

HOW TO GET AHEAD

*in the Television and
Radio Servicing Business*

JOHN MARKUS

HOME COURSE OUTLINE

for the McGraw-Hill
TV, Radio and Changer
Servicing Course

HOW TO GET AHEAD
IN THE
TELEVISION AND RADIO
SERVICING BUSINESS

Prepared by

JOHN MARKUS



McGRAW-HILL BOOK COMPANY

HOME COURSE
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Servicing Course

HOW TO GET AHEAD IN THE TELEVISION AND RADIO SERVICING BUSINESS

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Follow the plan of this Home Course, and you can train yourself in the shortest possible time to make real money fixing TV sets, radios and record changers.

A revolutionary idea helps you make truly rapid progress. It's the new "three R's"—*Reading, Recognizing, and Repairing*—that quickly help you turn the information in the *McGraw-Hill TV, Radio and Changer Servicing Course* into a profitable new career.

There is no need to memorize when you follow this plan. You learn the natural way, starting with the easiest jobs first. Easy reading steadily increases your skill in logical steps—just the way a building rises brick by brick.

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(Continued from front flap)

You'll save time (and money, too) with the practical "Experience-builder Plan" for helping you recognize and repair the troubles you read about. *This plan telescopes years of ordinary apprenticeship into just 74 practical jobs.* And it only requires access to three different sets—one radio, one TV and one record changer.

On these sets you perform the correct repair procedures for hundreds and hundreds of different troubles. You do these jobs in step with your *reading*. This way you *recognize* symptoms and fix in your mind the correct way to make each *repair* without even trying to remember it.

Since your goal is to fix sets and make money as soon as possible, this Home Course Outline also shows you how to get started right in the servicing business. Such advice-packed chapters as . . .

- How to Earn While Learning
- How to Advertise Your Business
- How to Figure Service Charges

tell you how to set yourself up in business, how to get customers and how to make sure you make money on each repair job. Read them carefully. They may well turn out to be the most important and profitable chapters you have ever read in your life.

This Home Course Outline is in every sense your key to future success. It unlocks for you all the wealth of practical information in the *McGraw-Hill TV, Radio and Changer Servicing Course*. And it does this by mapping a very definite program to follow to get the most value out of the Course, the most ability out of yourself and the most profit out of a new job or business of your own.



John Markus

JOHN MARKUS

Editor-in-Chief

**THE MCGRAW-HILL
TV, RADIO AND CHANGER
SERVICING COURSE**

Author of

**HOW TO GET AHEAD IN THE
TELEVISION AND RADIO
SERVICING BUSINESS
and
TELEVISION AND RADIO
REPAIRING**



ALEX LEVY

Radio Teacher at Chelsea Vocational High School. Mr. Levy has previously been a radio technician and a technical writer for Hazeltine Electronics Corp. He is also co-author of another McGraw-Hill book.

Behind John Markus' ability to write clear, easy-to-follow instructions is a background of sound electronic engineering training. He combines a lifetime of actual experience in repairing radios, television sets and electrical appliances with 25 years of writing about that experience in books and technical articles.

At various times in his career he has served as Technical Editor of *Mechanix Illustrated*, handling their Radio Department; Technical Editor for National Radio Institute, editing and writing their lesson texts; and Radio Editor of *Science and Mechanics*.

In 1943 he joined the editorial staff of *Electronics* magazine where today he is Feature Editor. He also writes the "Dollar and Sense Servicing" column which has appeared in every issue of *PF Reporter* since the start of this electronic service magazine in 1951. His name now appears on eight McGraw-Hill volumes, including the widely used TELEVISION AND RADIO REPAIRING which is the keystone of this Home Course.

Closely associated with the electronics field during the years of its amazing growth, John Markus has long realized the vital need for better train-yourself instruction in radio and television servicing. Consequently, he launched the original plan for this course by outlining in detail the individual books that were to revolutionize the training for a career in this field. Four outstanding experts joined him in converting these outlines to the present fully-coordinated six-volume Course. Today it constitutes *the world's simplest complete course of training* for a profitable career in television and radio servicing.

WILLIAM MARCUS

Principal of Corona Junior High School. Mr. Marcus formerly taught radio and also served as a technical writer for Hazeltine Electronics Corp. He is co-author of two other McGraw-Hill books.



EUGENE A. ANTHONY

starting as a serviceman himself 17 years ago, he is currently Consultant—Product Services Dept., in the Marketing Services Division of General Electric. Previous writings include 21 military texts.



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HOME COURSE OUTLINE
for the McGraw-Hill TV, Radio and Changer Servicing Course

How to Get Ahead

IN THE TELEVISION AND RADIO SERVICING BUSINESS

John Markus

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McGraw-Hill Book Company, Inc.
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How to Get Ahead
IN THE TELEVISION AND
RADIO SERVICING BUSINESS

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Getting Acquainted with Your Home Course

This Home Course Outline introduces you to a new and easy way to train for a successful career in television and radio servicing. You become acquainted here with the master plan for the books which make up the McGraw-Hill TV, Radio and Changer Servicing Course. You are guided through the books and through the associated experience-gaining jobs so that every minute of study gives real progress. You learn why the technical instructions in these books are so simple and so easy for you.

The three distinct features of this special new-type training course are:

(1) You learn to handle the easiest troubles first. Since these are also the commonest troubles, you can actually fix many television and radio sets long before you have completed even the first book in the course.

(2) You learn by reading easy-to-understand instructions. These require no previous technical education. There is no need to memorize, yet you unconsciously do remember. When you study the easy new way described in this Home Course Outline, reading brings learning.

(3) You learn in easy and logical steps, each building on the one before. When you study the books in their recommended order, they are all equally easy to understand. Each succeeding book builds up your knowledge of how to fix sets faster. Long before the end of the course you are ready to go in business for yourself if you wish.

This course of training is the result of ten years searching for a better way to learn servicing at home. Each book was planned and outlined many times until it met the goal called for by the above three requirements. These outlines were then turned over to outstanding experts in their fields, for the first writing of each book. The early manuscripts were

vi *Getting Acquainted with Your Home Course*

carefully checked against each other. Many changes were made to provide the required logical order of study.

After the books were technically done there came one more rewriting. Long words were replaced by simple short words to give easy reading. Sentences were shortened for easy understanding. Paragraphs were shortened to make important ideas clearer. Every known technique of modern education and writing was used to make the final books as easy and practical as possible. All this was done without omitting a single important fact needed for success in this field.

Finally, this Home Course Outline was prepared to guide you in training yourself for a new job. It shows how to get started the right way toward a profitable and enjoyable career in the fascinating field of servicing.

The first chapter of the Outline describes the jobs you can choose after completing the Course or even while still studying. Your future in each is discussed in terms of your own abilities and preferences.

The second chapter in this Outline introduces you to this new self-training course and shows how each book fits into your training.

The next chapter gives you practical instructions for setting up a program of study that you can easily achieve. It tells you in detail how to start studying, how to concentrate, how to test your knowledge and how to get practical experience on actual television and radio receivers.

The complete experience-gaining program for your Course is summarized in one highly important chapter. Check-off boxes help you to keep track of the jobs already done. Television and record changer jobs are included here for your convenience, so you do not have to bring the study books down to your workbench for the more advanced experience-gaining jobs.

Additional chapters tell you how to earn while learning and give valuable business advice, so that your technical success will also show in your bank account.

Read this Course Outline carefully before you start studying the books in this Course. Follow its instructions. Apply yourself with honest effort, stick to the study schedule which you set up, and you too will soon advance to a bigger job and the better things in life!

John Markus

Contents

Preface

1. Your Opportunities in Television and Radio Servicing
2. How This Course Trains You
3. Studying Can Be Easy
4. How to Get Practical Experience
5. How to Earn While Learning
6. How to Advertise Your Business
7. How to Figure Service Charges
8. How to Keep Business Records

YOUR PATHWAY TO PROFITS

*McGraw-Hill TV, Radio and
Changer Servicing Course*

JOHN MARKUS, Editor-in-Chief

★ **Home Course Outline: How to Get Ahead in the Television and
Radio Servicing Business**

by John Markus

I Television and Radio Repairing

by John Markus

II Practical Radio Servicing

by William Marcus and Alex Levy

III Profitable Radio Troubleshooting

by William Marcus and Alex Levy

IV Profitable Television Troubleshooting

by Eugene Anthony

V Repairing Record Changers

by Eugene Ecklund

Your Opportunities in Television and Radio Servicing

Making Spare-time Money. Ability to fix television and radio sets means that you can make extra money evenings and weekends to supplement your regular income. You can do as little or as much of this as you want, to match your financial needs. There are very few other spare-time jobs like this, where you can turn the flow of money on or off as you wish. The more repair work you want, the more advertising you do—it's just that simple.

Your Working Hours Don't Matter. Spare-time servicing can be done no matter what your regular job is. Even your hours of work do not matter. If you are on the regular day shift, you can make home calls for repair work on evenings and weekends. This has advantages because when both husband and wife work there is no one home during the day. By coming evenings, you get the jobs that shops with regular daytime hours can't handle.

On the other hand, if you work a night shift, you can do servicing work during regular business hours just as does any other service shop. Here you can build up to a full-time business, so that eventually you can drop the night-shift work.

Cash Needed to Start. In spare-time work, very little capital is needed to get started. If you avoid the rush jobs, there is no need to tie up a lot of money in a stock of spare parts. Start in with radio work and use the profits to build up a small stock of television tubes for test purposes. Order replacement parts as you need them, possibly two or three times a week.

2 *How to Get Ahead in the Television and Radio Servicing Business*

You can get started with only a multimeter and a tube tester as your basic test instruments. The more specialized instruments can be obtained later, after you have completed your training.

How Much Can You Make? Your income from spare-time servicing is limited only by the number of hours you want to put in. You charge the same rates as does a regular full-time serviceman because you are doing the same work that he is. At the beginning you will take longer on each job because you are still acquiring practical experience, so you will charge on a job basis rather than by the hour.

After you have completed this Course and built up your experience, your speed should match that of other servicemen. Your hourly return for servicing work should then be essentially the same as theirs. This rate varies in different parts of the country, but will generally be within the range of \$1.50 to \$2.50 an hour. This is your net return that corresponds to salary. Your labor charge to customers is quite a bit more, to take care of the overhead expenses associated with your business operation. The Course shows you how to figure up these expenses, so they do not cut into your salary and your normal business profit.

Your Location Doesn't Matter. Today radio sets are found in practically every home in this country. Television sets likewise are in almost every home. This means you have an opportunity to do spare-time servicing no matter where you live. Out west in ranch country you may have to travel more miles to get to your customers, but this just means you do more driving and see more scenery while you work. Being farther away from other sources of entertainment, your customers in rural areas rely more on radio and television and will therefore pay what is required to keep their sets working.

In cities you can do spare-time radio service work even without a car at the start. Just take jobs within easy walking distance, so that you can carry the radios to your own workbench. Later, after you get a car, you can take television jobs also. With a car, you can live anywhere in the city or its suburbs because you go to the customers' homes to pick up the jobs. You just use your home for the jobs that cannot conveniently be done in the customer's home.

Insurance for Your Future. Knowing how to fix television and radio sets is one of the finest kinds of job insurance you could have. You have this work to fall back on if you are temporarily laid off or lose your job. Even in a depression, servicing can bring you enough income to live on, because people will then rely still more on television and radio for entertainment.

Spare-time servicing is excellent for keeping up your speed in repairing sets, even if you only fix two or three sets a week. On the other hand, this Course is designed so that you do not need to keep in practice. Carefully worded chapter and section headings, combined with detailed back-of-book indexes, allow you to find repair instructions quickly in any of the five books, to refresh your mind. This Course is thus a lifetime investment in insurance for your future and for the protection of your family.

Getting a Job in a Service Shop. After you have completed the study and experience-gaining programs outlined here, you are qualified and ready to take a regular full-time job in a service shop. This is interesting work because you are doing something different every hour and every day. No two sets go bad in the same way, and rarely do you come across the same make of set twice in a row. You visit different homes and meet different people every day, so there is little chance to get tired of your work. Many thousands of men prefer working this way.

The Help Wanted ads in your local newspapers often indicate the salaries being paid to television and radio servicemen. If this money is adequate and you prefer to avoid business responsibilities, you may well decide to stick to salaried work all your life. You will be part of a working team, with good job security and without any of the worries of management. In the larger shops you will be eligible for regular vacations, sick pay and holiday pay just as on other regular jobs. When the hands of the clock point to quitting time, your work for the day will be done or you will go into overtime pay. All this comes while doing work that you really enjoy, in the fast-growing electronic industry.

Building Up Your Capital and Confidence. This Course prepares you to go directly into a business of your own if you wish. There are certain advantages in working a few months or a few years for someone else first, however. For one thing, you can build up your capital in this way, so that you can launch your own business on a full-time professional basis with a main-street shop of your own, a service truck, a fully equipped workbench and a full stock of parts.

Working for someone else also builds up your confidence in yourself, particularly if you have not dealt with people before. Success in servicing depends on knowing how to deal with people, just as much as on knowing how to fix sets.

Finally, working for someone else builds up your speed in fixing sets, because you become better acquainted with the various makes and models of sets in your locality and learn their common troubles. You may learn, for example, that after a hot and humid summer month you can expect

4 How to Get Ahead in the Television and Radio Servicing Business

to replace a lot of filter condensers in one make of set. On another common set in your area, you may become so skilled that you can just glance at the screen, then reach blindfolded into the back of the set and pull out the bad tube. This knowledge of common local troubles will allow you to fix more sets and make more money when you do start your own shop.

Setting Up a Shop in Your Home. If you like the freedom of being your own boss and choosing your own working hours, your goal will be a shop of your own. In the beginning this will probably be in the basement or garage of your home. This keeps down your overhead expenses, such as for rent, light, heat, and telephone. Another advantage of a home shop is that there is generally someone at home to answer the telephone while you are out on service calls.

Renting a Shop for Your Business. If your home is located in a residential area where a full-time business is not permitted, you will have to rent a small shop in a business zone. Here you will need someone to tend the shop and answer the phone while you are out on calls. Your wife can do this at the start if she has the time. If you schedule all your calls for the afternoon, you can do bench work in the morning while taking phone calls and handling customers. If your wife is too busy to help out, there should be no trouble finding a housewife or grandmother living nearby who would welcome a chance to work half a day like this.

You gain many advantages from having a regular store for your business. You can have window displays, put up business signs, and choose a location where many people will pass each day. Such a shop thus does its own advertising to a great extent, so that you can get along with less money for advertising and promotion.

