

THE BUSINESS SIDE OF SERVICING

Introduction: What Does It Cost To Render Service?

by John F. Rider

(Editor's Note:—The ideas contained in this series of articles are offered as suggestions to the radio service industry. There has been much talk about placing the radio service industry upon a business basis. Accordingly, the author feels that a series of articles devoted to the various phases of business administration as applied to small business, such as is to be found in the radio service industry, cannot help but be of some value.)

THE future welfare of the radio service industry demands that attention be paid to business administration. Every successful commercial enterprise conducts its business along certain definite lines of administration and control. The radio service industry can do no better than to fall in line with such practices.

It is vital to the success of the industry that the conduct of the business should be removed from what is termed professional ideas. It is well to consider the service technician as a professional man and it is well for the service technician to maintain that attitude towards

the public. However, each service organization should realize that it is a commercial enterprise and the man responsible for the control and welfare of that business should administer it along such lines.

The average service organization is a business. It buys and sells. It buys labor and sells labor. It buys accessories and sells them. The services of the service technician, be he the owner or just one of the employees, is labor, or should be considered as labor. Consequently, his time is a sale, just as if it were an accessory. This does not lower the prestige of the man working, no matter how extensive his qualifications. It is simply a viewpoint with respect to the handling of the affairs of the company.

The service industry has made excellent strides during the past two or three years. The association effort has been successful. The technical education of the industry has advanced with leaps and bounds. However, there has been a dearth of business education. While it is true that the merchandising ideas offered in numerous publications have

been found quite remunerative, the industry lacks certain information. It is hoped that this series of articles will arouse sufficient interest to cause the men concerned to seek further data. If we may be so bold as to suggest activities on the part of established associations, business administration should be a topic discussed at each and every meeting.

Small Business Is Most Lax

Men well acquainted with business tactics, for example accountants, agree that small business suffers markedly as a result of laxity in financial control. The small business man who is his own help or who employs a few men, invariably ignores certain definite business principles. His financial leaks are numerous, yet are never recognized or detected. He feels that the responsibility is his own and as such, there is no necessity for regimentation of any kind. Only when it is too late, does the individual seek counsel. To maintain any such idea is wrong. Every man who seeks

(Continued on page 7)

RCA-Victor Vibrator Data

On the page opposite you will find a service chart which applies to the vibrators used in RCA-Victor and General Electric receivers equipped with vibrator type power supply units. While the material shown is directly applicable to the receivers named, we feel that this information will prove of general value in connection with other types of receivers, equipped with vibrator units.

Want To Make A Buck?

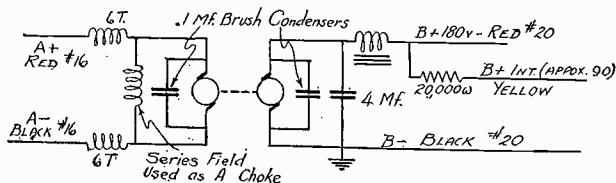
We want service hints. Every one accepted and published in **SUCCESSFUL SERVICING** is worth a dollar to the sender. Send us your hints. If they are published, we'll send you one brand new dollar bill for each hint or kink published.

**Zenith Chassis 2054,
Models 475, 760, 765, 767**

If the audio system does not seem to be working properly, check for an open circuit, possible short circuit or leakage in the .02 mfd condenser, which couples the a-f. tube volume control to the diode demodulator tube.

Carter Genemotor Model 1580A

Several circuit changes have been effected upon this device. The circuit given herewith is used at present.



Schematic wiring diagram of
Carter Genemotor
Model 1580-A

Baird AW 50

Two types of the Baird AW-50 model receiver were produced by the General Electronics Corp. Receivers equipped with an oscillator padding condensers were designed with a 465 kc. i-f. peak. Receivers with specially shaped oscillator tuning condenser plates and not equipped with a padding condenser employed a 456 kc. i-f. peak.

