Ray

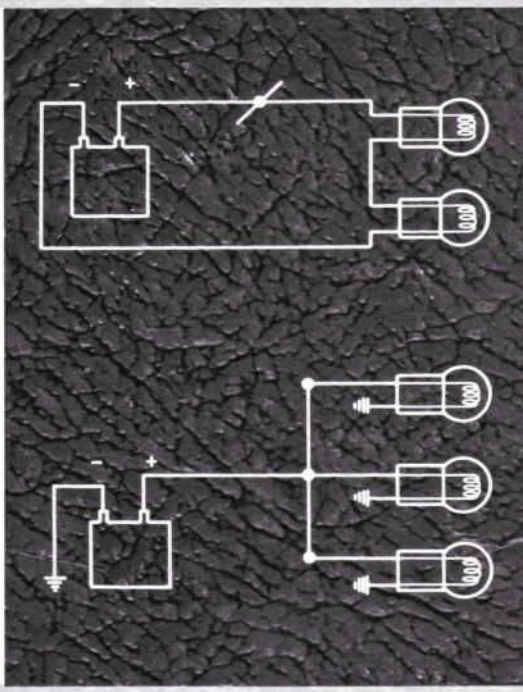
READY REFERENCE 13001

HOW TO READ WIRING DIAGRAMS

Ford

REGISTERED TECHNICIAN

VOL. 68 S7 L2A



HOW TO READ WIRING DIAGRAMS

COURSE 13001 • VOL. 68 S7 L2A

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NATIONAL SERVICE OFFICE
FORD DIVISION

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INTRODUCTION

The Why and Wherefore of Wiring Diagrams

To the uninformed, a wiring diagram — or a wiring assembly — looks like it might take a genius to figure out.

Not so — as you'll find out when you get better acquainted with these subjects.

There're as understandable and logical as a road map and road markers, when you're finding your way on a cross-country drive.

The ability to read a wiring diagram and relate it to a vehicle's wiring system is, of course, an essential part of a modern service technician's skill. And it's growing in relative importance, too, due to owner's increasing demands for the comforts and conveniences supplied by electrically-operated options and accessories. This opens up greater opportunities, for the forward-looking technician.

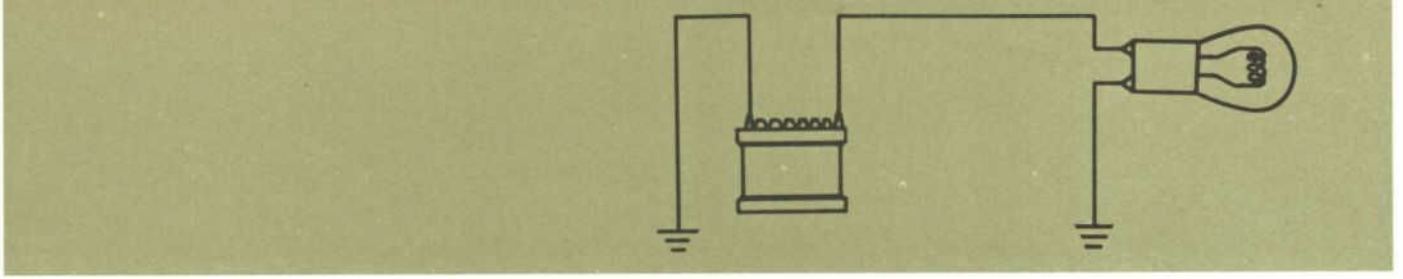
The Purpose of this Booklet . . .

. . . is to acquaint you with the systems by which electrical circuits are traced on vehicles. Specifically, it is designed to help you acquire the ability to make your own power checks, quickly and accurately.

Scope of the Booklet

Basically, this is a printed version of the film, "How to Read a Wiring Diagram." It is in no sense a manual of the shop methods by which electrical repairs are made.

It *can* be a helpful guide that can introduce you to the principles of wiring diagrams and vehicle wiring. As you gain experience in reading wiring diagrams, you'll accumulate your own know-how in this important skill. When it becomes "second nature" to you, these pages will have served their purpose — and yours.



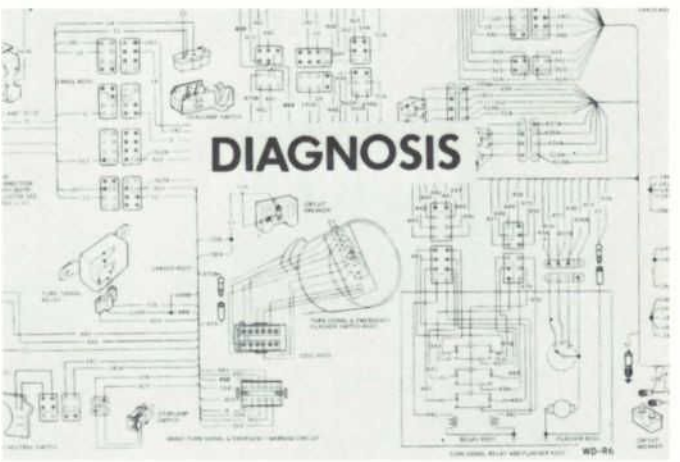
To show how to read wiring diagrams — and to explain how they can be used to help you troubleshoot problems in the electrical system — is what this booklet is all about. Obviously, these are important subjects.

A LOGICAL APPROACH TO ELECTRICAL DIAGNOSIS

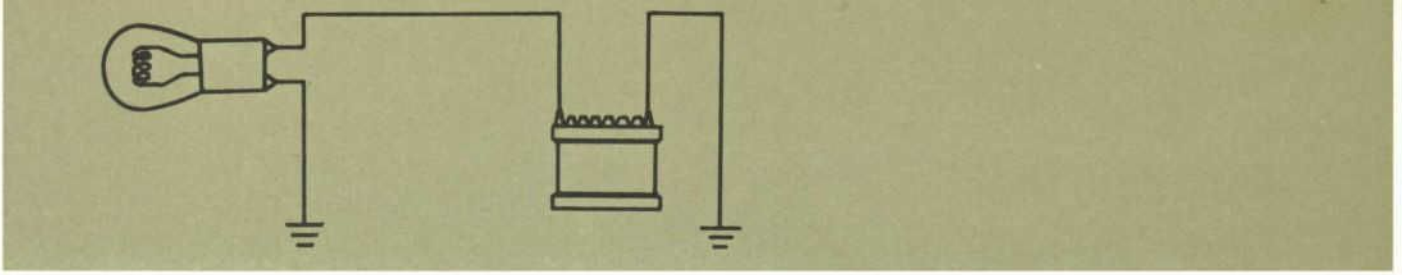
If a customer comes in because his headlights aren't working, you can't just make a snap decision. That's not the *professional way.*

Putting in a new sealed-beam unit *may* be the answer . . . but then again, *it may not.* Snap decisions are *out.* They're *not professional.*

When you go to a doctor, for example, he tries to find out what's *really* wrong with you. He looks beyond the aches and pains you feel, to see what's *causing* the trouble. We call this, *diagnosis.*

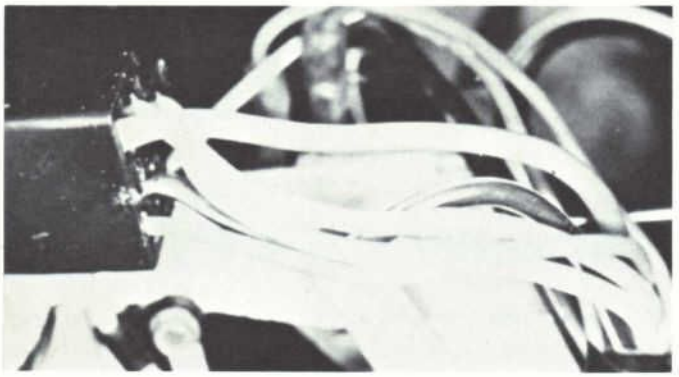


Troubleshooting an electrical system calls for diagnosis, too — *Your* diagnosis. *You're* the doctor. You must find out what's causing the trouble, and fix it.