Looking into the Future. A shop of your own establishes you as a businessman in your community. You will be invited to join the Lions Club and other business and fraternal organizations. You will also be acquiring business know-how for the future. With a well-established service shop, a good reputation and good credit, it is logical to expand into selling television and radio sets, then eventually sell home appliances as well. Yes, going into business for yourself is the first step toward what can become a highly prosperous business operation.

Being Your Own Boss. When in business for yourself, you will be putting in much longer hours at the start than if working for someone else. You will do this voluntarily because you want to and like to. You will do it because you will enjoy working for yourself, taking orders from no one. You will do it to get experience in all aspects of a service business, so that you can better direct your accountant, office help and other

servicemen when you expand your business. You will do it to make more money at the start, to build up your capital in preparation for expansion.

When running your own business properly as outlined in this Course, you make a profit on each job in addition to your regular hourly wages as a serviceman. This is why your capital can build up so much faster when you go into business for yourself. Therefore, if you want to be independent, plan to have a shop of your own. You can do this right after you finish your study of this Course, or after you have had a bit of experience working for someone else.

Being a Boss for Others. If you think you would enjoy operating a large business and directing the work of others, choose your first shop location with a view to expansion. A small shop located in a row of other shops may be the best from this standpoint, because you can then rent adjacent shops as they become vacant and your business expands.

In a one-man shop most of your time is spent on actual repair work. As you expand, the business part of your operation will demand more and more of your time. Eventually you will have to turn over the actual repair work to others so you can concentrate on managing your business and supervising your staff. The nature of your servicing career will depend to a great extent on whether you prefer working with radios or with people. There is good money in both, but your best chances for big money lie in managing people.

The technical training which this Course gives you is excellent preparation for a management position in this field. Because you understand servicing, you are in a better position to direct the work of other servicemen. You know that some repair jobs take much longer than others. You know that there are occasional tough jobs which challenge the ability of even the best servicemen. You therefore direct your men with patience and understanding, to keep their morale high so that they do their very best work for you all the time.

Working in the Electronic Industry. Learning how to fix television and radio sets also gives you the basic training needed for a variety of other jobs in the electronic industry. With little or no additional study you can be in a position to hold a good-pay job as tester or technician in an electronic manufacturing plant. Here you may make the final tests and adjustments on television and radio sets, check the performance of radar equipment, or work on top-secret electronic controls for guided missiles. Your pay will be far better than that of ordinary assembly-line workers and your chances for regular promotions will be excellent.

Repairing Electronic Controls in Factories. There are good-pay jobs as

6 *How to Get Ahead in the Television and Radio Servicing Business*

maintenance technicians in a variety of factories. More and more plants are installing electronically controlled machinery. The controls use much the same tubes, parts and circuits as do television and radio sets. Service manuals for the controls are generally available, just as they are for television sets, so you can quickly expand your knowledge to handle industrial electronic controls.

The pay of an electronic technician is generally higher than that of a television serviceman, and there are no business details to bother with. Your only job is to keep the machines running. The better you do your repair work, the less work you have to do on the machines and the more time you have to take on other more important responsibilities. The job of repair technician in the factory is thus an excellent stepping-stone to better things.

Special Television Servicing Pays Well. Closed-circuit industrial television systems are coming more and more into use. These are being used in operating rooms so that hundreds of students or doctors can watch operations on television sets connected by wire to the camera.

Factories use this same television setup for watching dangerous operations such as the testing of aircraft jet engines. Stores use television cameras to detect shoplifters, and factories use them to replace guards at doorways.

All these closed-circuit television installations require attention by servicemen from time to time. Here is another fine opportunity for advancement to higher pay, if you choose to specialize in the field of industrial television after first getting a bit of experience with regular sets.

Working on Airborne Electronic Equipment. The airplane of today is practically a flying electronic laboratory. The technicians who fix this equipment at airports get good pay and have fine working conditions. Men capable of doing this work are often so scarce that airlines will hire ordinary servicemen and train them at full pay to fix the navigation and communication equipment used in planes.

With the basic training given in this Course, you are in an excellent position to continue your studies and pass the examination for an FCC operator's license. This allows you to work on aircraft radio transmitters and opens the door to jobs at television, radio and communication stations.

Opportunities for Electronic Technicians in Military Service. Military electronic equipment needs repairing just as does any other. Your knowledge of practical servicing can result in interesting military jobs all over the world, servicing the equipment of our armed forces. Furthermore, in the peacetime draft or in event of war, your ability as a serviceman will

Your Opportunities in Television and Radio Servicing 7

usually mean preferential treatment. This generally involves behind-the-lines assignments at repair stations. Many lives depend on the satisfactory performance of the radio and electronic equipment used in a modern army.

Fixing Sets As a Profitable Hobby. From its first day on the air, radio has been a hobby as well as a career for many. The arrival of television lured many more thousands to this group of men and women who experiment with sets purely for pleasure. Tape recorders and hi-fi audio setups now have their following as well.

Electronic equipment used as a hobby goes bad now and then just as does any other. Being able to fix your own set brings added satisfaction and the assurance that precious units will not be mishandled. With the knowledge gained so easily from this Course you can handle practically all of your own repair work and save money, as the first step in preparing for a profitable new career.

2

How This Training Helps You

Previous Education Doesn't Matter. The books which make up the McGraw-Hill TV, Radio and Changer Servicing Course are all you need to prepare yourself for a career in servicing. They start right from the beginning. The first book assumes that you've never seen the inside of a television or radio set. It assumes that you haven't even handled a tool before. If you can read, you have enough education to start this Course.

Naturally, if you are handy with tools you will make faster progress in the chapters on tools. If you have read popular scientific magazines or taken a science course in high school, you will go faster through the chapters which introduce you to television and radio. Your previous experience may even allow you to skip a few other chapters and sections once you glance through them. Every single topic starts from the beginning, however, to refresh your memory.

Even engineering college graduates can profit from a study of this Course, because the books give practical money-making information that training in theory rarely includes. The accurate and useful step-by-step instructions give an engineer the additional practical know-how needed to fix television and radio sets.

All Men Are Created Equal. The Declaration of Independence of the United States of America states that "All men are created equal, that they are endowed by their Creator with certain unalienable rights, that among these are life, liberty and the pursuit of happiness."

This means that no matter who you are, you have just as much right to success in life as anyone else. But having a right to success does not mean that it will come to you automatically. You will have to work for it and earn it.

Men differ greatly from each other. Some are tall and others short.

Some are strong and others weak. Some are fast talkers, while others have little to say. Some learn quickly, while others take longer to study. But these differences in men need not have anything to do with success.

Each man must work for success in his own way. He must use the talents which he has, instead of wishing for those he lacks.

Your Chances for a Better Job Depend on You. Steady plugging for a definite goal will get results. Even the turtle goes places and gets the food he wants, because he uses to the fullest extent his ability to plod steadily along.

It is hard for us to judge our own talents. We generally tend to be too modest about the things we do best. Mental ability, often called "brains," is not by itself a guarantee of success. Even if you learn slowly, you can still move ahead of flashier men by putting your own abilities to work. The great inventor Thomas A. Edison said that genius is 1 percent inspiration and 99 percent perspiration.

Remember—no matter what your education and mental ability, this Course gives you just as much chance for success in television and radio servicing as any other man. Your own natural talents are enough. Each of the books is planned and written for study at your own rate of speed, to match your combination of talents, no matter what they may be. If you learn slowly, it'll take longer—but at the end you'll have the same know-how as any other man who completes this course of training.

What the Books Cover. This course of training teaches you television and radio servicing in easy and logical steps, as follows:

How to Get Ahead in the Television and Radio Servicing Business

Book I: Television and Radio Repairing

Book II: Practical Radio Servicing

Book III: Profitable Radio Troubleshooting

Book IV: Profitable Television Troubleshooting

Book V: Repairing Record Changers

These books are carefully planned to provide logical step-by-step training for a career. The books are divided into chapters and sections in such a way that knowledge is built up steadily. This means that if the books are studied in their correct order, a paragraph in one of the later books will be no more difficult to understand at that stage in your training than were those in the first book.

You study only one thing at a time. Each step in learning prepares

10 *How to Get Ahead in the Television and Radio Servicing Business*

you for the next. This is possible only because the books were carefully planned beforehand specifically for easy study at home.

Step-by-step Learning Is Easy. The first time you take a television or radio set out of its cabinet, the chassis may look like a rat's nest. The parts and wires appear to be crammed into the chassis in a hopeless mess. But first impressions don't count here.

If you hold over this chassis a large sheet of paper in which is cut one small hole, you see only one part. This part looks simple and is simple. It generally has only a body and two wire leads, each going to one simple terminal in the set. When a set goes bad, it is usually because trouble has developed in one simple part.

This Course trains you to look for one trouble at a time, just as if you were looking through the hole in the sheet of paper. Very soon after starting your studies, you lose your awe of the rat's nest. You learn to think of only one part or trouble at a time.

Many courses of training start out by forcing the student to learn a great deal of theoretical and historical information. This training course, on the other hand, teaches you to *do things* right from the start. You learn to do the easiest jobs first, which is the natural way of learning. You can see a practical need for every bit of information in the books, because the information is given right when needed for a particular television or radio repair job. You will never have to wonder, "Why do I have to learn this?" You can see that everything you study will help you to make good money in servicing as fast as possible.

Time is money. The faster you learn, the faster you will build up your income. This is why so much attention has been given in this Course to streamlined modern step-by-step learning. The goal of the authors at all times was to make learning as easy as possible for you.

Memorizing Isn't Necessary. The books in this Course have been prepared so you can master them simply by reading. There is nothing to memorize. As soon as you understand a sentence, you go on to the next. As soon as you understand a chapter, you are finished with it for study purposes.

All this is so different from ordinary study that an explanation should be made. The secret of learning without memorizing lies in two outstanding educational features. First come the step-by-step explanations, in simple and short sentences which build up your knowledge so fast and so easily. Second is the carefully planned organization of each book in logical chapters each having clearly labelled sections.

With clear bold-face headings for every section, any desired topic can quickly be located later. Most of the time, you will not even need to use the detailed cross-index at the end of each book. When you are working on a set and need repair information, you can look up that topic in the Course and glance over it in a few minutes. Isn't this far better than memorizing long lists of troubleshooting and repair procedures?

Your Subconscious Mind Helps You to Remember. Some memorizing will come automatically as you carry out the experience-gaining jobs. More will come later as you look up and use certain repair techniques over and over again. Learning by doing gradually eliminates the need for looking up the repair instructions. This type of memorizing requires no effort. You simply go through each step with your hands as you read about it, and your subconscious mind stores up that procedure.

Learning through experience is the ideal way to make use of your own abilities. You work on and fix actual sets while learning, instead of going through long and tedious experiments.

Order of Studying Books. The books in this Home Course should be studied in their correct order because they build up your knowledge gradually in a carefully planned way.

Occasionally you may get a repair job that calls for knowledge in advance of your study progress. There is nothing wrong with looking up that subject in a book you haven't studied yet. You'll be surprised at how many times you can actually complete a repair job by looking ahead in this way.

Don't get overconfident and forget about the skipped material, however. You need to read and understand every single paragraph in the earlier books in order to make equally fast progress through the later books.

3

Studying Can Be Easy

Importance of a Study Schedule. One advantage of the McGraw-Hill TV, Radio and Changer Servicing Course is that you control your own speed of progress. By following the practical study suggestions given in this chapter, you can achieve your goal at your own pace.

If you have a lot of time for study, or if you already have some knowledge of radio, you can finish the Course quickly. On the other hand, if you prefer to study slowly and steadily while continuing a more or less active social life, the choice is still yours.

How Many Hours a Week Can You Study? The important thing is to decide now on a definite study program that you know you can carry out. Plan it on a weekly basis. Choose a figure for your average number of study hours per week. Remember that you are committing yourself for many months, so be practical with your plans. There are bound to be some study hours when you get nothing done because friends or relatives drop in. There will be days when you are knocked out with a cold, flu, or other illness and are unable to study.

Chart out your study program on a calendar for a full year ahead. Make allowances for vacations and trips, so your average number of study hours per week can be met over the full year. Failure to meet your time schedule for study can discourage you tremendously, so be realistic. Even ten hours of study a week can get you real results over a period of time.

For faster progress, give consideration to a total of 15 hours per week. This can be achieved quite easily even though you work five days a week and have family responsibilities at home. With this schedule, you can still have at least two evenings a week completely free for relaxation.

Setting Up a Study Schedule. One way to figure out how many hours

you can expect from yourself for study is to set up an actual weekly time schedule. An example will illustrate how this is done.

Suppose you are working five days a week. You have to be in bed by 11 p.m. to get up fresh for work the following day. You are free to start studying at 7:30 p.m. on weekdays. You need half an hour after studying to relax from the strain of concentration before going to bed. This gives you the three hours between 7:30 p.m. and 10:30 p.m. for study on a weekday.

Next, suppose that you will devote three out of the five weekday evenings to study. It leaves two evenings free for watching television, for planned or unplanned social engagements, and for other interruptions. When you feel like it, you can study on these clear evenings to get ahead of your schedule. You can keep up your weekly average even though out-of-town business trips or long illnesses prevent study on some weeks.

Over weekends, you may well decide to put in three hours during the day on Saturday and three hours on Sunday evening. With nine hours study on weekday evenings and these six weekend hours, you get in a total of 15 hours study per week without any real sacrifice of precious weekend time. This total is about all you should normally consider if you are holding down a full-time job and have the usual amount of maintenance and repair work to do around the house.

Allowing for Experience-gaining. The time needed for getting practical experience must not be overlooked. It's a good idea to divide study and experience-gaining time about equally, right from the beginning. The actual work on radio and television sets will help you to understand, appreciate and remember what you are studying. In the evenings, do your studying first, when your head is clearest, and spend the last half of your evening at the workbench.

Remember that the above study schedule is an example and may not fit you at all. It is intended to show how you can figure out your own schedule, based on the amount of time you regularly have available each week for study. You may even prefer to set up your study schedule on a monthly basis, if there are some weeks in which you have no time for study.

Try Milkman Hours for Study. You may find it desirable to study at home early in the morning, while you are still fresh. Set the alarm clock to get you up half an hour or so ahead of your usual time. Wash the sleep out of your eyes, get dressed, and settle down for concentrated and uninterrupted study while the house is completely quiet. You may find that you make much more progress than you would during equivalent evening

14 *How to Get Ahead in the Television and Radio Servicing Business*

hours. Give these milkman hours a fair trial for a few weeks before establishing your definite time schedule for study.

Choosing a Place for Study. There is no one ideal place to study. Some can study best right in the living room, with the family around but not too noisy. Some even like to have the radio on, tuned to a musical program. Others study best by themselves in a quiet room. Where you study doesn't matter nearly as much as how well you study. Try out several different locations, or study wherever the mood of the day leads you.