Cathode Ray Tubes For Servicing

Three calls in one week asking about the use of cathode ray tubes in connection with servicing. The greatest interest is being evidenced in the use of the tube for alignment purposes. Detecting the presence of regeneration, side band suppression and faulty audio systems will be quite simple when the cathode ray tube is put to use. More than likely high-fidelity receivers will call for such methods of servicing in order that the full advantages of such design be realized in serviced receivers.

I-F. Wave Traps

The use of a wave trap tuned to the intermediate frequency has been suggested and used in connection with short wave superheterodyne converters. It may be found advantageous to apply such a wave trap with a conventional superheterodyne, which seems to be afflicted with code and speech signal type of interference, that persists irrespective of the setting of the tuning dial. As a general rule such signal interference emanates from some maritime, airway or range beacon at the receiver i-f. frequency or a harmonic of this frequency. In some instances it is picked up by the components of the i-f. amplifier and shielding of the receiver's i-f. amplifier is the only remedy. However, oftentimes the signal is picked up by the receiver antenna and fed into the receiver, where by devious paths, it finds its way

into the i-f. system, and a wave trap in the antenna circuit relieves the situation. Concerning i-f. amplifier shielding, tube shields have been found very effective. In some instances, the trouble was found to be due to "floating" shields. In other words, the corrosion between the two halves of the shielding cans interferes with proper grounding of the upper part of the shield, with the result that the upper part of the shield

acts as a pickup medium and feeds the interfering signal into the i-f. transformers or adjacent circuit leads.

This type of interference seems peculiar in action because it is not continuous. It appears during certain parts of the hour with a lapse in between.

Through zeal knowledge is gotten, through lack of zeal knowledge is lost; let a man who knows this double path of gain and loss thus place himself that knowledge may grow.—

BUDDHA.

The Picture Is Changing

Reports received from service stations indicate that receivers brought into the shop for service are of recent vintage. While it is true that many of the receivers are three, four and five years old, there has been a great increase in the numbers of receivers nine, twelve and fifteen months old, which are finding their way into the service shop. The life of Volumes I and II of Rider's Manuals is still plenty long—but you fellows who lack Volumes III and IV, will start missing the absence of these volumes. As each day passes, you will note that more and more of the receivers brought into the shop are in these volumes.

Receiver Inoperative When Tuned To Very Powerful Local Stations

Cases have been reported to the effect that reception of weak stations is possible and the receiver cuts out when a power local is tuned in. Strange as it may seem, the trouble has oftentimes been localized as being an incorrectly located AVC voltage feed line connection to the diode detector. The result is the application of excessive control grid bias at all times, but when weak stations are being received, the condition does not manifest a harmful influence. However, when a strong signal is tuned in, the bias reaches such proportions as to operate the i-f. and preceding tubes beyond cut-off.

THE ZERO BEAT Phenomenon

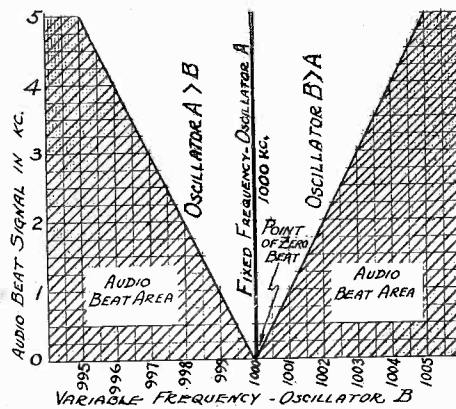
The zero beat phenomenon has confused many men during the calibration of service equipment and receiver. It seems as if the frequent reference to beat note signals has created the impression that the point of silence between two beat signals is a defect in the operation of the oscillator in question. As you no doubt know, the mixing of two signals of unlike frequency results in the production of a beat signal. Furthermore, you also know that if one of these signals, which we shall call "A," is of a fixed frequency and if the other signal, which we shall call "B," is of a variable frequency, a difference frequency beat note will be produced for two conditions, namely, when "B" is higher than "A" and when "B" is lower than "A." Thus if "A" is 1,000,000 cycles and "B" can be varied over a range of from 995,000 cycles to 1,005,000 cycles, the 5,000 cycle beat note will be produced at both limits and lower frequency beat signals, approaching zero, will be produced as oscillator "B" is tuned from 995,000 cycles through 1,000,000 cycles to 1,005,000 cycles.

