capacitor mounted on top of the coil for minimum signal from the interfering station.

**RCA 68R1, 68R2, 68R3, 68R4, Chassis RC-608**

These models are the same as those illustrated on pages 16-39 to 16-43 of *Rider's Volume XVI*, except that the dial cord assembly has been redesigned. The revised design uses a simpler method, and the length of the dial cord has been reduced to approximately 67 inches



Revised method for dial cord stringing in RCA models 68R series.

rather than the original 80 inches. See accompanying illustration for method of restringing.

**DeWald 418**

This model is the same as model 414 appearing on page 11-2 of *Rider's Volume XI*.

**Montgomery Ward 74WG-2711**

This model is similar to model 74WG-2705B described in *SUCCESSFUL SERVICING* for September-October 1947, except for the addition of twin doors on the cabinet covering the dial panel.

**GE YRB 60-12**

This receiver is the same electrically as the YRB 60-2 appearing on page 15-5 of *Rider's Volume XV* but the cabinet is different.

**GE YRB 92-2 and 81-3**

These models are the same electrically as the YRB 82-1 appearing on pages 15-53 to 15-54 of *Rider's Volume XV*, but they have different cabinets.

**GE 254**

This model is illustrated on pages 16-3 to 16-5 of *Rider's Volume XVI*. The suffix letters after 254 indicate only the cabinet styling. All versions are electrically identical.

**Arvin 544 and 544R (Noblitt-Sparks)**

The following changes have been made in the circuit appearing on pages 15-3 to 15-5 of *Rider's Volume XV* to reduce low level hum and hum modulation.

1. The capacity of the electrolytic capacitor A19136 (C7) is changed from 40-20 $\mu$ f, 150v, 20 $\mu$ f, 25v, to 50-20 $\mu$ f, 150C, 20 $\mu$ f, 25c.
2. The rotor of the variable capacitor is now connected to AVC instead of to chassis. (This is the same circuit that was used in sets built previous to March 1946.)
3. C11 0.1 $\mu$ f, 400v, capacitor from AVC to chassis is deleted.
4. The bypass capacitor from B+ to chassis is changed from C9, 0.05 $\mu$ f, 400v, to C11, 0.1 $\mu$ f, 400v, to prevent oscillation.
5. A fiber washer part 20198 1/4 inch ID, 1/2 inch OD, 1/8 inch thick, is added under the pointer to prevent the pointer from touching the dial and shorting AVC to the chassis.
6. The floating ground wiring is changed; the jumper from the oscillator coil to the #3 lug on the 12SK7 socket is removed and replaced by a jumper from the ground side of the volume control to the a-c switch lug.
7. The top of the dial scale backing plate has been cut off even with the top of the dial, to allow the dial to set in a more vertical position. The part number remains the same, and the old and new plates are interchangeable.

The parts list for these models remains the same as that enumerated on page 15-5 of *Rider's Volume XV* except for the changes noted.

Part No.	Description
A19136	Capacitor, electrolytic 50-30 $\mu$ f, 150v. 20 $\mu$ f, 25v.
A20198	Washer, fiber

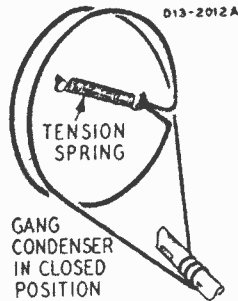
**Montgomery Ward 74WG-1801C**

This model is similar to 64WG-1801C shown on pages 15-27 to 15-29 in *Rider's Volume XV*, except for the following changes. The frequency range has been slightly contracted to 540 to 1600 kc. The dial cord length has been increased, and the following dial cord replacement data should be used.

Turn the gang capacitor to the fully closed position. Use a new drive cord 18 inches in length and tie one end to the tension spring. Fasten the other end of the tension spring to the hook on the drive pulley. Pass the cord through the slot in the drive-pulley rim and continue

around pulley one-half turn, counterclockwise. Wind 3 1/2 turns counterclockwise (from front of chassis) around tuning shaft. Turns should progress toward rear of chassis. See accompanying illustration.

Wind cord counterclockwise around drive pulley in back of previous 1/2 turn. Pass cord through the slot in the pulley rim. Stretch tension spring and tie free end of cord to the spring. Cut off any excess string.



New dial cord stringing for Montgomery Ward model 74WG-1801C.

The components used in the 74WG-1801C are the same as those listed for the 64WG-1801A on page 15-29 of *Rider's Volume XV*, except as noted below.

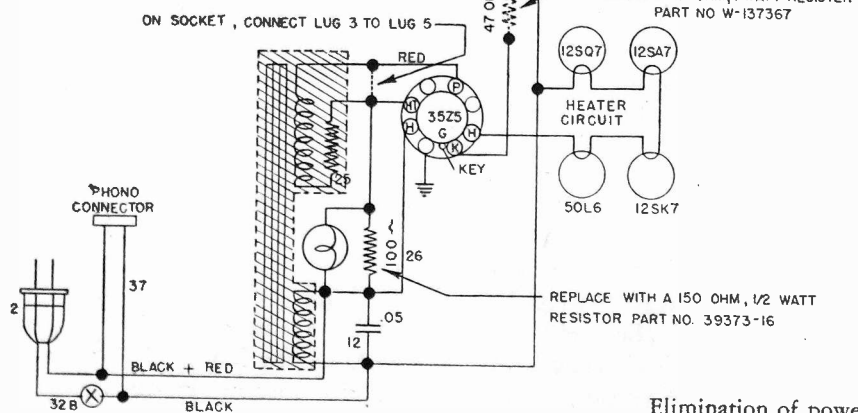
Ref. No.	Part No.	Description
C-15	B67204	0.20 $\mu$ f 200 V tubular
C-16	D67104	0.10 $\mu$ f 400 V tubular
C-18	D67102	0.001 $\mu$ f 400 V tubular
C-19	17A123	1.5-12 $\mu$ f trimmer
T-1	26A467	"B" band loop antenna assembly
T-3	9A1775	1st i-f transformer and can assembly

**Electronic Laboratories 2811**

This model, shown on page 16-8 of *Rider's Volume XVI*, uses the Webster model 56 record changer, which is shown on page RCD.CH.15-10 of *Rider's Volume XV*.

**Crosley 52TQ**

The power transformer of this model, shown on page 13-21 of *Rider's Volume XIII*, may be eliminated by following the instructions in the accompanying diagram.



NOTE: REMOVE OR DISCONNECT PARTS SHOWN IN SHADED AREA

**Stewart-Warner 61TR36 (9029-B), 61TR46 (9029-H), 61TR56 (9029-J), 61TR66 (9029-K), 61TR76 (9029-L)**

These models are the same as the 61TR36 shown on pages 15-9 and 15-10 of *Rider's Volume XV*, except for the addition of a 0.0008- $\mu$ f capacitor 52 part No. 502470. This is connected at the junction of resistor 27 and the phono-pickup cable socket to ground when an L-70-Z cartridge is contained in the tone arm used with the DT-505049 changer.

**Belmont 8A510**

This model is the same as the 8A59 shown on pages 15-8 to 15-12 of *Rider's Volume XV*, except for the addition of four parts.

The two miscellaneous parts of the removable tuner assembly are:

1. Part No. A-2J-7176—cam locking spring.
2. Part No. A-2J-7627-1—retainer spring.

The miscellaneous part added to the main chassis is part A-19A-11539 which is a plug on the speaker leads.

The final addition is an alternate record changer which can be used with this model. Part C-201-12545-1 is a Detrola changer model 550, which is shown on pages RCD.CH.15-1 to 15-10 of *Rider's Volume XV*.

**Firestone 7402-4**

This model is the same as model S7426-6 shown on page 10-5 of *Rider's Volume X*.

Elimination of power transformer in Crosley model 52QT.

## Television Servicing

(Continued from page 1)

service work will be done by the smaller independent shops. No doubt, they will be authorized shops bearing the emblems of *more than one* television receiver manufacturer, but be that as it may, the smaller independent will not be out in the cold.

It seems to be almost a good thing that television servicing is developing as it is, for it gives the smaller outfit a better and longer opportunity to become acquainted with the art, to acquire the necessary equipment. Both are important, although even today a very great discrepancy exists in the thinking of those who should know concerning the amount of money which will have to be spent for equipment. Some manufacturers talk in terms of thousands of dollars, whereas here and there, one hears very much lower figures—in fact, below 1,000 dollars. Maybe it will go much lower, for like everything else which is new, obstacles as well as requirements always seem greater than they really are. Moreover, the greater the familiarity with the test equipment and the television receivers to which they are applied, the more that can be accomplished with less.

### Educational Efforts Important

So as we see it, the display of patience by the independent servicing group; the display of perseverance in the effort to gain the knowledge, and the realization that the success of the future depends on the educational efforts of the present, without any doubt, will bear healthy and luscious fruit. The independent servicing industry, is still far from being relegated to a has-been.

Before discussing the results, it is necessary to make an important comment: the independent servicing industry as a whole has displayed sound and sensible judgment when considering the various servicing plans employed by the television-receiver manufacturers during the first year of operation; the absence of any condemnation of these manufacturers for not throwing television servicing wide open to all independent service stations on a catch-as-catch-can basis at the start, is to be lauded. It was sane reasoning.

As a matter of fact it was a fortunate circumstance that small operators could not get in on the so-called television installation and servicing "gravy," during the first year. The service contract seemed to be framed with gold. Actually it was

just the opposite. Giving the television-receiver buying public an unlimited-call service contract on an annual basis has proved to be a revelation. So much so that we doubt if *any organization* rendering service on such a contract has shown a profit on its service operations. It may have shown a profit on sales—but *not service*. And it is important to bear in mind that this was the condition for volume service contracts. Where comparatively few contracts existed, the problem was not profit—but, how to keep the loss low.

### Problems to Be Solved

The radio manufacturing industry has progressed very far in its knowledge of radio wave propagation; in the techniques of receiver design and construction, and in the design of components, yet it has not a complete knowledge of every possible condition which may arise in the development of the proper television signal at random locations where a purchaser may live. Nor can it be said that the numerous conditions associated with the performance of the receiver in any location—landlord reactions to antennas, intervening obstructions, ham interference, f-m interference, diathermy, and so forth—have been fully resolved. All this takes time and experience. Finally, make the service call dependent *on the option* of the receiver customer and a real problem is born. Such has been television servicing during the first year.

Despite all of this, television is doing a job; it has been well received. The public wants it and will continue wanting it more and more. Whatever are its difficulties, television receiver engineers, service personnel, and programming personnel will solve them, and it will become a nation-wide facility of gigantic proportions. In the meantime, what about the future of the independent serviceman?

Based upon past performance, it is only logical to assume that servicing during the year 1948 will be in the main a repetition of what transpired in 1947. The producers of television receivers in the price class of those manufactured in 1947 will continue their present service practices. Complete and final conclusions based on experience cannot yet be drawn—the period of trial and error has been too short. No call-limit service contracts with the public will continue, even for those who have had their receivers for a year, for the buyers of these receivers are in the income group that is earning \$7,500 a year or more. There are about

a million such earners, which means a like number of families and a like number of higher-priced television receivers, exclusive of bars and hotels, of course. Members of this group wish to be freed from the responsibility of seeking servicing facilities—they desire to follow the path of least resistance when a service facility is needed. Only an unlimited-call contract would appeal to them. So they sign a contract for the first year and have expressed a willingness to sign for the second year. Whether or not they will sign a contract for the third year, by which time the cost for service will amount to a reasonable share of the sales price of the receiver—well, that is doubtful. And whether or not a service facility can afford to cut its contract price for the third year, which cut would be expected by the customer, bearing in mind that the possibility of trouble is more likely in the third year than in the second, that too is very doubtful.

But television cannot be successful unless it has mass acceptance, which means that it must be marketed at prices lower than those at present. One such completed receiver is already on the market! The possible success of unlimited-call contract service for a low-priced television receiver, that is, a contract price which is less than the average being asked today, is unlikely on two counts: First, because it becomes a substantial fraction of the sales price, and second, the possible problems which may be experienced at present during installation and service are no fewer on the cheapest television receiver than on the present higher-priced receivers. Consequently, a natural conclusion would be that contract service—even a limited-call contract—would not be viewed favorably by either the customer or the repair facility.

### General Electric 202

This receiver is the same electrically as the model 200 as shown on pages 15-54 to 15-56 in *Rider's Volume XV*, except that it has a different cabinet.



You didn't know it - did you ?



# Successful SERVICING

REG. U. S. PAT. OFF.

Vol. 9

JANUARY - FEBRUARY, 1948

No. 3

Dedicated to the financial and technical advancement of the  
Electronic Maintenance Personnel

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## NEW FIELDS TO CONQUER

This is not the first time we have used this title for an editorial. As each day passes new openings for activity are developing. To ignore them is foolish, because it means the loss of opportunity—technically and financially.

We realize that all men are not equally capable of taking advantage of opportunity, but we would be derelict in our duty if we failed to call to the attention of the personnel in the servicing industry new activities which either do, or will in the immediate future, require the talents of these men. In the final analysis those capable of doing a special type of work will be the first in the field—in

time the rest will follow. But someone must start it.

In this issue is a request from the Federal Telephone and Radio Corporation. They are seeking men for a field service chain. Certain questions are asked, and the answers to them will determine the organizations chosen. We hope that the response will be adequate to take care of their needs. Also that the basis of operation—and in this respect we do not know what the FT & R have to offer financially—will be such that participation by members of the radio servicing industry will be justified.

JOHN F. RIDER

### Federal Telephone and Radio Expands Field Service Chain

The Federal Telephone and Radio Corporation of 100 Kingsland Road, Clifton, N. J., is seeking the facilities of radio service shops as members of a field service chain for the maintenance of their mobile radio equipment. This covers radio transmitters and receivers used in point-to-point communication, both in present and new territories. The organizations which are accepted will be appointed as Authorized Service Stations.

Here is the information desired by Federal, and it should be contained in the responses forwarded to the company:

- (a) The number of service men employed.
- (b) How many employees are now thoroughly experienced in two-way mobile communication and central station equipment?

- (c) Would you be willing to send some of your men to the Federal factory at Clifton, N. J., for training on the mobile equipment? The instruction would be free.
- (d) What territory could you handle efficiently and expeditiously? Indicate specific Towns, Cities, Counties, or States.
- (e) What other manufacturers' intercommunication two-way mobile equipment are you now authorized to install, service, or maintain.
- (f) Applications considered for appointment will be sent further particulars.

Address your responses direct to  
Mr. A. R. Lallone  
Installation and Field Service  
Federal Telephone and Radio Corp.  
100 Kingsland Road  
Clifton, New Jersey

### Rider's Volume XVII Is on Its Way

The second Rider Manual in the three-a-year plan is now at the printer and will be delivered to jobbers in March 1948. This is Volume XVII (17). We had hoped that the three-volumes-a-year series could be carried on with each volume containing less than 800 pages. Such is not possible if complete distribution of service data covering American-made radio receivers, is to be made to the servicing industry.

The output of American radio factories during the past eight months has been terrific. Statistics indicate 1947 production as 17,000,000 receivers. That is why Rider's Manual Volume XVII contains slightly more than 1600 pages and the products of more than 100 manufacturers. These sets include single and multiband receivers, with each multiband job presented in "clarified schematic" form—record changers used in these receivers, and the wire recorders which are used in these receivers.

The magnitude of service data essential to the servicing industry is determined by the output of the receiver and allied equipment manufacturers. Never before in the history of the radio industry were there so many manufacturing organizations in business. Dissemination of the service data on these products is the function of the Rider organization. With the release of Rider's Manual Volume XVII, more than 23,300 pages have been released.

Dollar for dollar Rider's Manuals give you the greatest coverage of service material of American-made radio receivers. For example, in the postwar Volumes XV, XVI, and XVII are more than 4400 pages of service data—complete data—accurate data—offered at less than 1 cent per page . . . In addition, three "How It Works" books totaling more than 250 pages—three books which give you the latest theories embodied in the newest receivers. . . . Also "clarified schematics," breakdowns of each band in multiband receivers . . . And finally, changes in sets published in the free house organ "Successful Servicing" . . . Nowhere—we repeat, nowhere else is such value available to the radio servicing industry! Rider's seventeen volumes is the world's great compilation of servicing data on radio receivers and allied equipment.

### RCA Record Changers 960001 Series

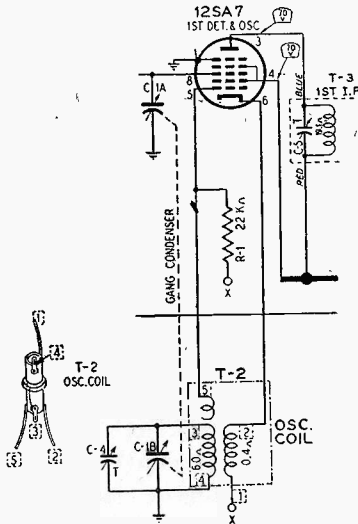
These changers are the same as Model 960001-1 on *RCD. CH. page 15-1 of Rider's Volume XV* except for the following changes:

- 960001-4 Uses L230270 Motor. Has additional pickup shorting switch that shorts out pickup arm when in the rest position.
- 960001-5 Uses pickup cable 72583 of different length.
- 960001-6 Same as 960001-5 except for color of knobs, arm, etc.

### Montgomery Ward 74WG-1801D

This model is similar to the 64WG-1801C shown on *pages 15-27 to 15-29 in Rider's Volume XV*, except for the changes listed below. This model incorporates all the changes previously listed for the 74WG-1801C.

The grid resistor (R-1) of the 12SA7 det. and osc. tube has been changed to 22,000 ohms. The oscillator coil has been changed and capacitance coupling to the tube is now obtained through



First detector and oscillator circuits of the Montgomery Ward model 74WG-1801D.

the use of a "gimmick," as shown in the accompanying drawing. The components used in the 74WG-1801D are the same as those listed for the 64WG-1801C on *page 15-29* except for the changes previously noted for the 74WG-1801C and those below.

Ref. No.	Part No.	Description
R-1	B84223	22,000 ohms 0.5 watt, carbon
R-4	36X368	0.5 megohm volume control and switch
R-8	B84151	150 ohms 0.5 watt, carbon
T-2	9a1911 13X546 10X45	Oscillator coil assembly Line cord and plug assembly Drive cord assembly

To replace the dial cord, use either a new 10 x 45 drive-cord assembly or a piece of cord 18 inches long. See replacement instructions under Model 74WG-1801C.

### Montgomery Ward 74WG-1054A and 74WG-1054B

These models are similar to 64WG-1054A shown on *pages 15-82 to 15-84 of Rider's Volume XV*, except for the following changes. The terminals of the oscillator coil are reversed. The high side of the 2.2-ohm winding goes to the first grid of the 1R5 mixer tube and the high side of the 6.4-ohm winding goes to grids 2 and 4 of the same tube. The low side of the 2.2-ohm winding is grounded and the low side of the 6.4-ohm winding is connected to R-7. These models also incorporate the changes noted on page 6 of the May 1947 issue of *SUCCESSFUL SERVICING*.

It has been called to our attention that misinterpretations are possible of the statements made in the May 1947 issue about wiring changes. The wiring of the set does not change, as no components are changed; but the wiring of the socket of the output tube changes as indicated in the afore-mentioned issue.

In model 74WG-1054B, in addition to the changes listed above, a 2.2-megohm resistor (R-24) in parallel with a 100- $\mu$ F capacitor (C-24) is connected from the antenna to grid 3 of the 1R5 mixer tube.

### Montgomery Ward 64WG-1050D, 74WG-1050B

These models are similar to the 64WG-1050A shown on *pages 15-75 to 15-77 of Rider's Volume XV* with the following changes. The 0.1- $\mu$ F capacitor (C-11) is connected to B— from pin 1 of the 1R5 socket instead of to chassis ground. A 1000-ohm resistor (R-13) is connected from pin 7 of the 3S4 output tube to B—.

### The Cover

A "make believe" model for testing tube designs has been developed by the research engineers of the Westinghouse Electric Corporation. This model enables engineers to test tube designs in one day that formerly required up to three months.

The model consists of a very thin sheet of rubber stretched across a frame about four feet by six feet. Wooden blocks of various sizes and shapes act as the tube elements. Hills and valleys in the rubber simulate electric voltages. Bronze balls the size of BB shot represent electrons.

### PRICE CHANGE IN DIAGRAM SERVICE

Because of the many problems which have developed since we started the continuous Rider Diagram Service in between the publication of *Rider Manuals*, we are forced to make changes in this program.

1. A flat rate of 35c will be charged for all the available data on any receiver model up to and including 6 pages. Each page thereafter will be 10c.

2. If additional money is required to cover the data requested, you will be notified. We cannot forward data without receiving your remittance.

3. This does not include data on television receivers, which cannot as yet be made generally available.

4. Be sure to enclose a self-addressed envelope bearing a 3-cent stamp.

The hills and valleys in the thin rubber sheet direct a ball and control its velocity, much as the various electrode voltages control the velocity and direction of an electron. Engineers can calculate the speed of electrons in the actual tube merely by measuring the time a ball takes to roll from one part of the rubber sheet to another. The necessary voltages for optimum operation are then easily determined. If the size and shapes and spacing of the wooden blocks representing the tube elements are varied, the tube design engineer can select the combination that results in the best focusing of the electrons.

The illustration on page 1 shows a Westinghouse engineer using this model to test the design of a new television tube. A white marble is here used as an electron, rather than the bronze ball normally used, to make the "electron" stand out in the illustration. The wooden blocks represent the various focusing and accelerating electrodes.

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UNDERSTANDING  
VECTORS AND PHASE  
BROADCAST OPERATORS  
HANDBOOK**

# Rolling REPORTER



Dear R.R.—

Why is it every time you go out of town we always have lousy wether here? You go away after Xmas and wat do we have? the worst snowstorm *since you was a boy* or maybe that was when your father was a boy—I dont remember wich wen you told me about the blizzard of 88. I was on the subway so long that night I got madder and mader so that I forgot to be hungry. Their was a dame hada portable radio with her and she tuned in some guy telling how bad the snow was and how high it was getting to be so that I got madder than ever. Finally she tuned in some danse music but the only dancing we could do in that crowded car was up and down not round and round, but that got me warmed up even though the dame I got dancing with was cockeyed. You should of seen the kid from the printers who came up to pick up the pages for Vol. XVII (17 to you). *I thought he was a walking snowman.* And just so's youll be happy down ther among the shlitering palms wen you get this, practically all the Vol. 17 pages will be printed, and so you can tell any guys you see that it wont be long before they can be flipping through them 1648 pages and getting the latest dope *just as easy as you can find a martini market.* And speaking of new books, you should see that new one by the Boss and Si Uslan. Not their book on vectors, I mean the one on FM. Since you been out of here i've had to do some of yur proofreading and while I was going through most of them 416 pages with the gals in the editorial dept I learned lots. *About FM I mean.* I suppose youre thinking that if I can get an explanation out of a book without you telling me all about it, the book must be good. Well, i aint the only one that says its good—one of your boy freinds at the printers phoned you and said that hes been wondering about fm for a long time and he had to read proof and could we please dummy the pages up faster because he was at a vital *(thats what he said, vital)* part and he wanted to find out the rest of the explanation. Later he said thanks he understood

it now. And speaking of fm, a job just was sent into the office by Dewald that you'd like, for the most work youd have to do is turn it on and twirl a dial or two. Remember the wireless record players? *Well this is a wireless fm tuner.* All you got to do is tune the output of the tuner to a dead spot on the dial of your blooper and I bet that wouldnt be hard to do with that junkodyne you admit you own and then tune in the fm job. No wires nor nothing for you to get messed up. Youve been yipping for a fm job—well here you are. *Shall I order you one?* While youre pedaling around down there and on your way back home, you might tell any of the gang you see that television is coming along faster than ever. Several mfrs have announced their going to put out TV recievers thatll *sell for between \$190 and \$220 installed* and that means a lot of customers are going to be buying sets that never thought of doing it before. And I overheard someone saying that nearly 200 thousand TV sets were made last year, that there was more than 140 thousand in homes and about those in bars and places like that, didnt you tell me you counted more than 25,000? Anyhow theres a lot of sets that will need servicing now and then so the boys better get busy and find out what its all about before its two late. And wile youre on the subject ask how the boys would like a manual with nothing but TV sets in it. We're working on a manual now with all sorts of tele sets but i dont know when itll be out—most likely this spring sometime. And speaking of spring are you planing to stay away until you get a slant at the spring training of some baseballers specially the Bums? I think you should oughter as I may be able to get a bet down if you get me some decent dope on how they look. . . . By the way, your wife phoned me yesterday and wanted to know where you were. Why dont you send her a postal at least once a week? And speaking of writing, why dont you send something more than directives in collect telegrams? How about sending some nice picture postcards with cheesecake for the collection of yours truly,

Aloysius Winenwiski  
Asst. Colyumist

## Where Is Michael Gulkewicz?

We have been unable to deliver the prize Mr. Gulkewicz won in the Rider Manual Contest. His entry stated that his home was at 113 Willow St., but he gave no town. As the entry bore the imprint of Radio Electric Service, Allentown, Pa., we sent the prize to that city, but it came back. Radio Electric told us they had his address as Bethlehem, Pa., but we tried

that town too—unsuccessfully. So if Mr. Gulkewicz will let us know where he lives, we'll send him his prize.

## Public Address Installation and Service Book

No doubt many are wondering why the "Public Address Installation and Service Book" has not yet made its appearance. We don't mind explaining the situation.

The manuscript was ready in time for the initial publication date. Final critical reading showed that information which would answer the question "How much acoustical power do I need to fill a certain space?" was missing. It is true, we had general information on the ratings of amplifiers normally recommended for certain types of installations, but we felt that more data than this were required in such a book for it to be useful, especially for someone interested in the difference in requirements for speech and music.

Then there is the question of low-power outdoor installations—the correlation between "How much power is needed to reach a certain distance?" and, in both outdoor and indoor installations, "How much acoustical power is needed to override certain noise levels?" These questions were finally answered, and now the book is in process.

For the first time, a book which answers many different questions in practical and definite terms will soon be available. Examples of actual installations are covered, and these should prove of great value for technicians working with this low-power public address work.

We are sorry it is late, but what you want to know about low-power public address systems is in this book and it appears at this writing that it will be ready in May.

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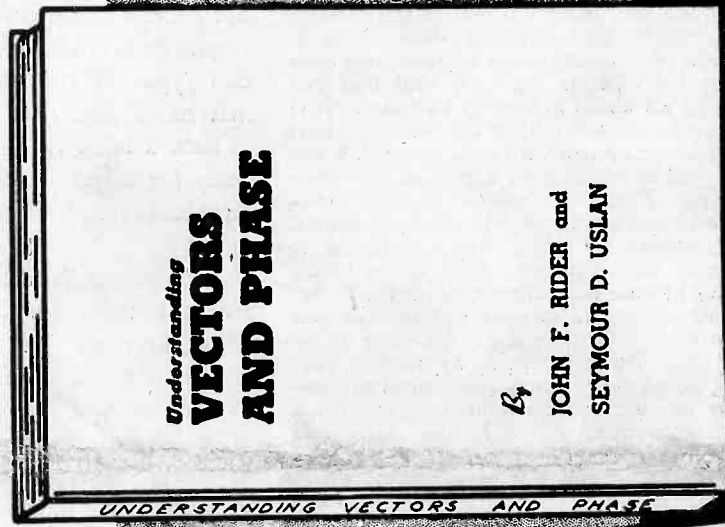
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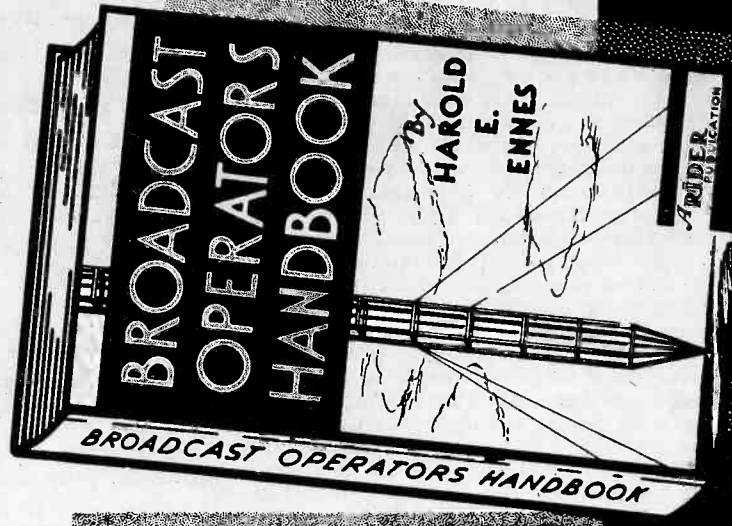
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MARCH, APRIL, MAY, 1948

## LOCAL TELEVISION LECTURES

By JOHN F. RIDER

**A**RE you planning television lectures in anticipation of the arrival of television in your area? If so, our "Television—How it Works" book, described elsewhere in this issue, is ideal as lecture material because, as you can see by examining the table of contents, it combines the theoretical with the practical—it presents theory exactly as it has been used in the receivers on the market. Furthermore, all of this material is immediately available.

We are formulating plans for a lecture series on television, frequency modulation, and public-address systems that will be of interest to servicemen throughout the nation. While we are planning for all, it is best to start such a venture in conjunction with association activity; therefore, we are greatly interested in hearing from the secretaries of servicemen's associations whose members are desirous of obtaining such information through a program like this. As mentioned above, we are planning these lectures for all; so if you are not affiliated

### SUCCESSFUL SERVICING ON REGULAR SCHEDULE

Beginning with this issue **Successful Servicing** will go on a regular monthly schedule just as we were years ago. . . . Each month you will receive information about the changes made in receiver equipment—radio and television, and public address equipment, thus keeping your **Rider Manuals up to date. . . . Also other technical information and various facts pertaining to our publications. . . . So in addition to the Rider Manuals—the individual diagram service—we now add another step in the "Continuous Service to the Radio Servicing Industry."**

John F. Rider Publisher, Inc.

with any association activity, write us yourself. Please drop us a post card indicating whether you are or are not interested in such a program, stating your preference of subject matter and your address. Of primary importance is your willingness to devote the necessary time per month—perhaps two evenings—to attend these lectures. It will cost you no money to participate in this activity.

Local jobber—local servicemen and local school cooperation afford a perfect setup for the dissemination of technical information to those radio servicemen of this nation who are so located that they cannot attend the regular television school classes.

With television the hottest thing on the grill—now is the time for men in those areas where television is as yet unavailable to get acquainted with the subject. Cooperate with us and we will get the information to you. The first step is to mail us a card—the sooner we get your reaction, the sooner will the series of lectures and demonstrations start

### Montgomery Ward 64WG-1807B, 74WG-1807B

These models are the same as model 64WG-1807A, shown on pages 15-91 to 15-94 in *Rider's Volume XV*, except for the following changes. A 0.2- $\mu$ f bypass capacitor (C-35) has been connected between ground and the screen grid of the 6V6GT output tube, resistor R-14, resistor R-12, the red lead of the second i-f transformer (T-3), resistor R-5, resistor R-4, the red lead of the first i-f transformer (T-2), and resistor R-2. The 0.004- $\mu$ f capacitor (C-31) is now connected from the plate lead of the 6V6GT output tube to the cathode of this tube. No counterpoise foil antenna is used.

### Firestone 7423-5

This model is the same as model S7402-5 shown on page 13-38 of *Rider's Volume XIII*.

### Admiral 7C65

The voltage data and parts list of model 7C65, chassis 7E1 were omitted from page 17-3 of *Rider's Volume XVII* and are here reproduced for inclusion in that Manual. The record changer for this receiver is the Admiral model RC170 or RC170A, the data for which will be found on *RCD.CH*, page 16-1 of *Rider's Volume XVI*.

### Automatic 650

This model is similar to the 650 shown on pages 15-4 and 15-7 of *Rider's Volume XV* except for the following change: The 20,000 resistor in the oscillator grid circuit of the 12SA7GT now is connected directly to ground instead of to the cathode of that tube.

### Truetone D1118B

This model is similar to the D1118A model, shown on pages 13-68 and 13-69 of *Rider's Volume XIII* except for the following changes: The antenna trimmer (C2), part number 17A1116, mounted on the loop aerial assembly in the issue A model has been removed. The 1400-kc adjustment as given in the alignment procedure is omitted. The 1400-kc adjustment is made at the factory and need not be made in the field.

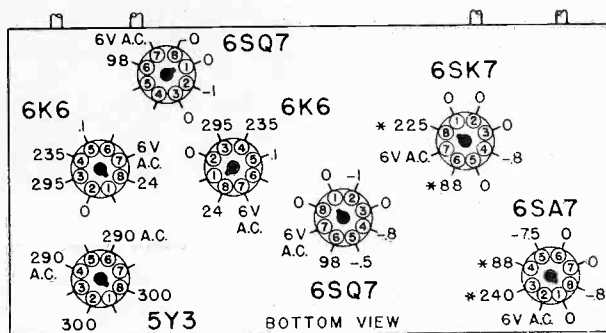
### Remler Model 5100

This model appears on *Misc. page 16-9* in *Rider's Volume XVI*. The external resistor connected from the suppressor grid (pin 3) to the cathode (pin 5) of the 6SK7 i-f amplifier has been changed from 100 ohms to 220 ohms. The 1-meg resistor connected from the plate (pin 3) of the 6V6GT audio amplifier to the junction of the 0.01- $\mu$ f coupling capacitor and the 220,000-ohm plate load resistor of the 6SQ7 detector, has been removed. A 0.05- $\mu$ f filter capacitor has been connected from each side of the a-c power line to ground.

### Sears-Roebuck 4518, Chassis 101.393

This model is the same as model 4500, chassis 101.393 shown on page 8-15 of *Riders Volume VIII*.

**VOLTAGE DATA** — "Radio-Phono" switch in "Radio" position. Readings made between point indicated and chassis. Measured on 117-volt a-c line. Dial turned to low-frequency end, no signal. Voltages measured with a vacuum-tube voltmeter. If voltage readings are taken with "Radio-Phono" switch in "Phono" position, readings will be zero or practically zero.



Symbol	RESISTORS	Part No.
R1	22,000 Ohms, 1/2 Watt	60B 8-223
R2	15,000 Ohms, 2 Watt	60B 20-153
R3	47,000 Ohms, 1/2 Watt	60B 8-473
R4	4.7 Megohms, 1/2 Watt	60B 8-475
R5	270,000 Ohms, 1/2 Watt	60B 8-274
R6	270,000 Ohms, 1/2 Watt	60B 8-274
R7	1 Megohm, 1/2 Watt	60B 8-105
R8	220,000 Ohms, 1/2 Watt	60B 8-224
R9	4.7 Megohms, 1/2 Watt	60B 8-475
R10	270,000 Ohms, 1/2 Watt	60B 8-274
R11	270,000 Ohms, 1/2 Watt	60B 8-274
R12	680 Ohms, 2 Watt	60B 20-681
R13	2 Megohms, Tone Control	75B 1-8
R14	27,000 Ohms, 1/2 Watt	60B 8-273
R15	1 Megohm, Volume Control and Switch (SW2) Tapped at 500,000 Ohms	75B 2-2
R16	270,000 Ohms, 1/2 Watt	60B 8-274
R17	100,000 Ohms, 1/2 Watt	60B 8-104
R18	1,800 Ohms, 2 Watt	60B 20-182
R19	50 Ohms, 5 Watt	61A 1-6
R20	120,000 Ohms, 1/2 Watt	60B 8-124
R21	1,000 Ohms, 1/2 Watt	60B 8-102

Symbol	CONDENSERS	Part No.
C1	50 mmfd., Ceramic	65B 6-4
C2	20 mmfd., Ceramic (used only in early production)	65B 6-26
C3	.1 mfd., 400 Volts, Paper	64B 1-20
C4	.05 mfd., 400 Volts, Paper	64B 1-22
C5	100 mmfd., Ceramic	65B 6-3
C6	250 mmfd., Ceramic	65B 6-5
C7	.02 mfd., 400 Volts, Paper	64B 1-24
C8	.1 mfd., 200 Volts, Paper	64B 1-30
C9	.002 mfd., 600 Volts, Paper	64B 1-14
C10	.002 mfd., 600 Volts, Paper	64B 1-14
C11	.02 mfd., 400 Volts, Paper	64B 1-24
C12	.02 mfd., 400 Volts, Paper	64B 1-24
C13	.001 mfd., 600 Volts, Paper	64B 1-15
C14	.25 mfd., 200 Volts, Paper	64B 1-28
C15	.02 mfd., 400 Volts, Paper	64B 1-24
C16a	30 mfd., 350 Volts, Elect.	67C 6-22
C16b	30 mfd., 350 Volts, Elect.	
C17a	0-420 mmfd. (RF section)	
C17b	0-162 mmfd. (Osc. section) Gang and drum assembly A1550† (used in later production)	
C18	.002 mfd., 600 Volts, Paper	64B 1-14
C19	10 mmfd., Ceramic (used only in early production)	65B 6-24

Symbol	CONDENSERS	Part No.
C20a	4-70 mmfd. } Dual Trimmer	
C20b	4-70 mmfd. } (used with A1550 gang in later production)	66A 1-10†
C21	500 mmfd., Ceramic	65B 6-6
† If early type tuning gang (with trimmers attached) must be replaced, use gang assembly A1550 and separate trimmer 66A1-10, and remove C2 and C19 from circuit.		

Symbol	COILS AND TRANSFORMERS	Part No.
L1	Loop Antenna (11')	95A 18-2
L2	Coil, Loop Loading	69A 26-1
L3	Coil, Oscillator	69A 14
T1	Transformer, 1st IF (Slug tuned)	72B 46
T2	Transformer, 2nd IF (Slug tuned)	72B 47
T1 & T2 were trimmer-tuned in early production.		
T3	Transformer, Power	80B 1
T4	Transformer, Output	98A 34-10

Symbol	DIAL AND TUNING DRIVE PARTS	Part No.
"C" Washer (used with tuning shaft)		4A 4-1
Crystal, Dial (for 7C65W & 7C65M)		24B 7
Crystal, Dial (for 7C65B cabinet)		24B 7-1
Cord, Dial Drive (30 1/2")		50A 1-3
Dial Drum and Hub Assembly		A1380
Dial Scale Assembly		A1530
Pointer, Dial		A1303
Shaft, Pointer		28A 16
Shaft, Tuning		28A 10-1
Snap Button, Dial Crystal Fastening (used on 7C65B cabinet only)		13A 1-3-21
Socket, Pilot Light, with leads		82A 8-3
Spring, Dial Cable Tension		19B 1-5
Spring, Hairpin (for pointer shaft)		19A 2-4
Spring, on Tuning Shaft		19A 18
Spring Washer (for pointer shaft)		4A 6-9-0
Spring Washer (for tuning shaft)		4A 6-5-0

Symbol	MISCELLANEOUS	Part No.
SW1	Switch, Radio-Phono	77A 16-2
SW2	Switch, AC power	Part of R15
SW3	Switch and Lever, part of record changer assembly	G400A 162
M1	Socket, Speaker	87A 6-1
M2	Speaker, includes M3 and T4	78B 29
M3	Plug, Speaker	88A 4-4

Description	MISCELLANEOUS	Part No.
Grommet, Condenser Gang Mounting		12A 1-2
Socket, Octal Tube		87A 5-1

PHONOGRAPH PARTS		
Note: See record changer manual for complete parts list.		
M4	Socket and Leads	89A 6-6
M5	Socket, Phono Pickup	88A 5-8
M6	Pickup Cable & Plug	A1415
M7	Cartridge & Needle, Pickup	A1372
M8	Motor	407B 3-2
M9	Plug, Motor (Male)	88A 8-1
	Centerpost	G400B 137-1
	Drive Disc (under Turntable)	G400A 179
	Eye Bolt (for Tilt-Out Spring)	1A 87-1
	Idle Wheel (407B3 Motor)	G400A 23
	Idle Wheel (407B1 Motor)	G400A 57
	Nut, Wing (for fastening record changer during shipment)	2A 5-9-2
	Strip, Sponge Rubber (1/16x1/4x1")	12A 5-5
	Tilt-Out Hinge Assembly (Pickup Arm Side)	AC118-2
	Tilt-Out Hinge Assembly (Record Support Side)	AC118-1
	Tilt-Out Spring (2 1/4" long)	19A 15-1
	Tilt-Out Tie Bar	15B 126
	Tilt-Out Tie Rod	28A 22

CABINET PARTS		
*Cabinet		
Walnut (7C65W)		35E 67-1
Mahogany (7C65M)		35E 67-2
Blond (7C65B)		35E 67-3
Door Catch and Strike Plate		98A 34-9
*Door, Radio and Phono Tilt-Out		
pair for 7C65W		98A 34-1
pair for 7C65M		98A 34-2
pair for 7C65B		98A 34-3
Door Handle, Radio or Phono Comp.		
for 7C65W, 7C65M		98A 34-4
for 7C65B		98A 34-5
Grille Cloth		98A 34-8
Hinge, Radio Door		
pair for 7C65W, 7C65M		98A 34-6
pair for 7C65B		98A 34-7
Knob		33A 13-3
Washer, Felt (used under tuning knobs)		5A 4-4
* Supplied only if old part cannot be repaired. When ordering, describe condition of old part in detail.		

### FM Specialties Model Fidelotuner

This model is shown on pages 17-1 to 17-4 of *Rider's Volume XVII*. Three terminals are shown in Fig. 5, page 17-4; the first labelled 3, and the third terminal (not labelled in this figure) should be labelled 4. The ground from the phonograph connection to the receiver should be made to this third terminal (terminal 4).

### RCA Record Changer Model 960015

This model is shown on *RCD.CH. Page 15-11 of Rider's Volume XV*. If binding or freezing of turntable bearing occurs, the turntable shaft should be removed and polished with very fine emery cloth or crocus cloth. Clean off any bearing metal or foreign particles from the shaft, including the set-screw burr. Next, bevel the top edge of the top bearing slightly, with a knife or scraper. Clean the shaft and the bearing with carbon tetrachloride, removing oil and grease and being certain to clean out any chips which may have dropped into the bottom bearing. Lubricate all moving surfaces with a light coating of a very light-bodied grease.

If records do not separate properly and it is found necessary to adjust record slide actuating lever, proceed as follows:

1. Rotate separator shelf to 10" position.
2. Remove 10" landing adjustment bolt.
3. Press down on reject button and rotate turntable by hand in the normal direction until a "click" is heard (reject actuating slide latching).
4. Loosen set screws "G" and set record actuating lever 3/8 inch from bracket as indicated in Fig. 2 of service data.
5. Tighten set screws "G" and replace landing adjustment bolt.
6. Make necessary landing adjustment as described in service data.

NOTE: This method just described makes the set screw "G" more accessible and is therefore found more convenient. This method can be substituted for step No. 9 under Preliminary Adjustments.

### Montgomery Ward 64WG- 2500B, 74WG-2500B

These models are similar to the 64WG-2500A, shown on pages 15-1 and 15-31 to 15-35 of *Rider's Volume XV*, except for the following changes: The 64WG-2500B has a 10" electrodynamic speaker in place of an 8" electrodynamic speaker

used in the issue A models. The part number and description of the new speaker is as follows:

Part No.	Description
12A399	10" Electrodynamic Speaker

Two types of speaker assemblies are used in the 74WG-2500B receiver. These are listed below and are directly interchangeable, both electrically and mechanically.

Part No.	Description
12A399	10" Electrodynamic Speaker
or	
12A455	10" Electrodynamic Speaker

### Crosley Model 66CS(0)

This model is the same as Model 66CS (s) appearing on pages 16-16 to 16-19 of *Rider's Volume XVI*, except for the cabinet and the following changes:

Item	Part No.	Description
44*	39368-10	Control, Tone
45*	39368-18	Control, Volume
	39369-1	Switch, Power
	39370-1	Shaft, Plug In
	R-139206	Cabinet
	D-137057	Record Changer
	AC-137885	Lid Support, Cabinet
	W-138330	Hinge, Cabinet Lid

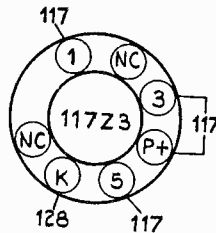
\* These parts replace the original equipment parts.

The record changer (Part No. D-137057) is Oak Model 6666 shown on *RCD.CH. pages 15-1 to 15-7 of Rider's Volume XV*.

### Sentinel Model 286P

In this model (pages 16-14 to 16-16 of *Rider's Volume XVI*) all factory wiring connections were made to the 117Z3 tube socket at pin number 1. The 117Z3 tube, as originally produced, had an internal connection to pins 1, 3, and 5. Therefore,

When a new type 117Z3 is used in the Sentinel model 286P, pins 1, 3, and 5 must be externally connected. Voltages are here shown.



the foregoing connection was satisfactory, and no jumper was provided.

The new production of 117Z3 tubes provides no internal connection between the number 1 pin and the number 3 and 5 pins. Therefore, it is necessary to wire the 1, 3, and 5 socket connections together, so that this receiver will operate when the original 117Z3 tube is replaced with a recent production tube.

### RCA QB55, Chassis RC-563A

The following changes pertain to RCA QB55, chassis RC-563A appearing on pages 15-27 to 15-28 of *Rider's Volume XV*. In some chassis the 12-μmf section (C20) of the electrolytic capacitor has been changed to 20-μmf and the 20-μmf section (C22) has been changed to 30-μmf. C12 has been changed to 0.03μf and C18 to 0.003-μf.

### Admiral Models 7RT41, 7RT42, 7RT43

These models are shown on pages 16-11 and 16-2 of *Rider's Volume XVI*. An error has been found in the part number of the SW2 radio-phono switch in the service information on these models. The part number of this switch should be 77A16-1 instead of 77A16-2.

### Montgomery Ward 64WG- 2700B

This model is similar to the 54WG-2500A, shown on pages 15-1 and 15-32 to 15-35 of *Rider's Volume XV*, except for the following change: This receiver has a 10" electrodynamic speaker in place of the 8" electrodynamic speaker used in the issue A models. The part number and description of the new speaker is as follows:

Part No.	Description
12A455	10" Electrodynamic Speaker

### Sears-Roebuck 7080, Chassis 101.809; 7100, Chassis 101.811

These models, shown on page 16-4 of *Rider's Volume XVI*, use The General Instrument model 205 record changer which is shown on page *RCD.CH.15-5 of Rider's Volume XV*.

### General Electric A51, A56

These models are the same as model A54 shown on pages 7-4 to 7-6 of *Rider's Volume VII*.

### FLASH

The answers to our survey concerning the Rider Public Address Amplifier Service Manual are arriving in such quantities as to permit the statement that the candidate wins by a 5 to 1 plurality. We will shortly announce a 2000-page public-address manual covering the years 1938 to date. Everything will be like the regular Rider Manuals. More information later.



## TELEVISION "HOW IT WORKS"

**T**HE interest in television is as "hot" today as radio was back in the very early 1920's when it first came to the attention of the American public. Furthermore, many areas in this nation are now going through the throes of planning for television transmitters—and the radio repairing industry in those areas is vitally concerned with the subject. . . . The men are anxious to know what makes the system tick—what is in the television receivers now being sold in and around many large cities in the Northern part of the country—what the theories are surrounding the operation of these systems which are native to television equipment. . . .

The answer for those interested in present-day television from the combined theoretical and practical viewpoint is "Television—How It Works"—a 203-page book, 8½ x 11 inches in size, which is a part of *Rider's Television Manual Volume 1*—but ALSO AVAILABLE SEPARATELY at \$2.70. . . . *Your jobber has it—or you can order it directly from us. . . .* So that you will have an idea of what is contained in this text, here is the Table of Contents. . . .

### CHAPTER 1. GENERAL ASPECTS OF THE TELEVISION SYSTEM

Comparison with Sound Broadcasting—Scanning—Number of Elements Required—Need for Scanning—THE CAMERA AND PICTURE TUBES—The Picture Tube—The Camera Tube—SCANNING AND SYNCHRONIZATION — The Scanning Pattern—Flicker and Hum on the Raster—Scanning Waveform—Overall View of a Television System—THE TELEVISION SIGNAL—The Video Signal—Signal and Sync Pulses—Standard Television Signal—Horizontal Blanking and Synchronization—Vertical Blanking and Synchronization—Range of Frequencies in Video Signal—The Modulated Wave—Positive and Negative Modulation—RECEIVER CIRCUITS: GENERAL.