You may find it desirable to set up a study table in a corner of your bedroom. Another possibility is up in the attic, or in the basement if it is comfortably dry and warm.

If the selected location is too cold, get an inexpensive portable electric heater and aim it at your feet while studying. If you set up plywood or Celotex panels on each side of your desk or study table to give a small enclosure, it won't take much heat to keep you warm.

For efficient study, it is far better to have too little heat than too much. Heat makes you sleepy and kills your desire to study. Dress warmly, and you can study far better in a cool room.

Study While You Ride. If you ride to work on a train or bus, do a part of your studying while you travel each day. Most people find that study on the way to work is very effective. Sitting among strangers gives the complete isolation needed for concentration. Of course, you will have to avoid talkative friends on the train or bus, or give them something to read while you study. You may not be able to concentrate as well on the way home when tired from the day's work, but give this a try anyway. Even if you only get in half an hour a day of study while traveling, you can accomplish wonders in extra progress.

Choosing a Study Table. You don't need a fancy or expensive desk for study. Any simple table will do. It should be the right height for you and have room for your legs underneath. Your table and chair together should allow you to rest your elbows on the table comfortably now and then while studying. When the book is lying flat on the table, it should be at the most comfortable reading distance for you. Adjust the height of the chair or table to achieve this.

Arranging Your Study Table. Keep the books of this Course in a regular place at the back of your study table. Stand them up vertically between book ends or other supports, so that you can easily reach for any one of the books when you want to look something up.

Keep pencils and paper in another fixed location on your table or in

its drawer. Instruct your family to stay away from your study table at all times. Never let them borrow your pencils or take your paper. This may sound fussy and strict, but it is extremely important to you. Each interruption to look for something while studying makes it that much more difficult for you to concentrate again.

Where to Keep Catalogs. As you progress with your studying, you will acquire catalogs and literature such as tube manuals, radio parts catalogs, radio magazines and service manuals. Don't pile these on your desk where they will distract you from study. It is far better to keep them on your workbench or in a little bookcase that is out of sight of your study area. This removes temptation. There are so many times when you will not feel like studying. With interesting magazines or catalogs on your desk, you would be tempted to pick them up instead and waste precious study time looking through them.

Do your magazine and catalog reading outside of your regular study schedule, because these are not a part of your training. This Course is planned to teach all you need to know to get started in servicing.

Choosing a Light for Study. One important requirement for study is good light. Since most of your studying will probably be done at night, you will definitely need a good desk lamp.

A desk-type fluorescent lamp with a white tube in it will prove easiest on the eyes, particularly if your eyes are a bit weak and occasionally feel tired after reading or study.

The next best choice for light is an inexpensive adjustable gooseneck-type lamp having a 60-watt or 100-watt frosted bulb in its reflector. Adjust this to throw the light right on the page where it is needed. Set the lamp on your left side with the bulb close to your left ear, so the light does not cause glare on the pages of the book.

Use an ordinary table lamp or floor lamp only as a last resort. Unless designed especially for study, these will usually cause eye strain.

Choosing a Workbench Light. The adjustable gooseneck-type lamp is also ideal for your workbench. It can be bent and set to throw light right into a chassis propped up at any angle on the bench. This alone will serve nicely until you have the time and money to install regular incandescent or fluorescent lighting over your bench.

Another good possibility for both study and bench use is an ordinary clamp-on photographic reflector with a 100-watt bulb in it. This can be clamped to a temporary wood stand or even to the back of a chair, and set at the desired angle.

16 *How to Get Ahead in the Television and Radio Servicing Business*

How to Concentrate While Studying. Getting started is half the battle of concentration for study. Do all your pencil sharpening, desk cleaning, fingernail trimming and other time-wasting tricks well before the study hour. Mark your book clearly each time you stop studying, so you have no excuse to waste time hunting for the starting point. Get your glass of water beforehand, as well as an ash tray and a supply of cigarettes if you smoke. Give yourself no excuses, and you'll study the instant you sit down.

Don't try to listen to a sports broadcast or watch a television program while studying. Don't try to listen to a conversation while studying. If such distractions are present, do your studying somewhere else.

How to Avoid Interruptions. Interruptions are the next big enemy to concentration. After half a dozen interruptions, you may no longer be able to concentrate. Further study that day will then do very little good. Let your family know this. Post your study schedule where all can see it, and insist that they protect you from all interruptions during the hours of study.

If certain neighbors and relatives are inclined to drop in, give them copies of your study schedule also. If telephone calls come for you during study time, instruct your family to take the message so you can call back after study time. Resist the temptation to ask who called, and instruct your family to keep all messages until you are finished. With this planned attack on interruptions, the one or two that are unavoidable each evening won't hurt too much.

How to Stay Awake While Studying. The next big enemy of concentration is sleepiness. Study is hard enough even for a student, and is many times harder for a person who may not have studied recently. Sleepiness is the normal sign of rebellion of your body to this unusual activity, particularly after a hard and long day of regular work. It will be hard to fight at first, but you can lick it. Once you get started on your study schedule, each succeeding evening will be better because you develop the habit of concentrated study.

Here are some tricks for helping you combat sleepiness. Try them all, and use those which work best.

When your eyes refuse to stay open any longer, get up and wash them with cold water. Wipe your face dry vigorously, then go right back to your study without making the rounds of the house to talk to the family.

Try keeping a large glass of ice water on your desk. Take a sip occasionally, to clear your head. Putting a small piece of ice in your mouth now and then will also help.

Too much comfort can cause sleepiness. If your favorite chair is nicely cushioned, change to a straight hard chair for your study hours.

If the room feels warm, try opening all the windows for a while to get it really cooled off. Put on a coat or jacket if you have to. Inhale deep breaths of the fresh outside air to clear your head, then close the windows and proceed with your study.

How to Start Studying a Chapter. When you are ready to start a new chapter, just relax and do it the easy way. First go through the chapter about as fast as you can turn the pages, reading only the heavy black type headings for the paragraphs. This gives you your bearings, so that you have a quick picture of what that chapter will cover.

Next, go through the chapter again quickly, looking only at the illustrations and reading their captions. This makes you still more familiar with the chapter, so that already you get the feeling that you have learned a lot. This confidence in yourself and in your speed of learning makes studying a lot easier.

Now, for the first time, read the chapter from beginning to end. Read it just as you would a magazine story. This first time, don't worry if you can't understand some sentences. Read straight through without stopping to reread. When you have finished reading, sit back and close your eyes. Think about what you have just read. You will be amazed at how much you learned in this quick and easy reading. Isn't studying easy and interesting when you do it this way? Don't you get a real feeling of confidence when you learn so much without hardly trying?

How to Master a Chapter. Now start over again with the first section of the chapter. Read this slowly and carefully up to the second paragraph heading. If you don't understand a sentence, read it over and over again word by word until you do. If there are diagrams relating to that section, study these carefully now too. Don't try to memorize a thing, however.

As soon as you understand a sentence, go on to the next. For most sentences, one slow reading will be enough to give understanding. Only occasionally will you have to reread a sentence and perhaps look back at previously studied material before you figure out exactly what it means.

Study each remaining section in the chapter slowly in the same way. The paragraph headings divide the chapter into logical sections that help you to learn because they deal with only one topic at a time. You thus learn in easy steps, one thing at a time, without becoming confused. You learn in a relaxed way that makes studying a pleasure, because you find it so easy to master just one topic at a time.

18 *How to Get Ahead in the Television and Radio Servicing Business*

Set Your Own Pace. The sections of a chapter differ greatly in length, because some topics require more explanation than others. This means that you will spend more time on some sections than on others. There will be many sections, having just one short paragraph, that you can read slowly and understand in just two or three minutes. Other sections may take you 15 or 20 minutes, before you are satisfied that you understand every sentence.

Remember that for this careful reading, *understanding* is your goal. Set your own pace for study. You are your own teacher now. When you understand, you as teacher can give yourself a passing grade as student, and assign yourself to the next section of the chapter.

How to Review a Chapter. When you come to the end of a chapter with this slow and careful reading, stop your studying for that day. Change over to working with receivers to get practical experience or earn extra money. Relax and let the contents of that chapter rest in your mind at least overnight. You'll be amazed at how much learning your subconscious mind will do for you if you give it a chance at the right time. Without actually trying to memorize, you'll find that you do remember the important things.

The next time you study, go through the chapter quickly one final time. Do it this way. Read the paragraph heading for a section, then close your eyes and ask yourself, "Do I understand what this section covers?" If your answer is yes, then go on to the next section and repeat this. If you are a little bit doubtful, read that section quickly one last time to tie your thoughts together on that topic. Complete this quick skimming reading of the entire chapter, and you're ready for the next chapter.

Understanding Counts More Than Grades. Although questions are given after some chapters in some of the books in this Course, you do not need to answer them if you follow the study plan just described. Your goal is to understand everything in a chapter, and there couldn't possibly be enough test questions to check this.

The questions allow you to find out if you are studying thoroughly enough. You should be able to answer one or two of the questions for a chapter immediately after studying it. You should be able to find the answers to the rest of the questions in the chapter, by locating and quickly reading the section or paragraph covering that topic. If you can do this, your study habits are correct. You are understanding what you read, and you are learning how to find essential information quickly when you need it.

What a College President Says about Grades. In an address to his students, President R. E. Doherty of Carnegie Institute of Technology attacked the common idea that education is achieved by memorizing. All too true, he said, is this humorous definition of education: “The process by which the instructor’s notes get into the notes of the student without passing through the brains of either.”

This famous educator definitely said, “*Many of us have more capacity for understanding and for intelligent thought than we are given credit for having.*”

The study plan for this Course emphasizes and gives you understanding rather than grades. It thus achieves the ideal learning goal right in your own home at your own rate of progress. Dr. Doherty’s advice to his students applies perfectly to you:

“Learn to use your heads. Dig yourself out of confusion. Insist on understanding! Stop memorizing words and formulas that you do not understand, merely for a grade. You know when you understand and when you do not. With all the emphasis in me I repeat: Insist on understanding! *Then . . . under your own initiative . . . you will be in a position to go forward more effectively and more rapidly.* You will get a genuine education gauged to the demands of the changing world in which you will live.”

Suggestions for Answering Self-check Questions. Read the question slowly and carefully. Read it over and over until you have a clear idea of *exactly* what is being asked. Every single word counts. Skimming over one word too fast may give you the wrong idea, and make the question seem far harder than it actually is.

After reading a question, think about it for half a minute or so. Don’t jump at your answer too soon. There are no tough questions and no catch questions. Each asks a carefully planned question that is intended only to help you find out if you are ready to advance.

You can say the answers to yourself, either silently or out loud. Don’t worry about the wording of your answers. The important thing is to get the facts right. For example, suppose the question asks, “What is a symptom of a worn volume control in a radio set?” Your answer can simply be, “A scratchy noise when the volume control is turned.”

4

How to Get Practical Experience

Experience-gaining Plan. This Course gives you a carefully planned sequence of experience-gaining jobs. Each one is aimed at practicing a money-making technique that really counts. No time is wasted on experiments that you would never do when fixing sets for a living. No time is wasted in building receivers or test equipment that you would never build to make a living. Every single experience-gaining job in this Course improves your ability to fix sets faster.

Three Steps to Expertness. Your experience-gaining program is divided into three major steps. For radio receivers, four entire chapters in Book II, "Practical Radio Servicing," give you the practical experience equivalent to fixing over a hundred radio sets. You actually get more experience here than you would from months of apprentice work in a radio shop, because this Course gives you a much more complete variety of jobs. No two are the same. You repeat the jobs on entirely different sets so as to broaden your experience while making every minute count.

For television receivers the experience-gaining jobs are given right here in this Home Course Outline. You can do some of these jobs while studying the television material in Book I. The rest you do while studying Book IV, "Profitable Television Troubleshooting."

For record changers the experience-getting jobs are likewise given here. You go through such everyday money-making procedures as changing needles, changing cartridges, adjusting the setdown and trip positions, checking speed and lubricating changers. On just one changer you get the experience equivalent to working on several dozen units.

Why You Learn So Fast. The secret of the effectiveness of this experience-gaining program lies in the fact that for practically every job you start with a set in good working order. You introduce or simulate the defect

yourself, then practice the repair procedure. You know what you are doing all the time because the job instructions tell you. No time is wasted in puzzling over possible troubles. No time is wasted in trying things while blindly searching for the cause of trouble. In each case you carry out the fastest and most accurate troubleshooting or repair procedure, as instructed in the books of the Course, so that you are training yourself to make good money fixing sets.

Time Needed for Experience-gaining Jobs. There are 74 job assignments in this course of training. Some are simple and will take you only a few minutes. Others may take an hour or more each. You will want to do each job two or more times to get maximum value from it.

This means that experience-gaining is an important major part of your course of training for a career. Do not try to rush through it all at once just to get the boxes checked off. Keep the experience-gaining jobs in step with your study progress, to make the maximum speed in reaching your goal.

If you follow the plan recommended in this book for dividing your time about equally between study and experience, you'll be on the right track. No matter what your study speed is, you can match your job to the material being studied.

Although your study speed cannot be easily changed, the jobs are planned to give the flexibility you need. Some jobs need be done only once. Other jobs can be done on three or more different makes of sets, to give you time to catch up with your studies. This insures that you will not be trying to do a job that hasn't yet been studied in the books. Your progress chart with its check marks will always show which job should be given first choice for repeating when you get caught up again.

Time for Earning. If you plan to fix sets for others and make money while studying, provide extra time for this. Fixing a set that has failed does not give you anywhere near the experience that you get from the carefully planned jobs in this Course. Fixing sets should therefore not be counted as part of your experience-gaining time.

You can either fix sets for profit during your own leisure hours or reduce the number of hours in your weekly study schedule, as you prefer. Naturally, however, the fewer hours you put in your study schedule each week, the longer it will take to complete the course of training.

The decision here is entirely yours, which is another important advantage of this training plan. You yourself control the speed of your study and the amount of money that you make.

22 *How to Get Ahead in the Television and Radio Servicing Business*

Number of Sets Needed for Jobs. Although there are dozens of different jobs in this experience-gaining program, you can do them all on a minimum of just three different units—one radio, one television set and one record changer. You probably have all of these already yourself. If not, you can very likely borrow the missing units from friends or relatives, on the assurance that you will return them in perfect overhauled condition.

Since repetition helps learning, you will want to repeat at least some of the jobs on additional sets. On radios especially, you should have no trouble in getting three distinctly different sets on which to do the jobs.

There is no need to go out and buy new sets for training purposes. Of course, if you are planning to buy a new set anyway for the family, there is no harm in using this from time to time for your jobs.