Assuming ideal operating conditions, there will be one adjustment of oscillator "B" when a beat note will be absent. This point is the 1,000,000 cycle adjustment, since at this time both oscillators are in exact resonance and produce the same frequency. In actual practice this means that as oscillator "B" was being tuned, and with a suitable means of making the beat note audible, you would hear a whistle of gradually lowering frequency, until a point of silence was reached. Beyond this point, the beat note would appear again and increase in frequency until it reached the maximum, as represented by the frequency difference between oscillators "A" and "B."

As the tuning of "B" is varied and it approaches the frequency of "A," the beat note changes from a musical tone to a hum, then a growl and finally a thump and then silence, or zero beat.

As the state of zero beat is approached, the frequency difference between "A" and "B" becomes a few cycles per second, which beat is indicated by a rapid thump and as the frequency difference approaches a cycle per second or a half cycle, the thumps become slower and minute tuning then causes zero beat and silence.

The ability to tune so finely as to hear beat notes less than 20 or 30 cycles per second with the oscillator frequency at 1,000 kc. (1,000,000 cycles) is quite an accomplishment and depends largely upon the design of the oscillators. Two



Graphic representation of zero beat phenomenon showing areas of audible beat notes.

oscillators coupled to a common circuit have a tendency to "pull" into resonance before absolute resonance is reached via tuning. When this occurs there is a more extended zone of silence between the two zones of the audible beat signal. If these oscillators "pull" into resonance within 50 cycles of absolute resonance, no harm is done, since a tolerance of as high as 100 cycles is quite permissible when operating anywhere within the intermediate and radio frequency ranges.

We have found that extremely close tuning is possible when interaction between the two signal sources is precluded. We have found that calibration with intermediate frequency oscillators is possible within a few cycles without any trouble of the type stated.

It is important to remember that during calibration the important spot upon the dial is where the zero beat condition exists and in order to establish the zero beat position definitely, it is essential that you be certain that the zone of silence is located between the two zones of the audible signal.

"Gimmick"

According to the Belmont service notes covering the model 575 receiver, the word "gimmick" denotes a wire wound around another wire. Since the arrangement of two such wires constitutes a condenser, maybe future condensers will be known as "gimmicks." Do not confuse with "gim-me."

Are You Getting Your Share?

According to a survey by the Electrical Equipment Division of the U. S. Department of Commerce, there are 18,500,000 receivers in use in the United States. According to this survey there are about 42,540,000 receivers in use in the world.

A Warning!

Be on the lookout for a man who calls himself J. H. Brown and is masquerading as an agent for Rider Manuals . . . He may see this notice and assume another name . . . Be on your guard . . . Do not give him any money . . . He claims to be selling Rider's Manuals under various plans . . . He takes a small deposit and says that the balance may be paid C.O.D. upon receipt of the manual . . . That man is not our agent . . . Do not give money to any man who claims to be our agent unless he can deliver the manual to you when you pay him or unless he can absolutely identify himself as being our accredited representative . . . The men we employ as agents are also agents for *Radio Engineering* and *Service Magazine* . . . Make them show their identification papers from these magazines as well as from ourselves . . . Be on your guard.

Successful SERVICING

Dedicated to financial and technical advancement of the radio service man.

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Hello

SUCCESSFUL SERVICING makes its bow. It has but one aim, which we hope will result in the accomplishment of certain effects. It has been our concern for many years past to serve the radio service industry. The primary purpose of this house organ is to knit ourselves more closely to radio service technicians. We want to convey our thoughts to you and to have you convey your requirements to us. We want to do all in our power to make servicing a more profitable enterprise.