### CHAPTER 2. FREQUENCY CHARACTERISTICS OF THE TELEVISION SIGNAL

Television Channels—Video Signal Characteristics — Vestigial-Sideband Transmission—Operating Bandwidth Characteristics—The Carrier and Intermediate Frequencies.

### CHAPTER 3. TELEVISION RECEIVING ANTENNAS

The Transmitted Television Signal—Horizon Range and Line of Sight—The Television Signal at the Receiver—Voltage and Current Distribution—The (Half-Wave) Dipole Antenna—Antenna Resistances—

Resonance and Impedance—Transmission Lines—Impedance Matching—Q of Antenna—The Folded Dipole—Length of the Half-Wave Antenna—Indoor Antennas—Dipole with a Reflector—Direct, Reflected, and Blocked Waves—Ghosts or Multiple Images—Maximum Voltage Input—Noise Reduction—Installation and Orientation of Antennas—Other Types of Antennas.

### CHAPTER 4. R-F AMPLIFIER, OSCILLATOR, AND MIXER CIRCUITS

The R-F Amplifier—Input Circuits—Frequency Converters—High-Frequency Oscillators—Belmont Model 21A21—General Electric Model 802-61. RCA Model 621TS—Du Mont Model RA-103—Westinghouse Model H-181.

### CHAPTER 5. THE F-M SOUND CHANNEL

THE I-F SYSTEM—The I.F.'s and Image Frequency Interference—I-F Stages—Detection of the F-M Signal—THE LIMITER SYSTEM—Analysis of Limiting Action—AVC from Limiters—Input Voltage Considerations—THE DISCRIMINATOR SYSTEM—Circuit Analysis—Resonance Condition in the Phase Discriminator—Applied Frequency Higher Than Resonance—Applied Frequency Lower Than Resonance—Summary—The Discriminator Output Curve—Pre-emphasis and De-emphasis—Modifications of the Discriminator Network—THE RATIO DETECTOR—Simplified Ratio Detector—Practical Radio Detector—AVC From Ratio Detectors—Ratio Detector Modifications—Slope Detection.

### CHAPTER 6. THE VIDEO I-F AND DETECTOR SECTION

The Video I-F System—Bandwidth Requirements—Overcoupled I-F Transformers—Resistance Loading—Typical Overcoupled Circuits Employing Resistance Loading—Stagger-Tuned I-F Transformers—The Need for Sound and Video I-F Traps—Practical I-F Traps—Contrast Control—Automatic Gain Control (agc)—Video I-F Amplifier Tubes—VIDEO DETECTOR—Phasing of the Picture Signal—Detector and Amplifier Action—Detector Loading—Garod Model 3912—TVFMP—Belmont Model 21A21—General Electric Model 802—Consolidated Television Model 2315—Television Assembly Model F1-101—Hallicrafters Model T-54.

### CHAPTER 7. VIDEO AMPLIFIERS AND D-C RESTORERS

Requirements of a Video Amplifier—Basic Circuit for Video Amplifier—Low-Frequency Compensation — High-Frequency Compensation — AVERAGE

BRIGHTNESS AND D-C RESTORER CIRCUIT—D-C Restorer Circuits—Basic D-C Restorer Circuits—Brightness Control — Grid-Leak Capacitor Restorer — The Contrast Control.

### CHAPTER 8. SYNCHRONIZING CIRCUITS

General Requirements—Sync Methods—Instantaneous Locking Versus AFC—Sync Separation — AFC Circuits — Reactance Tube Operation—Sweep AFC Circuit in RCA Model 630TS—Additional Circuit Features.

### CHAPTER 9. SWEEP CIRCUITS

Electrostatic Versus Magnetic Sweep — Sweep Oscillators—The Blocking Oscillator — Required Sweep Waveforms — Sweep Circuits—Typical Sweep Circuits for Magnetic Deflection.

### CHAPTER 10. THE PICTURE TUBE

Screens—Persistence of Vision—Focusing — Optical Analogy of Focusing—Electrostatic Focusing—Magnetic Focusing—Deflection of the Beam—Electrostatic Deflection—Magnetic Deflection—Combined Methods of Focusing and Deflection—ION SPOT — Ion Trap Methods — PROJECTION TUBES.

### CHAPTER 11. POWER SUPPLIES

Low-Voltage Power Supplies—High-Voltage Power Supplies—Typical Circuits.

### CHAPTER 12. ALIGNMENT AND SERVICING

ALIGNMENT — Equipment Required — Alignment Procedures—Sound I-F Section — Trap Circuits—Video I-F Section—Local Oscillator—R-F Amplifier and Mixer—TROUBLESHOOTING — Localizing the Trouble — Troubleshooting Chart.

### The Cover

On page 1 is shown a portion of the audience of 1500 servicemen who attended the illustrated discussion on p-a systems, f.m., and television on May 20th, held by the Associated Radio Servicemen of New York under the sponsorship of John F. Rider, Publisher, in the Grand Ballroom of Manhattan Center. The speakers were M. Plotkin, of RCA Institutes; C. A. Tutthill, sound engineer and author of "Loudspeakers," a forthcoming Rider book; John Meagher, engineer with the Tube Division of RCA; and Seymour D. Uslan, technical editor of the Rider organization and co-author with Rider of "Understanding Vectors and Phase" and "FM Transmission and Reception." Mr. Rider, who led the discussion, was awarded a plaque by the A.R.S.N.Y. with the following inscription, "In grateful appreciation of his meritorious achievement in behalf of the radio service industry—1921-1948."



# Successful SERVICING

REG. U. S. PAT. OFF.

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MARCH, APRIL, MAY, 1948

No. 4

Dedicated to the financial and technical advancement of the  
Electronic Maintenance Personnel

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## THE CLOUDS ARE PASSING

THERE was a time in the not too distant past when the status of the servicing industry relative to television was very much in doubt. . . . Many plans and methods of operation were discussed, and none was too favorable to the radio repairman. . . . But as time passed many changes in thinking developed. . . . By far the most numerous of these were favorable to the independent radio serviceman. . . . Today the panorama of television servicing is growing wider and wider, so that it is pretty much of a certainty that television servicing will be an independent activity.

Frankly, the conversion of ideas took place much more rapidly than was anticipated. Originally, it seemed destined to be a long, drawn-out affair—perhaps because no one dreamed that television would take hold as rapidly as it has. . . . In the opinion of this writer the interest in television today is greater than the interest in radio back in the early 1920's. . . . That the part to be played by the independent radio serviceman in television was recognized so rapidly reflects a great deal

of credit upon the television receiver manufacturers—the service managers and sales executives—both of whom have a major stake in any servicing program.

Everything is not yet cut and dried, of course. . . . There are still numerous questions which must be answered—availability of test equipment—the development of the most satisfactory techniques—the education of the radio repairing industry along television lines—and many more—all of which will be answered in time. . . . In the meantime the servicing industry is given the opportunity of thinking more clearly without a sword of Damocles hanging over its head. The fact that the receiver manufacturers are releasing data on their television receivers means a great deal to the servicing industry—even if many of its members are not doing television work at the moment. . . . At least the systems being used—the innovations introduced by the design engineers—are becoming known and permit explanations of the theories involved, thus fostering the all-important requirement of familiarity.

JOHN F. RIDER

## FM Transmission and Reception

It is with considerable gratification that we are able to quote from an unsolicited letter written to us by M. R. Briggs, who is the Division Engineer of the Westinghouse Industrial Electronics Division, Broadcast Equipment Engineering, "The book ('FM Transmission and Reception') is extremely interesting and certainly contains much information that cannot be found in any other publication. I have recommended it to our Sales Department

for use by all of our electronic sales personnel. I am sure that this new publication will find ready acceptance in the Electronics Industry."

And from all parts of the country we have received compliments from readers on the nature of the book's contents and the consensus certainly is that "FM Transmission and Reception" is the kind of a book on frequency modulation that was needed in the industry to clarify and make the subject easily understandable. *Have you got your copy yet?*

## Rider Television Manual, Volume 1

BECAUSE of the rapid expansion of television throughout the country's major cities—New York, Chicago, Washington, Philadelphia, Boston, Los Angeles, and many others—many manufacturers are marketing their television receivers and kits at an accelerated pace. It was estimated last year that there were about 17,000 receivers in the United States—at this writing there are approximately 350,000. At the rate sets are coming off the manufacturers' production lines, it has been predicted that by the end of 1948 from 900,000 to 1,000,000 sets will be in use and over 100 more transmitters than the present 23 will be telecasting programs to an estimated audience greater than 50,000,000 in 1950.

All this brings the man who performs installation and maintenance operations on television receivers very definitely into the picture. That in turn brings us into the same picture, for when servicemen require technical data—installation or maintenance—they naturally turn to Rider.

And as usual—*Rider comes through with another first!*

The Rider Television Manual, Volume 1, will contain approximately 1400 pages according to the folios on the pages, but in reality there will be more than 1000 sheets of paper, which, if they were all paged or folioed, would make it a 2000-page book. Here is the reason for this. . . .

When we received some of the schematics from the manufacturers, it was found that there were too many tubes, coils, transformers, and all the other components on the huge drawings to reduce even to our double-spread-page size. The reduction necessary would have made the lettering so small that it would have been impossible to read—some of the symbols would have filled in and become illegible. The answer was a larger page size—a page so big that everything printed on it could be easily read. Then the question arose—how big could these pages be made? Then, how could they be put in the binder so that they would be usable and part of them not be hidden when the single pages were turned?

Returning to the question of size, we were guided by the size of the sheet on which are printed 32 regular manual pages; this was 35 by 45 inches. To make a long story short, it was decided to use one half of each of these sheets to make one of the new pages; that is, they would have an over-all size of 35 by 22½ inches.

Please turn to page 6

## Television Manual

*Continued from page 5*

Of course, these pages must be bound in the loose-leaf binder and so space has to be allowed for the holes through which the binder posts go. In order that all parts of the material printed on the large page be visible when single pages are turned, the part of the paper that would be covered is left blank; that is, the left-hand  $8\frac{1}{2}$  inches of the page has nothing printed on it—all the material appears on the remaining  $26\frac{1}{2}$  inches, which extends beyond the right-hand edges of the single pages. In order to fold this huge sheet down to  $8\frac{1}{2}$  by 11 inches, the lower half of the left-hand blank strip has to be cut away after the pages are printed. This is done by die-cutting and as you doubtless know, this is a costly operation. Making allowances for trimming the pages and everything else, we found that the usual double border could be made a maximum size of 451 square inches. And what a difference those extra 318 square inches make compared with the 133 square inches total area of the double spreads!

Thus you see each of these 36 giant-size pages in this first Television Manual is really the equivalent of 16 ordinary pages but to keep the page numbering simple, they bear only a double folio such as has been employed on double-page spreads. For example, a giant page may be folioed "FARNSWORTH TV PAGE 1-15, 16." Furthermore, where it is necessary to place one of these giants in the midst of the ordinary sized pages carrying the data on one model, the same material is repeated on the reverse of the page, so that as you read the pages toward the rear of the manual, past the giant, you can refer to the diagram printed on the back without the bother of turning to its front side.

Needless to say, an over-size binder had to be specially made to accommodate all these pages, so that when they were inserted in their places in the Manual along with the double spreads, the front cover of the binder would be horizontal. This necessitated a departure from our regular procedure of using the same size binder for as many manuals as possible in order to keep the binder cost to a minimum.

But notwithstanding all this added manufacturing expense, the price of Rider Television Manual, Volume 1, will be as announced—\$15.

Now a word about the servicing material of the 34 manufacturers' receivers covered in the Rider Television Manual. You will find everything which the manufacturers gave us, and in a number of

instances we contacted the makers of the sets when we felt that additional data should be furnished for you. This information was added when we were able to procure it. You will find circuit descriptions, adjustments of various trimmers, traps, transformers, etc., voltage and resistance readings, complete alignment instructions, parts lists—in fact, everything possible to make your servicing job easier.

To make it as easy as possible for you to find some particular portion of the data on one model, we have made the index to the Manual much more comprehensive than ordinarily is done with the regular manuals. The reason for this is that al-

though the alignment for even a five-band broadcast receiver can be run on one Manual page, the alignment for a television receiver and its attendant sound channel covers two, three, or even more pages, and so they are individually indexed. This was also done with the circuit description installation notes, troubleshooting procedure, etc. The same applies to the necessarily extended nature of television service data as a whole.

In addition to the actual Manual itself and its separate Index, there will be a "How It Works" book of about 200 pages. It was felt that because of the complicated nature of the subject, it should be covered as thoroughly as possible. The opening chapter deals with the transmission and reception of television signals in general, so that you can gain a true over-all idea. The second chapter deals with frequency standards, the next with antennas—their theory and installation—and then come descriptions of the various portions of a television receiver: the r-f, oscillator, and converter circuits in the front end, the sound channel, the video i-f system and detector, the video amplifier and d-c restorer, the sync and sweep circuits, picture tubes, power supplies, and the book concludes with a consideration of the problems involved in the alignment and servicing of television receivers in general. Throughout the "How It Works" book the practical is stressed along with the theoretical, so that when you do a certain operation or make an adjustment on a set, you will know why you are doing it.

The Rider Television Manual, Volume 1, its Index of 16 pages, and the "How It Works" book will be in your jobber's hands in June. Its country-wide representation of television manufacturers gives you the best coverage and that is what you need in any kind of a service manual and that is what Rider always provides for you. Whether or not television has reached your locality yet, here is a Rider Manual that you should have, for as we mentioned at the outset, television is spreading to all parts of the country. Order your copy of the Rider Television Manual, Volume 1, today—you will need it.

### General Electric 219, 220, 221

A few cases of hum which cannot be reduced in the normal manner from these models shown on pages 15-28 to 15-31 of Rider's Volume XV, may be corrected by cathode degeneration in the output tube, 35L6GT/G, cathode circuit. Remove R17 and C29-C from the circuit. This can be done by disconnecting one end of R17.

## RIDER MANUAL

**We have consistently said that Rider Manuals give the service industry the greatest coverage of American-made receivers. As one example of the fact that nowhere—nowhere else can you find equivalent coverage, we quote some figures concerning the last three Rider Manuals which have been published—the three Manuals which have appeared since the end of the war—Volumes XV, XVI, and XVII.**

**The receivers which pose a problem to the serviceman with respect to time, are those which have more than one band. In addition to 1415 models of single-band receivers contained in these volumes, we have published in these volumes as of this date**

- 387 Two-band Receivers**
- 172 Three-band Receivers**
- 41 Four-band Receivers**
- 61 Five-band Receivers**
- 27 Six-band Receivers**
- 15 Seven-band Receivers**

**Now, knowing that the breakdown of the switching and the components in each comprise a time-consuming process, we also published in these same three Manuals, approximately 1000 clarified schematics of these multi-band receivers.**

**Check any single source you wish and nowhere will you find this representation—nowhere else will you find these time-saving and therefore these money-saving clarified schematics. We repeat—Rider Manuals are the world's greatest compilation of service data on radio receivers and allied equipment.**

# Rolling REPORTER



## WE'RE HERE AGAIN

Didya miss us when we didn't show as usual? Well, it's a long yarn so we'll only give with the high spots. . . . First of all we had to give the Editorial Dept. a hand to get Vol. XVII out so the Boss could keep his promise to yuh about shipping the books before the end of March. . . . Then we apparently helped so nicely with XVII that we were drafted to do a job with the **FIRST AND FOREMOST Television Manual**. . . . And when we were all set to start battin' out our col. on Qwerty, our printer was closed down and that, boys and gals, is why we cannot imitate four Hawaiians. . . . (*With apologies to Joe Cook*).

## VOL. 1 TV

By now you have heard tell that the Boss is gonna give with a manual on the whys and hows of fixin' TV sets. Remember that card you got sayin' that Vol. 1 was gonna have a thousand pages? Well, we'll let you in on something—we found that 1,000 pages weren't enough and when you get your copy, you'll find that there'll be nearer 1,400 pages!!! How many manufacturers are represented? **Thirty-four** (*count 'em!*) 34. . . . And that doesn't take in Webster, Seeburg, and other record-changer mfrs. . . . 34 *Television Mfrs!!!!* We could go on and on telling you about all the descriptions of circuits, test patterns, trouble-shootin' and alignment charts, and the new "giant" schematic pages, but there just ain't room here. All we can tell yuh, get yer order in to yer jobber *but fast* or you'll be outa luck.

## 10 YEARS

Yep, it's been that long since we helped pack up all our records, and service data, and books and magazines, and all the other stuff around the office at 1440 B'way and made the trek down here to 28th St. What changes that decade has seen! Less than a dozen people on the force then—now there's nearly 40. . . . Up at 1440 B'way three offices and a room for shipping—now we have a whole floor and could use another! Back there *Miss Schneider* was the accounting dept.,—*Lou Prior* was the art dept.—*Bill Marcus* saw to it that the books went on their way to you—*Shad Rowe* did the proofreadin' and make-up and *the Boss* did a little of everything. And wot did we do in those good old days? Well, we pedaled the old chariot around and about gatherin' news and doin' anything in the office that nobody else wanted to do.

## POINTER

Do you remember that Survey we sent yuh last June? Well, about 15% of you who helped us out by answering, said you were hams. So, W2RID (*the Boss to you*) has put out a **RADIO AMATEUR'S BEAM POINTER GUIDE**. Any of you hams gotta antenna that you can aim? Well, if you have, that's the book for you. For a *buck*, you can get the bearing in degrees from north for any country on the earth where there's a brother (or sister) ham, and if you aim your antenna as per the degrees reading, *your beam will follow a great-circle route* smack-dab to PK5, ZE, LU, or anywhere else.

## ON DECK

An' speakin' of books for hams and for any of youse guys who are hankerin' after some good

dope on microwaves, there's a MS in the house called "Microwaves in the Ham Shack" that's the result of the experience and skull-work of Samuel Freedman, W6YUQ and ex-W2CPS, W2BCD, etc., etc. . . . Then we've another book that's waiting for us to get at it—that one's about *loudspeakers*. It's written by C. A. Tuthill, who was the Supervisory Engineer of the Lake Success United Nations building a-f channels and who engineered the a-f end of the p-a, TV, radio, and recording channels in the United Nations General Assembly Bldg. in Flushing. We dunno when you'll be able to grab yourself these books, but it'll most likely be sometime this summer. . . . And don't think we've forgotten about that p-a book. You'll like it when you see it.

## WE EXPAND

We'd just batted out the paragraph above labeled "10 Years," when the Boss came along and told us he'd decided to expand and move some of us downtown. We don't know when the trek will occur, but it will be in the not too distant future—we'll let yuh know.

## NYC NIXES LICENSING

Servicers in New York City might be interested in learning about the Boss's appearing at the conferences of the Commerce and Industry Assoc. of New York relative to the licensing of radio repairmen here in town. He showed that you fellows in NYC were charging very close to the average nationwide charges and he proved his points in the main from the replies you made to the Rider Survey last year. . . . And so there's to be no further action until next Fall when the situation may or may not be reviewed, depending on the success of the Associated Radio Servicemen of N. Y. who so far have done a terrific job of cleaning house. That's not only going to bat for you, but cloutin' out a beaut!!!

## OURS ARE PICKED

Since the first of the year, the Boss has been getting quite a few jolts of happiness because more and more schools throughout the country have been picking "FM Transmission and Reception" and "Broadcast Operations Handbook" as textbooks. In fact, one school in Chicago sent in an SOS for 500 copies of the Handbook—send 'em *rush* and all that sort of thing. . . . And our export agents have arranged to furnish a copy of the Handbook to the chief engineer of the 500 leading broadcast stations

## TELEVISION HOW IT WORKS BOOK AVAILABLE SEPARATELY

The HOW IT WORKS book that will be published simultaneously with the Rider Television Manual Volume 1, will be a comprehensive discussion of television as it is today. The opening chapter deals with an over-all picture of the transmission and reception of television signals; then frequency standards and receiving antennas are discussed, followed by thorough explanations of each section of a television receiver. The last portion of the book covers the servicing and aligning of television sets. The book will have approximately 200 pages, each 8½ x 11 inches.

The HOW IT WORKS book can be purchased separately from the Television Manual either at your jobbers or directly from this office. The price is \$2.70.

throughout the world!!! Well, they MUST be good. . . . *By the way, have you got your copy yet?*

## THE SHOW

If you're gonna be at the show in Chicago, be sure to stop in at Booth 141. *There will be a preview that you'll want to see. . . .* The Boss—Bill Hynes—Bill Marcus—from the office here will be there to welcome you. . . . *Look for the flashing red light!!*

The Rolling Reporter

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*All that Mankind has done, thought, gained or been: it is lying as in magic preservation in the pages of books.*

*—Thomas Carlyle*

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High Frequency Measuring  
Techniques Using  
Transmission Lines  
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Control Systems  
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Radar — What It Is  
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Understanding Microwaves  
385 pages . . . \$6.00  
Radio Amateur's Beam  
Pointer Guide  
32 pages . . . \$1.00

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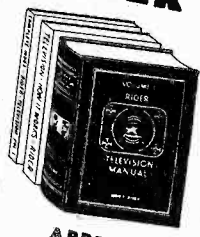
**Anticipating the Servicing Industry's Needs has resulted in an important chain of Rider "Firsts"**

Being the leader means being first. First in volume of sales; first in the offering of new, time-saving, money-making ideas and services.

During eighteen years of continuing service to the servicing industry, the leadership of Rider has been constantly maintained by regular releases of new books anticipating the needs of the industry. New books, of new ideas, timed for the greatest profit to all concerned.

That is our record. That record we intend to maintain! The books shown on this page demonstrate that policy in action. All these titles were released within the past few months!

**RIDER VOLUME 1  
Television MANUAL**  
Publication date June 1st



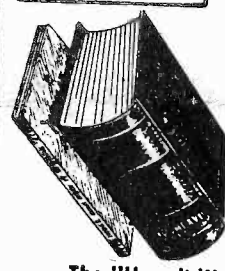
Here is a companion volume to the famous Rider Manuals—This time on television receivers. Everything that must be known about the 1946-1947 television receivers produced by the industry's leading manufacturers. Complete and kit receivers are covered.

**APPROXIMATELY 1350 PAGES—** Circuit Descriptions—Schematics—Patterns—Alignment—Voltage and Resistance Tables—Chassis Views—Parts Lists—Double-Spread and Giant Pages—Standard Rider Looseleaf Binder.

Separate "HOW IT WORKS" BOOK (about 200 pages) Explanation of the theory of Antennas—R-F Sections—Sound and Video Channels—Sync and Sweep Circuits—Waveforms in Circuits—Power Supplies—Alignment and Servicing.

**Complete, Accurate, Separate INDEX**  
Complete \$15.00

### RIDER MANUALS NOW IN 17 VOLUMES



Within the past two months we released **RIDER MANUAL VOL. XVII**  
The latest addition to the "The World's Greatest Compilation of Radio Servicing Data."


Here are 1648 pages of authentic servicing information, factory-facts on the products of 115 manufacturers. Here, Rider-exclusive "clarified-schematics" break down every multi-band job into individual schematics of each circuit as it exists with each turn of the wave band or equipment switch. The circuit analysis has been done by Rider.

The "How It Works" book and the cumulative index covering Vols. XVI and XVII, are included at no extra cost. "How It Works," clarifies the underlying theories of new radio circuits and the mechanical innovations of the latest sets.

Complete \$15.00

**Another New Rider Publication, issued in the past few months**  
(One of the hottest we have released since pre-war days)

### FM TRANSMISSION AND RECEPTION




Here is the most inclusive, the most practical book on one of the hottest subjects in the industry. Written in easy-to-understand style, it has proved of equal interest to engineers, "hams," servicemen and students. FM in homes, and even television, receivers—in "ham," police, marine, aircraft, taxi, railroad, and other point-to-point communication applications, make this new book of widespread interest. It has the latest in theory, method of operation, high and low power, antennas, methods of alignment, solutions of servicing problems, everything needed. And—it is priced spectacularly, even for a Rider publication.

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*"Eighteen Years of Continuing Service to the Servicing Industry"*

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JUNE, 1948

Courtesy Raytheon Mfg. Co.

## SOME NOTES ON TELEVISION RECEIVING ANTENNAS

**I**F there is one factor that makes for a good television installation, it is the receiving antenna . . . Its importance cannot be emphasized sufficiently. It is impossible in the space available to enter into all the various factors that are involved in a television antenna installation; only a relatively few can be considered here, but they should be of assistance to men who are doing television work now or who will be in the near future.

One of the most important things to bear in mind is that an antenna for the reception of television signals should be as high above the ground as it is possible to have it. Due to the nature of the high-frequency signals, the distance they can travel is determined by line-of-sight paths, which are indicated by *AB* and *CD* in

Fig. 1. Assume that the transmitting antenna is at a height *A* above the ground and the receiving antenna is at a height *B*. Signals radiating from *A* will be received at *B* as each is far enough above the ground as the line-of-sight path is tangent to the earth at *X*. If the height of the transmitting antenna were increased to *C*, the length of the path will also be increased so that it is tangent to the earth at *Y* and the

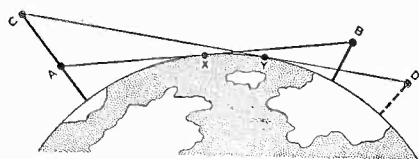


Fig. 1. The line of sight is shown between the antennas at *A* and *B*. If *A* were raised to position *C*, the line of sight would be increased to *D*.

signals can be received at an antenna *D* of the same height as *B* but at a greater distance.

The distance or horizon range from the transmitting antenna to *X* or *Y* can be found from the formula, *Distance* =  $1.23 \sqrt{h}$ , where the distance is measured in miles; *h*, the antenna height above the ground, in feet; and 1.23 is a constant which takes into account the curvature of the earth. Assume that the transmitting antenna is 1000 feet above the ground; substitute this for *h* in the above formula and we have

$$\begin{aligned} \text{Distance} &= 1.23 \sqrt{1000} = 1.23 \times 10 \sqrt{10} \\ &= 1.23 \times 31.62 \\ &= 38.9 \text{ miles.} \end{aligned}$$

Now if the receiver installation is within this horizon range of the

Please turn to page 4

# RIDER'S *Continuing* LEADERSHIP MEANS CONTINUING PROFITS FOR YOU!

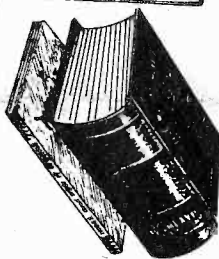
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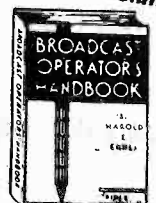
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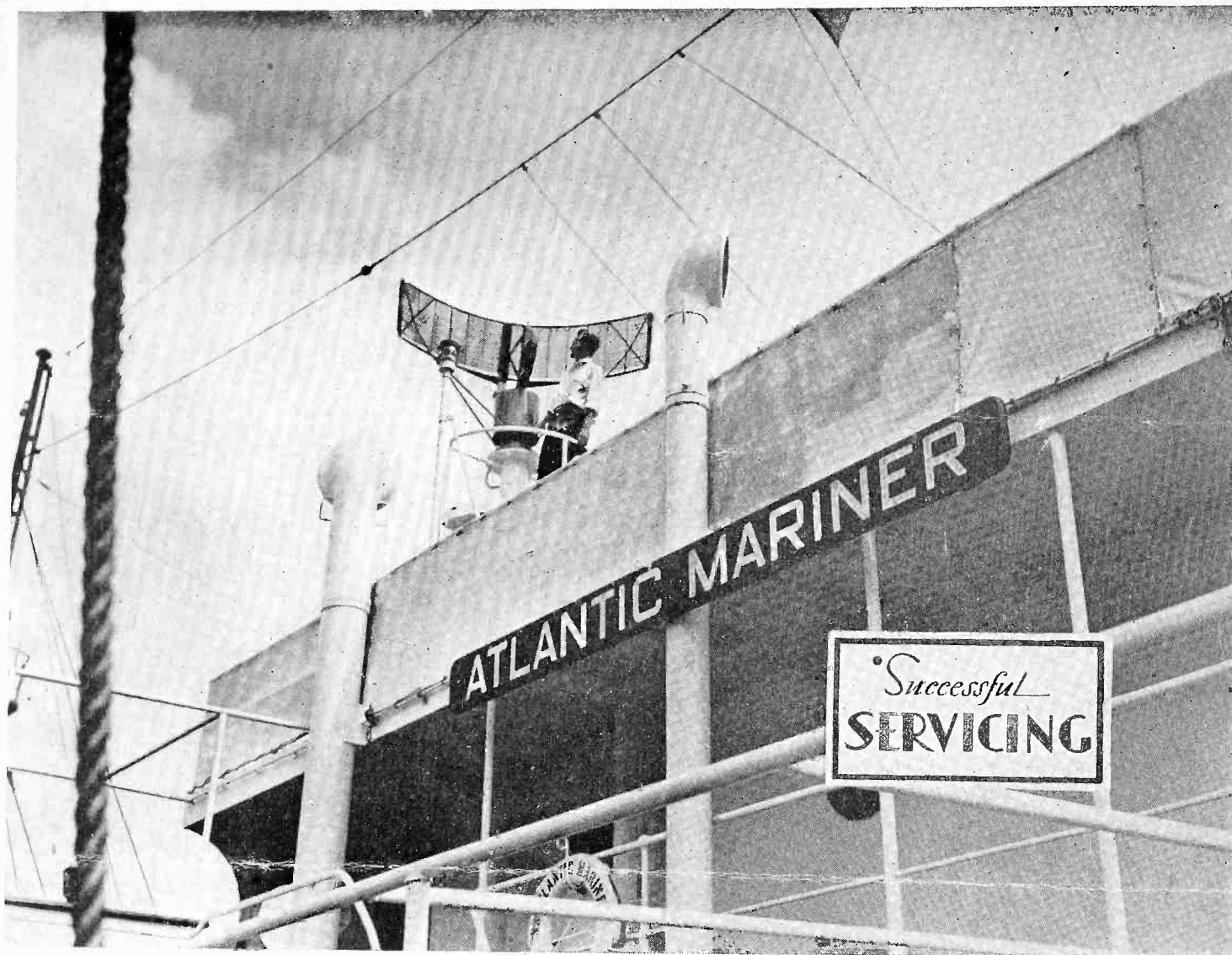
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JUNE, 1948

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## SOME NOTES ON TELEVISION RECEIVING ANTENNAS

**I**F there is one factor that makes for a good television installation, it is the receiving antenna . . . Its importance cannot be emphasized sufficiently. It is impossible in the space available to enter into all the various factors that are involved in a television antenna installation; only a relatively few can be considered here, but they should be of assistance to men who are doing television work now or who will be in the near future.

One of the most important things to bear in mind is that an antenna for the reception of television signals should be as high above the ground as it is possible to have it. Due to the nature of the high-frequency signals, the distance they can travel is determined by line-of-sight paths, which are indicated by *AB* and *CD* in

Fig. 1. Assume that the transmitting antenna is at a height *A* above the ground and the receiving antenna is at a height *B*. Signals radiating from *A* will be received at *B* as each is far enough above the ground as the line-of-sight path is tangent to the earth at *X*. If the height of the transmitting antenna were increased to *C*, the length of the path will also be increased so that it is tangent to the earth at *Y* and the

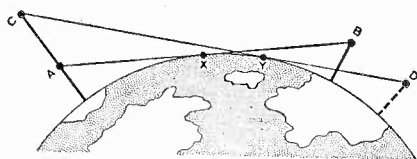


Fig. 1. The line of sight is shown between the antennas at *A* and *B*. If *A* were raised to position *C*, the line of sight would be increased to *D*.

signals can be received at an antenna *D* of the same height as *B* but at a greater distance.

The distance or horizon range from the transmitting antenna to *X* or *Y* can be found from the formula, *Distance* =  $1.23 \sqrt{h}$ , where the distance is measured in miles; *h*, the antenna height above the ground, in feet; and 1.23 is a constant which takes into account the curvature of the earth. Assume that the transmitting antenna is 1000 feet above the ground; substitute this for *h* in the above formula and we have

$$\begin{aligned} \text{Distance} &= 1.23 \sqrt{1000} = 1.23 \times 10 \sqrt{10} \\ &= 1.23 \times 31.62 \\ &= 38.9 \text{ miles.} \end{aligned}$$

Now if the receiver installation is within this horizon range of the

Please turn to page 4



### Automatic 640, Series B

The schematic of this model is the same as the 640 shown on page 15-7 of *Rider's Volume XV* except for the change from octal type to loctal type tubes.

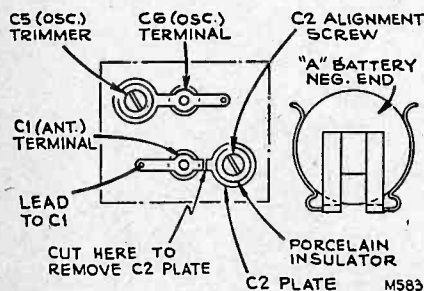
This model uses the 14Q7, 14A7, 14B6, 50A5, and 35Y4 in place of the 12SA7GT, 12SK7GT, 12SQ7GT, 50L6GT, and 35Z5GT tubes.

### RCA 54B Series

These receivers have been produced with loops of two types of construction: "taped," in which the coil is fastened to the loop cover with Scotch tape; and "cemented," wherein the coil is fastened to the loop cover with coil cement. Receivers using "cemented" loop have been produced with and without the antenna trimmer capacitor, C2. Receivers using the "taped" loop have only been produced with antenna trimmer C2, and they are to be aligned according to the instructions on page 15-22 of *Rider's Volume XV*. In the case of those receivers using the "cemented" loop which has the trimmer C2, this capacitor is removed before alignment. Trimmer C2 is removed by removing the C2 alignment screw and cutting off the C2 capacitor plate as shown in the accompanying illustration.

Removal of the trimmer necessitates changes in the alignment for sets using the "cemented" loop. Refer to the alignment instructions on page 15-22. Steps 1 and 2; connect the high side of the test oscillator to the connection lug of C1 located on rear of gang in series with 0.01- $\mu$ f capacitor. Step 3: test oscillator tuned to 1500 kc; the gang capacitor is rocked instead of being set to 1600 kc. Step 4: omitted. Step 5: the gang capacitor is rocked instead of being set to 600 kc. All other instructions are the same with the foregoing exceptions.

If there is distortion and low volume in the RCA 54B series, check



Before aligning the RCA model 54B with a "cemented" loop, C2 is removed, as indicated.

the coupling capacitor C19 (0.002  $\mu$ f) for leakage. This capacitor couples the audio signal from the 1S5 tube to the 3S4 output tube. This capacitor has only a 150-volt rating and it should be replaced with one that has a 200-volt rating.

The following is a list of changes for the parts lists for these models:

1. Delete Stock No. 70454—Capacitor-Tubular, 0.002  $\mu$ f, 150 volts (C14, C19)

2. Add Stock No. 72315—Capacitor-Tubular 0.002  $\mu$ f, 200 volts (C14, C19).

3. Delete Stock No. 70453—Capacitor-Tubular, 0.02  $\mu$ f, 100 volts (C10, C15).

4. Add Stock No. 71928—Capacitor-Tubular, 0.02  $\mu$ f, 200 volts (C10, C15).

NOTE: C15 (Stock No. 71928) should be located adjacent to the output transformer instead of under the socket subpanel, since its physical size is slightly larger than C15 (Stock No. 70453).

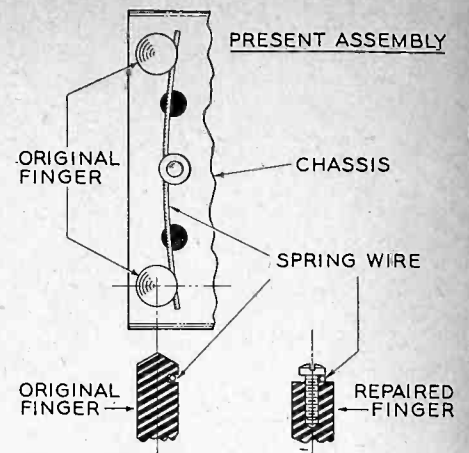
### Hallicrafters SP-44 AND SX-42

These models appear on pages 17-1 to 17-5 and 17-6 to 17-16 respectively of *Rider's Volume XVII*. When the SX-42 is used with the SP-44 Panadaptor on the low-frequency band, it appears to motor boat. To correct this condition, do the following.

The connecting cable between the SP-44 and the SX-42 is shielded and the shield is connected to the SX-42 ground. Disconnect the shield from the SX-42 ground and place a 50- $\mu$ f capacitor between the shield and the SX-42 chassis. Be sure that the SX-42 chassis is well grounded. A shielded antenna lead, or a balanced antenna, on the SX-42 may also help.

The following modifications should be made on the SP-44 unit. A strip of bonding braid,  $\frac{3}{8}$  inch wide, may be connected to the No. 1 grounded pin of the 6AC7 tube, going around the choke coil and connecting to the right side of the chassis. The braid should be insulated with a piece of spaghetti and should lie parallel to the front panel. Two pieces of braid  $\frac{1}{4}$  inch wide, or a copper strap may also be used.

A piece of copper or steel sheet about  $2\frac{1}{2}$  inches wide may be screwed or soldered across the bottom so that it is attached to both edges of the chassis. This plate should be centered over the bottom of the 6AC7 tube.



A machine screw can be substituted for the broken head of the finger which catches the spring wire holding chassis of Setchell Carlson 427 in cabinet.

### Setchell Carlson 427

This model appears on page 16-1 of *Rider's Volume XVI*. If the line voltage is extremely low, the 50L6 tube should be replaced with a 35L6 tube. The chassis is held in the cabinet by means of a spring wire caught in slots which are near the top of a finger built into the cabinet. If the head of this finger breaks off, repair can be made by drilling and tapping for an 8/32 machine screw. The accompanying illustration shows this method.

### Sears-Roebuck 6200A, Chassis 101.800-1; 6203, Chassis 101.800-A

These models are the same as Model 6200, chassis 101.800, shown on pages 15-13 and 15-2 of *Rider's Volume XV*, except for the following changes. A phono socket has been added to Model 6200A. An ivory cabinet, instead of a brown one, is used on Model 6203.

Part Number	Description
R61010	Cabinet, Ivory (101.800-A)
R44897	Socket, phono (101.800-1)

### Sears-Roebuck 7025, Chassis 132.807-2

This model is the same as that shown on page 13-63 of *Rider's Volume XIII*, with the following exceptions. The electromagnetic speaker (Part No. N17258) has been replaced by a permanent magnet speaker (Part No. N16993.) The oscillator coil (Part No. 17233) has been rotated 180 degrees and the mounting lug soldered to the back of the chassis to provide a better mounting. This change does not involve any circuit changes.



**Goodrich R655-W**

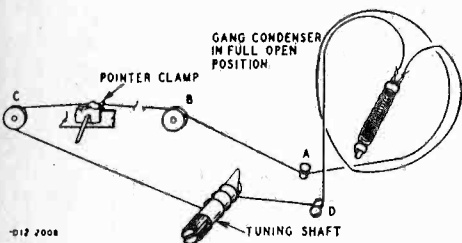
This model, appearing on pages 15-7 and 15-8 of *Rider's Volume XV*, uses the International Detrola Model 550 Record Changer. The Model 550 may be found on Int. Det. RCD.CH. pages 15-1 to 15-10 of *Rider's Volume XV*.

**Montgomery Ward 64WG-1804B, 74WG-1804B**

These two models are similar to Model 64WG-1804A shown on pages 15-88 to 15-90 of *Rider's Volume XV*, except for the following changes.

The frequency range has been slightly contracted to 540-1600 kc. A 47-ohm dropping resistor (R-20) has been inserted between B+ and the junction of the primary winding of the first i-f transformer (T-3), the screen grids of the 12SA7 mixer, the screen-grid of the 12SK7 r-f amplifier, and resistor R-1. A 0.05- $\mu$ f bypass capacitor is connected from this junction to the point marked "X" in the filament line of the schematic shown on page 15-88 of *Rider's Volume XV*.

The drive cord length has been increased for these models and the following drive cord replacement instruc-



Winding for the new longer drive cord for Models 64WG-1804B and 74WG-1804B.

tions should be observed. Turn the gang capacitor to the fully open position. Use a new drive cord 42 inches long and tie one end to the tension spring. Hook the other end of the tension spring over the tab on the drive pulley rim and continue around pulley 1/2 turn counterclockwise. Pass cord around stud D and wind three turns clockwise (from front of chassis) around the turning shaft. Turns must progress away from chassis. Pass cord around pulleys C and B and stud A. Pass cord under drive pulley and wind 1 1/2 turns counterclockwise around drive pulley. Stretch tension spring and tie free end of cord to spring. Cut off any excess string. Attach the dial pointer to the cord and position as instructed on page 15-89 of *Rider's Volume XV*.

The components used in the Models 64WG-1804B and 74WG-1804B are the same as those enumerated on page 15-90 of *Rider's Volume XV*, except for the following.

Ref. No.	Part No.	Description
C-1	D67102	0.001 $\mu$ f, 400 v. tubular
C-14	B67403	0.04 $\mu$ f, 200 v. tubular
C-15	B67602	0.006 $\mu$ f, 200 v. tubular
C 19	B67253	0.025 $\mu$ f, 200 v. tubular
C-22	B67204	0.2 $\mu$ f, 200 v. tubular
C-24	17A123	1.5-12 $\mu$ f, trimmer
C-28	B67503	0.05 $\mu$ f, 200 v. tubular
R-14	B84274	270,000 $\Omega$ , 0.5 watt, carbon
R-20	B85471	470 $\Omega$ , 0.5 watt, carbon
	20X329	Capacitor cushion stud in gang capacitor mounting
	28X95	Drive cord tension spring

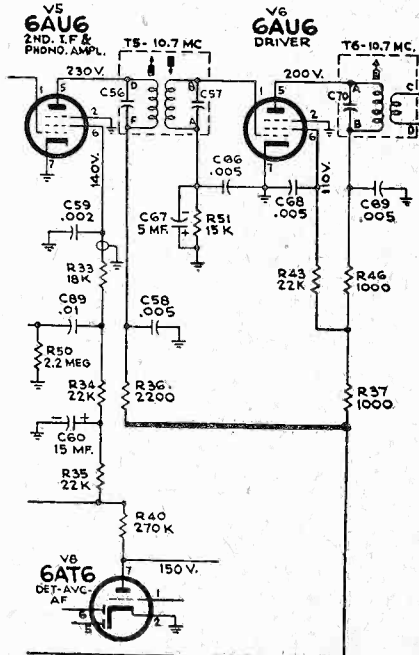
**Truetone D-696**

This model is the same as Model D-727, which appears as Model 175 on *Detrola page 9-1 of Rider's Volume IX*.

**RCA 612V1, 612V3, 612V4, Chassis RK-121**

These models, appearing on pages 17-31 to 17-43 of *Rider's Volume XVII*, have been changed as follows. R36 is no longer connected to the junction of R35-R40-R22-R25. It is now connected to R37 and terminal #11 of S5. This change removes the plate voltage from V5 (6AU6) when the range switch is in the "Phono" position, and is illustrated here.

If the shielded lead of the power cable touches the speaker frame, noise will be caused. The power cable should be clamped in such a position to prevent contact with the speaker frame.



This new connection for R36 removes the plate voltage from V5 when the range switch is in the "Phono" position.

**Television Change**

**Garod 3915 TVFMP**

This model is the same as Model 3912 TVFMP on TV pages 1-1 to 1-6 of *Rider's Television Volume 1*, except for the following changes.

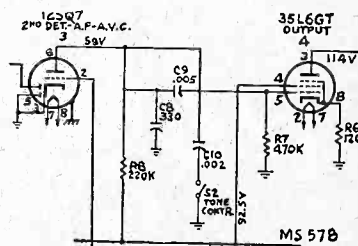
A 100- $\mu$ f 25-volt tubular capacitor has been connected across the cathode resistor (F31) of the fourth picture i-f stage. Items marked R-78, R-79, R-80, R-83 and C-70 and C-71 are matched pairs  $\pm 1\%$ . Replace as matched pairs only. Should parasitic oscillation occur when replacing the 6B6G tube (V20), a 100-ohm 1/4-watt resistor should be connected in series with pin 5. The second series of tuners are supplied with two wave traps connected between antenna and ground.

The Model 11FMT radio receiver used in conjunction with the Model 3912 TVFMP has been changed to the Model 9FMT. Full information on this receiver will be included in *Rider's Television Manual, Volume 2*,

The video alignment has been changed as follows. The bottom peak of T1, T3, and T5 has been changed to 22.0 mc.

**RCA 66X11, 66X12, 66X13, Chassis RC-1046C, RC-1046D, RC-1046E**

These models are the same as Model 66X11, chassis RC-1046A, on pages 17-29 and 17-30 of *Rider's Volume XVII*, except for the following change. The capacitor C10 (tone-control circuit) which was connected



Capacitor C10 is here connected to the plate of the 12SQ7 a-f amplifier tube.

to the grid of the 35L6GT output tube, is now connected to the plate of the 12SQ7 a-f amplifier tube, as shown.

**International Detrola 2744**

This model is the same as Model 274 appearing on page 10-9 of *Rider's Volume X*.

## TV Receiving Antennas

Continued from page 1

transmitter, the antenna should be as high as possible in order to avoid local obstructions, but its height is not of paramount importance as it is when the antenna is beyond the range, as *B* or *D* in Fig. 1. In this case, the height above ground of both antennas must be taken into consideration and the following formula is used.

$$H, \text{ height of receiving antenna} \\ = \left( \frac{\text{Distance}}{1.23} - \sqrt{h} \right)^2$$

Assume that you wish to know how far above the ground a receiving antenna should be installed at a location, say 50 miles from the transmitter with an antenna height of 1000 feet, as in the above example. Substitute 50 for the distance and 1000 for *h* in the above equation. Thus we have

$$H = \left( \frac{50}{1.23} - \sqrt{1000} \right)^2 = (40.6 - 31.6)^2$$

$$H = (9)^2 = 81 \text{ feet}$$

You will find that this height *H* increases quite rapidly with an increase in the line-of-sight distance; for example, at 55 miles, a receiving antenna would have to be 171 feet above ground with a 1000-foot transmitting antenna, and at 60 miles, *H* would be 294 feet above ground.

It should be clear from the foregoing that if you perform similar calculations, you should know accurately the line-of-sight distance of the location where the receiving antenna is to be installed, because just a few miles means such a great difference in the height.

### Multiple Receiver Connections

It may happen that you will want to have more than one television receiver connected to a single antenna; this might easily occur if the installation is to be in an apartment house, a store, a dealer's display room, etc. This can be done if the relative signal strength of the signals is sufficient in the locality. It is necessary to know this, because the number of sets which can be connected to one antenna is limited by the signal strength available, the maximum being four for two television receivers, the

to the resistors and switches by a twin lead with the same impedance. In Fig. 3(A) a half-wave dipole is indicated, this having an impedance of 75 ohms and a coaxial line of the same impedance being employed.

You will note that in Fig. 2 there are two double pole-double throw switches connected in parallel through series resistors to the twin-lead line from the antenna. The number of receivers connected to the antenna determine the value of these series resistors: for two receivers, the value is 150 ohms; for three receivers, 300

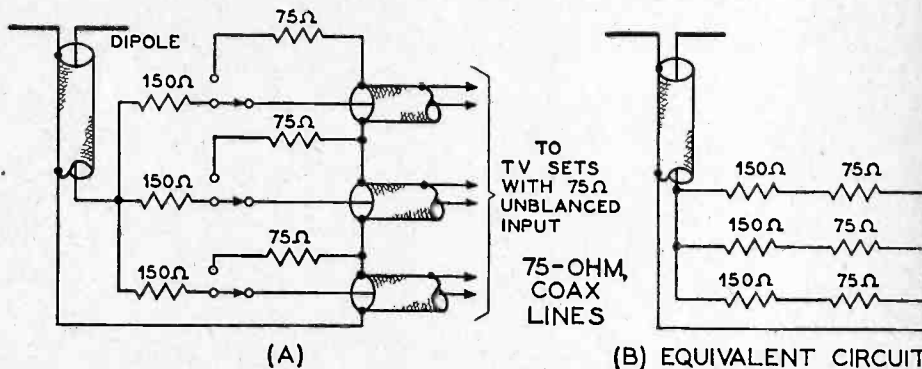


Fig. 3. Connections for two, three, or four television sets with 75-ohm unbalanced inputs to a dipole. Note that the value of the series resistors changes with the number of sets used.

available signal voltage is cut 2 to 1; for three sets, it is cut 3 to 1, and for four sets, 4 to 1.