The sets should all be in perfect working condition when you start. If they aren't and if the trouble is beyond your capabilities at that time, have the set put in good working order by a reliable local serviceman.

Choosing Sets for Experience-gaining. It is all right to use one old a-c radio and one old 10-inch round television receiver for jobs, because you will still occasionally get these for repair in a service business. The other sets for your jobs should definitely be newer types, however. They should be the kinds of sets you will get for regular service work in your community.

One of the radios on which you practice should have printed circuits. One of the television sets should have at least a few printed circuits. You will then get experience in tracing wiring, making measurements and replacing parts on this type of wiring.

If you are unable to borrow a suitable modern set and do not want to buy a new one, try shopping around for a used set in good working order at local dealers and service shops. Ask particularly for a set having a damaged cabinet, because these cannot ordinarily be sold to regular customers and will hence be much lower in price.

How to Use the Progress-indicating Boxes. At the start of each experience-gaining job in Book II and in this Home Course Outline you will find a square box. Each time you complete a job, place an X in its box. Alongside this, put down the date and any comments you may have about that particular job. If you repeat the job on a different type or make of receiver or changer, record this in the margin of the page. The filled-out boxes will also serve as impressive proof of your practical experience when you apply for your first job.

TELEVISION EXPERIENCE-GAINING PLAN

Job 1. Install a New Television Antenna for Your Workbench. You will need an extra antenna for testing television sets at your bench, so for this job you can be your own first antenna customer. Size up the job, plan the location for the antenna on the roof, plan the transmission line route, purchase the necessary material and hardware, and install the antenna. The transmission line should reach every part of the bench.

Job 2. Making an Air Test of a TV Receiver. Using a set that is in good working order, hook it up to your workbench television antenna. Tune in each station in turn carefully, and check picture clarity, focus, linearity, brightness, contrast, width and height.

Job 3. Recognizing TV Antenna Troubles. With your workbench television antenna connected to a receiver, note picture quality carefully for all stations in your area. Rotate the antenna 30 degrees (the angle between 12 and 1 on a clock dial) and check picture quality again on all stations. Repeat for 60 degrees (between 12 and 2 on a clock) and for 90 degrees (between 12 and 3). Return the antenna to the position that gives best reception on all stations.

Disconnect one transmission line lead at the antenna and check all stations. Repeat with this loose lead touching the other line lead. Connect the antenna properly again, then disconnect one line lead at the set and check all stations.

Job 4. Checking the Tuning Range of the Fine Tuner. Tune in a good local station and turn the fine tuner slowly through its range. Find the setting at which picture quality and sound are best. Find the point at which the picture starts to become blurry because the carrier is tuned too high. Find the point at which the picture loses quality and sound interference becomes noticeable because the carrier is too low. Repeat for two other stations.

Job 5. Identifying Tubes in a TV Receiver. Without taking the receiver out of its cabinet identify each tube in the set by type number and function as you point to it. Use the service manual of the set or the diagram pasted inside the cabinet as your guide. With the set turned off, confirm your identification each time by removing that tube from its socket and checking its number, then replace the tube. This job also gives you the sense of touch needed for removing and replacing tubes quickly.

Job 6. Locating Bad Tubes in a TV Receiver. Collect as many bad tubes as you can, that were taken from television receivers. Friends and neighbors may each have a few. A local serviceman may loan you a boxful if you explain that you need them to gain experience and will return them in a few months.

Select the tubes that fit the set you have on hand for the job. Choose one socket in the set, remove and clearly mark the good tube for it, then put in one of the bad tubes. Turn on the set, note the effect on the picture and sound, then turn off the set and remove that tube.

Repeat for all other bad tubes which fit that socket. Always turn off the set when changing tubes, to avoid burnout on other tubes when mixing a cold tube with tubes that have warmed up. When done with the first socket, put your good tube back.

Repeat for each other socket in your set for which you were able to obtain bad tubes. Note that a tube may work in one socket but not in another requiring that same tube type.

Job 7. Adjusting an Ion Trap Magnet. Tune in a picture and turn the brightness very low. Do this in a darkened room if you can. Now turn the ion trap one way and then the other for maximum brightness. Move the trap forward a little and again rotate it slightly, looking for maximum brightness. After this, slide it back, and repeat the adjustment. Make each step a small change, so small that the screen never goes blank. In the process you will see how the trap works and will discover that there are a number

24 *How to Get Ahead in the Television and Radio Servicing Business*

of usable settings. With care, a best one can be found which may be better than its original adjustment.

Job 8. Adjusting Picture Tilt. Loosen the yoke clamp, tune in a picture and then note the effect of rotating the yoke. It will tilt the picture one way or the other. Now readjust it for best line-up. You may notice that when the lines at the top of the picture are perfectly parallel to the mask, those at the bottom are not, and vice versa. This is not unusual because most yokes fail to produce a perfectly rectangular picture. For the final adjustment, use a compromise setting. The lines at the center of the screen will then be perfectly horizontal.

Job 9. Handling Neck Shadow. Take a good set, loosen the yoke clamp and slide the yoke back about $\frac{1}{4}$ inch. This should be enough to produce a neck shadow. If necessary, readjust the yoke position so that only a slight corner shadow is produced. Try to remove or reduce it by means of the picturing centering adjuster, the position of the focus magnet, and improvement of the ion trap setting. This will give you practice in doing the work and will give you a feel for the situation. When you are through, push the yoke back against the picture tube and see how nicely the shadow disappears.

Job 10. Checking for Good Interlacing. Tune in a picture and adjust focus for the sharpest line structure. Now turn the vertical hold control through its range and see if you can identify the point at which interlace is best. Note that at each extreme of the control, the interlace is normally poor and the lines appear coarse. At a certain position, the coarse lines split into two lines each and are quite fine. On close examination, the spacing will be seen to shift as the control is turned. Find the spot at which the lines are fine and evenly spaced. This is the point of perfect interlace and shows you how it should look.

Job 11. Adjusting the Horizontal Hold Control for Maximum Stability. Tune in a picture and then make these tests: Turn the set off, let it cool for about 5 minutes, turn it on and count the seconds required (after the screen shows light) for the horizontal sweep to pull into sync; tune the set to a dead channel, leave it there for about 10 seconds, switch back to the active channel and count the seconds required for the horizontal sweep to pull into sync; repeat these tests at different settings of the horizontal hold control. Note how differently the set acts at different settings of the control. The proper setting is the one which provides minimum delay in getting into sync.

Job 12. Taking a TV Chassis Out of Its Cabinet. Unplug the set, take off the back cover, disconnect the antenna and speaker, remove the tuning knobs, remove the chassis mounting bolts, and pull the chassis out of its cabinet. Clean the safety window and the face of the picture tube, then replace the chassis in the cabinet.

Job 13. Replacing a Picture Tube. To get experience and confidence in testing and handling picture tubes, first remove the socket from the picture tube in your set. Check the tube heater for continuity by measuring between the heater pins with your ohmmeter. Check for shorting between other electrodes. Now remove the chassis, remove the ion trap magnet if present, loosen the picture tube mounting bolts or screws, and carefully remove the picture tube. Place the tube on its face while you study the yoke assembly and any other parts that were hidden by the picture tube. Now replace the tube, replace the ion trap magnet and socket, turn on the set and adjust the ion trap magnet for maximum brightness.

Job 14. Quick Checks in High-voltage and Horizontal Sweep Circuits. The purpose of this job is to gain familiarity with the kind of arcs and sparks which should be obtained from a properly operating set, so that you can spot a failure in a set you are testing.

Use a screwdriver insulated for high voltage (10,000 volts or more). Keep the idle hand clear of the set. While the set is working, push the tip of the screwdriver under the bottom edge of the plate cap of the horizontal sweep amplifier tube so that it

touches the metal cap itself. Draw out an arc and notice its appearance. It may pull out to $\frac{1}{8}$ inch or more. Do the same thing at the cap of the high-voltage rectifier tube and note the appearance of the arc.

Connect a wire to the chassis and bring the other end near the high-voltage terminal of the cathode-ray tube, or, better yet, to any terminal connected to the high-voltage lead. Note the spark which is obtained. It may jump $\frac{1}{2}$ inch or more and will make a sharp snap. Since this wire is grounded to the chassis, you can hold it without getting a shock if using insulated wire.

Job 15. Checking Free-running Speeds of Scanning Oscillators. The purpose of this job is to observe how a receiver operates when the sync fails and to practice checking whether the scanning oscillators are capable of running at correct speeds by themselves, as when the sync signal fails.

Locate the clipper tube. Disable it by jumping an 8-mfd 450-volt electrolytic condenser from its plate to its cathode. (Positive terminal of condenser on the plate.) The scanning oscillators will then run free. Observe the effect and remember how it looks on the screen.

Adjust the vertical hold control to get the picture to stop rolling, so it stands as nearly still as possible. Now adjust the horizontal hold control so as to produce as nearly a whole picture as possible. As you do this you will find that you can pass through correct speeds although there will be no automatic locking effect.

This procedure is used in its entirety if you are trying to find out whether a defective set with sync trouble is *capable* of correct speed.

Job 16. Adjusting the Sound Discriminator Coil. The purpose of this job is to gain practice in making this adjustment, which is often needed in practical experience.

Locate the discriminator coil with the help of the appropriate service manual. It may have one or two adjusters. If it has two, use the manual to find out which one is identified as the *secondary*. This is the one which calls for critical adjustment and with which you will practice.

Tune in a station and adjust the volume control so you can hear the sound clearly. Now turn the discriminator adjuster and note the effect. You will hear a hum, buzz, or noise, or usually a combination of these. Note how the noise drops out as you retune the coil through its proper setting. Try the adjustment on different channels and with different settings of the fine tuning control. With a little practice you will see how the adjustment works and how it should be adjusted. You will also be able to recognize a set which is in need of this adjustment, by the way it sounds.

Job 17. Adjusting 4.5-mc Sound Trap. The purpose of this job is to gain familiarity with the adjustment of the 4.5-mc sound trap in intercarrier sets.

Tune in the strongest local channel. The stronger the signal, the greater the effect of this adjustment. The effect may not be very noticeable on weak stations. Using the service manual, locate the adjustment identified as the 4.5-mc sound trap. To make sure you have the right trap, trace the circuit to make certain that the trap is located in the circuit somewhere after the video detector and not in the video i-f circuit.

When you find the adjuster, note its setting so you can return to it if you must do so without the help of a clear indication on the picture. Then, turn the adjuster while watching the picture very closely. If the signal is strong enough you will see a fine interference pattern (f-m interference, since the television sound signal is frequency-modulated) on the screen. Note how it gets more pronounced as you turn the adjuster further. Tune it through the proper setting and note how the trap clears up the picture. Switch to different channels when you are finished to make certain that you have returned the adjuster to its best setting.

Job 18. Studying Linearity Problems. The purpose of this job is to get the feel of how defective components can influence scanning. The vertical circuit is used in this job because it is usually easier to reach. Locate the vertical sweep output amplifier tube

26 How to Get Ahead in the Television and Radio Servicing Business

and trace out its circuit so that you know which components are used. Now make each of the following tests and observe and remember the effect each has on a picture.

(1) Disconnect the cathode bypass condenser. The effect will simulate an open condenser.

(2) Bypass the cathode resistor with a condenser much smaller than the original (8 mfd will probably do). This will simulate the effect of a poor but not open bypass.

(3) Restore the original connections, then jump a 20-megohm resistor momentarily across the coupling condenser which feeds the signal into the grid of the same tube. The effect will simulate a leaky coupling condenser. If you have several of these resistors, connect them in series to make up 75 or 100 megohms and repeat the test. The effect will simulate low leakage, as is often encountered in practice.

(4) Locate the charging condenser. It will be in the range of from 0.05 to 0.2 mfd and will connect from the grid of the vertical sweep output amplifier (or the plate of the driver on the other side of the coupling condenser) to ground or to the cathode of the amplifier. While watching the picture, jump a succession of resistors across the condenser, starting with about 2 megohms and going down to about 100,000 ohms. This will simulate the condition of leakage in the condenser, each lower resistor representing more leakage.

Job 19. Producing and Observing the Effects of Corona. The purpose of this job is to increase familiarity with corona conditions. Locate the high-voltage rectifier tube. While the set is off, solder a fine strand of wire to one of the terminals on its socket. The strand can be a single strand pulled out of common stranded wire and may be about $\frac{3}{4}$ inch or 1 inch long. Dress the wire so that it sticks out into clear space and is at least an inch or more away from any metal. Turn the set on and look at the strand in as much darkness as possible. You will see violet corona discharge. Note the effect, if any, on the picture. Notice the smell of ozone after a few minutes. Try some weak stations and notice the noise interference.

If you have a high-voltage meter, measure the voltage with and without the strand. Note how the corona causes the high voltage to drop and how it reduces brightness.

When you are finished, remove the strand and leave that terminal with a clean and smooth solder joint, otherwise corona may continue to some slight degree.

Job 20. Checking Waveforms with an Oscilloscope. The purpose of this job is to gain familiarity with an oscilloscope and with the interpretation of waveforms. Refer to the service manual for your set and locate each of the test points for which waveforms are shown. Adjust the oscilloscope as instructed in the service manual and in the instruction book for the oscilloscope, and look at the waveform at each test point. Make sure to check the amplitude against the oscilloscope calibration as well as the shape. Check these basic waveforms: (1) Video at video detector; (2) video at input to picture tube; (3) input to clipper; (4) sync output of clipper; (5) vertical output waveform; (6) vertical oscillator waveform; (7) horizontal oscillator waveform; (8) horizontal sweep at grid of sweep amplifier.

Job 21. Sound I-F Alignment. The purpose of this job is to get practice aligning the over-all sound i-f adjusters in an intercarrier set, using a live signal for this work. Refer to the service manual and find the locations of the sound i-f adjusters, instructions for sound i-f alignment, and instructions for connecting a voltmeter as an alignment indicator.

Connect the meter and adjust the sound i-f coils as instructed. This will usually call for peak meter reading at the limiter stage while an actual signal is tuned in. When you can do this with confidence, throw the adjusters way off and note how the set works with poor sound alignment, then realign the coils properly. Readjust the discriminator also, by following the instructions given in the service manual for the set.

Job 22. Observing and Trapping Interference. The purpose of this job is to see how c-w interference looks and acts and how trapping works. Obtain two or more traps of the type that are connected to the antenna terminals of a set. One should be an i-f trap

(should cover the i-f range, which is 40 to 50 mc for most sets). The other can be an f-m band trap (80 to 110 mc, for example).