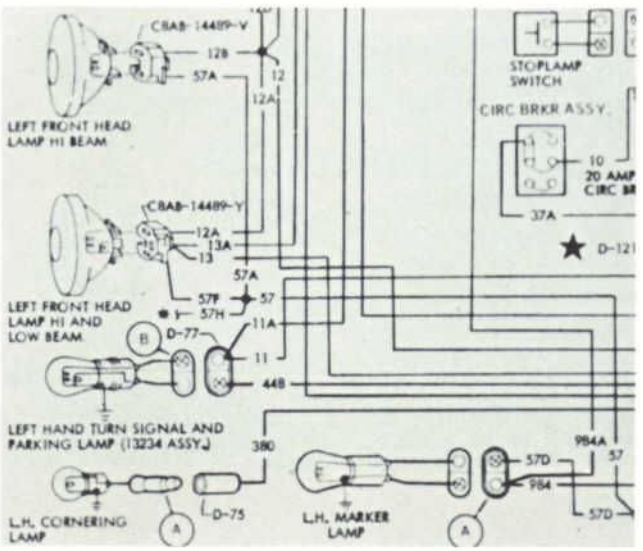


LOGICAL APPROACH

The easiest way is to begin with a *logical approach* — you check things out. You find out what parts of the electrical system are still working okay. You narrow it down to one part — one wire — one switch.

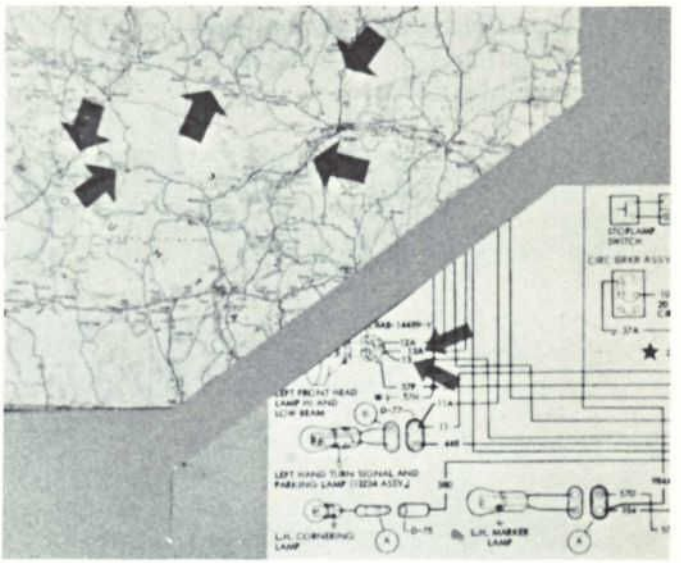


Sure, you may feel a little confused when you face a jumble of wires for the first time. But there's a way to make sense out of this. There *is* a logical approach.



It starts with a *diagram* that shows all electrical parts — switches, wires, splices, connections, the battery — everything you need to know.

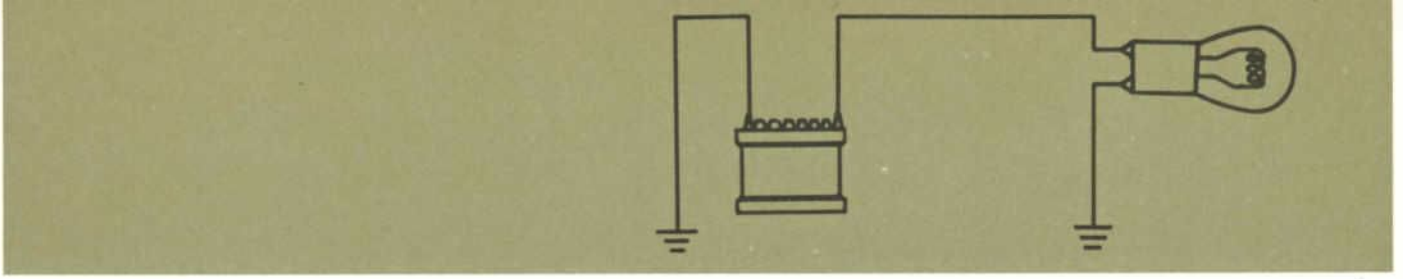
LIKE READING A ROAD MAP

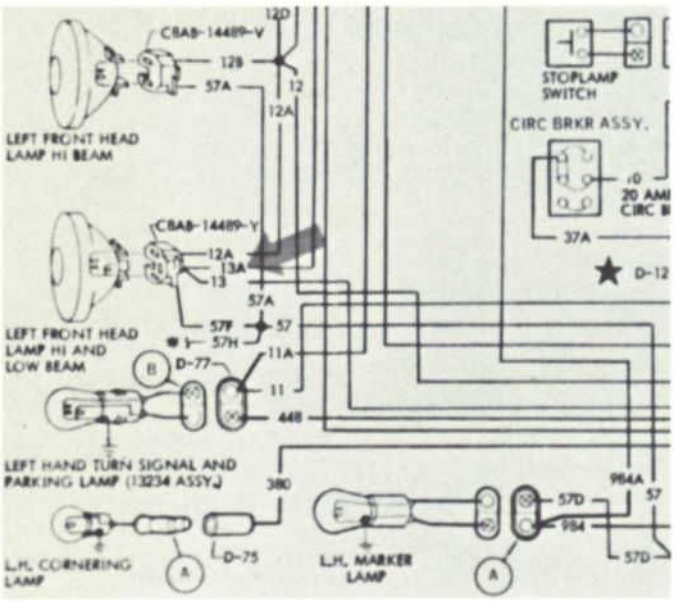


Reading a wiring diagram is something like reading a road map. The map shows routes that connect one place with another . . . and a diagram shows routes, too. The lines represent actual wires, and these wires are identified by numbers . . . much like highways are identified by number.