Two methods of connections are shown in Figs. 2 and 3, the former being that employed with receivers with a balanced input and the latter with unbalanced-input sets. It goes without saying that in order for the signal to be a maximum at the receiver input, the impedance match between the antenna, the lead, and the input should be as nearly perfect as possible. In Fig. 2(A), a folded dipole is indicated (this has a 300-ohm impedance) and it is connected

ohms; and for four receivers, 450 ohms. It is important to use carbon and not wire-wound resistors, as the latter may unbalance the system. Of course, the dummy load in each case remains 300 ohms, thus matching the input of the set and providing a balance in the event the set is removed from the system.

With receivers having an unbalanced input of 75 ohms, single pole-double throw switches are used with series resistors connected to the center lead of the coaxial line from the antenna. Here again the value of these series resistors changes with the number of sets connected in the system. In the case of two sets in the system, the value of each series resistor is 75 ohms; if three sets are used, the value becomes 150 ohms; and when four receivers are used, the value becomes 225 ohms. Carbon resistors must be used here also. In the event that a set is disconnected, then the switch in that circuit is thrown to the dummy load.

The equivalent circuits of each of these methods of connection are shown in Figs. 2 and 3 (B). In the former, the two 150-ohm resistors in series with the 300 ohms of either the set input or the dummy load, give two parallel circuits of 600 ohms each.

Please turn to page 6

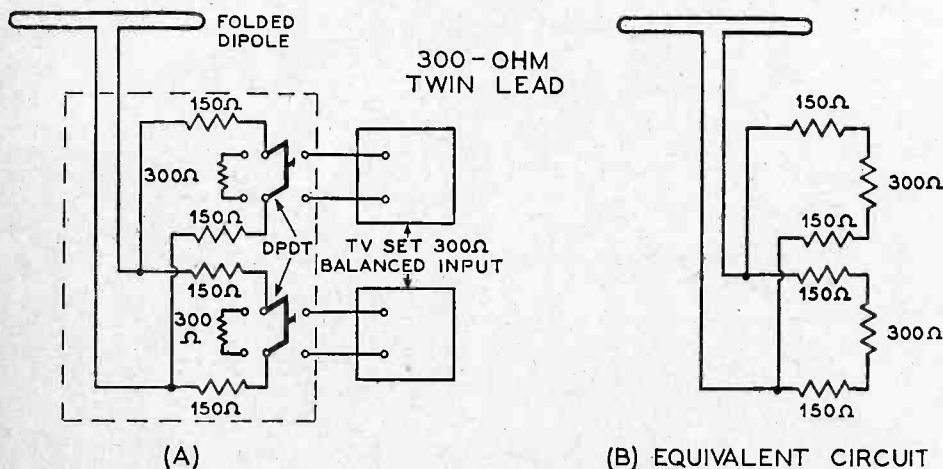


Fig. 2. Connections for two, three, or four television receivers with 300-ohm balanced inputs to a folded dipole. The value of the series resistors must be changed with the number of sets, as explained in the text.

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No. 5

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## TELEVISION SERVICE PROBLEMS

**N**OW that almost two years of post-war television are behind us, it is possible to review some of the service problems. No one is surprised that they are numerous—entirely too many of varied sorts to permit editorial coverage during one issue. So we will comment on just one portion of the complete picture. One hears a great deal about alignment and the sweep generator necessary for such operation. Strangely enough, alignment is not the major television service problem. Of course the alignment of the r-f and video and sound i-f systems is a paramount detail during manufacture, but if service records are analyzed, this alignment is not found to be a common-place fault. The far more frequent complaint is the garden variety failure of components—especially resistors; the type of trouble which has been experienced for more than a generation with the conventional home receiver.

Just why this is so is not important at the moment. Let us simply say that the stable alignment is due to the know-how on the part of the manufacturers. Of much greater importance, there is a lesson to be learned from the analysis of service records. Personnel of the repair industry who are looking forward to operations on television receivers, should realize that whatever the fault is, it is not always misalignment. Moreover, if this alignment is checked and found satisfactory, very little improvement in picture or sound detail will be accomplished by a "touch up" of the alignment controls. It might be well to establish a cardinal rule relative to alignment:—check it—if it is all right, leave it alone!

In line with this thinking, we suggest that the press tone down the importance of alignment and place more emphasis on the service troubles which are born daily in television receivers—defects associated with electrical focusing, creeping oscillator capacitors, non-linearities in vertical and horizontal sweep, Barkhausen oscillation, and finally, that very troublesome antenna. Twenty years of disregard of the antenna must be overcome in the mind of the servicing industry. The orthodox outdoor dipole is simple in appearance and erection—but its location and orientation to serve the television set owner properly, is much more complex. A thorough understanding of not only the orthodox outdoor unit, but the unorthodox indoor system is vital. As to alignment—it is important, very much so, in its place, but it can prove very troublesome if performed when not required.

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The Master Index lists every model number and chassis number of receivers whose service data appeared in Volumes I to XV inclusive of Rider's Manuals . . . Cross indexing has been eliminated—if more than one model number applies to a chassis, each model number is listed separately as well as the chassis number. (*This innovation was made to save you time . . . Just one place to look for what you want!*) Because thousands of men had early Volumes I and II, special Radiotron-Cunningham editions, and the Abridged Manual Volumes I to V, the page numbers of these volumes are added to the listings if a model and chassis were published in one or more of these in addition to the regular edition of the Manuals.

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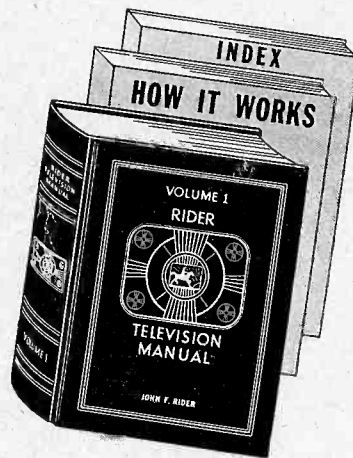
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## TV Receiving Antennas

*Continued from page 4*

Hence, the impedance of the combination is 300 ohms, providing the proper match for the twin-lead line. In the event that three sets are connected to the same folded dipole, the 150-ohm series resistors are changed to 300 ohms each, making each parallel branch circuit 900 ohms. The total resistance of three 900-ohm circuits in parallel is again 300 ohms, providing the required impedance match for the line.

The same reasoning can be applied

to Fig. 3(B). Here but one resistor is needed in series with the 75-ohm unbalanced input of the receiver to provide the impedance match. The total resistance of each series circuit is 225 ohms and the total resistance of the three parallel circuits is 75 ohms. If four 75-ohm receivers are to be connected to the one dipole, the series resistances are changed from 150 to 225 ohms, the total resistance of each series circuit being 300 ohms. Therefore, the total resistance of four 300-ohm parallel circuits would again be 75 ohms, giving the correct match.

## Another Bouquet for "FM Transmission and Reception"

In the "Val-Tech News" published by the Valparaiso Technical Institute, Dr. J. B. Hershman has this to say about Rider and Uslan's "FM Transmission and Reception":

"The best book that we have seen to date for the beginner. Four hundred pages of text material with six pages of bibliography on the subject; all references to periodical literature with the exception of three books . . . The text is well illustrated with graphs, diagrams and circuit drawings . . . This book is especially recommended as an introductory text on FM. If studied carefully and methodically, we believe it will give excellent basic background for further advanced study."

And "Radio News" has the following to say about this book: "This book has been divided into two main sections dealing with FM transmission and FM reception. The authors have provided a detailed explanation of the equipment and techniques used in transmitting FM program material including transmitting antennas.

"While this material provides an excellent background for the all-around technician, servicemen will undoubtedly find the section dealing with FM receiving equipment of more immediate value. Receiving antennas are covered in some detail in a separate chapter . . .

"Servicemen will welcome the chapters dealing with the alignment and servicing of FM receivers. Procedures are carefully outlined and complete details for performing the various operations are given. An appendix covering vectors, powers of ten, FM ground wave signal range, i-f response curves, and a reactance tube chart provide a handy reference for the serviceman.

Every serviceman in America — everyone interested in radio — should have this book. Order from your jobber or directly from us.

### Regal Electronics 208

This model is the same as models 800 and 801 shown on page 16-1 of *Rider's Volume XVI*.

### Motorola 402

This model is the same as the Motorola shown on pages 12-62 and 12-65 of *Rider's Volume XII*.





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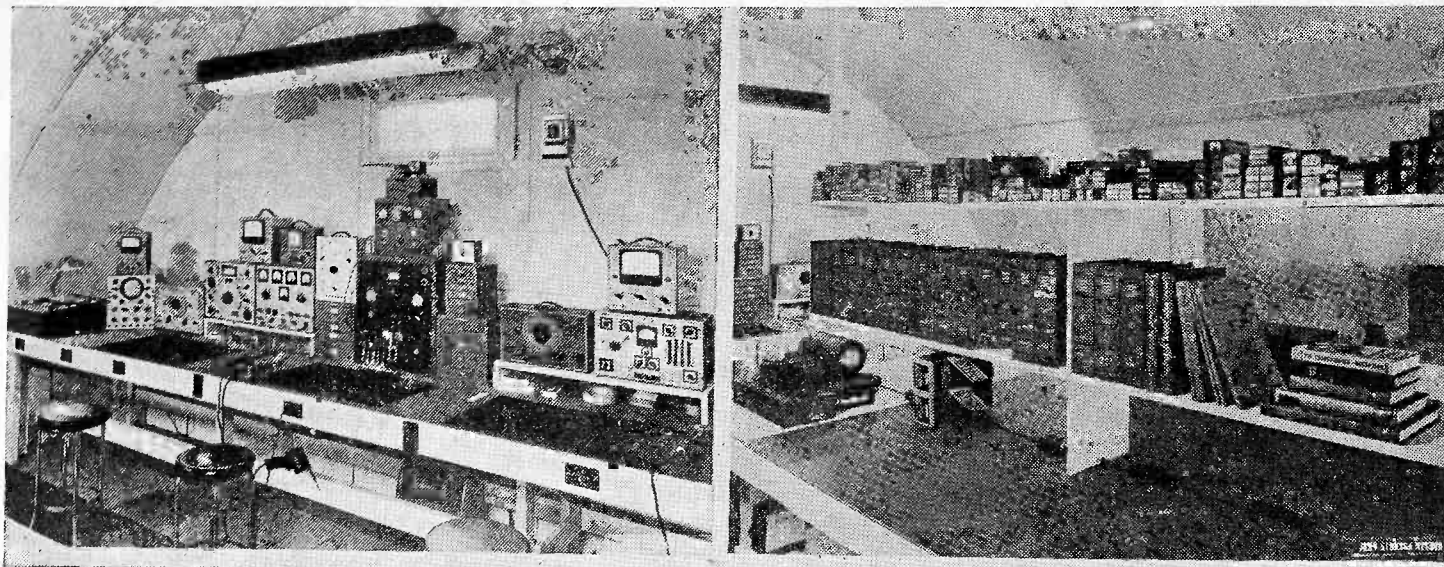
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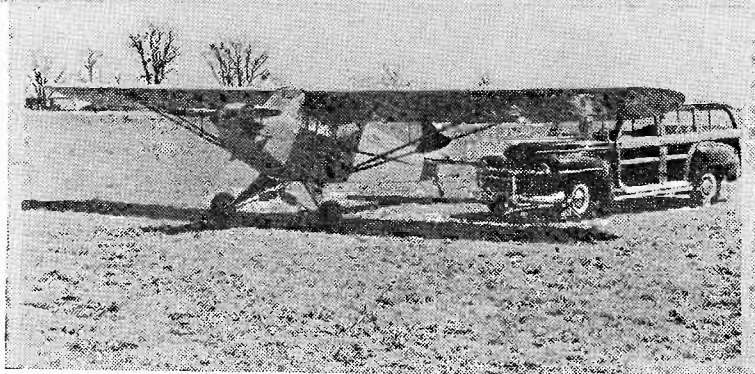
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JULY, 1948



## SYNTHESIS OF COMPLEX WAVES

By JOHN F. RIDER

IT is a simple matter to present a complex wave on the screen of a cathode-ray oscilloscope, which type of display is a very important function of the cathode-ray tube. However, the analysis of complex waves, that is, the determination of the phase and amplitude of the different components which comprise the wave, is much more complex, and to say the least, quite tedious. Granted that harmonic analyzers enable a comparatively easy analysis of the amplitude of the component frequencies present in the complex wave, still the determination of the phase of these components as well as their amplitude is much more troublesome.

Back in 1935 when the first edition of our "Cathode-Ray Tube At Work" was being prepared, the presentation of complex waves with certain definite component amplitudes and relative phase proved extremely bothersome. Set phase conditions did not remain constant, and a great deal of time was spent in an effort to photograph these patterns. The timing of the camera shutter to coincide with the proper phase conditions in the sine-wave voltages being mixed to produce the resultant complex pattern resulted in so much waste of time that it was impossible to present in that book a number of illustrations which might prove of value as a guide in the analysis of complex waves.

When the revised edition of Rider's "Cathode-Ray Tube At Work" was first discussed almost a year ago, the subject of complex wave presentation again reared its ugly head. The method used more than a decade ago was known to be inadequate and a new arrangement for producing these waves was considered vital. A development project was started on a device which would synthesize complex waves by mixing a number of sine waves. Moreover each of these component waves would be controllable in phase individually through 360 degrees and also in amplitude from 0 to 100 percent. Finally, each of the components would be so synchronized in frequency and phase that the synthesized resultant would remain stationary on the screen even when the phase of the individual components was varied. Such a synthesizer was developed and the results obtained with it are shown in some of the accompanying photographs of complex waves which were synthesized on this device. The composition of each complex wave is described in the accompanying caption.

Of significant interest is the fact that this device enables the generation of a wide variety of complex waves, which when arranged photographically in groups based upon the component frequencies, can serve as a reference source of complex wave composition for anyone working with

such waves. Naturally a limit must be set on the number of waves presented in this manner, because the combinations possible with a fundamental and twelve harmonics are myriad. Maybe some day a book devoted to such waves will be published by us; in the meantime the forthcoming text on cathode-ray tubes will show complex waves up to and including the seventh harmonic for such reference purposes.

An interesting sidelight on the utility of such a synthesizer is its possible use for instruction in the development of complex waves, showing the effect on the resultant of a change in amplitude and phase of the respective components.

For those who may be interested in the general plan of the synthesizer, each component frequency is generated individually, then amplified and fed into a phase inverter; from the phase inverter the signal is fed to a continuous phase shifter, and the output of these units is fed into a mixer system. This is shown in Fig. 1.

In passing we might mention that the upper limit of frequencies in such a system is not confined to the twelfth harmonic of the fundamental; it can be carried much higher; but for many purposes, such as ours, or for that matter, instruction in communication schools, a higher order of harmonics is not necessary. This is

Please turn to page 3

**Allied Radio 6A-127 Revised, 6B-127, 6C-127**

This model is the same as Model 6A-127 appearing on pages 15-4 and 15-5 of *Rider's Volume XV*, except for the following changes. Part 36 has been changed in value from one megohm to 220,000 ohms and the bottom side of this resistor has been moved from the negative filament line (junction of parts 34 and 17 and 47) to the ave bus (junction of parts 33, 34, 14, and 35). Part 40 has been changed in value from 220,000 ohms to 100,000 ohms. Part 13 is now connected from the junction of resistor 39 and the secondary of the first i-f transformer to the positive side of the filament of the IN5GT tube instead of from the junction to the common negative as previously.

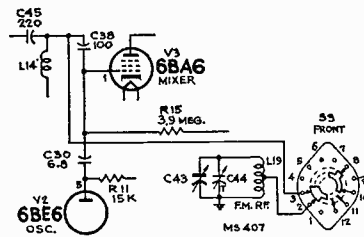
Part 28 is now connected from the negative side of the filament of the 1H5GT tube to the grid of that tube instead of from the center arm of the volume control to the common negative. The bottom side of part 19 is now connected to the junction of part 48 and the center tap of the filament of the 3Q5GT tube, and thence to the left-hand side as shown on the schematic) of capacitor 10. This part was formerly connected directly to the right-hand side of the same capacitor. The connection from the negative side of the filament of the IN5GT tube to the left-hand side of capacitor 10 has been removed. A 68-ohm resistor has been inserted in the high side of the 45-volt battery lead.

The following changes have been made in the parts list.

Illus. No.	Part No.	Description
36	27E224	Carbon, 220,000 Ohm, 1/3 W.
40	27E104	Carbon, 100,000 Ohm, 1/3 W.

**RCA 711V1, 711V2, 711V3, CHASSIS RK-117, RS-123**

Models 711V1 and 711V3 are the same as Model 711V2 shown on pages 17-44 to 17-55 of *Rider's Volume XVII* except for the cabinets. The following changes apply to all models. Resistor R6 is 1200 ohms instead of 680 ohms as indicated on the schematic of the RK-117 chassis. The



The revised V3 mixer circuit.

mixer (V3) input circuit of this chassis has been revised. C28 is omitted, the connections to terminals #2 and #3 of the range switch (S3 front) have been reversed, the plate circuit of the r-f amplifier (V1) is coupled to the grid circuit of the mixer (V3) through C38 instead of C28. Capacitor C1B on Chassis RS-123 has been changed from 15µf to 50µf. The following change should be made in the parts list for for this chassis. Stock number 36599 should be deleted, and number 72955 added.

Stock No.	Description
72955	Capacitor—Electrolytic, comprising 1 section of 30µf, 450 volts, 1 section of 50µf 400 volts, and 1 section of 40µf 25 volts. (C1A, C1B, C1C.)

**Magnavox FM Chassis**

We have been requested by The Magnavox Company to state that all of their models as sold have the chassis pan already installed to accommodate their f-m chassis CR-189, 2

band, or CR-192, 1 band. The only exceptions to this are the 138 series Duette and the 132 series chairside.

**Setchell Carlson 416**

This model appears on *Misc. page 15-19 of Rider's Volume XV*. The i-f transformers were coated with a low melting point wax (yellow wax). If this wax runs, the trimmers will not stay adjusted. The only remedy is to replace the transformer.

**RCA 612V1, 612V3, AND 612V4**

These models appear on pages 17-31 to 17-43 of *Rider's Volume XVII*. The alignment tabulation should be corrected to read as follows.

Step No. 12—Repeat steps 10 and 11 for exact calibration.

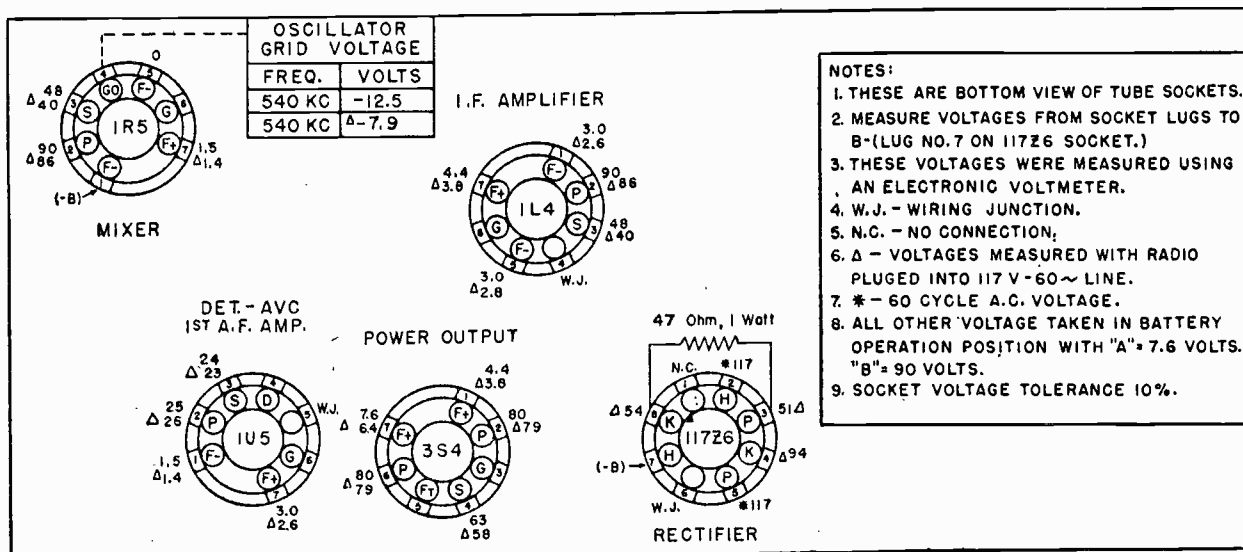
Step No. 18—Repeat steps 16 and 17 for maximum output.

On chassis RS-123, the electrolytic capacitor C1B has been changed from 15µf to 50µf.

**Crosley 56PA, 56PB**

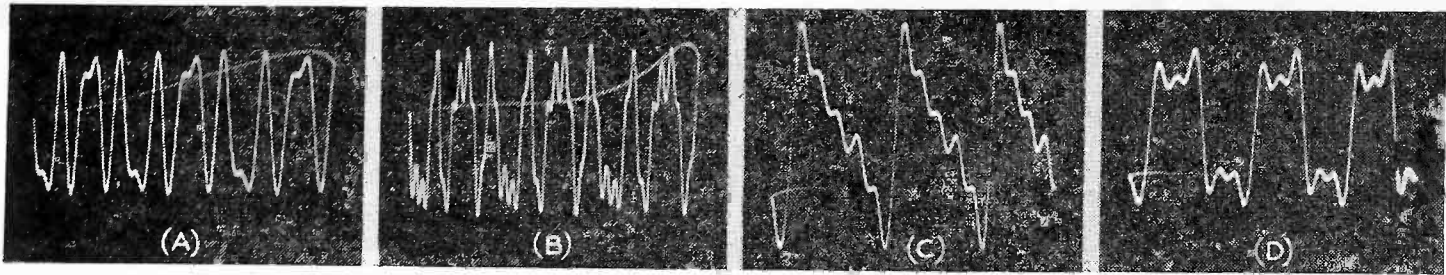
These models appear on pages 15-29 to 15-31 of *Rider's Volume XV*. It has been found that the 3S4 tube used in these models has a tendency to burn-out. The following change should be made to prevent this. Remove the wire that connects the plate lug 3 to the cathode lug 8 of the 117Z6 tube socket. In its place solder one end of a 47-ohm, 1-watt resistor (part number 39373-119) to the plate lug. The 1S5 Det.—AVC—1st A-F Amplifier tube has been changed to a 1U5 tube. The characteristics of the tubes are the same but the socket connections are different.

The accompanying socket voltage chart includes both changes.



Socket voltage chart for Crosley models 56PA and 56PB showing new socket connections.



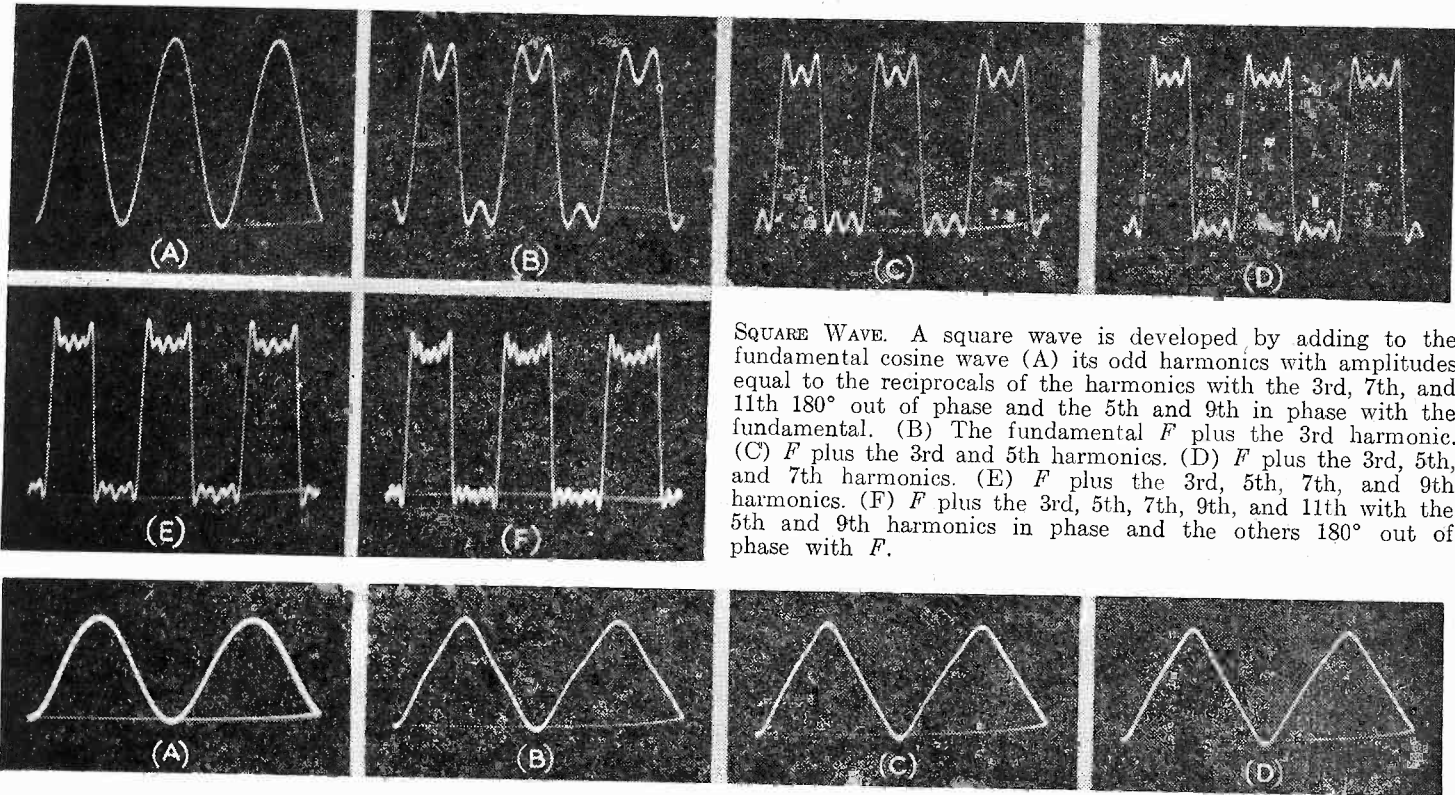


**COMPLEX WAVES.** The composition of a complex wave consists of a fundamental frequency with the addition of certain harmonics of various amplitudes which are in certain phase relationships to the fundamental.

- (A) Fundamental — 100% Amplitude
- 3rd Harmonic — 215%         "     Leading 170°
- 5th Harmonic — 122%       "     Leading 45°
- (B) The fundamental and harmonics of (A) with 12th Harmonic — 66% Amplitude Lagging 65°

	Amplitude	Amplitude	
(C) Fundamental	100%	(D) Fundamental	100%
2nd Harmonic	65%	3rd Harmonic	50%
3rd Harmonic	40%	5th Harmonic	20%
4th Harmonic	30%		
5th Harmonic	25%		

NOTE: All harmonics in (C) and (D) are in phase with fundamental.



**SQUARE WAVE.** A square wave is developed by adding to the fundamental cosine wave (A) its odd harmonics with amplitudes equal to the reciprocals of the harmonics with the 3rd, 7th, and 11th 180° out of phase and the 5th and 9th in phase with the fundamental. (B) The fundamental  $F$  plus the 3rd harmonic. (C)  $F$  plus the 3rd and 5th harmonics. (D)  $F$  plus the 3rd, 5th, and 7th harmonics. (E)  $F$  plus the 3rd, 5th, 7th, and 9th harmonics. (F)  $F$  plus the 3rd, 5th, 7th, 9th, and 11th with the 5th and 9th harmonics in phase and the others 180° out of phase with  $F$ .

**TRIANGULAR WAVE.** A cosine wave (A) of fundamental frequency  $F$  and an amplitude  $V$ , can be made into a triangular wave by adding its odd harmonics all in phase having amplitudes equal to the reciprocals of the square of the harmonics.

(B) The fundamental  $F$  plus the 3rd harmonic. (C)  $F$  plus the 3rd and 5th harmonics. (D)  $F$  plus the 3rd, 5th, and 7th harmonics; note the slight change made by adding the 7th harmonic.

**Synthesis of Complex Waves**

*Continued from page 1*

evident from the illustration of the square wave synthesized by using the fundamental and the five odd harmonics, including the eleventh. Of course the higher the number of odd harmonics is the square wave, the more closely it approaches the ideal. But even these few harmonics enable the synthesis of a wave which is definitely square in character.

Our laboratory has not explored the full gamut of possible applications of this device, and we solicit inquiries from individuals and organizations who may be interested in such equipment or in further development of this apparatus for varied uses. In this respect we desire to announce that the John F. Rider Laboratories are available for electronic development of all types. The organization is

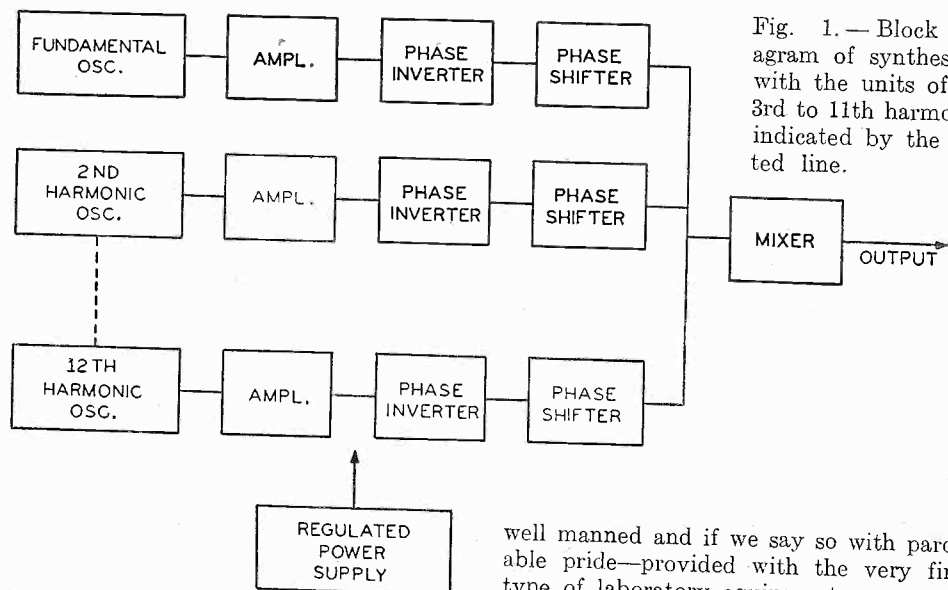


Fig. 1.—Block diagram of synthesizer, with the units of the 3rd to 11th harmonics indicated by the dotted line.

well manned and if we say so with pardonable pride—provided with the very finest type of laboratory equipment.

## Orchids to TV Manual

We wish to express our gratification to the writers of the following letters and their opinions of the Rider Television Manual and the accompanying "How It Works" book...

"...was particularly interested in the accompanying 'How It Works' book which covers the operation of television in a very complete manner. This little book should be particularly useful to radio servicemen who are entering the television field." *S. F. Patten, Allen B. Du Mont Laboratories, Inc.*

"....The book is all that might be expected of it. The giant pages are especially practical from the view of limited work area on some benches... The "How It Works" is excellent." *Fred W. Prognier, Service Dept. Transvision Inc.*

"For the past few weeks our engineering group, production staff and service division have had occasion to study the Manual and we find it extremely helpful in that it presents in one volume all the information that is available today in connection with circuit design and other features of instruments manufactured by all the leading manufacturers. Particularly interesting to us is the "How It Works" book.

"We are faced with the problem of training our present production personnel in the intricacies and characteristics of

## It's as True Today as it was Then---

Knowledge is of two kinds: we know a subject ourselves, or we know where we can find information upon it.

—Samuel Johnson

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television production and testing... While our personnel are experienced and have good backgrounds in the manufacture, production, and servicing of conventional radio receivers, television—particularly pulsing circuits—are new to most of them. Your

new book will provide basic material for a course of instruction to this group which is planned for the immediate future." *George M. Solomon, Manager Service Dept., Olympic Radio and Television, Inc.*

### Admiral Chassis 9A1

This chassis is shown on pages 16-6 to 16-8 of Rider's Volume XVI. It has been found that the dial windows of these chassis build up a small electrostatic charge, thus causing the plastic to attract fine dust particles. These are so fine that the dial windows appear milky or foggy.

Treating the windows with a solution called Hexco Dust-Ded reduces the amount of fine dust that collects on them. The dial window should be removed from the cabinet to apply the solution properly. Remove the knobs and the screws holding the escutcheon to the cabinet. Clean the window by wiping off the dust thoroughly on both sides with a damp (not wet) cloth or chamois skin. Apply the Hexco Dust-Ded according to the directions on the bottle.

Part No.  
98A11-2

Description  
Hexco Dust-Ded

### Goodrich R655W

In the June issue of SUCCESSFUL SERVICING, we stated that the Goodrich model R655W, which appears on pages 15-7 and 15-8 of Rider's Volume XV, uses the International Detrola Model 550 record-changer. This note should be corrected to read that this model uses the Admiral record-changer model RC161 or RC161A, which are to be found on Admiral RCD. CH. pages 17-1 to 17-7 of Volume XVII.

### Emerson BF-169, BF-204, And BF-207

These models are the same as Model BF-191 appearing on pages 9-1 and 9-2 of Rider's Volume IX.

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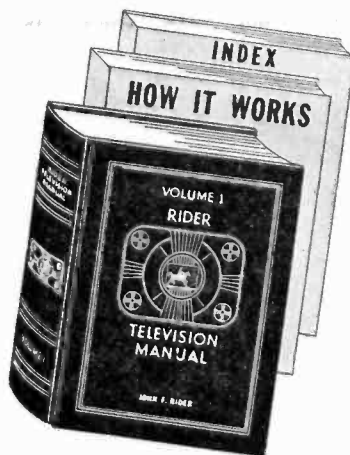
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Vol. 9

JULY, 1948

No. 6

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Electronic Maintenance Personnel

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## CURTAIN CALL

### Television, Wow!...

If you're on the Atlantic seaboard and lucky enough to be a TV viewer—*LIFE IS GRAND*. . . The best of talent—the best of speakers—the prettiest of gals—the funniest of comedians. . . TV receivers in the East are a boon to the power company—not because of the power they use—but because the families stay home to watch it. . . *It's Telific*. . . What a treat is in store for America when the span of the TV nets will cover the nation!

### Education...

Lest we forget—TV will be as important an educational medium as it is an entertainment facility. . . The TV serviceman will get into the schoolhouse—if only to repair the receiver—*if not as a student*. . . Is it silly to imagine the local television station broadcasting an educational program to the serviceman of the area? Possibly two hours a week—or more. . . **THAT WOULD BE A REAL PUBLIC SERVICE**

Are you willing to aid several vocational schools where radio is taught? They are shy parts—such as resistors and capacitors and chokes and transformers. . . If you are kindly disposed—send a couple of items to our personal attention. . . They don't have to be new—but they must be in good condition. . . We'll accumulate them and turn them over to the proper authorities in the name of the American radio serviceman. . . *Thanks for whatever you'll send.*

### Mr. Radio Magazine Editor...

If you want a good story about a modern day radio service facility which will make interesting reading, contact the guy who owns the airport radio shop pictured on our cover. . . **HE HAS A LOT TO SAY AND SAYS IT WELL.**

### Pollen...

People talk about the radio serviceman—what he does and doesn't do. . . Well, we had a contract for typewriter service and a visiting serviceman. . . Now we have no contract but we still have the bad machines. . . Then there is the outfit that is supposed to clean these offices

every morning. . . They arrive all right—but judging by the results—all they do is keep out of the rain or the sun—depending on the kind of day it is.

### Gadgets...

And now the radio paging system. . . You buy a set—pocket-size with pull-out antenna and tiny loudspeaker. . . You are assigned a code call letter. . . At stated intervals you listen to the broadcasts. . . If you hear your code number, you call the station on the land-line and get your message. . . This mobilfone business of dispatching cabs, trucks, repair wagons, and even diaper deliveries, is spreading like a flood. . . Due to shortage of frequencies some interference problems exist, but by proper cooperation and the display of friendship all traffic is cleared. . . Is it true what they say about the new Bell Lab crystal—**THAT IT MAY EVENTUALLY REPLACE THE VACUUM TUBE AS AN AMPLIFIER?** It takes us back to the first DeForest Audion we owned. . . When we accidentally burned it out—we shed tears for the rest of the day. . . 11 bucks was a fearful amount of money back in the very early 1900's. . .

### Half and Half...

Do you ever get to New York City? . . . Try to see Mr. Roberts. . . That's the name of a play about the Navy. . . It's the best thing we have ever seen. . . Try and see it. . . just try!—A pair of seats in the first three rows dead center can be had for about \$6.60 apiece **AND A CADILLAC CAR** (Fleetwood body only). . . Six o'clock on New York's West Side Highway going north. . . *One is just as well off starting out 90 minutes later.* . . There must be a conspiracy between Dame Nature and the tailors—otherwise it would not rain just as everybody is ready to leave the office at 5:30.

### Mr. Jobber...

The control of inventory is the display of good judgment—but ultraconservatism in this respect can prove costly. . . The too-frequent handling of purchase orders—the increase in the number of small item billings—means unnecessary increases in

the cost of doing business. . . Carried to extremes, it results in the loss of customers to those vendors who can deliver most rapidly. . . *Even conservatism must be tempered by conditions of good business.* . . **MR. JOBBER, WHAT DOES IT COST TO MAKE OUT A PURCHASE ORDER?**

### Television Interference...

Don't always blame the radio amateur. . . The "ham" is conscious of the television problem—but the diathermy and X-ray machine user *IS NOT*. . . The "ham" is a good buyer of TV receivers and most of those located in TV areas are off the air during the operating periods. . .

### Radio Servicing...

Fully 70 percent of the receivers which come into the service shop for repair were made before April 1942. . . Did you see the new **CORNELL-DUBILIER** capacitor replacement parts catalog? . . . *It was just released.* . . *The ONLY source of radio service schematic data mentioned is RIDER'S MANUALS.* . . We're proud of that! The same is true about the Mallory Encyclopedia 6th Edition released this past April. . . *Again we're proud!* . . Give yourself a break—get the most out of your scope. . . It's interesting to note that on the 1000-volt range a 20,000 ohms-per-volt voltmeter has a greater input resistance than the usual vacuum-tube voltmeter. . . Do you read the "How It Works" books which accompany the Rider Manuals? *They're an education in theory and practice.* . . And don't forget to make use of the manufacturers' changes that you'll find in this and every issue of **SUCCESSFUL SERVICING.** . .

John F. Rider

### What the Reviewers Say About— BROADCAST OPERATORS HANDBOOK

"This text is the first of its kind we have seen, describing some of the actual mechanics of broadcast engineering operations. His discussions of piano pickups in particular, was found to be interesting and helpful. The entire text bridges the usual gap in the literature covering the engineering design and development of broadcast equipment, and its practical operation and use.

"The text covers studio control room and master control operation, and transmitter operation. The most pertinent book on 'broadcasting for the broadcaster' that we have seen, and obviously worth \$3.30."—*The Broadcast Engineers Journal.*

"The author has assembled available data and techniques connected with radio broadcasting and arranged them in book form. In general, the book is good reading for the technician starting out in the field. . .

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98A11-2

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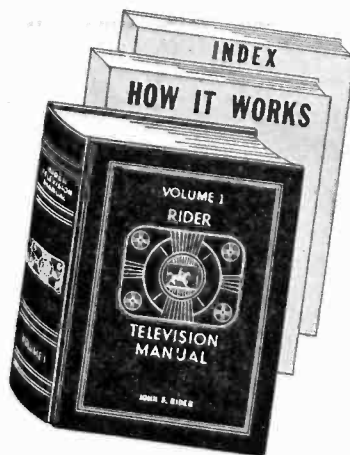
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REG. U. S. PAT. OFF.

Vol. 9

JULY, 1948

No. 6

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Are you willing to aid several vocational schools where radio is taught? They are shy parts—such as resistors and capacitors and chokes and transformers. . . If you are kindly disposed—send a couple of items to our personal attention. . . They don't have to be new—but *they must be in good condition*. . . We'll accumulate them and turn them over to the proper authorities in the name of the American radio serviceman. . . *Thanks for whatever you'll send*.

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every morning. . . They arrive all right—but judging by the results—*all they do is keep out of the rain or the sun*—depending on the kind of day it is.

### Gadgets...

And now *the radio paging system*. . . You buy a set—pocket-size with pull-out antenna and tiny loudspeaker. . . You are assigned a code call letter. . . At stated intervals you listen to the broadcasts. . . If you hear your code number, you call the station on the land-line and get your message. . . This mobilfone business of dispatching cabs, trucks, repair wagons, *and even diaper deliveries*, is spreading like a flood. . . Due to shortage of frequencies some interference problems exist, but by proper cooperation and the display of friendship all traffic is cleared. . . Is it true what they say about the new Bell Lab crystal—*THAT IT MAY EVEN-TUALLY REPLACE THE VACUUM TUBE AS AN AMPLIFIER*? It takes us back to the first DeForest Audion we owned. . . When we accidentally burned it out—*we shed tears for the rest of the day*. . . 11 bucks was a fearful amount of money back in the very early 1900's. . .

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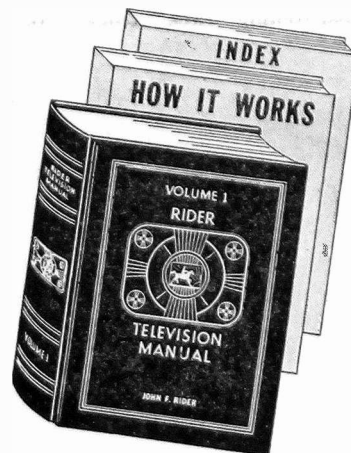
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### Another Rider First—The PA Manual

We asked you if you wanted a manual covering the public-address field. By an overwhelming plurality—5 to 1—you answered YES.

We asked you how far back you wanted us to go—two years, five years, ten years. By the same vote, you answered that you wanted us to cover the p-a equipment manufactured from 1938 to date.

And that's what you're going to get in the 2000-page Rider PA Manual that's on its way to the printer's now. . . . And you'll get it in September. . . .

Its contents? You will find every type of public-address system that is manufactured today in the United States—high-powered jobs—jobs with low output—and jobs in between. . . . There are amplifiers for outdoor announcing systems—musical instruments and phonographs—sound systems used in schools, hotels, hospitals, wherever speech and music are to be distributed—intercommunication systems—hearing aids that are used in churches and theatres—the sound systems used in home and theatre movies—mobile and portable p-a systems—the data from 145 manufacturers. We originally advertised 135, but

due to our desire to give maximum coverage, we are including data just received that increases the total.

Twenty years of publishing experience have gone into the make-up of the PA Manual—we know what you need to service an amplifier or an entire system and that is the information you will get. . . . Schematics—tube and chassis layouts—installation notes and instructions—operational notes and hints—voltage and resistance tables—instructions for the impedance matching of mikes, phonographs, or radio receivers to the input and the matching of one, two, or more speakers to the output—parts lists—everything you require for time-saving servicing. . . .

It was stated above that the products of 145 amplifier manufacturers were covered in the PA Manual. . . . Just to give you an idea of the coverage of a few manufacturers, there are 159 pages of David Bogen, Inc., covering 124 models—34 pages of the Amplifier Corp. of America with data on 24 models—58 pages of Electro-Acoustic Products Division of Magnavox covering 40 models—more than 100 pages of Rauland's products—about 200 of RCA—more than 100 of Operadio. . . .

And there will be a PA "How It Works" book that will accompany the PA Manual. . . . We cannot tell you at this writing how many pages it will contain, for our writers are still going over some of the schematics and data—gathering those unusual or interesting circuits for explanation—getting new ideas for installing or operating different equipment—in short, preparing to give you that tie-up between the theoretical and practical that is the whole idea behind every Rider "How It Works" book. . . . that comes to you as an extra dividend. . . .

The 2000 pages of the Rider PA Manual will be in the Rider Manual type of loose-leaf binder. . . . Every page will be indexed in the usual way.

That's the story as of this moment. . . . We'll give you more complete details later on. . . . In the meantime, you've told us you wanted a PA Manual—now tell your jobber—tell him to order yours so you'll have it when it comes off the press in September. . . . Do that today—now!

### What Reviewers Say

*Continued from page 5*

studio setups with microphone placement and accompanying explanation is of value to the newcomer.

"A section on preventive maintenance is especially valuable to the operator of any radio station. . . ."—*Electronics*.

#### THE RADIO AMATEUR'S BEAM POINTER GUIDE

"Twenty two tables showing the direction (in degrees clockwise from north) that an antenna should be oriented in order to beam a signal along a great-circle route. The tables are designed for use in 19 cities of the U.S. and three foreign cities, and directions are given for making the slight corrections that may be necessary for locations other than those listed."—*Electronics*.

### The Cover

The illustrations on page 1 are of the repair shop and the means of transportation of Lyman A. Abbott of Oskaloosa, Iowa. The Oskaloosa Airport provides an easily designated spot in advertising, ample space for parking, and an on-the-spot radio repair shop for aircraft sets. Mr. Abbot says,

"I have been in the radio business more than 15 years and have learned to appreciate time-saving shop methods. The use of your Manuals has proved to be not only a wonderful time-saving element, but a source of indispensable information. . . . We enjoy a state-wide business of tube replacement, repair, and rebuilding of electronic units used by the medical profession.

"The most effective advertising has been with the Cub airplane and the public address; the same plane is used for service calls throughout the state of Iowa. Instead of directly advertising my shop, the P.A. is used more to serve local organizations such as the JayCeas, Farm Bureau, in conducting safety drives, Cancer Fund, etc. This creates a community feeling toward my service that could not be gained by merely advertising my shop."

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COVERS 145 MANUFACTURERS' AMPLIFIERS  
PRODUCED FROM 1938 to DATE FOR

Public Address Systems

Outdoor Announcing

Musical Instruments and Phonographs

Theatre, Church Hearing Aids

Electronic Megaphones

Intercommunication Systems

Theatre and Home Motion Pictures

School, Hotel, Hospital Sound Systems

Mobile and Portable Sound Systems

SCHEMATICS — VOLTAGE and RESISTANCE TABLES —  
TUBE and CHASSIS LAYOUTS — INSTALLATION NOTES —  
OPERATIONAL INSTRUCTIONS — IMPEDANCE MATCHING

2000 Pages in this new RIDER FIRST

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and INDEX.....List Price.....\$18.00

Ready for You in September

Order at Your Jobbers TODAY

# Rolling REPORTER



## Video Stuff

A coupla weeks ago we attended a showing of a bunch of TV sets—the last word as of that minute, so we were told. Some of them had big screens and a couple projected the pix on a screen that *could be measured in feet*. . . That's our idea of the way TV should be. . . And is that a *loooooong jump* from the idea we had when we saw Dr. Alexanderson's television demonstration in his Schenectady lab about 20 years ago! We looked into a hooded hole in the end of a box and saw a 2-in. plate of a neon tube and on that was a pic of a gal smoking a cigarette and *the picture moved!!!!* And there across the lab was the gal with streaks of light across her face. Yahsuh—that was sumpin'—in them days. . . .

## History Repeats

When we batted out the 20-year-ago stuff just above, we were reminded about the new Pilot portable TV receiver. . . . The history part comes into it via the size of the tube in this new set—it's a 3 inch, which gives yuh a pic that's a bit smaller. . . And just this morning we gotta release from Raytheon-Belmont telling about their new TV universal receiver which *operates on a.c. of any frequency as well as direct current!!!!* Remember the hollabaloo when ac-dc broadcast sets were first trotted out? Did we hear someone ask if those TV sets would be in Rider's TV Manual Vol. 2? *Certainly*, they will and a lotta others as well. . . .

## Editorial Drippin'

The other day we wandered by mistake into the editorial dept and of all the busy guys and gals we've ever laid eye to that gang were the mostest busiest—and that's pul-lenty rushed. . . They're puttin' together the **new PA manual** and purty soon they'll start feedin' pages to the printer. . . . It's gonna be 2000 pages all sorta amplifiers—big uns, little uns and the in-betweeners. . . . Is it gonna have a "How It Works" book? Say, wad-dya want'er ask foolish questions like that on a 90° day like this, huh? Of course, there's gonna be a "H.I.W." book and as per usual, *we bet you'll like it lots*. . . .