Connect the set for normal operation with an antenna and set up a standard signal generator with its output lead near the antenna transmission line at a point about 10 or 15 feet away from the set. Adjust the signal generator to the i-f frequency of the set and set the attenuator to produce only mild interference. Try tuning the set and note the effects on the picture. Now connect the i-f trap to the set and tune it as instructed by the manufacturer. Note how it acts on the interference. Remove the trap.

Repeat the operation at a frequency within the range of the second trap. Tune the generator about until you get interference. Now use the f-m trap to eliminate it. Repeat the operation at as many different frequencies as your traps will cover.

Job 23. Checking Effects of Reduced Horizontal Sweep Output. The purpose of this job is to observe what happens when horizontal sweep output drops appreciably in a television set. Locate the horizontal sweep output amplifier, then locate its control grid terminal. Get a selection of mica condensers ranging in value from about 25 mmfd to about 1,000 mmfd. A half dozen will do. While watching the picture, jump one condenser at a time from the control grid terminal to ground and observe the effect with different sizes. Each successively larger condenser will reduce sweep output further and will show you clearly what to expect when this happens in a set. The cause could be a bad sweep amplifier tube, a defective yoke, a bad damping tube or some other defective component which would act to reduce sweep output.

RECORD CHANGER EXPERIENCE-GAINING PLAN

Job 1. Checking Performance of a Record Changer. Using a set that has a record changer in good working order, check changer performance thoroughly for each size and type of record it is designed to handle. Does the needle set down close to the starting groove on the record? Does the changer trip quickly after the end of the record? Is the next record of that same size fed or dropped down smoothly without chipping? Does the changer shut off properly after the last record is played, or repeat the last record properly if it is the repeating type? Will the changer handle a full load of records? If of the intermix type, will it handle mixed records properly? Is the needle in good condition? Is the volume and tone satisfactory? Is the hum level satisfactory? If a change-over cartridge is used, are both needles good?

Job 2. Removing a Record Changer from Its Cabinet. Disconnect the pickup and power supply leads, remove mounting bolts if present, then take the record changer out of its cabinet and support it above your bench. Plug in the changer and let it operate while watching the mechanism underneath. Locate the parts which control needle set-down. Point to the parts which turn while a record is playing. Point to the parts which control tripping at the end of a record. Point to the parts which control dropping of the next record. Point to the parts which control shutdown at the end of the last record. Finally, run the changer through its entire cycle slowly by turning the turntable with your hand. You can now see more clearly how the parts move underneath with each action. After the record starts playing, move the pickup slowly to the end of the record, then continue turning by hand while you watch the trip mechanism. Replace the changer in its cabinet.

Job 3. Changing Needle and Cartridge. With the changer in its cabinet, remove and replace the needle without removing the cartridge from the pickup arm (on a changer where this is possible). Next, remove the cartridge from the changer without removing the pickup arm. Note the position of the grounded lead, so you get it back properly. Replace and reconnect the cartridge. Now remove and replace the entire pickup arm, as required for changing needles or cartridges in some changers. This job gives you experience in handling small screws and parts in awkward locations.

28 *How to Get Ahead in the Television and Radio Servicing Business*

Job 4. Making Motor Drive Repairs. With the changer on your bench, identify the type of drive used between the motor and the turntable on the changer. Study and experiment until you know exactly how speed changes are obtained. Remove and replace the rubber-tired idler wheel. Clean the idler wheel tire and the inside of the turntable with alcohol. Check turntable speed with a stroboscope disk at each speed, with one record, half a load, and a full load of records on the turntable and a record playing for each test. Are the rubber grommets for the motor mount still soft and flexible? Inspect the insulation on the motor leads.

Job 5. Adjusting Trip Mechanism. With the changer on your bench, locate the screw or other control which affects the operation of the end-of-record trip mechanism. Change its adjustment, operate the changer to see how it misbehaves, then readjust the trip mechanism. Identify the type of trip mechanism used in the changer (position, eccentric, or velocity). Bend a lever or otherwise introduce a defect which causes continuous cycling without playing through a record, study the result by operating the turntable manually, then correct the trouble.

Job 6. Getting Acquainted with Record Changer Springs. Locate all the springs there are in the record changer. Operate the changer on your bench with or without power while studying the mechanism, until you have determined the purpose of each spring. Try to figure out what will happen if a spring breaks or comes loose, then unhook that spring and operate the changer to check your guess. Do this for each coil spring in turn, where it can be done without ruining the record changer.

Job 7. Working on the Record-dropping Mechanism. Identify the type of record-dropping mechanism (slicer, pusher, or spindle). With the changer on your bench, locate all screws and adjustments affecting the dropping of a record, and loosen or turn each one to note its effect. Compare the mechanism with the diagrams and descriptions in Book V, "Repairing Record Changers," and try to produce at least one of the troubles described there. Finally, put the record changer back in good condition by fixing and readjusting.

Job 8. Working With Pickup-arm Cycling Mechanisms. With the changer on your bench, concentrate now on the parts that move the pickup arm out of the way at the end of a record, so the next record can drop. Identify the type of mechanism used (combination or independent, with or without intermix). Locate the indexing adjustment, change it and note the effect, then set the indexing correctly again. What lifts the pickup arm? Locate, change, and reset the adjustment for the amount of lift. Is muting provided during the change cycle? Locate and study the automatic or manual parts which change the needle set-down position for different record sizes.

Job 9. Getting Acquainted with Shutoff Mechanisms. If the changer has automatic shutoff, identify the type and locate the actuating finger that senses when the last record has dropped down. Trace the parts involved in shutoff, and figure out three ways in which it could get out of order. Introduce each of these defects and see what happens, then repair it. If the changer is the type that repeats the last record, study the repeating mechanism and the manual shutoff control and linkages.

Job 10. Lubricating a Changer. Obtain the service manual for your changer if possible, and carry out the complete instructions for applying oil and grease. If no manual is available, follow the general instructions given in Book V, "Repairing Record Changers," and locate for yourself the important points needing lubrication. If the changer is dusty or covered with old grease, clean this out first with alcohol. Clean the turntable and polish the top of the changer to complete the job.

5

How to Earn While Learning

When to Start Fixing Sets for Profit. The McGraw-Hill TV, Radio and Changer Servicing Course is so planned that you can fix the common easy troubles in many television and radio sets after studying only nine chapters in the first book. This means that if extra income is essential and more important than making fast progress with your training, you can take on repair jobs for profit well before you have finished the first book.

Each additional chapter and each additional book studied builds up your servicing speed and increases the number of jobs you can handle. It is therefore desirable to study as long as you can before interrupting your training to do money-making jobs.

How Soon Can You Handle Various Jobs? Here are some mileposts that may help make your decision on when to start fixing sets. By the end of Book I you will have learned how to test and replace practically every tube and part found in television and radio sets, but will not yet have studied troubleshooting techniques. This means that you will have to get expert help on about one set out of four, and will have to spend quite a bit of extra time hunting for bad parts.

By the end of Book II you should be able to fix at least 9 out of 10 radios yourself, so you could very well consider specializing in radio repair work at that time.

Book III completes your radio training by giving specialized high-speed troubleshooting techniques, along with instructions for using specialized test instruments that further speed up radio troubleshooting. At the end of this book, assuming you have kept up with the experience-gaining jobs on radio sets, you can consider yourself an expert radio serviceman.

Book IV gives you the television troubleshooting techniques, so that you can take on all sets with confidence by the time you finish this book.

30 *How to Get Ahead in the Television and Radio Servicing Business*

Book V rounds out your training on record changers and tape recorders, so you can fix these as individual units or when built into receiver consoles. This last book is pretty much independent of the others, so you can study it a bit earlier if you have a particular reason for wanting to fix record changers sooner.

Start by Fixing Radios. Practically all the radios in use today are table models. This is ideal for you because such sets are easily carried to your own shop or home for repair. You can then spend just as long as you want on the set without having someone looking over your shoulder.

Most homes today have two or more radios, and hence the customer won't mind being without the radio for a week or so. This also is ideal for earning while learning, because it provides the time needed for ordering the required repair parts. You can thus start with practically no capital investment, and gradually build up a stock of new tubes and replacement parts by using the profits from your first jobs.

Cash Needed to Start. You will need some money for advertising to get your first jobs. Count on spending a few dollars also for the business stationery that will help you get full professional rates for your work.

If you live at a distance from a radio parts jobber, you may want to have on hand a minimum stock of the commonest electrolytic condensers and paper condensers, as well as a few of the commonest tubes used in radios.

Many businesses fail because of insufficient starting capital. This can't happen to you when working on a part-time basis while learning, but insufficient capital can slow up your progress to the point where you may get discouraged before you give servicing a fair chance. For this reason, it is recommended that you have at least \$200 in cash on hand before you decide to take in radio repair work. You will need between \$125 and \$150 of this for a good multimeter and tube tester. The balance can go for advertising, stationery, a starting stock of spare parts and the few tools that you may need.

There are very few other careers where you can go in business for yourself with such a small investment. There are still fewer where you can start like this on a spare-time basis while learning. By plowing back your profits build up to your business assets, you can launch a full-time business of your own with little or no additional capital, after you have completed your training.

Getting into Television for Extra Income. Around three out of four television receivers go bad simply because one or more tubes have become

weak or burned out. You learn how to locate and replace television tubes early in the very first book. This means you can handle three out of four television repair jobs that early in your training. For television, however, ability alone is not enough. You must also consider making arrangements for dealer service, building up a tube stock, building up a service manual library, and obtaining a car for transporting television sets.

Arranging for Dealer Service. First, you must recognize that there will be a certain number of television receivers you do not yet know how to fix. You must act as if you know how to fix them all, to build up your business reputation. In the background, however, you must have an arrangement with a dealer or experienced serviceman to fix these tough sets for you during your training period.

When you find that new tubes will not fix the trouble, you ask the customer's permission to take the television chassis to your shop for a thorough checkup with instruments. This is standard procedure with many servicemen anyway.

Building Up a Tube Stock. The second important requirement for going into television servicing is a good stock of new tubes. This stock must include one tube of each type found in television receivers in your locality. On some common types that are used a number of times in each set, such as the 6SN7, you will need two or more in your stock.

If you are located at some distance from a tube dealer, your stock must be still larger if you want to avoid going to the tube dealer after each of your service calls. Your dealer can advise you on the tubes to carry in stock. You can probably get started with a minimum of \$100 worth of tubes. You will want to build up this investment in tubes even more later, though, so that you always have new tubes on hand for test purposes. A tube tester is unsatisfactory for television tubes; the only reliable way to find bad tubes in television sets is to try new tubes.

Buying Service Manuals. When you first tackle television receiver repair, you will usually want to have on hand the service manual for the receiver on which you are working. If you obtain the make and model number of the receiver from your customer beforehand, you can purchase from your dealer the Sams Photofact Folder or other volume containing this service data. Buying manuals only as you need them spreads out the expense of your service manual library over a number of jobs, but increases the number of trips you have to make to your parts jobber.

Buying the manuals all at once is a far more efficient way from a time standpoint. A complete library covering all television and radio receivers

32 *How to Get Ahead in the Television and Radio Servicing Business.*

put out since World War II will cost several hundred dollars. You will eventually have to spend this money anyway if you plan to go into servicing as a career, so give consideration to buying the complete set on a time-payment plan. You then have all the manuals right from the start, yet pay out little more each month than if you were buying the manuals individually.

Transporting Television Sets. The fourth requirement for television work is a car or truck for transporting television sets. Since you usually take out only the chassis, the trunk compartment of an ordinary passenger car can be used for this purpose. Never put a television set on the back seat of a car. If you do, the springs in the seat may flip the set over onto the floor the first time you hit a bump. You'll then have a beautiful mess to fix up.

When lifting and carrying television sets, use your legs and knees as much as possible. Bend your knees just as does a professional furniture mover, to avoid putting a strain on your back. The older you are, the more important this becomes.

When you use dealer service on tough sets, you will generally have to bring the set to the dealer, then pick it up again after he has fixed it, if you want the benefit of wholesale rates for his work. Here also you need a car or truck.

There is nothing wrong with using your own car for service work. Thousands of servicemen do this regularly. Some even keep a rack on the roof at all times, to which they can tie aluminum or magnesium ladders for television antenna work. The ladders can then be taken off easily when the car is used for personal trips.

Get Signs for Your Car. It is a good idea to have a sign on each side of your car when using it for business. The signs can be made to slip into side rear windows, on the inside so they will not blow off. Here a few strips of Scotch tape will hold up cardboard signs.

Another possibility is mounting the sign on plywood or pressed wood, then attaching hooks that go over a car door on the outside or over the top of the window glass. For this arrangement, you may need to put a rubber suction cup at each lower corner of the sign to hold it against the car. This will prevent the sign from blowing off on windy days or when driving fast.

Use signs of professional quality, to make it evident to all that you are doing professional service work. Signs are good advertising for you, to bring new customers as well as to hold your present customers.

Money in the Sky. One of your best sources of income while learning

lies in the installation and repair of television antennas. Practically every receiver needs a good outdoor antenna installation. These must withstand the punishment of summer heat and rain, then winter winds and ice and snow, all combining to cause rapid wear. Antennas therefore need overhaul regularly every few years. Even changing the transmission line, an easy job for you, can improve the picture quality tremendously on many sets.

The very first book in this Course gives you complete instructions for installing and repairing television antennas. Still more information is given in Chapter 9 of Book IV, so you may wish to read that chapter ahead of time when you decide to take on antenna work.

Doing Antenna Work for Dealers. Many dealers who sell television sets have no manpower or facilities for installing the antennas. You may be able to make arrangements to have all this work turned over to you. It can be done just as easily after your regular working hours, particularly in summer when daylight saving time gives you an extra hour of daylight in the evening.

As soon as you have studied the material on television antennas in this Course and practiced it on half a dozen or more jobs, you can advertise yourself as a specialist in this field. Opportunities here are particularly good if you don't mind working high up. Many men turn down antenna work because they get dizzy on high roofs and don't even feel safe on ladders.

If roof work appeals to you, let other servicemen know it. Some of them may be glad to turn over all of their antenna work to you. An exchange deal is another possibility; you do their antenna work in payment for their fixing your tough sets.

Getting Started with Record Changers. Here is one earn-while-you-learn activity that requires practically no additional capital investment. You just need a rack or a few wires for supporting a record changer above your bench. Even a flashlight will do for the portable lamp used when watching the mechanism as you rotate the turntable by hand to put it through the change cycle in slow motion.

On each record changer job you can make a small extra profit by installing a new sapphire or diamond needle. You learn in this Course how to tell when a needle needs replacing. You learn that most people use a needle far longer than they should, so that they frequently ruin their records. You are thus rendering a real service when you point out the need for a new needle and install it properly.