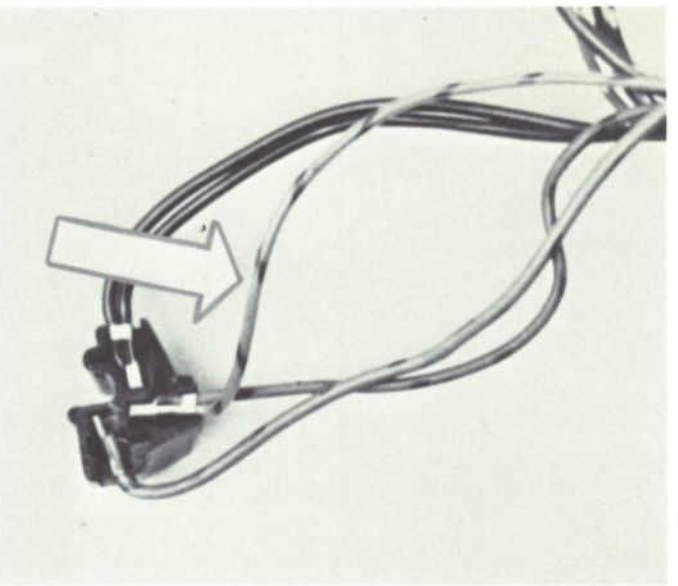
HOW WIRES ARE NUMBERED AND COLOR-CODED

When you want to locate a specific highway, you check the number on the map with a number on a highway sign. It's almost that easy with wires and wiring numbers.





You find the number you want on the wiring diagram.

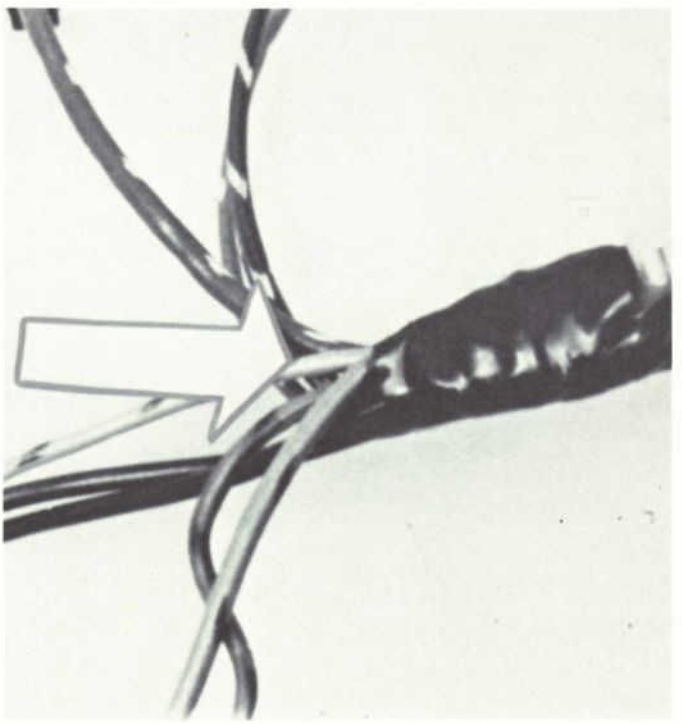


Here's the wire you're looking for. This wire is an electrical path, a path that goes from one specific place to another.

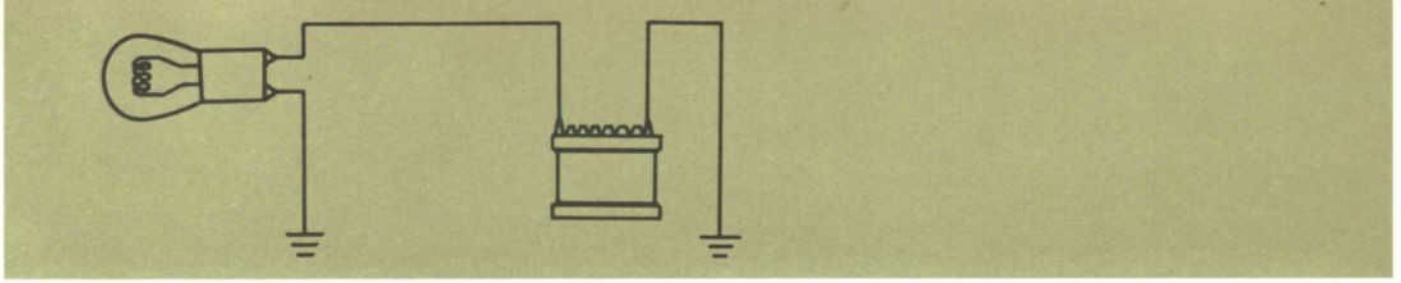
WIRING COLOR CODE

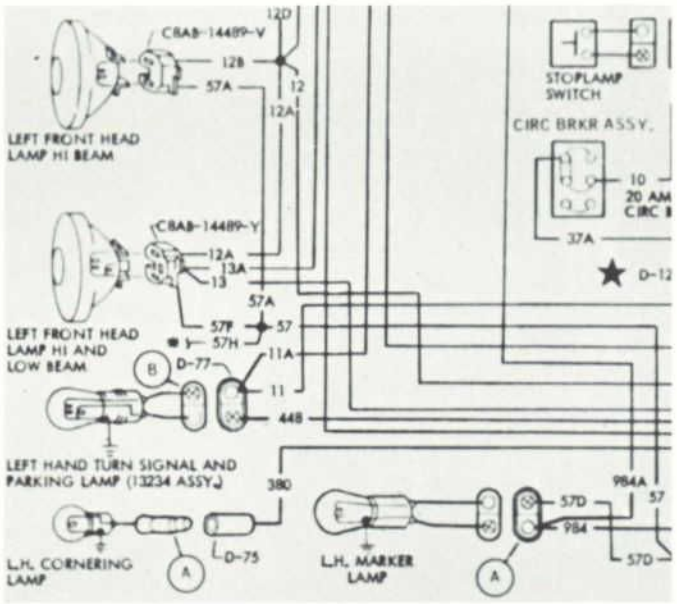
BASIC COLOR	STRIPE	WIRE NUMBER
ORANGE	RED	8, 447
GREEN	RED	10, 10A, 443
BLACK	YELLOW	11, 11A
GREEN	BLACK	12, 12A, 12B, 12C
RED	BLACK	13, 13A
ORANGE	YELLOW	8
BLACK		14, 57 THRU 57H, 48, 48A
VIOLET		77, 441, 441A
BLACK	RED	140, 140A, 140B

Then you find the number on the wiring color code. It tells you what color the wire should be.



You try to follow the wire, but it soon disappears into a bundle of wires that's tightly bound with black tape. How do you find out where it goes from here?



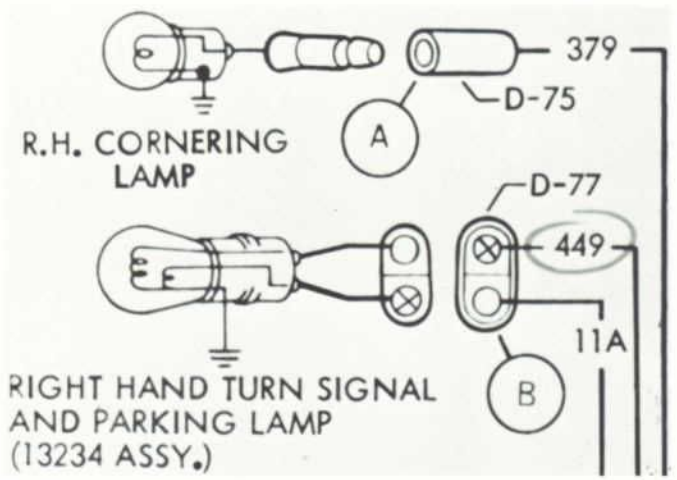


You look on the diagram. That's the purpose of a wiring diagram — or a road map, for that matter. You can find out where the path leads without actually going there.