Primarily John F. Rider, Publisher, is a source of technical information for the guidance of the radio service technician. However, technical information is not the only pre-requisite to a successful servicing business. The cultivation of business acumen—the proper conduct of the organization—is just as important, but, bear in mind, the successful service organization must be founded upon proper technical ability and business ability.

It shall be the purpose of SUCCESSFUL SERVICING to bring to you additional technical information related to the Rider Manuals and to help you conduct your business in a businesslike fashion. The opening gun in the effort to help you understand the ramifications of business is fired in this issue. Further

details will follow in succeeding issues. Read this material closely. Accept the material with an open mind. Learn how it applies to your establishment and you will find it to be profitable. We shall endeavour to present business facts of such type as apply to the small business—as would be suitable for application to your business, be it large or small.

This type of information coupled with technical ability and proper technical data, will, we hope, prove financially remunerative. Above all, remember that your interests are ours. Mayhap, this is a selfish motive, for if you prosper—we prosper . . . If you do not succeed—we do not succeed. So let's get together and work for a common good.

JOHN F. RIDER.

Fore!

According to *Electronics*, August, 1934, the golf stroke of Francis Ouimet, captain of the 1934 Walker Cup Team, was photographed with an electron controlled high-speed motion picture camera. The hit ball picked up a speed in excess of two miles per minute and had a spin of about 5000 r.p.m. Think of these figures and you'll clear the way when someone yells "fore."

Antenna Notes On Stewart-Warner R-126 and R-127

According to information received from the receiver manufacturer, the all-wave receiver chassis stated above and bearing models numbers from 1261 to 1269 and from 1271 to 1279, have special connections for use with doublet receiving antennae. When used with a conventional "T" or inverted "L" antenna, the black coil return lead within the receiver is joined to the chassis ground clip. When these receivers are used with a doublet antenna, this black coil return lead is connected to one lead of the doublet.

"Servicing Superheterodynes"

by John F. Rider

288 Pages Price \$1.00

The 1C6 Tube

The 1C6 is a pentagrid converter intended for service similar to that of the 1A6 tube. However, some of the constants of the 1C6 differ from those of the 1A6. The inter-electrode arrangement is like that in the 1A6 and the socket contact arrangement is also the same. The following is a tabulation of tentative constants as furnished by Radiotron-Cunningham under the date of June 15th, 1934, for the tube used as a converter (oscillator-mixer).

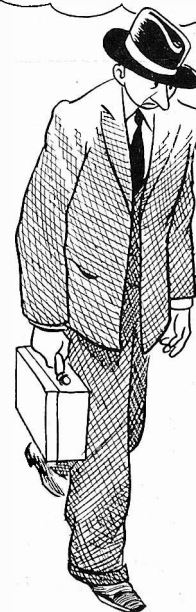
Filament Voltage	2.0 volts
Filament Current	0.120 amp.
Plate	180. volts
Screen (Grids 3 and 5)	67.5 volts
Anode Grid (Grid 2)	180. * volts
Control Grid (Grid 4)	— 3 volts
Oscillator Grid (Grid 1) Res.	50,000 ohms
Plate Resistance	750,000 ohms
Conversion Cond.	325 umhos
Plate Current	1.5 ma
Screen Current	2.0 ma
Anode Grid Current	3.3 ma
Oscillator Grid Current	0.2 ma
Total Cathode Current	7.0

* Applied to 20,000 ohm dropping resistor.

This tube is being used in some of the receivers and the warning is issued not to confuse the tube with the 1A6. Although the above constants are furnished at 180 volts anode voltage, the tube is also suitable for use with 135 volts at the anode.

IS THIS YOU?

THAT'S THE THIRD JOB THIS WEEK I COULDN'T FIX!



THERE WILL BE PLENTY MORE IF YOU CONTINUE TO WORK WITHOUT RIDER'S MANUALS!