Record changer repair work should usually be brought into your shop.

34 *How to Get Ahead in the Television and Radio Servicing Business*

There you can support the changer in the required level position for proper operation, high enough so you can see underneath. Keep a few records of your own on hand for all three speeds, so that you can try out each changer after repairing it. For this test you can plug the changer into your own table radio having a phono jack, or into a simple audio amplifier kept on your bench for this purpose.

For record changer work, you do not even need to have a complete set of service manuals. For a much lower price you can get specialized books containing only record changer service manuals.

6

How to Advertise Your Business

Letting the World Know. The big day has come. You have learned how to fix most sets, and have lined up dealer service for the rest. You want to start making extra money, so that you can boost your income while continuing your studies. How do you get repair jobs?

The answer is, "By advertising." This chapter tells you how to do this and get maximum results with minimum money. Each method of advertising described is simple and practical for a new servicing business. You can do much of the actual work yourself in some cases, to keep expenses down at the start.

Getting Started with Advertising. There are only a few kinds of advertising to consider when first getting started in part-time or full-time servicing. Each can play an important part in your business success if done right. Plan your advertising as recommended here if you want to get started on a sound basis. Above all, don't be tempted away from your program by other advertising schemes presented by salesmen who call on you. Their methods may work fine for other businesses or for larger shops. With a small beginning business, however, you just can't afford to gamble with your advertising money.

If you expect to get most of your service jobs by telephone, an ad in the classified advertising section (the Yellow Pages) of your local telephone directory should receive first consideration. Next comes direct-mail advertising, which is the least expensive way to get your service message into the homes of the exact people you want as customers. Newspaper classified advertising is also a good bet in some communities. The extent to which you use each will vary with local conditions and with the results you obtain. Business signs and business stationery complete your advertising program at the start.

36 *How to Get Ahead in the Television and Radio Servicing Business*

Choosing a Business Name. It is perfectly proper to use your own name in a servicing business. There are a great many advantages, however, in having a regular business name which indicates the type of work you do. A distinctive business name helps people to remember you when they need service work. The name also brings you free advertising wherever it appears in print, as in newspaper stories, in telephone directory listings, in local chamber of commerce promotions, and in a variety of other ways.

One highly effective name for a servicing business is that which combines your own name with the nature of your business. Examples of this are:

Bob's Radio-TV Service
Johnson TV Service Shop
Johnny Smith's TV Shop
Miller and Brown Television Service

Another possibility is combining the nature of your business with your geographical location. Here are a few examples of this:

Main Street Radio-TV Service
Pasadena Radio & Television Service
Northern New Jersey Television

Finally is the completely impersonal type of business name, illustrated by the following:

Reliable Radio-TV Repair Shop
AAAA Emergency Television Service
Radio-TV Service Unlimited

Starting your business name with AAAA has one advantage—it puts you first in any alphabetical listing in the telephone directory or elsewhere.

Telephone Directory Advertising. When you use a telephone for business purposes, you get one free listing in the Yellow Pages (classified section) of your telephone directory, using your business title. This listing is in small type, located alphabetically under the heading for your type of business. If your business title indicates that you do radio and television servicing, this listing alone may bring you enough business to pay the extra charge for a business phone.

For a bit more money, you can add one or more lines of advertising to your alphabetical Yellow-Page listing, located between your name and your telephone number. A small extra charge is made here for printing your business name in heavy black type.

Regular display ads give you more space but cost quite a bit more. These

are located under the heading you want, but not in alphabetical order. Generally a new ad is placed after those of older advertisers for that heading.

Although you must contract for telephone directory advertising on a yearly basis, you can pay for it monthly with your telephone bill. This is a definite help when starting in business. You can use the profits from your early jobs to make the remaining payments on your telephone ad.

If you plan to repair both radio and television sets right from the start, have your telephone ad placed under the heading "Television Service" and be sure to indicate somehow in the ad that you also repair radios.

If you plan to do only radio repair work at the start, have your ad placed under "Radios—Repairing," "Radio Service" or a similar heading used in your local directory. It is generally not necessary to have an ad under radio servicing when you have one under television servicing.

Planning Your Telephone Directory Ad. First of all, visit the business department of your local telephone company. Get their prices for various sizes of ads and various listings in the Yellow Pages of the directory. Ask also for business telephone rates and how they apply to you. Get any sample ads and literature they may have. Bring home this information for study, without making any decision yet.

Next, study carefully all the ads for radio and television servicing that are already in your directory. Ask your friends to give you their reactions to each ad. Make notes on what each person says. After doing this with at least half a dozen people, you'll begin to see which ads make the best impression. You will probably find that some of the smaller ads are getting more attention than the big ones.

Now, keeping in mind your advertising budget for the life of the ad (usually one year, but ask your telephone company about this), decide on the size of ad you want.

Your ad should give your business name, your address, and your telephone number. It should tell what you do. If space permits, add phrases that will make your ad different from the others and guide the customer in choosing you. Here are a few examples of such phrases:

**Our Customers Recommend Us
All Work and Parts Guaranteed
Written Guarantee
Prompt Service—Reasonable Rates
We'll Do the Job Right
We Are Able to Satisfy
Honest, Prompt, Friendly, Dependable
Honest and Dependable**

**Honest, Efficient, and Prompt Service
Guaranteed Repairs on All Makes
Expert Repairs on All Sets
No Better Service at Any Price
Reasonable Rates
All Work Itemized
Guaranteed Service on All Makes
Specialist in Service**

38 How to Get Ahead in the Television and Radio Servicing Business

Record Changers Our Specialty
Tubes Tested Free
TV Antenna Installations
Roof Antennas Installed and Repaired
As Close as Your Phone
Any Time, at Your Convenience

Service Till Midnight Seven Days a Week
Open 9 a.m. to 9:30 p.m. Daily
Day and Night Service
24-Hour 7-Day Service (Call Any Time)
Daily Sundays Holidays 'Til 10 p.m.
For Better Televiewing Call

Discount on First Service Call If You Mention This Ad

Direct-mail Advertising. Any advertising which is sent directly to a prospective customer by mail is known as direct-mail advertising. The simplest form of this is the single government post card. This has space for the address of the prospective customer on the stamped side. It gives you the entire other side, a space 5½ inches wide by 3¼ inches high, for typing or printing your advertising message.

Letters mailed in envelopes cost much more than post cards and are more difficult to prepare. A letter gives you far more room than a post card on which to present the reasons why you should be called for a service job. If people are too busy to read a long message, however, the letter is wasted. An advertising letter usually gets thrown away after being opened, especially if no service work is needed at that time. A card is easier to save and easier to read. At the start, then, you will probably get more results from your advertising money by using single post cards.

How to Prepare Good Direct-mail Advertising. A good post card or letter for a service business should tell who you are, what you do, why you do it better, and why you give better value. It should offer something *that the reader wants*. This does not mean offering a set of dishes or a free pencil; it means putting information in your ad that will help a reader who wants to find a good reliable serviceman. Finally, your ad should ask the reader to do something, so that you get the results *you want*.

Tell Them Who You Are. Your name or your business title should be large enough for easy reading and easy remembering in any ad. Your address and telephone number should be close to your name, so people know how to get in touch with you. One simple secret of successful advertising is making it easy for the customer to reach you when he needs you.

Tell Them What You Do. Make it easy for people to decide if you are the right person for the job they have at hand. If you fix only radio sets, say that you are a specialist in radios. If you also fix television sets, say so. If you can handle record changers and auto radios, put that in your ad.

If you can also fix simple home appliances, such as electric irons and toasters, mention that. Don't overlook record changers, phonograph needles, and tape recorders. Don't make people guess; decide what type of work you want to get, then tell them.

Tell Them Why You Give Good Service. Make it easy for the customers to choose a serviceman. List in the ad the reasons why you should get their work. You can point out that you repair only what is necessary. You can tell exactly how you guarantee your work. You can say that you make evening, Saturday and Sunday calls regularly if that is the case.

If you're willing to have your phone ring any time day or night, say so. Many shops succeed because they do offer 24-hour service 7 days a week. This looks good in advertising, even though few people if any would call for repair work in the middle of the night.

At the start of your advertising campaign, list all the reasons you can think of for getting service jobs. Don't put them all in every piece of advertising, though. Make your promotions look different, so they will all get read, by mentioning different things each time.

Tell Them Why You Give Honest Value. The cost of service work is foremost in people's minds today. The chief reason is that homes have so many more receivers and appliances to go bad now than they had ten years ago. People would rather buy still more new things than pay for repairs on what they have. This is why it is good to emphasize that you give better value for the money.

If you are making your minimum service charge for a home call attractively low to attract new customers, tell what it is and point this out. If you are looking for permanent customers and will guarantee satisfaction, mention this. People everywhere are looking for servicemen who want to please, try to please, and know how to do a good job. Don't be bashful in telling why you give full value for your service charges.

Ask for Action. In general, advertising is wasted unless it asks the reader to do something. In your case, ask them to call you when they need reliable service work. Tell them to save the card if they don't need you right away. One serviceman uses this message on his card: "Good for 50 cents discount on your next repair job if we find this card Scotch-taped to the back of your set."

If you are offering a special antenna overhaul job or something else that everyone can use, ask for immediate action by including, "Call today for an appointment."

Getting Your Mailing List. The first requirement for direct-mail advertising is a list containing the names and addresses of prospective customers. In a small town, the local telephone directory is generally a good source of names for your mailing list. If you want to serve the entire area, use the entire directory. If you want to serve only part of the area, first contact your telephone company to see if that area coincides with certain telephone

40 *How to Get Ahead in the Television and Radio Servicing Business*

exchange listings. If this holds true, cross out the names which have telephone number exchanges outside your area.

If the exchanges have no relationship to the areas you want to serve, get a city map and outline your area on it. For each street which crosses your area, mark in the house number limits at the border line. You can then go through the directory and cross out all addresses outside the area. You can do this a few pages at a time as you need addresses for your mailings. Spread the work out over several months and the job won't seem as hard. Doing it yourself saves the rather high cost of buying a mailing list prepared especially for you.

In some cities the telephone company maintains reverse telephone books. Here people are listed by their street address rather than by name. Inquire as to the cost of renting or buying these special directories.

The best list of all, once you have been in business long enough, is that of your own customers. Therefore, keep a card file of your customers in which each name and address is on a separate card. Arrange these in alphabetical order and keep the addresses up to date as much as possible.

Today the percentage of homes having radio and television sets is so high that there is no point in trying to weed out people who don't have sets. Just assume that everybody has radio and television sets today.

How to Time Your Mailings. There is no point in advertising so much that you get more jobs than you can handle. You then get behind in the repair work and risk losing impatient customers. It is better to send advertising out steadily in small amounts, so that the jobs come in at the same steady rate.

Actual experience is the only way of determining how many mailings it takes on the average to bring in a service job. Experience will also tell you the average time it takes after a mailing for a job to come in.

For a start, you may wish to try sending out 100 cards or letters regularly each week. Try this for several months, since it may take two to four weeks to get results from a mailing. If this brings more jobs than you want to handle at that time, simply cut down the number of mailings per week or send them out every other week.

When you reach the end of your mailing list, start over again at the beginning of the alphabet. You will probably find that each succeeding mailing brings better and better results, as people get to know you and remember your name. This is called the cumulative effect of advertising.

Timing of advertising is important. It should be planned for a long period ahead, because the effects of advertising are cumulative. Planning

ahead and setting a firm budget for advertising also minimizes the chances of wasting your advertising money.

Service business is seasonal. It has its summer slump when people are outside more and go on vacation, hence lose interest in radio and television. In the summer, then, you would need special-offer advertising calling for immediate action, such as for service on portable radios or auto radios. In general, the fall, winter and spring months are best for regular direct-mail advertising.

How to Prepare Post Card Mailings. By using a 2¢ government post card and doing all the work within your own family, your first mailings need cost nothing beyond postage. The advertising message can be kept short and typed or mimeographed on the back of each card. The address can be either typed or written on the front of the card.

Typing of cards is one way of experimenting with different advertising messages, to see which brings the best results for you. If you send one particular message to names beginning with A, B, and C, and do no other advertising, you know that all jobs coming in from names starting with A, B and C can be credited to that card.

When you get well established in business and want to use printed advertising, get quotations from various local printers on having your advertising message printed on government cards. The more you order at a time, the lower is the printing cost per card. Of course, you have to pay for postage in advance when using government cards.

In a new business, the amount of cash on hand will for many months or even years determine automatically for you the size of your printing order. Printing in small quantities has the added advantage of giving you freedom to change your advertising when you get a better idea. It also means that you don't have to throw out or print over a lot of cards if you move or change your phone number.

The wording used on post card mailings should be planned just as carefully as for other types of advertising. At the bottom of the card, put a reminder to save the card for future use.

Planning Mailings of Letters. If you have a good business letterhead, you may wish to try a few mailings which use letters in envelopes. Compare the results with those obtained from post cards sent out during that same period. Remember that it is the cost per new customer which counts. Keep accurate records of all costs and results, to guide you in planning future advertising.

Letters must generally be prepared by a printing or duplicating process.

42 *How to Get Ahead in the Television and Radio Servicing Business*

because it is impractical to type each one individually. Mimeographing is one possibility. Another is offset printing. Your printer can give you quotations on various techniques of reproducing letters by the hundreds.

Letters are most effective when started with an inside address and a personalized salutation, but this is also the most costly. You have to have the letter printed, then type in the address and the name, such as "Dear Mr. Jones," on each letter, and make sure that you match the letters with the addressed envelopes. This extra work and cost may not pay off, so give consideration to printing the entire letter. You can then start it with something like "Dear Television Enthusiast," "Dear Radio Owner," or simply "Dear Neighbor."

How to Prepare a Good Letter. Your letter should be short, simple, and natural. It must attract attention, so it will get read. It must create interest in your service. It must create a desire for your service. Finally, it must demand action.

Writing a good letter is just as easy as talking. Use the same short, friendly words that you do in everyday conversation. Avoid old-fashioned business phrases such as "assuring you of prompt attention." Tell your story, just as if you were talking to a prospective customer and giving the reasons why he should let you fix his set.

Don't overlook the advantages of a postscript for putting across your most important idea. The position of this P. S. at the bottom of a letter is eye-catching and hence it is sure to be read.

Many tube and set manufacturers offer helpful samples of servicing business letters through their distributors, as well as printed letterheads. Use all of this professional advertising service that you can, particularly at the start. Get help from others in preparing your letters and advertising, if possible. Another way is to write several letters, and ask a number of people to choose the one they think will be most effective. Get the advice of your printer also; his future business from you depends on the success of your letter, so he'll cheerfully help all he can.