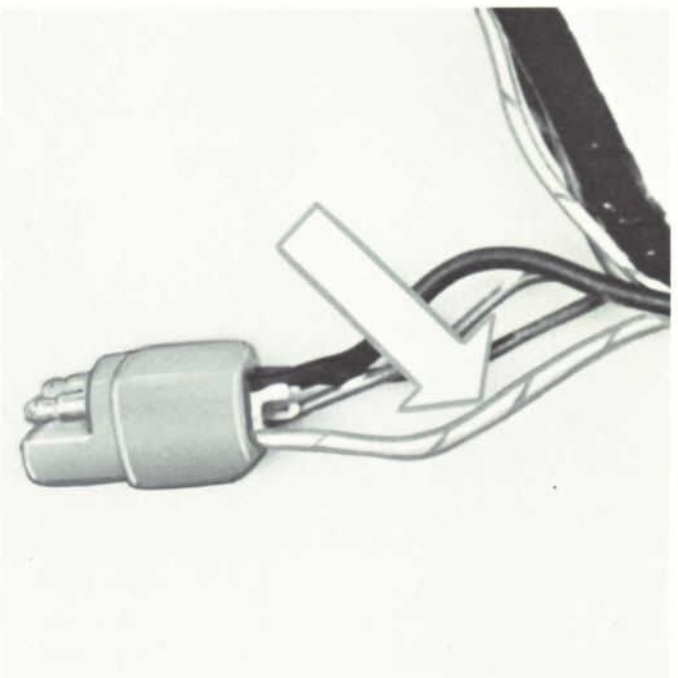
WIRING COLOR CODE

BASIC COLOR	STRIPE	WIRE NUMBER
BROWN		984, 984A
WHITE		440, 440A
GREEN	ORANGE	442
ORANGE	BLUE	445
ORANGE	WHITE	446
GREEN	WHITE	448, 475, 475A
WHITE	BLUE	449
ORANGE	BLACK	458, 458A, 458B
ORANGE	GREEN	459
BLUE		514
BROWN		694, 694A, 694B, 984, 984A
WHITE	BLACK	950

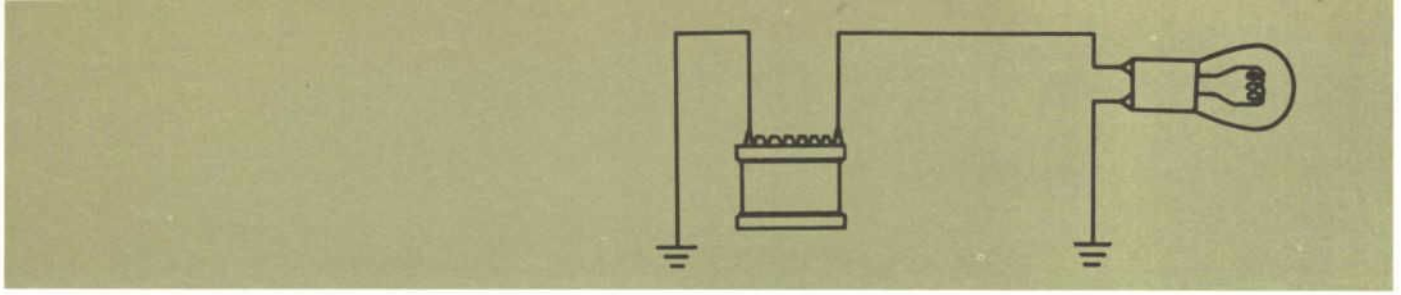
Then you look on the wiring color code . . .



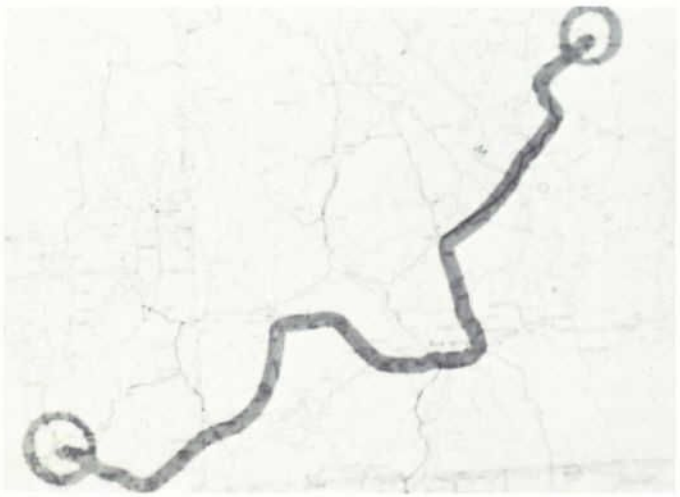
On a wiring diagram, you follow a wire by *number.*



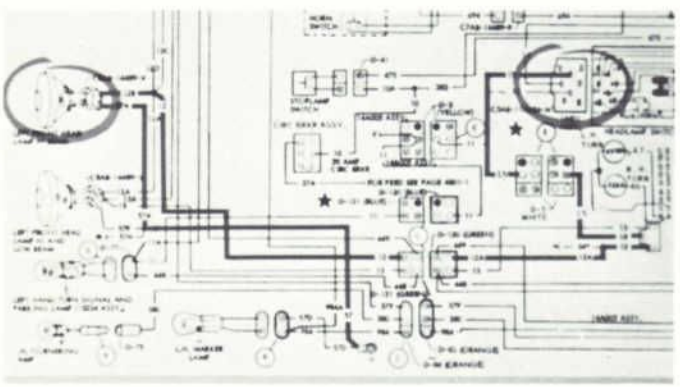
. . . to find what color the wire should be on the car. Wire numbers stand for wire colors. The numbers you see on the diagram stand for the wire colors you'll find on the car.



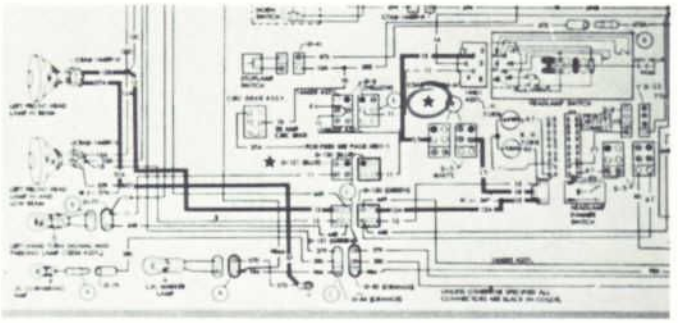
CIRCUIT — A COMPLETE ELECTRICAL PATH BETWEEN TWO POINTS



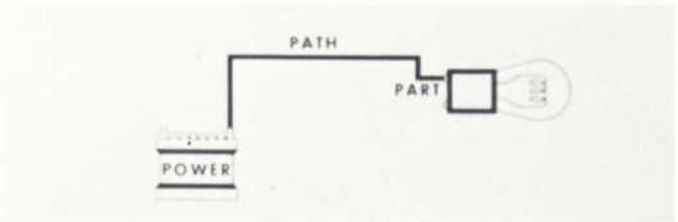
When you're traveling from one place to another, you follow a route — probably a main highway. If you don't know the way, you look at a map to find out where you are. Your purpose is to find a *complete route* between two points.



