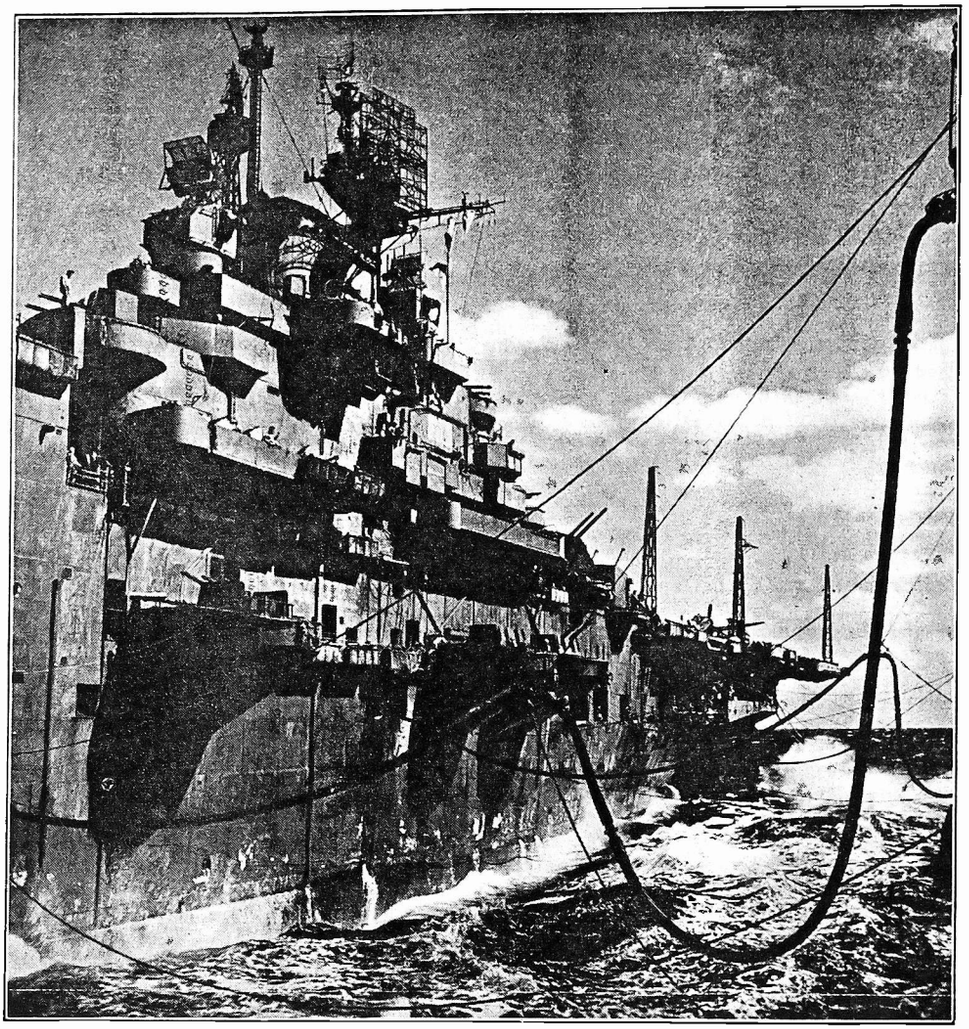
Successful SERVICING

JULY, 1946



Courtesy of Western Electric Co.

Should the Name "Radio-Serviceman" Be Changed?

By John F. Rider

THERE comes a time in the life of almost everyone when some sort of a change seems advisable . . . It may be a change in habit, name, custom, speech, behaviour, in fact, one or a number of things pertinent to the continued successful operation of an individual or a group. In our opinion, this seems to be an excellent time to think about changing the identity of the individual who in the past was identified as the "radio serviceman", "radio repairman", in fact, even the "radio service engineer".

The reasons behind this suggestion are numerous. As a matter of fact, we were surprised that a dispassionate analysis of the situation disclosed so many justifiable reasons. Let us examine these individually:

1. The public is being sold on the idea that it is on the threshold of electronics. Fine! This means that it is well for those in the maintenance branch of the radio industry to look at the field of electronics from a much broader viewpoint than just radio . . . If that is true, then it is equally important to recognize that typing oneself by using a designation which pins down activity to just one branch of electronics, is not too wise. Admittedly, radio is a field of great magnitude, but is the interpretation of the word "radio" in the minds of the public such as to indicate that the individual who is known as the "radioman", is capable of performing the necessary maintenanace on a number of electronic devices? Our answer to this rhetorical question is in the negative.

In the minds of the public, "radio" has a definite meaning. It means the facility of education and entertainment which grew out of "wireless" . . . The public press sees television as a new art — not as a development of radio transmission and reception. We'll hazard the statement that the public will, unless its mind is changed at an early date, view the "radioman" as one individual and the "television man" as another. The fact that at the present moment adequate television service is not available in large numbers in the ranks of the repair industry is of very little consequence with respect to the subject under consideration . . . It is important to recognize that identifying oneself as a "radio" repairman is augmenting sales promotion difficulties with respect to sale of "television" repair facilities.

2. Then there is FM . . . The technician considers it as a form of radio differing from AM only in the character of the radiated wave. The public on the other hand — wrong though it may be — looks at FM as a new art . . . It is not beyond the realm of normal imagination to visualize the public calling FM transmission and reception as "FM", and speaking about AM as "radio" . . . Of course, we admit that this is foolish, but more foolish things than this have come to pass . . . Many "radio" repairmen will be asked if they are familiar with FM, just as if it were an entirely different process of conveying intelligence.

3. Facsimile, as a device in the home, seems far off. Yet it justifies consideration in this discussion because the recommendation we are making is for long-range thinking . . . If we judge by past performance — and it is only natural that this be done — then facsimile too will appear as a new art, apart from all other radio devices which have been sold to the

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Editorial Staff of John F. Rider Publisher

G. C. BAXTER ROWE
Editor

Born, February 2, 1897 at Philadelphia, Pa. Attended DeLancey School, and after one year in the Towne Scientific School, University of Pennsylvania, transferred to Union College, Schenectady, N. Y. from which he graduated in 1920 with the degree of B.S. in E.E., after serving in the Officers Material School, U.S.N.R. From 1934 until 1938 attended evening classes at the New York School of Industrial Art.

After nearly two years in the Test Department of the General Electric Co., he joined the Engineer of Tests Department of the Atlantic Refining Co. in Philadelphia, where he remained until October, 1924, when he became an Associate Editor of *Radio News* in New York. Four years later, he became Managing Editor of *Radio Engineering* and in 1929 left to write a correspondence course on sound projection and acoustical engineering. In 1933, he became associated with the Rider organization editing the Rider Manuals and textbooks. In May, 1942 he received a Civil Service appointment as Senior Editor, War Dept., Signal Service at Large, and was assigned to the Aircraft Warning School at Fort Monmouth, N. J. and a month later was transferred to the newly organized Training Literature Division of the Southern Signal Corps School, Camp Murphy, Florida, where he edited training manuals on radar equipment until May, 1944. In September, 1943 he enlisted in the West Palm Beach Flotilla of the U.S. Coast Guard Temporary Reserve in which he served until he returned to the Rider organization in New York in May, 1944. He was appointed Public Relations Officer of Flotilla 1002 (Brooklyn), U.S.C.G.T.R. in the summer of 1944, which assignment he held until the end of the war.

ROBERT LORENZEN
Chief Engineer, John F. Rider Laboratory

Born, Toledo, Ohio, March 3, 1907. After graduating with a B.S. degree from the College of the City of New York in 1929, he was employed on the technical staff of the Bell Telephone Laboratories for approximately three years. For the next six years, he devoted his time to the design of audio-frequency amplifiers, the installation of public address systems, and writing for technical magazines. From 1939 to the middle of 1942, he was employed by John F. Rider Publisher, Inc., in the combined capacity of communications engineer and technical editor. During this period, he was temporarily loaned to the Civilian Technical Corps to assist in grading the technical ability of the applicants who volunteered to repair radar equipment in England. From May, 1942, to April, 1943, he was an employee of the War Department, Signal Service at Large, at both Fort Monmouth and Camp Murphy, where he made a final technical check of radar instruction manuals. He then became a member of Columbia University, Division of War Research to work on antisubmarine warfare equipment. His next position was as Senior Electronics Engineer with Halstead Traffic Communications Corp., where he designed equipment intended for both the War Department and for civilian agencies associated with the war effort, such as a carrier-shift unit which enabled the simultaneous transmission of normal broadcast programs and telegraphic communications without mutual interference ,and FM transmitters and receivers for induction-field communication. In the early part of 1945, he became Chief engineer of John F. Rider Laboratory, where he is engaged in directing research work on a number of very interesting electronic devices.

WILLIAM R. HYNES
Associate Editor

Born in New York City, Nov. 5, 1902. Attended St. Francis Xavier Grammar School; Fordham High School and graduated in 1922 from Davis and Elkins College with a B.S. in Physics. Went to work for Deforest Radio Tel. and Tel. Co. in 1922 as laboratory assistant and was in charge of vacuum tube production and test when he left in 1924, going to Gilfillan Bros. and covered six states on sales and service work. In 1926, went with Stewart Warner Co. as factory representative in New York, covering service and sales. The next year, he went with Charles A. Freshman as engineer on audio-frequency amplifiers and remained with them until 1929 when he went with Hazeltine Service Corporation as assistant engineer of test equipment and remained with them in various capacities until 1938. During this period, conducted a column known as "The Footloose Reporter" in *All Wave Radio* magazine. Then he retired! — became a farmer and remained in Florida until 1942, when he went with Western Electric Co. in New York as government contract specialist and stayed with them until the end of the war. Joined the John F. Rider organization in 1945.

RICHARD F. KOCH
Radio Engineer

Born, April 20, 1920 at Cedarhurst, N. Y. Attended Lawrence, L. I. High School; graduated from Bard College, Columbia University, 1940, with degree of B.A. in Physics. In winter of 1940-41, graduate courses in physics and electrical engineering at Columbia University, where he held an appointment as Laboratory Assistant in Physics in summer of 1942; ESMDT courses in engineering mathmatics at New York University.

In July, 1941, Mr. Koch was appointed a 2nd Lieutenant, Signal Corps Reserve, and in August was called to active duty at Fort Monmouth, N. J. The following month he was sent to England, attached to the Office of the Military Attache and served with the Fighter Command of the R.A.F. studying various phases of British radar. In June 1942, he was assigned to the Staff and Faculty of the Southern Signal Corps School at Camp Murphy, Florida, writing and editing radar training manuals. In 1944, he was assigned to the Signal Corps Publications Agency at Fort Monmouth, where he remained until he was separated from active duty in April, 1945, when he joined the John F. Rider organization as an engineer. Is an Associate Member of I.R.E.

WILLIAM H. KNAPP
Technical Writer

Born, Aug. 15, 1910 in Easton, Pa. Graduated Easton High School, 1927. First contacts with radio were during high school days through special courses and association with "hams". Studied Radio and Electrical engineering and branched off into one of the kindred fields — theatre sound, for several years. In 1929, he became associated with a correspondence school instruction teaching Sound Projection and Acoustical Engineering Courses and allied electronic fields. Spent the next few years working as a technical writer on some of the above subjects. He also did radio and electrical servicing. Enlisted in the Navy in 1943 and finished out three years service. Attended many of the Navy's technical schools covering underwater sound gear, fathometers, radar, communication equipment, identification, beacons, direction finders, homing equipment, and numerous types of navigational aids. Was transferred into the instruction branch of the service and became supervisor of a laboratory on special training devices used in connection with developing crews for the operation of GCA (Ground Control Approach equipment) a blind-landing radar system. Joined the editorial staff of John F. Rider Publisher, Inc. shortly after discharge in Oct. 1945.

ELIZABETH M. THONUS
Editorial Asst.

Born, July 14, 1916 at Paterson, N. J. Attended St. John's High School—a Radio Technicians Training Course sponsored by Rutgers University in 1942, also a Radio Course at Paterson State Teachers College in 1943. In 1941, started in the radio field with Western Electric Co. as an inspector and electrical tester, then after industrial electronics training, as a calibrator and troubleshooter till 1944. In Aug. 1944, was employed by Federal Telephone and Radio Corp. in the Instruction Book Dept. till Nov. 1945, editing and producing training manuals on Direction Finding Equipment for the Army and Navy. In February, 1945 joined the John F. Rider organization.

LOUIS D. PRIOR
Chief Draftsman

Born Sept. 11, 1902; in Brooklyn, N. Y., Attended New York University for two years, and was graduated from Cooper Union and Mechanics Institute of New York completing their 3-vear specialized courses in Mechanical Drawing, Architectural Construction, Structural Drafting, Mathematics, and Commercial Art. He was employed as Mechanical and Radio Draftsman by the Bell Telephone Laboratories for ten years, by the I. T. and T. Co., the Sonora Phonograph Co., and Wired Radio, Inc., for several years thereafter. In 1933, he joined John F. Rider Publisher, Inc. and has assisted in the editing of most of the Rider Manuals,

has drawn and supervised the layout of illustrations and schematic diagrams for the Rider books and the production drawings for the Rider Chanalyst, Voltohmyst, and other Rider laboratory equipment. In May, 1942, he received a Civil Service appointment of Radio Engineer, War Dept., Signal Service at Large, and was assigned to the Southern Signal Corps School, Camp Murphy, Florida, as supervisor of the Art Department of the Training Literature Division, where he had charge of all art work for radar training manuals and other books; and instructing apprentice draftsmen. In June 1944, he rejoined John F. Rider Publisher, Inc., in New York and is at present still assuming the same duties he pursued before entering Civil Service.

SEYMOUR D. USLAN
Technical Writer

Born in Brooklyn, June 1921. Graduated from Abraham Lincoln High School and attended Brooklyn College as a science major. He is an Electrical Engineering graduate from the City College of N. Y., under A.S.T.P. and in June, 1945 he received his B.S. degree in Physics from the same college. At the beginning of the war, he was employed by the Signal Corps Radar Laboratories at Belmar, N. J. as an engineering research aide in radio and radar. He was one of the representative engineers of the laboratories sent out for travel duty to Bridgeport, Conn., and Schenectady, N. Y., for the purpose of testing equipment set up and inspecting radar equipment, especially IFF. In Oct. 1942, he enlisted in the U. S. Army. While in the army, he was associated with the Signal Corps and also with the atomic bomb project at the New Mexico branch. He was discharged from service early in 1945. He was then employed by the Columbia Broadcasting System (CBS) to work in the Engineering, Research and Development laboratories where he worked on radar and colored television. In the latter part of 1945, he was employed by the Fada Radio Co. as engineer for design and development work in electronics. Mr. Uslan joined the John F. Rider organization in March of this year.

SEYMOUR MAUSNER
Technical Writer

Born in Brooklyn, N. Y., July, 1922. After receiving his B.A. degree from Brooklyn College in 1942, he completed a 10-week program in engineering at the Defense Training Institute. In the Signal Corps Radar Laboratory, Belmar, N. J. he assisted, as an engineering aide, in the design and development of radar equipment and aided the Circuit Development Group in the preparation of reports. He entered the employ of the Emerson Radio and Phonograph Co., in 1943 where he worked in the Mechanical Engineering Dept. on the mechanical design and model making of radio equipment, where he was awarded a citation from the Office of Scientific Research and Development. In 1944, he was employed by the Hammarlund Mfg. Co. as a project engineer on a Navy radar trainer and later was put in charge of the company's instruction-book division where he supervised the preparation and publication of Army and Navy manuals for such equipment as a radar trainer, airborne transmitter, etc. In the fall of 1945, he joined John F. Rider Publisher, Inc.

GEORGE DUNLAP
Radio and Radar Technician

Born in Wrightsville, Georgia, in 1917. During the early years of his life, he spent a great part of his time hunting, fishing and exploring the woods and swamps of Georgia. As he grew older, he turned to radio as a hobby. And later made it his means of earning a living. After 5 years in the practical servicing field, he enlisted in the Army Air Force in 1941. He received additional schooling in radio and radar, and was put into antisubmarine patrol off the Atlantic Coast. He received more radar training in Florida and was sent to Italy to be with the 2nd Bombing Group of the 15th Air Force. He participated in combat and radar radio photo reconnaissance flights, one of which carried him to the Ukraine in Russia. He was returned to the United States and discharged at Ft. McPherson in Atlanta, after serving four years with the Army Air Force. In 1945, he came to New York and secured his present position with this company.

STANLEY BERNARD SCHLENGER
Technical Writer

Born Sept. 28, 1919 at Brooklyn, N. Y. Formal schooling at New Utrecht High School and Brooklyn College where he majored in mathematics and obtained his B.A. degree in 1940. After working as a machinist for a year, shortly before Pearl Harbor he took a civil service job at the New York Navy Yard as a shipfitter. In 1943, he was inducted into the Navy. Passing the Eddy test led to extensive training under the Radio Technicians program in Radio and Radar with specialized training in Radar countermeasures and deception. He was assigned to one of the new "cruiser-destroyers" which added its weight to the signing of the unconditional surrender in Tokyo Bay. While on duty, he maintained and repaired communication and radar receivers, transmitters, and the jamming equipment over which he had tactical and operational control. In January of '46, he was returned to civilian status and in Feb. was employed by John F. Rider.