## Like Father, Like Son

A letter came to us a couple days ago from *George Kuhn of Weehawken, N. J.*, who said, "I just purchased the complete set of your Trouble Shooters Manuals and am well satisfied. I've been using the manuals for some time as my father also has a radio repair business and also has a complete set of your manuals." Well, George, your Father sure set you on the right track when he started you off in fixin' sets. And if you'll take a look at pages in your Manuals from Vol. XV on, you'll see that we do refer you to the page now instead of the index. *Thanx for your swell letter.*

## TV and the Conventions

Do yuh remember that in last month's col, we made with a warning that this political year was gonna be a lulu as far as the air waves are concerned? Well, if you happened to be swelterin' in Philly during the nominatings, maybe you got a rough idea of how the old home town went TV-minded in a **BIG WAY!!!**

We never saw so many TV sets per city block as when we pedaled down Chestnut St. and Market St. Some of the dept. stores had a set workin' madly away in every one of their show windows. . . And wot some of the jobbers report on their *increase in sales!!!* One of 'em gave with the figger of a 250% increase over his previous week's biz and another made the place more humid by weepin' that he'd sold every TV set in his place. . . And wot's all that mean to you? Gwan—you guess. . . .

## More per Page

Didja notice *the new look* that's been given some of the pages in this issue? Well, the reason 'twas done was so we could get more words on a page and that means more honest-to-gosh information to you per issue. . . . We do our best to give you the dope so that you'll be up to the minute in what's going on throughout the whole industry—especially the servicing angle. . . . *Got any suggestions???????*

## In de Lab

We was lookin' for the Boss t'other day and tracked him down out in de lab. He was up to his elbows in all sorta apparatus the main thing bein' a scope an' over its screen were slowly wanderin' a pair o' spots that usually are dashin' thither and 'yon so 'fast' they look like solid lines. . . . *It's a new gizmo and mebbe we'll give you the low-down later on*. . . .

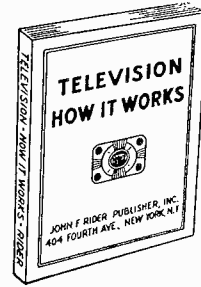
## And Now — The Transistor

Does your radio memory go back to the crystal detector days—when the only way you could get a signal was to search patiently for a sensitive spot? Well, if it does, you'll be interested as we are in the latest from the Bell Labs—the *Transistor*. It's a device about the size of a shoe-lace tip—works as a amplifier and an oscillator, but has no glass envelope, filament, or vacuum. The "works" of the gadget is a hunk of germanium about the size of a pinhead with a pair of thin wires spaced two thousandths of an inch apart. When power is fed to one of the wires, it's amplified 100 times over the surface of the germanium and carried to an output circuit by the other catswhisker. Now don't go askin' us questions—we don't know no more'n that about it, but we aims to give yuh the latest dope we get a-hold of. . . .

## Where Are You?

The other day the Boss gotta letter from Howard Christian erstwhile of Fort Monmouth and now of Fort Worth in which he suggests that the Boss call for a muster of the Radar Division of SCPA (1943-1945) in these cols and when we get answers run the names and addresses in S.S. so the old Fort Monmouth gang will know one another's whereabouts. . . . So if you were one of that outfit, please write to the Boss and tell him where you are now, what you're doing, etc., etc. . . . NOTE: This is NOT inserted herein at any military request—it's just to give youse guys a bit of aid and comfort. . . .

# Television "HOW IT WORKS"



**STOP  
"Wondering  
About"  
Television**

## SIMPLE—BASIC INFORMATION

Television is in the eye of the public and the radioman alike. Knowledge of its underlying theories is a must for anyone who hopes for a future in radio work.

Rider, famous for his practical, easy-to-understand style of presentation has just published this new book with its easy-to-apply explanations on the biggest development since the very introduction of radio.

## A GOLD MINE OF PRACTICAL FACTS

Here is practical theory. The first chapter deals with the transmission and reception of television signals in general, giving you a clear over-all picture. The second chapter deals with frequency standards, the next with antennas. Television "How It Works," then goes into descriptions of the various portions of a television receiver: the r-f, oscillator, converter circuits in the front end; the sound channel; the video i-f system and detector; the video amplifier and d-c restorer, the sync and sweep circuits, picture tubes, power supplies. The conclusion covers alignment and servicing problems. The entire book carries the practical right along with the theoretical, ending up with the *when* and *why* of certain operations in television receiver maintenance.

## A VALUABLE BOOK—YOU NEED NOW!

Though television may not now be in your area, it will be soon. You need the knowledge this book provides, now.

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## Hot Time in the Old Town

Remember last month we thought that our back-porch thermometer didn't go to high temps on accounta 'twas a Xmas present? *Boy, were we wrong!!!* Just a coupla days after we batted that out, did that thermo make a liar outa us—85°—90° and **last night 92°+** !! But while we dislike such heat here in town (*Editor's note: where do you like it? Remember Florida? (Ok, Boss, you win. . . I don't like it PERIOD).* we know it's swell for our Conn. garden. Yep, last Friday night when we measured (by flashlight) how much our tomatoes had grown in a week, we were astounded. But, dammit, the weeds had grown even more!!! (*That round in the Battle of the Weeds vs Us was NOT won by the undersigned.*) Just got us a brainthrob, to wit and viz: We're gonna catch us a flocka Japanese beetles and tell 'em flowers and our tomatoes ain't good for 'em to eat and that weeds are. Get the idea? *Ain't that a dilly?* Sooooo, instead a us wearily tryin' to pull out the weeds instead a flowers, we'll be off to some place we've been wantin' to paint. . . . Yessuh! so when yuh see a gardener parked in the cool shade of a big tree paintin' a pic of some easy-to-look-at scenery, that'll be

The Rolling Reporter

**Stromberg-Carlson 1235**

This model is similar to Model 1135, appearing on pages 16-8 to 16-10 and 16-16 to 16-19 of *Rider's Volume XVI*, except for the following changes. The audio system has been changed and is shown in the accompanying diagram. Connections have been omitted from pins 1, 2, 3, 4, and 7 of the wire record socket. Pin 6 is grounded and the 17,000-ohm resistor, R-79, has been removed. Pin 5 is still connected to the junction of R46 and R47. A 1000-ohm resistor, R-41, has been added to the top of the bleeder. There is no connection to the junction of R-41 and R-40.

The following additional parts are used on the Model 1235.

149246	R-64	150 ohm, 5 watt
28155	R-56	560 ohm, 1/2 watt
149247	R-41	1000 ohm, 5 watt
28158	R-76, 77	1000 ohm, 1/2 watt
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28191	R-72	1 megohm, 1/2 watt
28193	R-67	1.5 megohm, 1/2 watt
149121	R-75	2.2 megohm, 1/2 watt
149125	R-66	10 megohm, 1/2 watt
25485	C-81	0.01 µf
29891	C-86, 88	0.05 µf
110494	C-90	0.05 µf
111012	Electrolytic	50 uf
41489		6SL7 tube
30224		Plug
161230		Output transformer
33964		Bull's eye socket assembly

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**Sonora KBU-168**

This model is the same as Chassis KB, appearing on page 12-5 of *Rider's Volume XII*.

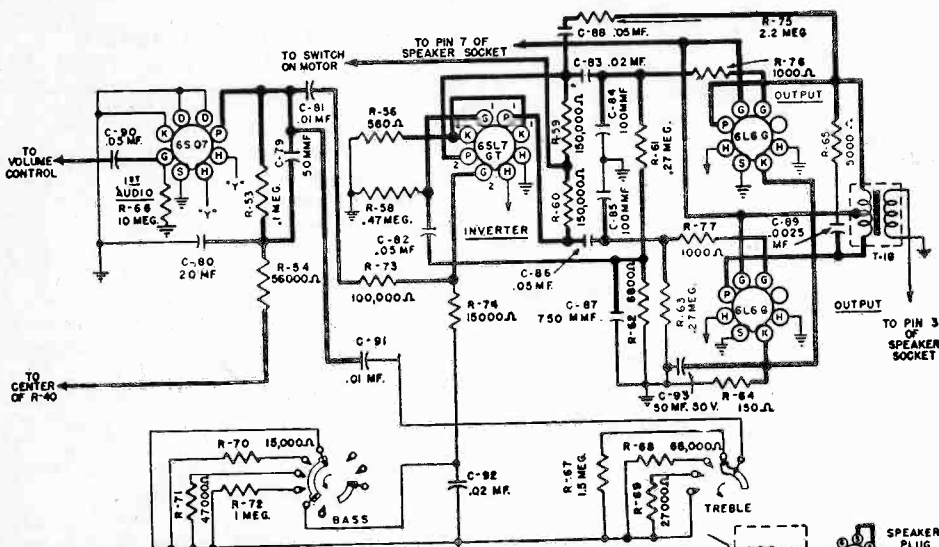
**Phillips Petroleum 3-62A**

This is the same as Model 3-61A, appearing on pages 17-9 to 17-12 of *Rider's Volume XVII*.

**Montgomery Ward 74BR-2003C**

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Ref. No.	Part No.	Description
	C-13E-15103	Loop antenna assembly
	R17	C-9B1-62 1000 ohms, 1/2 watt



Schematic diagram showing audio system of Stromberg-Carlson model 1235 in which it differs from 1135.

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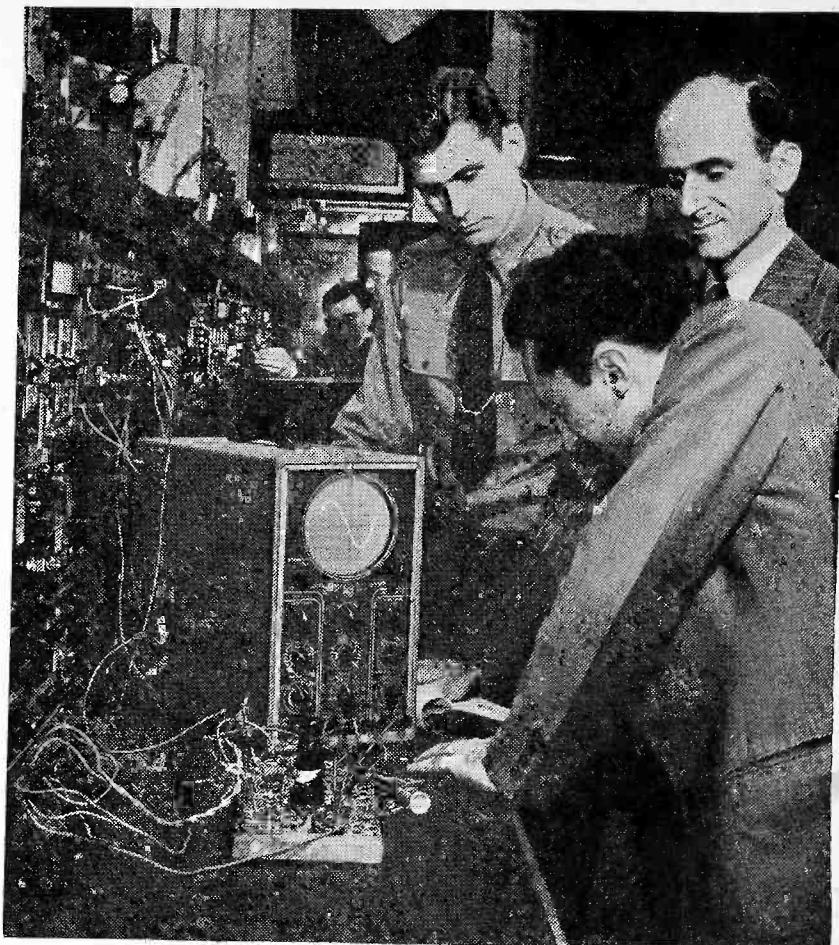


# Successful SERVICING

AUGUST, 1948

## TYPICAL RESTAURANT P-A INSTALLATIONS

By  
JOHN F. RIDER



Courtesy RCA Institutes

IT makes little difference to what part of this country you travel today, the chances are good that you will find most of the better restaurants, night clubs, country clubs, hotels, etc. equipped with public-address systems of one sort or another. Even though this use of sound amplification has become increasingly widespread, yet there is an enormous number of installations yet to be made. To that end we are presenting here three typical p-a installations with the thought that they may give those who are starting out in this field of electronics, an idea of how installations are made to fit different conditions.

Raffaele's Italian Restaurant at 100 West 57th Street in New York City is a medium-size restaurant seating 200 people with a pianist and phonograph with automatic record changer as entertainment. The layout of the area served by the installation shown in Fig. 1, indicates that it is about three times as long as it is wide. It has six tables along one wall behind semi-circular archways upon which are mounted three loudspeakers which face the opposite side of the room. Five columns are in a line down the length of the plaster-walled room, the rear part of which is served by a fourth speaker mounted in the wall behind grillwork matching the wall decoration. The speakers are mounted near the 10-foot ceiling, except the one in the rear which is mounted about a foot below the ceiling to match the height of a ventilator on the same wall.

The piano music is picked up by a Shure Unidyne (cardioid type) microphone

using a floor stand with an on-off switch and it is suspended over the keyboard from a gooseneck. Although two of the speakers face the microphone directly, there is no feedback problem because of the type of microphone used and the low level operation of the system. The micro-

**THE** contents of this article are from the author's book, "Installation and Servicing of Low-Power Public-Address Systems" which will be published in the near future. Credit is extended to those establishments mentioned which have cooperated by providing the details of their p-a installations.

phone has a multi-impedance output and the 250-ohm tap is used. A shielded line is fed from the microphone to the Shure A86A line-to-amplifier transformer (250-ohm primary, high-impedance secondary) located about 4 feet from the amplifier to

prevent hum pickup in this transformer from the amplifier power transformer. The microphone line is run at low impedance to prevent pickup from the many neon lights. The additional cost of the step-up transformer is offset by the superior reproduction without hash due to the pickup of neon-light noise. One microphone outlet is at the base of a structural column; another is situated at the base of the first column at the end of the room near the bar so that music from a piano can be picked up from there. The second microphone input on the amplifier is used for this latter outlet.

The 14-watt Bogen model E-14 amplifier is mounted on a shelf on the office wall so that it can be reached only by someone standing on a chair; this was done to discourage tampering with the controls which are set for optimum performance. An amplifier on-off switch hangs from an extension cord. A Webster automatic record

Please turn to page 3

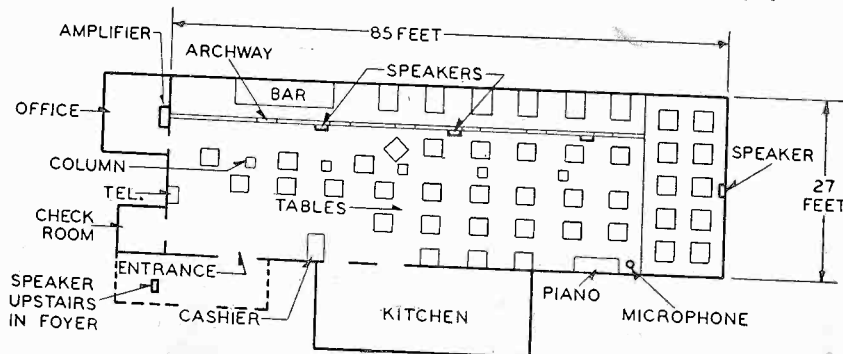


Fig. 1. Installation of p-a equipment in Raffaele's Italian Restaurant

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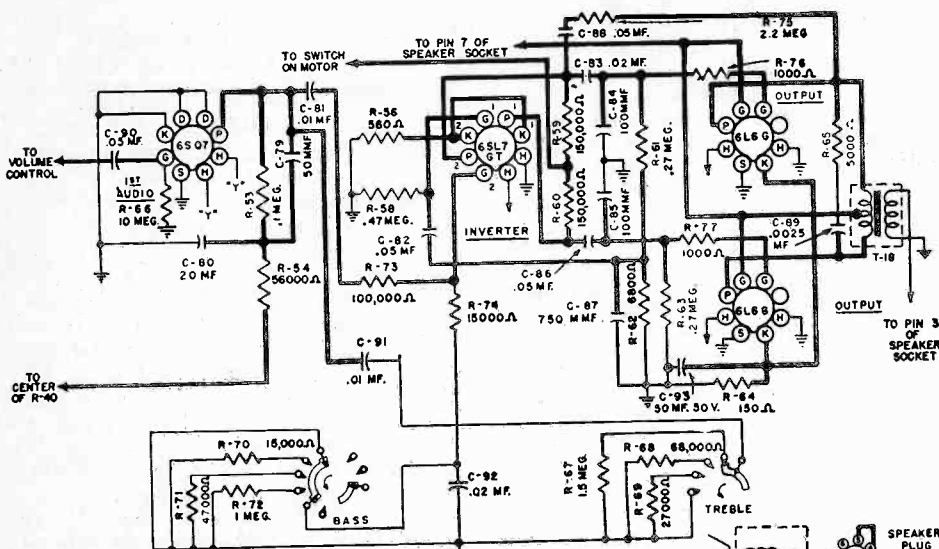
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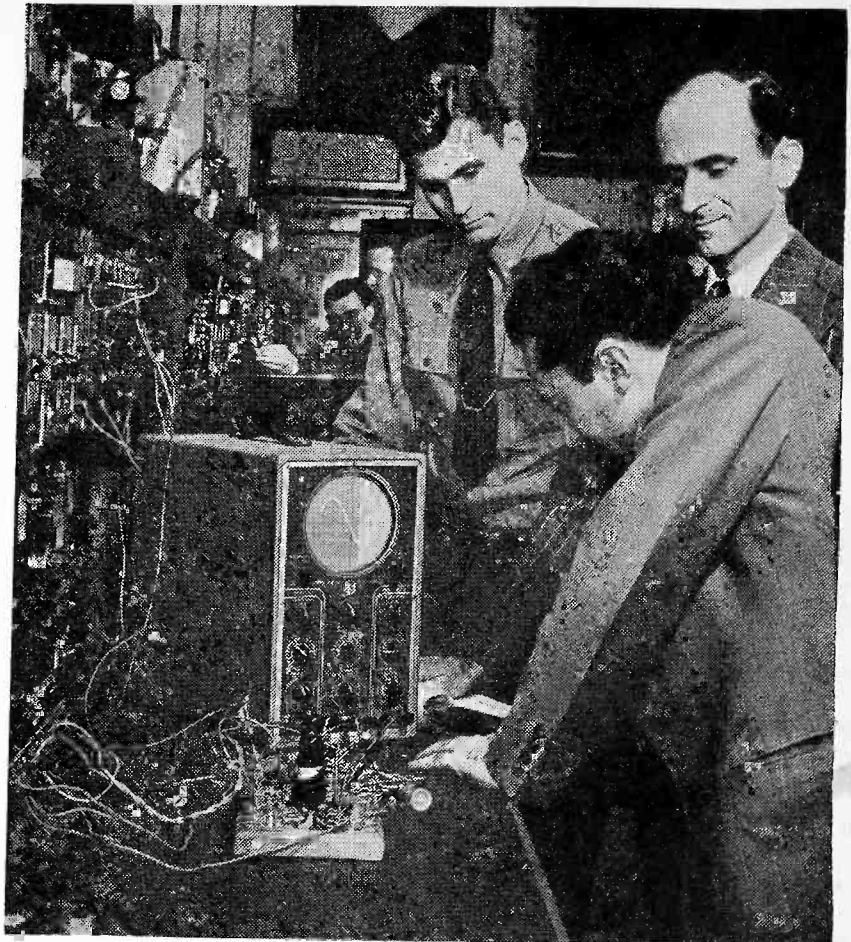
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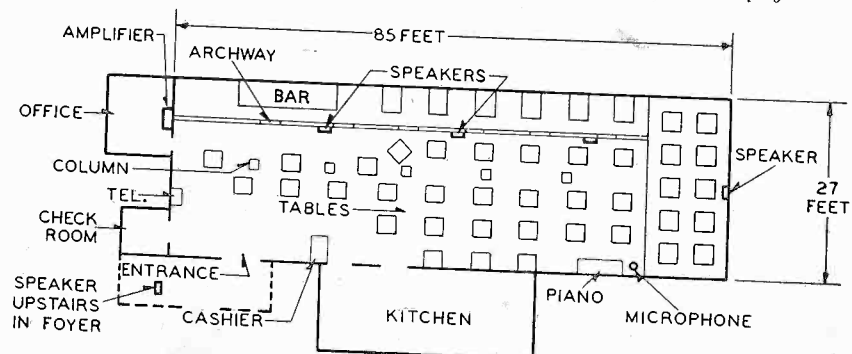


Fig. 1. Installation of p-a equipment in Raffaele's Italian Restaurant



**Emerson 567, Chassis 120016**

This model is the same as Model 560, Chassis 120016, appearing on pages 17-30 to 17-32 of *Rider's Volume XVII*.

**Sears Roebuck 3351, 3451, 3551, Chassis 132.802-2C, -2D, -2E**

These models are the same as Model 3351, Chassis 132.802 on page 12-34 of *Rider's Volume XII*, except for the following changes. A pilot-light shield and snubber assembly has been added, replacing the dial-light shield which was assembled to the dial-pointer shaft bracket. The push-button caps are permanently cemented to the push buttons at the time the set is built.

**Zenith 12H090, 12H091, 12H092, 12H093, 12H094, Chassis 11C21Z**

These models are similar to Model 12H090, Chassis 11C21, on pages 15-87 to 15-94 of *Rider's Volume XV*. The difference between these chassis appears in the power supply and the audio section. Chassis 11C21 uses an electro-dynamic speaker and the field of the speaker is used as a choke in the power-supply filter circuit. Chassis 11C21Z uses a permanent magnet speaker. To convert Chassis 11C21 to 11C21Z, it is necessary to replace the speaker field with a 200-ohm, 5-watt resistor (R8 in the accompanying diagram). A 40- $\mu$ f capacitor must be connected from the center tap of the power transformer to pin number 6 of the power-supply cable plug, as shown in the diagram. C40 and C41 must be changed from 30 $\mu$ f to 40 $\mu$ f (they appear as C5 and C6 in the 11C21Z chassis). A 1000-ohm, 3-watt resistor (R9) must be connected between the screen grid of the first beam-power output tube and the center tap of the output transformer. The capacitor shown as C3 in the accompanying diagram is capacitor C39 in the schematic on page 15-87, 88 of *Rider's Volume XV*.

**RCA 66X11, 66X12, 66X13, Chassis RC-1046C, RC-1046D, RC-1046E, Second Production**

These models are similar to Model 66X11, chassis RC-1046A, on pages 17-29 and 17-30 of *Rider's Volume XVII*. They incorporate the changes listed in the June 1948 issue of *SUCCESSFUL SERVICING*, in addition to the following changes. The parts list should be amended as follows:

**CHASSIS ASSEMBLIES**

- Change: 72896 Plate—to read  
72896 Plate—dial back plate complete with drive cord pulleys for Model 66X11.
- Add: 72601 Plate—dial back plate complete with drive cord pulleys for Model 66X12.

**MISCELLANEOUS**

- Change: 73169 Back—to read  
73169 Back—cabinet back for Model 66X13—walnut
- Add: 73278 Back—cabinet back for Model 66X13 mahogany  
71893 Decal—trade mark decal

The stock number of the dial cord should be 72953 instead of 72913. This cord is supplied in 250 foot reels. Approximately 56 inches are required for the first

tuning capacitor without C16 is used. Two dial lamps type number 1490 are used. Chassis RC-1046E is the same as RC-1046C, except that only one dial lamp, Type 47, is used. For oscillator circuit see accompanying diagram.

- 73172 Capacitor—ceramic, 56 $\mu$ f (C19)
- 73163 Coil—Oscillator coil complete with adjustable core and stud (L3, L4)
- 73164 Capacitor—Variable tuning capacitor (C12, C13, C14, C15)

**RIDER MANUALS Mean SUCCESSFUL SERVICING**

**Radio Wire Television M72 and M73**

These models are the same as Model M70A which appears on pages 17-6 to 17-11 of *Rider's Volume XVII*, with the following exceptions. The 22K resistor (R51) in the grid circuit of the first audio stage has been removed. The 0.02- $\mu$ f capacitor (C19) which was connected from the top of R51 to one side of the tone control (R14) now is connected from the bottom of R13 to ground.

*Television Change*

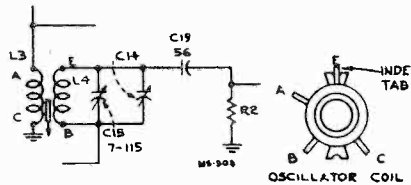
**Philco Television 48-2500, Code 122**

This model appears on TV pages 1-23 to 1-44 of *Rider's TV Volume I*.

During early runs of Code 122, the projection tube was modified so that the high-voltage-anode snap terminal was placed closer to the front of the tube to prevent arc-over to the deflection yoke and picture-tube mounting assembly. When this was done, the anode snap terminal was too close to the keystone-magnet clamp band. The clamp band was modified temporarily by using a plastic strip at the top of the band, with the band cut out for the anode terminal clearance. In later runs of Code 122, a new all-plastic band was added. This band is to be used with old, modified, or new tubes. When replacing tubes, use the new tube (TP400A) and the new magnet clamp band, Part No. 76-3298. When making keystone adjustments on tubes employing the new band, be sure to ground each magnet before touching, in addition to attaching the ground to the band clamp screw.

During run two of Code 122, the 1000- $\mu$ f high-voltage filter capacitors, C100, C101, and C102, Part No. 30-1229-1 were replaced by 500- $\mu$ f capacitors with the same voltage rating, Part No. 30-1229. Only the 500- $\mu$ f capacitors are available as replacement parts.

The deflection-yoke assembly has been changed slightly. The new deflection-yoke assembly is Part No. 32-9613 and it has the two 100,000-ohm resistors mounted on the outside of the yoke instead of the inside. Because of this change, it is necessary to drill a hole in the optical housing, adjacent to the deflection-yoke cable, if a new yoke assembly is used with an early type optical-housing assembly. The hole must be large enough to pass the deflection-yoke cable connector. The new aluminum-backed projection tube TP400A, Part No. 34-2614, is interchangeable with the old tube.

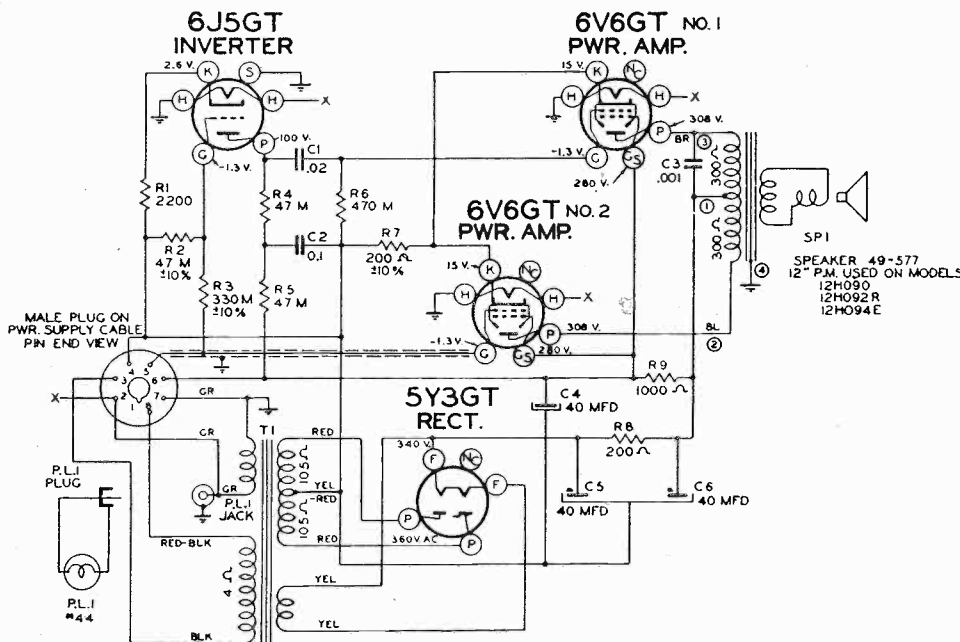


**Oscillator Circuit RC-1046C, RC-1046E**

Schematic otherwise identical to RC-1046, -A, -B except ant. tuning cond. C12 is 10-398 mmfd., only one dial lamp used on RC-1046E.

production and approximately 49 inches for the second production.

The differences between these various chassis are as follows. Chassis RC-1046C uses oscillator coil without capacity winding, L5. Capacitor C19 is used and a



The audio section and power supply of the Zenith chassis 11C21Z

**P-A Installations**

*Continued from page 1*

changer with intermixing and automatic stop-at-last-record feature is mounted below the amplifier. The record player has its own volume control which is set for maximum volume. The amplifier tone control is set for best reproduction of the piano and an Astatic scratch filter is at the output of the phonograph pickup to permit scratch elimination without changing the tone control setting; this filter has bass, medium, high, and on-off positions.

The four loudspeakers are heavy-duty, 12-inch Utah PM type mounted in wooden wall cabinets, the three along the side being of the inclined type. The four 8-ohm voice coils are each matched to the 250-ohm line (250-ohm amplifier transformer tap) by means of individual Jensen impedance-matching transformers connected in parallel and having 1000-ohm primaries.

Another loudspeaker is mounted in the upstairs foyer at the street entrance. A Jensen 8-inch PM speaker is used connected to a Utah 8-ohm L-pad mounted on the office wall near the amplifier, this pad being connected to the 8-ohm tap. In winter when the street door in the foyer is closed, the attenuator dissipates most of the power in the load, but in summer when this door is open considerably more power is needed to override street noises. Since the amplifier output is more than adequate for the installation, this mismatch (the simultaneous use of two amplifier transformer taps fully loaded) does not affect reproduction in any way.

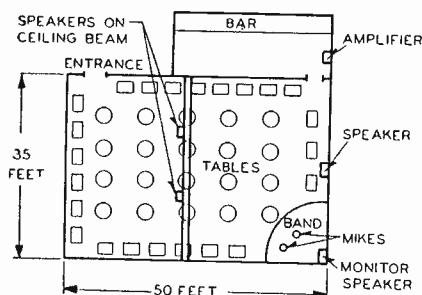


Fig. 2. A 25-watt amplifier is used in the p-a installation at Le Ruban Bleu.

Le Ruban Bleu, 4 East 56th Street, New York City has an area to be covered by its p-a system that is 50x35 feet as indicated in Fig. 2, with tables for 150 persons. Drapery and mirrors cover the walls and the ceiling is 10 feet high. One Shure cardioid microphone is used for the band pickup and another of the same type is often used for soloist or piano. Separate lines are run for each one at 30 ohms impedance and step-up matching transformers are used to match the high-impedance tube inputs. A 25-watt Stromberg-Carlson amplifier mounted on a shelf in the bar, is used with the microphone gain controls usually at the low-level position.

The loudspeaker line is run at 500 ohms feeding four 12-inch PM inclined wooden-cabinet loudspeakers, each having a matching transformer, which are in parallel. The loudspeaker mounted behind the band is a monitor for the performers to hear them-

selves, the matching transformer being of such high impedance with respect to the impedances of the other loudspeaker transformer primaries, that the output is at a very low level and no acoustic feedback results, even though the speaker directly faces the microphones.

As may be seen in Fig. 2 one speaker is at the middle of the front of the room near the ceiling; the other two are mounted on a constructional beam which runs across the middle of the ceiling. This arrangement of the speakers is such that the sound will not be uncomfortably loud at the front of the room and can be clearly heard in the rear.

The walls of the Hawaiian Room at the Hotel Lexington, 48th Street and Lexington Avenue in New York City are decorated with mats and other material that provide a high degree of absorption; the ceiling is also acoustically treated. Even though a certain amount of glass is used in the room, there is no problem of acoustic feedback although the microphones are somewhat ahead of the loudspeakers, as shown in Fig. 3. The room holds 350 persons and has two wing terraces where the ceiling is 10 feet high; the ceiling of the dance floor is 18 feet high.

Three Amperite velocity microphones are connected by means of twist-lock plugs to the front of the bandstand, these being used for band pickup and are series connected. One of the pickup sides of each microphone faces the band so that the insensitive sides are toward the loudspeakers. A Shure Unidyne (cardioid) microphone is used for the band leader or soloist.

There are two microphone channels: one for the three series-connected bi-directional microphones and one for the single uni-directional microphone. Each channel has an on-off switch and a 200-ohm variable T pad. Each of the three series microphones has a 50-ohm secondary winding on the microphone transformer, while the cardioid microphone has a 200-ohm output impedance. The 200-ohm microphone lines run from the Hawaiian Room, that is one floor below the street level, to the radio and sound control room on the 27th floor of the hotel.

The console type amplifier (and a spare in case of failure) was custom-made and

these are located in the control room. The channel controls in the amplifier are set at the optimum point (close to a maximum setting) and the pads at the microphone are varied for volume control. The amplifier has four 2A3 triode output tubes in push-pull parallel, operated class AB2, and delivers 40 watts.

The loudspeaker line is run at 500 ohms impedance feeding two 8-ohm Stromberg-Carlson 18-inch PM loudspeakers through two matching transformers in parallel, each having a 1000-ohm primary impedance. The cone-type speakers, on either side of the band, are mounted in exponential baffles beneath the ceiling so that the baffles fit with the ceiling design. The baffle grillwork facing the room is 10 inches high by 42 inches wide so that very wide coverage is obtained.

**RIDER MANUALS** Mean SUCCESSFUL SERVICING

**New Name**

When you get your Rider's Manual Volume XVIII next Fall, a new name will be found at the top of those pages which contain the simplified break-downs of three-band, four-band, etc. schematics. Heretofore, we have called these "clarified schematics", but hereafter the name at the top of these pages will be

**CLARI-SKEMATIX**

Registered Trademark

This is a registered trademark of John F. Rider Publisher, Inc. and when you see it on a schematic page you will know that it is another part of that service that Rider is giving the industry in an endeavor to make radio servicing successful.

**Automatic Tom Thumb**

Please change the listing in your Rider's Volume XVII Index for Automatic page 17-8 from Models 660, 662, 666 to Model Tom Thumb.

**Teletone 161, 167, 168, 171, 174, Chassis T**

These models are all the same as Model 150, Chassis T, appearing on pages 17-2 and 17-3 of Rider's Volume XVII.

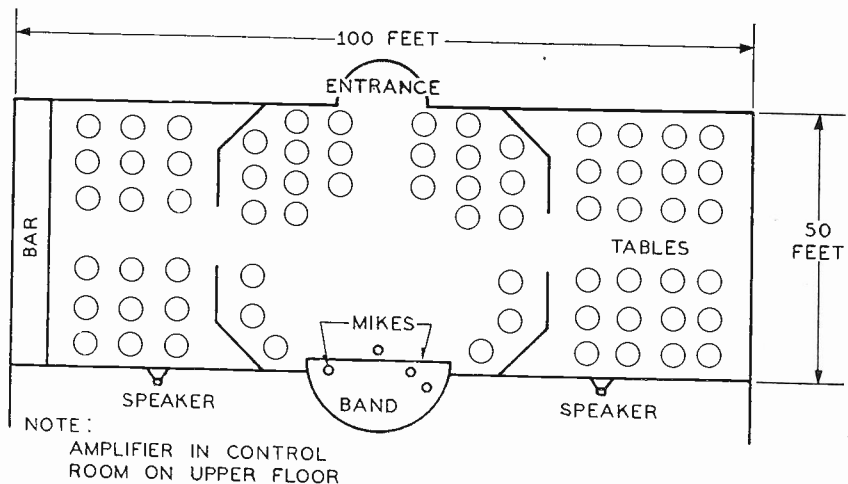


Fig. 3. The Hawaiian Room of the Hotel Lexington is one floor below the street level and the 40-watt amplifier is in the control room on the 27th floor.

# RIDER'S PA MANUAL

By the time you read these lines Rider's PA Manual (or to give it its official title, *Rider's Public Address Equipment Manual*) will be nearly ready for the bindery. And that means that in about a month, copies will be on their way to jobbers throughout the country.

This has been one of the toughest Manuals that we have ever prepared for the printer. You indicated that you wanted to have included the service data on amplifiers that had been on the market since 1938, which we have done. That meant asking the manufacturers to dig far down deep in their files and some of the technical material that came to light was in pretty poor condition, as far as reproducing it went. So, schematics, wiring diagrams, chassis layouts had to be redrawn and voltage and resistance tables, circuit descriptions, and notes on installation, impedance matching at the input and output circuits, parts lists etc. had to be re-typed. All this beside the usual amount of editing and dummyming of the pages, but even with all this extra cost of preparation we have maintained the price of the PA Manual as it was originally announced—at least for the present. . . .

Several months ago when we made our count of the number of manufacturers who supplied us with servicing material, we found there would be more than 135 names. Following our usual procedure of sending out a last-minute call to those manufacturers from whom we had received no replies, resulted in our obtaining service information from them that brought the total number of names up to 147! And that's the final count—147 manufacturers' products in Volume 1 of *Rider's PA Manual*. . . .

Just so that you will get an idea of the coverage — and that's what you need in a Manual like this — you will find below a list of the manufacturers whose products of the past 10 years are covered in this newest Rider "first".

Admiral	Cavalcade
Air King	Challenger
Alamo	Clark
Allied	Collins
Altec Lansing	Continental
American Comm.	Commun-A-Phone
American Sound	Concord
Amplifier Corp.	Crosley
Ansley	Dalmo Victor
Apex	Decca
Assoc. Electric	DeVry
Atomite	Dual Engineering
Audax	Dynavox
Audio Comm.	Eastern Amplifier
Audio Development	Eckstein
Automatic Musical	Electro Acoustic
Automatic Projection	Electromatic
Aviola	Electronic Design
Beam Radionics	Electronic Devices
Bell	Electronic Labs.
Belmont	Electronic Trading
Bogen	Ellinwood
Brook	Emerson
Brown Ebinger	Epiphone
Caltron	Espey

Fada	Optron
Federal Mfg. & Electronics	Packard Bell
Federated Purchaser	Philco
Gamble Skogmo	Philmar
Garod	Pickering
General Electric	Pilgrim
General Television	PortoMatic
General Transformer	Precision
Gentleman Products	Presto
Gibbs	RCA
Goodrich	Radio Craftsmen
Grant	Radio Parts
Greene	Radio Wire
Hamilton Electronics	Radolek
Hammond	Rauland
Inter-Communication	Regal
Jackson	Remler
Jefferson	Rock-Ola
Jewel	Scott
Langevin	Sears Roebuck
Laurehk	Seeburg
Lewyt	Setchell-Carlson
Lyman	Sheridan
Lyon & Healy	Mark Simpson
Magna	Sonora
Meck	Sonotone
Mectron	Sound, Inc.
Mellaphone	Speak-A-Phone
Meissner	Spiegel
Mercury	Steelman
Mills	Story & Clark
Minnesota	Stromberg Carlson
Montgomery Ward	Sundt Engineering
Morlen	Symphonic
Motiograph	Talk-A-Phone
Motorola	Tele-Tone
Movie Mite	Telequip
Musitron	Teletran
National Dobro	Templetone
National Filben	Thordarson
Neill	Trav-Ler
Nelge	United Scientific
Newark Electric	Valco
Operadio	Walker Jimieson
	Walsh Engineering

Watterson  
Webster Chicago  
Webster Electric  
Western Auto

Wilcox Gay  
Worner Electronic  
Wurlitzer  
Zenith

Well, that's the story on Volume 1 of Rider's PA Manual . . . Service data on the products of 147 manufacturers—schematics, chassis layouts, wiring diagrams, voltage and resistance charts, circuit descriptions, installation instructions, impedance-matching notes and tables for the input and output circuits, service and trouble-shooting notes, parts lists — in short, everything you need for the servicing of amplifiers.

You told us you wanted the data on manufacturers' products from 1938 to date; we have given them to you. We told you you were going to get more than 135 manufacturers; you will get 147. We stated that Rider's PA Manual would have 2000 pages; actually you will find 2024 pages in the big loose-leaf Rider binder. And, of course, there will be the usual "How It Works" book with the valuable tie-up between theory and practice and the complete Index to those 2024 pages. . . .

You have told us you wanted this PA Manual . . . Now tell your jobber the same thing . . . Do that today — NOW — so you can be sure of getting yours as soon as it is off the press . . . *Order it now!*

## RIDER MANUALS *Mean* SUCCESSFUL SERVICING

### Allied 6C-122

This model is the same as Model 6B-122 appearing on pages 16-3 and 16-4 of *Rider's Volume XVI*.

### Radio & Television (Brunswick) 4000, 4000½, 6000, 6000½, 6876

These models are the same as Model SF-6810 on pages 16-1 to 16-5 of *Rider's Volume XVI*.

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*Books, to particular arts and professions, are absolutely necessary; to men of real science, they are tools.*

—Samuel Johnson

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Inside the Vacuum Tube 424 pages . . . . .	\$4.50	Automatic Frequency Control Systems 144 pages . . . . .	\$1.75
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# Successful SERVICING

REG. U. S. PAT. OFF.

Vol. 9

AUGUST, 1948

No. 7

Dedicated to the financial and technical advancement of the  
Electronic Maintenance Personnel

Published by  
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G. C. B. Rowe, Associate Editor

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## CURTAIN TIME

### Television . . .

WJZ-TV of the American Broadcasting Company is inaugurating TV service to-night — the 10th of Aug. . . . A 5-hour program is in store for the viewers . . . This is the sixth of the seven stations allocated to this area . . . There is gnashing of teeth already because the number of channels allocated to an area is not sufficient to permit all who have \$500,000.00 to spend to become TV broadcasters . . . There is the rub in the present allocation system.

Is it conceivable that TV service will be made available to those who are far removed from major centers but who are within the range of relay stations? A high-frequency converter ahead of the conventional TV receiver? . . . Is it possible? . . . We just completed a vacation at a resort 75 miles from New York. The owner assembled a TV kit and on Tuesday nights hundreds of people gather on his lawn to watch the Texaco Star Theatre program . . . He moves the set onto the porch . . . The viewing habit sure is strong!

### Polite Police . . .

Our respects to the PD of Chicago . . . Recently we were being driven to a golf course by Ascher Cole of ATI in that town . . . It was a pleasure to be witness to the reprimand . . . It was polite yet firm . . . To the point and all inclusive . . . At no time was he abusive but he sure got his point across . . . I don't know about Ascher, but if ever I drive in Chicago, I'll be sure to observe the traffic laws . . . Again congrats to all the Chicago Police from the top man down.

### Just Wondering . . .

Why is it that phase is so difficult for the average student to understand? . . . Is it because imagination must be used to visualize it — or is it because the lab presentation is not as lucid as it might be? More and more we see signs of the printed circuit making its commercial debut to the public . . . What has happened to Citizens Radio? . . . Channels are assigned

and several manufacturers were supposed to have equipment ready for approval by the FCC . . . Wot hopped?

When will the test equipment industry get a shot in the arm? . . . TV servicing tactics call for minor repairs in the home . . . Will this trend influence the repair of small receivers — repair in the home instead of the shop? Will this trend tend to produce miniature test equipment? . . . The pocket scope was a huge success . . . Unlike any other maintenance industry, the radio serviceman who has a shop and test equipment is in a position to do much experimental work for self-education . . . Are we nuts for making such a suggestion? . . . Can radio shops adjacent to summer resorts — beaches and other places where visitors gather for a day or week or more, increase income by renting battery-operated portables? . . . Some are doing just that!! There is room for more such activity . . . ATTENTION RADIO SERVICE ASSOCIATION SECRETARIES . . . We are preparing a list of radio service associations to receive gratis file copies of our new text books for use in their libraries . . . Send your name and address on association stationery . . . Obviously we cannot send Rider Manuals gratis . . . They cost too much . . . Ready for mailing is our "Television — How It Works!"

### Radio Servicing . . .

The condition which strikes us most strongly about TV servicing — is that all the troubles which exist in the receiver are not taken care of during the service call . . . This makes the customer wild! . . . Reading instructions is something the average human being is very reluctant to do . . . This applies to the technical circuit descriptions which are found in Rider Manuals and in the accompanying "How It Works" Books . . . These data are extremely important! . . . They furnish technical knowledge in general — special information about the specific receiver. Time and again they contain clues to possible defects and if known before the repair is made — will save a great deal of time and effort . . . But it has ever been thus and always will be . . . The serviceman on the West

Coast averages \$1.00 more per service charge than those on the Atlantic seaboard . . . Why? . . . The receivers are the same—the test equipment is the same . . . Is it possible that a better selling job is done?? Incidentally, percentagewise radio service shops on the West Coast are more completely equipped with test equipment than radio service shops elsewhere in the nation . . . Of course, this is on the average . . . Specific shops all over the nation may be more completely equipped than most Pacific Coast shops.

### Town Meeting of Radio Technicians

The Radio Industry is sponsoring a 3-day Town Meeting in New York City, at the Hotel Astor to be specific, on Sept. 27, 28 and 29 for the radio servicing industry . . . Leading technical personalities will deliver papers during the 3-day session . . . These will cover all pertinent phases of radio servicing, specializing in TV — but taking care of such things as business practices, advertising, public relations and other seldom discussed matters . . . The Associated Radio Serviceman of New York City are working in close cooperation with the Coordinating Committee of the Electrical Parts and Equipment Mfgs., the RMA, The Sales Managers Club and the West Coast Electronic Mfgs. Assoc.

Please turn to page 8

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# Rolling REPORTER



Dear R. R. —

Your the mostest lucky guy that ever pushed a typewriter key. You go out of N.Y. on a so called bizness trip and what happens? The top blows off Grandmas thermometer and she baked me some cookys *without lighting the gas in the oven*. She was kicking at the heat but I told her i was going to rent one end of the subway platform out where I get my face pushed in every day and start a turkish bath. My grandma thinks Im a smart businessman. . . . Yeah, youre lucky alrite like wen you left town last Dec. just befour we had the big blizard of 47. Remember that? And could I use some of that snow rite now? *Yes!*

There was a guy in here the other day from Phila looking for you—he said he wanted to pay you some money he owed you. thats almost as big a news story as the man biting the dog — *someone who owes you money!!!!* Wat a sucker he must be. . . . Anyhow he told me a good story about TV during the conventions in your old home town. it seems that some- wear on Market St theres two big dept stores cattycornered across the st. from each other. Know where I mean? I forget the names. Well each store has a TV set in every one of there windows showing the doings at the convention. Your friend was looking in one stores window and along comes a commercial with a good-looking doll making with the cheesecake and telling about the bargins in ladys dresses *at the other store across the street!* Sounds like the Miracle on 34 St. dont it?

Now that youve been out of our way we got *ALL* the pages of the PA manual down to Jack and yesterday i took a mess of the index copy up to be set, so we are getting along swell without you. Maybe wen you go on your vacation we can get out vol. 18 wich I herd the boss say wood be out this fall. You better tell any guys you call on to *get their orders in but fast for that PA manual* or they may get left just like sum of em did on the TV manual cause they didnt order soon enough.

Say did you know that *THREE* more service depts of TV set mfrs are using the TV How It Works book as a text for training there repairmen? If you see any other service managers you might tell them that Rider's TV "H.I.W." is the one place where they can find all the dope on TV sets in one batch of pages and between one cover and they can find it *NOW!* Oh i forgot to tell you that the mfrs are *Emerson, Admiral and Zenith*. . . .

And wile Im talking about the TV "H.I.W." book, if any guys start yipping to you that they cant pry a copy loose from their jobber, tell em the first press run went byebye out of here so fast our stock was nothing before we could tell the printer to get going again. When you get this letter the next run will be off and books on their way out to your boy friends. . . .

The huskies of the shipping dept have been shipped downtown to the new place at 480 Canal st. No, the Boss aint told me if and when me and you is going to move. Gee itll be tough on you if we move wont it for you to find another artist that builds gin rickities the way you like em. But youll find someone—*Id bet your last buck on that!*

Do you remember M. L. Hart who is a servicer out in Alhambra, Cal? Well, he wrote you that he *likes the GIANT pages in the TV manual*. He says as to how hes still 100% on our manuals and seems to be panting for the one on PA. . . .

Hey do you want I should make reservations for you at the radio show in L.A. next month? How are you going out there —on your chariot? Dont forget what happened to you the last time you went on a trip like that and how embarrassed you was when you went to that lady doctor with *where* you had them callouses. . . .