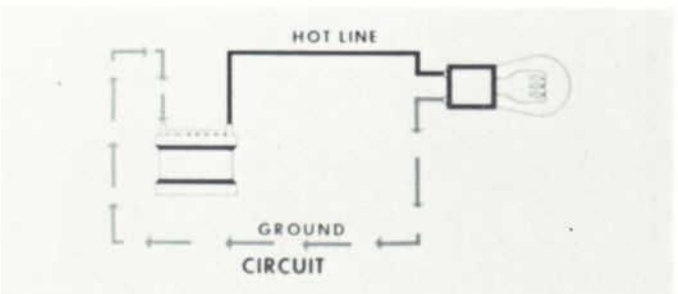
Here's a path traced on a wiring diagram, from a switch to a light. The purpose of tracing such a route is to find a path that goes all the way from one place to another. You have to have a complete path, or else you won't get where you're going.



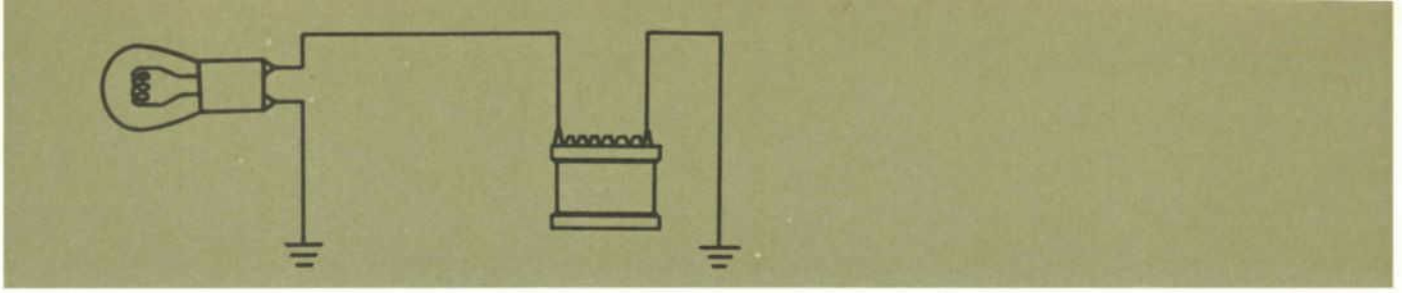
Electrical power must get from the battery — the primary power source — to the light, in this case. The star symbol is used to indicate the power source on Ford wiring diagrams.



If the light doesn't work, there must be a break in the path somewhere along the line. The light will work only if its path from the battery is complete. If the electricity can't get to the part, the part won't work.

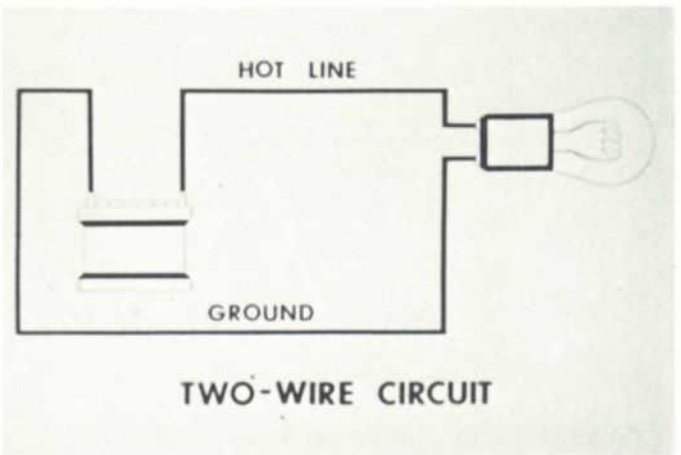


What's more, there must be a way for the electricity to get back from where it came . . . *there must be a return path.* In an electrical system, this is called a "circuit." The electricity must *circle back* to the battery — a round trip. A circuit must be *completed* in order for the part to work properly. Notice that the return trip is made by a different route than the trip from power to part.



TWO-WIRE CIRCUIT

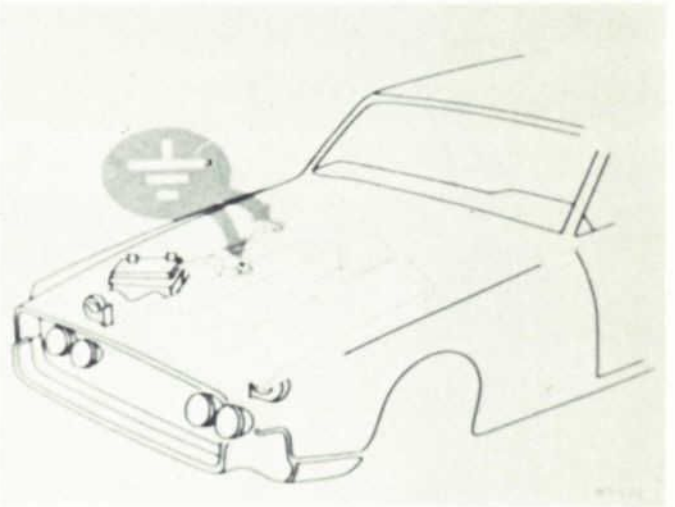
Anyone who's ever fixed a plug or appliance cord knows that two *separate* wires are used . . . one to bring electricity in, and the other to carry it out.



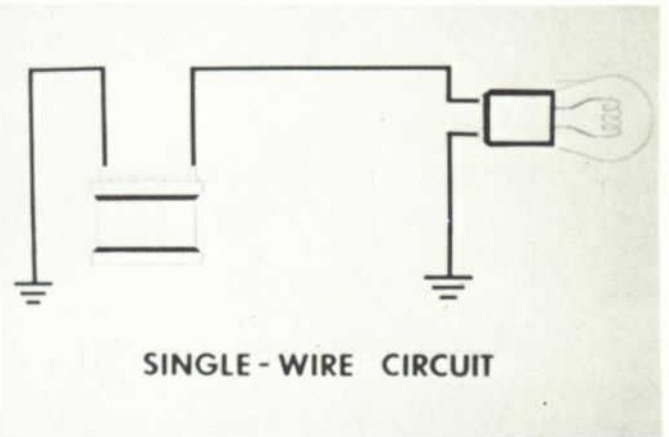
TWO-WIRE CIRCUIT

This is called a *two-wire* circuit. The wire that carries power *in* is called the "hot line." The other is the "return," or "ground" line. The purpose of the *ground* is to return the power to its source, so we have a complete circuit. But we don't have to have a *wire* to carry the electricity back.