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Rider's Vol. XV

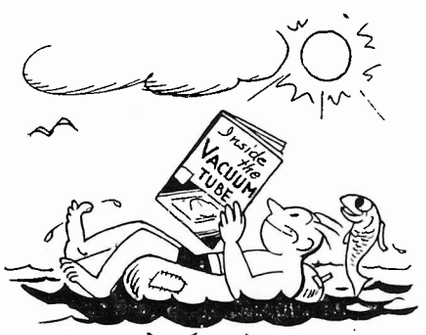
During the past few months when receiver manufacturers were getting all set to start making sets for the home again and then doing it too in a big way, we have been just as busy getting ready for the rush of new servicing data that will be the result of this return to production. And it's a good thing we made our plans early because from all that we can gather, there's an enormous lot of work in the offing.

Here's why: prior to 1942 there were between 50 and 75 manufacturers that made practically all the receivers sold in this country; now there are about three times that number that either have sets on the market already or are planning to put out a line of home receivers. Inasmuch as we have always strived to have 100% coverage of all manufacturers in Rider's Manuals, you can see the job we have cut out for us. Right in our files today we have the servicing data on receivers for Volume XV from more than sixty manufacturers — old and new — and we have assurances from as many others that just as soon as their data are published, they will be sent to us. And there are quite a few more firms whose plans are not definite at this writing, but who have told us they will cooperate with us when they do get into production.

So much for the usual broad coverage that characterizes all Rider Manuals. Now there is something else that we want to bring to your attention.

Ever since the publication of the first Rider Manual, we have been constantly trying to improve the Manuals — to make them so they will be of greater use to you. For instance, we published a "How It Works" supplement with several volumes so that you would be better acquainted with some of the new test procedures and new circuits resulting in a saving of time for you. We agitated for a more concise presentation of alignment instructions, having as a prototype our two volumes of "Aligning Philco Receivers", and were gratified that so many manufacturers adopted the idea of the tabular form.

Realizing that the post-war receivers are going to present more problems to the servicing field than those of 1941 and 1942, we are planning to make Vol. XV of even greater value to you than the preceding volumes. At this writing, it is premature to tell you of all our plans, but we assure you that you will find Rider's Vol. XV filled with ideas which prove progressive thinking and you will like, for they will give you a better insight into servicing methods and so enable you to diagnose troubles more rapidly and more accurately giving you a greater return in dollars per hour spent at your service bench. Rider's Volume XV will be the best yet!



Should the Name "Radio Serviceman" Be Changed?

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public. Its direct association with what we call "radio" will be very remote in the minds of the public, despite the fact that it is simply an expansion of the field of radio.

Taking these three things into account, it seems to us that the wise thing to do is to establish a situation wherein "radio", "television", "FM", "facsimile", or whatever else of electronic character may find its way into the home, is embraced by the identification of the repair facilities in a manner which is easily recognizable by the public. We realize that if the public were made to understand that all of these devices stem from the same root and utilize identical, basic phenomena, then the word "radio" would be all-embracing . . . This, however, is not being done . . . This nation's psychology in buying is such that it is constantly seeking "new" things; therefore, the sales appeal is made on that basis. This statement is not intended as a criticism; as a matter of fact, it is recognized as a sound, proven method of selling. Such being the case, it is necessary to appreciate the requirements this dictates for other related activities.

Other Activities

4. The sale of electronic devices to the public is not the only activity worthy of consideration. There are the devices being sold to the various phases of industry — from the office to the factory . . . As a rule, these are in no way associated with the transmission of intelligence without wires, that is, radio, yet the equipments fall within the operational province of the "radio" repairman by virtue of the technical details involved. But such an association is recognizable only by a person who is familiar with the technical phases of the subject and we can't expect the office manager or factory superintendent to realize it. In the past, it has been a matter of selling the idea, "we also do ——— work," fundamentally because radio repairing is considered apart from industrial electronic-control apparatus. It, therefore, behooves the group who is seeking such repair activity to identify themselves properly so as to attract the customer.

5. The wire recorder will no doubt see commercial application very shortly. As a competitor to disc, cylinder, and stenotype methods of recording commercial notes and correspondence, it holds out high promise. Its repair by the existing repair industry is entirely in order, but how would the users know that the man who "fixes" radio sets is the individual to do this work? Being typed with "radio" is not conducive to business which apparently has no connection whatsoever with radio. It is possible to mention numerous other equipments of this kind which are subject to similar reasoning, but neither space nor the time are necessary inasmuch as numerous other justifying conditions exist which require coverage in this brief discussion.

Competing for Business

6. There is the matter of competition between the set dealer and the so-called "radio service shop" for repair business. . . . The modern radio set dealer sells many appliances for the home. These he secures from manufacturers who make not only radio sets, but washing machines, home freezers, refrigerators, air-conditioning units, and the like . . . In other words, the present-day radio-set dealer can afford a service department of reasonable size because he no longer depends upon radio repair as the means of income for that branch of his business. Incidentally, it is very interesting to note that more and more of the set dealers are installing service shops . . . Where will they get their repair business? From their equipment customers and from the man we have learned to call the independent radio repairman. . . .

Doubtless the latter will not stand by idly and be put out of business. He will no doubt compete by becoming a merchant — by selling merchandise *and* his repair facilities . . . Such being the case, the title "radio repairman", "radio serviceman", or even "radio service engineer" is not appropriate for his future activity . . . He must seek a new identity more descriptive of his actual activity.

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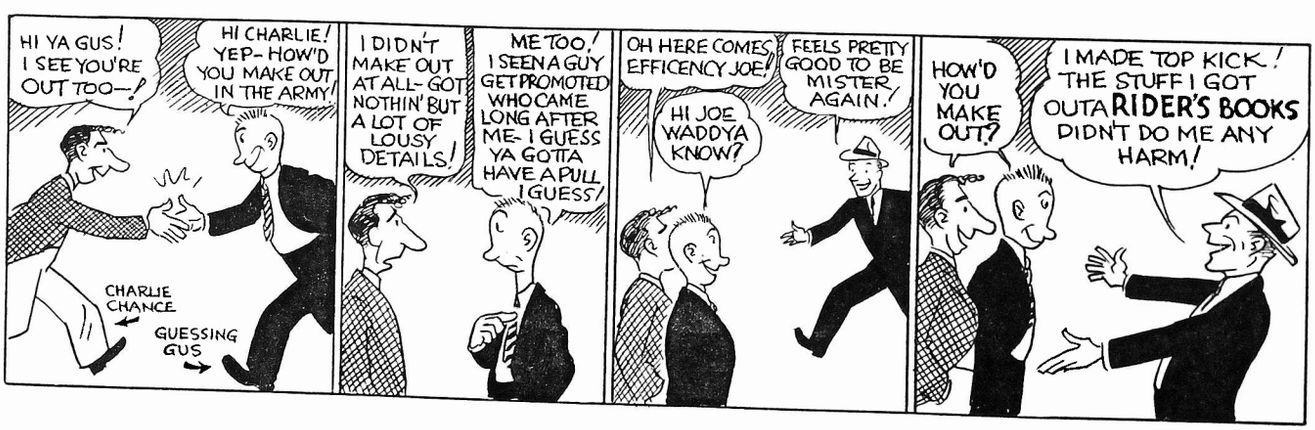
They Helped Joe



Successful
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Vol. 8 JULY, 1946 No. 1

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

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JOHN F. RIDER, Editor G. C. B. Rowe, Associate Editor

THE BETTER WAY

The learning and knowledge that we have is at best but little compared with that of which we are ignorant. Plato.

IT IS interesting to compare the man who gains his knowledge through years of practical experience, and the individual who first studies his theory and then applies himself to the practical side. We have both types active in the radio-repair field.

There are many who are willing to leap off the deep end and say — no doubt judging by their own experiences in the radio-repair field — that the practical man has the best of it all around. The evidence advanced is past performance, wherein the experience of years with commercial radio receivers has created a form of familiarity which theoretical knowledge can not attain. This cannot be denied, especially since practical experience develops an instinctive understanding of what is happening within the circuits of the receiver; above all, the requirement is to correct the defect, which is done. Furthermore, the nature of repair work in the past has been of such order that through the aid of a wide variety of test equipment and the presence of adequate reference data, the practical radio serviceman could perform his work in a creditable manner . . . Having been successful without any special effort to reach theoretical proficiency, the practical worker cannot be denied his right to quote the adage, "Experience is the best teacher," inasmuch as it has worked in his case.

But there is more to the story than just that. In fact, it is recognized in many parts of the world. Nowhere else in the world does the man who repairs the nation's radio receivers have it as easy as in the good old U.S.A. To quote from a letter in April, 1946 *Radio Craft,* from a radio repairman in New Zealand . . . "I believe American radio servicemen have been spoon-fed. They have unlimited technical information on the receivers they service — and they have had in many cases anyway, easy access to replacement parts. I base my opinion on personal contact with American radiomen out here with the Armed Forces." . . . We have discussed this subject with radiomen from England and the Continent. All have the same opinion. So there must be some merit to the practical man's viewpoint.

Nevertheless this is not correct. It is true that experience teaches many things . . . The school graduate must first pass through the baptism of commercial business cross-fire before he becomes worth his salt . . . But after having the experience, his theoretical knowledge gives him every edge over the other man, that is, if both possess equal business acumen, which must be assumed . . . The instinctive understanding of the action taking place in a radio receiver gained through practical experience only is horribly weak when viewed in the light of the future requirements of home AM, FM, television receivers, and other kinds of electronic equipment; even more so when looked at from the viewpoint of future electronic devices which will be handled by the repair group. Training is a bulwark upon which the individual can lean: it is something which prepares him to cope with the unusual. Practical experience enables the solving of commonplace daily problems. Training enables the solution of these and more. Knowledge is not only power; it is the foundation of confidence — the signpost for rational and deliberate thinking in the right direction, with the final result attained with a minimum of effort and the greatest ease. . . .

The practical worker is facing a problem; that is, the thousands of men and women interested in electronics who have received training in the Armed Forces and who are continuing their education in various schools. . . Someday, these people will be active in daily life and will have to be reckoned with. There are some who disclaim the value of electronics training in the Armed Forces. That is a mistake. This writer has not only seen but spoken to many very competent technicians who gained their knowledge in the Army, Navy, and other branches of the service. What with their avowed interest in the future of electronics, give them several years of practical experience and they will make more than just a successful showing.

JOHN F. RIDER.

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Here We Are Again

Just about four years ago, we told you that we had to suspend publication of SUCCESSFUL SERVICING "for the duration" because of the paper shortage and all the other headaches connected with getting out a magazine, not to mention the fact that most of us were scattered here and there over the map doing what we could to help win the war.

Well, that's history now. . . .

And we're very glad to be able to announce that from now on we are planning to publish an issue of SUCCESSFUL SERVICING every other month — *at least* six issues per year depending on the paper supply. We would like to be able to tell you that it is going to be a monthly publication, but the truth of the matter is that the paper situation is still rather critical. We do want to pass on certain information to you — information which we feel you will agree, is most important. We intend to get this material to you as quickly as possible and we also want to keep you informed as to what we are doing here in our editorial department and in our lab.

So from now on, keep on the lookout for SUCCESSFUL SERVICING. Don't lend your copy to anyone — tell the would-be borrower to send us his name and we'll see that it is put on the mailing list, for we want everyone — serviceman, student, engineer, etc. — to have his own file of this magazine.

Radar

Knowing about radio to whatever extent you do, there is no doubt that you are more or less familiar with some aspects of radar. Perhaps you were one of those who were keeping an SCR-270 in operating condition on some Pacific island or were watching the pips on the PPI scope of an SL-1 gear on some battle-wagon or maybe you were one of those who for some good reason kept his business going during the war period. But no matter what you did, Radio Detecting and Ranging meant something to you.

A very great deal has been published in the technical press about radar — how this circuit or that component worked — how "maggie" was able to have such a great output — why waveguides had to be used — and a thousand and one other matters of scientific interest. But up until now, nothing has been published that described in a general way the uses to which radar was put by the Army and the Navy, the different equipments they had and how they functioned.

RADAR — WHAT IT IS tells this — and more.

Written by John F. Rider and G. C. Baxter Rowe, this profusely illustrated book describes in easy-to-understand language the principles upon which radar is based and the main components which every radar installation must have. Then come descriptions of radar equipment used by the Army, the Navy, and the Air Force and how each branch of the service employed their gear in different operations. For instance, do you know about the historic feint that our flyers pulled on the Germans before dawn on D-day? And do you know about how the British battleship *Duke of York* trailed the German's *Scharnhorst* unbeknown to the latter until it was within 12,000 yards, when the British let go her main battery? Radar played an important role in these episodes and in many more. Reading this large-sized 80-page book will not only give the "what it is" of radar, but will show just how important radar is. It will be out in July. Get a copy at your jobbers then. It is not a technical book! *Price $1.00*

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Postal Zone Number

Will you please look at the typed address to which this copy of SUCCESSFUL SERVICING was directed. If your address has a postal zone number and if this number does not appear on the typed address, please let us know what your zone number is. When a bulk mailing of thousands of magazines, such as this, goes to the Post Office, the authorities demand that the addresses carry the zone numbers, for those cities that are so divided into mailing zones.

In order to assure the prompt delivery of your copy of SUCCESSFUL SERVICING, please check up on this and if the zone number is omitted from your address, write your complete address on a postal card including zone number, and mail it to us at once. Thanks for cooperating.

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In The Works

Most of you know that throughout the years we have published books which the radio servicemen of this and many other countries have pronounced invaluable. Realizing that the servicemen of to-morrow are going to be faced with additional complexities in their work, we are anticipating their needs and have in preparation a book which we are positive will be up to our usual standards of value.

As has been stated elsewhere in this issue, the field of servicing must expand and this book will cover this expansion as well as work that you are encountering to-day. It will cover all phases of certain equipment — the underlying theory, the operation, and practical servicing — equipment used in many electronic fields.

That seems like a large order, but so firm is our belief in this book and how it will be regarded, that we are willing to make this unusual offer: if you can honestly say in six months after buying the book, that it has not been of great assistance to you, we will refund the price of the book. — No — we will not tell you what it is at this moment — wait one more month then watch for the announcement.

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Above 1000 Megacycles

The principles upon which any science is based, must be understood if apparatus embodying those principles is to be used intelligently. This is particularly true with microwave equipment for there is a tremendous stride from the solid connectors of a broadcast transmitter to the waveguide of a radar set—from the triode oscillator to the magnetron — from the wires of the long-wave transmitting antenna to the pocket-sized dipole and its reflector. These are some of the components with which the student and engineer of today must be familiar, for radio technique of to-morrow will deal with waves measured in centimeters and millimeters.

A new book "Understanding Microwaves" by Victor J. Young, just published by Rider, explains the fundamental problems encountered in the field of ultra-high-frequency research and production and how they are surmounted—problems met in the design and operation of waveguides and coaxial lines; resonant cavities as they function in the magnetron and the klystron; the theory and design of antennas used in conjunction with the transmission and reception of microwaves.

Section I of this 400-page book covers the theories upon which this microwave technique is built: electrostatic and electromagnetic fields, microwave generation,

Please turn to page 7

To Rider Manual Owners

Ever since October, 1945 when governmental restrictions on book production and basic materials were lifted, we have been making every effort to ship more and more Rider Manuals each month. The basic material problems, widespread throughout the nation, cannot help but make its effects felt all along the line. We are getting paper, but it is like pulling hens' teeth to get it! That is why you may find several kinds of paper in a single volume.

We are getting printing done, but it means baiting these shops into doing the work as rapidly as we need it. Then when we have stepped up the printing and see some hope in sight, we are told that the binder manufacturer cannot get as much cloth as he was promised; or the converter says that he is not getting his basic material from textile mill; or the steel for the posts, which was promised at a certain time, was late and then only 50% of the order came in. . . .

It's a problem all around, but we think we're making progress as we are making shipments in increasing quantities each month. Please bear with your jobber — each repairman's name can't be at the top of the list . . . No doubt each jobber is delivering in accordance with the sequence of orders placed with him . . . Take our word for the fact that we'll do all we can to step-up production and get the manuals to you. . . .

Thanks for your patience.

Rolling REPORTER

HELLLLLOOOOOOO

Yeah, it's nigh onto 4 yrs. since we yanked the last hunka copy outa *Qwerty* and then forgot to put the cover on her when we lit out for Fort Monmouth and points south. (That *points south* stuff is another story!) But here we are again — *and glad of it, too, b'gosh* — and so begins another series of droolin's and drippin's from yr. reporter who has rolled and rolled *and* rolled since last we met. And if we ain't met before, this here colyum is where you'll always find some choice hunka news or over-the-back-fence stuff that you won't care anything about, but then — mebbe you will. . . . Who are we to know wot you or *you* or even YOU like?

