

BEFORE YOU START REPAIRING ELECTRICAL GAZETS

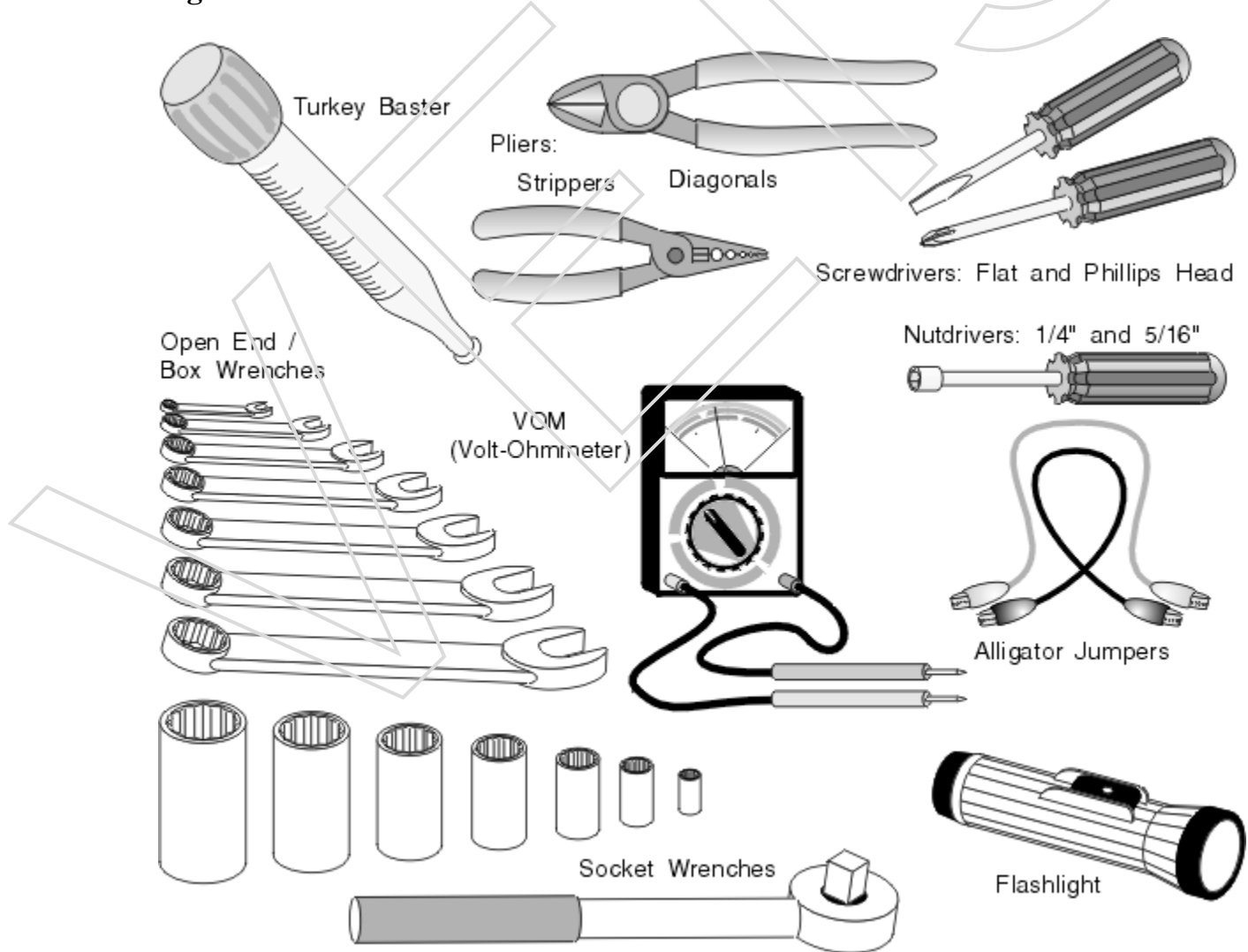
1-3 TOOLS (Figure 1-2)

The tools that you may need (depending on the diagnosis) are listed below. Some are optional. The reason for the option is explained.

For certain repairs, you will need a special tool. These are inexpensively available from your appliance parts dealer. They are listed in this book as needed.