Boston School Superintendents Authorize Rider's Manuals

At the meeting of the board of superintendents of the various schools in the city of Boston, Mass., on June 21st, 1934, the four volumes of Rider's "Perpetual Trouble Shooter's Manual," were authorized for reference use in the radio classes of the Boston Trade School Evening Classes.

Here is further evidence that Rider's Manuals absolutely lead the field.

Wilcox-Gay Voltage Tables

Below will be found voltage tables for Wilcox-Gay receivers whose schematic diagrams have already been published in Volume IV of Rider's Manuals.

Model 2-VA-7, 2-VB-7

Circuit	Plate to Ground	Screen Grid to Ground	Cathode to Ground
RF	230	95	2.5
1st Det.	230	95	5.0
Osc.	100		0
I-F.	230	95	2.5
2nd Det.	165		0
Output	210	230	0

Speaker Field Voltage 165 volts.

Model 3-F-7

Circuit	Plate to Ground	Screen Grid to Ground	Cathode to Ground
1st Det.	210	105	3
Osc.	100		3.4
I-F.	210	105	2.8
Diode Det.	0		0
1st AF	80		4.0
Output	200	210	0

Speaker Field Voltage 175 volts.

Models 3-L-7, 3-LB-7

Circuit	Plate to Ground	Screen Grid to Ground	Cathode to Ground
RF	240	50	2.5
1st Det-Osc.	240	50	5.0
I-F.	240	50	2.5
2nd Det.	115		0
Output	220	240	0

42 Grid to Cathode 12.5 volts. Speaker Field Voltage 115 volts.

Model 3-J-5, 3-K-5, 3-KD-5

Circuit	Plate to Ground	Screen Grid to Ground	Cathode to Ground
1st Det-Osc.	118	65	3.6
I-F.	118	65	2.2
2nd Det.	52	65	3.2
Output	111	118	17

Speaker Field Voltage 135 volts.

Models 3-T-6, 3-TA-6

Circuit	Plate to Ground	Screen Grid to Ground	Cathode to Ground
RF	110	50	1.75
1st Det-Osc.	110	50	1.25
I-F.	110	50	1.75
2nd Det.	67.5		1.0
Output	105	110	15

Speaker Field Voltage 115 volts.

\$3.00 Value For \$1.00

Have you seen a copy of Rider's new "Servicing Superheterodynes"? If you have not—then you should at once. As a general rule, technical books are listed at prices which approximate about 1c per page. On that basis, this volume is the biggest technical book bargain ever! 288 pages for \$1.00—and Mister Man—the contents of this new book is worth ten times as much to you! . . . There is no other book like it—in any language. It is far superior to any volume which is intended to convey superheterodyne servicing information to the reader . . . We know you'll agree with us.

WANTED

John F. Rider, Publisher, will pay \$1.00 per chassis model to anyone who will send in service data on sets manufactured by the following companies:

Calvert Motors Associates, Baltimore, Md.

Commonwealth Radio Mfg. Co., Chicago.

Capitol Radio Corp., Chicago.

Detrola Radio Corp., Detroit.

El Rey Radio Mfg. Co., Los Angeles.

Karadio Corp., Minneapolis.

We will purchase only *original* schematic diagrams, voltage tables, condenser adjustment data, etc., as supplied by the manufacturer. Copies will not be accepted. If more than one person sends in data for the same receiver, the first one to be received at the publisher's office will be accepted.

Your cooperation will be appreciated—thanks.

Receiver Classifications

The present three classifications of radio receivers have been defined as follows, in accordance with the decision of the RMA Engineering Division.

1. The "standard broadcast" receiver is that which has a tuning frequency range from 540 kc. to 1750 kc.

2. The "standard and short wave" receiver is that which has a tuning frequency range from 4000 kc. to 20,000 kc.

3. The "all wave" receiver is that which has a tuning frequency range from 540 kc. to at least 18,000 kc.

The term "dual wave" as an alternative definition for the "standard and short wave" receiver, has been eliminated by the RMA.