You should have ought to seen the BIG dalias that Emily brought in. She said one was formal and others was informal. I never knew you had to be introduced to flowers or that some just didnt care. . . . And speaking of flowers and a garden, your wife called me up and asked *WHEN* you was going back up to Conn. to take care of your patch of weeds? She said you sure pulled the wrong line on them Jap beetles—you should have told them *weeds* wasnt good for them instead of flowers for

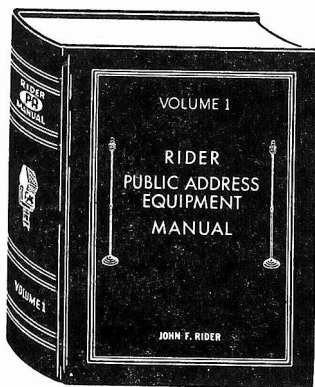
theyve been eating your marigolds for the main course with zinnias for dessert ever since you made with the big brainthrob. Your wife said youd better get headed that way soon for there were funny looking green worms headed for your tomato patch and *she wasnt going to touch the nasty things*. Boy oh boy—you can have the life of a farmer!!! Me Im just a sucker for things like water you get when you turn a faucet, light when you turn a switch, ice from a refrigerator, and warm water in a shower. Well, have fun when you get back home and see that you get out all them weeds. . . .

Yours for life in a big city,  
Aloysius Winenwiski  
Head Officeboy

## WANTED—TV Installation Service

A well-known manufacturer of television receivers wishes to contact reliable service companies to assume complete television installation and service of their products. When you write give full particulars as to the territory you cover, your facilities, equipment, and number of road men, trucks, etc., together with financial standing. Address your letter to TV Installation, Care of John F. Rider Publisher, Inc. 404 Fourth Ave., New York 16, N. Y. and we will forward it to the manufacturer.

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## MR. RADIO JOBBER

Bear in mind that we are not printing an unlimited quantity of the Rider PA Manual. If you delay in sending in your order, you may experience the same condition that existed when the Rider Television Manual Volume I was published. Approximately six weeks existed between the delivery of the first printing and the delivery of the second printing.

Get your order in today—thereby making certain that you will be able to make delivery to your customers from the first run. If you are lax in sending in your order, you will find some other jobber in town who is more wide-awake, is making deliveries.

### Montgomery Ward 04BR-420B

This model is the same as Model 93BR-420A appearing on pages 11-25 and 11-26 of Rider's Volume XI.

### Arvin 664 and 664A, Chassis RE-206-1

These models appearing on pages 15-10 and 15-5 and 15-6 of Rider's Volume XV, have been changed as follows to reduce the a-c hum. The 0.1- $\mu$ f capacitor (C12) connected from B+ to the cathode of the 35L6 tube has been changed to 0.03 $\mu$ f. The resistance of R12 connected from B+ to the cathode of the 35L6 tube has been changed from 12,000 to 15,000 ohms. Making this change will reduce the a-c hum of many of the sets with the previous circuit.

The parts list should be changed as follows:

Delete:

Ref.No.	Part No.	Description
R12	C20070-123	Resistor 12,000 ohms, 1 watt
C12	C20068-104	Capacitor, 0.1 $\mu$ f, 400 v. p. t.

Add:

Ref.No.	Part No.	Description
R12	C20070-153	Resistor, 15,000 ohms, 1 watt
C12	C20068-303	Capacitor, 0.03 $\mu$ f, 400 v. p. t.

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### The Cover

The photograph on page 1 shows students in the RCA Institutes laboratory investigating the characteristics of an audio amplifier by the use of an oscilloscope. Signals of various frequencies and amplitudes are fed into the amplifier from the oscillator in the test panel on the left, wherein are also located the power supply and the necessary meters for experimental work. The cathode-ray tube oscilloscope

is across the output of the amplifier, which being built on a breadboard, can have different components substituted in the circuit, showing different output effects on the 'scope screen.

### Curtain Time

*Continued from page 5*

who are the sponsoring groups . . . Attendance is free to all and sessions will be held afternoon and evenings . . . It is hoped that ALL radio servicemen within a 50 or 75 mile radius of NYC will see their way clear to attend this Town Meeting.

For the benefit of those men who are new in TV receiver servicing, remember that peculiar tube problems develop in these units. Tubes may not work well in certain parts of the receiver, yet function perfectly in other parts,—so—don't discard a tube which seems inoperative in one place, without trying it in other stages which employ like tubes . . . Very frequently an interchange of like tubes solves

the problem . . . Save time and money by inquiring if the customer has permission to erect an antenna on the roof before you attempt to do so . . . We're speaking about TV antennas . . . In too many instances the customer is derelict in procuring permission and the serviceman is the sufferer.

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JOHN F. RIDER

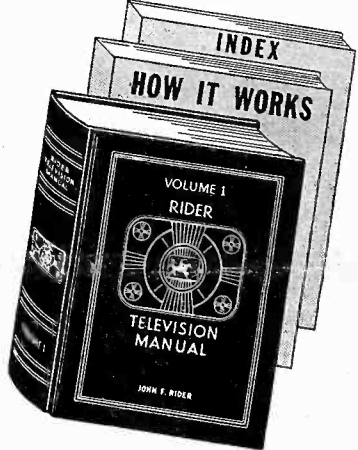
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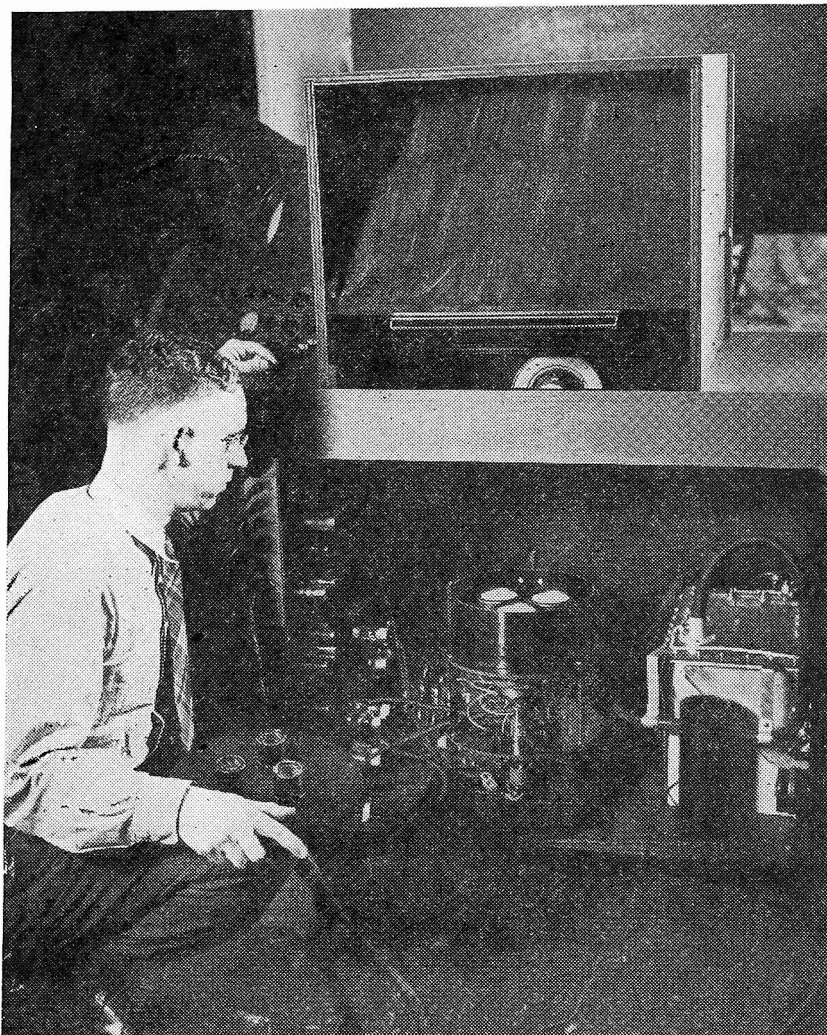
# Successful SERVICING

SEPTEMBER, 1948

## SCHEMATIC DIAGRAMS AND P-A SERVICING

By

William Bouie



Courtesy RCA

At first thought it might appear that a public-address system is a more or less standardized arrangement, one system not differing by very much from another system. This, however, is not the case, and no one system can be considered as representing a standard. Of course, certain features and functions are common to all p-a systems, just as in other electronic equipments used for the transmission and reception of speech and music. Some of these common features are that the signal (speech or music) must be applied to some sort of an input system; it must undergo a required amount of amplification; and it must be made to provide sufficient power to operate the loudspeaker(s) with the desired efficiency. These features plus a source of operating power are the common denominator in all p-a systems, but at this point the similarities cease. The manner in which the above results are obtained and the types of circuits used differ widely from one system to another.

Consider the input circuits of the p-a system. There are p-a arrangements wherein there is only one input circuit — either for a phonograph or a microphone and there are others with provision for as many as six or eight input circuits. These circuits may be simple or complex depending upon the specifications of the system. For example, the signal may be applied directly to the grid of an input stage or it may be coupled to the stage through a transformer to satisfy impedance requirements. On other occasions, cathode coupling may be used,

necessitating an entirely different circuit arrangement. Provision may be made for control of volume in the input stage, or a pre-emphasis network may be incorporated to provide the desired frequency response. In addition, mixing networks may be included in the outputs of individual input circuits so that signals from several sources may be combined. When more than one input is used in an amplifier, quite often considerable differences exist in the circuit arrangement, each one being intended for a specific purpose.

Considerable differences exist between mixer circuits. Some use a resistance-type mixer network while others employ electronic mixing, and still others use a combination of these two. Master volume controls are often used in either the input or the output of these stages. Quite often more or less complex tone-compensation networks exist in either the input or output of the mixer stages, requiring specific circuit arrangements. Different-type tubes, requiring different values of circuit components, are employed depending upon the specific design of the amplifier.

Such added features as expander circuits, which compensate for the compression of loud passages in recorded music, require separate circuits, usually consisting of two stages, which operate in conjunction with a voltage amplifier stage. Variations of these circuit arrangements will be encountered in different amplifiers depending upon the design specifications. In addition to the expander a type of compression circuit to

limit the intensity of loud passages may be included in the amplifier, or some sort of automatic gain control may be incorporated to maintain a constant level of sound output. The audio stage may include an equalizer network to provide more uniform frequency response. One or all of these circuits may be included in an amplifier and the tubes and circuit-component values will differ with the particular circuit arrangement, which in turn is dependent upon the design.

No exclusive coupling system has been made standard for audio amplifiers. In some circuits transformer coupling is used, others feature impedance-capacitor coupling arrangements, direct coupling where d-c operating potentials are applied to the control grid as well as the other elements of a tube, is a feature in the audio amplifiers of at least one manufacturer. Resistance-capacitor coupling, which may be encountered most frequently in audio amplifiers, uses no standard value for the plate-load resistor, the coupling capacitor, or the following grid resistor. For example, the plate-load resistor in a voltage amplifier stage will be found to vary from a low value of 50,000 ohms to a high of 500,000 ohms, and for specific arrangements even exceeding these limits. The coupling capacitor may have a value from 0.01  $\mu$ f to 0.5  $\mu$ f. Grid resistors vary in value from 100,000 through 10 megohms. Since the values of the coupling components are more or less interdependent upon each other, it can be seen that numerous variations in the above values will be encountered.

Please turn to page 4

**RCA 54B1, Chassis RC-589, 54B1-N, Chassis RC-589D, 54B2, Chassis RC-589A, 54B3, Chassis RC-589B, Second Production, Chassis RC-589U, RC-589UA, RC-589UB**

These models are the same as Model 54B1, Chassis RC-589, appearing on pages 15-22 through 15-24 of *Rider's Volume XV*, except for the following changes. These models have been produced with loops of two types of construction: "taped"—the coil is fastened to the loop cover with scotch tape; and "cemented"—the coil is fastened to the loop cover with coil cement. The models with the "cemented" loops have been produced with and without the 2—15- $\mu$ f antenna trimmer capacitor C2. Receivers with the "taped" loop all have C2. The three combinations are listed below with the correct alignment procedure specified. CAUTION: A "taped" type loop should never be used as a replacement on those models which do not have antenna trimmer capacitor C2.

Loop Construction	C2 Ant. Trimmer	Alignment Procedure
Taped	With	As given on page 15-22
Cemented	With*	See following alignment table
Cemented	Without	See following alignment table

\*Remove antenna trimmer capacitor C2 by removing C2 alignment screw and cut off C2 capacitor plate.

\*Steps 3, 4, and 5 require a coupling loop from the signal generator to feed a signal into the receiver loop located in the lid. This loop should be approximately one turn of 6x3½ inches coupled to the signal generator through a 200- $\mu$ f capaci-

tor, and loosely "coupled" to the receiver loop antenna at about 1¾ inches distances, so as not to disturb the receiver loop inductance. Ground test oscillator through 0.1- $\mu$ f capacitor to receiver chassis.

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Delete:

Stock No.	Description
60954	Capacitor—ceramic, 56 $\mu$ f (C4)
65405	Capacitor—ceramic, 82 $\mu$ f (C13)

Add:

Stock No.	Description
70448	Fastener—push fastener to hold loop (two required)
71563	Hinge—lid hinge—Model 54B3, —Red (two required)
71565	Lid—case lid complete with lid support less loop—Model 54B3—Red
71564	Loop—antenna loop complete with connectors less lid — Model 54B3—Red
71562	Plate—backing plate for mounting hinge on lid—Model 54B3—Red (two required)
71725	Screw—case cover mounting screw (one set)—Model 54B3
71567	Bottom—case bottom—Model 54B3—red
71566	Center—case center—Model 54B3—red
71568	Handle—carrying handle—Model 54B3—red
71569	Link—handle link—Model 54B3—red (two required)

**Hallicrafters S-40A**

This model is the same as Model S-40, second revision, on pages 15-67 to 15-86 of *Rider's Volume XV*, except for the following changes. C18 has been changed in value from 100 $\mu$ f to 68 $\mu$ f. A 10-ohm resistor (R30) has been connected between the center tap of oscillator coil T10 and terminal C. R30 has been removed from its previous position between C16 and the junction of C26, C6C, C7C, and switch S1F. C55 has been changed in value from 100 $\mu$ f to 47 $\mu$ f, and is now connected to the top of the 470- $\mu$ f capacitor (C54). The coil T17 is connected directly across C54, with one end going to ground. The center tap of this coil is connected to the cathode of the 6J8 tube. The 0.01- $\mu$ f capacitor (C53) is connected from the plate of the 6J8 tube directly to ground.

The parts list should be changed to read as follows:

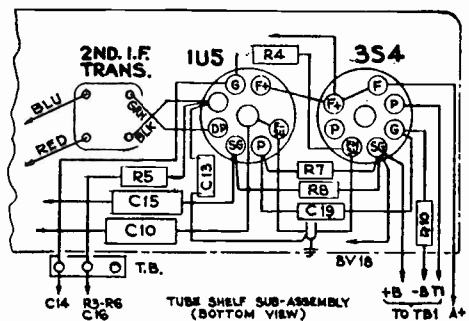
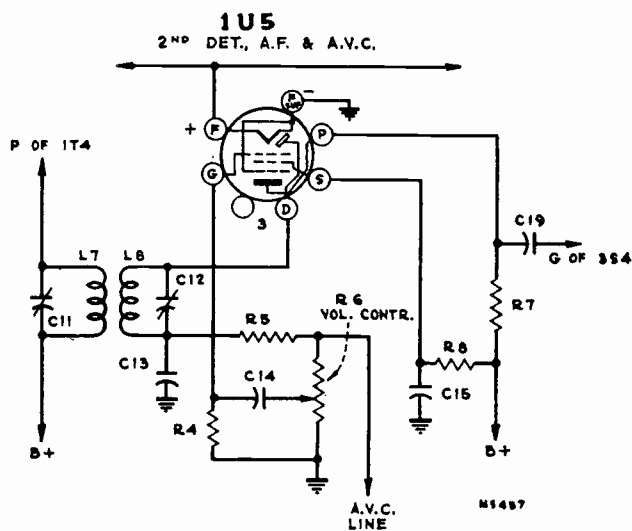
Ref. No.	Description	Hallicrafter's Part No.
C18	68 $\mu$ f, $\pm$ 10%, 500 vdcw; neg. temp. coeff. 0.0075 $\mu$ f/ $\mu$ f/deg.C;	CC25UK680K ceramic
C55	47 $\mu$ f, $\pm$ 20%, 500VDC,	CM20A470M Mica
T17	BF0 coil; 455 kc; shielded	54B033-2

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**General Electric 260**

This model appears on pages 16-7 to 16-12 of *Rider's Volume XVI*. It has been found that late production 1LC6 tubes, coded H7E, will oscillate at another frequency in addition to the desired frequency, causing unsatisfactory operation. To remedy this condition, the oscillator grid capacitor, C17, should be changed from 100 $\mu$ f to 56 $\mu$ f.

Steps	Connect the high side of test osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output—
1	Connection lug of C1 located on rear of gang in series with .01 mf.	455 kc	Quiet point near 1,600 kc	C11, C12 2nd I-F trans.
2		455 kc	Quiet point near 1,600 kc	C8, C9 1st I-F trans.
3	*Antenna coupling loop thru 200 mmf. capacitor	1,500 kc	Rock gang	C5 (osc.)
4		600 kc	Rock gang	L2 (osc.)
5	Repeat steps 3 and 4 for final adjustments.			



tor, and loosely "coupled" to the receiver loop antenna at about 1¾ inches distances, so as not to disturb the receiver loop inductance. Ground test oscillator through 0.1- $\mu$ f capacitor to receiver chassis.

The second production of these models use a type 1U5 tube in place of the type 1S5 (second detector, a-f, ave). They may be identified by the letter U in the chassis number which is stamped on the tuning capacitor or chassis. The accompanying diagrams show a partial schematic and a parts layout and wiring diagram for this tube. The replacement parts for these models are the same as those for the

Alignment instructions for sets with cemented loop are shown in the table. The wiring changes for the type 1U5 tube used in the second production are shown on the right.

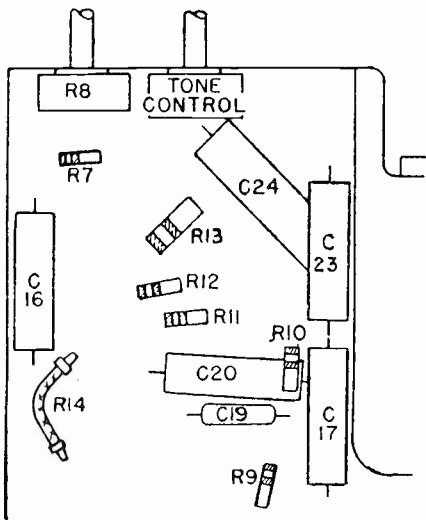


**National Union Presentation**

This model is the same as Model G-619 appearing on pages 15-1 and 15-2 of *Rider's Volume XV*. This company's Presentation Deluxe is the same as Model G-613 appearing on pages 16-1 and 16-2 of *Rider's Volume XVI*.

**Sears Roebuck 8052, Chassis 101.808-1C, and 8053, Chassis 101.808-1D**

These models are similar to Model 7054, Chassis 101.808, appearing on pages 16-1 to 16-3 of *Rider's Volume XVI*, except for the appearance of some of the parts and the addition of a variable tone control circuit. This circuit, consisting of a 0.001- $\mu$ f capacitor (C23) in series with a 2-megohm variable resistor (R15), has been connected from the plate of the 7C6 tube to the B



The variable tone control consisting of capacitor C23 and resistor R15 in Models 8052 and 8053.

minus line. The location of these parts is shown in the accompanying illustration.

The dial stringing diagram for these models is shown in the accompanying diagram and is the same for both Models 8052 and 8053 except that part No. R62057 is part No. R62187 for Model 8053.

**Hallicrafters SX-42**

This model appears on pages 17-6 to 17-16 of *Rider's Volume XVII*. It has been found that there is unsatisfactory image ratio on the 10-meter band. This can be corrected in two ways, one of which provides for the change or replacement of four parts and the other provides for no change in the oscillator coil.

The first method is as follows:

1. The band 4 oscillator coil should be removed and replaced with a new coil, part number 50-837D.
2. Resistor R24, now 56 ohms, should be removed and replaced with a 22-ohm resistor, part number RC20AE22OM.
3. Remove the main tuning dial scale, part number 83C265, and replace with new scale, part number 83C325.
4. Remove antenna coil, part number 51B827-C, and replace it with antenna coil, part number 51B827-D.
5. Align the receiver in the normal manner, making certain that the image falls on the high-frequency side of the signal frequency.

The second method is as follows:

1. Remove the oscillator trimmer capacitor C-42.
2. Calibrate the main tuning dial at 28 megacycles, with slug S-33, making certain that the image falls on the high-frequency side of the fundamental.
3. Calibrate the bandspread as outlined on page 17-15 of *Rider's Volume 17*, except that slug S-33 should be used instead of trimmer C-42.

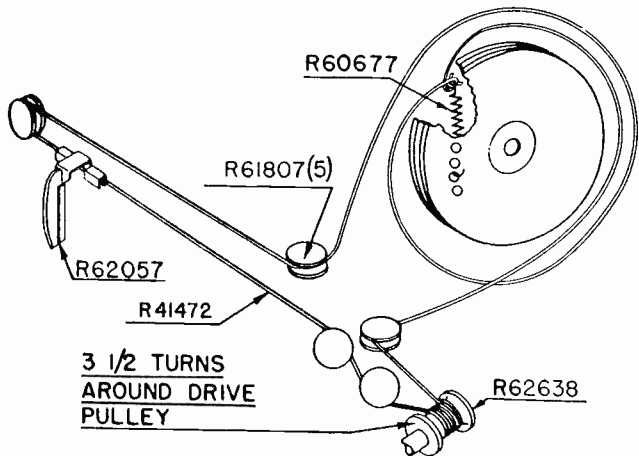
It will be noticed that in this method the calibration of the low-frequency end of the number 4 band has been neglected entirely, since this cannot be accomplished without the use of trimmer C-42. The oscillator coil would have to be replaced to allow the use of this trimmer.

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**Belmont 6D127**

This model is the same as Model 5D128 appearing on pages 15-4 and 15-5 of *Rider's Volume XV*.

The wiring in the Howard Model 909-MR to accommodate the GI-RC130 recorder and record changer.



Part number R62057 shown here is for Model 8052. Model 8053 uses part number R62187.

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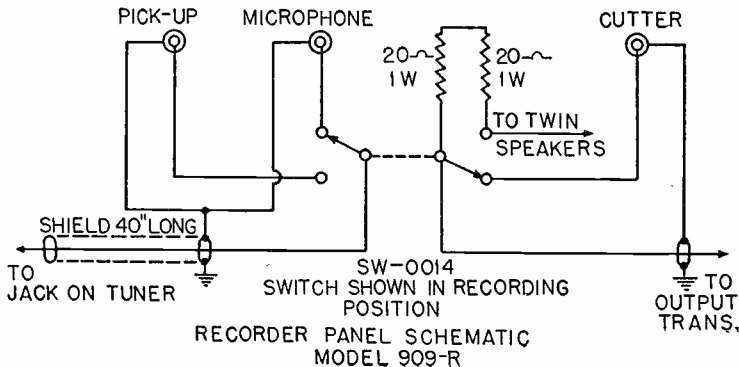
**Majestic 8FM783, Chassis 8B07D**

This model is the same as Model 8FM776, Chassis 8B07D, appearing on pages 17-17 to 17-22 of *Rider's Volume XVII*, except that "solid doors" are used instead of metal grilled frame doors. The parts list should be changed to read as follows:

Part No.	Description
115-48	Cabinet, console combination, mahogany or walnut (state color)

**Howard 909MR**

This model is similar to Model 909M appearing on pages 17-34 to 17-37 of *Rider's Volume XVII*, except that recording units were added. The General Industries Model GI-RC130 recorder and record changer combination was used to make this change. The recorder unit was added without disturbing the wiring of the radio chassis. The wiring necessary for the addition is shown in the accompanying diagram.



## P-A Schematics

*Continued from page 1*

tered in audio circuits. From this it can be seen that just any value of component part cannot be used as a replacement if the audio system is to provide optimum operation. An understanding of the circuit requirements by a reference to the schematic diagram of the unit will go far to establish the relationship existing between the various components thereby enabling the p-a serviceman to restore the system to its original state of efficiency.

If a single output tube is used to feed a speaker, the problem is not too involved; however, in the great majority of audio systems, push-pull output is employed and these circuits vary from one system to another. Some may employ a single push-pull output stage, while others may have a number of these stages in series or in parallel. Phase inversion of the signal must be accomplished to feed the two push-pull inputs which are 180 degrees out-of-phase with each other. This phase inversion is accomplished in different ways and an understanding of the method employed in a particular amplifier is a requirement in proper service. A reference to the schematic diagram of the unit in question will quickly determine the

### P.A. MANUAL

Due to the fact that a trucking strike held up delivery of paper to our printer, Rider's PA Manual will not be ready for distribution until November. . . . It's an ill wind that doesn't blow somebody some good—this gives you a chance to still get your order in to your jobber so you'll get your PA Manual as soon as it's off the press. Thanks for waiting.

type of circuit used without resort to laborious and time-wasting circuit tracing. All that has been said here as regards phase inverter and output stages applies equally well to driver stages which are usually employed in the larger systems to provide power to the output stages.

Usually, the output load on an amplifier is a loudspeaker or series of loudspeakers. Where a single speaker is connected to an output transformer having but one value of impedance, no problem is involved; however, most small p-a systems employ at least two speakers, and the larger units many more, usually arranged in banks. Multiple tap arrangements on output transform-

ers, and even multiple output transformers are required to feed the proper value of electrical energy to these various speakers. A schematic diagram presentation of the circuit arrangement and the method of connecting the various loud speakers to the amplifier output, including values of impedance taps, switching arrangements, pad attenuator circuits, cross-over networks for "woofer-tweeter" speaker systems, is mandatory to the proper maintenance and servicing of these systems.

The economic factor in any business is a function of time. If it takes more time than is necessary to complete any specific operation, the business suffers a loss. This holds just as true in the servicing industry as in any other phase of commercial activity. If the serviceman spends more time than he should upon any particular repair or service job, the result is a decrease in his potential income. This has only to occur a few times and its effect begins to be felt. On the other hand, finishing a job in less than the required time provides the serviceman with monetary gain besides promoting in the customer a certain confidence in the serviceman's ability to do a job quickly and efficiently.

By now it should be perfectly obvious that the fastest and most efficient method of becoming familiar with a particular audio system, thereby insuring a surer, more rapid repair service is by reference to the particular schematic diagram when service is required on the system. A brief reference to the diagram in question will usually save hours of tedious testing for defective parts, and the time saved can be applied economically to the next job. It cannot be stressed too emphatically that next to the actual test equipment, the serviceman's most important tool is the schematic diagram. It can mean the difference between profit and loss.

#### Montgomery Ward 62-690

This model is the same as Model 14WG-690A appearing on pages 13-61 and 13-62 of *Rider's Volume XIII*.

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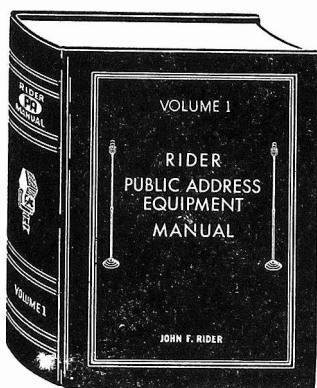
#### General Electric H639AC-DC

The r-f alignment instructions of these models found on page 11-80 of *Rider's Volume XI*, should read as follows: With gang condenser plates completely meshed, set dial to the first mark at the left end of scale. Then set dial to 1500 kc. Apply a 1500-kc signal either through a standard I.R.E. dummy to the antenna terminal or through an additional loop connected to the generator output which can be magnetically coupled to the receiver Beam-a-Scope. Align C2 and C1 at 1500 kc for maximum output. Set dial to 580 kc and peak C3 on 580 kc while rocking the gang condenser. Retrim at 1500 kc.

#### Montgomery Ward 14WG-635B

This model is the same as Model 14WG-624A appearing on pages 13-53 and 13-54 of *Rider's Volume XIII*.

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Vol. 10

SEPTEMBER, 1948

No. 1

Dedicated to the financial and technical advancement of the  
Electronic Maintenance Personnel

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## CURTAIN TIME

### TV

WABD the Dumont TV station serving metropolitan N. Y., announces that beginning in October they will start broadcasting at 7 A.M. Up to 6 P.M. the programs will be slanted at the women — naturally with sports exceptions . . . Then from 6 P.M. to 11 P.M. the programs will serve the family . . . How long will the other TV stations in this area permit Dumont to steal the show? . . . All-day TV transmission will really throw a monkey wrench into "ham" activity — especially 10 meters . . . *That means us too!*

It's astounding to note the interest in TV in the fringe areas . . . *It's getting so that maybe soon there will be no fringe.* Our home was a guinea pig for some receiving tests for the new Sentinel a-c TV portable . . . It uses a 7-inch tube and the set is pyramid shaped, about 11 x 15 x 17 inches — weighed about 35 pounds. Using an indoor area of the tunable dipole variety, it sure did a *swell job on all channels.*

A new TV net is scheduled for October. It will take in Chicago, Cleveland, Toledo and Buffalo . . . So it will not be too long before Richmond, Washington, Baltimore, Philly, New York, Boston, New Haven, Albany will be tied in with the mid-west . . . This area is highly industrialized and has a high percentage of the nation's population . . .

### Just Wondering . . .

There was a time when everybody felt that the TV servicing problem would be specialized — that it would call for a complete turn-over in the servicing industry . . . With the totally unexpected rocket pace of TV expansion it is just about impossible to do anything else than what has been the practice in years past — namely to train servicemen — to produce the best service manuals, thereby giving the service industry the maximum amount of reference data and to open the activity up to all who can handle it . . . We are convinced that such will be the case and do not hesitate to say so . . .

Back in 1939 when we introduced Signal Tracing, we declared that the signal is the common denominator for all communica-

tion systems . . . *This includes TV! . . .* In fact our book *Servicing by Signal Tracing* shows the application of signal tracing equipment to TV receivers . . . After working with the TV receivers of modern vintage we are more certain than ever that what was said then is true today . . . Every convenience which ST offered for conventional receiver servicing, can be attained with TV receivers . . . Maybe the necessary equipment is not yet available — *but it will be . . .* Who will be the first to produce a small mixer system which will enable tracing of signals in TV equipment using the ST equipment which has been available? Who will produce the first ST equipment for TV receivers? We used such equipment during 1943 to trace signals in the SCR 268 receivers which functioned at a carrier frequency of about 200 megacycles and intermediate frequencies which approximate the present pix channels . . . *and the equipment worked well! . . .* The same thing can be done with TV . . . Don't sell signal tracing short! . . . The higher the frequency of operation, the more effective the system.

### Don't Forget . . .

That while TV is hot, the conventional radio receivers *still require service . . .* There is no doubt about the fact that the pendulum has swung wide in the direction of TV — but blind radio is still here and will be with us for a long time to come . . . Don't develop the belief that all of your interests will be in connection with TV . . . Don't disregard the requirements of blind radio . . . maybe the sales of blind radio receivers have slowed up — but people are still buying and sets will need service . . . Many tens of millions of such receivers are still in use and will require service . . . It makes sense to prepare for television — *but don't sacrifice your regular radio activities . . .* It can still provide the butter for the bread . . .

### Did You Know

That a 1-pound weight at the equator weighs more at either the south or north pole . . . in fact the weight increases as one moves away from the equator . . .

Shellac comes from an insect . . . the human body has more than 500 muscles . . .

### Play in One Act

Scene — radio service shop in industrial area . . . Actors — Charlie the owner; Harry, his assistant, and Susie, Charlie's wife . . .

(Charlie) . . . "Harry, what can we do to get work out faster — to reduce our expenses — to do a better job for our customer?"

(Harry) . . . "That's easy Charlie,— see those vacant spaces in your Rider Manual library . . . You're shy Volumes 9, 11 and 14 . . . Many of the sets which have come in for service during the past three months were in those volumes . . . We had to labor over those sets — tracing circuits . . . That's why we lose much time . . . Complete your Rider Manual library and save money . . . Am I right Susie?— Remember, I mentioned that to you."

(Susie) . . . "Right! . . . Charlie, I told you so . . . In fact, I didn't tell you but I ordered *Rider's Volume 18* and his *TV How it Works Book . . .* We'll get his *TV Manual* when TV gets here . . . Let's get those missing Rider volumes today . . . Okeh?"

*Curtain comes down midst tumultuous applause*

### Peace — It's Wonderful

About the PA Manual scheduled for September . . . It will be November because the recent local trucking strike prevented the removal of the necessary paper from the warehouse . . . the book requires several carloads of paper . . . All of it cannot be stored at the printer at one time . . . The printing was under way — then — Came September 1st and the trucking strike — no paper pickup and delivery . . . Thank heaven it's over and things are back to normal . . . Our apologies for something which is not our fault. . .

JOHN F. RIDER

### The Cover

On page 1 is shown an RCA research engineer checking the component parts of one of that company's new all-electronic sets for reception of television signals that result in colored pictures. Appearing in the center of the lower part of the cabinet is the "Trinoscope" projection assembly, which consists of three 3-inch kinescopes that separately receive signals representing red, blue, and green images and project them optically as a composite color picture on the 15 x 20-inch screen at the top and front of the cabinet.

**RIDER MANUALS** Mean SUCCESSFUL **SERVICING**

### Test Loop Antenna

In response to the many letters that have been received concerning the Hazeltine test loop antenna, if anyone is desirous of obtaining one, get in touch with Mr. W. F. Woodbury, Commercial Department, Hazeltine Electronics Corp., 58-25 Little Neck Parkway, Little Neck, L. I., N. Y.

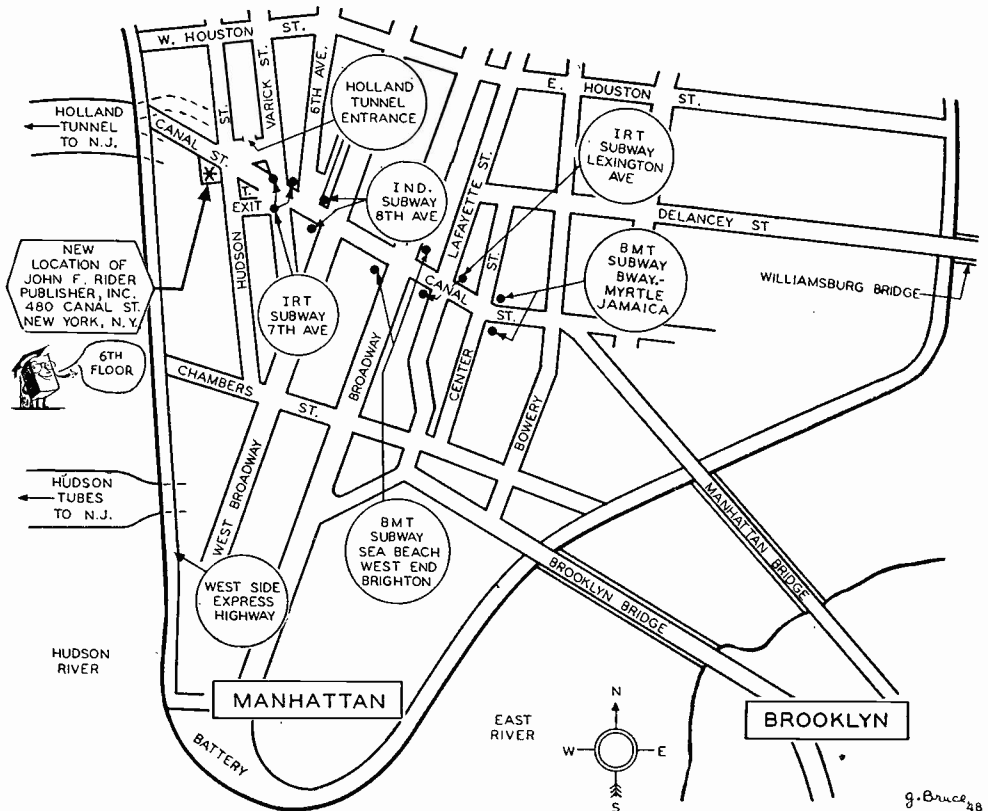
## WE MOVE

By the time you receive this issue of **SUCCESSFUL SERVICING**, we will have moved all departments to our new plant at 480 Canal Street, New York 13, N. Y. Hereafter please send all mail to this address.

## We Take a Bow

Have you seen the 6th edition of the Mallory Radio Service Encyclopedia? Or the C-D Capacitor Manual for Radio Servicing, 1948 edition No. 4? If you have, you certainly noticed that Rider Manuals — and *Rider Manuals only* — were given as a reference source for complete schematic diagrams. These companies have recognized, as have hundreds of others, that the technical information in Rider Manuals can be trusted as it is the greatest compilation of authentic service data in existence.

And we want you to know that the data in Rider Manuals are not just put on the dummy make-up sheets and sent to the printer. Far from it. . . . Every schematic is checked to see if it must be clarified and while this is being done, one of our technical editors looks over the circuit to see if there is anything new — of possible interest for inclusion in the "How It Works" book for that Manual. Now and then something



This is where we are now — and this is how you can get here. Take the elevator to the sixth floor.

VOLUME 1

RIDER

# Television MANUAL

HERE ARE COMMENTS FROM  
TELEVISION RECEIVER  
MANUFACTURERS

"During the past two weeks I have had the opportunity to thoroughly look through your Television Manual and its "How It Works" book.

Since I am engaged in the production of technical manuals for Link Radio Corp., I realize the tremendous undertaking this book represents.

Congratulations on a splendid job and I sincerely hope the service fraternity will give the "How It Works" book the attention it deserves."

George E. Connor, in charge of Technical Publications Dept.  
Link Radio Corp.

"As a source of information on all TV equipment I believe this Manual far surpasses anything else available. In my personal contacts with service organizations and individual service dealers I have heard very high praise of your Manual and I feel that the information in TV Vol. 1 has played a tremendous part in providing proper service to the consumer.

I look forward to seeing the same work and presentation in TV Manual Vol. 2."

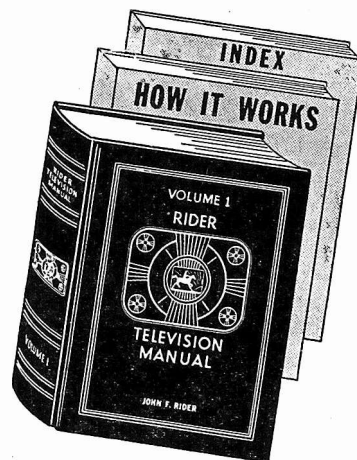
Irving Boilen, Chief Engineer  
Federal Video Corp.

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arises about which the manufacturer must be consulted and as a result, we have received many letters — hundreds of them in the course of years — such as these:

"Your observations relative to the schematic of our 182TFM, chassis RE237, are correct. Your vigilance certainly speaks well for the accuracy of Rider publications and doubtless explains in part the fact that Rider's Manuals hold their eminent place as the radio serviceman's Bible".

R. A. Chestnut, Service Manager  
Noblitt-Sparks Industries, Inc.

"These days of very complicated circuits require a considerable amount of checking, and we have begun to think of the John F. Rider organization as another link in our chain of check and double check to give the radio technician information that will help him, rather than hinder his work".

Charles A. Nichols, Asst. Chief Engineer  
Packard-Bell Co.

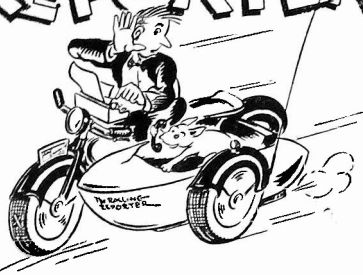
Here are two more of the numerous reasons why thousands of servicemen all over the world have been buying Rider Manuals throughout the years. They have proven invaluable in providing that knowledge that assists a serviceman to save precious minutes in diagnosing defects in a set and repairing them. . . . And those saved minutes soon add up to hours in the course of a month. . . . See to it that you have all 17 Rider Manuals. . . . They are a gilt-edge investment that will pay dividends as long as you are in business.

TELEPHONE 139, 140, 141, 149, 157,  
163, 164, Chassis H

These models are the same as Model 135, Chassis H, appearing on *Misc. Page 16-11 of Rider's Volume XVI.*



# The Rolling Reporter



## Hotelevision

Yeah, you guessed it — that means *television reception in hotel rooms*. . . . As of now, the Hotel New Yorker here in town has 100 of its rooms and the Roosevelt a flocka theirs equipped with a screen and push-buttons so you can select the prancin' pix comin' from any one of the six N.Y. stations. There's a central monitor with six complete receivers and the outputs are carried down to the rooms on co-ax cable. . . . Olympic is makin' this equipment and from the way the hotel managers are grinnin', this outfit done a bang-up job in their design for seein'. . . . *Wanta bet we'll have the dope in TV Vol. 2? ? ? ?*

## Electronic Music

When Vol. VIII was published back in '37 it had the dope on an electronic piano and you were told then that here was a new field that some day would blossom out and be worth your while. Well, *that's come true all right*. . . . In Rider's PA Manual, you'll find not only piano amplifiers but all sorta amplifiers that are used with various stringed musical instruments. Were we right or were we when we advised you to go after this end of the service field????

## Printed!!!

This morning Si ("FM") Uslan (remember he worked with the Boss on "FM Transmission and Reception") came out to where we were drippin' all over Qwerty's keys and he was bustin' with "somethin' new". . . . He'd been goin' over the schematics that are goin' in Vol. XVIII to see what was new and unusual for 18's "How It Works" and he came across this Majestic job. The two resistor and capacitor symbols forming the coupling ckt between the 1st a.f. and output tubes were enclosed with a dotted line. Wondering why, he consulted the parts list and found "**Printed Circuit Plaque**". Well, boys and gals, *that's the start!* There yuh are — two resistors, two capacitors all connected up ready to be slapped into place. . . . *and everything printed!*

## Flanellmouth

Knowing our love for the ridiculous and the unusual, Ida Kaplan, whos sees that "S.S." gets to you each month, told us this one: It seems as to how she was riding home from a wedding with the bride's parents in a chartered automobile that was equipped with 2-way radio. There had been the usual (*and futile*) efforts to find out where the happy couple was going to spend their first night of honeymooning and Ida was still trying to find out (and unsuccessfully) from the bride's mama. Suddenly the loudspeaker up beside the chauf came to life with this "Car 14. Car 14. When you deliver your passengers to their destination, return to the hall and pick up the bride and groom and *take them to the St. George*

Hotel". P.S. Ida did her stuff and reports a happy ending to the day — for the wedding party NOT the newlyweds.

## TV Scannin's

Up near Lake Placid in N. Y. there's an inn at the top of Whiteface Mt., said inn being about 120 miles from WRGB in Schenectady as the pigeon flies (we don't like crows so we ain't givin' 'em no publicity). G. E. Co. engineers figgered an antenna on that mile-up inn would give 'em line-of-sight reception from the GE TV antenna, instead of the usual 50-mile limitation. Moral: If you want faraway TV sigs, move up, young man, move up — *to the highest mountain you can find*. . . . We hear tell that Motorola is doing some very successful TV receivin' in taxis. . . . Aug. 29 marks the day that the Navy and N.B.C. made the first *experimental TV broadcast of a simulated air attack* on the U.S.S. Leyte, 26 miles from the Empire State Bldg. The successful hour and three-quarters telecast was made from the Empire State Bldg. for this area and sent by co-ax cable to network stations in Boston, Philadelphia, Washington, Richmond, Va., Baltimore, and Schenectady.

## August, 1946

Any of youse guys gotta an extra copy of SUCCESSFUL SERVICING of August, 1946?? We've been asked for that issue by the New York Public Library and also by the University of Illinois library. . . . If you'd like to give either of these libraries a hand, send your extra copy to us and we'll see that it gets into the proper hands so their files of S. S. can be complete. . . . Thanks—a lot. . . .

## 144 Months

Yep, it was just *that long ago* that we took over the pedalin' of the chariot that gave us our title and we'll bet you were surprised when you saw the new model that now graces the head of the col. The Boss decided that in this day of streamlinin', new looks, and all, we should oughter get us a *new buggy*, soooooo-o-o-o-ooo, how do yuh like it, huh?

## New 1/4's

Naw, we ain't talkin' about two-bit pieces, we're referin' to the new address you'll use

when/if you write us or come see us. . . . *It's 480 CANAL ST., NEW YORK 13, N.Y.* Right down at Canal and Hudson, Southwest corner. . . . We gotta swell layout on the 6th floor. . . . Well, yuh remember May West's famous sayin', don't cha?

## Change of Scene

Yassuh, that's what gonna happen. . . . We're takin' us outa here for a coupla weeks and are on the search for some place that's cool — that's got some nice paintable scenery—that's *cool*—that's got good food —*that's COOL!* . . . After this tussle with superheated streets, subways, and everything else in N. Y. that's burned to a crisp, we'll compromise on practically anything *as long as it's cool!* . . . So, if you happen to live in a place that *ain't* hot and if you see a guy supposed to be paintin' a pic in a nice shady place and a thermos bottle from which he's gettin' inspiration, *you guessed it* — that'll be the vacationin'.

## Rolling Reporter

## Omission

On page 187 of Rider's Television "How It Works" credit lines were omitted from Figs. 12-4 and 12-5. These two illustrations were supplied by the Radio Corporation of America, to whom we apologize.

## Automotic 127

This model is the same as Model 120, appearing on page 12-7 of Rider's Volume XII.

## General Electric L604

This model is the same as Model L600 appearing on page 13-40 of Rider's Volume XIII.

## International Detrola 339, 340, 340-1

These models appear on page 12-4 of Rider's Volume XII. The 30-ohm resistor used in these models is the resistor with 5% tolerance, part number 8158.

*It's as True Today as it was Then---*

*The true University of these days is a Collection of Books.*  
—Thomas Carlyle.

FM Transmission and Reception 416 pages . . . Cloth Cover \$3.60	A-C Calculation Charts 160 pages . . . . . \$7.50
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**Farnsworth GK-140**

Slippage of the dial-drive cable on the early production sets can be corrected by replacing the cable with part number 05096. This cord is softer and smaller than the one used previously.

If the push buttons bind on the front panel of the cabinet, the ganged capacitor may not be properly positioned. This may be corrected by installing a flat metal washer under each of the mounting grommets. This may be done without removing the ganged capacitor from the chassis.

Oscillation or low sensitivity on f.m. may be due to poor ground connections from the gang to the r-f shelf. When aligning the f-m band, oscillation may occur with certain signal generators. Changing the value of the

resistor in series between the generator and the chassis will prevent oscillation. With some generators more than 400 ohms are required, with others less.

In some preliminary sets a 200- $\mu$ f capacitor was placed in series with the short-wave converter-trimmer. If for any reason this trimmer requires replacement, removal of the capacitor is suggested. This capacitor is not shown on the schematic.

In some of the preliminary 14-tube sets, Belden braid was used to ground the ganged capacitor to the r-f shelf. In certain instances too much solder flowed into the braid and as a result some joints break loose or the set becomes microphonic. This braid should be replaced with soft copper strips.

*Attention, Hams*

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1. 35 cents is the charge for all the available data on any radio receiver model up to and including six pages. Each page thereafter will cost 10 cents.

2. If additional money is required to cover the data requested, you will be notified. We cannot forward data without receiving your remittance.

3. Service data on television receivers may be obtained at costs varying from 35 cents to \$1.50. It is suggested that you inquire the cost before sending us a remittance for television data.

4. Be sure to enclose a self-addressed envelope bearing a 3-cent stamp.

If you will follow these rules, it will simplify matters for both of us and you will receive the data you need with a minimum of delay.

