

Excerpt from

# Your Career in Appliance Repair

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# Preview

The following is a sample excerpt from a study unit converted into the Adobe Acrobat format. A sample online exam is available for this excerpt.

The sample text, which is from the Appliance Repair program, examines the work habits that you will need as a professional technician. It details how to start your own business and keep it prosperous.

Specifically, this excerpt covers information on how to arrange your shop. Shop organization is important in creating a safe and efficient work area. Also included is information on tools, safety, and various forms that will be required to maintain records in your shop.

After reading through the following material, feel free to take the [sample exam](#) based on this excerpt.

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# Your Career in Appliance Repair

## YOUR SHOP

Your shop and its equipment are very important. If you set the shop up properly, you will be able to do your work easily and rapidly. The faster a given job is done, the more you can earn on it. Here are some suggestions gathered from a number of technicians experienced in appliance repair work.

If yours is a *repair business*, and not a sales business, you will not need a location where people pass by. Since you are a repair technician, your customers will bring equipment to you when they need you, or you will visit them to service the equipment. A shop location on a side street or in a spare room, a garage, or the basement of your home will save you a lot of rent money. If you start a shop in your home, there may be the advantage of having a member of your family on hand to answer the telephone when you are out on calls. Since many customers will contact you by telephone, a business listing in the classified section of your telephone directory will be your most profitable method of advertising. Advertising will be discussed at greater length later in this text.

## Shop Layout

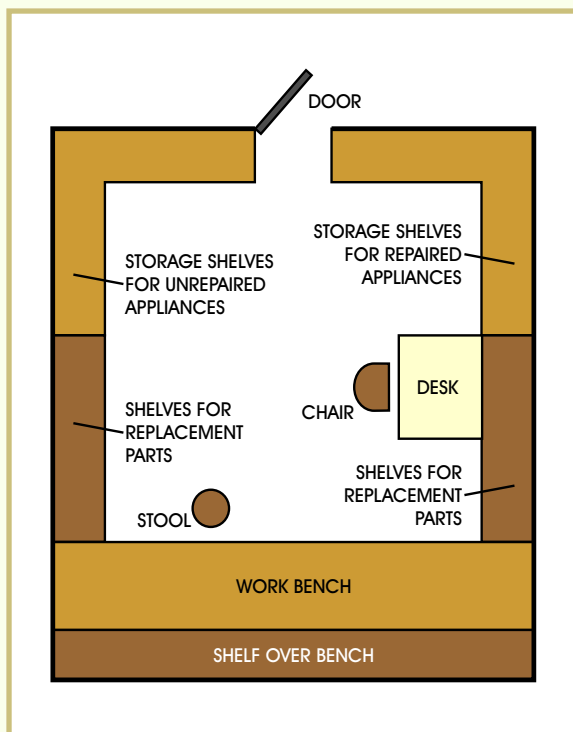
The arrangement, or *layout*, of your shop space must be designed for safety and efficiency. Set up the shop so that you can do your work with the least amount of wasted motion. Keep the tools you use most often near at hand.

A workshop should be divided into three major areas:

1. The *working area*, which includes the workbench itself, the space in front of it, and the storage for the tools and parts used most often.
2. The *storage area* for replacement parts, which should be close enough to the working area to be reached quickly, yet far enough away not to interfere with movement around the workbench.
3. The *storage area for appliances*, which should be divided into two parts. One of these is for repaired appliances awaiting delivery. This part should be near the outside door for easy loading of the repaired appliances into your vehicle. The other part of the storage area should be reserved for appliances to be repaired.

A suggested workshop layout is shown in [Figure 1](#). No dimensions are given. You can change this layout to suit the size and shape of your shop area.

**FIGURE 1**—Shown here is an example of an efficient layout for an appliance repair shop.



Storage space is very important in a shop. The appliances themselves will take up most of the storage space. Keep in mind that they must be stored for easy access when the owners come to pick them up or when you are ready to deliver them. The appliances should never be stacked up on the workbench itself, or in any place where they will be in the way when you are working. Keep the space around your workbench clean to avoid having to step over or around tools or wires. Not only will an uncluttered space keep the shop neat and safe, but it will also save you time. You can build shelves for the smaller appliances and leave floor space for the larger appliances.