SCREWDRIVERS: Both flat and phillips head; two or three different sizes of each. It is best to have at least a stubby, 4" and 6" sizes.

Figure 1-2: Tools



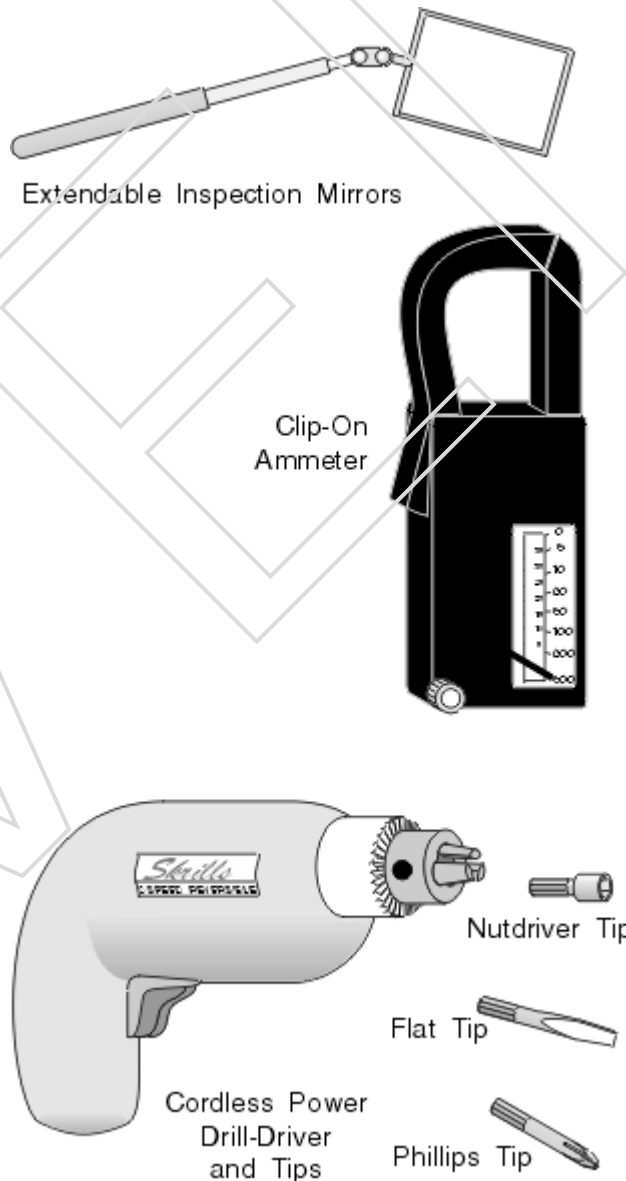
NUTDRIVERS: You will need at least a 1/4" and a 5/16" nut driver. 4" or 6" ones should suffice, but it's better to have stubbies, too.

ELECTRICAL PLIERS or STRIPPERS and DIAGONAL CUTTING PLIERS: For cutting and stripping small electrical wire.

BUTT CONNECTORS, CRIMPERS, WIRE NUTS AND ELECTRICAL TAPE: For splicing small wire.

VOM(VOLT-OHM METER): For testing circuits. If you do not have one, get one. An inexpensive one will suffice, as

Figure 1-3: Optional Tools



long as it has both "A.C. Voltage" and "Resistance" (i.e. R x 1, R x 10, etc.) settings on the dial. It will do for our purposes. If you are inexperienced in using one, get an analog (pointer) type (as opposed to a digital.)

SYRINGE TYPE TURKEY BASTER: For cleaning fill hose and fill solenoid valve strainer screens.

ALLIGATOR JUMPERS (sometimes called a "CHEATER" or "CHEATER WIRE"): small gauge (14-16 gauge or so) and about 12 to 18 inches long; for testing electrical circuits. Available at your local electronics store. Cost: a few bucks for 4 or 5 of them.

OPEN END/BOX WRENCHES

SOCKET WRENCHES

FLASHLIGHT

OPTIONAL TOOLS

(Figure 1-3)

SNAP-AROUND AMMETER: For determining if electrical components are energized. Quite useful; but a bit expensive, and there are alternate methods. If you have one, use it; otherwise, don't bother getting one.

EXTENDABLE INSPECTION MIRROR: For seeing difficult places beneath the washer and behind panels.