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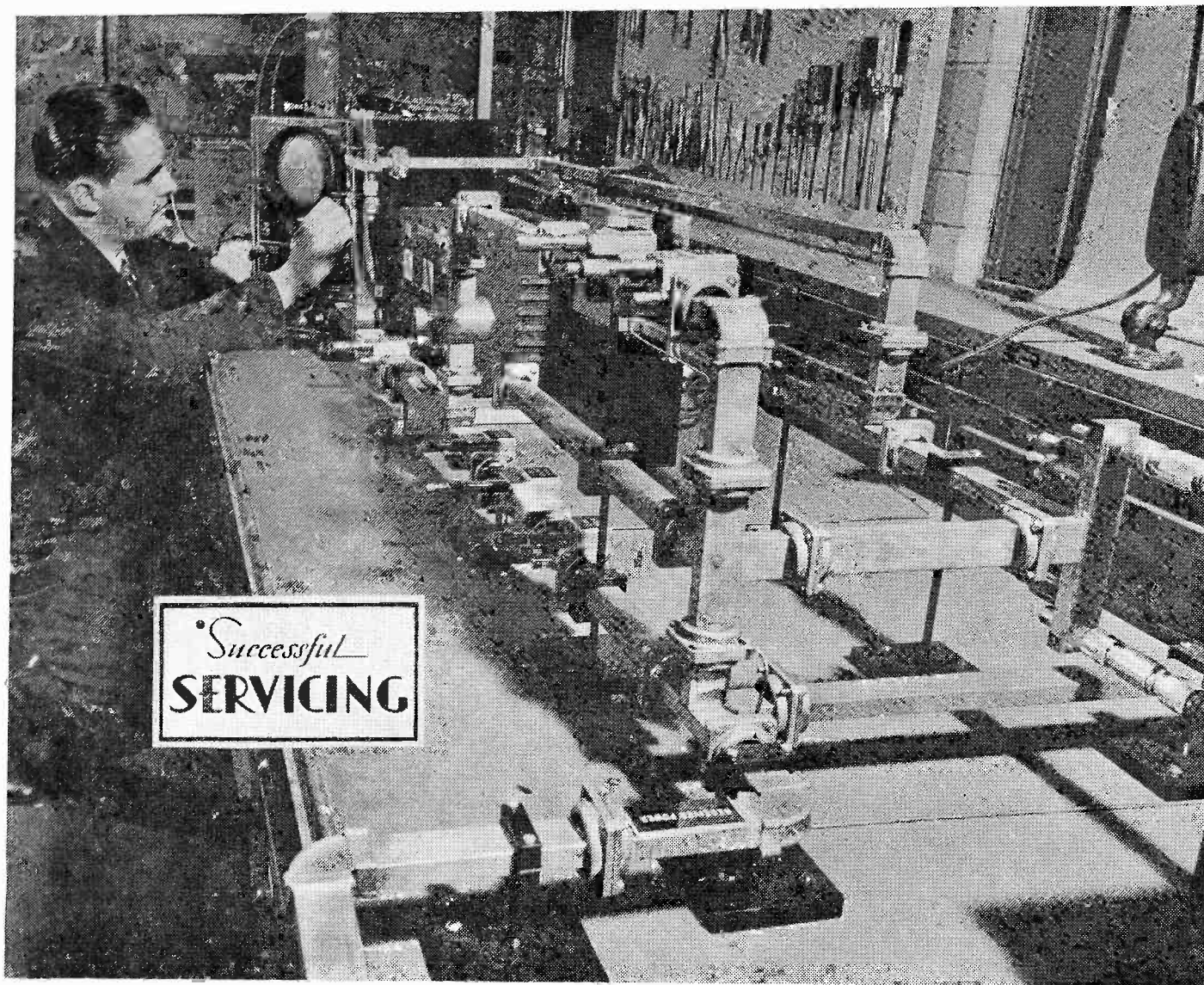
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OCTOBER-NOVEMBER, 1948

Courtesy Westinghouse Electric Corp.

## A WORD OF CAUTION

By John F. Rider

**T**ELEVISION is on everybody's tongue—inside and outside of the servicing industry... That is all well and good but it behooves the men who make their living servicing this nation's radio and allied equipments to take stock and grab that pendulum of interest and pull it down to a rational level... It has swung too far in one direction!

Understandably, the radio servicing industry cannot *change* the public's reaction to television. There is no doubt in anyone's mind that TV is one of science's greatest developments—a wonder of the ages. The public is eating it up and it is the serviceman's responsibility to be able to cope with the situation. That is something no one can deny... But is it sound to think of conventional radio as being dead duck?... Even so, thinking is one thing and doing is another—especially when the day the last small a-m receiver is junked because there will be

no more a-m broadcast stations, is a long way off. Honestly, I'd hate to refrain from shaving until that day. I think I'd have a beard which could be used for a ski jump.

Everybody appreciates that the public is TV-minded and is not taking too keenly to console type receivers which cost several hundreds of dollars... That is an open secret in all places where TV exists or where it is expected to exist... It is also true that in many homes where several a-m receivers were in use, the present interest is the TV receiver recently purchased... The other receivers are not seeing the usual amount of use—in fact, it is entirely plausible that where each room contained its own receiver, the failure of one of these will not result in a rush call for a serviceman...

But don't kid yourself into believing that the intense interest being displayed by the TV-receiver owner at present is

going to be maintained forever... Of course, TV is here to stay... It is a new member of society... Once a family has owned a TV receiver they will never give it up and eventually we shall see two or more receivers in a home, but that will be a long time off—many years in fact... The industry as a whole has much ground to cover before blanketing the nation with transmitters and receivers...

But the families who have TV are already feeling a sense of confusion—of restraint—of confinement and even frustration... The women are beginning to object to staying in every night, although they are the ones who want to see the program... Believe it or not, bridge playing has suffered and so has gin rummy and mah jong... With one set in the home and two excellent programs to watch, both being televised at the same

*Please turn to page 4*



**RCA 54B1, 54B2, 54B3**

These models appear on pages 15-22 to 15-24 of *Rider's Volume XV*. The position of the green and black leads of the second i-f transformer (stamped 922246-2) have been transposed to facilitate assembly. This change affects only the wiring, not the schematic.

**Sears Roebuck 7056**

This model appears on pages 13-75 and 13-76 of *Rider's Volume XIII*. The Astatic L-40A crystal cartridge should be used as a replacement cartridge for the phonograph pickup.

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**Noblitt-Sparks 664 and 664A**

These models are the same as Model 6640, Chassis RE-206-1, appearing on pages 17-16 to 17-18 of *Rider's Volume XVII*, except that the loop assembly has been changed. The part number is AC18579-1.

**Stewart Warner VM-506261 Record Changer**

This model is the same as Model VM-505339, appearing on pages RCD.CH. 17-14 to RCD.CH. 17-19 of *Rider's Volume XVII*, except for color.

**Wilcox-Gay 6B10, 6B20, 6B30, 6B40, and 6B42**

These models are the same as Model 6B10, Late, on page 15-4 of *Rider's Volume XV*, except for the following changes. A 0.00005- $\mu$ f capacitor (C34) has been connected across R38.

A 6E5 tube has been substituted for the 6U5; the socket connections are the same. A 6SJ7GT tube has been substituted for the 6J7GT formerly used. The socket connections for the 6SJ7GT are:

- 1 No connection
- 2 Heater
- 3 Suppressor Grid
- 4 Grid
- 5 Cathode
- 6 Screen Grid
- 7 Heater
- 8 Plate

The points are utilized for voltage measurements, see the accompanying voltage chart.

**TYPICAL VOLTAGE CHART**

TUBE	VOLTAGE TO GROUND PIN NO.							
	1	2	3	4	5	6	7	8
6A8	0	13	240	80	-10	156	13	2.6
6SK7	0	13	3.3		3.3	80	13	240
6SN7	0	232	6.5	0	55	1.6	13	13
6SQ7	0	0	1.5	0	0	68	13	13
6V6	0	13	225	240	0	240	13	13
6SJ7	0	13	0	0	0	3.3	13	80
5Y3	0	280		275AC		275AC		280
6E5	13	6	0	240	1	13		

MEASURED WITH 1000 OHMS PER VOLT METER. SCALES USED -3-30-150-300

ALL PLUNGERS IN RELEASED POSITION.

Typical voltage chart for the Wilcox-Gay 6B10, 6B20, 6B30, 6B40, and 6B42.

**Arvin 140P, Chassis RE-209**

This model appears on pages 17-1 through 17-4 of *Rider's Volume XVII*. The volume control mounting has been revised to prevent the dial-indicator eccentric mounted on the volume-control shaft from binding in its bracket. The mounting bushing on the control is slotted instead of threaded, and the control is mounted with a C20227 Speed Clip, instead of a 3/8-inch nut.

The following changes have been made in the oscillator circuit to increase the sensitivity. The 0.05- $\mu$ f capacitor (C5) formerly located between the bottom of the oscillator tickler coil (L3) and floating ground, has been connected from the second grid of the 1R5 converter tube (pin 3) to the junction of the top of the tickler coil to the bottom of the primary of T1. The 22,000-ohm resistor (R3) is now connected in parallel with C5 instead of from the bottom of the tickler coil to the bottom of the primary of T1. The top of the tickler coil is connected to the bottom of the primary of T1 instead of to the second grid of the 1R5 converter tube. The 1R5 plate current as well as the screen current thus passes through the tickler coil.

To prevent audio oscillation, a 0.00025- $\mu$ f bypass capacitor (C10) has been added from the plate to the positive filament of the 1S5 tube. The plate load of the 1S5 tube (R9) has been changed from 330,000 to 470,000 ohms. The value of R21 has been changed from 6.8 to 15 megohms. The value of C13 has been changed from 0.05 $\mu$ f to 0.02 $\mu$ f. The 0.05- $\mu$ f capacitor (C19) has been changed from the input side to the plate side of L4 to reduce hash.

Since the clinch nuts in the top of the loop shield, which hold the screw in the top of the cabinet, have at times come loose, a brass extruded nut, part number A21681, has been made available for replacing these clinch nuts when they come loose.

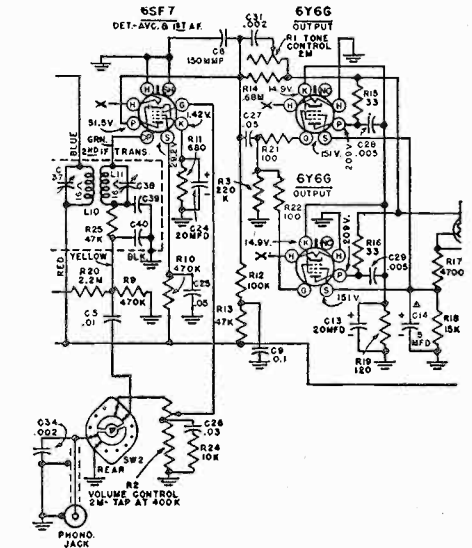
In the note under the resistance chart on page 17-4 of *Rider's Volume XVII*, K was shown as equalling 100 ohms. This note should read K equals 1000 ohms. The parts numbers given in the parts list on page 17-2 for the miniature tube sock-

ets were A21032-1 and A21032-2. These should have been A20132-1 and A20132-2.

A slide switch, part number A21051, has been added to the parts list.

**Westinghouse H-110, H-111, H-137, and H-138, Chassis V-2102-1**

These models are the same as Model H-104 on pages 15-1 to 15-4 of *Rider's Volume XV*, except that the tone control circuit has been modified. This change is illustrated in the accompanying diagram.



The modified tone control circuit of the Westinghouse Chassis V-2102-1.

**Sonora RMR-219, RMR-220, RMR-245, 402A Mahogany and Prima Vera**

These models are the same as Model RMR appearing on pages 17-6 to 17-8 of *Rider's Volume XVII*.

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**RCA 66X1, 66X2, RC-1038, 66X3, 66X4, 66X7, 66X8, 66X9, Chassis RC-1038A**

These models are similar to Model 66X1, Chassis RC-1038, appearing on pages 15-89 through 15-91 of *Rider's Volume XV*. The following additions have been made to the parts list.

Stock No.	Description
72753	Plate—dial back plate complete with four (4) pulleys less dial for models 66X3, 66X4, 66X7, 66X8, 66X9
6134	Resistor—1200 ohms, 1 watt, (R11)
72514	Back—cabinet back for 66X7 and 66X9
72721	Back—cabinet back for 66X8
X1627	Baffle—baffle board and grill cloth for 66X7, 66X8, 66X9
Y1423	Cabinet—catalin (black) cabinet for 66X7
Y1408	Cabinet—catalin (red) cabinet for 66X8
Y1393	Cabinet—catalin (black and white) cabinet for 66X9
72822	Dial—glass dial scale for 66X3, 66X7, 66X8, 66X9
72678	Knob—control knob (black) for 66X7 and 66X9
71821	Knob—control knob (maroon) for 66X8
72295	Socket—phono



**Sentinel 1U286**

This model is the same as Model 286PR on pages 16-14 to 16-16 of Rider's Volume XVI, except for the following changes:

A 0.1- $\mu$ f capacitor (46) has been placed between pin number 6 of the 1K5 oscillator modulator tube and the top side of the ganged tuning capacitor. A 470,000-ohm resistor (48) has been connected in the a-c line between the top of the 0.05- $\mu$ f capacitor (11) and the 4,700,000-ohm resistor (35). A 0.05- $\mu$ f capacitor (47) has been connected from the junction of resistors 48 and 35 and ground. Two interlock plugs have been added in the power line. The 21 transformers (2 and 3) may either be the transformers listed in the parts list on page 16-16, or they may be part number 20F299.

The following parts should be deleted from the parts list shown on page 16-16:

Illus. Part No.	Description
8 23E2014-4	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
10 23F2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
11 23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
12 23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
13 23F2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
14 23E2014-8	Capacitor, tubular, 0.05 $\mu$ f, 150 V.
16 23E2014-12	Capacitor, tubular, 0.002 $\mu$ f, 150 V.
1 29E2014-9	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
19 29E2014-9	Capacitor, tubular, 0.1 $\mu$ f, 150 V.
23 23E480-3	Resistor, carbon, 68 ohm, $\frac{1}{4}$ W.
20E128	"A" battery con. bracket assembly, with 4 No. 10E43 trimount studs.
20F180-1	Complete cabinet assembly, with lid and loop, handle, lid catch and pushbutton assembly and bottom assembly.
20E184	Top lid assembly with loop and hinges.
20E186-1	Bottom assembly with locking slotted head stud.
20E28-1	Cabinet center section, less lid and bottom assemblies, with handle, speaker screen, lid catch and pushbutton.
20E186-1	Hinge and spring assembly with two No. 82E36-F10 No. 4-24 x $\frac{1}{4}$ mounting screws.
85E22-1	Handle, leather.
71E42-F10	Screw, No. 4-40 x 3/16 slot PHILM.

The following parts should be added to the parts list:

Illus. Part No.	Description
6 23E2004-1	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
10 23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
11 23F2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
12 22E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
13 23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
14 23F2004-7	Capacitor, tubular, 0.05 $\mu$ f, 200 V.
16 23E2004-2	Capacitor, tubular, 0.002 $\mu$ f, 400 V.
17 20E2004-9	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
25 27E680-3	Resistor, carbon, 68 ohm, 1 W.
44 20E780-2	Switch, lid operated, mounted on "A" battery bracket assembly.
43 20F284	Interlock, socket assembly.
46 23E2014-9	Capacitor, tubular, 0.1 $\mu$ f, 200 V.
47 20E2014-9	Capacitor, tubular, 0.05 $\mu$ f, 200 V.
48 85E47-1	Resistor, carbon, 470,000 ohm, $\frac{1}{4}$ W.
49 20F284	Interlock, socket assembly.
20F180-1	Complete cabinet assembly with lid and loop, handle, lid catch and pushbutton assembly and bottom assembly.
20E184-1	Top lid assembly with loop and hinges.

20E24-1	Cabinet center section, less lid and bottom assemblies, but with handle, speaker screen, lid catch and pushbutton assembly.
20E184-2	Hinge, right hinge and spring assembly with two No. 82E36-F10 No. 4-24 x $\frac{1}{4}$ mounting screws.
20E186-3	Left hinge and spring assembly with two No. 82E36-F10 No. 4-24 x $\frac{1}{4}$ mounting screws.
20E240-2	Complete "A" battery bracket assembly with lid operated switch assembly.
20E283	"A" battery contact plate assembly.
52E23	Plastic covered handle.
55E39	Handle strap, clock spring steel.
85E4-21	Screw, No. 4-40 x 3/16 Slot headless cup point for control knobs.
82E2004	Screw, for adjusting lid switch shaft.

**RIDER MANUALS Mean SUCCESSFUL SERVICING**

**Arvin 150TC, 151TC, Chassis RE-228-1**

These models are the same as Model 150TC appearing on pages 17-5 to 17-8 of Rider's Volume XVII, except for the following changes. The 35W4 rectifier tube has been replaced with a 100-ma selenium rectifier. The 35B5 output tube has been replaced with a 50L6 output tube. A negative temperature coefficient resistor has been added in the filament line. The filter choke has been replaced by a 1200-ohm resistor and a tap on the output transformer. The 0.005- $\mu$ f tone capacitor has been replaced with an 0.003- $\mu$ f capacitor.

REF. NO.	PART NO.	DESCRIPTION
		DELETE
	A19141	Terminal Strip, Double
	B21123-1	Tube retainer Spring, long
R13	C20060-331	Resistor 330 ohm $\frac{1}{4}$
R14	C20070-123	Resistor 11,000 ohm $\frac{1}{4}$ W
R15	C20060-104	Resistor 0.1 Megohm $\frac{1}{4}$ W
L3	AE21107-1	Filter Choke Assembly
T3	AE21099-1	Output Transformer

REF. NO.	PART NO.	DESCRIPTION
		ADD
	A19140	Terminal Strip, Single left hand
	A18254-1	Socket, tube wafer octal
SR	A20207-2	Selenium Rectifier

T3	AC21494-1	Output Transformer
NTCR	AC21489-1	N.T.C. Resistor and Can Assy.
C10	C20069-302	Capacitor 0.003 $\mu$ f 600 V P.T.
R13	C20223-122	Resistor 1200 ohm, 2W. $\pm$ 10%

**Montgomery Ward 74BR-1812B**

This model is the same as Model 74BR-1812A appearing on pages 16-17 through 16-21 of Rider's Volume XVI.

**Wells-Gardner 7A41-593**

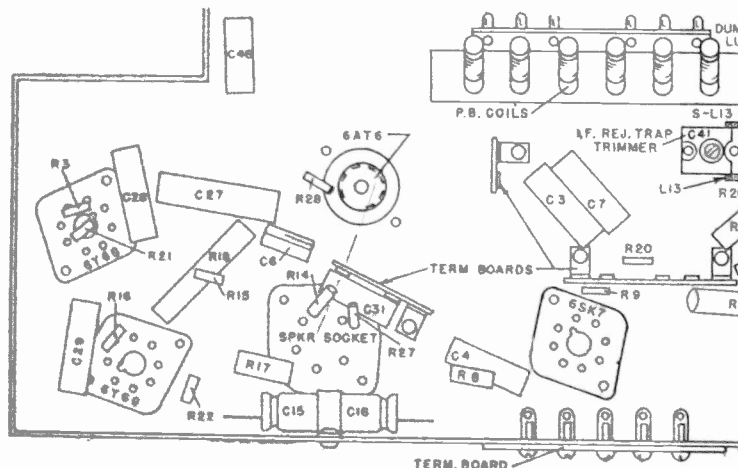
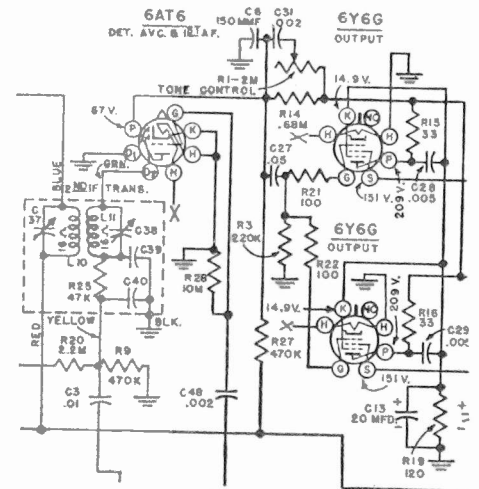
This model is the same as Model 7A41-704 appearing on pages 12-8 to 12-11 of Rider's Volume XII.

**Westinghouse H-110A, H-111A, H-137A, and H-138A, Chassis V-2102-2**

These models are the same as Model H-104 on pages 15-1 to 15-4 of Rider's Volume XV, except that the tone control circuit has been modified and a 6AT6 miniature tube replaces the 6SF7 tube used originally. The tube layout is the same, but certain components have been added, as may be seen in the accompanying diagrams.

The following parts should be added to the parts list:

Part No.	Description
RCP10W6202A	Capacitor, 0.002 $\mu$ f, 600 v. (C48)
RC10AE474M	Resistor, 470K $\frac{1}{4}$ w. (R27)
RC10AE106M	Resistor, 10M $\frac{1}{4}$ w. (R28)



Changes in the tone control circuit, above, and in the parts layout, left, of the Westinghouse Chassis V-2102-2.

**RCA 54B1, 54B2, 54B3**

These models appear on pages 15-22 to 15-24 of *Rider's Volume XV*. The position of the green and black leads of the second i-f transformer (stamped 922246-2) have been transposed to facilitate assembly. This change affects only the wiring, not the schematic.

**Sears Roebuck 7056**

This model appears on pages 13-75 and 13-76 of *Rider's Volume XIII*. The Astatic L-40A crystal cartridge should be used as a replacement cartridge for the phonograph pickup.

**RIDER MANUALS** Mean SUCCESSFUL SERVICING

**Noblitt-Sparks 664 and 664A**

These models are the same as Model 6640, Chassis RE-206-1, appearing on pages 17-16 to 17-18 of *Rider's Volume XVII*, except that the loop assembly has been changed. The part number is AC18579-1.

**Stewart Warner VM-506261 Record Changer**

This model is the same as Model VM-505339, appearing on pages RCD.CH. 17-14 to RCD.CH. 17-19 of *Rider's Volume XVII*, except for color.

**Wilcox-Gay 6B10, 6B20, 6B30, 6B40, and 6B42**

These models are the same as Model 6B10, Late, on page 15-4 of *Rider's Volume XV*, except for the following changes. A 0.00005- $\mu$ f capacitor (C34) has been connected across R38.

A 6E5 tube has been substituted for the 6U5; the socket connections are the same. A 6SJ7GT tube has been substituted for the 6J7GT formerly used. The socket connections for the 6SJ7GT are:

- 1 No connection
- 2 Heater
- 3 Suppressor Grid
- 4 Grid
- 5 Cathode
- 6 Screen Grid
- 7 Heater
- 8 Plate

The points are utilized for voltage measurements, see the accompanying voltage chart.

**TYPICAL VOLTAGE CHART**

TUBE	VOLTAGE TO GROUND PIN NO.							
	1	2	3	4	5	6	7	8
6A8	0	13	240	80	-10	156	13	2.6
6SK7	0	13	3.3		3.3	80	13	240
6SN7	0	232	6.5	0	55	1.6	13	13
6SQ7	0	0	1.5	0	0	68	13	13
6V6	0	13	225	240	0	240	13	13
6SJ7	0	13	0	0	0	3.3	13	80
5Y3	0	280		275AC		275AC		280
6E5	13	6	0	240	1	13		

MEASURED WITH 1000 OHMS PER VOLT METER. SCALES USED -3-30-150-300

ALL PLUNGERS IN RELEASED POSITION.

Typical voltage chart for the Wilcox-Gay 6B10, 6B20, 6B30, 6B40, and 6B42.

**Arvin 140P, Chassis RE-209**

This model appears on pages 17-1 through 17-4 of *Rider's Volume XVII*. The volume control mounting has been revised to prevent the dial-indicator eccentric mounted on the volume-control shaft from binding in its bracket. The mounting bushing on the control is slotted instead of threaded, and the control is mounted with a C20227 Speed Clip, instead of a 3/8-inch nut.

The following changes have been made in the oscillator circuit to increase the sensitivity. The 0.05- $\mu$ f capacitor (C5) formerly located between the bottom of the oscillator tickler coil (L3) and floating ground, has been connected from the second grid of the 1R5 converter tube (pin 3) to the junction of the top of the tickler coil to the bottom of the primary of T1. The 22,000-ohm resistor (R3) is now connected in parallel with C5 instead of from the bottom of the tickler coil to the bottom of the primary of T1. The top of the tickler coil is connected to the bottom of the primary of T1 instead of to the second grid of the 1R5 converter tube. The 1R5 plate current as well as the screen current thus passes through the tickler coil.

To prevent audio oscillation, a 0.00025- $\mu$ f bypass capacitor (C10) has been added from the plate to the positive filament of the 1S5 tube. The plate load of the 1S5 tube (R9) has been changed from 330,000 to 470,000 ohms. The value of R21 has been changed from 6.8 to 15 megohms. The value of C13 has been changed from 0.05 $\mu$ f to 0.02 $\mu$ f. The 0.05- $\mu$ f capacitor (C19) has been changed from the input side to the plate side of I4 to reduce hash.

Since the clinch nuts in the top of the loop shield, which hold the screw in the top of the cabinet, have at times come loose, a brass extruded nut, part number A21681, has been made available for replacing these clinch nuts when they come loose.

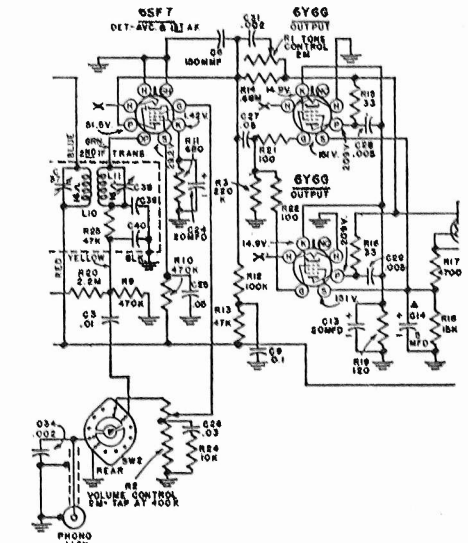
In the note under the resistance chart on page 17-4 of *Rider's Volume XVII*, K was shown as equaling 100 ohms. This note should read K equals 1000 ohms. The parts numbers given in the parts list on page 17-2 for the miniature tube sock-

ets were A21032-1 and A21032-2. These should have been A20132-1 and A20132-2.

A slide switch, part number A21051, has been added to the parts list.

**Westinghouse H-110, H-111, H-137, and H-138, Chassis V-2102-1**

These models are the same as Model H-104 on pages 15-1 to 15-4 of *Rider's Volume XV*, except that the tone control circuit has been modified. This change is illustrated in the accompanying diagram.



The modified tone control circuit of the Westinghouse Chassis V-2102-1.

**Sonora RMR-219, RMR-220, RMR-245, 402A Mahogany and Prima Vera**

These models are the same as Model RMR appearing on pages 17-6 to 17-8 of *Rider's Volume XVII*.

**RIDER MANUALS** Mean SUCCESSFUL SERVICING

**RCA 66X1, 66X2, RC-1038, 66X3, 66X4, 66X7, 66X8, 66X9, Chassis RC-1038A**

These models are similar to Model 66X1, Chassis RC-1038, appearing on pages 15-89 through 15-91 of *Rider's Volume XV*. The following additions have been made to the parts list.

Stock No.	Description
72753	Plate—dial plate complete with four (4) pulleys less dial for models 66X3, 66X4, 66X7, 66X8, 66X9
6134	Resistor—1200 ohms, 1 watt, (R11)
72514	Back—cabinet back for 66X7 and 66X9
72721	Back—cabinet back for 66X8
X1627	Baffle—baffle board and grill cloth for 66X7, 66X8, 66X9
Y1423	Cabinet—catalin (black) cabinet for 66X7
Y1408	Cabinet—catalin (red) cabinet for 66X8
Y1393	Cabinet—catalin (black and white) cabinet for 66X9
72822	Dial—glass dial scale for 66X3, 66X7, 66X8, 66X9
72678	Knob—control knob (black) for 66X7 and 66X9
71821	Knob—control knob (maroon) for 66X8
72295	Socket—phono

**Sentinel IU286**

This model is the same as Model 286PR on pages 16-14 to 16-16 of *Rider's Volume XVI*, except for the following changes.

A 0.1- $\mu$ f capacitor (46) has been placed between pin number 6 of the 1R5 oscillator-modulator tube and the top side of the ganged tuning capacitor. A 470,000-ohm resistor (48) has been connected in the avc line between the top of the 0.05- $\mu$ f capacitor (14) and the 4,700,000-ohm resistor (35). A 0.05- $\mu$ f capacitor (47) has been connected from the junction of resistors 48 and 35 and ground. Two interlock plugs have been added in the power line. The i-f transformers (2 and 3) may either be the transformers listed in the parts list on page 16-16, or they may be part number 20E299.

The following parts should be deleted from the parts list shown on page 16-16.

Illus. No.	Part No.	Description
8	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
10	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
11	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
12	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
13	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
14	23E2014-8	Capacitor, tubular, 0.05 $\mu$ f, 150 V.
16	23E2014-12	Capacitor, tubular, 0.002 $\mu$ f, 150 V.
17	23E2014-9	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
46	23E2014-9	Capacitor, tubular, 0.1 $\mu$ f, 150 V.
23	23E680-3	Resistor, carbon, 68 ohm, $\frac{1}{2}$ W.
	20E128	"A" battery con. bracket assembly, with 4 No. 10E43 trimount studs
	20E130-1	Complete cabinet assembly, with lid and loop, handle, lid catch and pushbutton assembly and bottom assembly
	20E134	Top lid assembly with loop and hinges
	20E135-1	Bottom assembly with locking slotted head stud
	30E25-1	Cabinet center section, less lid and bottom assemblies, with handle, speaker screen, lid catch and pushbutton
	20E136-1	Hinge and spring assembly with two No. 82E36-F10 No. 4-24 x $\frac{1}{4}$ mounting screws
	55E22-1	Handle, leather
	71E42-F10	Screw, No. 4-40 x 3/16 slot B.H.I.M.

The following parts should be added to the parts list.

Illus. No.	Part No.	Description
8	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
10	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
11	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
12	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
13	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
14	23E2004-7	Capacitor, tubular, 0.05 $\mu$ f, 200 V.
16	23E2004-2	Capacitor, tubular, 0.002 $\mu$ f, 400 V.
17	23E2004-8	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
23	27E680-3	Resistor, carbon, 68 ohm, 1 W.
44	20E280-2	Switch, lid operated, mounted on "A" battery bracket assembly
45	20E284	Interlock, socket assembly
46	23E2014-9	Capacitor, tubular, 0.1 $\mu$ f, 200 V.
47	23E2014-8	Capacitor, tubular, 0.05 $\mu$ f, 200 V.
48	27E47-7	Resistor, carbon, 470,000 ohm, $\frac{1}{4}$ W.
48	20E284	Interlock, socket assembly
	20E130-3	Complete cabinet assembly with lid and loop, handle, lid catch and pushbutton assembly
	20E134-3	Top lid assembly with loop and hinges

30E25-3	Cabinet center section, less lid and bottom assemblies, but with handle, speaker screen, lid catch and pushbutton assembly.
20E136-2	Hinge, right hinge and spring assembly with two No. 82E36-F10 No. 4-24 x $\frac{1}{4}$ mounting screws
20E136-3	Left hinge and spring assembly with two No. 82E36-F10 No. 4-24 x $\frac{1}{4}$ mounting screws
20E280-2	Complete "A" battery bracket assembly with lid operated switch assembly
20E283	"A" battery contact plate assembly
52E23	Plastic covered handle
55E39	Handle strap, clock spring steel
85E4-21	Screw, No. 4-40 x 3/16 Slot headless cup point for control knobs
32E2004	Screw, for adjusting lid switch shaft

**RIDER MANUALS Mean SUCCESSFUL SERVICING**

**Arvin 150TC, 151TC, Chassis RE-228-1**

These models are the same as Model 150TC appearing on pages 17-5 to 17-8 of *Rider's Volume XVII*, except for the following changes. The 35W4 rectifier tube has been replaced with a 100-ma selenium rectifier. The 35B5 output tube has been replaced with a 50L6 output tube. A negative temperature coefficient resistor has been added in the filament line. The filter choke has been replaced by a 1200-ohm resistor and a tap on the output transformer. The 0.005- $\mu$ f tone capacitor has been replaced with an 0.003- $\mu$ f capacitor.

**DELETE**

REF. NO.	PART NO.	DESCRIPTION
	A19141	Terminal Strip, Double
	B21123-1	Tube retainer Spring, long
R13	C20060-331	Resistor 330 ohm $\frac{1}{4}$
R14	C20070-123	Resistor 11,000 ohm $\frac{1}{4}$ W
R15	C20060-104	Resistor 0.1 Megohm $\frac{1}{4}$ W
L3	AE21107-1	Filter Choke Assembly
T3	AE21099-1	Output Transformer

**ADD**

REF. NO.	PART NO.	DESCRIPTION
	A19140	Terminal Strip, Single left hand
	A18254-1	Socket, tube wafer octal
SR	A20207-2	Selenium Rectifier

T3	AC21494-1	Output Transformer
N.T.C.R.	AC21489-1	N.T.C. Resistor and Can Assy.
C10	C20069-302	Capacitor 0.003 $\mu$ f 600 V P.T.
R13	C20223-122	Resistor 1200 ohm, 2W. $\pm$ 10%

**Montgomery Ward 74BR-1812B**

This model is the same as Model 74BR-1812A appearing on pages 16-17 through 16-21 of *Rider's Volume XVI*.

**Wells-Gardner 7A41-593**

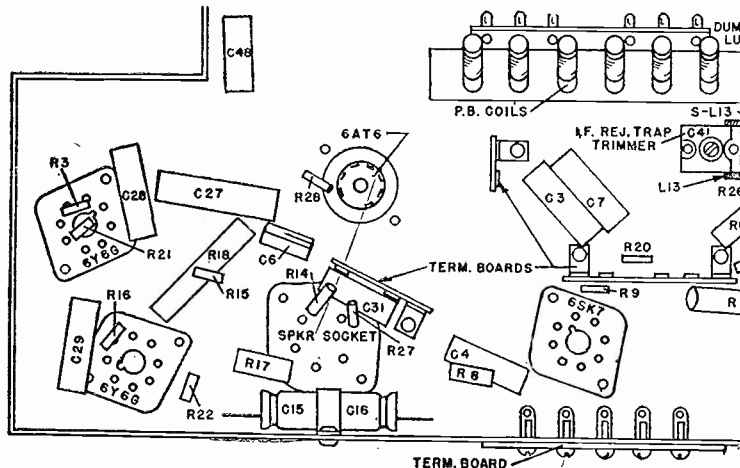
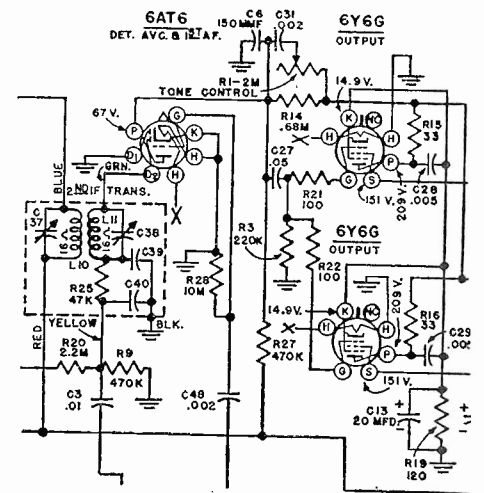
This model is the same as Model 7A41-704 appearing on pages 12-8 to 12-11 of *Rider's Volume XII*.

**Westinghouse H-110A, H-111A, H-137A, and H-138A, Chassis V-2102-2**

These models are the same as Model H-104 on pages 15-1 to 15-4 of *Rider's Volume XV*, except that the tone control circuit has been modified and a 6AT6 miniature tube replaces the 6SF7 tube used originally. The tube layout is the same, but certain components have been added, as may be seen in the accompanying diagrams.

The following parts should be added to the parts list.

Part No.	Description
RCP10W6202A	Capacitor, 0.002 $\mu$ f, 600 v. (C48)
RC10AE474M	Resistor, 470K $\frac{1}{4}$ w. (R27)
RC10AE106M	Resistor, 10M $\frac{1}{4}$ w. (R28)



Changes in the tone control circuit, above, and in the parts layout, left, of the Westinghouse Chassis V-2102-2.

**RCA 54B1, 54B2, 54B3**

These models appear on pages 15-22 to 15-24 of *Rider's Volume XV*. The position of the green and black leads of the second i-f transformer (stamped 922246-2) have been transposed to facilitate assembly. This change affects only the wiring, not the schematic.

**Sears Roebuck 7056**

This model appears on pages 13-75 and 13-76 of *Rider's Volume XIII*. The Astatic L-40A crystal cartridge should be used as a replacement cartridge for the phonograph pickup.

**RIDER MANUALS** Mean SUCCESSFUL SERVICING

**Noblitt-Sparks 664 and 664A**

These models are the same as Model 6640, Chassis RE-206-1, appearing on pages 17-16 to 17-18 of *Rider's Volume XVII*, except that the loop assembly has been changed. The part number is AC18579-1.

**Stewart Warner VM-506261 Record Changer**

This model is the same as Model VM-505339, appearing on pages RCD.CH. 17-14 to RCD.CH. 17-19 of *Rider's Volume XVII*, except for color.

**Wilcox-Gay 6B10, 6B20, 6B30, 6B40, and 6B42**

These models are the same as Model 6B10, Late, on page 15-4 of *Rider's Volume XV*, except for the following changes. A 0.00005- $\mu$ f capacitor (C34) has been connected across R38.

A 6E5 tube has been substituted for the 6U5; the socket connections are the same. A 6SJ7GT tube has been substituted for the 6J7GT formerly used. The socket connections for the 6SJ7GT are:

- 1 No connection
- 2 Heater
- 3 Suppressor Grid
- 4 Grid
- 5 Cathode
- 6 Screen Grid
- 7 Heater
- 8 Plate

Tie points are utilized for voltage measurements, see the accompanying voltage chart.

**Arvin 140P, Chassis RE-209**

This model appears on pages 17-1 through 17-4 of *Rider's Volume XVII*. The volume control mounting has been revised to prevent the dial-indicator eccentric mounted on the volume-control shaft from binding in its bracket. The mounting bushing on the control is slotted instead of threaded, and the control is mounted with a C20227 Speed Clip, instead of a 3/8-inch nut.

The following changes have been made in the oscillator circuit to increase the sensitivity. The 0.05- $\mu$ f capacitor (C5) formerly located between the bottom of the oscillator tickler coil (L3) and floating ground, has been connected from the second grid of the 1R5 converter tube (pin 3) to the junction of the top of the tickler coil to the bottom of the primary of T1. The 22,000-ohm resistor (R3) is now connected in parallel with C5 instead of from the bottom of the tickler coil to the bottom of the primary of T1. The top of the tickler coil is connected to the bottom of the primary of T1 instead of to the second grid of the 1R5 converter tube. The 1R5 plate current as well as the screen current thus passes through the tickler coil.

To prevent audio oscillation, a 0.00025- $\mu$ f bypass capacitor (C10) has been added from the plate to the positive filament of the 1S5 tube. The plate load of the 1S5 tube (R9) has been changed from 330,000 to 470,000 ohms. The value of R21 has been changed from 6.8 to 15 megohms. The value of C13 has been changed from 0.05 $\mu$ f to 0.02 $\mu$ f. The 0.05- $\mu$ f capacitor (C19) has been changed from the input side to the plate side of L4 to reduce hash.

Since the clinch nuts in the top of the loop shield, which hold the screw in the top of the cabinet, have at times come loose, a brass extruded nut, part number A21681, has been made available for replacing these clinch nuts when they come loose.

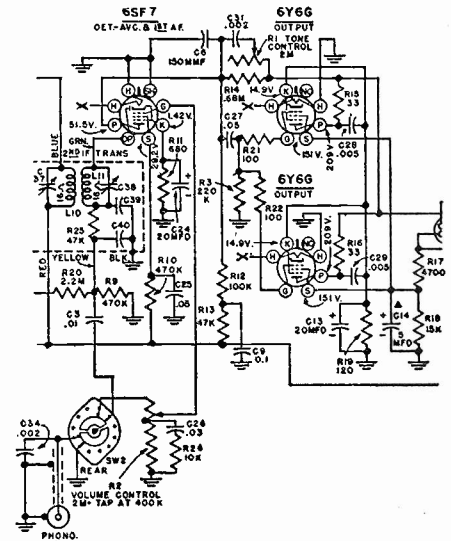
In the note under the resistance chart on page 17-4 of *Rider's Volume XVII*, K was shown as equalling 100 ohms. This note should read K equals 1000 ohms. The parts numbers given in the parts list on page 17-2 for the miniature tube sock-

ets were A21032-1 and A21032-2. These should have been A20132-1 and A20132-2.

A slide switch, part number A21051, has been added to the parts list.

**Westinghouse H-110, H-111, H-137, and H-138, Chassis V-2102-1**

These models are the same as Model H-104 on pages 15-1 to 15-4 of *Rider's Volume XV*, except that the tone control circuit has been modified. This change is illustrated in the accompanying diagram.



The modified tone control circuit of the Westinghouse Chassis V-2102-1.

**Sonora RMR-219, RMR-220, RMR-245, 402A Mahogany and Prima Vera**

These models are the same as Model RMR appearing on pages 17-6 to 17-8 of *Rider's Volume XVII*.

**RIDER MANUALS** Mean SUCCESSFUL SERVICING

**RCA 66X1, 66X2, RC-1038, 66X3, 66X4, 66X7, 66X8, 66X9, Chassis RC-1038A**

These models are similar to Model 66X1, Chassis RC-1038, appearing on pages 15-89 through 15-91 of *Rider's Volume XV*. The following additions have been made to the parts list.

Stock No.	Description
72753	Plate-dial back plate complete with four (4) pulleys less dial for models 66X3, 66X4, 66X7, 66X8, 66X9
6134	Resistor—1200 ohms, 1 watt, (R11)
72514	Back—cabinet back for 66X7 and 66X9
72721	Back—cabinet back for 66X8
X1627	Baffle—baffle board and grill cloth for 66X7, 66X8, 66X9
Y1423	Cabinet—catalin (black) cabinet for 66X7
Y1408	Cabinet—catalin (red) cabinet for 66X8
Y1393	Cabinet—catalin (black and white) cabinet for 66X9
72822	Dial—glass dial scale for 66X3, 66X7, 66X8, 66X9
72678	Knob—control knob (black) for 66X7 and 66X9
71821	Knob—control knob (maroon) for 66X8
72295	Socket—phono

**TYPICAL VOLTAGE CHART**

TUBE	VOLTAGE TO GROUND PIN NO.							
	1	2	3	4	5	6	7	8
6A8	0	13	240	80	-10	156	13	2.6
6SK7	0	13	3.3		3.3	80	13	240
6SN7	0	232	6.5	0	55	1.6	13	13
6SQ7	0	0	1.5	0	0	68	13	13
6V6	0	13	225	240	0	240	13	13
6SJ7	0	13	0	0	0	3.3	13	80
5Y3	0	280		275AC		275AC		280
6E5	13	6	0	240	1	13		

MEASURED WITH 1000 OHMS PER VOLT METER. SCALES USED -3-30-150-300

ALL PLUNGERS IN RELEASED POSITION.

Typical voltage chart for the Wilcox-Gay 6B10, 6B20, 6B30, 6B40, and 6B42.



**Sentinel 1U286**

This model is the same as Model 286PR on pages 16-14 to 16-16 of Rider's Volume XVI, except for the following changes.

A 0.1  $\mu$ f capacitor (46) has been placed between pin number 6 of the 1R5 oscillator-modulator tube and the top side of the ganged tuning capacitor. A 470,000-ohm resistor (48) has been connected in the arc line between the top of the 0.05- $\mu$ f capacitor (14) and the 4,700,000-ohm resistor (35). A 0.05- $\mu$ f capacitor (47) has been connected from the junction of resistors 48 and 35 and ground. Two interlock plugs have been added in the power line. The if transformers (2 and 3) may either be the transformers listed in the parts list on page 16-16, or they may be part number 20E299.

The following parts should be deleted from the parts list shown on page 16-16.

Illus. No.	Part No.	Description
8	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
10	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
11	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
12	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
13	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
14	23E2014-8	Capacitor, tubular, 0.05 $\mu$ f, 150 V.
16	23E2014-12	Capacitor, tubular, 0.002 $\mu$ f, 150 V.
17	23E2014-9	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
18	23E2014-9	Capacitor, tubular, 0.1 $\mu$ f, 150 V.
23	23E680-3	Resistor, carbon, 68 ohm, 1/4 W.
	20E128	"A" battery con. bracket assembly, with 4 No. 10E43 trimount studs
	20E130-1	Complete cabinet assembly, with lid and loop, handle, lid catch and pushbutton assembly and bottom assembly
	20E134	Top lid assembly with loop and hinges
	20E136-1	Bottom assembly with locking slotted head stud
	30E25-1	Cabinet center section, less lid and bottom assemblies, with handle, speaker screen, lid catch and pushbutton
	20E136-1	Hinge and spring assembly with two No. 82E36-F10 No. 4-24 x 1/4 mounting screws
	55E22-1	Handle, leather
	71E42-F10	Screw, No. 4-40 x 3/16 slot R.H.I.M.

The following parts should be added to the parts list

Illus. No.	Part No.	Description
8	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
10	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
11	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
12	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
13	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
14	23E2004-7	Capacitor, tubular, 0.05 $\mu$ f, 200 V.
16	23E2004-2	Capacitor, tubular, 0.002 $\mu$ f, 400 V.
17	23E2004-8	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
23	27E680-3	Resistor, carbon, 68 ohm, 1 W.
44	20E280-2	Switch, lid operated, mounted on "A" battery bracket assembly
45	20E284	Interlock, socket assembly
46	23E2014-9	Capacitor, tubular, 0.1 $\mu$ f, 200 V.
47	23E2014-8	Capacitor, tubular, 0.05 $\mu$ f, 200 V.
48	27E47-7	Resistor, carbon, 470,000 ohm, 1/4 W.
49	20E284	Interlock, socket assembly
	20E130-1	Complete cabinet assembly with lid and loop, handle, lid catch and pushbutton assembly and bottom assembly
	20E134	Top lid assembly with loop and hinges

30E25-3	Cabinet center section, less lid and bottom assemblies, but with handle, speaker screen, lid catch and pushbutton assembly.
20E136-2	Hinge, right hinge and spring assembly with two No. 82E36-F10 No. 4-24 x 1/4 mounting screws
20E136-3	Left hinge and spring assembly with two No. 82E36-F10 No. 4-24 x 1/4 mounting screws
20E280-2	Complete "A" battery bracket assembly with lid operated switch assembly
20E283	"A" battery contact plate assembly
52E23	Plastic covered handle
55E39	Handle strap, clock spring steel
85E4-21	Screw, No. 4-40 x 3/16 Slot headless cup point for control knobs
82E2004	Screw, for adjusting lid switch shaft

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**Arvin 150TC, 151TC, Chassis RE-228-1**

These models are the same as Model 150TC appearing on pages 17-5 to 17-8 of Rider's Volume XVII, except for the following changes. The 35W4 rectifier tube has been replaced with a 100-ma selenium rectifier. The 35B5 output tube has been replaced with a 50L6 output tube. A negative temperature coefficient resistor has been added in the filament line. The filter choke has been replaced by a 1200-ohm resistor and a tap on the output transformer. The 0.005- $\mu$ f tone capacitor has been replaced with an 0.003- $\mu$ f capacitor.

REF. NO.	PART NO.	DESCRIPTION
	DELETE	
	A19141	Terminal Strip, Double
	B21123-1	Tube retainer Spring, long
R13	C20060-331	Resistor 330 ohm 1/4
R14	C20070-123	Resistor 11,000 ohm 1/4 W
R15	C20060-104	Resistor 0.1 Megohm 1/4 W
L3	AE21107-1	Filter Choke Assembly
T3	AE21099-1	Output Transformer

REF. NO.	PART NO.	DESCRIPTION
	ADD	
	A19140	Terminal Strip, Single left hand
	A18254-1	Socket, tube wafer octal
SR	A20207-2	Selenium Rectifier

T3	AC21494-1	Output Transformer
NTCR	AC21489-1	N.T.C. Resistor and Can Assy.
C10	C20069-302	Capacitor 0.003 $\mu$ f 600 V P.T.
R13	C20223-122	Resistor 1200 ohm, 2W. $\pm$ 10%

**Montgomery Ward 74BR-1812B**

This model is the same as Model 74BR-1812A appearing on pages 16-17 through 16-21 of Rider's Volume XVI.