One often overlooked necessity in creating a shop is protection from unlawful entry. At any given time, you might have many expensive appliances in your shop. If they are stolen, replacement could be expensive. One easy way to protect your shop is to place curtains over each window. If you do that, no one can see inside, thus reducing a thief's temptation to steal the appliances or your tools.

A dead-bolt lock on the door of your shop is a necessity. This type of lock is not easily sprung by placing a bar between the door and the door jam. Many inexpensive burglar alarms are also available and are strongly suggested. Modern burglar alarms use ultrasonic or thermal sensors to sense the presence of an intruder. This type of alarm removes the need for taping each window with conductive foil and removing wall-board to place wires within the wall areas.

Insurance for a workshop is essential. Surprisingly, contractor-type insurance is not very expensive. This type of insurance can be tailored to meet your needs. For example, you can purchase insurance for your shop, your technical repairs, and your truck or van in one package, thereby reducing cost. Also, if you have installed dead bolts and an alarm system for burglar and fire, your insurance premiums for the shop itself will be quite small.

## Workbench

The workbench itself is very important. It must be *big enough* to hold medium-sized appliances with room to spare and *sturdy enough* to support any kind of repair work without collapsing. The top of the bench should have an overhang at both the front and the sides, for fastening a vise or a bench grinder and for clamping small appliances to the lip of the bench.

The bench should also be *well lighted*. It should have electrical outlets for plugging in test equipment, soldering irons, and measuring instruments, and it should have a master switch.

Always use a cloth pad when you work on small, highly polished appliances. Hang the pad on a hook near the bench.

Keep a small brush on the bench. When you finish a job, brush off all the litter into a wastebasket. A plain wooden stool and a small wooden box for a footrest will help you to be more comfortable at the bench.

A shelf across the back of the bench is very useful for holding service manuals, electrical test equipment, small tools, and general replacement parts, such as line cords and plugs.

You can build wooden storage drawers under the bench for tools not used on every job, such as wrenches, large soldering irons, electric drills, and similar items. Put these drawers where you can reach them easily without moving too far, but be sure that they do not interfere with legroom under the bench.

For storage of other replacement parts, build a set of wider shelves at one or both ends of the workbench. Larger parts can be stored in their original boxes, with the labels showing. Small parts can be stored in steel or plastic cabinets, which are available in many sizes. Cabinet drawers can be divided into compartments of any size. Each drawer should be *plainly labeled* with the names of the parts it contains.

## Service Data

To be able to work on modern appliances, you must have up-to-date *service data*. The only reliable source for such data is the company which made the appliance. You can obtain a yearly subscription to these data for a small fee, and the service data will be mailed to you monthly or at intervals of several months. In addition, once you are a subscriber, you will get service bulletins whenever they are issued. Service bulletins are information packets that show remedies for design flaws or product flaws. However, you may obtain these data from distributors for the various manufacturers or from larger dealers nearby. Their names will be in the Yellow Pages of your telephone book.

Arrange to get the service manuals for the most popular appliance models in your area. Keep your files up-to-date. When a mailing of service data comes in, file it immediately in its proper place. In that way, you will always have the needed information at your fingertips, without wasting time looking for it.

When setting up the shop, make sure that you arrange your service manuals in a bookshelf or *filing space* close to your workbench. Binders for service data and file cabinets for manuals are also available.

A good *reference library* of service manuals from the appliance manufacturers will be a big help in your work. Start building up such a library as soon as you can. It is not practical for you to try keeping all needed data in your head, so you should know where to look up any information. Wherever possible, sample data from service manuals are included in these texts to show you how much information these manuals contain. For large appliances, such as refrigerators, dryers, and air conditioners, these manuals are the *only* source of reliable information about the locations and types of certain parts in a given model.