Sign Your Letters Yourself. Always hand-sign your letters. If you want people to remember you by your first name and want to encourage people to address you that way, have your full name printed on the letter but sign only your first name. This is a friendly gesture that often brings extra business.

When signing a letter, it takes only a moment longer to underline or encircle an important word or phrase in the printed letter. This adds the personal touch and helps to get the letter read. Most people will read at

least a part of your letter just to find out why you marked those few words.

Seal and Stamp Your Letters. Since your mailings of letters will probably be rather small at the beginning, you will probably want to seal the letters and put on first-class postage. This is a postal requirement anyway for many types of quantity-reproduced letters.

The sealed letter with personally applied stamp always gets more attention, particularly if a new or unusual commemorative stamp is used. Discuss all of these postal problems with your local postmaster from time to time, because he can often give you suggestions that will save work and money.

How to Use Newspaper Ads. Some local weekly or even daily newspapers maintain a classified advertising section for business services. Special headings are provided for television and radio servicing. Here you run the same ad continuously for the duration of your advertising contract, much like telephone directory advertising. Because the ad is repeated so many times, the rate is much lower than for regular classified advertising. Look into the cost; if not too high, you may wish to try this for one to three months.

Keep your ad as short as possible, to keep the cost down. Work with the newspaper on the wording, to get maximum use of your space. A full line costs no more than half a line at the end of the ad, so have them count words carefully. Get the most for your money.

Regular newspaper advertising can be a gamble, because people read papers quickly and throw them away. You have to catch the eye of the customer at the exact moment when he is looking for someone to fix a set that has just gone bad. Furthermore, newspapers usually cover a far greater area than any one service shop can handle. This means that a small or large part of your money for a newspaper ad is wasted on people you cannot handle as customers. This holds true even if you specify in your ad that you serve only a certain part of the city, because newspaper advertising rates are based on the total circulation of the newspaper. These are some of the reasons why you find so few television and radio servicing ads in newspapers.

Business Stationery Is Good Advertising. Well-printed stationery is of great importance in impressing your customers and prospects with your competence and efficiency. You need business cards, letterheads, envelopes and job record cards right at the start. They establish you as a serviceman entitled to wholesale rates and all the other services of parts jobbers and manufacturers.

You need stationery also so that your very first repair job for profit

44 *How to Get Ahead in the Television and Radio Servicing Business*

can be conducted on a sound business basis for which you can collect full professional rates. Getting started right prevents relatives and neighbors from saying, "He's just a beginner, so he'll fix your set free just to get experience."

The very first chapter in Book I, "Television and Radio Repairing," gives examples of good business cards and practical suggestions for getting them printed. The same information can easily be rearranged by your printer to go across the top of your business letterhead.

Getting Low-cost Advertising from Tube Manufacturers. Some of the larger tube manufacturers, such as General Electric Co., RCA and Sylvania, offer personalized advertising material to servicemen. This material is well designed and often printed in two or more colors. They imprint the material with your business name and address, and generally charge less for the entire order than you would normally pay for the paper alone. Each item contains the manufacturer's name or insignia, which serves to identify you with his national advertising. At the beginning this may be desirable, to help build up your prestige in your community.

Look over the assortments of material available at the local distributors for tube and set manufacturers. Compare them carefully, then choose the one line that best meets your needs. It is usually best to stick to one manufacturer for your needs, to avoid confusing your customers. All orders for manufacturer's promotion material are placed through your local distributor.

Business cards, letterheads and envelopes are the most popular imprinted material available from manufacturers. A year's supply or more can be obtained for only a few dollars.

Manufacturers also offer several types of job tickets. These have one tear-off section to give to the customer as a receipt for his set. You tie another section to the set for identification while in your shop, to serve as a record of the work you do and the parts you put into that set. The job ticket may also include a bill form section, which you fill in and present to the customer as your bill when returning the set.

Personalized outdoor metal business signs are also available to service shops at a modest cost. Your business name is painted on the sign by hand before it is shipped to you by the tube manufacturer.

How to Figure Service Charges

Importance of Charging Regular Rates. Once you make up your mind to take in service work, do it on a professional basis and charge full professional rates. When you fix a set, you have done the work of a professional and are entitled to his full rates regardless of how much longer it took you to fix that set. But don't let anybody know that it takes you longer. Be a professional television and radio serviceman right from the start, and you will be on the right path to success.

What Your Service Charges Should Include. A bill for television or radio service charges will include one or more of the following items:

1. Minimum service charge. For a home service call, this includes travel up to 5 miles from your shop and up to ½ hour of time working on the set in the home. For a set brought into your shop the charge is less because you have no travel time.
2. Fixed charges for the various repairs made, or an hourly-rate charge on special time-consuming jobs such as intermittents.
3. List prices of all parts installed.

A minimum charge is made for giving an estimate if the customer decides not to have the work done. You are entitled to this because you have spent time working on the set and locating the trouble in order to give an estimate of the repair charge.

Guide to Service Charges. Service charges vary greatly in different sections of the country and go up almost every year in step with increases in the cost of living. Despite this, a list of average service charges will help you to figure out your bills at the start. Remember that you can increase or decrease these figures as you wish, to make them fit local conditions and apply better to a particular job.

46 How to Get Ahead in the Television and Radio Servicing Business

RADIO SERVICE CHARGES

Minimum shop charge for check-up and test, including up to ½ hour of work (customer brings set into shop and takes it home again himself)	\$2.00
Minimum home service call within 5 miles of shop, including up to ½ hour work	5.00
Hourly rate for radio work in shop or home	3.50
Minimum charge for estimate in shop (customer brings in set, but decides not to have it fixed)	2.00
Minimum charge for estimate in home (customer decides not to have set fixed)	5.00
Antenna, built-in loop—repair	1.50
Alignment, simple table radio	3.50
Condenser, paper, mica or ceramic—install	3.75
Condenser, electrolytic, single-section—install	3.75
Condenser, electrolytic, multi-section—install	4.00
Dial cord—install (average complexity)	3.00
Line cord—install	1.50
Mileage rate—per extra mile traveled15
Resistor, fixed carbon or wire-wound—install	3.75
Selenium rectifier—install	3.50
Soldered joint or connection—repair (small jobs like this are covered by the minimum shop or home service charge if done within ½ hour)	Free
Speaker—install	3.50
Switch, on/off, on volume control—install (if volume control must be replaced with switch, charge \$3.50)	3.25
Tube—install (work of checking and replacing tubes is normally included in minimum service charge, since profit is made on sale of tube at list price)	Free
Tube socket—install	4.50
Transformer, audio—install	4.00
Transformer, power—install	7.00
Transformer, i-f or r-f—install and align	5.00
Volume or tone control—install	3.50

TELEVISION SERVICE CHARGES

Minimum shop charge for check-up and test, including up to ½ hour of work (customer brings set into shop and takes it home again himself)	\$3.50
Minimum home service call within 5 miles of shop, including up to ½ hour of work ..	6.50
Hourly rate for television work in shop or home	5.00
Minimum charge for estimate in shop (customer brings in set, but decides not to have it fixed)	3.50
Minimum charge for estimate in home (customer decides not to have set fixed)	6.50
Alignment, audio i-f section	3.00
Alignment, discriminator or ratio detector	2.50
Alignment, r-f and oscillator circuits	7.50
Alignment, video i-f	7.50
Alignment, complete	12.50
Antenna—standard installation, including all materials (for special installations and difficult jobs, charge for material at list price and for labor at \$6.00 per hour. Higher labor rate here covers liability insurance for roof work, plus cost of ladders and other special antenna equipment)	25.00 to 35.00
Antenna—repair or adjust (on special jobs, charge at hourly rate of \$6.00 per hour for labor)	7.50
Coil, focus—install	5.50
Coils, wave-trap, choke and other small single coils—install	5.00
Condenser, electrolytic, single-section—install	5.00

TV-RADIO SERVICE ORDER

ORDER No.

91963

DATE OF ORDER

DATE PROMISED

DATE COMPLETED

CUST. TEL.

NAME

ADDRESS

APT. No.

CITY

 ESTIMATE

 C.O.D. CHARGE

REPAIRED IN

 HOME

 SHOP

MAKE AND TYPE

MODEL

SERIAL No.

PICTURE TUBE SERIAL No.

 PARTS WARRANTY

 SERVICE CONTRACT

CONTRACT EXPIRES

 TV ANTENNA RADIO PHONO REMOVED BROUGHT IN

NATURE OF CUSTOMER'S COMPLAINT

QUAN.	TUBE TYPE	AMOUNT	PARTS AND MATERIALS	AMOUNT
	Installing Selenium rectifiers 2 -			6.50
	Putting up Antenna & Adjust set			8.00
	Testing & installing tubes -			4.00
	Cleaning Picture tube & glass			3.50
	Installing fuse & vibrator in car			3.00
	Test tubes & put on tube brightener			3.50
	Load motor off washing machine & tested			4.00

AMOUNT FOR TUBES

AMOUNT FOR PARTS & MATERIALS

COMMENTS:

AMOUNT FOR TUBES

TOTAL TUBES AND PARTS

TAX

LABOR AND SERVICE CHARGE

LABOR NOTES

TIME STARTED	TIME FINISHED	HOURS	RATE PER HR.
A.M. P.M.	A.M. P.M.		

TOTAL 32.50

THIS IS TO CERTIFY SERVICE SHOWN HEREON HAS BEEN COMPLETED IN A SATISFACTORY MANNER.

RECEIVED PAYMENT \$

CUSTOMER'S SIGNATURE

TECHNICIAN

Ray Snyder
PLEASE PAY SERVICEMAN ON COMPLETION OF WORK

Form TVR-10 Electronic Publishing Co., Inc. Chicago 6 Ill.

DUPLICATE

6.50
 6.50
 6.50
 19.50
 6.50
 9.00
 9.50
 6.50
 5.50

PICTURE TUBE STORAGE RELEASE

After having the dangers of explosion or implosion explained,
 I
 do hereby assume full responsibility for the safe storage of my picture
 tube, Serial No. and do hereby release

 from all liability resulting from any accident which may occur from
 retaining this picture tube in my possession.

Signature of Owner

..... Date

PROMISSORY NOTE

\$ Date 19...
 For Value Received, promise to pay to the order of

 the sum of
 to be paid as follows
 with interest at percent per annum after
 until paid.

And to secure the payment of said amount and interest, the Purchaser does authorize irrevocably
 any attorney of any Court of Record to appear for him in such Court in term time or vacation,
 at any time hereafter, and to confess judgment without process in favor of the holder of this Note
 for such amount as may appear to be unpaid thereon, together with interest, costs, and reasonable
 attorney's fees and to waive and release all errors which may intervene in any such proceedings,
 and to consent to immediate execution upon such judgment, hereby ratifying and confirming all
 that said attorney may do by virtues hereof.

Witnessed by:

How to Figure Service Charges 47

Condenser, electrolytic, multi-section—install	5.25
Condenser, paper, mica or ceramic—install	5.00
Connection—repair obvious damage (small jobs like this are covered by the minimum shop or home service charge if they are done within the first ½ hour of work; if it takes longer to find the trouble, bill for this at the hourly rate)	Free
Control, volume, brightness, etc.—single-section—install	4.00
—dual-section—install	5.00
Deflection yoke—install and adjust	6.00
Mileage rate—per extra mile traveled15
Picture tube—clean face and safety window (included in minimum service charge if chassis is removed for other work)	Free
Picture tube—install and adjust	9.50
Picture tube—resolder pins	2.00
Resistor, fixed carbon or wire-wound—install	5.00
Selenium rectifier—install	4.00
Speaker—install	4.00
Switch, on/off on control—install (if control also is replaced, use rate for that control)	3.75
Transformer, audio—install	4.50
Transformer, power—install	8.00
Transformer, horizontal sweep output—install	7.00
Transformer, horizontal oscillator—install	6.00
Transformer, i-f, video or discriminator—install without aligning	5.50
Transformer, vertical oscillator or output—install	5.00
Tube—install (work of checking and replacing tubes is normally included in minimum service charge, since profit is made on sale of tube at list price)	Free
Tube socket—install	5.00
Tuner—clean and lubricate	4.00
Tuner—repair poor connection or short	4.00
Tuner—install small part	8.50
Tuner—install without realigning	10.00

RECORD CHANGER SERVICE CHARGES

Minimum shop charge for check-up and test, including up to ½ hour of work (customer brings changer into shop and takes it home again himself)	\$2.00
Minimum home service call within 5 miles of shop, including up to ½ hour of work	5.00
Hourly rate for work in shop or home	3.50
Minimum charge for estimate in shop (customer brings in changer, but decides not to have it fixed)	2.00
Minimum charge for estimate in home (customer decides not to have changer fixed)	5.00
Adjust needle set-down position	2.50
Adjust trip mechanism of changer	5.00
Clean and lubricate changer	2.50
Clean and lubricate single-play phonograph	1.50
Clear jam in record changer (no parts replaced)	10.00
Install drive motor	10.00
Install needle (included in minimum service charge)	Free
Install part in audio amplifier in phonograph	Same as for radio parts
Install phono pickup cartridge	3.50
Install rubber-tired idler wheel	6.50
Install shielded or unshielded leads going to pickup	6.50
Mileage rate—per extra mile traveled15
Repair record drop mechanism	7.00
Repair shut-off mechanism	5.00
Repair trip mechanism of changer	8.00

48 How to Get Ahead in the Television and Radio Servicing Business

Example of Typical Bill. Suppose that a customer brings a dead five-tube table radio to your shop. You replace the 35Z5 rectifier tube. The set then works but has a loud hum and the pilot lamp is out. You replace the 30-50 mfd, 150 v electrolytic condenser and put in a new pilot lamp. The set then works fine. The customer comes to get the set, and cheerfully pays your bill which is worded like this:

Check-up and test at shop	\$2.00
Install two-section electrolytic condenser	4.00
30-50 mfd electrolytic condenser	1.95
Type 35Z5 tube	1.45
Pilot lamp20
Total	<u>\$9.60</u>

On this job the condenser costs you \$1.15, the tube 81¢ and the lamp 10¢ so your actual cash outlay for the job is \$2.06. You spend 20 minutes talking to the customer when she brings the set in, 1 hour and 25 minutes locating the troubles and repairing the set, and another 15 minutes when the customer comes to get the set, for a total of 2 hours. You figure that your own labor should be worth \$1.75 an hour, or a total of \$3.50. Adding the \$2.06 for parts to this gives \$5.56. This leaves \$4.04 for your overhead and profit on this job.