WILCOX-GAY PEAK FREQUENCIES

Below will be found a list of the I-F. peak frequencies for the receivers manufactured by Wilcox-Gay Corp. for the years 1932, 1933 and 1934.

Model	I-F. Peak	Model	I-F. Peak
1932			
2S5	175	3R6	175
2SA5	175	3S5, 3SA5	175
2T5	175	3T6, 3TA6	175
2V7, 2VA7	175	3V6, 3VA6	175
2W10	175	2VB7	175
1933			
3A8	515	4B6	175
3C10	515	4C5	175
3D5	175	4CD5	175
3E5	175	4D10	175
3F7	115	4DB10	175
3G6, 3H6	175	4E6	115
3GA6, 3HA6	175	3KD5	115
3J5, 3K5	175	3PB8	115
3L7, 3LB7	175	3S5	175
3P6, 3PA6	115	3TB8	175
		3VB6	175

Columbia Radio SG-8

This wiring diagram contained in Rider's Manuals and similar manuals sold by National Union, Raytheon and RCA Radiotron, showed a 30,000 ohm volume control. Word has been received from Centralab that they supplied all of the volume controls for this receiver and that the correct value is 75,000 ohms. The 30,000 ohm specification was shown upon the original schematic received from Columbia Radio, hence all of our plates show that value. Please make the change. Thanks.

Intermediate Frequencies In New Philco Receivers

These i-f. peaks are given as of May, 1934. It is possible that by the time this page goes to press, changes have been made, but as we have not received any notice to that effect, we still feel that the following list is correct as of today. At any rate, it is correct for the original productions of the receivers.

Model	I-F. Peak	Model	I-F. Peak
29	460 kc.	10 (Code 122)	260 kc.
45	460	18 (Code 124)	260
59	460	11	260
66	460	G	260
118	460	32	260
144	260	34, 34A	460
200	175	700	260
49 DC	260		

Thanks Mr. Kuser!

Mr. Warren E. Kuser of Boyertown, Pennsylvania, has the following to say: "Just a few more words about the other Rider Manuals. So far I have all the Rider Service Manuals from Volume I to Volume IV. I don't know how I would get along without them, especially Volumes III and IV. *These two books contain all the information a service man needs to service modern complicated receivers.*"

(Signed) Warren E. Kuser.

Notice

Drop us a line if you are interested in receiving "Successful Servicing." If you have any friends who are also interested, tell them to send us in their name and address. "Successful Servicing" is mailed FREE each month.

Philco Model 16

Starting with the recent production, a tubular condenser, part #30-4125, rated at .006 mfd., has been added between the plate of the 77 tube and the tone control circuit.

Sets With Whiskers Still In Use

From various tube company reports comes the information that the AC triodes type 26 and 27, the screen grid 24-A and the 80 rectifier, still constitute more than half of the tube replacement business. It seems as if the old timers just refuse to die out. Accordingly, there is still plenty of life in Volume I and II Rider Manuals, for both of these manuals contain many receivers which employ the type 26 and 27 tubes. In fact, such old tubes as the O1-A are still in demand and in quite substantial numbers. Demand for type 45 power tubes far out-numbers the 71-A, but the latter is still being made and sold.

Peaks In New Stewart-Warner Receivers

Although only temporary data is available, the following is the list of i-f. peaks employed in recently announced Stewart-Warner receivers.

Chassis Model	Receiver Models	I-F. Peak
R-117	1171, 1172	177.5 kc.
R-123	1231 to 1239	456. kc.
R-125	1251 to 1259	456. kc.
R-126	1261 to 1269	456. kc.
R-127	1271 to 1279	456. kc.

Columbia Phonograph Co.

Rider Manuals, inclusive of those sold by National Union, Raytheon and Radiotron-Cunningham should be corrected as follows. Under the heading of Columbia Phonograph Co., models 31 and 33 should be changed to read models 31 and 32, Chassis C-101. Also models 32 and 34 as shown in the manuals, should be changed to read models 33 and 34, Chassis C-102. Thanks.