A HUNKA HISTORY

Just so's youse guys'll know why the office here at 404 4th Avnoo had that evacuated look during the late unpleasantness, we'll slip yuh a flashback. . . . In the winter of '42, the Boss (*John F. Rider* to you) was offered a commission in the Signal Corps with the job of running the Training Literature Div. at the Southern Signal Corps School at Camp Murphy, Florida. He entered the service as a Capt., was upped to a Major, and then got sent back to God's country at Fort Monmouth, N. J., where he wound up as *Director of the Signal Corps Publications Agency* and as a *Lt. Col!* If you were in the Sig Corps and studyin' now-it-can-be-mentioned radar and detected a familiar touch in the textbooks, it was that of Lt. Col. Rider. Yassuh, he's the one who gave vuh the *real* low-down on the whys and wherefores of the prancin' pips. . . . Since last Sept. he's been outa uniform, but the Signal Corps didn't forget the swell job he did during those 3 yrs., for on Feb. 5th, *he was awarded the Legion of Merit!!!!*

The Boss took with him to Camp Murphy, Bob Lorenzen as Technical Editor, Shad Rowe as Senior Editor, and Lou Prior as Chief Draftsman — all from our staff here at the office. (*Oh yeah, we oiled up the old bicycle and went along too*). Bob ferreted out technical inaccuracies in the radar texts, Shad saw to it that they followed the rules of the king's English, had all the pix in 'em, etc., and Lou bossed the staff of artists and draftsmen (*and women*) . . . In the spring of '43, Bob tearfuly (*sic!*) emptied the Fla. sand outa his No. 10's and went nautical on us, doing some highly hush-hush Naval radar work for the N.D.R.C. in New London. Shad and Lou staved at their radar work at Camp Murphy until the Spring of '44, and then they came back here to the old stand. The call of the briny deep hit Shad and in '43 he enlisted in the Coast Guard Temporary Reserve in West Palm Beach; so for days per week he sweated for the Army and on the 7th he helped fight the Battle of Florida with the Coast Guard. (See a March 1944 issue of the *Satevepost*).

And do we hear "And wot did *you* do in Fla?" Who, us? We too toiled at Camp Murphy and among other things it was our job to go around each morning and collect all the pips that disappeared off the radar scopes the night before. They were elusive little devils, but we didn't blame 'em for hiding out to get away from the sand flies and the red bugs. Then we had to keep the gremlins off the antenna arrays, but we finally licked that job easy — we got us a fleet of dive bombers (*they call 'em mosquitoes down there*) from out in the 'Glades and trained them to chase the gremlins before they could kick the radar pulses outa line. Yeah, we had some swell jobs down there . . . mebbe some day we'll tell you how we had to mow the grass on the scopes and plough the fields in waveguides . . .

GRIPE DEPT.

We're always glad to get new ideas on servicin' matters, no matter whether they're gripes or otherwise. . . . *So how about writin' to the undersigned.* If you gotta gripe that you think will interest your feller servicers and mebbe help them in some way, feed a hunka paper into your Corona or Royal or whatever engine you use, and *get it offen yer chest.* . . .

VEST-BUTTON PUSHER-OFFER

Say, is it any wonder that the tailors are kept busy replacing popped-off vest buttons when the reviewers keep on saying such nice things about **"Inside the Vacuum Tube"?** When you read, it, you'll know what made 'em **hang out the banner the way they did.** Wot? You ain't got your copy yet? *Wassamatta?* You hustle right down and get that *Best Buy* in the red-and-blue gift wrapper. We'll wager a goodly hunka the weekly stipend that you'll say it's *the finest gilt-edged investment yuh ever made.* . . .

2 HOURS FOR 2 BITS

Here's the latest . . . G.E. is puttin' out a 2-bit receiver for hotel guests. Now don't go gettin' all het up at this price — it's the cost of the entertainment *not* the cost of the set. If a guest wants to listen to Henry Morgan do his stuff, the Lone Ranger, Mr. District Attorney, and the Green Hornet, he drops 25c in a slot in the top of the receiver and then tunes in whatever he wants for 2 hours. . . .

3rd FLOOR NOW

Last fall when we found that our staff had outgrown our quarters on the 10th floor, we moved down here to the 3rd floor where we have enough room so that we're not sittin' in one another's laps like we was for a while upstairs. Yep, it's all painted a nice blue with lotsa big windows and in case there's another elevator strike, we only got three flights of stairs to climb. Sure, we're lazy — have you ever crawled up 10 flights on an indigo Monday? **'Tain't funny!!!**

HUSH-HUSH UNHUSHED

Last Aug. the Army and Navy broke down and admitted there was such a thing as radar and that a lot of it *ain't hush-hush no more.* . . That bein' the case, the Boss and Shad Rowe co-authored a book low-downing how a radar set works and how 'twas used on land and sea and over 'em both. We gotta eyeful of the MS and pix and after June when **RADAR — WHAT IT IS** is let loose on the unsuspectin' world, we suggest you keep your eyes tight shut every time you go in your jobbers and don't ask about that book, 'cause if you buy it, you'll mebbe learn something about this here latest electronic marvel and how it helped win the war. . . . It'll cost a whole buck. . . .

IN THE SPRING
A YOUNG MAN'S FANCY. . . .

Now that the tulips are done bloomin' and the Iris have busted out in our Brooklyn garden and we've put the winter benny outa reach of the starvin' moths, we know that Spring has officially arrived. . . . Another sign is the urge that sneaked up and bopped us to do *plenty of nawthin'*. . . . Yep, these is the days when we get too lazy even to tune out a string quartette that follows a good program — and *boy,* that's plenty lazy!!!! Ho-hum — move over in that hammock, willya, and make room for

THE ROLLING REPORTER.

The Cover

During refueling operations at sea, the Navy's big battleships and carriers were "sitting ducks" for enemy planes. The cover photograph, courtesy of Western Electric Co., taken from the deck of a tanker, shows the fuel lines stretched over to an Essex-class carrier, which had a variety of radar antennas on her superstructure from which microwave radio pulses searched the skies for hostile planes.

Above 1000 Megacycles

Continued from page 6

radiation, reflections, etc. A comprehensive collection of terms, ideas, and theorems, explaining their nature and use in radar and microwave communications is contained in Section II. This is a ready reference and will prove invaluable to those interested in the development of the microwave technique. A special feature is the two frequency-spectrum charts found on the reverse of the jacket, which is suitable for framing. The mathematical treatment of certain phases of the subject has been minimized and wherever possible appears in footnotes at the chapters' ends.

Here is a book that is for engineering students, radio manufacturers' engineers and designers, school and college libraries, in other words, to those interested in the development of microwave technique.

CHAPTER TITLES: *Section* 1

1. The Ultra High Frequency Concept
2. Stationary Charge and Its Field
3. Magnetostatics
4. Alternating Current and Lumped Constants
5. Transmission Lines
6. Poynting's Vector and Maxwell's Equations
7. Waveguides
8. Resonant Cavities
9. Antennas
10. Microwave Oscillators
11. Radar and Communication

Section 2

Microwave Terms, Ideas and Theorems. Index. *Price $6.00*

Should the Name "Radio Serviceman" Be Changed?

Continued from page 4

The Matter of Public Confidence

While we do not concur with the blanket statement that the radio repairman lacks public confidence, it is nevertheless true that the attitude does exist in many places . . . It cannot be denied that harm has been done by numerous public indictments of the repair group by the press, individuals in the municipal judiciary, and others. In fact, even the best of repairmen starts out with two strikes called on him when he solicits business, simply because he is known as a "radio repairman" . . . Perhaps present condition, that is, shortages of material and man-power, tend to relieve this situation slightly, but it is almost a certainty that set-dealer competition plus a greater freedom of repairing facilities, will make the public attitude felt more strongly — unless something is done soon to minimize the blow.

Granting that a change in identity does not make for a better man — if the man is bad — it does, however, tend to remove a man from the shadow of unfounded suspicion — if the man is good. . . . Most of the public never had cause for complaint, but each time that they bought repair they did so with much misgiving because they were dealing with a "radio serviceman" . . . Do you agree? . . . Let's have your comments.

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R.R.3
HUDSONVILLE, MICH.

Successful SERVICING

AUGUST, 1946

Photograph by Sgt. Coster, AIR FORCE *Magazine*

ASSOCIATIONS ARE STILL NEEDED

By JOHN F. RIDER

LUSH times tend to becloud important issues because the mind is lulled into a false sense of security. But history has shown that highly lucrative periods are comparatively short lived; that the day surely comes when easy money no longer is plentiful — when the problems of old, associated with the effort to maintain the proper living standard, are revived. . . .

Radio servicing is still capable of producing a satisfactory income and will continue being so for quite some time to come — at least eighteen months to two years. This is the time to anticipate future needs . . . Regardless of the trends in maintenance activity, such as the wedding of maintenance and merchandising — those who keep this nation's electronic equipment in working order, should cock a weather eye towards the future. Yes, this is the time to give some thought to association effort.

Years have passed, but mental attitudes have not undergone major changes. . . . Admittedly, the public has come to understand that radio repairmen are in general honest — but as set owners, they still face a very serious dilemma: the technical proficiency and competency on the part of the repair group. . . . The "guarantee" is still an unknown quantity. . . . What does it mean? . . . How can a set owner be assured of proper repair? . . . In fact, we feel that the average individual who is seeking a repair facility thinks more about getting a good job done, than about the cost. . . .

The local association is the best means of licking this problem . . . Its guarantee will bear much more weight than a guarantee issued by an individual . . . Maybe the industry isn't much concerned with such details today — but it will be — and that's as certain as sunrise and sunset. Some of you may think that this is a fixation with the writer . . . Maybe it is, for we have been saying the same thing since back in 1932 . . . *And we'll continue pounding the same idea until it comes to pass!*

Just today at luncheon, our guest, who incidentally has seven receivers in his home (three of them ready for the repair shop), asked us to tell him how to select a radio-repair shop in which he could have the utmost confidence relative to technical performance . . . This question is asked almost every week — sometimes more often . . . There must be one answer for the public as a whole — one which everyone will understand . . . Now is the time to develop it . . . Now is the time to plan the education of the public — to start the ball rolling. . . .

An individual voice means nothing . . . Whatever is being done in this nation's enterprises and activities, is being accomplished by groups . . . Today the men who comprise the repair industry are in most parts of the country typifying rugged individualism; each man is going his own way . . . That type of thinking has its place, but when the problem is the education of a large group totalling many millions — the simplest and fastest and most effective method of attaining the desired end with mutual benefits is *by group action* . . . The association is the answer.

Local radio associations exist in different parts of the country . . . They are altogether too few in number . . . There must be many more . . . Moreover their contact with the public must be closer . . . That — and not protection of one repairman from the other — is the crying need . . . Technical advancement of the repair industry also is imperative . . . For that too, the association is the answer. . . .

The radio-repair group should not fall prey to the usual human weakness of for-

Please turn to page 5

Circuit Analysis of Olympic 6-601, 6-602

By Seymour D. Uslan

In the schematics of the Hamilton-Olympic Models 6-601W, 6-601V, and 6-602, we will find some very interesting features that are worth mentioning. The 1 mmf capacitor between the signal grid of the 6SA7 converter tube (pin 8) and the high side of the oscillator tuning capacitor, shown in Fig. 1, is used for preventing interaction between the signal and oscillator circuits. This interaction is caused by an *effective* capacitance (within the tube) existing between the signal grid (pin 8) and the oscillator injection grid (pin 5). This effective tube capacity consists of two parts. One part is the interelectrode signal-grid to oscillator-grid capacity, which for the 6SA7 is 0.15 mmf. The other part is due to *space-charge coupling* between the oscillator grid and signal grid. This space-charge effect is very important because it is evident in most converter tubes. It is explained as follows: There is a space-charge region around the signal grid which is continually varying at the oscillator frequency. Due to the resultant effect of this space charge a voltage of oscillator frequency is coupled into the signal grid circuit. This effect is the same as if a very small capacitor were connected in the tube between the oscillator grid and signal grid, and some of the oscillator frequency were injected into the signal-grid tuned circuit through this capacitance, causing unwanted interaction between these grid circuits. The 1 mmf capacitor takes care of this undesired feature by neutralizing out the total *effective* capacity existing inside the tube between the oscillator and signal circuits. If there were no neutralizing capacitor, the conversion gain would be slightly decreased — and this is not desired because a high conversion gain is always wanted when a converter tube is used.

In the short-wave band, there is a special "gimmick" incorporated in conjunction with the r-f transformer between the 6SG7 r-f amplifier and the 6SA7 converter, as shown in Fig. 1. This "gimmick" (drawn heavier for clarity is shown to be a few turns of wire with one end connected to the high side of the primary of the r-f transformer (#1) and the other end open. These few turns of wire serve the purpose of a low-value mica capacitor. In other words, there exists a certain amount of capacitance between the high side of the secondary of the r-f transformer and the "gimmick" shown. This capacitance is very low, possibly as low as 1 mmf. The function of this effective capacity is to increase the response at the high frequencies because without it, the amplification of the stage decreases at the high frequencies. This added capacity — which is effectively between the plate of 6SG7 and the signal grid of the 6SA7 — provides for greater coupling between the two stages and prevents this decrease in gain at the high frequencies. This is effective at the high frequencies since the capacitive reactance of the "gimmick," decreases with increase in frequency and results in a minimum amount of opposition to high frequencies.

Another interesting feature is the 1.5 megohm resistor and 0.001 mf capacitor feedback arrangement from the plate of the 6V6GT/G tube to its grid input as shown in Fig. 2. This arrangement is installed to decrease the high-frequency audio output only and not the low audio or bass frequencies. It is also known that this R-C combination reduces the distortion of the set at the high audio notes. This R-C combination represents a special

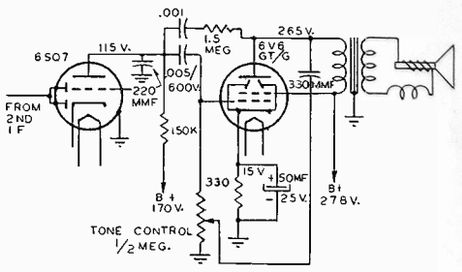

Fig. 2. The R-C combination feedback circuit from the plate of the 6V6GT/G tube decreases high-frequency a-f output.

time-constant network to the audio output voltages available at the 6V6GT/G plate. The feedback shown is one of degeneration (i. e., the voltage fed back from the 6V6GT/G plate is out of phase, approximately 180°, with the original input voltage to its grid) and thus the voltage fed back tends to reduce distortion, as well as the gain of the set, at the high audio frequencies. The reduction in gain is not much and a 6V6GT/G power output tube can easily afford it, especially when distortion output is also decreased at these high audio frequencies. The R-C combination is selected so that the capacitor offers a high reactance to the low frequencies and a low reactance to the high frequencies — of the audio range. Therefore, due to the effect of degeneration, the output at the high frequencies is decreased, which *effectively* increases the output at the low or bass frequencies. This type circuit is sometimes termed a "bass-booster" circuit.

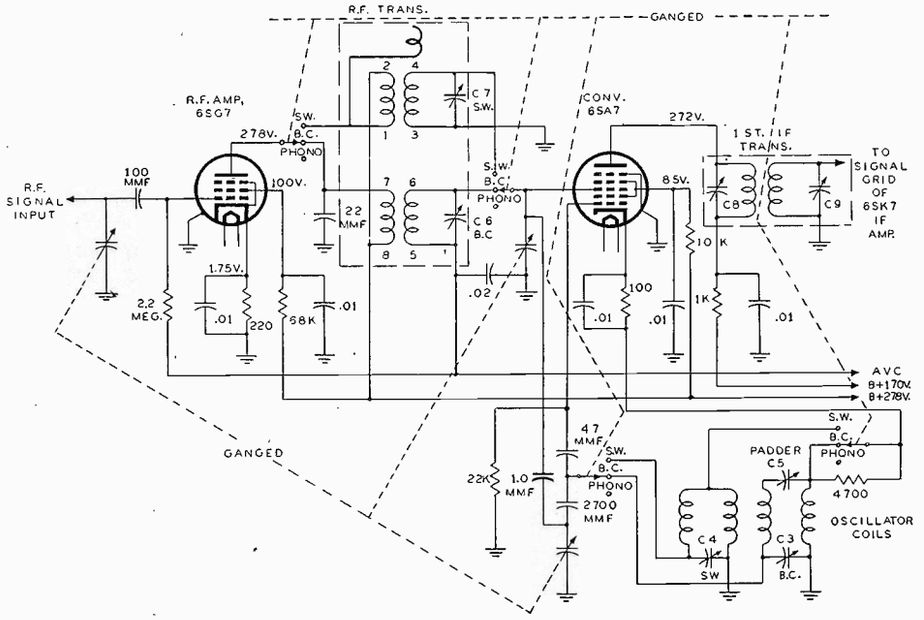

Fig. 1. The 1-mmf capacitor in signal-grid circuit of the 6SA7 tube and the "gimmick" connected to terminal 1 of the r-f transformer, are the interesting features in this part of the circuit.

A Study of Regenerative Feedback

Feedback being such a controversial subject of the radio field today, the John F. Rider Laboratories performed a series of experiments to clarify certain regenerative and degenerative features of feedback. In this article, one of the experiments on feedback will be discussed. Very sensitive d-c microammeters were used. These microammeters are similar to galvanometers in the respect that they can vary on either side of their zero point, which is in the center of the meter scale. All the microammeters, used in this experiment, were hooked up in such a way that their negative terminals would be in the direction of current flow and their needles would swing to the right.

These d-c microammeters could record oscillating currents if the input frequency was very low. This would be evidenced by the *slow* swinging movements of their needles. A very low-frequency oscillator, designed at the John F. Rider Laboratories, was used as the source of signal input. The circuit hookup without feedback is shown in Fig. 1, and that with feedback in Fig. 2. We found, by the use of the microammeters, that feedback, from the plate of the 6F6 tube through the variable feedback coupling resistor, *R8,* to the grid of the 6C5 tube (as shown in Fig. 2), was regenerative. The *output* of the 6C5 tube and the 6F6 tube increased with this type of feedback.

In both figures, the dashed arrows on the meters show the sweep of the needles due to the low frequency, which was one-half cycle per second. The solid-line arrows represent the needles of the meters.