CORDLESS POWER SCREWDRIVER OR DRILL/DRIVER WITH MAGNETIC SCREWDRIVER AND NUTDRIVER TIPS: For pulling off panels held in place by many screws. It can save you lots of time and hassle.

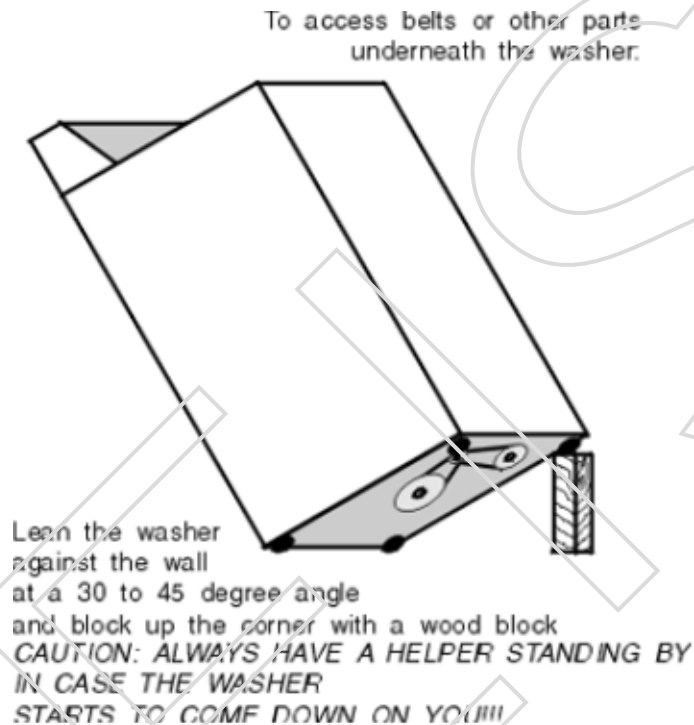
1-4 BASIC REPAIR AND SAFETY PRECAUTIONS

1) Always de-energize (pull the plug or trip the breaker on) any washer that you're disassembling. If you need to re-energize the washer to perform a test, make sure any bare wires or terminals are taped or insulated. Energize the unit only long enough to perform whatever test you're performing, then disconnect the power again.

2) To work underneath the washer sometimes requires leaning the washer back against the wall at a 30- to 45-degree angle. When you do, always block up one corner of the

washer as shown in Figure 1-7. NEVER DO THIS ALONE! Always have someone standing by to help you while you work beneath the washer, in case it comes down on you.

Figure 1-7: Leaning the Washer Against the Wall



3) If the manual advocates replacing the part, **REPLACE IT!!** You might find, say, a solenoid that has jammed for no apparent reason. Sometimes you can clean it out and lubricate it, and get it going again. The key words here are *apparent reason*. There is a reason that it stopped--you can bet on it--and if you get it going and re-install it, you are running a very high risk that it will stop again. If *that* happens, you will have to start repairing your washer *all* over again. It may only act up when it is hot, or it may be bent slightly...there are a hundred different "what if's." Very few of the parts mentioned in this book will cost you over ten or twenty dollars. Replace the part.

4) If you must lay the washer over on its side, front or back, first make sure that you are not going to break anything off, such as a drain hose or fill valve. Lay an old blanket on the floor to protect the floor and the finish of the washer. And for goodness' sake, make sure you drain the thing completely first!

5) Always replace the green (ground) leads when you remove an electrical component. They're there for a reason. And **NEVER EVER** remove the third (ground) prong in the main power plug!

6) When opening the washer cabinet or console, remember that the sheet metal parts are have very sharp edges. Wear gloves, and be careful not to cut your hands!

1-5 TIPS & TRICKS

Following are a few hard-earned pearls of wisdom:

1) When testing for your power supply from a wall outlet, plug in a small appliance such as a shaver or blow dryer. If you're not getting full power out of the outlet, you'll know it right away.

2) If you just can't get that agitator unstuck, your appliance parts dealer has a device called an Agi-Tamer for just such an occurrence. It's basically a heavy-duty rubber balloon that fits under the agitator, and uses water pressure to lift it upwards from underneath.

3) If you need to drain the tub (usually because your pump isn't pumping out) most folks try to bail it out. That's a wet, messy, yucky job, and not very thorough.