SINGLE-WIRE CIRCUIT

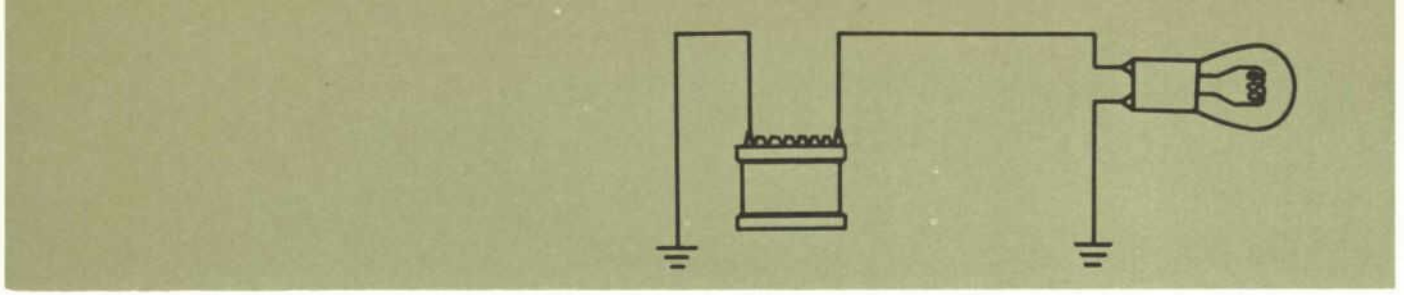


The metal parts of a car can also serve as a ground return. Most circuits in a car's electrical system are grounded on the body, engine or frame. Electricity travels through the metal path back to the battery.

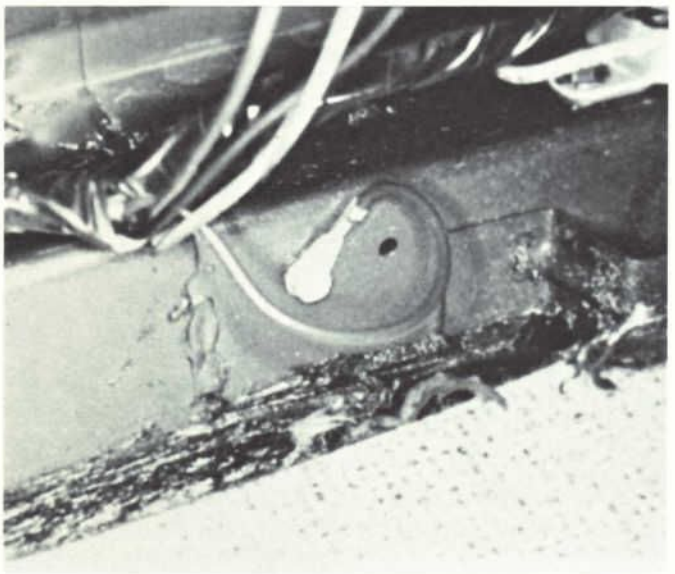


SINGLE-WIRE CIRCUIT

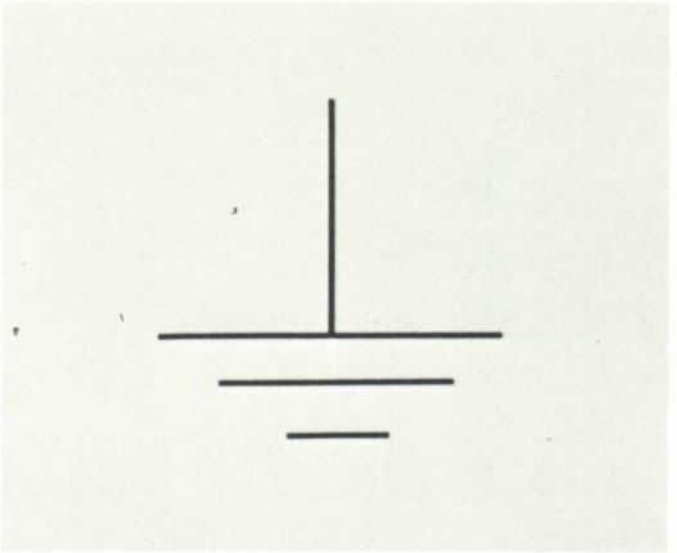
That's what's happening here. This is called a *single wire circuit.* There's a complete path from power to part and back again, but it uses only one main wire — the hot line. The ground path goes through the metal parts of the car. *This is the type of circuit you'll find most often on a car,* so let's take a closer look. You should be able to recognize a single wire circuit any time you see one.



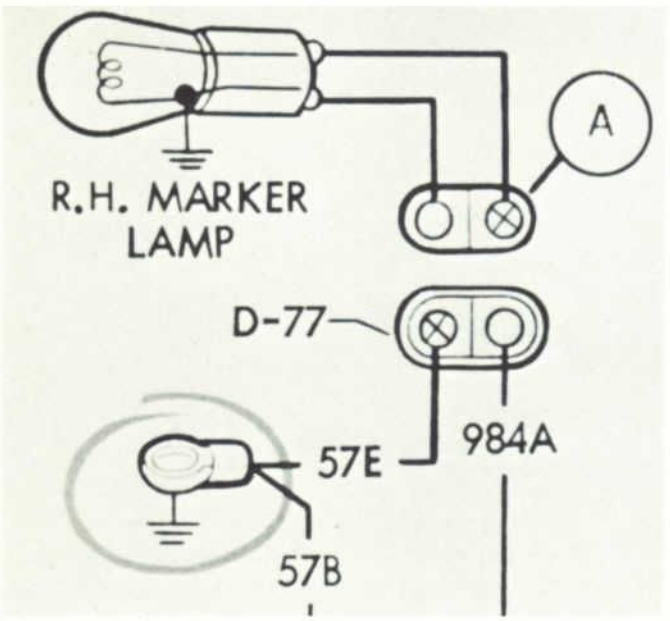
GROUND CONNECTIONS



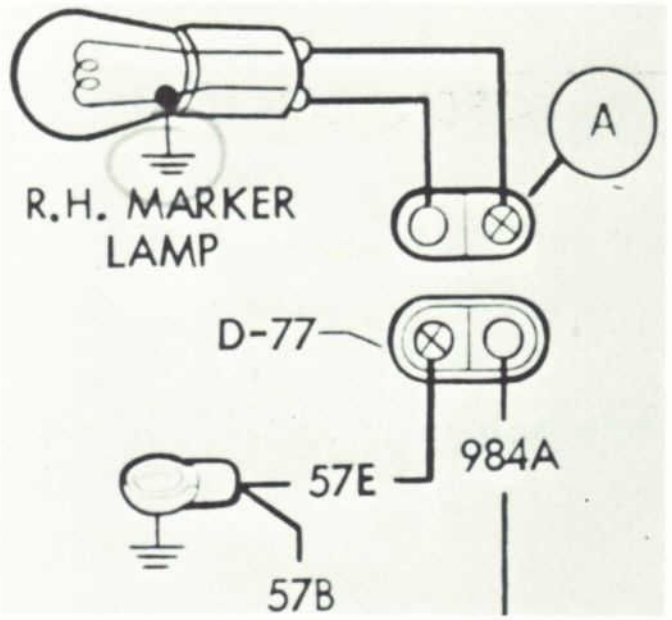
This is a typical *ground connection.* It's bolted to the body.