What Fixed Service Charges Include. Fixed service charges usually cover only your professional services. They do not include the replacement parts needed. These parts should be billed separately at list prices. The fixed rates are based on three factors:

- (1) The knowledge and skill required to locate and fix that particular trouble.
- (2) The average time required for a professional serviceman to do that job on a typical set, including the time required to get the correct replacement part if it is a special item.
- (3) The possibility of unforeseen complications on that particular job, or failure within your guarantee period through no fault of your own.

Practical Advice on Preparing Bills. The suggested rate schedules given here allow you quite a bit of flexibility. For example, if you replace a lot of parts in a set but get the entire job done quickly, you can omit the fixed-rate charges for some of those parts. On the other hand, if you run into a tough set that requires many hours of your time, such as for locating an intermittent trouble, you can use all the fixed-rate charges which apply to the job or use the hourly rate for labor.

In the beginning, you will probably want to bring most of the jobs to

your shop if checking of tubes does not locate the trouble in the customer's home. Later, as you acquire more experience, you will be able to fix more and more of the sets right in the home. It is best to use the same home service charge in both cases. The extra trip involved in bringing the set back to the home after fixing it in your shop must then be considered a part of your overhead expense. This is standard practice among most servicemen.

The mileage charge for calls farther than 5 miles from your shop includes your own time too, hence is higher than the normal expense-account allowance for a car alone.

Charging for Replacement Parts. On most parts which you buy for replacement purposes, you will not know the regular list price. The normal markup to which you are entitled as a businessman ranges from 40% to 50%. It is best to use the 50% figure on small items. It takes just as much of your time to buy a 25¢ part as it does to buy a \$25.00 picture tube. To get a 50% markup, just multiply your cost price by 2.

On more expensive parts, you may prefer to use a 40% markup. To figure this, multiply your cost price by 1.7. For example, if you pay \$3.00 for a new transformer, you can use \$5.10 as its price on your bill.

How to Handle Tough Jobs. When you encounter a job that is beyond your ability at that time, take it to the dealer you have lined up for fixing these tough sets. Pay his bill (being sure to get a bill from him for your records and for tax purposes), then bill the customer as if you had fixed the set yourself. The extra time which you spent on the job gave you extremely valuable experience and knowledge, hence should not be charged to the customer. Consider this as a part of your training program time. Charge the customer full professional rates for that job, but no more. This policy gets you started right in professional servicing.

If there is an occasional set which you can't fix and can't get someone else to fix for you, return the set to its original condition and bring it back to the customer without any charge whatsoever. Never try to get by with a makeshift repair job. Explain frankly to the customer that you do not have the necessary test equipment for repairing that particular trouble. This explanation preserves your reputation and keeps the good will of that customer so that you do not lose him.

Always remember that there comes a time in the life of every set when it is no longer economical or practical to fix it. This is the time when the set should be junked or traded in on a new model. Don't feel bad if one of these sets stumps you. When a new serviceman sets up business in

50 *How to Get Ahead in the Television and Radio Servicing Business*

a town, he gets many tough or hopeless jobs that were refused or returned by other servicemen. After experience with a few of these, you soon learn to recognize when to quit working on a set and give it back to the customer without charge.

Fixing Sets for Friends and Relatives. One of your biggest problems at the start will be your relatives and close friends. Knowing that you are just getting started, they will generally try to get their sets fixed by you at cut rates or for just the cost of parts. They may be honest in their belief that you need the experience. Don't do it, however. Once you fix a set for anyone at cut rates as a beginner, you will find it extremely difficult to charge regular rates for your work later.

If you feel an obligation to anyone, you can return the favor by fixing his set on a full professional basis without any charge whatsoever. To make it clear that you are doing this, you may even want to make up a regular bill on the job. You can then write across the bill, "No charge" and sign your name. This lets the chap know that he can expect a regular bill on the next job he brings you.

How to Guarantee Your Work. It is pretty much standard practice for a serviceman to guarantee a repair job for 30 days. This guarantee covers only the repairs and materials listed on the bill. The guarantee means that you fix the set without charge if it goes bad within the time limit because of trouble in the circuits you worked on.

From a practical standpoint, it is good business to be as liberal as possible when honoring your guarantee. You may find that an entirely different circuit or part failed through no fault of your own. The average customer won't understand your technical explanation, won't believe it isn't your fault, and will resent any charge for the callback. The fixed rates suggested here are high enough to cover these normal callbacks, so that you can handle them cheerfully and retain your customer good will.

Here is a simple guarantee statement which you can have printed at the bottom of your bill or simply write it on:

Repairs and parts listed above are guaranteed for 30 days.

Sign your name under this, to make a good impression. The guarantee of course starts from the day that the set is returned to the customer, which is also the date on your bill.

Making an Estimate of Repair Charges. The big question in the mind of many customers is, "How much is it going to cost me?" On simple jobs that involve merely the replacement of a few tubes, you can figure this up as soon as you have located the bad tubes. On more difficult jobs, where

many measurements must be made in the shop in order to locate the trouble, it is practically impossible to give an accurate estimate beforehand in the home.

When a set must be taken to the shop to find the trouble, it is common practice to call the customer back later when the trouble is found, and give the estimate. The repair is not completed until the customer approves the amount of the service charge. If the customer decides not to have the set fixed, only the minimum service charge for an estimate is made. If this arrangement is clearly explained beforehand, most people are willing to allow their set to be taken out of the house for an estimate.

If the customer forces you to guess at an estimate, make it high enough to cover all possibilities you know of, then multiply your figure by $1\frac{1}{2}$ to cover guessing risks. You can always charge less than your estimate if the trouble proves to be simpler than you thought, but it is extremely difficult to charge more than your estimate when you guess too low. Don't be afraid of losing the job by estimating too high; it is far better to lose it than to do the job at a loss.

Value of a Good Reputation. Once you have established your reputation for honesty and reliability, your regular customers will simply say, "Fix it" without asking how much. They in turn will tell other people about your reliability and competence, so that the question of estimates will become less and less important in your business.

In fairness to your regular customers, always call them for approval of a price whenever you think it will run a lot higher than they expect. If you think the set is no longer worth fixing, tell them tactfully. You will gain their respect this way, even though you lose the repair job. Treat your customers the way you would like to be treated yourself; it pays.

How to Collect Your Money. Occasionally, when presenting a bill for a repair job, a serviceman hears the plea, "I'm a little short of money today, but I'll pay you Saturday." Too often that Saturday never comes, despite phone calls, bills, or even time-consuming personal visits. In Book III you learn how to handle this situation and many of the others which come up in a service business.

A cash policy is best but is not always practical. You cannot tactfully ask the customer beforehand whether he has the necessary cash. Likewise, you cannot take out the repair work and make the set go bad again if the customer doesn't pay you at the end of the job.

In most cases you will definitely receive payment when promised. Rigid enforcement of your C.O.D. rule here would mean losing that man and

52 *How to Get Ahead in the Television and Radio Servicing Business*

many of his friends as customers. Remember that the allowance for overhead expenses in your service charge covers bad debts. It is therefore good business to trust people unless you are pretty sure that their credit is bad.

Here is an additional idea which may help you with your collections. Have a definite policy of making an extra charge for bookkeeping when payment is put off. This gives your customer a cash incentive for paying immediately, even if it means shaking out the piggy bank. A 10% charge for bookkeeping is fully justified. For good customers you can ease this by making the charge effective after ten days or after the first of the following month. The important thing is to have a penalty charge, let your customers know about it, and enforce it.

Making Special Offers on Service Calls. Servicemen occasionally advertise home service calls at rates very much lower than the minimum charges suggested in this book. These offers are generally being made to obtain new customers. The loss on the service charge is considered as advertising expense.

Of course, it is not profitable to continue the reduced charge indefinitely. There is no point in having a lot of customers and doing a lot of work if it doesn't show up in your bank account. Don't be like the dealer who bought electric fans wholesale for \$12.00 each and sold them at \$11.98. His argument was, "I only lose a few pennies on each fan, but I sure get a lot of business."

If all servicemen in your community advertise very low service charges, yet stay in business, you can be sure they are getting the full amount some other way. This can be done by raising the hourly rates and fixed charges a corresponding amount. You may have to do this too, to get your share of the repair jobs, if competition is stiff in your town. The customer pays the same either way.

8

How to Keep Business Records

Are You Sure You're Making Money? In the servicing business, just as in many others, your bank balance may not be an accurate measure of success. Without accurate records of what you spend, what you owe, what you take in, what is owed you and what you plan to spend, you can't tell where you stand. This is why Book III has one entire chapter on record keeping. It shows you how to keep the simple records needed for success in servicing.

How Much Is Your Business Worth? Another important item not shown by your bank balance is the value of your business. This is determined by adding together cash on hand, accounts receivable, value of your parts inventory, and the depreciated value of your business furniture and fixtures, shop equipment and delivery equipment. Subtracting from this total your unpaid bills gives the true value of your business at any particular time.

Such a balance sheet should be figured at least once a year, to give you an accurate picture of how your business has expanded. This balance sheet is also highly essential when applying to a bank for a loan to expand your business or for some other purpose.

Income Tax Tips. Money-saving income tax information is given in the chapter on record keeping in Book III, "Profitable Radio Troubleshooting." This emphasizes the importance of keeping a record of every cent you spend on your business. If, for example, you forget to make records of \$100 worth of gas and oil put into the car for service calls during the year, you'll be paying income tax for \$100 more than you actually earned. Why do this?

Some people don't like to keep records. If you are one of these, just get yourself a cigar box. Each time you spend money or take in money,

54 *How to Get Ahead in the Television and Radio Servicing Business*

write down on a card or scrap of paper the *date*, the *amount* and the *nature* of the income or expense. Put these slips in the cigar box. Line up an accountant or a friend who is good with figures. Once a month, have him sort out your slips and enter them properly in your record book.

Your business record at the start can be a simple profit-loss statement like that shown in Book III, which tells you your net profit for that month. If portions of your home expenses and personal auto expenses are chargeable to business, include these also in your monthly profit-loss statements, along with the monthly share of depreciation on equipment.

With dated and itemized records for your business expenses, you'll have no income tax worries. According to government records, many people pay more tax than they should, simply because they don't keep records and they forget about allowable expenses. Your government urges you to take every possible legal deduction. It asks only that you be able to provide records as proof.

How to Figure Depreciation. Your test equipment, workbench, shelves, office fixtures, and antenna installation ladders are large items of expense. When figuring overhead and when figuring deductions for income tax, the cost of such large items is usually spread out over the useful life. This is standard business practice, and is called depreciating the equipment.

Here is an example. Suppose you spend \$120 for a tube tester and expect it to last five years. You divide the cost by 5 then, and put down \$24 each year for depreciation on this tube tester. On your monthly profit-loss statement, the depreciation figure would include one-twelfth of this or \$2 for the tube tester.

For income tax purposes, the life expectancy in years varies with different equipment. Homes range from thirty to forty years, and automobiles are usually five years. This five-year figure will also apply to just about everything else used in a servicing business, such as your test equipment, television and radio sets used in your shop, power tools, ladders, typewriter, office desk, file cabinet, chairs and stools.

When you buy something that must be depreciated in this way on your records, be sure to write down the years of depreciation on your cigar-box slip, so your accountant can enter it properly.

Small tools and supplies can generally be put down completely as current expenses without bothering about depreciation. Your expenses for wood shelving, your workbench and other special equipment which you make or have made to your order can likewise be put down as current expense.

When in doubt, such as for a new soldering gun, take the easy way out and charge it off as current expense.

What Are Your Overhead Expenses? You've probably heard the word overhead many times, without stopping to think about what it includes. The instant you go into business for yourself on a part-time or full-time basis, this one word will become terrifically important to you. It will mean the difference between profit and loss, between success and failure in servicing.

The dictionary says that overhead includes those general business expenses which cannot be charged exclusively to one particular repair job. Here are some examples of overhead expenses in a servicing business.

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|---|---|
| 1. Telephone | 16. Interest on loans |
| 2. Electricity | 17. Depreciation on equipment |
| 3. Heat | 18. Insurance |
| 4. Water | 19. Bookkeeping |
| 5. Gas | 20. Lost time, such as talking to salesmen and to people who "just dropped in to see how you are getting along" |
| 6. Automobile operation, maintenance and depreciation | 21. Vacation with pay |
| 7. Advertising | 22. Sick leave with pay |
| 8. Rent | 23. Holidays with pay |
| 9. Shop supplies | 24. Callbacks because set goes bad again within guarantee period |
| 10. Office supplies | 25. Wasted trips because no one is home |
| 11. Bad debts | 26. Service manuals |
| 12. Taxes | 27. Technical magazines and books |
| 13. Contributions | |
| 14. Professional dues | |
| 15. Shop maintenance, including cleaning, painting and decorating | |

The above list will suggest many more items of overhead expense. For example, all of your working time that is not charged up as labor on specific jobs becomes overhead expense. If you hire someone to answer the phone while you are out on calls, the salary of that person is overhead.

Figuring Overhead for a Shop at Home. Don't neglect overhead just because you are using a part of your home for business. You or your family are paying for that home and its operating bills. A proper proportion of this expense should be charged to your customers when you do repair work in your own home for them. The same proportion of your home expense can be charged off as a business deduction on your income tax return. It is thus doubly desirable for you to figure your overhead accurately.

Take the telephone bill, for instance. If about half the calls which

56 *How to Get Ahead in the Television and Radio Servicing Business*

come in are your business calls, then half the telephone bill should be considered as business overhead.

On electricity you might figure the total wattage of lights and equipment available to you for business, then figure the total wattage of all lights and electrical appliances in the house. This ratio should be applied to the electric bill. For example, if your shop lights, desk light, soldering iron, test equipment and power-tool wattages add up to 2,000 watts and the total wattage of everything in the home is 10,000 watts, then one-fifth of your electric bill is business overhead expense.

If you heat 750 sq. ft. of floor space in your basement and elsewhere in the house for business use and the total heated floor space in the house is 2,250 sq. ft., one-third of your heating bills and furnace repair charges are business overhead.

If you rent your house, figure the rent overhead the same as for heat. If you own your home, add together the taxes, mortgage interest, depreciation, maintenance and repair costs, then take the same proportion as for heat.

Who Pays Your Overhead? Now that you know some of the items involved in the overhead expense of a business, you can see that the overhead for one year can add up to quite a bit of money. If you keep accurate records of all business expenses for the year, you will know exactly what it is. Getting this money is the next problem.

It is standard practice to make the fixed service charges and the hourly charge for labor high enough to take care of overhead. Each customer then pays his fair share of your overhead, just as in any other type of business. The suggested rates given in this book take this into account for an average servicing business in an average community. Since you can't figure your own overhead accurately until you have been in business for at least a year, it is quite all right to use these suggested rates at the start.