In Fig. 1, (no feedback) the needles of meters 1, 4, and 5 all point in the same direction at the same time, indicating that the frequency currents in these circuits are all *in-phase* with each other. Likewise, meters 2 and 3 indicate that the frequency currents in their circuits are in-phase with each other, at the same instant of time as meters 1, 4, and 5 are read. But, since the needles of meters 2 and 3 swing in the opposite direction to the needles of meters 1, 4, and 5, then the frequency currents in meters 2 and 3 are *180° out-of-phase* with those frequency currents in meters 1, 4, and 5. The above analysis immediately establishes the fact that the frequency currents in the plate and cathode circuits of a tube are 180° out-of-phase with the input signal on the grid of the same tube.

The complete swing of the needles indicates the strength of the signal in different parts of the circuit, and the needle swing of meter 5 indicates the output strength of the system. With all this in mind, let us now refer to Fig 2, with the feedback arrangement inserted. With this arrangement, the coupling resistor, *R8,* controls the amount of voltage fed back to the grid of the 6C5 tube from the 6F6 plate. The amount of feedback is indicated by meter 6. The current flowing in meter 6 is *in-phase* with that of meter 1, as indicated by the position of the needles; therefore, these two in-phase currents *aid* each other and, consequently, the total effective input to the grid of 6C5 tube is increased. This is shown by the greater swing of the needle in meter 1. Since the input to the 6C5 tube is increased, the output is also increased and this output is impressed across the grid of the 6F6 tube. Consequently, the output of the 6F6 tube also increases due to its increased input. *The increase in all the frequency currents flowing is indicated by a larger amplitude of needle swing of all the meters (compare the meters of Figs. 1 and 2) especially meter 5, which is fundamentally the indicating output meter for the whole system.*

This type of feedback (through a coupling resistor), from the plate of one amplifier tube to the grid of a preceding amplifier tube, causes regeneration in the system.

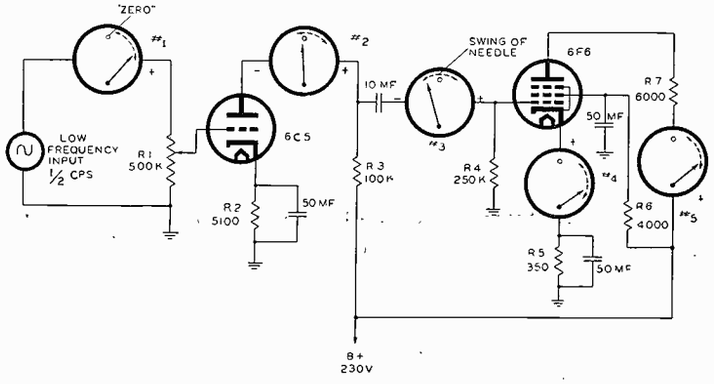

Fig. 1. left. Typical amplifier circuit without feedback showing current phase relationships.

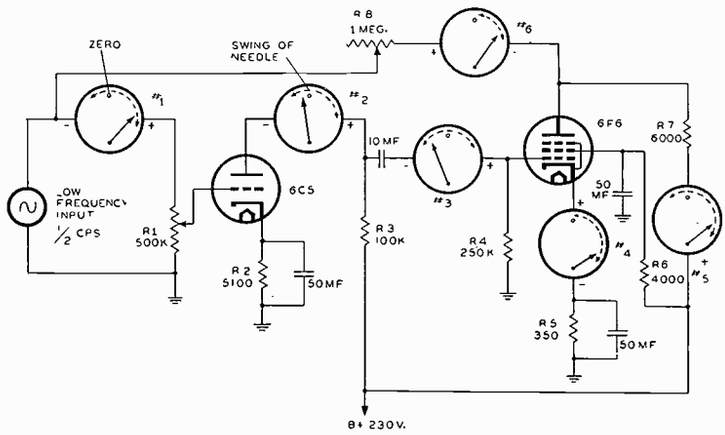

Fig. 2, right. Amplifier circuit with regeneration illustrating phase relations of current.

WHAT WILL YOU HAVE?

It has always been the policy of this organization to publish books that will fill the repair industry's needs and so we are asking you to indicate on a postal your answers to these questions:

1. Would you be interested in a manual on audio amplifiers, p-a systems, etc.

2. Would you like to have servicing data on amplifiers in Rider's Vol. XV?

3. What subjects would you like to have covered in new books?

Please let us hear from you soon.

The Cover

The photograph on page 1 shows an Air Force's Radar Navigational specialist looking at the scope of a PPI (Plan Position Indicator), which is installed in a B-29 Superfortress. This is a typical airborne radar scene by means of which our aerial navigators were aided in their jobs.

The Master Index

It has always been the policy of the publisher of Rider's Manuals to make the servicing data as complete as possible and to make these data easy to find — in other words, complete indexing. No matter how well the servicing information is presented, if it can not be located in some particular volume, then it might just as well be at the bottom of the ocean.

Following the policy of continual improvement in everything related to the Manuals, we are planning to publish a Master Index in which will be incorporated the listings of every model and chassis in every Rider Manual ever published: the original Volumes I and II, which had a different page-numbering system than the one started with Vol. III, and since revised; the RCA Combination Manual of 2760 pages; the abridged 2000-page volume of data in Volumes I to V inclusive; and the remainder of the Manuals. In short, it will make no difference what Rider Manuals you own, the Master Index will list the model numbers of every receiver in every Manual so that you will need consult only one index to find the data you require.

For instance, suppose the information on a model was first run in the original Vol. II, repeated in the RCA Combination Manual, in the revised Vol. II, and also in the Abridged Vols. I to 5 Manual. Such a model will have four sets of page numbers, the location of the data in each Manual.

Heretofore in order to conserve space in the Rider Manual Indexes, it has been the practice to cross-reference data. For example, suppose that a chassis has two or more model numbers; the lowest number of the group was listed followed by the others, as 2114, 2819, 3200. The second and third numbers were listed in their respective places in the numerical sequence and referred back to the first number where all the data on the one or more pages were listed. This necessitated the consulting of at least two places in the index.

In the Master Index, this cross-referencing will be discontinued — all the data pertaining to each model will be listed separately. In the above example, the data belonging to 2114, 2819, and 3200 will be indexed three times — each group of listings being in its own place in the numerical sequence of model numbers. Thus, if model 2819 comes to your bench, you will just look up that number and find the Manual pages indexed there and you will not have to refer back to model 2114 to find them.

It is uncertain at the present writing when the Master Index will be published, for you can see that it is an enormous and expensive task to gather all these data, arrange them, have them set in type, checked and re-checked, and printed; however, we plan to have it ready by the end of the year or early in 1947 so that it will include Volume XV. Neither do we know what the price of the compilation will be.

Just as soon as we know the publication date and the price of the Master Index, we will tell you in these pages. Watch for further announcements.

•

Speeding Up Servicing

You have doubtless read in many places recently that while the receivers of the present day are in general not too different from the pre-war variety, those of the future will be more complex. We might hazard a guess that these complexities will be in the form of various control circuits and other features that as yet are in the research-laboratory stages, but whatever they may be, there are headaches in the offing for servicemen, among them being increased competition.

One way of keeping clear of such headaches is for the repairman to acquire the ability of faster diagnosis of trouble in a receiver. In order to do this, he must use a method of trouble-shooting that is basic and capable of providing positive information on the condition of any circuit in a receiver. There is one way of doing this and that is by inserting a signal at the input of a receiver and following the course of this signal throughout all the circuits, determining its condition at all major points. . . . In other words, *signal tracing*.

If signal tracing is employed effectively, it will do more for the serviceman than merely provide him with the location of the trouble; it will teach him how the signal flows through the various circuits, because in order to use the method he must be able to choose the test points from a schematic, which means a knowledge of the functioning of all the components. And where can you get such information to enable you to do this? From Rider's "SERVICING BY SIGNAL TRACING."

Just in case you do want to speed up *your* work and at the same time increase your ability to cope with the more complicated sets that are bound to come to your shop, we suggest that the next time you are in your jobber's, ask him for a copy of this book. Look over the breakdown of the different circuits that are common to almost all the sets you encounter — read one or two of the explanations of how these circuits affect the signal. Look at the listings under Chapter 9 in the table of contents; certainly, you can see that if you had a thorough understanding of all these, the speed and accuracy of your work would be increased to a great degree. And look at the Chapter 10 listings; you may not feel the need of these facts today, but how about to-morrow?

It's a wise man and a good business man who looks to the future. Put yourself in that class — get a copy of Rider's "SERVICING BY SIGNAL TRACING" today. You'll find it an A-1 investment!

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YOU SAID IT!

Successful
SERVICING
REG. U. S. PAT. OFF.

Vol. 8 AUGUST, 1946 No. 2

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

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STANDARDIZATION RISES AGAIN

IF OUR memory serves us correctly, the standardization of symbols used in radio receiver wiring diagrams was widely discussed during the five years prior to the war. Progress was being made—and then came the war. During the past eight months, this writer has been examining manufacturers' wiring diagrams and it is easily seen that the interruption has had its effects. The matter of standardization is rising again.

It is impossible in one editorial such as this to cite all the items which deserve consideration, but let it suffice to say that there are many. Much constructive progress which has been accomplished, has been undone. In some instances, the symbols used conform with the A.S.A. standards, which are established during the war; others revert back to those developed before the war; at any rate, there is a conflict of sorts and it should be settled.

The need for standards in diagram symbols is not merely a matter of convenience to the man who is working on a communication system. Regardless of what symbols are used in a schematic diagram, restoration of a defective communication system can be accomplished, but beyond all question, uniformity of symbols makes the job so much easier. But even more important than maintenance operations, is the matter of basic training.

It is during this training period that the individual who will work in the electronic field, is most impressionable. . . . All that he is learning is new to him and he makes every effort to absorb and retain the information presented to him. One symbol taught during the training period and another used in commercial schematics only will lead to confusion, unnecessarily making the job more difficult. . . .

Which are the correct symbols to use during the school training? Which should be used in elementary texts? The greater the degree of specialization in symbols in order to identify the different types of similar components, the more important does clarification of the issue become. . . .

What with the expansion of the electronic field and the creation of new symbols to indicate new types of components, this problem demands urgent action. . . . It is understandable that some hesitancy to change symbols may exist in certain quarters because of the many fundamental books on electronics now being used in educational institutions. The conflict relative to the direction of "electric current" and the direction of "electron movement" has raged for many years and is an example of the troubles which can be caused by the inertia of conservatism.

Perhaps this difference in thinking has not bothered men attending the higher institutions of learning, but it most certainly has confused the trade-school and high-school students, of which there are many more than college men. . . .

The years to come will see the publication of many times more fundamental books on electrical subjects than have been printed so far. . . . To assure that these contain the correct symbols so that students learn the correct things from the start, makes necessary urgent efforts at standardization. . . . As far as the radio industry is concerned, today is not soon enough to check the drift away from the standardization of radio symbols which existed. . . . It would be a shame to have wasted the many hours spent in accomplishment.

John F. Rider.

Associations Are Still Needed

Continued from page 1

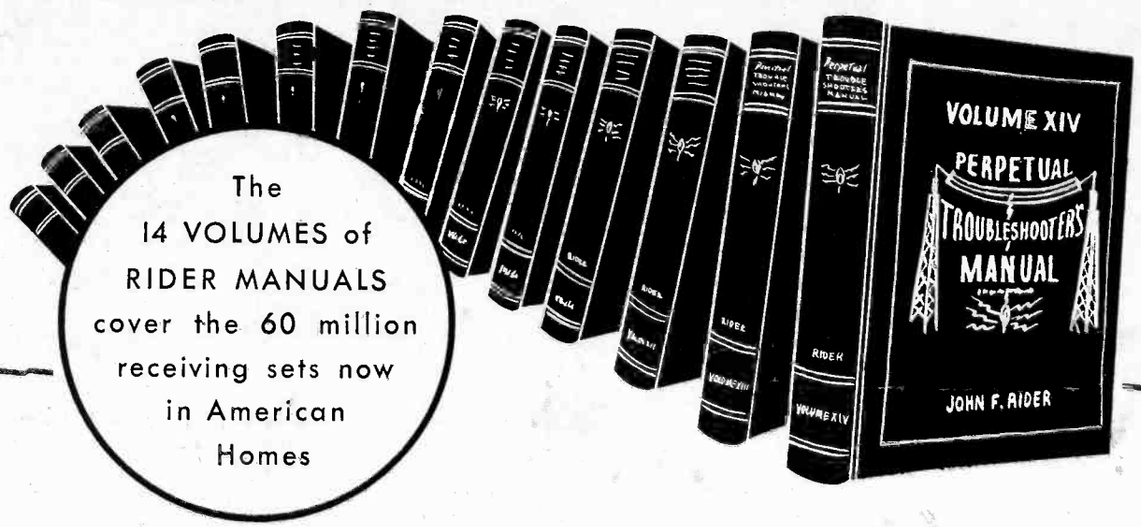
getting the past just because the present is bright . . . We have said this before and reiterate now simply because the transition from darkness to light was not caused by changes in the industry — or by a change of heart or greater understanding on the part of the public . . . Whatever prosperity exists in the repair field can be laid in the lap of the war . . . It is altogether a too common failing for the average man who has benefited from such an unfortunate event as a war, to feel that his present economic status is due to his own efforts, rather than conditions beyond his individual control . . . The true test of commercial ability is demonstrated in times of peace when materials and manpower are plentiful.

Everybody is speaking about the highly competitive days which are approaching in the radio industry . . . These comments do not exclude the repair industry . . . Why not then recognize the truth and realize that the issues which existed and never were solved — but rather placed in the background by World War II, will again rear their ugly heads and demand solution? And having been in existence for a number of years without solution, it will aggravate the skin when the public's itch begins again . . . The result will be many attempts at finding an answer which will have to be fought tooth and nail . . . Give the municipalities a chance and some of the misguided judiciary will be screaming for licensing — especially if activity in the electronic field is expanded by the development and sale to the public of more than just radio receivers. . . .

Individually, it is impossible to teach the public that mass production ends at the shipping department of the set manufacturer — that the 10,000th and the 648,000th sets off a production line are individual sets when they hit the service shop; that a burned-out plate resistor is the same defect in a $1000. and in a $24.95 receiver; that the more compact the receiver and representative of mechanical design ingenuity and genius type of engineering, the more difficult is the servicing problem . . . Association effort is the means of accomplishing this education. . . .

Education in the future is not limited to the public only . . . Much must be carried on within the ranks of maintenance personnel . . . To accomplish the necessary aims most effectively — to introduce the new ideas most rapidly — to convince the

Please turn to page 6



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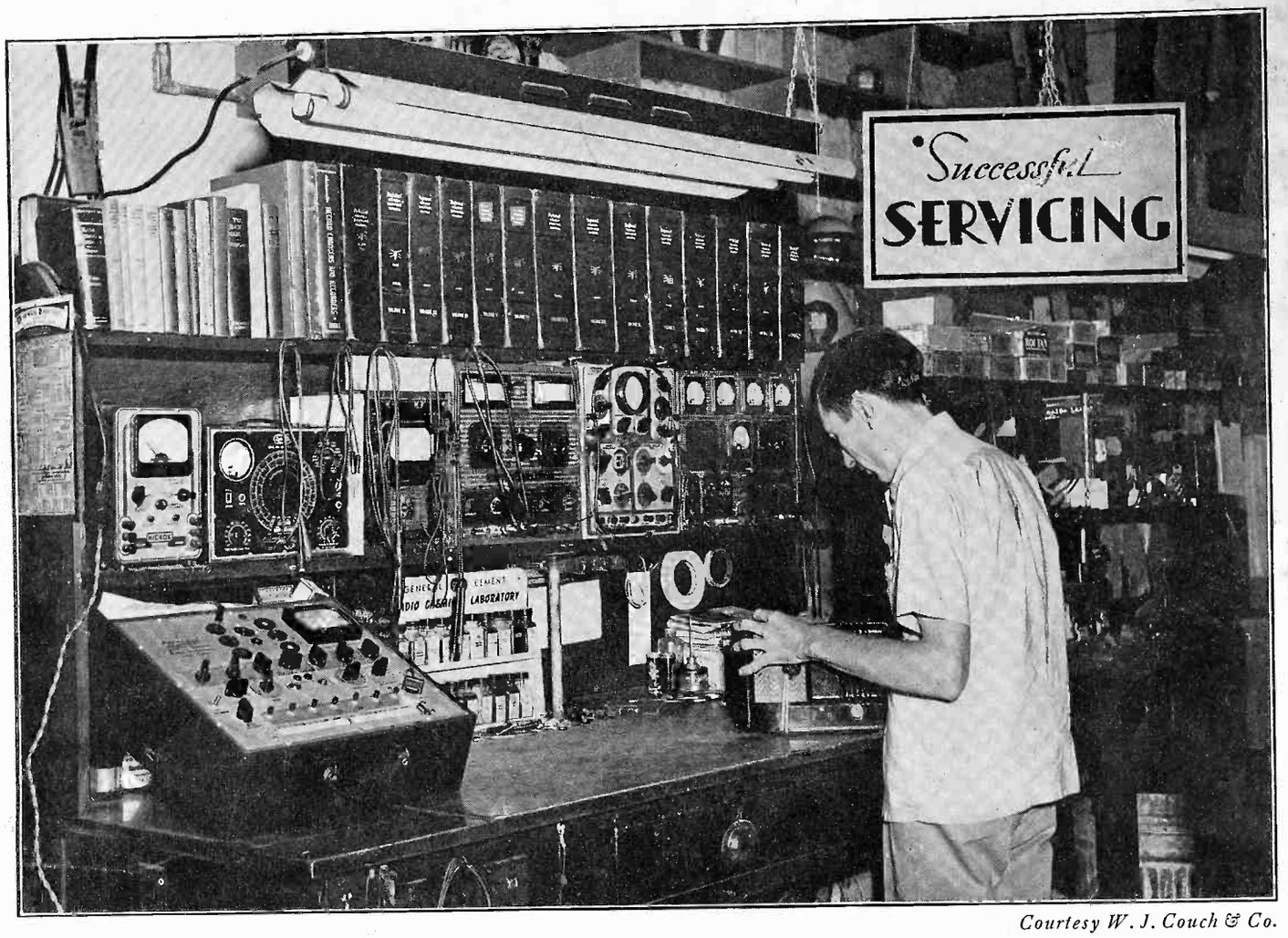

Courtesy W. J. Couch & Co.