**Wells-Gardner 7A41-593**

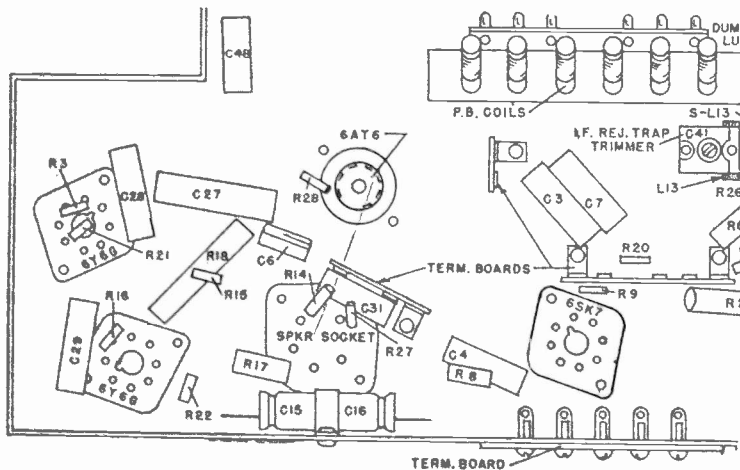
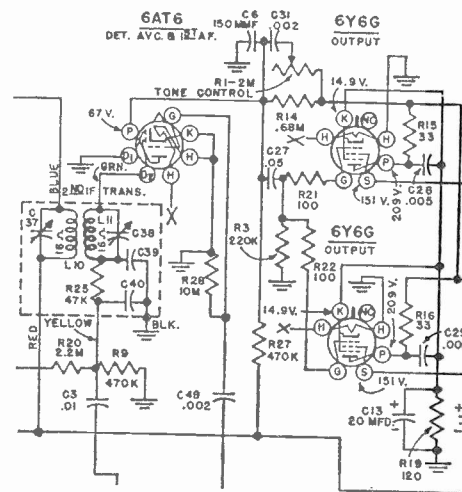
This model is the same as Model 7A41-704 appearing on pages 12-3 to 12-11 of Rider's Volume XII.

**Westinghouse H-110A, H-111A, H-137A, and H-138A, Chassis V-2102-2**

These models are the same as Model H-104 on pages 15-1 to 15-4 of Rider's Volume XV, except that the tone control circuit has been modified and a 6AT6 miniature tube replaces the 6SF7 tube used originally. The tube layout is the same, but certain components have been added, as may be seen in the accompanying diagrams.

The following parts should be added to the parts list.

Part No.	Description
RCP10W6202A	Capacitor, 0.002 $\mu$ f, 600 v. (C48)
RC10AE474M	Resistor, 470K 1/4 w. (R27)
RC10AE106M	Resistor, 10M 1/4 w. (R28)



Changes in the tone control circuit, above, and in the parts layout, left, of the Westinghouse Chassis V-2102-2.

## A Word of Caution

*Continued from page 1*

time from different stations, a difficult problem is posed . . . Which one to watch is a problem, so much so that many people are becoming very highly selective.

### TV Effects on Family Life

As a facility, TV is changing peoples' lives—changing the way they live in their homes . . . At the outset people stay in and watch everything which can be seen on a single receiver, but after a while they have not done the normal amount of reading—they don't get together with their friends (who also have TV receivers) until comparatively late in the evening . . . Yes, people are watching TV but they also realize that they have lost the independence of action in the home because of the attraction of TV.

The net result is that in homes where TV receivers have been in use for several months, members of the family are beginning to return to normalcy little by little . . . They are becoming more and more critical and selective of TV pro-

grams—and use their a-m receivers more than they did shortly after they acquired the TV receiver . . . This is no reflection on the merits of TV, instead it is habit fighting back . . . In our opinion it is even more than habit—it is a way of life which is striving to stave off a transition . . . Ultimately—many years in the future—this way of life, which was born of what we can call blind radio, will go down to defeat, but for years to come it will survive.

This reaction I am describing is not a figment of imagination—it is the reaction of the members of my family and the families of my friends . . . And not only in New York, but in Philly and Washington as well—wherever there is a choice of stations with a representative number of hours on the air . . .

### The Feminine Angle

The response by women to radio broadcasting over the past 28 years is the reason for its success. Everything will be done to accomplish the same thing with TV, but to do so means that more than one TV receiver will be needed in every home—conceivably as many as there are

a-m receivers today . . . Moreover, the development of such programming for feminine appeal as will permit turning off the video and listening to the sound alone, is a herculean task; that is, if leaving the picture on and having such dialogue, sound effects, side comments and the like—all the things which stir the imagination in blind radio, will make the telecast childish, if not foolish . . . The woman must be served . . . If she wishes, she can listen while cooking the dinner in the kitchen—reclining on the sofa in the living room or turning over the mattress in the bedroom . . . She can't be bothered *looking* while she is working . . . Neither will she accept a blasting radio in one room while she is working in another . . .

Where does all of this lead us? . . . It leads to the conclusion that a-m radio is far from being dead even in the towns where TV now is plentiful—let alone all those parts of the country where TV is not yet available and may not be for a long time to come . . . As we said before, the public in TV areas may be shying away from the expensive a-m and f-m consoles—not because a.m. is finished, but because they feel that for the money involved, they want TV . . .

### A. M. Still a Factor

The serviceman who thinks that a.m. is gone forever is making a bad mistake . . . It is fine to prepare for TV but to cease actively soliciting a-m receiver repair by focusing every minute of thinking upon TV, is not sound business . . . In fact, it is aiding and abetting a situation which is pouring oil on a fire . . . The power of suggestion contained in the various forms of advertising and sales and service solicitation should never cease functioning . . .

Admittedly, a thorough understanding of the operation of the TV receiver automatically means a thorough grounding in the operation of a-m and f-m receivers, but to permit the mind to dwell *only* on TV and to lose sight of the bread-and-butter a-m business, is all wrong. TV repair should be taken in your stride and since there is no home with TV which does not have one or more a-m receivers, *these receivers, which are far from being has-beens, should not be neglected.*

Perhaps a few years from now, the existing service potential of 70,000,000 a-m and f-m receivers in use will dwindle to perhaps one half or even one third, but even a few years is still a long way off . . . Perhaps the acceleration of the defense program with inevitable contraction of available supplies of hard goods, may tend to limit TV receiver production so that it will take longer than the anticipated time to blanket the nation . . . *Will the servicing industry give up its possible a-m and f-m receiver income awaiting the arrival of TV?* It is sound to visualize the destiny of the servicing business being in the lap of TV, yet it is equally sound to take advantage of every opportunity to do business—and very unsound to think that something which is still necessary to the completion of this nation's people's everyday life, will just shrink of nothingness overnight.

*Please turn to page 9*

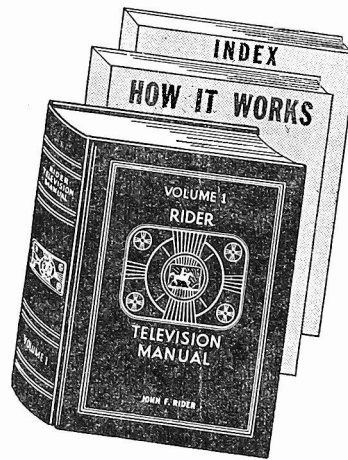
# "Giant Pages Make Circuits Easier to Trace"

That's the opinion of R. W. Meyers,  
General Service Manager, Gamble-Skogmo, Inc.  
of the 440-Square Inch Schematics in.

VOLUME 1

RIDER

# Television MANUAL



Mr. Meyers says further,

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# Successful SERVICING

REG. U. S. PAT. OFF.

Vol. 10

OCTOBER-NOVEMBER, 1948

No. 2

Dedicated to the financial and technical advancement of the  
Electronic Maintenance Personnel

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## CURTAIN TIME

### A New Wrinkle for TV

We hear that those homes with television find it very easy to get baby sitters . . . In fact, competition is developing between the professional watchers of the infant and the neighbors who do not own TV receivers . . . Maybe that feature should be advertised more—especially if sandwiches, beer and candy also are furnished.

### Factory TV Service

We saw a release which stated that RCA has ceased the mandatory factory service during the first year after the purchase of a TV receiver. *Now it is optional on the part of the set buyer . . .* We are not certain that the mandatory service program was national in scope, but having been dropped in Metropolitan N.Y. and Philadelphia, it is probably true in Chi and wherever else it may have existed . . . May we refer you to *Service Magazine* page 14, November, 1946 and *SUCCESSFUL SERVICING* page 5 May, 1948! . . . Stewart-Warner has opened TV servicing on their products to the independent serviceman. Replacement parts also are available.

A *Reminder . . .* Read the feature article in this month's *SUCCESSFUL SERVICING* once more . . . Maybe you read it too rapidly or were interrupted . . . We've been writing that story since December, 1947 and even if it is our own, we think that it deserves at least 30 minutes of your thinking—no matter where you are in the nation.

### We Are

*Just Wondering . . .* What's the difference between the sound channel in a TV receiver and an f-m receiver? . . . Nothing much—higher frequencies—some-what differently shaped i-f response curves . . . The over-all basis of operation is the same . . . But do you know your FM? . . . What's the difference between the pix system in a TV receiver, (exclusive of the sweep circuits and the picture tube) and the conventional receiver? . . . Basically, that is superheterodyne-wise speaking—nothing much . . . Higher fre-

quencies, shaped i-f response curves—wider bandpass . . . But do you know the meaning of bandpass and how it is accomplished in different types of coupling systems? . . . One TV receiver manufacturer employs bridge-T coupling circuits in the pix i-f amp—something which is well-known in engineering circles, but we have not seen it used in any other home receiver of any kind . . .

Then come the sync and sweep circuits and the picture tube . . . There's the rub in TV servicing . . . Learn the facts about these parts of the TV receiver and you'll find TV servicing just as easy as any other type of receiver! . . . TV isn't tough . . . Every serious minded serviceman who desires to learn the theory can do so . . .

*Just Suggesting . . .* Many good test oscillators are in the hands of the servicing industry . . . It is not beyond the realm of good engineering to produce an f-m oscillator and marker-frequency source WHICH CAN BE USED WITH EXISTING TEST OSCILLATORS or SIGNAL GENERATORS which service stations now possess . . .

*Service Associations . . .* Those of you who sent us their names should have received our contribution to your association library by the time you read these lines . . . Those of you who wonder what the previous sentence meant, please refer to the August issue of *SS Curtain Time* page . . .

JOHN F. RIDER

### MORE PAGES

In line with the Rider policy of giving the readers of *SUCCESSFUL SERVICING* up-to-the-minute data on changes made in the course of receiver manufacturing as well as articles of timely interest to the service industry, we have enlarged this issue by four pages to accommodate the changes made in television receivers, whose data have been published in Rider's *TV Manual Volume 1*.

### Association Libraries

In accordance with the offer which was made in the editorial of the August, 1948 issue of *SUCCESSFUL SERVICING*, we have presented "FM Transmission and Reception", "Understanding Vectors and Phase", and "Television—How It Works" to the following associations for their libraries:

If your organization is not listed below, it is because we have not received your name and address.

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- Howard Claiss, Pres., Radio Serv. Assn. of Tucson, Tucson, Ariz.
- Thos. Cafore, Pres., Bridgeport Radio Serv. Assn., Bridgeport, Conn.
- P. R. Hollingsworth, Pres., Radio Assn. of Macon County, Decatur, Ill.
- Victor J. Wolf, Secy., Radio Service Men's Assn., Inc., Evansville, Ind.
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Please turn to page 10

**RCA 54B1, 54B2, 54B3**

These models appear on pages 15-22 to 15-24 of *Rider's Volume XV*. The position of the green and black leads of the second i-f transformer (stamped 922246-2) have been transposed to facilitate assembly. This change affects only the wiring, not the schematic.

**Sears Roebuck 7056**

This model appears on pages 13-75 and 13-76 of *Rider's Volume XIII*. The Astatic L-40A crystal cartridge should be used as a replacement cartridge for the phonograph pickup.

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**Noblitt-Sparks 664 and 664A**

These models are the same as Model 6640, Chassis RE-206-1, appearing on pages 17-16 to 17-18 of *Rider's Volume XVII*, except that the loop assembly has been changed. The part number is AC18579-1.

**Stewart Warner VM-506261 Record Changer**

This model is the same as Model VM-505339, appearing on pages RCD.CH. 17-14 to RCD.CH. 17-19 of *Rider's Volume XVII*, except for color.

**Wilcox-Gay 6B10, 6B20, 6B30, 6B40, and 6B42**

These models are the same as Model 6B10, Late, on page 15-4 of *Rider's Volume XV*, except for the following changes. a 0.00005- $\mu$ f capacitor (C34) has been connected across R38.

A 6E5 tube has been substituted for the 6U5; the socket connections are the same. A 6SJ7GT tube has been substituted for the 6J7GT formerly used. The socket connections for the 6SJ7GT are:

- 1 No connection
- 2 Heater
- 3 Suppressor Grid
- 4 Grid
- 5 Cathode
- 6 Screen Grid
- 7 Heater
- 8 Plate

Tie points are utilized for voltage measurements, see the accompanying voltage chart.

**TYPICAL VOLTAGE CHART**

TUBE	VOLTAGE TO GROUND PIN NO.							
	1	2	3	4	5	6	7	8
6A8	0	13	240	80	-10	156	13	2.6
6SK7	0	13	3.3		3.3	80	13	240
6SN7	0	232	6.5	0	55	1.6	13	13
6SQ7	0	0	1.5	0	0	68	13	13
6V6	0	13	225	240	0	240	13	13
6SJ7	0	13	0	0	0	3.3	13	80
5Y3	0	280		275AC		275AC		280
6E5	13	6	0	240	1	13		

MEASURED WITH 1000 OHMS PER VOLT METER. SCALES USED -3-30-150-300

ALL PLUNGERS IN RELEASED POSITION.

Typical voltage chart for the Wilcox-Gay 6B10, 6B20, 6B30, 6B40, and 6B42.

**Arvin 140P, Chassis RE-209**

This model appears on pages 17-1 through 17-4 of *Rider's Volume XVII*. The volume control mounting has been revised to prevent the dial-indicator eccentric mounted on the volume-control shaft from binding in its bracket. The mounting bushing on the control is slotted instead of threaded, and the control is mounted with a C20227 Speed Clip, instead of a 3/8-inch nut.

The following changes have been made in the oscillator circuit to increase the sensitivity. The 0.05- $\mu$ f capacitor (C5) formerly located between the bottom of the oscillator tickler coil (L3) and floating ground, has been connected from the second grid of the 1R5 converter tube (pin 3) to the junction of the top of the tickler coil to the bottom of the primary of T1. The 22,000-ohm resistor (R3) is now connected in parallel with C5 instead of from the bottom of the tickler coil to the bottom of the primary of T1. The top of the tickler coil is connected to the bottom of the primary of T1 instead of to the second grid of the 1R5 converter tube. The 1R5 plate current as well as the screen current thus passes through the tickler coil.

To prevent audio oscillation, a 0.00025- $\mu$ f bypass capacitor (C10) has been added from the plate to the positive filament of the 1S5 tube. The plate load of the 1S5 tube (R9) has been changed from 330,000 to 470,000 ohms. The value of R21 has been changed from 6.8 to 15 megohms. The value of C13 has been changed from 0.05 $\mu$ f to 0.02 $\mu$ f. The 0.05- $\mu$ f capacitor (C19) has been changed from the input side to the plate side of L4 to reduce hash.

Since the clinch nuts in the top of the loop shield, which hold the screw in the top of the cabinet, have at times come loose, a brass extruded nut, part number A21681, has been made available for replacing these clinch nuts when they come loose.

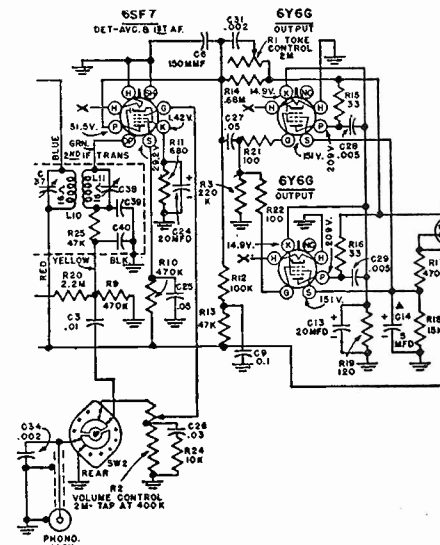
In the note under the resistance chart on page 17-4 of *Rider's Volume XVII*, K was shown as equalling 100 ohms. This note should read K equals 1000 ohms. The parts numbers given in the parts list on page 17-2 for the miniature tube sock-

ets were A21032-1 and A21032-2. These should have been A20132-1 and A20132-2.

A slide switch, part number A21051, has been added to the parts list.

**Westinghouse H-110, H-111, H-137, and H-138, Chassis V-2102-1**

These models are the same as Model H-104 on pages 15-1 to 15-4 of *Rider's Volume XV*, except that the tone control circuit has been modified. This change is illustrated in the accompanying diagram.



The modified tone control circuit of the Westinghouse Chassis V-2102-1.

**Sonora RMR-219, RMR-220, RMR-245, 402A Mahogany and Prima Vera**

These models are the same as Model RMR appearing on pages 17-6 to 17-8 of *Rider's Volume XVII*.

**RIDER MANUALS** Mean SUCCESSFUL SERVICING

**RCA 66X1, 66X2, RC-1038, 66X3, 66X4, 66X7, 66X8, 66X9, Chassis RC-1038A**

These models are similar to Model 66X1, Chassis RC-1038, appearing on pages 15-89 through 15-91 of *Rider's Volume XV*. The following additions have been made to the parts list.

- | Stock No. | Description  |
|-----------|--|
| 72753     | Plate—dial back plate complete with four (4) pulleys less dial for models 66X3, 66X4, 66X7, 66X8, 66X9 |
| 6134      | Resistor—1200 ohms, 1 watt, (R11)  |
| 72514     | Back—cabinet back for 66X7 and 66X9  |
| 72721     | Back—cabinet back for 66X8   |
| X1627     | Baffle—baffle board and grill cloth for 66X7, 66X8, 66X9   |
| Y1423     | Cabinet—catalin (black) cabinet for 66X7   |
| Y1408     | Cabinet—catalin (red) cabinet for 66X8   |
| Y1393     | Cabinet—catalin (black and white) cabinet for 66X9   |
| 72822     | Dial—glass dial scale for 66X3, 66X7, 66X8, 66X9   |
| 72678     | Knob—control knob (black) for 66X7 and 66X9  |
| 71821     | Knob—control knob (maroon) for 66X8  |
| 72295     | Socket—phono   |



**Sentinel 1U286**

This model is the same as Model 286PR on pages 16-14 to 16-16 of *Rider's Volume XVI*, except for the following changes.

A 0.1- $\mu$ f capacitor (46) has been placed between pin number 6 of the 1R5 oscillator-modulator tube and the top side of the ganged tuning capacitor. A 470,000-ohm resistor (48) has been connected in the avc line between the top of the 0.05- $\mu$ f capacitor (14) and the 4,700,000-ohm resistor (35). A 0.05- $\mu$ f capacitor (47) has been connected from the junction of resistors 48 and 35 and ground. Two interlock plugs have been added in the power line. The i-f transformers (2 and 3) may either be the transformers listed in the parts list on page 16-16, or they may be part number 20E299.

The following parts should be deleted from the parts list shown on page 16-16.

Illus. No.	Part No.	Description
8	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
10	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
11	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
12	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
13	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
14	23E2014-8	Capacitor, tubular, 0.05 $\mu$ f, 150 V.
16	23E2014-12	Capacitor, tubular, 0.002 $\mu$ f, 150 V.
17	23E2014-9	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
46	23E2014-9	Capacitor, tubular, 0.1 $\mu$ f, 150 V.
23	23E680-3	Resistor, carbon, 68 ohm, $\frac{1}{2}$ W.
	20E128	"A" battery con. bracket assembly, with 4 No. 10E43 trimount studs
	20E130-1	Complete cabinet assembly, with lid and loop, handle, lid catch and pushbutton assembly and bottom assembly
	20E134	Top lid assembly with loop and hinges
	20E135-1	Bottom assembly with locking slotted head stud
	30E25-1	Cabinet center section, less lid and bottom assemblies, with handle, speaker screen, lid catch and pushbutton
	20E136-1	Hinge and spring assembly with two No. 82E36-F10 No. 4-24 x $\frac{1}{4}$ mounting screws
	55E22-1	Handle, leather
	71E42-F10	Screw, No. 4-40 x 3/16 slot B.H.I.M.

The following parts should be added to the parts list.

Illus. No.	Part No.	Description
8	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
10	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
11	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
12	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
13	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
14	23E2004-7	Capacitor, tubular, 0.05 $\mu$ f, 200 V.
16	23E2004-2	Capacitor, tubular, 0.002 $\mu$ f, 400 V.
17	23E2004-8	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
23	27E680-3	Resistor, carbon, 68 ohm, 1 W.
44	20E280-2	Switch, lid operated, mounted on "A" battery bracket assembly
45	20E284	Interlock, socket assembly
46	23E2014-9	Capacitor, tubular, 0.1 $\mu$ f, 200 V.
47	23E2014-8	Capacitor, tubular, 0.05 $\mu$ f, 200 V.
48	27E47-7	Resistor, carbon, 470,000 ohm, $\frac{1}{4}$ W.
48	20E284	Interlock, socket assembly
	20E130-3	Complete cabinet assembly with lid and loop, handle, lid catch and pushbutton assembly
	20E134-3	Top lid assembly with loop and hinges

30E25-3	Cabinet center section, less lid and bottom assemblies, but with handle, speaker screen, lid catch and pushbutton assembly.
20E136-2	Hinge, right hinge and spring assembly with two No. 82E36-F10 No. 4-24 x $\frac{1}{4}$ mounting screws
20E136-3	Left hinge and spring assembly with two No. 82E36-F10 No. 4-24 x $\frac{1}{4}$ mounting screws
20E280-2	Complete "A" battery bracket assembly with lid operated switch assembly
20E283	"A" battery contact plate assembly
52E23	Plastic covered handle
55E39	Handle strap, clock spring steel
85E4-21	Screw, No. 4-40 x 3/16 Slot headless cup point for control knobs
82E2004	Screw, for adjusting lid switch shaft

**RIDER MANUALS** *Mean* **SUCCESSFUL SERVICING**

**Arvin 150TC, 151TC, Chassis RE-228-1**

These models are the same as Model 150TC appearing on pages 17-5 to 17-8 of *Rider's Volume XVII*, except for the following changes. The 35W4 rectifier tube has been replaced with a 100-ma selenium rectifier. The 35B5 output tube has been replaced with a 50L6 output tube. A negative temperature coefficient resistor has been added in the filament line. The filter choke has been replaced by a 1200-ohm resistor and a tap on the output transformer. The 0.005- $\mu$ f tone capacitor has been replaced with an 0.003- $\mu$ f capacitor.

**DELETE**

REF. NO.	PART NO.	DESCRIPTION
	A19141	Terminal Strip, Double
	B21123-1	Tube retainer Spring, long
R13	C20060-331	Resistor 330 ohm $\frac{1}{4}$ W
R14	C20070-123	Resistor 11,000 ohm $\frac{1}{4}$ W
R15	C20060-104	Resistor 0.1 Megohm $\frac{1}{4}$ W
L3	AE21107-1	Filter Choke Assembly
T3	AE21099-1	Output Transformer

**ADD**

REF. NO.	PART NO.	DESCRIPTION
	A19140	Terminal Strip, Single left hand
	A18254-1	Socket, tube wafer octal
SR	A20207-2	Selenium Rectifier

T3	AC21494-1	Output Transformer
NTCR	AC21489-1	N.T.C. Resistor and Can Assy.
C10	C20069-302	Capacitor 0.003 $\mu$ f 600 V P.T.
R13	C20223-122	Resistor 1200 ohm, 2W. $\pm$ 10%

**Montgomery Ward 74BR-1812B**

This model is the same as Model 74BR-1812A appearing on pages 16-17 through 16-21 of *Rider's Volume XVI*.

**Wells-Gardner 7A41-593**

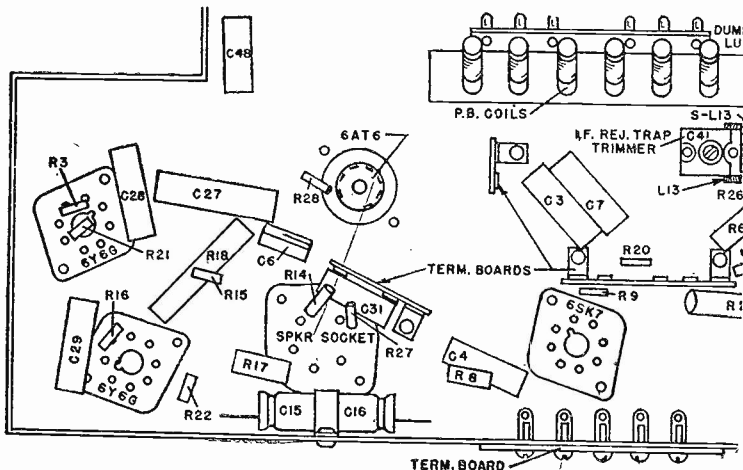
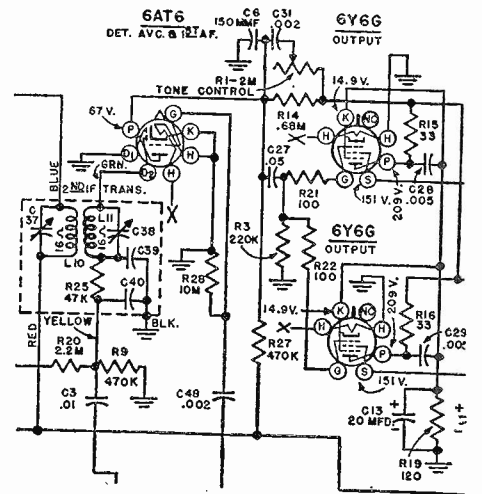
This model is the same as Model 7A41-704 appearing on pages 12-8 to 12-11 of *Rider's Volume XII*.

**Westinghouse H-110A, H-111A, H-137A, and H-138A, Chassis V-2102-2**

These models are the same as Model H-104 on pages 15-1 to 15-4 of *Rider's Volume XV*, except that the tone control circuit has been modified and a 6AT6 miniature tube replaces the 6SF7 tube used originally. The tube layout is the same, but certain components have been added, as may be seen in the accompanying diagrams.

The following parts should be added to the parts list.

Part No.	Description
RCP10W6202A	Capacitor, 0.002 $\mu$ f, 600 v. (C48)
RC10AE474M	Resistor, 470K $\frac{1}{4}$ w, (R27)
RC10AE106M	Resistor, 10M $\frac{1}{4}$ w. (R28)



Changes in the tone control circuit, above, and in the parts layout, left, of the Westinghouse Chassis V-2102-2.

**RCA 54B1, 54B2, 54B3**

These models appear on pages 15-22 to 15-24 of *Rider's Volume XV*. The position of the green and black leads of the second i-f transformer (stamped 922246-2) have been transposed to facilitate assembly. This change affects only the wiring, not the schematic.

**Sears Roebuck 7056**

This model appears on pages 13-75 and 13-76 of *Rider's Volume XIII*. The Astatic L-40A crystal cartridge should be used as a replacement cartridge for the phonograph pickup.

**RIDER MANUALS** Mean SUCCESSFUL SERVICING

**Noblitt-Sparks 664 and 664A**

These models are the same as Model 6640, Chassis RE-206-1, appearing on pages 17-16 to 17-18 of *Rider's Volume XVII*, except that the loop assembly has been changed. The part number is AC18579-1.

**Stewart Warner VM-506261 Record Changer**

This model is the same as Model VM-505339, appearing on pages RCD.CH. 17-14 to RCD.CH. 17-19 of *Rider's Volume XVII*, except for color.

**Wilcox-Gay 6B10, 6B20, 6B30, 6B40, and 6B42**

These models are the same as Model 6B10, Late, on page 16-4 of *Rider's Volume XV*, except for the following changes. A 0.00005- $\mu$ f capacitor (C34) has been connected across R38.

A 6E5 tube has been substituted for the 6U5; the socket connections are the same. A 6SJ7GT tube has been substituted for the 6J7GT formerly used. The socket connections for the 6SJ7GT are:

- 1 No connection
- 2 Heater
- 3 Suppressor Grid
- 4 Grid
- 5 Cathode
- 6 Screen Grid
- 7 Heater
- 8 Plate

Tie points are utilized for voltage measurements, see the accompanying voltage chart.

**Arvin 140P, Chassis RE-209**

This model appears on pages 17-1 through 17-4 of *Rider's Volume XVII*. The volume control mounting has been revised to prevent the dial-indicator eccentric mounted on the volume-control shaft from binding in its bracket. The mounting bushing on the control is slotted instead of threaded, and the control is mounted with a C20227 Speed Clip, instead of a 3/8-inch nut.

The following changes have been made in the oscillator circuit to increase the sensitivity. The 0.05- $\mu$ f capacitor (C5) formerly located between the bottom of the oscillator tickler coil (L3) and floating ground, has been connected from the second grid of the 1R5 converter tube (pin 3) to the junction of the top of the tickler coil to the bottom of the primary of T1. The 22,000-ohm resistor (R3) is now connected in parallel with C5 instead of from the bottom of the tickler coil to the bottom of the primary of T1. The top of the tickler coil is connected to the bottom of the primary of T1 instead of to the second grid of the 1R5 converter tube. The 1R5 plate current as well as the screen current thus passes through the tickler coil.

To prevent audio oscillation, a 0.00025- $\mu$ f bypass capacitor (C10) has been added from the plate to the positive filament of the 1S5 tube. The plate load of the 1S5 tube (R9) has been changed from 330,000 to 470,000 ohms. The value of R21 has been changed from 6.8 to 15 megohms. The value of C13 has been changed from 0.05 $\mu$ f to 0.02 $\mu$ f. The 0.05- $\mu$ f capacitor (C19) has been changed from the input side to the plate side of L4 to reduce hash.

Since the clinch nuts in the top of the loop shield, which hold the screw in the top of the cabinet, have at times come loose, a brass extruded nut, part number A21681, has been made available for replacing these clinch nuts when they come loose.

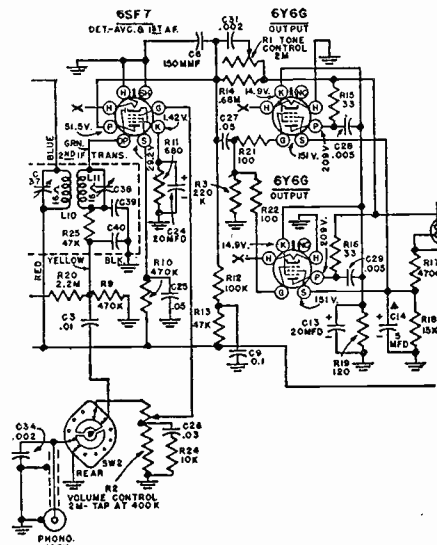
In the note under the resistance chart on page 17-4 of *Rider's Volume XVII*, K was shown as equalling 100 ohms. This note should read K equals 1000 ohms. The parts numbers given in the parts list on page 17-2 for the miniature tube sock-

ets were A21032-1 and A21032-2. These should have been A20132-1 and A20132-2.

A slide switch, part number A21051, has been added to the parts list.

**Westinghouse H-110, H-111, H-137, and H-138, Chassis V-2102-1**

These models are the same as Model H-104 on pages 15-1 to 15-4 of *Rider's Volume XV*, except that the tone control circuit has been modified. This change is illustrated in the accompanying diagram.



The modified tone control circuit of the Westinghouse Chassis V-2102-1.

**Sonora RMR-219, RMR-220, RMR-245, 402A Mahogany and Prima Vera**

These models are the same as Model RMR appearing on pages 17-6 to 17-8 of *Rider's Volume XVII*.

**RIDER MANUALS** Mean SUCCESSFUL SERVICING

**RCA 66X1, 66X2, RC-1038, 66X3, 66X4, 66X7, 66X8, 66X9, Chassis RC-1038A**

These models are similar to Model 66X1, Chassis RC-1038, appearing on pages 15-89 through 15-91 of *Rider's Volume XV*. The following additions have been made to the parts list.

- | Stock No. | Description  |
|-----------|--|
| 72753     | Plate—dial back plate complete with four (4) pulleys less dial for models 66X3, 66X4, 66X7, 66X8, 66X9 |
| 6134      | Resistor—1200 ohms, 1 watt, (R11)  |
| 72514     | Back—cabinet back for 66X7 and 66X9  |
| 72721     | Back—cabinet back for 66X8   |
| X1627     | Baffle—baffle board and grill cloth for 66X7, 66X8, 66X9   |
| Y1423     | Cabinet—catalin (black) cabinet for 66X7   |
| Y1408     | Cabinet—catalin (red) cabinet for 66X8   |
| Y1393     | Cabinet—catalin (black and white) cabinet for 66X9   |
| 72822     | Dial—glass dial scale for 66X3, 66X7, 66X8, 66X9   |
| 72678     | Knob—control knob (black) for 66X7 and 66X9  |
| 71821     | Knob—control knob (maroon) for 66X8  |
| 72295     | Socket—phono   |

**TYPICAL VOLTAGE CHART**

TUBE	VOLTAGE TO GROUND PIN NO.							
	1	2	3	4	5	6	7	8
6A8	0	13	240	80	-10	156	13	2.6
6SK7	0	13	3.3		3.3	80	13	240
6SN7	0	232	6.5	0	55	1.6	13	13
6SQ7	0	0	1.5	0	0	68	13	13
6V6	0	13	225	240	0	240	13	13
6SJ7	0	13	0	0	0	3.3	13	80
5Y3	0	280		275AC		275AC		280
6E5	13	6	0	240	1	13		

MEASURED WITH 1000 OHMS PER VOLT METER. SCALES USED -3-30-150-300

ALL PLUNGERS IN RELEASED POSITION.

Typical voltage chart for the Wilcox-Gay 6B10, 6B20, 6B30, 6B40, and 6B42.

**Sentinel IU286**

This model is the same as Model 286PR on pages 16-14 to 16-16 of *Rider's Volume XVI*, except for the following changes.

A 0.1- $\mu$ f capacitor (46) has been placed between pin number 6 of the 1R5 oscillator-modulator tube and the top side of the ganged tuning capacitor. A 470,000-ohm resistor (48) has been connected in the avc line between the top of the 0.05- $\mu$ f capacitor (14) and the 4,700,000-ohm resistor (35). A 0.05- $\mu$ f capacitor (47) has been connected from the junction of resistors 48 and 35 and ground. Two interlock plugs have been added in the power line. The i-f transformers (2 and 3) may either be the transformers listed in the parts list on page 16-16, or they may be part number 20E299.

The following parts should be deleted from the parts list shown on page 16-16.

Illus. No.	Part No.	Description
8	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
10	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
11	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
12	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
13	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
14	23E2014-8	Capacitor, tubular, 0.05 $\mu$ f, 150 V.
16	23E2014-12	Capacitor, tubular, 0.002 $\mu$ f, 150 V.
17	23E2014-9	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
46	23E2014-9	Capacitor, tubular, 0.1 $\mu$ f, 150 V.
23	23E680-3	Resistor, carbon, 68 ohm, 1/2 W.
	20E128	"A" battery con. bracket assembly, with 4 No. 10E43 trimount studs
	20E130-1	Complete cabinet assembly, with lid and loop, handle, lid catch and pushbutton assembly and bottom assembly
	20E134	Top lid assembly with loop and hinges
	20E135-1	Bottom assembly with locking slotted head stud
	30E25-1	Cabinet center section, less lid and bottom assemblies, with handle, speaker screen, lid catch and pushbutton
	20E136-1	Hinge and spring assembly with two No. 82E36-F10 No. 4-24 x 1/4 mounting screws
	55E22-1	Handle, leather
	71E42-F10	Screw, No. 4-40 x 3/16 slot B.H.I.M.

The following parts should be added to the parts list.

Illus. No.	Part No.	Description
8	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
10	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
11	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
12	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
13	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
14	23E2004-7	Capacitor, tubular, 0.05 $\mu$ f, 200 V.
16	23E2004-2	Capacitor, tubular, 0.002 $\mu$ f, 400 V.
17	23E2004-8	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
23	27E680-3	Resistor, carbon, 68 ohm, 1 W.
44	20E280-2	Switch, lid operated, mounted on "A" battery bracket assembly
45	20E284	Interlock, socket assembly
46	23E2014-9	Capacitor, tubular, 0.1 $\mu$ f, 200 V.
47	23E2014-8	Capacitor, tubular, 0.05 $\mu$ f, 200 V.
48	27E47-7	Resistor, carbon, 470,000 ohm, 1/4 W.
48	20E284	Interlock, socket assembly
	20E130-3	Complete cabinet assembly with lid and loop, handle, lid catch and pushbutton assembly
	20E134-3	Top lid assembly with loop and hinges

30E25-3	Cabinet center section, less lid and bottom assemblies, but with handle, speaker screen, lid catch and pushbutton assembly.
20E136-2	Hinge, right hinge and spring assembly with two No. 82E36-F10 No. 4-24 x 1/4 mounting screws
20E136-3	Left hinge and spring assembly with two No. 82E36-F10 No. 4-24 x 1/4 mounting screws
20E280-2	Complete "A" battery bracket assembly with lid operated switch assembly
20E283	"A" battery contact plate assembly
52E23	Plastic covered handle
55E39	Handle strap, clock spring steel
85E4-21	Screw, No. 4-40 x 3/16 Slot headless cup point for control knobs
82E2004	Screw, for adjusting lid switch shaft

**RIDER MANUALS** *Mean* **SUCCESSFUL SERVICING**

**Arvin 150TC, 151TC, Chassis RE-228-1**

These models are the same as Model 150TC appearing on pages 17-5 to 17-8 of *Rider's Volume XVII*, except for the following changes. The 35W4 rectifier tube has been replaced with a 100-ma selenium rectifier. The 35B5 output tube has been replaced with a 50L6 output tube. A negative temperature coefficient resistor has been added in the filament line. The filter choke has been replaced by a 1200-ohm resistor and a tap on the output transformer. The 0.005- $\mu$ f tone capacitor has been replaced with an 0.003- $\mu$ f capacitor.

**DELETE**

REF. NO.	PART NO.	DESCRIPTION
	A19141	Terminal Strip, Double
	B21123-1	Tube retainer Spring, long
R13	C20060-331	Resistor 330 ohm 1/4
R14	C20070-123	Resistor 11,000 ohm 1/4 W
R15	C20060-104	Resistor 0.1 Megohm 1/4 W
L3	AE21107-1	Filter Choke Assembly
T3	AE21099-1	Output Transformer

**ADD**

REF. NO.	PART NO.	DESCRIPTION
	A19140	Terminal Strip, Single left hand
	A18254-1	Socket, tube wafer octal
SR	A20207-2	Selenium Rectifier

T3	AC21494-1	Output Transformer
N.T.C.R.	AC21489-1	N.T.C. Resistor and Can Assy.
C10	C20069-302	Capacitor 0.003 $\mu$ f 600 V P.T.
R13	C20223-122	Resistor 1200 ohm, 2W. $\pm$ 10%

**Montgomery Ward 74BR-1812B**

This model is the same as Model 74BR-1812A appearing on pages 16-17 through 16-21 of *Rider's Volume XVI*.

**Wells-Gardner 7A41-593**

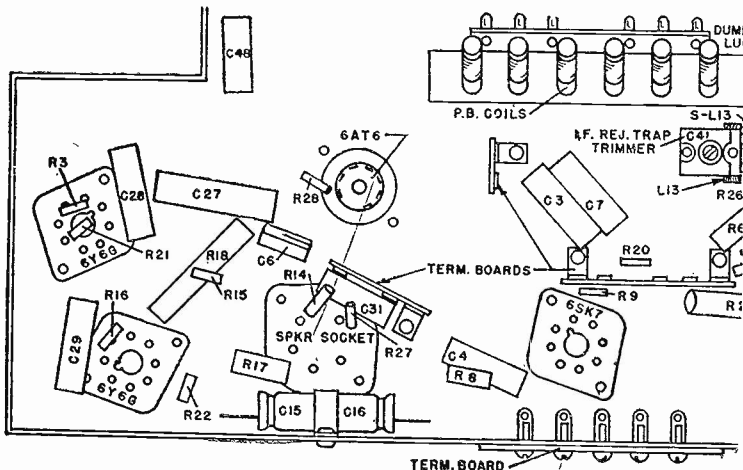
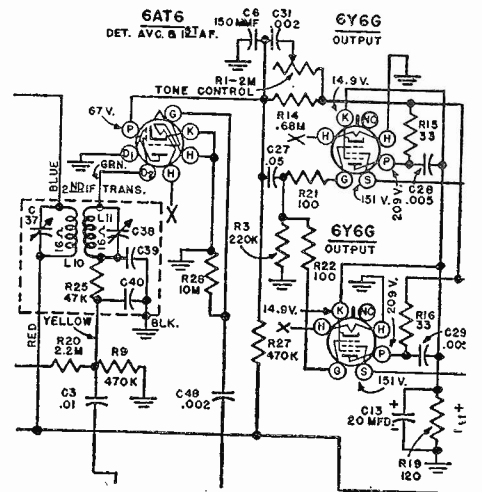
This model is the same as Model 7A41-704 appearing on pages 12-8 to 12-11 of *Rider's Volume XII*.

**Westinghouse H-110A, H-111A, H-137A, and H-138A, Chassis V-2102-2**

These models are the same as Model H-104 on pages 15-1 to 15-4 of *Rider's Volume XV*, except that the tone control circuit has been modified and a 6AT6 miniature tube replaces the 6SF7 tube used originally. The tube layout is the same, but certain components have been added, as may be seen in the accompanying diagrams.

The following parts should be added to the parts list.

Part No.	Description
RCP10W6202A	Capacitor, 0.002 $\mu$ f, 600 v. (C48)
RC10AE474M	Resistor, 470K 1/4 w, (R27)
RC10AE106M	Resistor, 10M 1/4 w. (R28)



Changes in the tone control circuit, above, and in the parts layout, left, of the Westinghouse Chassis V-2102-2.

**RCA 54B1, 54B2, 54B3**

These models appear on pages 15-22 to 15-24 of *Rider's Volume XV*. The position of the green and black leads of the second if transformer (stamped 922246-2) have been transposed to facilitate assembly. This change affects only the wiring, not the schematic.

**Sears Roebuck 7056**

This model appears on pages 18-75 and 18-76 of *Rider's Volume XIII*. The Astatic L-40A crystal cartridge should be used as a replacement cartridge for the phonograph pickup.

**RIDER MANUALS** Mean SUCCESSFUL SERVICING

**Noblitt-Sparks 664 and 664A**

These models are the same as Model 6640, Chassis RE-206-1, appearing on pages 17-16 to 17-18 of *Rider's Volume XVII*, except that the loop assembly has been changed. The part number is AC18579-1.

**Stewart Warner VM-506261 Record Changer**

This model is the same as Model VM-505339, appearing on pages RCD.CH. 17-14 to RCD.CH. 17-19 of *Rider's Volume XVII*, except for color.

**Wilcox-Gay 6B10, 6B20, 6B30, 6B40, and 6B42**

These models are the same as Model 6B10, Late, on page 16-4 of *Rider's Volume XV*, except for the following changes. a 0.00005- $\mu$ f capacitor (C34) has been connected across R38.

A 6E5 tube has been substituted for the 6U5; the socket connections are the same. A 6SJ7GT tube has been substituted for the 6J7GT formerly used. The socket connections for the 6SJ7GT are:

- 1 No connection
- 2 Heater
- 3 Suppressor Grid
- 4 Grid
- 5 Cathode
- 6 Screen Grid
- 7 Heater
- 8 Plate

Tie points are utilized for voltage measurements, see the accompanying voltage chart.

**Arvin 140P, Chassis RE-209**

This model appears on pages 17-1 through 17-4 of *Rider's Volume XVII*. The volume control mounting has been revised to prevent the dial-indicator eccentric mounted on the volume-control shaft from binding in its bracket. The mounting bushing on the control is slotted instead of threaded, and the control is mounted with a C20227 Speed Clip, instead of a 3/8-inch nut.

The following changes have been made in the oscillator circuit to increase the sensitivity. The 0.05- $\mu$ f capacitor (C5) formerly located between the bottom of the oscillator tickler coil (L3) and floating ground, has been connected from the second grid of the 1R5 converter tube (pin 3) to the junction of the top of the tickler coil to the bottom of the primary of T1. The 22,000-ohm resistor (R3) is now connected in parallel with C5 instead of from the bottom of the tickler coil to the bottom of the primary of T1. The top of the tickler coil is connected to the bottom of the primary of T1 instead of to the second grid of the 1R5 converter tube. The 1R5 plate current as well as the screen current thus passes through the tickler coil.

To prevent audio oscillation, a 0.00025- $\mu$ f bypass capacitor (C10) has been added from the plate to the positive filament of the 1S5 tube. The plate load of the 1S5 tube (R9) has been changed from 330,000 to 470,000 ohms. The value of R21 has been changed from 6.8 to 15 megohms. The value of C13 has been changed from 0.05 $\mu$ f to 0.02 $\mu$ f. The 0.05- $\mu$ f capacitor (C19) has been changed from the input side to the plate side of L4 to reduce hash.

Since the clinch nuts in the top of the loop shield, which hold the screw in the top of the cabinet, have at times come loose, a brass extruded nut, part number A21681, has been made available for replacing these clinch nuts when they come loose.

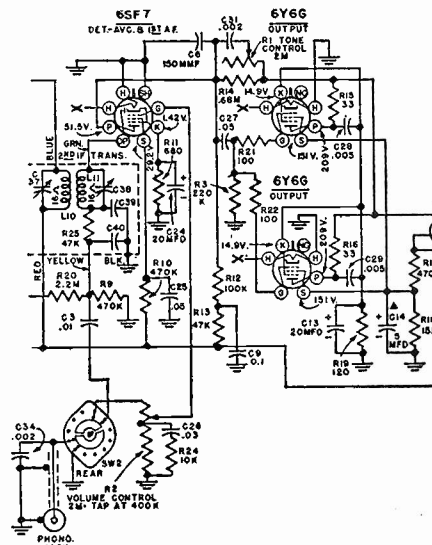
In the note under the resistance chart on page 17-4 of *Rider's Volume XVII*, K was shown as equalling 100 ohms. This note should read K equals 1000 ohms. The parts numbers given in the parts list on page 17-2 for the miniature tube sock-

ets were A21032-1 and A21032-2. These should have been A20132-1 and A20132-2.

A slide switch, part number A21051, has been added to the parts list.

**Westinghouse H-110, H-111, H-137, and H-138, Chassis V-2102-1**

These models are the same as Model H-104 on pages 15-1 to 15-4 of *Rider's Volume XV*, except that the tone control circuit has been modified. This change is illustrated in the accompanying diagram.



The modified tone control circuit of the Westinghouse Chassis V-2102-1.

**Sonora RMR-219, RMR-220, RMR-245, 402A Mahogany and Prima Vera**

These models are the same as Model RMR appearing on pages 17-6 to 17-8 of *Rider's Volume XVII*.

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**RCA 66X1, 66X2, RC-1038, 66X3, 66X4, 66X7, 66X8, 66X9, Chassis RC-1038A**

These models are similar to Model 66X1, Chassis RC-1038, appearing on pages 15-89 through 15-91 of *Rider's Volume XV*. The following additions have been made to the parts list.

Stock No.	Description
72753	Plate—dial back plate complete with four (4) pulleys less dial for models 66X3, 66X4, 66X7, 66X8, 66X9
6134	Resistor—1200 ohms, 1 watt, (R11)
72514	Back—cabinet back for 66X7 and 66X9
72721	Back—cabinet back for 66X8
X1627	Baffle—baffle board and grill cloth for 66X7, 66X8, 66X9
Y1423	Cabinet—catalin (black) cabinet for 66X7
Y1408	Cabinet—catalin (red) cabinet for 66X8
Y1393	Cabinet—catalin (black and white) cabinet for 66X9
72822	Dial—glass dial scale for 66X3, 66X7, 66X8, 66X9
72678	Knob—control knob (black) for 66X7 and 66X9
71821	Knob—control knob (maroon) for 66X8
72295	Socket—phono

**TYPICAL VOLTAGE CHART**

TUBE	VOLTAGE TO GROUND PIN NO.							
	1	2	3	4	5	6	7	8
6A8	0	13	240	80	-10	156	13	2.6
6SK7	0	13	3.3		3.3	80	13	240
6SN7	0	232	6.5	0	55	1.6	13	13
6SQ7	0	0	1.5	0	0	68	13	13
6V6	0	13	225	240	0	240	13	13
6SJ7	0	13	0	0	0	3.3	13	80
5Y3	0	280		275AC		275AC		280
6E5	13	6	0	240	1	13		

MEASURED WITH 1000 OHMS PER VOLT METER. SCALES USED -3-30-150-300

ALL PLUNGERS IN RELEASED POSITION.

Typical voltage chart for the Wilcox-Gay 6B10, 6B20, 6B30, 6B40, and 6B42.



**Sentinel IU286**

This model is the same as Model 286PR on pages 10-14 to 10-16 of Rider's Volume XVI, except for the following changes.