Without Parallel

We wonder if you actually appreciate the position of Rider Manuals in the servicing industry. There can be no greater evidence of absolute superiority of these manuals than the fact that four competing tube companies, such as RCA Radiotron, E. T. Cunningham, Inc., National Union and Raytheon, all offering tube deals to the same radio

service man, make use of Rider's Manuals. A situation without precedent!

No doubt you realize that if suitable competitive manuals were available, at least one of these companies would have made use of these manuals. Realizing that the service industry desired the most complete coverage of radio receivers, these manufacturers, after investigation found that only one set of manuals, namely, Rider's Manuals, provided such coverage.

The use of Rider's Manuals in these tube deals was not predicated upon price, because Rider's Manuals are more expensive than the competitive manuals available upon the market. Therefore it stands to reason that selection was based purely upon merit. Competitive manuals were available to these tube companies, but since it was the aim of these tube companies to supply the finest material available, there was only one choice. RIDER'S MANUALS.

You Can't Go Wrong With A Rider Manual!

The Business Side of Servicing

(Continued from page 1)

credit is not operating upon his own money, but upon his creditor's money. It is his responsibility to safeguard the investment his creditors have made in his business by extending him credit.

The service industry needs credit very badly. It has suffered for years because it could not secure credit and it will suffer for many more years from the same cause, unless steps are taken to alleviate the situation. The radio service industry collectively does business in the many millions, but its individual components are still in the small business category. Any and all steps taken to place the service industry upon a more solid business foundation will prove extremely beneficial to the personnel. Such an accomplishment will be a godsend to the manufacturers who cater to the service group.

(To be continued)

Rider's Manuals

HAD TO

BE BETTER

to become the "standard"

INVESTIGATE before you buy any new manuals. Be positive that the manual you buy contains the greatest amount of information which will be the most valuable and helpful to you.

We say that you should have RIDER'S MANUALS. They are the best manuals because they give you the greatest coverage of the radio industry and contain more service information of the kind you want and need—than all other manuals.

Take time off to read the comparative figures shown to the right. The superiority of Rider's Manual, Volume IV, also exists in Rider's Volumes I, II and III. . . . We guarantee you satisfaction with Rider's Manuals or your money back without any quibbling.

Buy on Merit . . . Rider's Manuals cost more than other manuals—but you GET MUCH MORE FOR YOUR MONEY.

Volume I	More than 1000 pages
	Price \$7.50
Volume II	More than 800 pages
	Price \$6.50
Volume III	More than 1150 pages
	Price \$7.50
Volume IV	More than 1060 pages
	Price \$7.50
Combination Volume I, II and III	\$21.50 and \$25.00
Servicing Superheterodynes (New Ed.)	288 Pages \$1.00
Servicing by Resistance Measurement	203 Pages \$1.00
"Specialized" Auto Radio Manual (Vol. I)	Price \$3.50

COMPARISON No. 1

This comparison is made with the superheterodyne receiver as the basis because it is the major service problem confronting the service technician today.

Total Number of Pages Including Index	
Rider Manual, Volume IV	1104
Manual "A", Volume 4	402
Total Number of Manufacturers in Volume	
Rider Manual, Volume IV	96
Manual "A", Volume 4	33
Number of Manufacturers of Superheterodynes	
Rider Manual, Volume IV	68
Manual "A", Volume 4	26
Number of Superheterodyne Schematics Presented	
Rider Manual, Volume IV	468
Manual "A", Volume 4	212
Number of Times I-F. Peak Is Specified	
Rider Manual, Volume IV	396
Manual "A", Volume 4	119

The above figures represent a comparison between Rider's Manual, Volume IV and another manual which is offered for similar use. . . .

Rider's Manual include the Radiotron-Cunningham, National Union and Raytheon issues.



John F. Rider, Publisher

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New York, N. Y.