Service data also contain electrical schematics, pictorial diagrams, and flowcharts to make your troubleshooting fast and efficient. When using the manufacturer's service data, you can quickly find such items as:

- How an air conditioner should perform (performance chart)
- How to adjust chain tension on a trash compactor
- How the wiring and water lines reach the door of a modern refrigerator
- What voltage should be on an SCR (silicon controlled rectifier) module when the microwave oven is set at power-level eight

Without a service manual, you are basically just guessing. With the service manual, you have a "book of clues" to assist you in tracking down the source problems in the appliance.

## Essential Tools

Throughout this course, many *standard tools* and *special tools* have been discussed. The use of many specialized electrical testers has also been described. If you are just opening your own appliance repair shop, you will, of course, not be able to buy all the tools you want right away. Here is a suggested *starter* set of the tools you are likely to use most:

- *Hammer*, small, ball-peen
- *Screwdrivers*, standard and Phillips, in several sizes
- *Pliers*, long-nose, diagonal-cutting, locking, and channel-lock
- *Wire stripper* and *crimp-on tool*
- *Wrenches*, box and open-end, in sets of different sizes
- *Socket wrenches*, in sets of different sizes
- *Nut drivers*, small, in sets of different sizes
- *Soldering iron*, one of 30-watt size and one of 100-watt size (also solder and flux)
- *Liquid-gas torch*, propane, light-duty type
- *Bench vise*, small, 10 to 15 cm
- *Electric drill*, with small set of high-speed bits

Later on, try to acquire *specialized tools* to speed up your work. Put aside a small amount of money each month towards the purchase of such tools. If you increase your stock of tools steadily, your work will be made easier. Buy *good-quality* tools whenever you can. Good tools will last longer, do better work, and so be less expensive in the long run.

Various appliance manufacturers recommend and will supply special tools for servicing their appliances. You should acquire these special service tools from the appliance manufacturers as you see the need for them.



## Safety

Once again, we remind you of the dangers involved in work with electricity. You study safety rules throughout your program, but here is a short summary of safety hazards and safety measures.

As an appliance technician, you should realize that 120 volts can give you a stiff electrical shock and that 240 volts is really dangerous. But here are a few cautions about treating a person who has been shocked into unconsciousness. The victim should, of course, be given artificial respiration promptly if breathing has stopped. However, *the first step to take must always be to break the electrical connection to the victim.* Sometimes a person going to the rescue of a shock victim tries to pull the victim clear of the electrical conductor with bare hands. This action is exceedingly dangerous, since the victim is electrically charged, and often the would-be rescuer also becomes a victim of electric shock. As a result, a single tragedy turns into a multiple tragedy; instead of one person being killed, two or more may die. Always pull the plug or use an insulated item to free the victim from the source of power.

Of course, the simplest way to avoid danger is to keep your wits about you when working with electrical equipment and systems. *Never touch a bare wire* or a terminal that might be hot, or connected to the circuit, without first making sure that the circuit switch is open and the appliance unplugged. It is particularly dangerous to touch a hot wire or terminal when standing on a *damp floor* or a metal grille. People have been killed, for example, by touching a 120-volt wire while standing on a warm-air register, grounded through the warm-air duct and furnace. Similarly, people standing on a damp basement floor have been killed by 120 volts.

Naturally, it will sometimes be necessary to test an electrical appliance that is connected to the voltage source, as, for example, when making an operating test, but you should never disassemble an appliance that is connected to the source.

Many electrical appliances are *grounded*. Grounding protects the user from danger of shock due to accidental shorting or grounding inside the appliance. Special ground leads are often run from the frame or housing of the appliance, as those found on a washing machine in a basement, for example. *These ground leads must not be removed.* Their removal seriously increases shock hazard.

Just as important as electrical safety is *mechanical safety*. Appliances such as dishwashers, garbage disposals, and washing machines offer many locations for injury. These locations, often called *pinch points*, are where your fingers or hands can get caught between moving belts and pulleys, blades, and so forth. Always make sure power is removed from any appliance before working on its mechanical assemblies.

Always make sure not to expose yourself or others to the energy from the magnetron tube in a microwave oven. Make sure all side panels are in place when operating the oven and follow the manufacturer's service instructions exactly while performing the repair. Long-term exposure to a microwave oven's energy can be particularly damaging to your health.