DECEMBER, 1946

RIDER'S VOLUME XV

Facts About the Latest and Biggest Rider Manual

HERE is the news about Rider's Volume XV- . . . We have waited a long time to tell you about it, because we wanted to be certain about all of the facts. Now that it is being printed, we're in a position to furnish facts and figures.

The number of pages in Volume XV will be between 1950 and 2000, which makes it the GREATEST single volume we have produced to date. The abridged Volumes I to V contains 2000 pages, but since this book does not represent a single volume, Volume XV still ranks as the greatest in the number of pages. In addition, there will be furnished with Volume XV a supplementary book, the "How It Works" book of about 150 pages, approximately 8½ x 11 inches in page size, and it will contain the explanations of the many new technical circuit features to be found in the new crop of receivers. . . . Thus all in all, Rider's Volume XV comprises a total of about 2100 pages — all of which is new material.

The number of pages in a volume, however, does not really indicate the contents of a book. The material ON the pages is what matters in evaluating the merits of a publication. In this connection we are proud of the accomplishment and we're certain that every single owner of Volume XV will feel likewise. Let us tell you what we have done to make this Rider publication the peer of them all — actually a milestone in our publishing career.

CLARIFIED SCHEMATICS

The radio repair industry admits that in general, the repair of a "midget" receiver is not difficult. The circuits as a rule are simple being in the main single-band circuits and many models of varied make bear a close resemblance to one another. . . . Of course, it may be a mess to remove the rivets when a replacement is to be made — or one's knuckles are skinned when a pilot light must be replaced — but as far as correlation between the component and the schematic is concerned, it is relatively simple. But multi-waveband jobs are different. . . . The more the number of bands or the combinations of functions — the more difficult is the service problem — the more costly the servicing time. . . . Not because the receiver contains more components, but rather because of the ingenuity of the present-day radio design engineer — the numerous and devious ways he has conceived to cut corners off production costs.

This display of American ingenuity is of tremendous value to the manufacturer, but it is fast becoming a major problem to the radio servicemen who must keep these brain children in proper repair. The public as a whole is willing to pay for service rendered, but it balks at paying

Please turn to page 4

CIRCUIT ANALYSIS OF STEWART WARNER MODELS 62T AND 62TC

By Seymour D. Uslan

IN THIS month's circuit analysis of new receivers on the market, a number of unconventional features will be found in the Stewart-Warner models 62T16, 62TC16, 62TC26, and 62TC36, that will be of interest. An unusual part of these sets' circuit is the coupling arrangement between the 6SK7 r-f amplifier and the 6SA7 converter, as shown in Fig. 1. The coupling arrangement consists of the following components: resistor 23, capacitor 24, and the single-tuned circuit which is made up of coil 15B and capacitor 16B. This combined coupling is composed of the usual resistance-capacitance coupling plus a single stage of tuned-circuit coupling. Good selectivity with wider bandwidth for the r-f signal between these two stages is possible with this type of coupling. Resistor 23 (4700 ohms) is considered to be in parallel with the tuned circuit and this effectively reduces the *Q* of the tuned circuit, in which case lowering the *Q* results in the bandwidth becoming broader. Condenser 24 (260 mmf) serves a dual purpose: a blocking and a coupling condenser. It blocks the d-c from getting to the signal grid of the 6SA7 at the same time that it allows the r-f signal to be coupled to the signal grid of the converter tube. This type of an arrangement helps conserve space, by doing away with the usual double-tuned transformer coupling. In place of one L-C tuned circuit, an R-C network is substituted which takes up less room and at the same time broadens the response.

Referring to Fig. 1 again, another interesting portion of the circuit is that instead of the usual ganged-condenser tuning for the r-f and oscillator stages, a *ganged permeability tuning* is incorporated in this model. Inside the coil forms of the first and second r-f tuned circuits, and the oscillator tuned circuit, are movable tuning slugs, which are all ganged together and are variable as one unit. The station selector or main tuning dial on the front of those Stewart-Warner models changes the resonant frequency of the circuits by varying their inductances *simultaneously*.

Each tuning slug is preset on its own threaded knob to a specific position, as shown in Fig. 2, so that when the ganged unit is varied, each individual coil section will tune properly. The condensers 16A, 16B, and 16C (Fig. 1) are the trimmers for the slug tuning units. These trimmers are arranged on one assembly but each one has to be tuned individually for proper tracking.

One advantage of ganged permeability tuning over condenser tuning is that the former occupies much less space. Also in the condenser tuning, the condenser plates may become bent or out of line and the frequency tuning will be affected. The short-wave oscillator coil slug is also ganged with the other three tuning slugs and it is therefore varied with the others. It is effective, however, only when the short-wave switch is thrown into position, in which case the broadcast oscillator coil is taken out of the circuit.

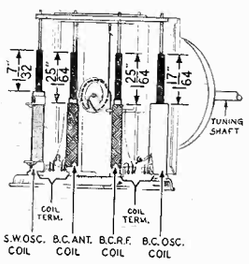

Fig. 2. This shows how the tuning slugs are preset on their own shafts.

Courtesy Stewart Warner Corp.

In some receivers, when second detector and avc functions are combined in a single tube, the first a-f amplifier is often incorporated in the same tube; in the circuit under discussion this is not so. Instead of the usual a-f amplifier, an i-f amplifier is used in conjunction with the second detector and avc, as shown in Fig. 3. The tube used for this purpose is the 6SF7, which is a diode super-control pentode amplifier. The pentode section was especially designed to be used as an i-f amplifier, although it also may be used as an a-f amplifier. In this circuit the first i-f transformer selects the i-f signal from the output of the converter tube and impresses this signal across the signal grid of the i-f pentode amplifier section of the 6SF7 tube. The i-f signal is then amplified by the pentode section of the tube and afterwards it is sent through the second i-f transformer. From the high side of the secondary of the second i-f transformer, the amplified i-f signal is returned to the 6SF7 tube to be impressed across its diode section. The signal is then detected and properly filtered so that the modulated envelope of the carrier is available for amplification by the following a-f amplifier and also for the avc component to be used.

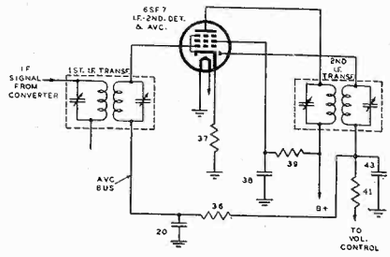

Fig. 3. Arrangement showing the 6SF7 i-f amplifier-2nd detector-avc tube connections instead of the usual 2nd detector-1st audio-avc functioning in one tube.

The Output Circuit

The high bias necessary on the 6K6GT power-output tube of these models is made readily available, through the use of the power transformer. This is accomplished by inserting a 330-ohm resistor to ground (resistor 65), in the center-tap lead of the power transformer as shown in Fig. 4. The d-c plate and screen current of all the stages flows through the center tap of the power transformer and in this way has to flow through resistor 65 to complete its path through ground. Consequently there is a voltage drop across this resistor due to the current flowing through it. The signal grid of the 6K6GT tube is connected to the center tap of the power transformer through grid-leak resistor 54. The bias on the grid is determined by the difference in potential between the grid and cathode. The cathode

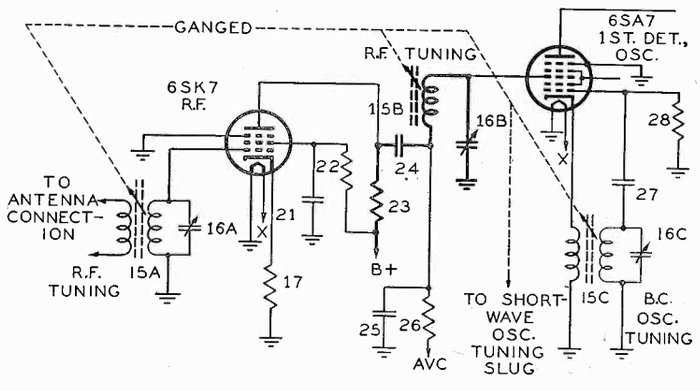

Fig. 1. The r-f coupling between the 6SK7 r-f amplifier and the 6SA7 detector - oscillator, and the ganged permeability tuning are unusual features of this Stewart-Warner circuit.

is seen to be at ground potential and the potential on the grid is *above* ground by the voltage drop across resistor 65. This voltage drop is 19 volts (as measured with a vacuum-tube voltmeter) and it is effectively considered as the bias on the signal grid of the 6K6GT power-output tube. It is impressed on the grid through grid-leak resistor 54. Due to the 19-volt drop across the 330-ohm resistor (65), the total plate and screen current flowing in the circuit can be easily determined by Ohm's law. Hence, from $I = E/R$

$$\text{We have} \quad I = \frac{19 \text{ volts}}{330 \text{ ohms}} = 57.6 \text{ ma}$$

which is the current flowing in the center tap of the transformer.

To complete the circuit analysis of these models, discussion of the inverse feedback arrangement as shown in Fig. 4 for reducing distortion is in order. This circuit is unique in that it feeds back the audio output voltage from the output transformer through a condenser 55 to the screen grid of the 6SK7 first a-f amplifier tube, to cause degeneration in the audio system. What happens is as follows: The audio output that appears across the *high side* of the secondary of the output transformer 68 is fed back through the feedback coupling capacitor 55 to the screen grid of the 6SK7 a-f amplifier tube. This audio voltage that appears on the high side of the output transformer is *out of phase* with that audio voltage on the plate of the

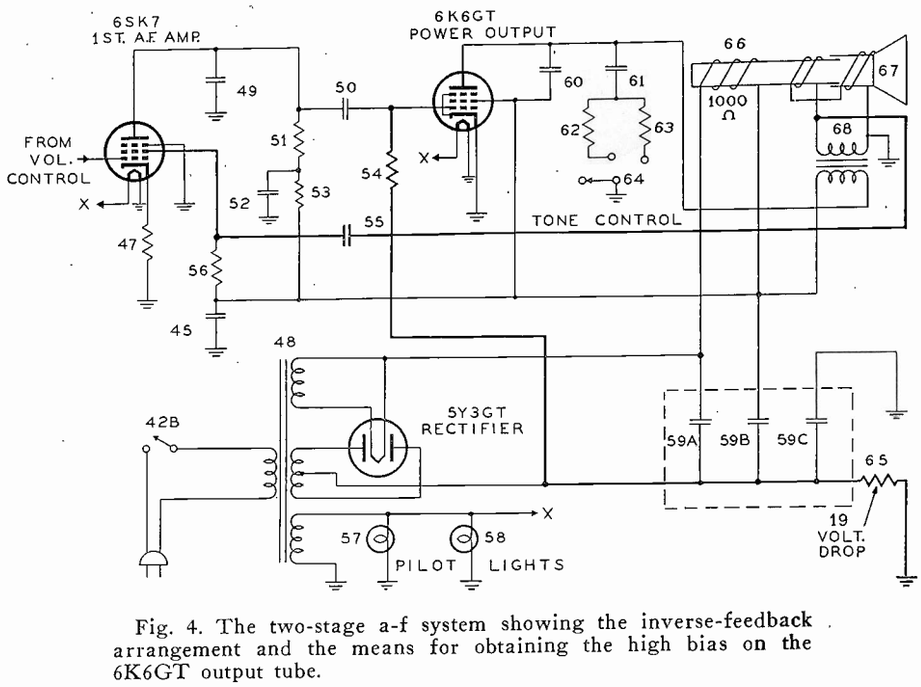

Fig. 4. The two-stage a-f system showing the inverse-feedback arrangement and the means for obtaining the high bias on the 6K6GT output tube.

6K6GT power-output tube. Furthermore, the audio signal on the screen grid of the 6SK7 a-f amplifier and that on the plate of the 6K6GT power amplifier are *in phase* with each other. With the phase relations between the two audio stages established, it is easily determined that the *voltage fed back from the high side of the secondary of the output transformer to the screen grid of the first a-f amplifier is out of phase with the voltage already existing on the screen thereby causing degeneration in the two-stage audio system.* Condenser 55 has a value high enough so as to offer a low-impedance path to practically all the audio frequencies and in this way distortion output at these frequencies is greatly reduced. The distortion of the 6K6GT tube is ordinarily about 10% and by this type of inverse feedback, the distortion output is diminished. The audio gain is likewise decreased but the power output of this receiver is high enough to withstand the reduction in gain.

This is the type of material that will be found in the "How It Works" section of Rider's Volume XV.

SELENIUM INSTEAD OF A TUBE RECTIFIER

By Stanley B. Schlenger

IN Montgomery Ward's Airline Radio, Model 64WG-1052A, there is an innovation which is worthy of mention. It is the use of a selenium rectifier, as shown in Fig. 1, instead of the conventional rectifier tube. It is believed that selenium rectifiers will soon be the common method of rectifying a.c. to d.c. in portable and automobile radio receivers, replacing the 117-volt rectifier tubes, in fact, several brands of small sets already use such devices.

These new rectifiers are new only in the sense of their application to broadcast receivers, for they have had widespread use where d.c. is needed for magnetic controllers, relays, motors, etc.

The principle of rectification in a dry-disc rectifier and in particular of the selenium rectifier, is the same as that of a rectifier tube. The rectifier presents a very low resistance to current flow in one direction and a very high resistance to the flow of current in the reverse direction, thereby allowing unilateral conduction or current flow for only one-half of the a-c cycle and thus obtaining a pulsation output voltage which is R-C filtered to produce a constant value of d.c.

The principles involved in rectification

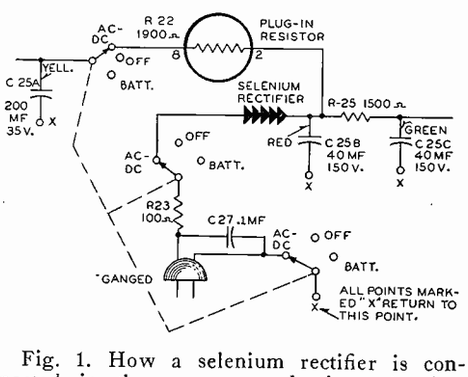

Fig. 1. How a selenium rectifier is connected in the power supply instead of a vacuum-tube rectifier.

by the selenium rectifier differ from that of a tube, in that rectification is achieved chemically when using selenium and thermally in a tube. The description of the construction of a selenium rectifier shows how a low resistance is obtained on one-half of the a-c cycle and a very high resistance on the other half cycle.

A rectifier disc consists of a metallic plate or back electrode upon which is deposited a very thin layer of selenium, a semi-conductor, which has the property of readily allowing flow of electrons in one direction but of hampering this flow in the reverse direction. This selenium layer is sprayed with another alloy which acts as a low-resistance front or counter electrode. The junction between the selenium and the alloy layers is called the *barrier* or *blocking layer*. Now considering electron flow within this rectifier, an

Please turn to page 6

RIDER'S VOL. XV

Continued from page 1

for time spent by the repairmen while tracing the schematic . . . Yet such time must be spent if these modern sets are to be repaired, regardless of the technique used to localize the fault. It is not right to penalize the public for the time required to trace out the numerous complicated switching methods which are found in these jobs — neither is it right that the dollar value of that time be contributed by the radio repairman without charge. Yet someone must spend the time doing that job . . . In the life of a repair shop, time is of the essence. Every hour spent on a job must produce a financial return.

As the oldest publishers of manuals and books prepared exclusively for the radio-repair industry — the problem was ours to solve — and after analysis of the ways to do it — we chose the *"clarified schematic"*, a feature found only in Rider's Manuals.

Rider's *"clarified schematics"* reduce circuit tracing time by the servicemen to the absolute minimum — because we do it for you! . . . Every multi-waveband receiver shown in Rider's Volume XV is broken down into the different wavebands and SEPARATE — INDIVIDUAL — SCHEMATICS ARE SHOWN FOR EACH WAVEBAND . . . A two-band receiver has the composite schematic and an individual schematic for each of the wavebands; — a three-band job has three such individual schematics — and a five-band job has five such schematics! . . . Each of these schematics illustrates the switch wafers and the switch terminals — moreover each of these schematics correlates the components used in the band with the components shown on the composite schematics — thus enabling very easy identification. *Every multi-band receiver in Volume XV is broken down in this manner* . . . and there are many hundreds of such *"clarified schematics"* in this volume . . . All of this *without* sacrificing manufacturers' coverage . . . More than 120 receiver and allied equipment manufacturers — large and small — are listed in Rider's Volume XV. A staff of 14 men consisting of engineers and draftsmen have been at work preparing these *"clarified schematics"* for the last eleven months.

The time and money which the radio-repair industry will save during the years to come by these *"clarified schematics"* is tremendous. Every man who has to probe his way through a multi-band job knows what it means — the hours spent — the problem of tracing switch wafers and contacts . . . Convert this time into dollars and you will realize the tremendous saving each year during the life of the manual . . . (Incidentally, later on we are planning to publish similar *"clarified schematics"* for previous volumes!)