Try this instead: use your garden hose as a siphon.

However, when you do, another problem arises: did you ever try to suck a charge of wash water through a fifty-foot garden hose? If you can, you've got one heckuva set of lungs. And what happens when that nice, week-old dirty wash water reaches your mouth?

You guessed it: there's a better way.

What's the point in sucking the water through the nose? To get rid of the air in the hose, right? Well, instead of using *lung suction* to do that, let's use *hose pressure*.

Leave your garden hose connected to the faucet, and put the other end of it in the washer tub. Turn the faucet on for a few seconds, until it stops bubbling in the tub. The air is gone now, right?

Kink the garden hose so you don't lose the water charge, and disconnect it from the faucet. When you're sure the faucet end of the hose is lower than the bottom of the washer tub, release the kink in the hose. The tub will drain, almost completely, in just a few minutes. No muss, no fuss.

1-6 HOW TO USE A VOM AND AMMETER

Many home handymen are very intimidated by electricity. It's true that diagnosing and repairing electrical circuits requires a bit more care than most operations, due to the

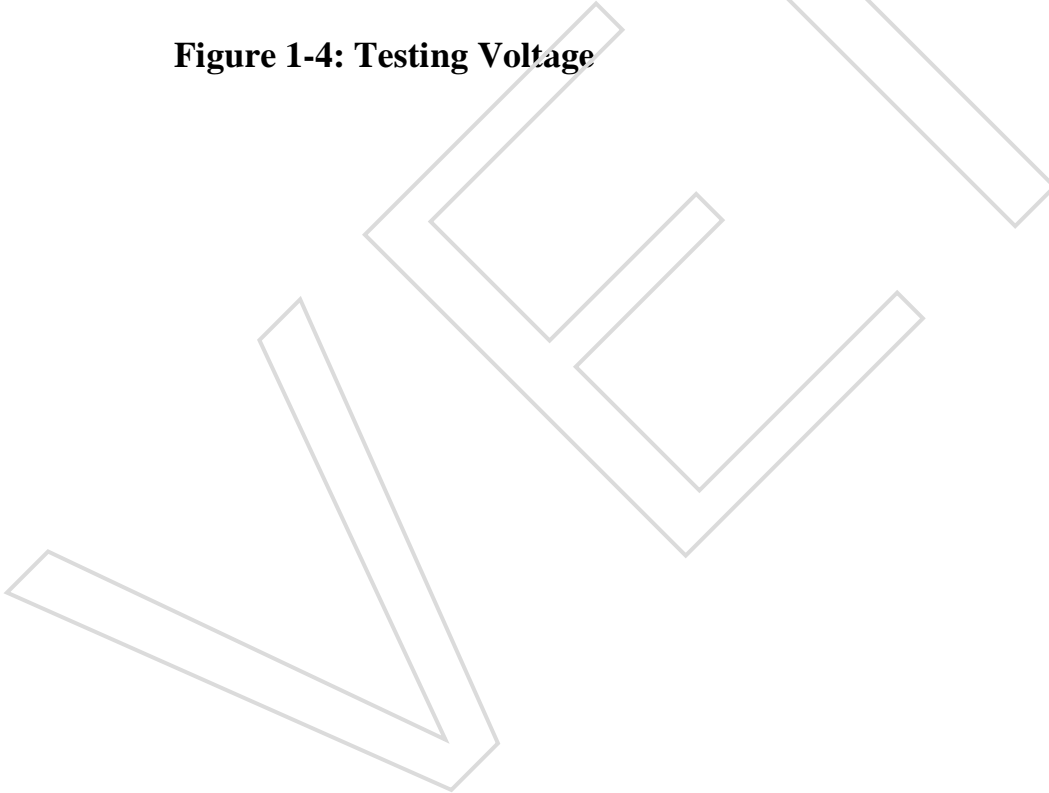
danger of getting shocked. But there is no mystery or voodoo about the things we'll be doing. Remember the rule in section 1-4 (1); while you are working on a circuit, energize the circuit only long enough to perform whatever test you're performing, then take the power back off it to perform the repair. You need not be concerned with any theory, like what an ohm is, or what a volt is. You will only need to be able to set the VOM onto the right scale, touch the test leads to the right place and read the meter.