A 0.1- $\mu$ f capacitor (46) has been placed between pin number 6 of the 1R5 oscillator-modulator tube and the top side of the ganged tuning capacitor. A 470,000-ohm resistor (48) has been connected in the ave line between the top of the 0.05- $\mu$ f capacitor (14) and the 4,700,000-ohm resistor (35). A 0.05- $\mu$ f capacitor (47) has been connected from the junction of resistors 48 and 35 and ground. Two interlock plugs have been added in the power line. The if transformers (2 and 3) may either be the transformers listed in the parts list on page 16-16, or they may be part number 20E299.

The following parts should be deleted from the parts list shown on page 16-16.

Illus. No.	Part No.	Description
8	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
10	23E2914-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
11	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
12	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
13	23E2014-6	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
14	23E2014-8	Capacitor, tubular, 0.05 $\mu$ f, 150 V.
16	23E2014-12	Capacitor, tubular, 0.002 $\mu$ f, 150 V.
17	23E2014-9	Capacitor, tubular, 0.01 $\mu$ f, 150 V.
16	23E2014-9	Capacitor, tubular, 0.1 $\mu$ f, 150 V.
23	23E680-3	Resistor, carbon, 68 ohm, 1/2 W.
	20E128	"A" battery con. bracket assembly, with 4 No. 10E43 trimount studs
	20E130-1	Complete cabinet assembly, with lid and loop, handle, lid catch and pushbutton assembly and bottom assembly
	20E134	Top lid assembly with loop and hinges
	20E135-1	Bottom assembly with locking slotted head stud
	30E25-1	Cabinet center section, less lid and bottom assemblies, with handle, speaker screen, lid catch and pushbutton
	20E136-1	Hinge and spring assembly with two No. 82E36-F10 No. 4-24 x 1/4 mounting screws
	55E22-1	Handle, leather
	71E42-F10	Screw, No. 4-40 x 3/16 slot B.H.I.M.

The following parts should be added to the parts list

Illus. No.	Part No.	Description
8	23E2004-6	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
10	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
11	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
12	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
13	23E2004-5	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
14	23E2004-7	Capacitor, tubular, 0.05 $\mu$ f, 200 V.
16	23E2004-2	Capacitor, tubular, 0.002 $\mu$ f, 400 V.
17	23E2004-8	Capacitor, tubular, 0.01 $\mu$ f, 200 V.
23	27E680-3	Resistor, carbon, 68 ohm, 1 W.
44	20E280-2	Switch, lid operated, mounted on "A" battery bracket assembly
45	20E284	Interlock, socket assembly
46	23E2014-9	Capacitor, tubular, 0.1 $\mu$ f, 200 V.
47	23E2014-8	Capacitor, tubular, 0.05 $\mu$ f, 200 V.
48	27E47-7	Resistor, carbon, 470,000 ohm, 1/4 W.
48	20E284	Interlock, socket assembly
	20E130-3	Complete cabinet assembly with lid and loop, handle, lid catch and pushbutton assembly
	20E134-3	Top lid assembly with loop and hinges

30E25-3	Cabinet center section, less lid and bottom assemblies, but with handle, speaker screen, lid catch and pushbutton assembly.
20E136-2	Hinge, right hinge and spring assembly with two No. 82E36-F10 No. 4-24 x 1/4 mounting screws
20E136-3	Left hinge and spring assembly with two No. 82E36-F10 No. 4-24 x 1/4 mounting screws
20E280-2	Complete "A" battery bracket assembly with lid operated switch assembly
20E283	"A" battery contact plate assembly
52E23	Plastic covered handle
55E39	Handle strap, clock spring steel
85E4-21	Screw, No. 4-40 x 3/16 Slot headless cup point for control knobs
82E2004	Screw, for adjusting lid switch shaft

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**Arvin 150TC, 151TC, Chassis RE-228-1**

These models are the same as Model 150TC appearing on pages 17-5 to 17-8 of Rider's Volume XVII, except for the following changes. The 35W4 rectifier tube has been replaced with a 100-ma selenium rectifier. The 35B5 output tube has been replaced with a 50L6 output tube. A negative temperature coefficient resistor has been added in the filament line. The filter choke has been replaced by a 1200-ohm resistor and a tap on the output transformer. The 0.005- $\mu$ f tone capacitor has been replaced with an 0.003- $\mu$ f capacitor.

REF. NO.	PART NO.	DESCRIPTION
	DELETE	
	A19141	Terminal Strip, Double
	B21123-1	Tube retainer Spring, long
R13	C20060-331	Resistor 330 ohm 1/4
R14	C20070-123	Resistor 11,000 ohm 1/4 W
R15	C20060-104	Resistor 0.1 Megohm 1/4 W
L3	AE21107-1	Filter Choke Assembly
T3	AE21099-1	Output Transformer

REF. NO.	PART NO.	DESCRIPTION
	ADD	
	A19140	Terminal Strip, Single left hand
	A18254-1	Socket, tube wafer octal
SR	A20207-2	Selenium Rectifier

T3	AC21494-1	Output Transformer
NTCR	AC21489-1	N.T.C. Resistor and Can Assy.
C10	C20069-302	Capacitor 0.003 $\mu$ f 600 V P.T.
R13	C20223-122	Resistor 1200 ohm, 2W. $\pm$ 10%

**Montgomery Ward 74BR-1812B**

This model is the same as Model 74BR-1812A appearing on pages 16-17 through 16-21 of Rider's Volume XVI.

**Wells-Gardner 7A41-593**

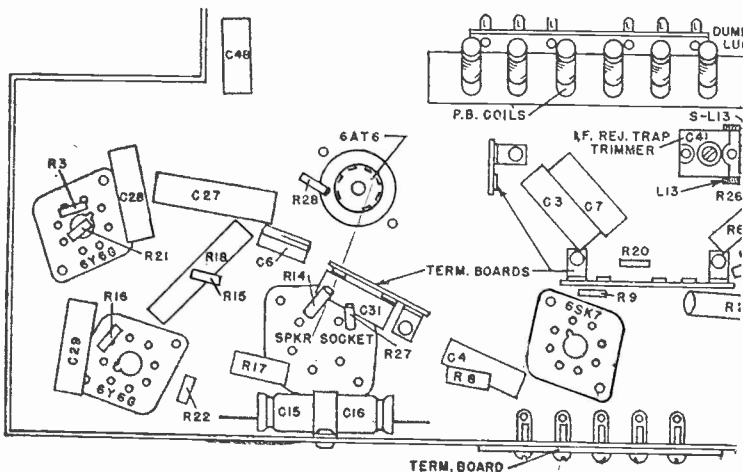
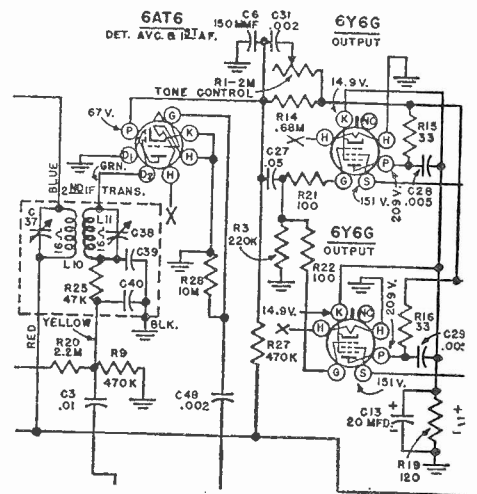
This model is the same as Model 7A41-704 appearing on pages 12-8 to 12-11 of Rider's Volume XII.

**Westinghouse H-110A, H-111A, H-137A, and H-138A, Chassis V-2102-2**

These models are the same as Model H-104 on pages 15-1 to 15-4 of Rider's Volume XV, except that the tone control circuit has been modified and a 6AT6 miniature tube replaces the 6SF7 tube used originally. The tube layout is the same, but certain components have been added, as may be seen in the accompanying diagrams.

The following parts should be added to the parts list.

Part No.	Description
RCP10W6202A	Capacitor, 0.002 $\mu$ f, 600 v. (C48)
RC10AE474M	Resistor, 470K 1/4 w, (R27)
RC10AE106M	Resistor, 10M 1/4 w. (R28)



Changes in the tone control circuit, above, and in the parts layout, left, of the Westinghouse Chassis V-2102-2.

## A Word of Caution

*Continued from page 1*

time from different stations, a difficult problem is posed . . . Which one to watch is a problem, so much so that many people are becoming very highly selective.

### TV Effects on Family Life

As a facility, TV is changing peoples' lives—changing the way they live in their homes . . . At the outset people stay in and watch everything which can be seen on a single receiver, but after a while they have not done the normal amount of reading—they don't get together with their friends (who also have TV receivers) until comparatively late in the evening . . . Yes, people are watching TV but they also realize that they have lost the independence of action in the home because of the attraction of TV.

The net result is that in homes where TV receivers have been in use for several months, members of the family are beginning to return to normalcy little by little . . . They are becoming more and more critical and selective of TV pro-

grams—and use their a-m receivers more than they did shortly after they acquired the TV receiver . . . This is no reflection on the merits of TV, instead it is habit fighting back . . . In our opinion it is even more than habit—it is a way of life which is striving to stave off a transition . . . Ultimately—many years in the future—this way of life, which was born of what we can call blind radio, will go down to defeat, but for years to come it will survive.

This reaction I am describing is not a figment of imagination—it is the reaction of the members of my family and the families of my friends . . . And not only in New York, but in Philly and Washington as well—wherever there is a choice of stations with a representative number of hours on the air . . .

### The Feminine Angle

The response by women to radio broadcasting over the past 28 years is the reason for its success. Everything will be done to accomplish the same thing with TV, but to do so means that more than one TV receiver will be needed in every home—conceivably as many as there are

a-m receivers today . . . Moreover, the development of such programming for feminine appeal as will permit turning off the video and listening to the sound alone, is a herculean task; that is, if leaving the picture on and having such dialogue, sound effects, side comments and the like—all the things which stir the imagination in blind radio, will make the telecast childish, if not foolish . . . The woman must be served . . . If she wishes, she can listen while cooking the dinner in the kitchen—reclining on the sofa in the living room or turning over the mattress in the bedroom . . . She can't be bothered *looking* while she is working . . . Neither will she accept a blasting radio in one room while she is working in another . . .

Where does all of this lead us? . . . It leads to the conclusion that a-m radio is far from being dead even in the towns where TV now is plentiful—let alone all those parts of the country where TV is not yet available and may not be for a long time to come . . . As we said before, the public in TV areas may be shying away from the expensive a-m and f-m consoles—not because a.m. is finished, but because they feel that for the money involved, they want TV . . .

### A. M. Still a Factor

The serviceman who thinks that a.m. is gone forever is making a bad mistake . . . It is fine to prepare for TV but to cease actively soliciting a-m receiver repair by focusing every minute of thinking upon TV, is not sound business . . . In fact, it is aiding and abetting a situation which is pouring oil on a fire . . . The power of suggestion contained in the various forms of advertising and sales and service solicitation should never cease functioning . . .

Admittedly, a thorough understanding of the operation of the TV receiver automatically means a thorough grounding in the operation of a-m and f-m receivers, but to permit the mind to dwell *only* on TV and to lose sight of the bread-and-butter a-m business, is all wrong. TV repair should be taken in your stride and since there is no home with TV which does not have one or more a-m receivers, *these receivers, which are far from being has-beens, should not be neglected.*

Perhaps a few years from now, the existing service potential of 70,000,000 a-m and f-m receivers in use will dwindle to perhaps one half or even one third, but even a few years is still a long way off . . . Perhaps the acceleration of the defense program with inevitable contraction of available supplies of hard goods, may tend to limit TV receiver production so that it will take longer than the anticipated time to blanket the nation . . . *Will the servicing industry give up its possible a-m and f-m receiver income awaiting the arrival of TV?* It is sound to visualize the destiny of the servicing business being in the lap of TV, yet it is equally sound to take advantage of every opportunity to do business—and very unsound to think that something which is still necessary to the completion of this nation's people's everyday life, will just shrink of nothingness overnight.

*Please turn to page 9*

# "Giant Pages Make Circuits Easier to Trace"

That's the opinion of R. W. Meyers,  
General Service Manager, Gamble-Skogmo, Inc.  
of the 440-Square Inch Schematics in.

VOLUME 1

RIDER

# Television MANUAL

Mr. Meyers says further,

"In looking over your receiver service manual and the new "Giant Pages" which you have introduced, it is my opinion that this book has been very well prepared. I like particularly the fact that you can lay out the large pages and have the complete schematic diagram rather than have to refer to several pages. I feel that this lay-out does make it much easier to trace the circuits of these complicated television receivers.

We are faced with the same problem on any manuals which we may publish for our receivers and feel that your solution is the best that we have seen to date and we will probably use a lay-out of approximately the same type in our manuals."

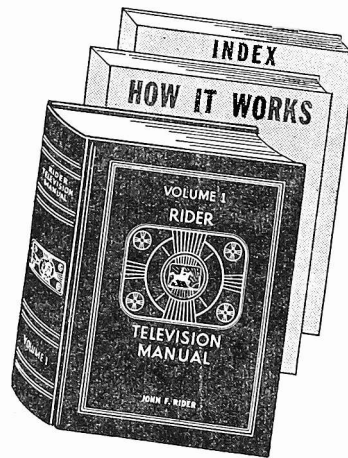
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# Successful SERVICING

REG. U. S. PAT. OFF.

Vol. 10

OCTOBER-NOVEMBER, 1948

No. 2

Dedicated to the financial and technical advancement of the  
Electronic Maintenance Personnel

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## CURTAIN TIME

### A New Wrinkle for TV

We hear that those homes with television find it very easy to get baby sitters . . . In fact, competition is developing between the professional watchers of the infant and the neighbors who do not own TV receivers . . . Maybe that feature should be advertised more—especially if sandwiches, beer and candy also are furnished.

### Factory TV Service

We saw a release which stated that RCA has ceased the mandatory factory service during the first year after the purchase of a TV receiver. *Now it is optional on the part of the set buyer . . .* We are not certain that the mandatory service program was national in scope, but having been dropped in Metropolitan N.Y. and Philadelphia, it is probably true in Chi and wherever else it may have existed . . . May we refer you to *Service Magazine* page 14, November, 1946 and *SUCCESSFUL SERVICING* page 5 May, 1948! . . . Stewart-Warner has opened TV servicing on their products to the independent serviceman. Replacement parts also are available.

*A Reminder . . .* Read the feature article in this month's *SUCCESSFUL SERVICING* once more . . . Maybe you read it too rapidly or were interrupted . . . We've been writing that story since December, 1947 and even if it is our own, we think that it deserves at least 30 minutes of your thinking—no matter where you are in the nation.

### We Are

*Just Wondering . . .* What's the difference between the sound channel in a TV receiver and an f-m receiver? . . . Nothing much—higher frequencies—something that differently shaped i-f response curves . . . The over-all basis of operation is the same . . . But do you know your FM? . . . What's the difference between the pix system in a TV receiver, (exclusive of the sweep circuits and the picture tube) and the conventional receiver? . . . Basically, that is superheterodyne-wise speaking—nothing much . . . Higher fre-

quencies, shaped i-f response curves—wider bandpass . . . But do you know the meaning of bandpass and how it is accomplished in different types of coupling systems? . . . One TV receiver manufacturer employs bridge-T coupling circuits in the pix i-f amp—something which is well-known in engineering circles, but we have not seen it used in any other home receiver of any kind . . .

Then come the sync and sweep circuits and the picture tube . . . There's the rub in TV servicing . . . Learn the facts about these parts of the TV receiver and you'll find TV servicing just as easy as any other type of receiver! . . . TV isn't tough . . . Every serious minded serviceman who desires to learn the theory can do so . . .

*Just Suggesting . . .* Many good test oscillators are in the hands of the servicing industry . . . It is not beyond the realm of good engineering to produce an f-m oscillator and marker-frequency source WHICH CAN BE USED WITH EXISTING TEST OSCILLATORS or SIGNAL GENERATORS which service stations now possess . . .

*Service Associations . . .* Those of you who sent us their names should have received our contribution to your association library by the time you read these lines . . . Those of you who wonder what the previous sentence meant, please refer to the August issue of *SS Curtain Time* page . . .

JOHN F. RIDER

### MORE PAGES

In line with the Rider policy of giving the readers of *SUCCESSFUL SERVICING* up-to-the-minute data on changes made in the course of receiver manufacturing as well as articles of timely interest to the service industry, we have enlarged this issue by four pages to accommodate the changes made in television receivers, whose data have been published in Rider's TV Manual Volume 1.

### Association Libraries

In accordance with the offer which was made in the editorial of the August, 1948 issue of *SUCCESSFUL SERVICING*, we have presented "FM Transmission and Reception", "Understanding Vectors and Phase" and "Television—How It Works" to the following associations for their libraries:

If your organization is not listed below, it is because we have not received your name and address.

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- Howard Clais, Pres., Radio Serv. Assn. of Tucson, Tucson, Ariz.
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Please turn to page 10

# Television Changes

## Transvision 12-Inch Kit

This model appears on pages 1-31 to 1-53 of *Rider's TV Manual, Vol. 1*. In cases where the horizontal hold control when set to the extreme position still does not result in proper locking, the 470,000-ohm resistor from pin #1 of the 6SN7 horizontal oscillator tube, X-6, to ground should be removed.

At certain times radiation of approximately 175 mc has been found to originate in the horizontal flyback circuit. This condition can be corrected by placing a 50-ohm, 1/2-watt resistor in the plate lead of the 6BG6G tube, X-4. This resistor will act as a parasitic suppressor.

In cases where the picture width is not sufficient and replacement of the sweep tubes, has not corrected this condition, the 680,000-ohm resistor connected from pin #2 of the 6SN7 horizontal oscillator, X-6, to ground should be checked and replaced if necessary.

## Philco 48-2500-5 (50 Cycles), Code 122, Run 1

This model is the same as Model 48-2500, Code 122, appearing on pages 1-23 to pages 1-43,44 of *Rider's TV Manual, Volume 1*, except for the following changes. An additional 30- $\mu$ f capacitor, part number 30-2568-19 has been added in parallel with C100. The power transformer has been physically repositioned.

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## General Electric 901 & 910

These models are shown on pages 1-73 to 1-81, 82 of *Riders TV Manual, Volume 1*. The input transformer, Stock No. RLA-033 is made available for addition to the Models 901 and 910 television receiver to provide a balanced input to ground for the transmission line. This eliminates direct pickup on the transmission line, of noise pulses and also video i-f harmonics radiated from the receiver.

### PROCEDURE:

(See Figures for Reference)

1. Unsolder C1, 300-ohm transmission line and green lead from terminal board on top-rear of r-f head-end unit.
2. Remove two screws holding terminal board. Save two brass grounding straps, discard terminal board along with L2 and C2.

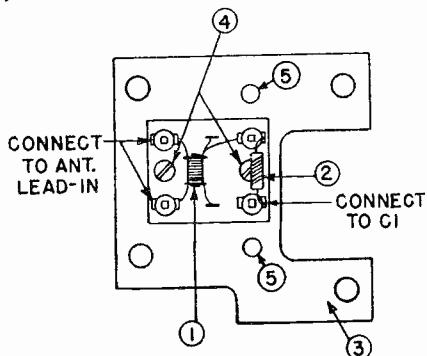


FIGURE 1

The parts layout necessary to provide a balanced input to ground in the GE television receivers 901 and 910.

### MATERIAL REQUIRED:

Description	Stock No.	Fig. 1 Reference
1—Antenna Input Transformer	RLA-033	1
1—Series Choke	RLL-037	2
1—Mounting Plate	RAP-008	3
4—#4-40 x 5/16" Screws, Nuts, & Lock-washers	.....	4

3. Remove green wire and 1.0-megohm resistor R175 from BC and SW external antenna terminal board, and discard parts. The green lead is end of lead removed in step (1).

4. Remove two screws holding the terminal board mounting plate to the rf head-end unit. Remove the screw and two spacers which support this plate to main chassis. Discard mounting plate.

5. Assemble transformer (1) Stock No. RLA-033 to mounting plate (3), Stock No. RAP-008, using two #4-40 x 5/16" screws, nuts, and lockwashers. Solder choke (2), Stock No. RLL-037, as shown in schematic, Figure 3, and mechanically mount as shown in Figure 1. Also, fasten the two brass ground straps, removed in step (2), to the holes (5) shown in Figure 1, using two #4-40 x 5/16" screws, nuts, and lockwashers.

6. Re-assemble mounting plate and transformer assembly to the head-end unit, using the same self-tapping screws removed from original mounting plate.

7. Solder C1 to choke as shown in Figures 1 and 3.

8. Re-connect antenna input transmission line to terminals as shown in Figure 1.

9. The label on the cabinet back under the hole through which connections are made to the terminal board for "external antenna for broadcast and short wave"

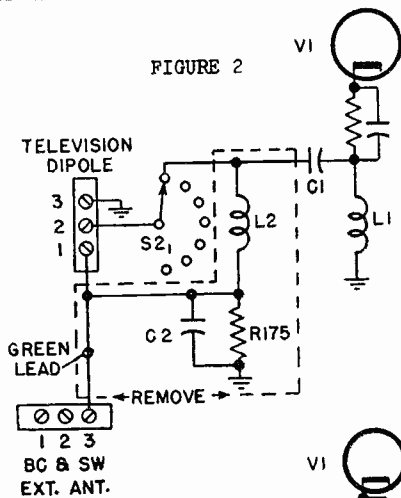


FIGURE 2

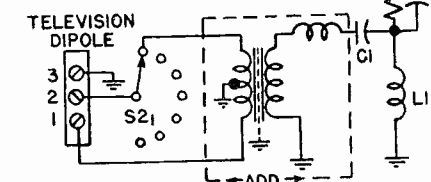


FIGURE 3

Schematic of unbalanced input to ground of GE 901 and 910, above, showing parts to be removed. Schematic of balanced input to ground, below, showing parts that were added.

must be changed. The change consists of blocking out with black ink, the link connection shown for dipole antenna. Provision is still provided for using an external antenna on BC and SW, but it must be independent of the television dipole and transmission line.

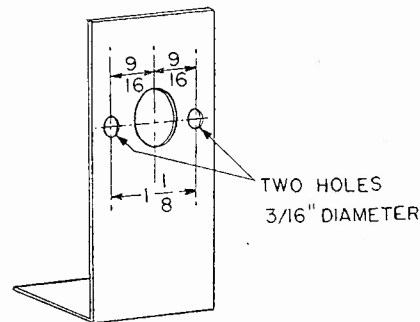
### Prevention of L-F Rumble.

To prevent low-frequency rumble on the f-m band of Models 901 and 910 when squelch is in operation, the following procedure should be followed.

Remove the receiver chassis from cabinet. View the squelch switch, S4, with the receiver chassis upside down and with operating controls toward observer. The lower right-hand terminal on squelch switch has connected to it a green wire, the other end of which connects to the junction of a 1.0-megohm resistor, R111, and a 1500- $\mu$ f ceramic capacitor, C105. Between this switch terminal and the nearest ground tab on an adjacent electrolytic capacitor, solder the 0.25- $\mu$ f, 400 V paper capacitor, Stock No. UCC-442.

## Crosley 307TA

This model appears on pages 1-1 to 1-17, 18 of *Rider's TV Manual, Volume 1*. To substitute the original e-m speaker (part no. 139199) with a p-m speaker, (part no. 134942), disconnect the two secondary



The holes that must be drilled in the speaker bracket of the Crosley 307TA to accommodate a p-m speaker.

leads of the output transformer from the original speaker. Do not disconnect the field coil.

Fasten the original speaker to the right hand side (facing front) of the cabinet with two small wood screws. Make certain that these screws are not long enough to protrude through the cabinet.

To mount the p-m speaker (part no. 134942), it is suggested that two 3/16 inch holes be drilled in the speaker bracket, as illustrated:

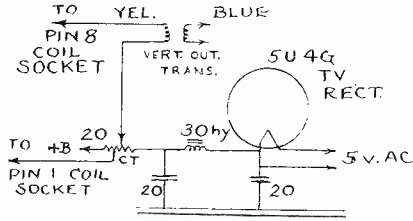
These holes will line up with the two holes on the rear of the speaker and will permit the voice coil lugs to be in a position that will allow the output transformer leads to be easily attached and soldered.



# Television Changes

## Remington Radio 80, 130

The following changes have been made in these Rembrandt models which appear on pages 17-1 to 17-9, 10 of *Rider's Television Manual, Volume 1*. The horizontal linearity control at the rear of the chassis has been replaced with a 500,000-ohm fixed resistor and the space has been utilized for a vertical centering control. This control is a 20-ohm center-tapped potentiometer. The television rectifier



The change in the power supply of the Remington 80 and 130 to produce the necessary centering voltages.

feeds the entire television section through this control. The two remaining taps on the control are wired in series with the vertical output transformer secondary after the ground has been removed from this secondary. This arrangement allows the B-plus current of the television section either to oppose or aid the vertical sweep voltages, thus producing the necessary centering voltages. This is shown in the accompanying diagram.

The horizontal hold control has been changed to one of a lower value (25,000 ohms), resulting in a less critical adjustment for the holding voltage. Full rotation of this new control will produce very little horizontal tearing at the extreme settings, if the circuit is properly balanced. A 100,000-ohm screwdriver-type control placed in series with the hold control, allows proper balancing of this circuit. This control has been placed approximately in the top center of the chassis.

## Admiral 30A15, 30A16

Damage to circuit components (such as horizontal output transformer T402) may result from failure of the 6BG6G horizontal output tube (V407), which is shown in *Rider's TV Manual, Vol. 1* on page 1-11, 1-12. A minor circuit change is necessary in order to provide adequate fuse protection. The modified circuit results in improved horizontal centering as well as fuse protection. Present production now incorporates this circuit modification.

The following circuit modification should always be made when major repairs are made on a television receiver chassis which does not already have a fused circuit.

*Fuse Protection Conversion Kit 98A50-8* contains the following parts and material:

C426	0.5 mfd., 200 Volts,	
Paper		64B 6-27
M402	Fuse, Cartridge, 0.25A/250 Volts,	
		84A 4-2
	Fuse Holder	84A 5-1
	S. T. Screw, #6x1/2"	1A 51-6-2
	Spaghetti tubing, 1-1/4" length	96A 2-5
	Hook-up wire, glass braid, white, 7" length	95B 10-20-20-92

The circuit modifications are made as follows:

1. Remove C426 and R436.
2. Clip out jumper wire between terminals 1 and 2 on tie-strip "A".
3. Remove lead on R432 from terminal 3 of tie-strip "B" and reconnect to terminal 2 of tie-strip "A".
4. Disconnect red wire from terminal 1 of tie-strip "A" and reconnect to terminal 3 of tie-strip "B".
5. Disconnect deflection yoke lead (yellow) from terminal 5 and reconnect to terminal 1 on tie-strip "A". Do not disconnect yellow lead from focus coil (this lead must remain connected to terminal 5).
6. Insulate one lead of a 0.5- $\mu$ f capacitor (64B6-27) with a 1-1/4" length of spaghetti tubing (96A2-5). Solder capacitor mounting strap to chassis next to terminal 3 of tie-strip "A". Connect capacitor between terminals 1 and 2 of tie-strip "A", insulated lead on terminal 2. See Fig. 2.
7. Connect a 7" length of wire (95B10-20-20-92, white with red tracer) to terminal 1 of tie-strip "C". Insert free end through nearest hole at rear of chassis (for connection to fuse holder in 9-kv rectifier compartment).
8. Use a #36 drill bit to drill a hole 1-1/8" from rear of chassis and 2-1/4" from left side of chassis. Since there is not too much room to work in the 9-kv rectifier compartment, it is convenient to dismount R435 and remove V409 from its socket while drilling the hole as described above. This hole permits mounting the fuse holder with a #6 self-tapping screw (1A51-6-2). See Fig. 3.
9. Cut lead (white with yellow tracer) 2-3/4" from terminal #5 on horizontal output transformer T402. Skin back the two ends 1/4" and tin. Solder both wires to the fuse holder terminal nearest rear of chassis.
10. Connect white wire red tracer (see step 7) to other terminal of fuse holder.
11. Press 0.25-amp fuse (84A4-2) into the fuse holder clips. Check lead dress to avoid possible shorts before placing receiver chassis in operation.

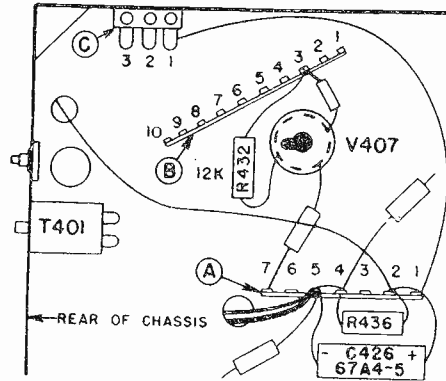


Fig. 1 ORIGINAL CIRCUIT

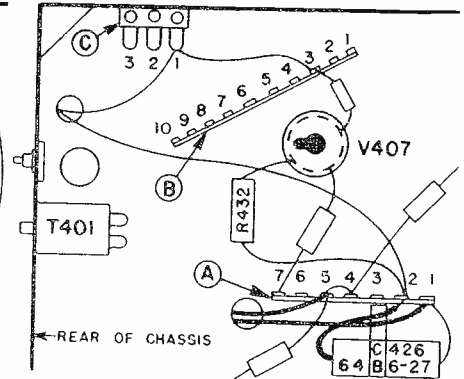


Fig. 2 MODIFIED CIRCUIT

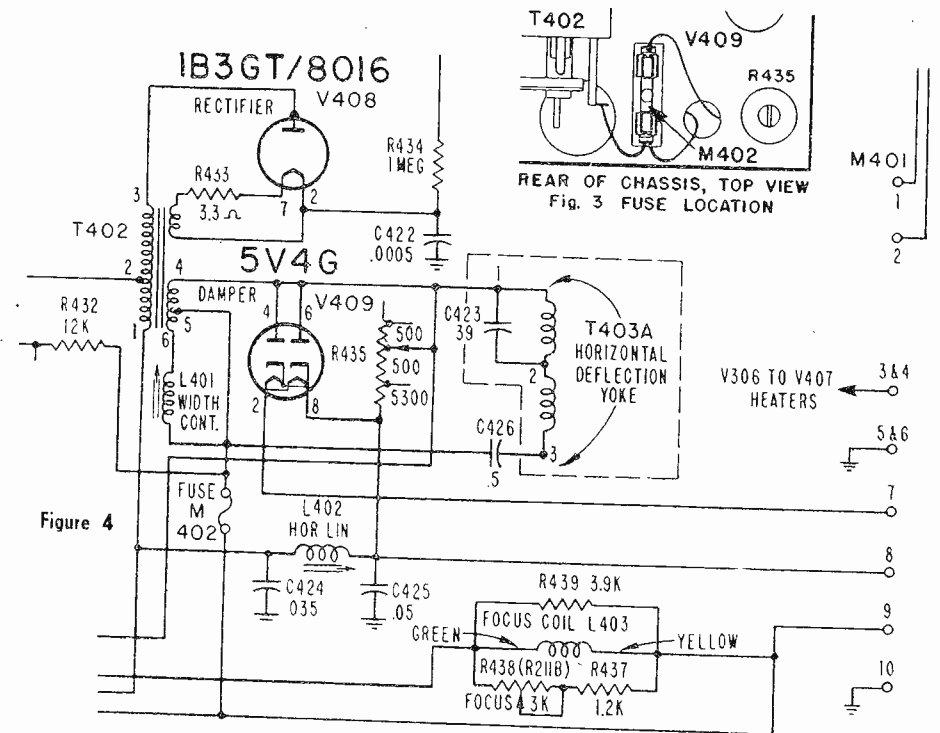


Figure 4

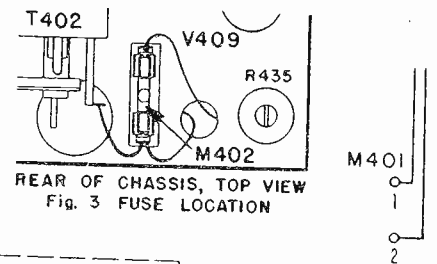


Fig. 3 FUSE LOCATION

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# Television Changes

## General Electric 801, & 802

Models 801 and 802, appearing on pages 1-28 to 1-72 of *Rider's TV Manual, Volume 1*, using the 48-square-inch mask may be converted to the larger size 52-square-inch mask by replacing it with mask, Cat. No. RDM-011. In some cases to get the additional width, it may be necessary to replace the original horizontal sweep output transformer with a new horizontal sweep output transformer, Cat. No. RT-048.

### Picture Tubes

Picture tubes 10FP4 and 10BP4 are interchangeable mechanically. Electrically, these tubes may be interchanged by adding an ion trap assembly, Cat. No. RET-001, to the 10BP4 tube, as explained in the service notes for these models. The 10FP4 does not require the ion trap. Therefore, when the 10FP4 replaces a 10BP4, it is only necessary to discard the ion trap assembly.

## Hallicrafters T-54, 505

The following changes have been made in these models during production. The complete schematic appears on TV page 1-29, 1-30 in *Rider TV Manual Vol. 1*.

Resistor R9 (3300 ohms, 2 w) in the plate circuit of the 6C4 oscillator tube, has been replaced with two 6800-ohm 2-w carbon resistors in parallel.

The two 47,000-ohm resistors, R41 and R42, in the plate circuits of the 12SN7 horizontal amplifier, have been changed from 1 watt to 2 watts each, the resistance value remaining the same.

A further reduction of residual hum is effected by adding a 1000- $\mu$ f ceramic capacitor to bypass the plate circuit of the 6C4 oscillator and one of the same value in the filament of the 6X5 rectifier. This hum is most apparent on the higher frequency channels with the volume control turned to minimum. These capacitors have been added as follows:

A 1000- $\mu$ f, 150 v, ceramic capacitor is connected from the filter capacitor side of the 100-ohm oscillator plate resistor R8 to ground. This capacitor is to be installed at the terminal strip which is just below the 6C4 oscillator tube socket.

A 1000- $\mu$ f, 150 v, ceramic capacitor is now connected from the filament pin 2 of the 6X5 rectifier socket to ground.

The position of the 7JP4 in the heater string has been changed to provide additional protection for this tube. It is now connected in series with the 6X5 rectifier filament from the high side of the 1000- $\mu$ f capacitor mentioned in the preceding paragraph, and the junction of pin 3 of the 6AG5-1 mixer and pin 7 of the 6SH7-5 audio amplifier. Resistor R92 (18 ohms) is now connected to the high side of the 0.1- $\mu$ f capacitor, C36.

In certain installations, such as those in office buildings, stores, and large hotels, there is generally a large amount of hum and low-frequency noise, appearing on the television antenna lead-in. This hum and noise tends to cause intermodulation

in the r-f stages and is most noticeable when the receiver fails to sync properly, with the picture erratically jumping across the face of the picture tube. In most cases, this trouble may be cured by grounding the shield or one side of the antenna lead-in.

On all T-54 and 505 Television Chassis, Serial No. 61436 and higher, a change has been made in the antenna circuit to minimize the effects of hum and low frequency noise as described above, and may be simply made on all chassis previous to Serial No. 61436, as follows:

Install a 1000- $\mu$ f ceramic capacitor in series with each side of the antenna lead, on the antenna side of the antenna coil. These capacitors should be installed under the chassis at the antenna coil terminal strip.

Remove the 47- $\mu$ f ceramic capacitor C3 in series with the antenna coil center-tap, and connect the center-tap directly to the chassis ground.

The first television models T-54 and 505 had a tendency to arc between the high voltage pins in the viewing tube socket and the metal bracket holding the socket. As a temporary expedient, the tube socket recesses were filled with wax to offer insulation between the pins and the bracket. This insulation was found to be unsatisfactory. As a temporary expedient, the tube sockets are now filled with Dow-Corning Compound No. 4 Ignition Seal, available from any automotive house.

As a permanent correction, the tube socket metal mounting bracket is being re-designed with cutouts giving space separation between the five high voltage pins and the metal mounting bracket.

In some cases, cathode to filament leakage develops in the 6SH7 tube first audio stage after some usage. When this happens, hum is encountered. It is suggested that the 6SH7 be replaced with a 6SJ7 tube, which has a lower leakage characteristic. No modification of the chassis whatever is required for this change. This change is being made in production in the very near future.

## Admiral Television Interference Trap A1711

Due to the broad bandwidth requirements, television receivers are inherently susceptible to image and beat frequency interference. Such interference is frequently caused by f.m. and other radio services using the frequencies in the 109-mc band. The trap herein described is for the purpose of eliminating such interference.

Solder two short pieces of tinned copper wire to the antenna lugs of the RF tuner unit. The trap mounting position is just above the antenna lugs and so oriented that the 6J6 r-f tube is midway between the two coils in the trap. Bolt the trap to the chassis using the rear tuner mounting bolt. Solder the front leg of the trap assembly to the chassis using a heavy soldering iron. Solder the two

tinned leads, previously connected to the tuner terminal lugs, to the trap terminals.

If the sound or video interference is of unknown origin and frequency, the two slug adjustments on the trap must be alternately adjusted in small steps starting at the fully counter-clockwise setting of the slug adjust screws. Continue this process until the interference is completely eliminated or reduced as much as possible. If no change in the interference condition can be effected, the interference frequency must be outside of the trap tuning range. It cannot then be eliminated by the use of this trap.

The above process can be used in an attempt to eliminate audio or video interference without test equipment. The following procedure may be used when the interfering signal can be identified and its frequency determined.

1. Set a Measurements Model 80 signal generator to the frequency of the interfering signal.
2. Connect the generator to the antenna terminals using a 150-ohm series resistor in each lead.
3. Adjust the tuning of the trap so that it eliminates the interference caused by the generator signal.
4. Disconnect the signal generator from the television receiver antenna terminals.
5. Connect an antenna to the receiver.
6. Make a fine adjustment of the trap for maximum rejection of the interference signal. Little adjustment should now be necessary since the trap has been pre-set using the signal generator signal.

The approximate range of this trap is from 94 to 113 mc.

## A Word of Caution

*Continued from page 4*

### Other Business Opportunities

Then again, how about the numerous other electronic devices which are making their appearance and are within the servicing province of the radio repair industry? Electronically heated blankets, and public-address systems, wire recorders, photoelectric control devices used by the public, citizen's radio, private marine radio, private aircraft radio, intercommunication systems and others . . . How about auto radio? Many shops which have felt a let-down in home a-m set servicing, have picked up business in auto radio sets—even in electronically controlled toy trains. These equipments require servicing . . . Will all of this business as well as a-m and f-m receivers and record players be neglected—just because TV is hot?

It's grand to be enthused about something new, but so much enthusiasm that the standby income is voluntarily permitted to shrink, is bad . . . All of this is just a word of caution . . . It is just a suggestion to consider all the facts and not to lose sight of all the things in view, just because one glitters more brilliantly than the rest.

**Showing Printed Circuits Elements**

The representation of printed circuits on receiver schematics is becoming a subject for discussion. At present the manner of showing such elements on schematics leaves room for doubt. In line with the effort to clarify the issue, we make the following suggestions.

1. Since the elements are inseparably associated with a strip or mount of some kind—the surface on which the elements are printed, these should be shown. One possible arrangement is shown in Fig. 1. Inductance, resistance and capacitance are symbolized, all being joined to a vertical line which indicates that the elements are part of the mounting plate or strip. The cross-hatch representation for the supporting block is quite commonplace. Frankly this form of representation is not the best and leaves much to be desired.

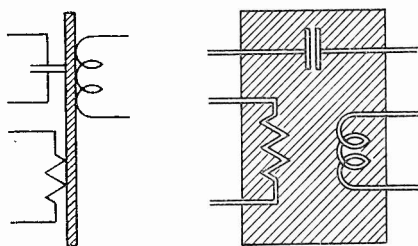


Fig. 1, left, and Fig. 2, right, show two possible methods of representing printed circuit elements.

2. The method of presentation in Fig. 2 seems to be more in line with the actual physical arrangement. The assembly of components which are printed are shown in double lines, and shown resting on a cross-hatched block. The general impression one gleans from even the first view of this illustration is that all the parts of the illustration are one and the same. In fact the use of the double lines for the elements gives the impression of location right on the mounting plate or block, which is actually the case . . . We vote for the second method of representation.

Inasmuch as such printed circuits are assembly of components, it would be wrong to omit the mounting strip or base on which the elements are printed. It seems that showing assemblies of elements is better than some special form of symbolization for each printed element and wide separation of the elements in the circuit. The arrangement shown in Fig. 2 permits spotting the entire assembly and making the connections without confusing the schematic diagram.

Any comments?

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**The Cover**

The maze of wave-guide shown on page 1 aids Westinghouse research workers investigating the effect of rain on radar waves. Ultra-short waves are guided in their path from transmitter to target and back to the receiver. Using synthetic raindrops made for the tests, the scatter-

ing of 1.25-cm waves by rain and snow is studied. The experimental waves are beamed from a transmitter, strike the target "raindrops" of ceramic powder and carbon black about 20 feet distant, and are reflected into the nearby receiver. The echo is then carried by the wave-guide system to sensitive measuring instruments, which must be capable of detecting and measuring changes as small as 10<sup>-14</sup> watt. The primary object is to determine the weather-forecasting possibilities of ultra-short waves.

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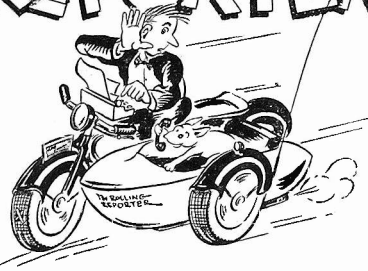
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# The Rolling Reporter



## Lofty TV

Naw, we ain't talkin' about whether or not telecasts are of silk topper variety—we ain't seen enuf of 'em to set ourself as a judge—we're referrin' to the fact that American Airline's been doin' some high-up experimentin' . . . To keep the payin' guests all happy and contented, A.A. installed a TV set in a cloud scraper and whenever the p.g.'s got bored lookin' down at the landscape under 'em or at the whoo-whoop stewardess up there with 'em, they could glimpse the prancin' pix on a TV screen. One thing sure—they didn't have to worry none about the height of the receivin' antenna. Results? *Swelegant*—passengers and engineers and everyone else very happy about it all . . .

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## P.A.

We got some news for you P-Aers—Rider's P-A Manual is practically ready to be sent out and it won't be long after you read these here words that you'll be able to get yours from yer jobber . . . And that ain't all either . . . Rider's "Installation and Servicing of Low-Power P-A Systems" is also very much in the works and the next time we bat out this here colyum, we'll tell you when you can get your copy . . . Take our word for it, this book gives the low down on P-A stuff the like of which you've never seen before!!!! And there's another on deck that we're bettin' you'll be likin' too . . . More of that one anon . . .

## Growin'

T'other afternoon when we was returnin' to the old home town from up Conn way on the New Haven's *Yankee Clipper*, we overheard a gent in the seat ahead say, "Dammit, I forgot to tell my wife to mail those papers! I gotta phone her" and he got up and went outa the car. After a short absence, he returned with "Well, *that's* off my mind. Great thing—the telephone". Bein' almost as curious as the w.k. kitty, we did some askin' and found that you can phone anywhere in the U.S.A. while the *Clipper* is chargin' across the countryside and—you guessed

it—it's done with f.m. Just another use to which this brainchild is bein' put . . . And are you keepin' up with the times? It's made easy for you—just get outside of the facts in our "F M Transmission and Reception" . . . Nuff said . . .

## Fall an' Winter

Well, now that we've got the World's Series outa the way, there's nawthin but football, Thanksgiving, Christmas, and Noo Years on deck and we'd like to go on record that we are thankful that the hot weather is over—or a long way off—you takes yer choice. Just to make sure we don't forget, here are the *first holiday greetin's* of this lovely cool season from  
**The Rolling Reporter**

## ESFETA Formed

About fifty radio servicemen representing five existing New York state radio service associations, met in the Hotel Arlington, Binghamton, N.Y. on October 31 for organizing and electing officers of the Empire State Federation of Electronic Technicians Associations, to which only associations not individuals, may belong.

The following officers were elected or appointed: *President*, T. Lawrence Raymo, Rochester. *Vice President*, Max Leibowitz, N.Y.C. *Secretary*: Wayne Shaw, Binghamton. *Treasurer*, Ben DeYoung, Poughkeepsie. *Board of Directors*: Herb Snyder, Binghamton, Robert A. Bryan, Rochester. Fred Booth, Poughkeepsie, Morris Noss, Cort-

land, Jack Edell, N.Y.C. *Chairman of Publicity Bureau*: Ed Fisk, who has asked each association in ESFETA to appoint a publicity bureau to assist him.

It was decided that each member association will have two delegates for the time being. The dues will be \$20.00 per association per annum and the expenses of the delegates will be arranged for by their local associations. Four meetings per year are contemplated, with the meeting places being changed to the different chapters of the federation.

## Pennsylvania Lectures

John F. Rider gave a series of talks to Pennsylvania servicemen under the auspices of the local serviceman associations shown below, all of which are affiliated with the Federation of Radio Servicemen's Associations of Penna. The cities in which he spoke and the associations are as follows:

Nov. 8—Wilkes-Barre, Scranton—Radio Servicemen's Assn. of Luzerne Co. and the Lackawanna Radio Technicians Assn.

Nov. 9 Philadelphia—Philadelphia Radio Servicemen's Assn.

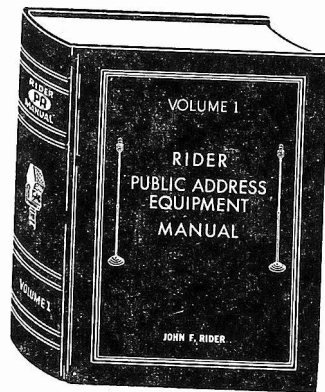
Nov. 10. Reading—Reading Radio Servicemen's Assn.

Nov. 12. Allentown. Bethlehem, Easton, Phillipsburg—Lehigh Valley Radio Service Assn.

Nov. 15. Harrisburg—Mid-State Radio Servicemen of Central Penna.

Nov. 16. Williamsport—Associated Radio Servicemen's Assn. of Penna.

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These models are the same as Model 56X on pages 15-31 and 15-26 of Rider's Volume XV, except for the following changes. Some sets have a 220,000-ohm resistor in shunt with the primary of the first i-f transformer. The replacement transformers may not need this resistor if the i-f amplifier seems stable.

Some sets have a 22-ohm, 1-watt resistor as a fuse in series with the electrolytic capacitor.

Some sets have a 56- $\mu$ f capacitor from terminal 1 of the oscillator coil to terminal 2. This is not necessary on replacement coils as they have a built-in capacity winding.

On some models the 500,000-ohm volume control is not furnished with a stop 50,000 ohms from the high end of the control. Controls having no stop can be identified by a dot of red lacquer on the left side of the control, viewing the shaft end with terminals up. In models using this

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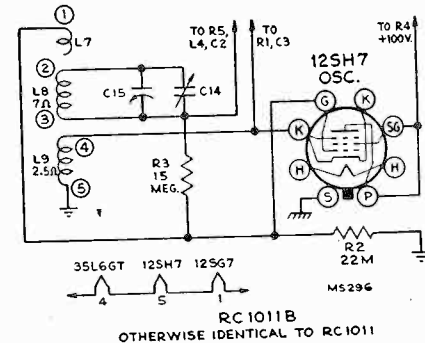
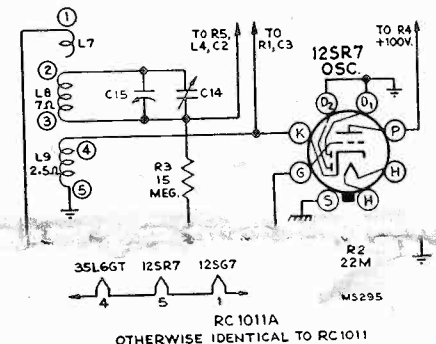
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completely covered with spaghetti tubing, is connected between the high end of the control and the yellow lead on the second i-f transformer.

Replacement controls equipped with a stop do not need this external 56,000-ohm

resistor, so when replacing a volume control, check the resistance between the arm and the high end of the replacement control with the arm turned fully clockwise. A reading of 50,000 ohms will indicate that the control is equipped with a stop and that the 56,000-ohm resistor should be removed before installing the new control.



Changes in the oscillator circuit of RCA Chassis RC1011A, above, and Chassis RC1011B, below.

In chassis RC 1011A and chassis RC 1011B, the 12J5GT oscillator tube has been replaced with a 12SR7 in the former and a 12SH7 in the latter. The wiring changes in respect to these tube changes are shown in the accompanying partial schematics. Otherwise chassis RC 1011A and RC 1011B are identical to chassis RC 1011.

# Coverage

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