"Clarified schematics" means

1. A great reduction in circuit tracing time
2. More rapid service operations
3. More profitable operation
4. Greater customer satisfaction

THE "HOW IT WORKS" BOOK

The *"clarified schematics"* in Rider's Volume XV does not comprise the only time and money saving feature of this volume . . . The "How It Works" supplement — a book of 150 pages (8½x11 inches page size) will also be of tremendous value to the radio servicemen . . . In this book, the theories of operation of the many new technical features of the new receivers are discussed . . . The post-war receivers are full of "gimmicks" and "gadgets"—each of which—if unknown in function — can prove to be a headache during servicing operations. Not only are functions and basis of operation described, but many of the complicated devices are illustrated, having been analyzed by our engineers.

The manner in which receiver manufacturers accomplish the utmost in performance in their radio equipment — and at the same time effect economies in numerous ways — is astounding. For example, by the interchange of components for different functions on the different bands, the development of critical values of capacity at special points in the circuits, without utilizing actual condensers, is wonderful. . . .

The use of new ideas — hitherto not used in radio receivers intended for home use — is extremely abundant in these new sets. Such items are the use of parasitic oscillation — control elements — combination tone control and feedback control — compensation by means of peaking coils — r-f and a-f regeneration — neutralizing of the heterodyne oscillator — the selenium rectifier — a multiplicity of new coupling systems components of different kind contained in a single container — enough new ideas to fill and make a big book of 150 pages . . . Each of these discussions of theory is tied down to the sets shown in Rider's Volume XV, with full diagrammatic and pictorial illustrations so that the ownership of Volume XV places at your fingertips the latest in theory as well as practice . . . This is the kind of information you'll find nowhere else! . . . It is an exclusive feature of Volume XV! And while we have published "How It Works" supplements before, this one is many times the size of the largest we have ever released. . . .

RECORD PLAYERS AND CHANGERS

Many of the post-war sets come equipped with record players and changers. And in many cases, the same record player and changer is used with a number of different receiver manufacturers' products . . . Each of these record players and changers is shown in Volume XV and directly associated with the receivers which employ them . . . Thus one record player may be affiliated with a dozen different receivers. It is shown only once, thus enabling maximum coverage of manufacturer's products. Yet all the data on the receiver combination are contained in a single volume.

Of course the manual contains the voltage, resistance, gain, alignment, socket layout, and other pertinent information as in previous manuals. . . .

"HAM" COMMUNICATION RECEIVERS

One of the features of Rider's Volume XV is the presentation of the amateur communication receivers . . . All the popular brand names are included, such as National, Hammarlund, RME, Hallicrafter, and others. Here is an untapped market for the wide-awake and competent radio repairman . . . The alignment of these receivers has been a problem to every "ham" . . . In the past he sent his set to the factory for alignment — this work can be done by the well-equipped and competent service shop. . . .

SCOTT RECEIVERS . . .

All the Scott receivers not shown in previous volumes and the post-war prod-

Please turn to page 7

R. M. A. PRODUCTION SOURCE CODE

In the February, 1937 issue of SUCCESSFUL SERVICING, we asked in an editorial how much and what data were needed by our readers. In a great majority of the answers, the need was expressed for some sort of positive identification of manufacturer and chassis or model number. In the interim this need has been intensified due to the great number of brand name sets that have been marketed. Recognizing this, the Radio Manufacturer's Association has assigned to manufacturers of receivers and components, numbers by means of which the products can be identified both as to source and time of production.

You will notice in the list of company names below and on the following pages that each is identified by a three-digit number. These three digits comprise the first of a six-digit identifying number, the last three being the year and production period. For example, assume that the number 105631 appears on the name plate or some part of a chassis. This identifies the manufacturer of the receiver as the Air King Products Co., from the first three digits, 105. The fourth digit, 6, means that the set was manufactured in 1946; 1947's set will have 7 as a fourth digit, the next year 8, and so on. The last two digits, 31, establish that the set was produced in the period between July 28 and August 3. These production periods are found in the last two lists on the fourth page of this insert, one being for this year and the second for 1947.

Thus the new R.M.A. identification code is a step forward in the right direction as an aid to servicemen, whereby it is possible for him to recognize obscure chassis; that is, if the original source employs the R.M.A. code on all their production.

NUMERICAL LIST

RMA Production Source Code Symbols Assigned to Companies

July 1, 1946

(* Indicates non-members)

Code Number	Company
101	Admiral Corporation, Chicago 47, Ill.
102	Aerovox Corporation, New Bedford, Mass.
103	Airadio, Incorporated, Stamford, Conn.
104	Aireon Manufacturing Corporation, Kansas City 15, Kan.
105	Air King Products Company, Inc., Brooklyn 19, N. Y.
106	Allen-Bradley Company, Milwaukee 4, Wis.
107	The Alliance Manufacturing Company, Alliance, Ohio
108	American Coil & Engineering Co., Chicago 22, Ill.
109	American Condenser Company, Chicago 40, Ill.
110	The American Steel Package Company, Defiance, Ohio
111	Amperex Electronic Corporation, Brooklyn 1, N. Y.
112	Amy, Aceves & King, Inc., New York 18, N. Y.
113	Andrea Radio Corporation, Long Island City 1, N. Y.
114	Ansley Radio Corporation, Long Island City 1, N. Y.
115	A. R. F. Products, River Forest, Ill.
116	The Arnold Engineering Company, Chicago 11, Ill.
117	*Arpin Manufacturing Co., Orange, N. J.
118	The Audio-Tone Oscillator Company, Bridgeport 3, Conn.
119	Automatic Manufacturing Corporation, East Newark, N. J.
120	Automatic Radio Mfg. Co., Inc., Boston 15, Mass.
121	Bank's Manufacturing Company, Chicago 40, Ill.
122	The Bead Chain Manufacturing Co., Bridgeport 5, Conn.
123	Bell & Howell Company, Chicago 45, Ill.
124	Belmont Radio Division, Raytheon Manufacturing Co., Chicago 39, Ill.
125	Bendix Radio, Division of Bendix Aviation Corp., Towson 4, Md.
126	Bentley, Harris Mfg. Company, Conshohocken, Pa.
127	The Benwood Linze Company, St. Louis 3, Mo.
128	Bliley Electric Company, Erie, Pa.
129	Boonton Radio Corporation, Boonton, N. J.
130	William Brand & Company, New York 10, N. Y.
131	Browning Laboratories, Inc., Winchester, Mass.
132	Call-A-Phone Mfg. Co., Chicago 23, Ill.
133	C. F. Cannon Co., Springwater, N. Y.
134	Centralab, Division of Globe-Union Inc., Milwaukee 1, Wis.
135	Chicago Condenser Corporation, Chicago 40, Ill.
136	Chicago Molded Products Corporation, Chicago 51, Ill.
137	Chicago Telephone Supply Co., Elkhart, Ind.
138	Chicago Transformer Division, Essex Wire Corporation, Chicago 18, Ill.
139	Cinch Manufacturing Corporation, Chicago 12, Ill.
140	Clarostat Mfg. Co., Inc., Brooklyn 2, N. Y.
141	Coil Engineering & Mfg. Co., Inc., Roanoke, Ind.
142	Colonial Radio Corporation, Buffalo 7, N. Y.
143	Communication Equip. & Engineering Co., Chicago 44, Ill.
144	C. G. Conn, Ltd., Federal Recorder Company, Elkhart, Ind.
145	Consolidated Radio Products Co., Chicago, Ill.
146	Continental Carbon Inc., Cleveland 11, Ohio
147	Continental Electric Company, Geneva, Ill.
148	Corning Glass Works, Corning, N. Y.
149	Cornish Wire Company, Inc., New York 7, N. Y.
150	Crescent Industries, Inc., Chicago 41, Ill.
151	Croname, Incorporated, Chicago 13, Ill.
152	The Crosley Corporation, Cincinnati 25, Ohio
153	Crystal Research Laboratories, Inc., Hartford 3, Conn.
154	Tobe Deutschmann Corporation, Canton, Mass.
155	DeWald Radio Mfg. Corp., New York 3, N. Y.
156	Wilbur B. Driver Company, Newark 4, N. J.
157	Dumont Electric Co., New York 13, N. Y.
158	Allen B. Du Mont Laboratories, Inc., Passaic. N. J.
159	DX Radio Products Co., Inc., Chicago 22, Ill.
160	Hugh H. Eby, Inc., Philadelphia 44, Pa.
161	Eckstein Radio & Television Co., Minneapolis 2, Minn.
162	Eitel-McCullough, Inc., San Bruno, Calif.
163	Electrical Reactance Corporation, Franklinville, N. Y.
164	The Electro Motive Mfg. Co., Willimantic, Conn.
165	Electronic Corp. of America, New York 11, N. Y.
166	Electronic Engineering Company, Chicago 47, Ill.
167	Electronic Laboratories, Incorporated, Indianapolis 4, Ind.
168	Vokar Corporation, Dexter, Mich.
169	Electronic Specialty Co., Los Angeles, 26, Calif.
170	Electronic Tube Corporation, Philadelphia 18, Pa.
171	Emerson Radio & Phonograph Corp., New York 11, N. Y.
172	Ensign Coil Company, Chicago 23, Ill.
173	Erie Resistor Corporation, Erie, Pa.
174	Espey Manufacturing Co., Inc., New York 19, N. Y.
175	Essex Wire Corporation, Fort Wayne 6, Ind.
176	Fada Radio & Electric Co., Inc., Long Island City, N. Y.
177	Farnsworth Television & Radio Corp., Fort Wayne 1, Ind.
178	John E. Fast & Company, Chicago 41, Ill.
179	Federal Telephone and Radio Corporation, Newark 2, N. J.
180	Felt Products Mfg. Co., Chicago 7, Ill.
181	Finch Telecommunications, Inc., Passaic, N. J.
182	A. W. Franklin Mfg. Corp., New York 14, N. Y.
183	Freed Radio Corporation, New York 13, N. Y.
184	Billings S. Fuess, South Orange, N. J.
185	Galvin Manufacturing Corporation, Chicago 51, Ill.
186	Garod Radio Corporation, Brooklyn 1, N. Y.
187	Gates Radio Company, Quincy, Ill.
188	General Electric Company, Schenectady 5, N. Y.
189	General Electronics Inc., Paterson 3, N. J.
190	The General Industries Company, Elyria, Ohio
191	General Instrument Corporation, Elizabeth 3, N. J.
192	General Laminated Products, Inc., Chicago 8, Ill.
193	General Magnetic Corporation, Detroit 5, Mich.
194	General Radio Company, Cambridge 39, Mass.
195	General Television & Radio Corporation, Chicago 51, Ill.
196	Gits Molding Corporation, Chicago 44, Ill.
197	The Fred Goat Co., Inc., Brooklyn 17, N. Y.
198	Edwin I. Guthman & Co., Inc., Chicago 7, Ill.
199	The Hallicrafters Co., Chicago 16, Ill.
200	Hamilton Radio Corporation, New York 11, N. Y.
201	Hammarlund Mfg. Co., Inc., New York 1, N. Y.
202	Harvey Radio Laboratories, Inc., Cambridge 38, Mass.
203	Harvey-Wells Electronics, Inc., Southbridge, Mass.
204	Hawley Products Company, St. Charles, Ill.
205	Haydu Brothers, Plainfield, N. J.
206	Hewlett-Packard Company, Palo Alto, Calif.
207	Hoffman Radio Corporation, Los Angeles 7, Calif.
208	Howard Radio Company, Chicago 13, Ill.
209	Hudson American Corporation, New York 18, N. Y.
210	Hytron Radio & Electronics Corp., Salem, Mass.
211	The Indiana Steel Products Company, Chicago 2, Ill.
212	Industrial and Commercial Electronics, Belmont, Calif.
213	International Detrola Corporation, Detroit 9, Mich.

Code Number	Company
214	International Resistance Company, Philadelphia 8, Pa.
215	Irvington Varnish & Insulator Co., Irvington 11, N. J.
216	The Jackson Electrical Instrument Co., Dayton 1, Ohio
217	Jackson Industries, Chicago 47, Ill.
218	Jefferson Electric Company, Bellwood, Ill.
219	Jefferson-Travis Corporation, New York 10, N. Y.
220	Jensen Radio Manufacturing Company, Chicago 38, Ill.
221	J. F. D. Manufacturing Co., Brooklyn 19, N. Y.
222	E. F. Johnson Company, Waseca, Minn.
223	Kerrigan Lewis Manufacturing Co., Chicago 51, Ill.
224	Kester Solder Company, Chicago 39, Ill.
225	King Laboratories, Inc., Syracuse 4, N. Y.
226	*Kuthe Laboratories, Inc., Newark 4, N. J.
227	Lear, Incorporated, Piqua, Ohio
228	Lenz Electric Manufacturing Co., Chicago 47, Ill.
229	Libbey Glass, Division of Owens-Illinois Glass Co., Toledo 1, Ohio
230	Littelfuse, Incorporated, Chicago 40, Ill.
231	Machlett Laboratories, Incorporated, Norwalk, Conn.
232	The Magnavox Company, Fort Wayne 4, Ind.
233	Maguire Industries Incorporated, Greenwich, Conn.
234	Majestic Radio & Television Corporation, Chicago 32, Ill.
235	P. R. Mallory & Co., Inc., Indianapolis 6, Ind.
236	Measurements Corporation, Boonton, N. J.
237	John Meck Industries, Inc., Plymouth, Ind.
238	Meissner Manufacturing Division, Maguire Industries, Inc., Mt. Carmel, Ill.
239	Merit Coil and Transformer Corporation, Chicago 40, Ill.
240	Micamold Radio Corporation, Brooklyn 6, N. Y.
241	Micro Switch Division, First Industrial Corporation, Freeport, Ill.
242	James Millen Manufacturing Co., Inc., Malden 48, Mass.
243	Minerva Corporation of America, New York 7, N. Y.
244	The Muter Company, Chicago 5, Ill.
245	National Company, Inc., Malden 48, Mass.
246	National Fabricated Products, Chicago 47, Ill.
247	National Union Radio Corporation, Newark 2, N. J.
248	Noblitt-Sparks Industries, Inc., Columbus, Ind.
249	Oak Mfg. Co., Chicago 10, Ill.
250	The Ohio Carbon Co., Cleveland 11, Ohio
251	Ohmite Manufacturing Company, Chicago 44, Ill.
252	Operadio Manufacturing Company, St. Charles, Ill.
253	Oxford-Tartak Radio Corporation, Chicago 15, Ill.
254	Packard-Bell Company, Los Angeles 15, Calif.
255	Packard Manufacturing Corp., Indianapolis 7, Ind.
256	*Panelyte Division, St. Regis Paper Co., New York 17, N. Y.
257	Parisian Novelty Company, Chicago 9, Ill.
258	Permoflux Corporation, Chicago 39, Ill.
259	Permo, Incorporated, Chicago 26, Ill.
260	Philco Corporation, Philadelphia 34, Pa.
261	Philharmonic Radio Corporation, New York 21, N. Y.
262	Philmore Manufacturing Co., New York 3, N. Y.
263	Phonovision Corporation, Chicago 22, Ill.
264	Pilot Radio Corporation, Long Island City 1, N. Y.
265	Poray, Inc., Chicago 51, Ill.
266	Precision Specialties, Los Angeles 4, Calif.
267	Premax Products Division, Chisholm-Ryder Co., Inc., Niagara Falls, N. Y.
268	Press Wireless Manufacturing Corp., Long Island City, N. Y.
269	Quality Hardware and Machine Corp., Chicago 26, Ill.
270	Quam-Nichols Company, Chicago 16, Ill.
271	Radell Corporation, Indianapolis 5, Ind.
272	Radex Corporation, Chicago 22, Ill.
273	Radio Condenser Company, Camden, N. J.
274	RCA Victor Division, Radio Corporation of America, Camden, N. J.
275	The Radio Craftsmen, Chicago 5, Ill.
276	Radio Engineering Laboratories, Inc., Long Island City 1, N. Y.
277	Radio Speakers, Inc., Chicago 16, Ill.
278	Radio and Television, Inc., New York 16, N. Y.
279	Pierce Wire Recorder Corporation, Evanston, Ill.
280	Raytheon Manufacturing Company, Newton 58, Mass.
281	Rea Magnet Wire Company, Inc., Fort Wayne 4, Ind.
282	Rek-O-Kut Company, New York 13, N. Y.
283	Remington Rand, Inc., Middletown, Conn.
284	Remler Company, Ltd., San Francisco 10, Calif.
285	The Rola Company, Division, The Muter Company, Cleveland 14, O.
286	The Ross Manufacturing Company, Chicago 16, Ill.
287	Walter L. Schott Company, Beverly Hills, Calif.
288	Screenmakers, Inc., New York 7, N. Y.
289	J. P. Seeburg Corporation, Chicago 22, Ill.
290	Selenium Corporation of America, Los Angeles 15, Calif.
291	Sentinel Radio Corporation, Evanston, Ill.
292	Sheridan Electronics Corp., Chicago 16, Ill.
293	Sherron Electronics Company, Brooklyn 6, N. Y.
294	The F. W. Sickles Company, Chicopee, Mass.
295	Mark Simpson Manufacturing Company, New York 14, N. Y.
296	Solar Manufacturing Corporation, New York 17, N. Y.
297	Sonora Radio & Television Corporation, Chicago 12, Ill.
298	Sound, Inc., Chicago 16, Ill.
299	The Sparks-Withington Company, Jackson, Mich.
300	Speer Resistor Corporation, Saint Marys, Pa.
301	Sperry Gyroscope Co., Inc., Great Neck, Long Island, N. Y.
302	Sperti, Inc., Norwood 12, Cincinnati, Ohio
303	Sprague Electric Company, North Adams, Mass.
304	Stackpole Carbon Company, St. Marys 3, Pa.
305	Standard Coil Products Company, Inc., Chicago 39, Ill.
306	Standard Transformer Corporation, Chicago 22, Ill.
307	Stewart-Warner Corporation, Chicago 14, Ill.
308	Stromberg-Carlson Co., Rochester 3, N. Y.
309	Stupakoff Ceramic & Manufacturing Co., Latrobe, Pa.
310	Superior Tube Company, Norristown, Pa.
311	Supreme Instruments Corporation, Greenwood, Miss.
312	Sylvania Electric Products Inc., Emporium, Pa.
313	Synthane Corporation, Oaks, Pa.
314	Syracuse Ornamental Company, Syracuse 2, N. Y.
315	*Technical Radio Company, San Francisco 3, Calif.
316	Telicon Corporation, New York 21, N. Y.
317	Templetone Radio Mfg. Corp., New London, Conn.
318	Thomas & Skinner Steel Products Co., Indianapolis 5, Ind.
319	Thordarson Electric Mfg. Division, Maguire Industries, Inc., Chicago 10, Ill.
320	Trav-Ler Radio Corporation, Chicago 6, Ill.
321	Triplett Electrical Instrument Co., Bluffton, Ohio
322	Tung-Sol Lamp Works, Inc., Newark 4, N. J.
323	United Electronics Company, Newark 2, N. J.
324	United States Radium Corporation, New York 7, N. Y.
325	U. S. Television Manufacturing Corp., New York 11, N. Y.
326	Universal Microphone Company, Inglewood, Calif.
327	*Universal Television System, Kansas City 8, Mo.
328	Utah Radio Products Company, Detroit 9, Mich.
329	Viewtone Television & Radio Corp., Brooklyn 1, N. Y.
330	Wm. T. Wallace Mfg. Co., Peru, Ind.
331	The Ward Products Corporation, Cleveland 3, Ohio
332	Warwick Manufacturing Corporation, Chicago 44, Ill.
333	Watterson Radio Manufacturing Corp., Dallas 1, Texas
334	Wells-Gardner & Co., Chicago 39, Ill.
335	Wm. H. Welsh Co., Chicago 16, Ill.
336	Western Electric Company, Inc., New York 5, N. Y.
337	Westinghouse Electric Corporation, Baltimore 3, Md.
338	Weston Electrical Instrument Corp., Newark 5, N. J.
339	Wilcox Electric Company, Inc., Kansas City 1, Mo.
340	Wilcox-Gay Corporation, Charlotte, Mich.
341	*Winters & Crampton Corporation, Grandville, Mich.
342	*The Zell Company, New York 12, N. Y.
343	Zenith Radio Corporation, Chicago 39, Ill.
344	Argus, Incorporated, Ann Arbor, Mich.
345	The Astatic Corporation, Conneaut, Ohio
346	Madison Electrical Products Corp., Madison, N. J.
347	Teletone Radio Company, New York 19, N. Y.
348	Rayenergy Radio & Television Corp. of America, New York, N. Y.
349	Franklin Photographic Industries, Chicago 10, Ill.
350	American Transformer Company, Newark 5, N. J.
351	Symphonic Radio and Electronic Corp., Cambridge 42, Mass.
352	*Magnetic Windings Company, Easton, Pa.
353	*Gralnick Bros. Inc., Philadelphia 22, Pa.
354	Lewis Electronics, Los Gatos, Calif.
355	*Boonton Molding Company, Boonton, N. J.
356	*R. Prescott & Son, Inc., Keeseville, N. Y.
357	*Teleradio Engineering Corporation, Wilkes Barre, Pa.
358	Cinaudagraph Division, Indiana Steel Products Co., Stamford, Conn.
359	Webster Electric Company, Racine, Wis.
360	*Gavitt Mfg. Co., Inc., Brookfield, Mass.
361	Hartford Industries, Inc., Jackson Heights, N. Y. C., N. Y.
362	*National Vulcanized Fibre Co., Wilmington, Del.
363	Eastern Electronics Corporation, New Haven, Conn.
364	*The Sillcocks-Miller Company, South Orange, N. J.
365	*Industrial Synthetics Corporation, Irvington, N. J.
366	*New York Transformer Company, New York 3, N. Y.
367	National Moldite Company, Hillside 5, N. J.
368	*Santay Corporation, Chicago 24, Illinois
369	*Stoddart Aircraft Radio Co., Hollywood 38, Calif.
370	*United-Carr Fastener Corporation, Cambridge 42, Mass.