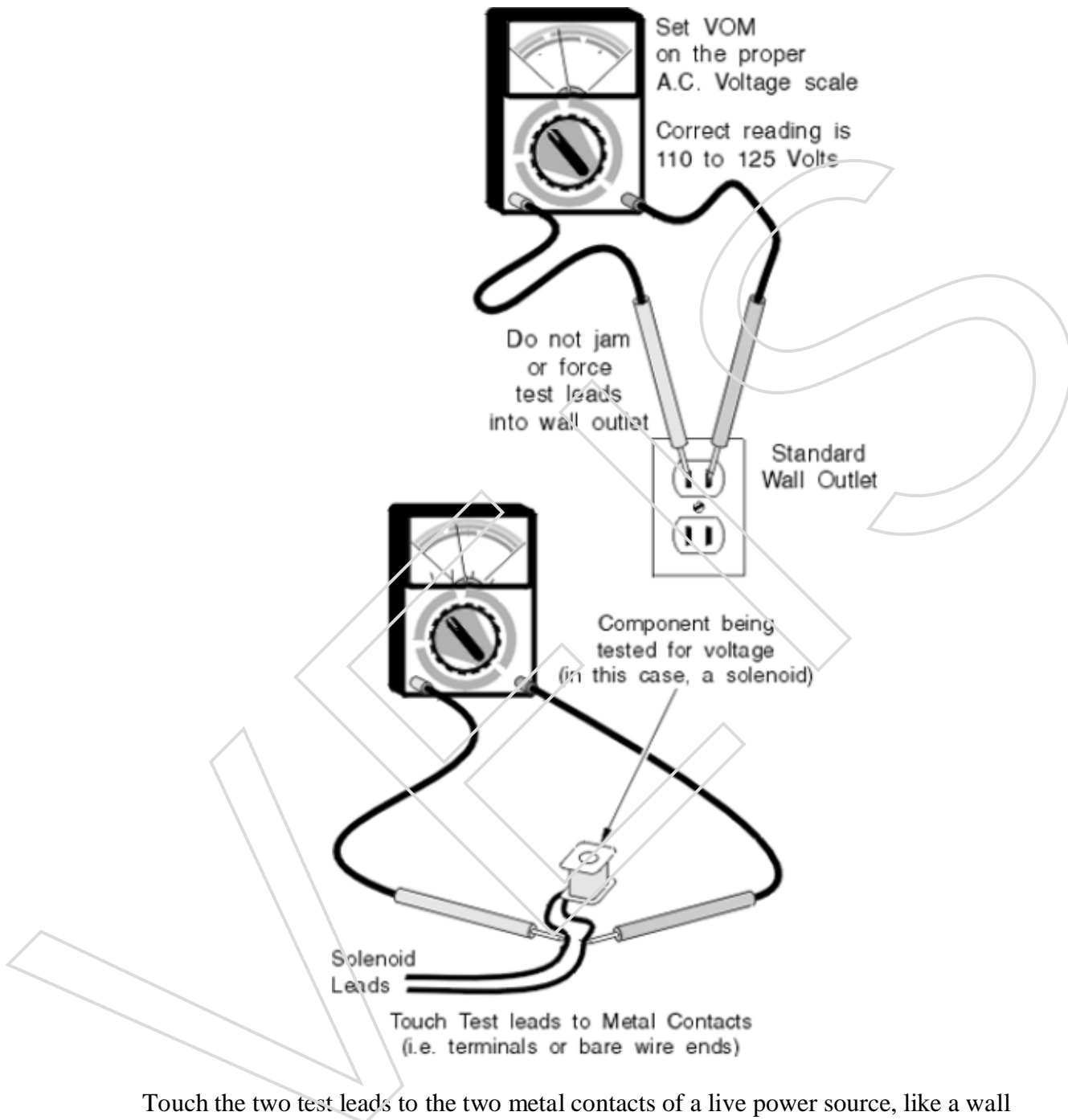
In using the VOM (Volt-Ohm Meter) for our purposes, the two test leads are always plugged into the "+" and "-" holes on the VOM. (Some VOMs have more than two holes.)

1-6(a) TESTING VOLTAGE (Figure 1-4)

Set the dial of the VOM on the lowest VAC scale (A.C. Voltage) over 120 volts. For example, if there's a 50 setting and a 250 setting on the VAC dial, use the 250 scale, because 250 is the lowest setting over 120 volts.