## Service Work Orders and Tags

When any appliance is brought into your shop, it must be instantly *tagged* not only for identification but also for your own protection. Business forms, such as the form shown in [Figure 2](#), are available, bound in books, and numbered. These forms are usually made with an original and two copies, each in a different colour paper. When an appliance comes in, fill out this service work order form, recording the customer's name and address, and the make and model of the appliance. The actual complaint can also be entered in the space provided. Tear off the third copy of the form and give it to the customer as a receipt. Tape or tie the original and the first copy firmly to the appliance in such a way that the customer's name can be seen when the unit is on a shelf.

**FIGURE 2**—A typical service work order form contains all necessary information about a service call.

(Courtesy McGraw-Hill Book Company, Inc.)

Service Invoice  
**HOME ELECTRIC SHOP**  
 100 MAIN STREET  
 HOMETOWN  
 555-1234

No. **23278**

Name \_\_\_\_\_ Date \_\_\_\_\_ 20\_\_

Address \_\_\_\_\_

Product \_\_\_\_\_

Model \_\_\_\_\_ Installation \_\_\_\_\_ Serial \_\_\_\_\_  
 Date \_\_\_\_\_ No. \_\_\_\_\_

Complaint \_\_\_\_\_

Work Done \_\_\_\_\_

Parts Used \_\_\_\_\_

QUANTITY	STYLE No.	DESCRIPTION	EACH	TOTAL

Serviceman \_\_\_\_\_ Material \_\_\_\_\_  
 Date \_\_\_\_\_  
 Serviced \_\_\_\_\_ Labor \_\_\_\_\_ Hrs. at \_\_\_\_\_ Per Hr. \_\_\_\_\_  
 Total Charge \_\_\_\_\_

\_\_\_\_\_  
 (Customer Signature)

*TERMS: Net Cash on Completion of Work*

When the job is finished, fill in the rest of the form. List the name and the price of every part used, the labour charge, and any taxes. In many areas, you will be responsible for collecting these taxes and paying them to the government at the end of the month. Sometimes, the tax applies only to materials (parts), and sometimes to both materials and labour. Find out what the tax laws are for your own location. This is important.

When the appliance is delivered or picked up, the customer gets the original form if the charges are paid. Mark the bill "Paid" and add your initials and the date of payment. Keep a copy of the *service work order* form for your records, especially for tax purposes. Also the dated and signed bill helps to prevent misunderstandings about the date of repair, the warranty, and other such items.

## Returned Material and Warranty Forms

Whenever a part fails within the warranty, or guarantee, period, the part must be returned to the factory properly tagged, with the warranty accurately filled out. Unless this is done in the prescribed manner, you are not likely to get proper credit from the factory. Each manufacturer has his own instructions and forms. Follow the instructions carefully to avoid losing money because the part was not properly identified.

## Record Keeping

Since detailed tax reports are required of everyone in business today, accurate record keeping is essential. This is easy if you use the right kind of forms. Complete records will also tell you exactly how much you are taking in, how much you are paying out, and how much you are actually earning from your shop.

At the end of each business day, fill out forms indicating finished work and enter the totals of each job in a ledger. Enter the customer's name on the center line, the labour charges on one side of the page, and the parts charges on the other. By adding up these two columns of figures at the end of each month, you will know exactly how much you have taken in for labour and parts during that month. Since these totals are needed for tax reports of all kinds, keep them up-to-date and accurate.

## Expense Records

Just as important as income records are expense records. You must know how much it costs you to do business. So, using another ledger, make up separate pages for each kind of expense. Record every cent you pay out for anything connected with the business. These expenses are normally all *deductible* from your income when you prepare your income tax return.

Typical expenses are light, heat, gas, water, telephone, advertising, and delivery expenses. If you use your own car for deliveries, you can deduct the upkeep on the car as a business expense, on a mileage or percentage basis.

Always keep accurate records of your *parts purchases* from every one of your suppliers. It is a very good idea to file invoices, statements, and receipts from each company in separate envelopes or folders. Then, in case of disputes, you can look up any transaction very quickly. A cancelled check written to the particular company on the date in question is positive proof that the account was paid.