Code Number	Company
371	*Best Manufacturing Co., Inc., Irvington 11, N. J.
372	*Holyoke Wire and Cable Corporation, Holyoke, Mass.
373	Regal Electronics Corporation, New York 11, N. Y.
374	*Harry A. Prock Cabinet Company, Glenside, Pa.
375	*Webster-Chicago Corporation, Chicago 47, Ill.
376	Hazeltine Electronics Corporation, New York 19, N. Y.
377	DeMornay-Budd, Incorporated, New York 51, N. Y.
378	*Bachmann Bros. Inc., Philadelphia 24, Pa.
379	United States Trunk Co., Inc., Fall River, Mass.
380	Radio Receptor Company, Inc., New York 11, N. Y.
381	*The Ucinite Company, Newtonville, Mass.
382	Waters Conley Company, Rochester, Minn.
383	Wilmak Corporation, Benton Harbor, Mich.
384	*Red Lion Cabinet Company, Red Lion, Pa.
385	*Dearborn Glass Company, Chicago 8, Ill.
386	*Arpee Products Co., Glendale, Calif.
387	*Kyle Corporation, South Milwaukee, Wis.
388	Modern Electronic Company, Inc., New York 11, N. Y.
389	National Design Service, New York 6, N. Y.
390	*Printloid, Inc., New York 12, N. Y.
391	Peerless Electrical Products Co., Los Angeles 3, Calif.
392	*The Wheeler Insulated Wire Company, Inc., Bridgeport 4, Conn.
393	*Western Gasket & Packing Company, Los Angeles 11, Calif.
394	*The A. P. Foster Company, Lockland 15, Ohio
395	*Permoflux Products Co., Glendale 5, Calif.
396	*General Cement Mfg. Co., Rockford, Ill.
397	The Workshop Associates, Newton Highlands 61, Mass.
398	Stamford Electric Products Company, Inc., Stamford, Conn.
399	Industrial Electronic Corporation, Brooklyn 31, N. Y.
400	Noma Electric Corporation, New York 11, N. Y.
401	*Wellmann Manufacturing Company, Los Angeles 46, Calif.
402	Andrew Co., Chicago 19, Ill.
403	Super Electric Products Corp., Jersey City 7, N. J.
404	Lincoln Electronics Corporation, New York 19, N. Y.
405	Ohio Tool Company, Cleveland 11, Ohio
406	*Wirt Company, Philadelphia 44, Pa.
407	Radio Navigational Instrument Corp., New York 21, N. Y.
408	*Mercury Equipment Co., Ashtabula, Ohio
409	British Industries Sales Corp., New York 13, N. Y.
410	Midwest Electric Products, Inc., Indianapolis 8, Ind.
411	Hardwick, Hindle, Inc., Newark 5, N. J.
412	*General Transformer Corporation, Chicago 7, Ill.
413	*The Acme Electric & Manufacturing Co., Cuba, N. Y.
414	Radiation Products, Inc., Los Angeles 15, Calif.
415	United Mfg. & Service Co., Milwaukee 2, Wis.
416	Lewyt Corporation, Brooklyn 11, N. Y.
417	Tone Products Corp. of America, New York 10, N. Y.
418	*United Transformer Corporation, New York, N. Y.
419	Radio Development & Research Corp., Jersey City, N. J.
420	*Schrader Electronic & Coil Corp., Los Angeles 11, Calif.
421	Lee Radio Manufacturing Corporation, New Hyde Park, N. Y.
422	Crimp-Seal Products Co., Chicago 10, Ill.
423	*North American Philips Company, Inc., Dobbs Ferry, N. Y.
424	Milwaukee Stamping Company, Milwaukee 14, Wis.
425	Essex Electronics, Newark 2, N. J.
426	E. W. McGrade Manufacturing Co., Kansas City 2, Mo.
427	Communication Measurements Laboratory, New York 6, N. Y.
428	Schulmerich Electronics, Inc., Sellersville, Pa.
429	Bernard Rice's Sons, Inc., New York 16, N. Y
430	Camburn, Inc., New York 13, N. Y.
431	Waterman Products Company, Inc., Philadelphia 25, Pa.
432	Premier Crystal Laboratories, Inc., New York 7, N. Y.
433	Cleveland Electronics Inc., Cleveland 15, Ohio
434	Electrical Reproduction Co., Chicago 22, Ill.
435	Plastoid Corporation, New York 18, N. Y
436	Adaptol Company, Brooklyn 13, N. Y.
437	Newcomb Audio Products Company, Los Angeles 7, Calif.
438	The Gudeman Company, Chicago 10, Ill.
439	Collins Radio Company, Cedar Rapids, Iowa
440	Cannon Electric Development Company, Los Angeles 31, Calif.
441	Gilner Manufacturing Company, Steger, Ill.
442	J-B-T Instruments, Inc., New Haven 8, Conn.
443	*Quakertown Luggage Company, Philadelphia 47, Pa.
444	A. F. Smuckler & Co., New York 6, N. Y.
445	*Adler Manufacturing Co., Louisville 11, Ky.
446	Good-All Electric Manufacturing Co., Ogallala, Nebr.
447	Radionic Controls, Chicago 18, Ill.
448	Radiomarine Corporation of America, New York 13, N. Y.
449	Wilder Manufacturing Corp., Chicago 47, Ill.
450	Columbus Process Company, Inc., Columbus (E), Ind.

Code Number	Company
451	Vertrod Corporation, New York 17, N. Y.
452	Empire Coil Company, New Rochelle, N. Y.
453	Russell Electric Company, Chicago 10, Ill.
454	Telequip Radio Co., Chicago 8, Ill.
455	Dynavox Corporation, Long Island City 1, N. Y.
456	Fisher Radio Company, New York 17, N. Y.
457	Herlec Corporation, Milwaukee 3, Wis.
458	General Aniline & Film Corporation, New York 17, N. Y.
459	General Communication Company, Boston 15, Mass.
460	Dual Engineering Corporation, Chicago 22, Ill.
461	Barker & Williamson, Upper Darby, Pa.
462	Communications Company, Inc., Coral Gables 34, Fla.
463	The W. W. Boes Company, Dayton 2, Ohio
464	*Q. L. C. Corporation, Summit, New Jersey
465	Oxford Radio Corporation, Chicago 15, Ill.
466	Delco Radio Division, General Motors Corporation, Kokomo, Ind.
467	Grigsby-Allison Company, Inc., Arlington Heights, Ill.
468	Cinaudagraph Speakers, Inc., Kansas City, Kan.
469	Gem Phono Manufacturing, Inc., New York 19, N. Y.
470	Kings Electronics Company, Brooklyn 5, N. Y.
471	Precision Parts Company, Ann Arbor, Mich.
472	Pyramid Electric Company, Jersey City 6, N. J.
473	United Speakers, Inc., Los Angeles 23, Calif.
474	Special Products Company, Silver Spring, Md.
475	*Glass Products Company, Chicago 2, Ill.
476	*Airdesign, Incorporated, Upper Darby, Pa.
477	Electro-Tone Corporation, Hoboken, N. J.
478	Burkaw Electric Co., New York 16, N. Y.
479	The National Varnished Products Corp., Woodbridge, N. J.
480	Acoustic Reproducers, Chicago 47, Ill.
481	Harnett Electric Corp., Port Washington, N. Y.
482	Rada Products Co., Chicago 12, Ill.
483	Texan Radio Manufacturing Co., Houston 2, Texas
484	*Shurite Meters, New Haven 8, Conn.
485	Scott Radio Laboratories, Inc., Chicago 40, Ill.
486	Lectrovision, Inc., New Rochelle, N. Y.
487	Televox, Inc., Mt. Vernon, N. Y.
488	Coronet Electric Company, Chicago 11, Ill.
489	Radio Television Products Corp., Grass Lake, Michigan
490	Union Electronics Corp., Long Island City 1, N. Y.
491	Advance Electronics Mfg. Co., Inc., Kearny, N. J.
492	Northeastern Engineering, Inc., Manchester, N. H.
493	*Dormitzer Electric & Mfg. Corp., Boston 15, Mass.
494	Fidelity Products Co., Inc., So. Orange, N. J.
495	Jason Electronics Co., Inc., Brooklyn 17, N. Y.
496	Dalbar Manufacturing Co., Dallas 15, Texas
497	The Hunt Corporation, Carlisle, Pa.
498	Radio Mfg. Engineers, Inc., Peoria 6, Ill.

This space for the insertion of additional listings that will be assigned in the future.

RMA DATE CODE

Symbol for Each Week in Period of
January 1, 1946, to December 31, 1946

Code	Period				
01	December	30	to January	5	incl.
02	January	6	to January	12	"
03	January	13	to January	19	"
04	January	20	to January	26	"
05	January	27	to February	2	"
06	February	3	to February	9	"
07	February	10	to February	16	"
08	February	17	to February	23	"
09	February	24	to March	2	"
10	March	3	to March	9	"
11	March	10	to March	16	"
12	March	17	to March	23	"
13	March	24	to March	30	"
14	March	31	to April	6	"
15	April	7	to April	13	"
16	April	14	to April	20	"
17	April	21	to April	27	"
18	April	28	to May	4	"
19	May	5	to May	11	"
20	May	12	to May	18	"
21	May	19	to May	25	"
22	May	26	to June	1	"
23	June	2	to June	8	"
24	June	9	to June	15	"
25	June	16	to June	22	"
26	June	23	to June	29	"
27	June	30	to July	6	"
28	July	7	to July	13	"
29	July	14	to July	20	"
30	July	21	to July	27	"
31	July	28	to August	3	"
32	August	4	to August	10	"
33	August	11	to August	17	"
34	August	18	to August	24	"
35	August	25	to August	31	"
36	September	1	to September	7	"
37	September	8	to September	14	"
38	September	15	to September	21	"
39	September	22	to September	28	"
40	September	29	to October	5	"
41	October	6	to October	12	"
42	October	13	to October	19	"
43	October	20	to October	26	"
44	October	27	to November	2	"
45	November	3	to November	9	"
46	November	10	to November	16	"
47	November	17	to November	23	"
48	November	24	to November	30	"
49	December	1	to December	7	"
50	December	8	to December	14	"
51	December	15	to December	21	"
52	December	22	to December	28	"
01	December	29	to January '47	4	"

RMA DATE CODE

Symbol for Each Week in Period of
January 1, 1947, to December 31, 1947

Code	Period				
01	December	29	to January	4	Incl.
02	January	5	to January	11	"
03	January	12	to January	18	"
04	January	19	to January	25	"
05	January	26	to February	1	"
06	February	2	to February	8	"
07	February	9	to February	15	"
08	February	16	to February	22	"
09	February	23	to March	1	"
10	March	2	to March	8	"
11	March	9	to March	15	"
12	March	16	to March	22	"
13	March	23	to March	29	"
14	March	30	to April	5	"
15	April	6	to April	12	"
16	April	13	to April	19	"
17	April	20	to April	26	"
18	April	27	to May	3	"
19	May	4	to May	10	"
20	May	11	to May	17	"
21	May	18	to May	24	"
22	May	25	to May	31	"
23	June	1	to June	7	"
24	June	8	to June	14	"
25	June	15	to June	21	"
26	June	22	to June	28	"
27	June	29	to July	5	"
28	July	6	to July	12	"
29	July	13	to July	19	"
30	July	20	to July	26	"
31	July	27	to August	2	"
32	August	3	to August	9	"
33	August	10	to August	16	"
34	August	17	to August	23	"
35	August	24	to August	30	"
36	August	31	to September	6	"
37	September	7	to September	13	"
38	September	14	to September	20	"
39	September	21	to September	27	"
40	September	28	to October	4	"
41	October	5	to October	11	"
42	October	12	to October	18	"
43	October	19	to October	25	"
44	October	26	to November	1	"
45	November	2	to November	8	"
46	November	9	to November	15	"
47	November	16	to November	22	"
48	November	23	to November	29	"
49	November	30	to December	6	"
50	December	7	to December	13	"
51	December	14	to December	20	"
52	December	21	to December	27	"
01	December	28	to January '48	3	"

•Successful SERVICING
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Dedicated to the financial and technical advancement of the Electronic Maintenance Personnel

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THE LOWLY ANTENNA — DON'T BELITTLE IT

EVERY so often some periodical carries a short squib stating some exceptional reception without the use of an antenna, the use of an ordinary FM antenna for television reception, or the fact that modern high-powered broadcast stations lay down a sufficiently strong signal so that extremely simple makeshift antennas are entirely adequate for receiving purposes.

Practice has made the antenna an almost unimportant element of a radio-receiving installation. . . . If a reason for such a condition is to be found, it can be the "midget" receiver . . . although what is being forgotten is that the majority of these receivers contain loop antennas within the cabinet so that an antenna is actually being employed, even if it is not visible. Some employ the power line into which they are plugged as antennas, so that again a definite signal pickup medium is used, although it is invisible.