Figure 1-4: Testing Voltage





Touch the two test leads to the two metal contacts of a live power source, like a wall outlet or the terminals of the motor that you're testing for voltage. (*Do not **jam** the test leads into a wall outlet!*) If you are getting power through the VOM, the meter will jump up and steady on a reading. You may have to convert the scale in your head. For example, if you're using the 250 volt dial setting and the meter has a "25" scale, simply divide by 10; 120 volts would be "12" on the meter.

1-6(b) TESTING FOR CONTINUITY

(Figure 1-5)

Don't let the word "continuity" scare you. It's derived from the word "continuous." In an electrical circuit, electricity has to flow *from* a power source back *to* that power source. If there is any break in the circuit, it is not continuous, and it has no continuity. "Good" continuity means that there is no break in the circuit.

For example, if you were testing a solenoid to see if it was burned out, you would try putting a small amount of power through the solenoid. If it was burned out, there would be a break in the circuit, the electricity wouldn't flow, and your meter would show no continuity.

That is what the resistance part of your VOM does; it provides a small electrical current (using batteries within the VOM) and measures how *fast* the current is flowing. For our purposes, it doesn't matter how fast the current is flowing

To use your VOM to test continuity, set the dial on (resistance) R x 1, or whatever the lowest setting is. Touch the metal parts of the test leads together and read the meter. It should peg the meter all the way on the right side of the scale, towards "0" on the meter's "resistance" scale. If the meter does not read zero resistance, adjust the thumbwheel on the front of the VOM until it does read zero. If you cannot get the meter to read zero, the battery in the VOM is low; replace it.

If you are testing, say, a solenoid, first make sure that the solenoid leads are not connected to anything, especially a power source. If the solenoid's leads are still connected to something, you may get a reading through that something. If there is still live power on the item you're testing for continuity, you will burn out your VOM instantly and possibly shock yourself.

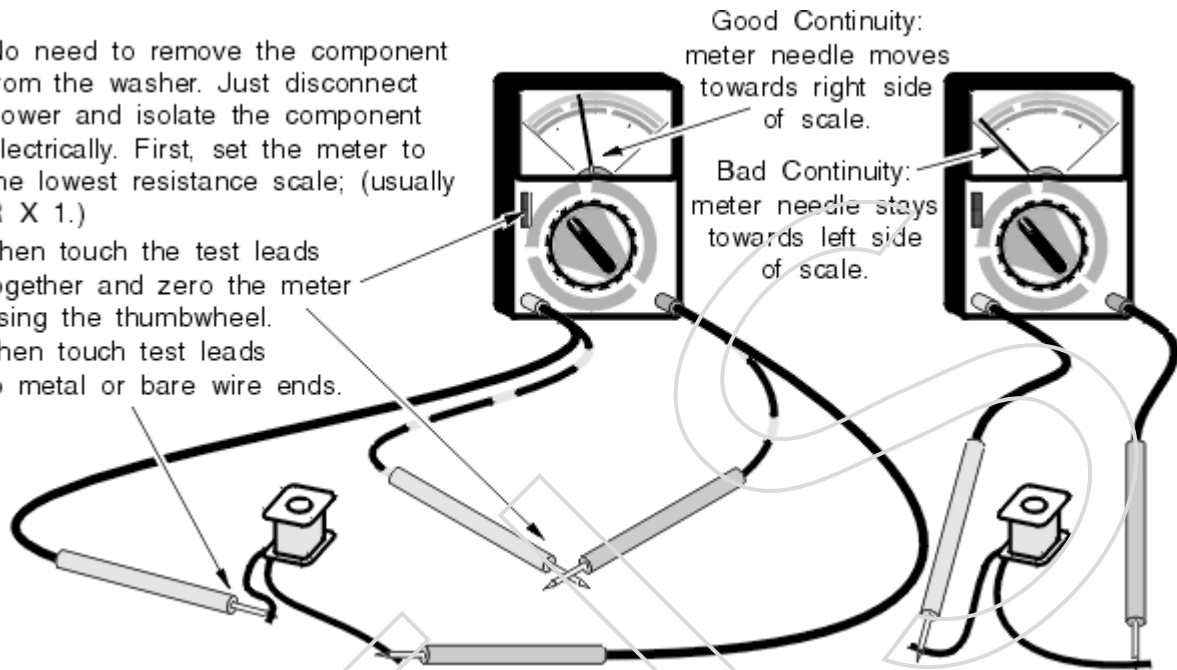
Touch the two test leads to the two bare wire ends or terminals of the solenoid. You can touch the ends of the wires and test leads with your hands if necessary to get better contact. The voltage that the VOM batteries put out is very low, and you will not be shocked. If there is NO continuity, the meter won't move. If there is GOOD continuity, the meter will move toward the right side of the scale and steady on a reading. This is the resistance reading and it doesn't concern us; we only care that we show good continuity. If the meter moves only very little and stays towards the left side of the scale, that's BAD continuity; the solenoid is no good.