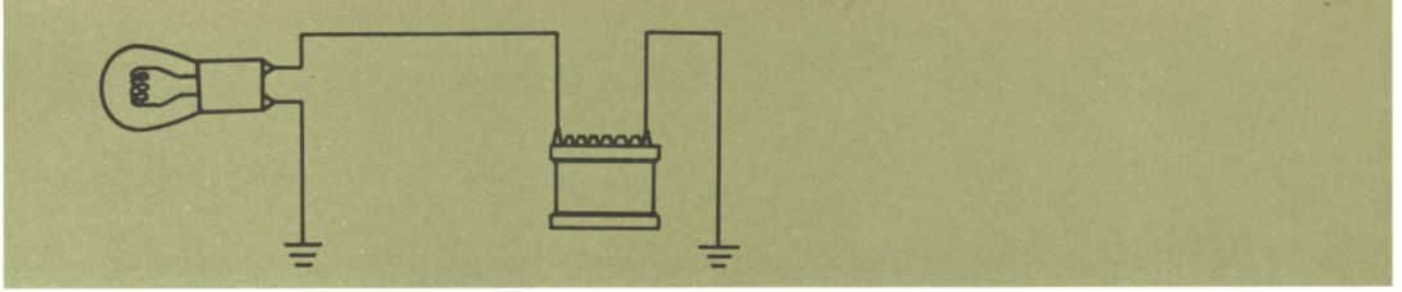
Here's a close-up of the symbol used to indicate a ground connection. Whenever you see a symbol like this on a diagram, you know you've located a *ground.*

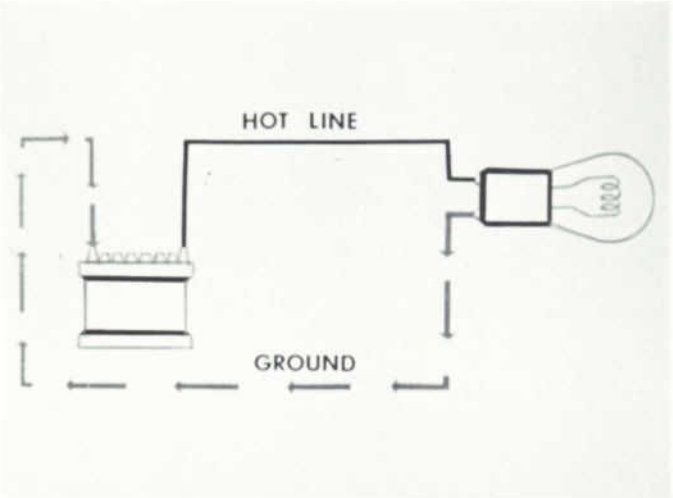


And, this is what it looks like on a diagram. The ground lead can be identified rather easily because the same symbol is always used.

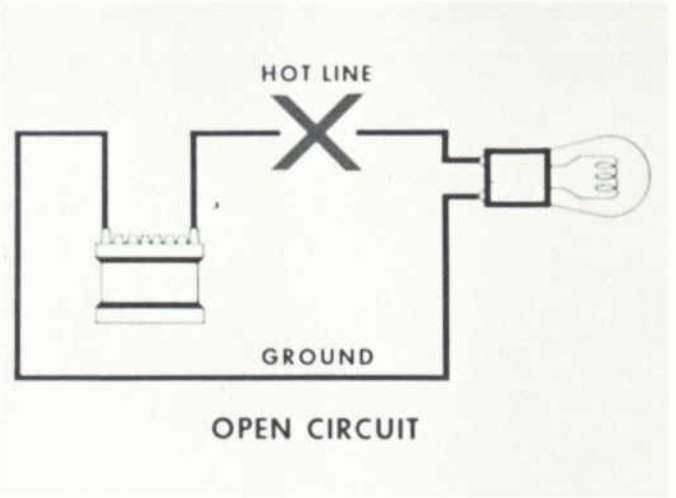


Every circuit is grounded someplace. You'll often find the ground symbol located right near a light or some other part. The electrical path goes from the part — in this case, a light bulb — through the socket and through a short ground lead that's attached to the body or frame right by the part.



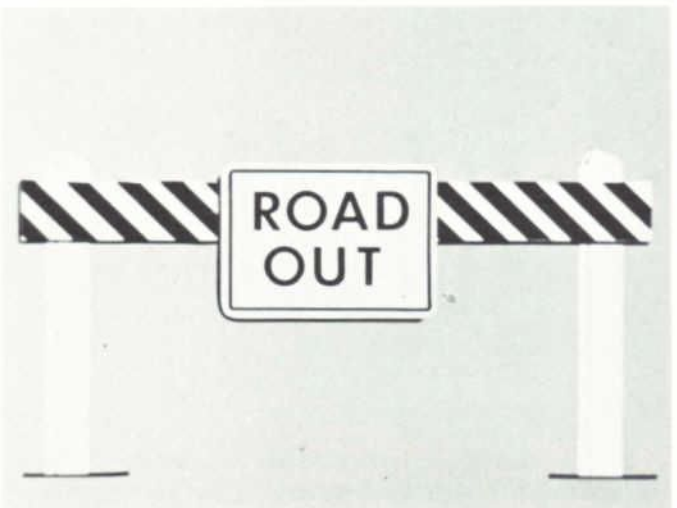


Remember, we made a point of telling you that there must be a complete path for an electrical round trip in order for a part to work — just as a driver must have a complete path to get to his destination and back.

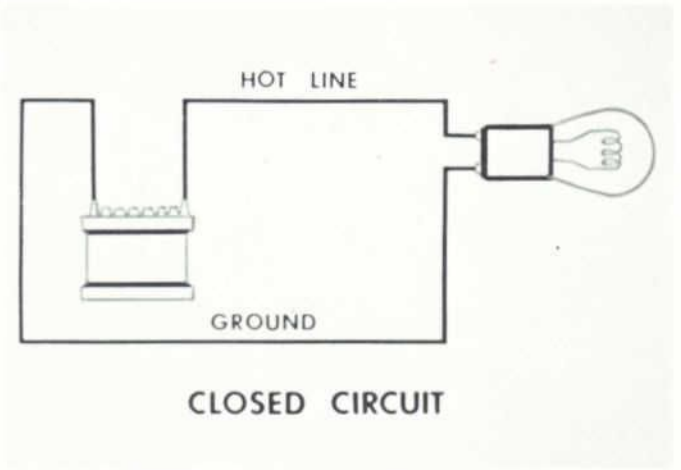


This is called an *open* circuit, because the connection is not complete. The break in the hot line blocks the electrical current from getting from the battery to the part and then back to the battery.