If we permit our imagination to run wild, it is entirely reasonable to forecast that some day in the future the receiving antenna will be a thing of the past; that receivers will have sufficient sensitivity so that antennas will not be required. That day has not yet arrived and while it is entirely in order to operate the "midgets" without outside antennas, the higher-priced receivers — that is those without self-contained antennas — require good antennas to produce their money's worth in good reception.

It is a mistake to imagine that just because the receiver is expensive — highly sensitive and elaborate—that the antenna requirements are reduced to a minimum; that "any antenna will do" . . . That is wrong! The sensitivity of the receiver becomes most useful when a good antenna is erected so that a good signal, capable of over-riding the local noise, is received. In fact, the better the receiver, the better should be the antenna . . .

The contempt usually displayed for the antenna is going to create difficulties when f-m and television receivers are to be installed, that is, unless everybody continues selling the public on the idea that good antennas are still needed. . . . Good f-m reception can be accomplished only when the proper antenna is installed; in television reception it is of utmost importance. . . . A high signal level is not the sole answer, multiple reflections are capable of destroying satisfactory performance. Don't belittle the lowly antenna. Give it its just due and the customer will be happier with his receiver.

Radio broadcasting may be 26 years old, but the antenna is still with us. . . .

JOHN F. RIDER

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The Cover

The photograph on page 1 was received with the very gratifying letter, reproduced below, and we thank Mr. Couch for his permission to use the picture and for his remarks.

Tullulahoma, Tenn.

"Gentlemen:

We are enclosing a picture of our radio bench, which shows all of your Trouble Shooter's Manuals together with several of your other books. We have been in the radio business since 1921 and have never found any to equal your books. We have seen many pictures of service benches but never one so completely equipped for a complete service. Many of the pictures we have seen look like they have been fixed up to take a picture, while ours was taken just as is.

W. J. COUCH & Co.
(signed) Robert L. Couch.

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Every business, from the peddler to the factory owner has to keep records if he wants to know whether he is making or losing money. You can't run a business by guess and by luck.

"WATCHING" CURRENT FLOW

By William H. Knapp

A recent experiment performed in the Rider Laboratories used the circuit shown in Fig. 1 to literally "watch" current flow. A special low-frequency oscillator provided the signal voltage for the grid of the 6J5 tube. Special bucking circuits around two of the three meters shown in the schematic eliminated the steady state plate current and thus permitted microammeters (100-0-100 type) to be employed as indicators of the a-c current component. Operating voltages and the values for the different components are as indicated on Fig. 1.

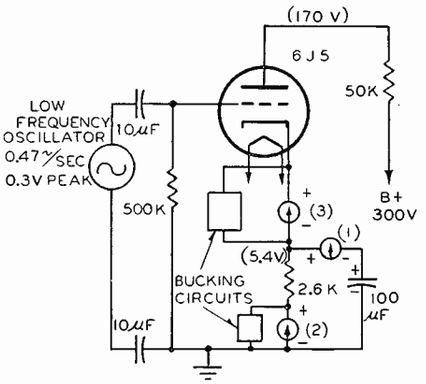

Fig. 1. With a very low frequency voltage impressed on the grid, the slow variations of the three microammeters in the cathode circuit indicate the instantaneous current flow.

It is of interest to note the large capacitance used across the cathode resistor. Values as high as 125 mf were tried out and at no time was a "rock steady" bias voltage obtained from the resistor. The experiment was conducted with the 100 mf capacitor shown on Fig. 1.

The pointers of the meters moved slowly enough from one side to the other of the center zero point that the amplitude and the phase relationships between the several currents in the cathode circuit were readily obtainable. These relationships are shown in the graphed curves of Fig. 2. Curve (1) shows the charging current of the capacitor portion of the circuit while curve (2) illustrates the current in the resistor. The last curve (3) is the composite result of the two aforementioned currents as shown by meter (3) in the circuit of Fig. 1 and has been used as the reference for drawing the graph.

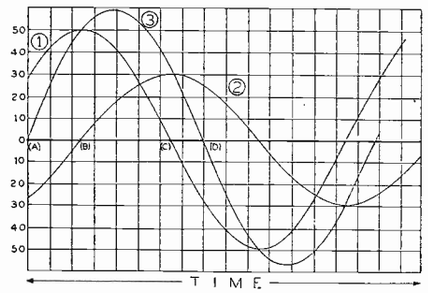

Fig. 2. The instantaneous readings of the microammeters in Fig. 1, plotted in correspondingly numbered curves, show direction of current flow and phase relationships.

The phase relationships and the amplitude of each of the currents may be readily noted on the graph. The capacitor current component is leading the composite result while the resistor component is lagging the composite current curve.

Four points are labeled on the graph, (A), (B), (C), (D). Between (A) and (B) the current flow is from the positive plate of the capacitor, through the resistor, to the negative plate. A component of current through the resistor of opposite polarity, however, is bucking this capacitive component and as shown by the curve at (A) they are equal and opposite and meter (3) thus reads zero. Between these two points, the amount of current flowing from the capacitor is increasing to its peak reached at (B) while meter (2) is showing less and less current until it reaches a zero value, changes polarity and starts to indicate current flow in the opposite direction.

Thus it may be seen between the points shown on the graph that the capacitor is alternately feeding current into the circuit and taking it out to recharge. During the same period, the current flow through the resistor is at times bucking and at other times aiding the capacitor current and the relative amplitudes of the current components are as indicated by curve (3) from readings obtained from meter (3).

This is the type of material that will be found in the "How It Works" section of Rider's Volume XV.

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SELENIUM RECTIFIERS

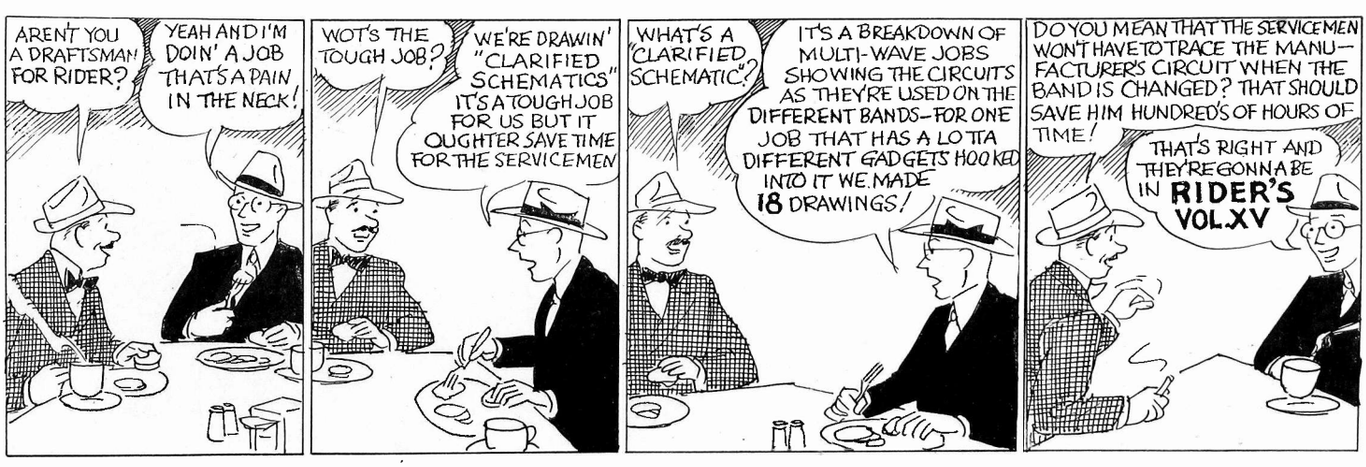
Continued from page 3

abundance of free electrons exists in the front electrode available for passage through the selenium layer, a semi-conductor, to the back electrode. Since the number of free electrons available in the selenium layer is very limited, electron flow in the reverse direction, that is, from the back electrode to the counter electrode, will be restricted to a minimum.

The use of these rectifiers eliminates the normal warm-up period for a radio to start, because there are no rectifier tube filaments to heat up to operating temperature. Since the selenium rectifier operates so much cooler than the rectifier tube, overheating and the breakdown of nearby component parts due to overheating will be eliminated.

This is the type of material that will be found in the "How It Works" section of Rider's Volume XV.

WORKING TO SAVE YOU TIME



Tube Icebox

Saw in a G.E. release t'other day something about a high-altitude tube testing chamber that simulates conditions up at 80,000 feet, where it's about 100 degrees *below* zero, and that can go up to 175 degrees in the plus direction. It was built by G.E. engineers to test tubes for aircraft during the war, but now it's bein' used for all sorts of conditioning. So, it doesn't make any difference whether you're in superheated parts of the world or playing around the icebergs, you can be sure that the new tubes won't melt or freeze. . . .

W2RID Takes Off

Yep, the Boss has hit the waves on 10 Meters! When he started out he was pushing out with 250 watts, but by the time you get an eyeful of this, **W2RID** will be givin' with 750. . . . *Heard him yet????*

One Fer De Book

A commander, recently returned from months in the Pacific, told us this one t'other nite, showing that you *can't stump a sailor.* It seems as to how on long treks the skipper of this here battlewagon was wont to keep his crew on their toes by dishing out some battle practice ever and anon. (Remember how the problems and situations were written up on perforated sheets and parts of these dealt out to all and sundry?) Well, the slip that was delivered to the No. 1 turret crew read *"Direct bomb hit on No. 1 turret; all hands killed".* In practically nothing flat, the phone on the bridge rang and this ensued:

Voice on phone: No. 1 turret reporting, sir. Turret hit by bomb and all hands killed.

Skipper: If all hands are dead, how in hell can you report?

Voice: Them's my dying words, sir!

Here's the Reason

T'other day a letter came in from *A. R. Stripp of LeRoy, N. Y.* and we've been asked to answer it here because the same idea might have occurred to other users of Rider's Manuals. Mr. Stripp states that the binder posts in Vol. XIV are an inch longer than is necessary to accommodate the pages, thus making the binder thicker and more awkward to handle, and increasing the cost of the binder. Instead of an increase in the cost, the contrary is true: by buying binders in large quantities having posts of uniform length, the cost per binder is lowered from what it would be if binders at special size for each volume were bought separately. *And this saving is reflected, of course, in the price of the Manuals to you.*

The Win-nah

Just so's you'll know that the members of the Rider organization do other things besides push out books for youse guys, *Ray Hall* won himself first prize t'other night on the "Date With A Disc" program with Enoch Light and his orchestra by doin' some sweet warblin'. We're lookin' for a quiz program where they give away bicycle tires as a consolation prize — apparently that's the only way we'll ever get new tires for this here colyumist's chariot. . . .

8 On 1

The I. T. & T. Co. recently gave a preview of what radio broadcasting can be in the future by broadcasting *eight* (count 'em, EIGHT) programs on the same carrier *at the same time!* And at the receiving end, they were unscrambled and any one was selected merely by pushing a button. You guessed it —the answer is pulse time modulation form of transmission (as was used in radar work) and a microwave frequency — around 900 mc — carried the beamed transmission. (Suggestion: Young's *"Understanding Microwaves"* we recently published can be a help. . . .)

Thanx Fer Dem Kind Words

To **Orlando Damiani, of Camden, N. J.** for his nice remarks about Rider Manuals and how they've helped him; don't worry, sir, we'll keep right on boosting the radio repair biz — To **A. Hardy of Baltimore;** we're glad we're batting out this stuff on Qwerty again and we missed it too — To **Frank Piersol of Webster Groves, Mo.,** who said he was anxiously waiting for Vol. XV to appear because he likes our Manuals better than any other *barring none.* And to all you other fellows who were kind enough to answer the questions in the August issue of SUCCESSFUL SERVICING. . . .

More From De Mail Bag

D. H. McCoy, Buffalo, West Va.—We are gonna adopt your suggestion and publish the addresses of the manufacturers in Vol. XV. *That make you happy?* **Clyde Fuller, Orlando, Fla.** — Thanx for telling us about that wrong connection in the schematic; certainly, we appreciate your cooperation. . . . **Chas. W. Davis, Dorchester, Mass.** — 'Stoo bad you didn't like all them pix; your suggestion about the service hints is under consideration. . . . **F. A. Bringer, Muscatine, Iowa** — Don't discount the abilities of G.I.'s; a lotta of Joes are plenty wise and know their way around in radio and business. . . . **Richard F. Nugent, Milford, Del.** — Glad you agree with our idea in getting a name that will be all-embracing. We're waiting until some more of your fellow servicers write us on this subject. . . . **John C. Pyle, Salina, Kan.** — Some of your thoughts on organization are swell, but we can't agree to the name you suggest. . . .

Pays for Silence

We were rollin' around and about near Bethlehem, Pa. not so long ago and being thirsty went into a place where a juke box was thunderin' away to the great joy of a crew of bobby-soxers. *"Chickery-Chick"* was blastin' away when we went in and some lame-brain kept feedin' nickels into the box alla time for the same piece. . . . Well, some guy who was even more fed up than we were, pushed the nickel-feeder away and put in his own nickel, punchin' another button. D'ya know wot happened. *Nothin',* s'help me, **nawthin'.** For 5 minutes there was blessed silence, broken only by the barkeep slidin' glasses down the mahogany and the tinkle of the cash register. *That thar is wot we calls a boon to humanity.*

VOL. XV

As we're battin' this out on Qwerty the air around us is fulla such stuff as this, "I tell yuh that if the switch is in that position that tube there can't be in the circuit. Lookit that line there goin' ", "Did anyone get that guy in Chicago on the phone yet?", "Call up that guy in Brooklyn and get the i-f peak on this job, willya?" "Who swiped my scissors?" "Are those clarifieds back yet?" and so on *ad inf.* That's the usual turmoil around the editorial dept. during the birth of a volume of Rider's Manuals and this year, it's stepped-up a few hundred %, for Vol. XV is gonna be the **BIGGEST AND BEST THAT'S EVER GONE OUT TO YOU AND YOU AND YOU!!!!**

" 'Twas the Nite Before———"

Yep, it's in the offing again and as ever the battle between the family and Pop's pocketbook is about to commence, but be that as it may, it doesn't cost anything to unlimber the old smile and do a lotta **Merrychristmasing** and **happynewyearing** around and about. And that, boys and gals, is just wot we're sending to all of yuh with the hope that *1947 will be prosperous for one and all.* Yassah — them's the best holidaze greetin's dished out so far by

THE ROLLING REPORTER

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RIDER'S VOL. XV

Continued from page 4

ucts are contained in Rider's Volume XV. These descriptions are complete in every detail — in fact, *"clarified schematics"* are shown for not only the r-f sections, but even for the control switching circuits — an exclusive feature to be found only in this publication.

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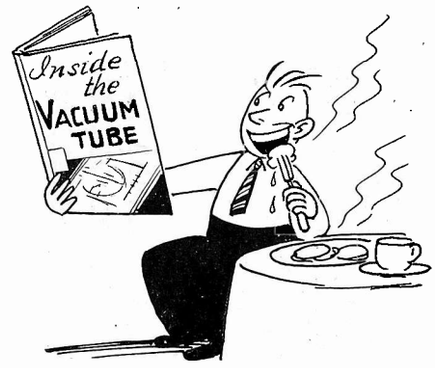
Like the other Rider's Manuals — Rider's Volume XV will pay its own way for years to come and show a profit too. Just recall when you bought your first volume and the number of years it served you!



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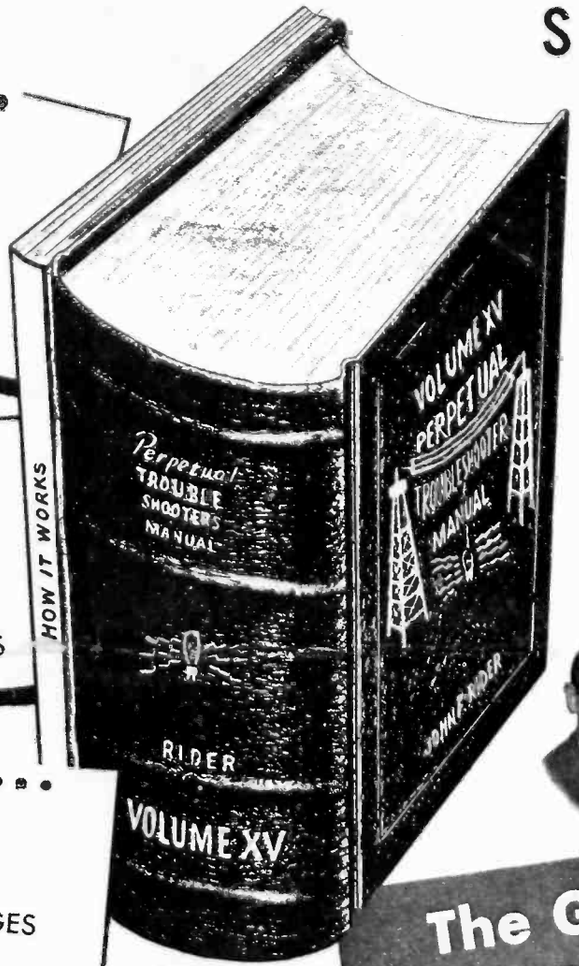

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"clarified schematics," and separate "How It Works" book are but two of the exclusive features that characterize the thoroughness of presentation on the products of over 120 receiver and associated equipment manufacturers; but two of the reasons why Rider Manual Volume XV is the biggest single volume yet issued.

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John F. Rider

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