If you are testing a switch, you will show little or no resistance (good continuity) when the switch is closed, and NO continuity when the switch is open. If you do not, the switch is bad.

Figure 1-5: Testing Continuity

No need to remove the component from the washer. Just disconnect power and isolate the component electrically. First, set the meter to the lowest resistance scale; (usually R X 1.)

Then touch the test leads together and zero the meter using the thumbwheel. Then touch test leads to metal or bare wire ends.



1-6(c) AMMETERS

Ammeters are a little bit more complex to explain without going into a lot of electrical theory. If you own an ammeter, you probably already know how to use it.

If you don't, don't get one. Ammeters are expensive. And for our purposes, there are other ways to determine what an ammeter tests for. If you don't own one, skip this section.

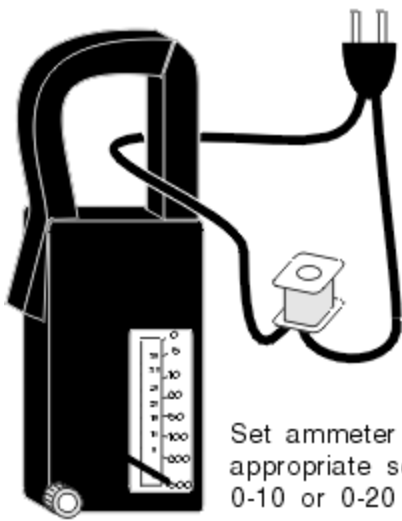
For our purposes, ammeters are simply a way of testing for continuity without having to cut into the system or to disconnect power from whatever it is we're testing.

Ammeters measure the current in amps flowing through a wire.

The greater the current that's flowing *through* a wire, the greater the density of the magnetic field it produces *around* the wire. The ammeter simply measures the strength of this magnetic field, and thus the amount of current, flowing through the wire. To determine continuity, for our purposes, we can simply isolate the component that we're testing (so we do not accidentally measure the current going through any other components) and see if there's *any* current flow.

To use your ammeter, first make sure that it's on an appropriate scale (0 to 10 or 20 amps will do). Isolate a wire leading directly to the component you're testing. Put the ammeter loop around that wire and read the meter. (Figure 1-6)

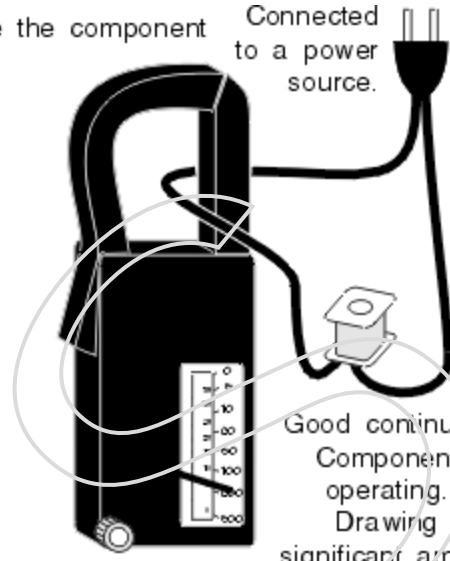
Figure 1-6: Testing Amperage



No need to remove the component from the washer

Connected to a power source.
Clip ammeter around one lead only.
No continuity: component not operating. Break somewhere in circuit. Drawing zero amps.

Set ammeter to an appropriate scale, say 0-10 or 0-20 amps



Connected to a power source.

Good continuity: Component operating. Drawing significant amps.