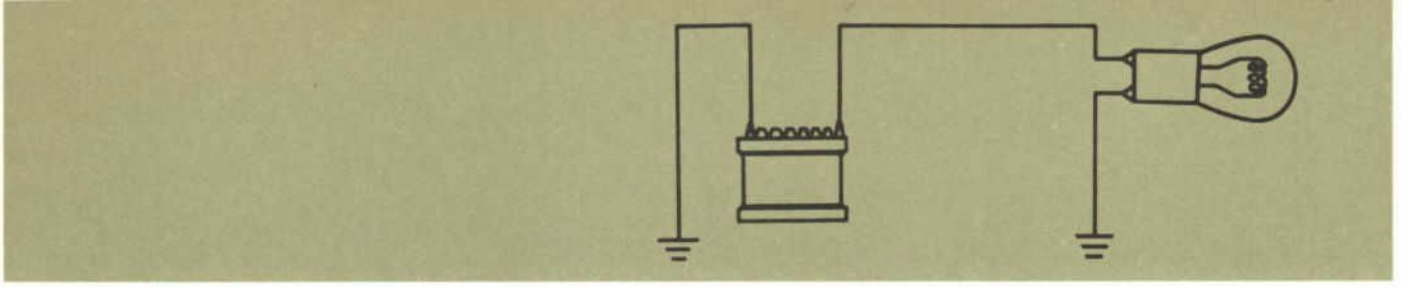
OPEN CIRCUITS



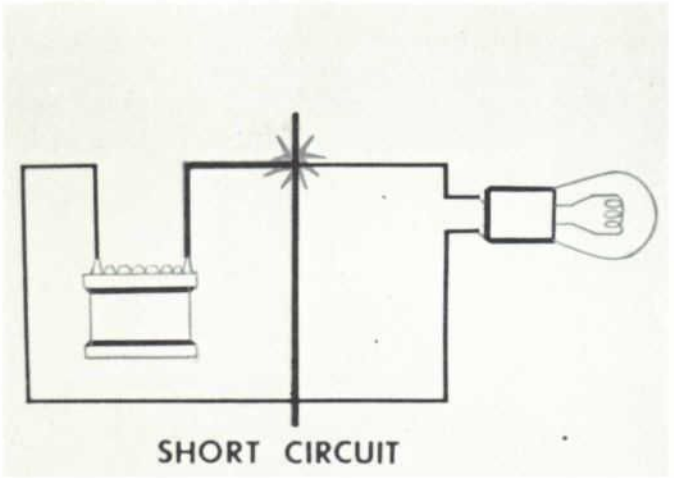
Now, suppose the driver encounters this sign. His path is blocked. In an electrical system, something similar could happen to a circuit — a break in the line.



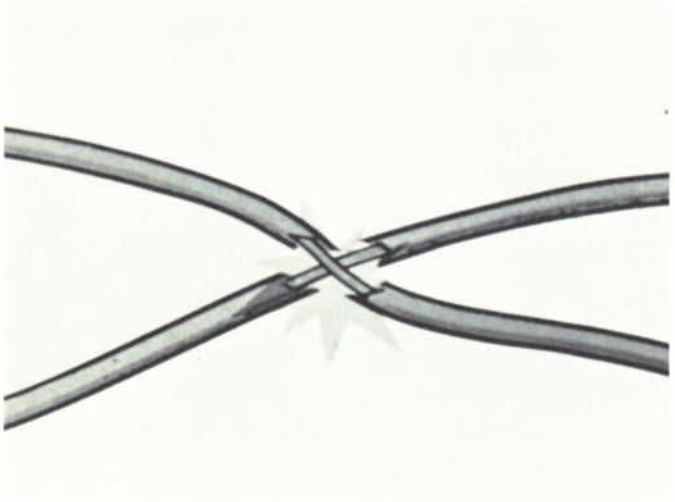
A circuit must be *closed* in order for the part to work. Otherwise, its electrical path isn't complete.



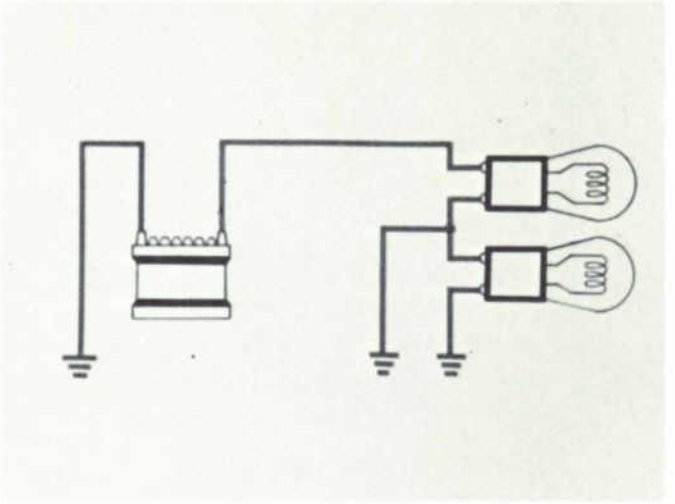
SHORTS



Here's a situation where the path seems to be complete, but something's wrong. The path doesn't go all the way *to* the part. This is called a *short circuit.* The path falls *short* of its intended destination and electricity will take the shortest path it can find.

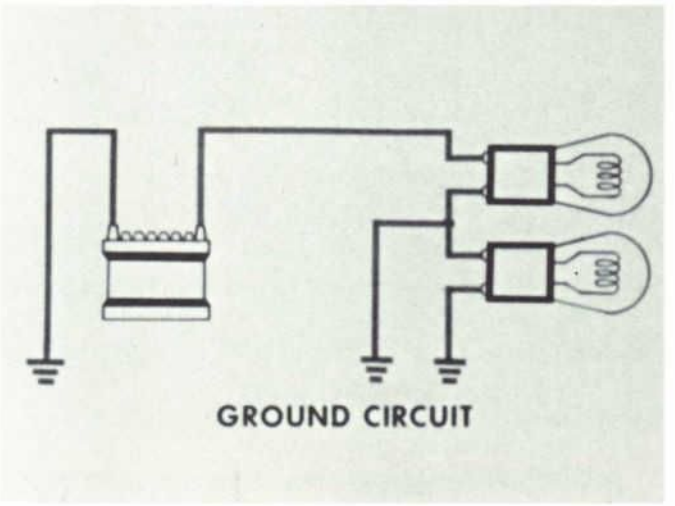


Generally speaking, a short circuit occurs on the hot line. The insulation on the wires wears through, and bare wires touch; the electrical path detours from its intended course. When something similar happens on the ground side of a circuit, it's a grounded circuit.

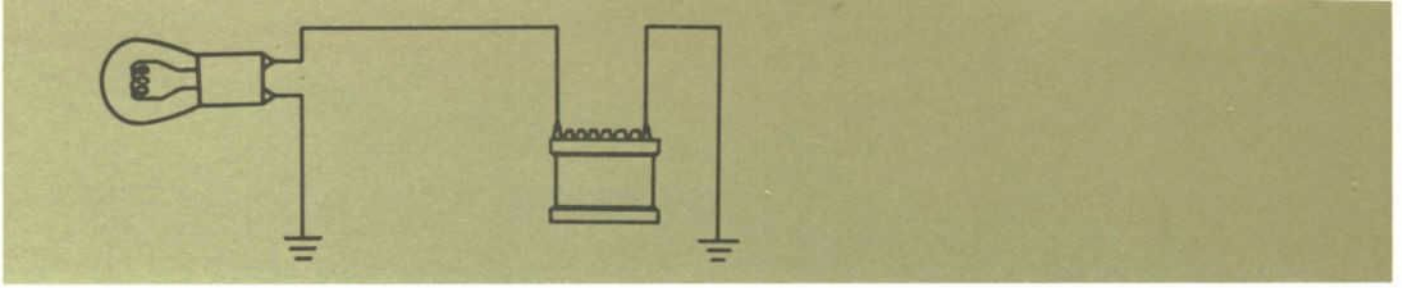


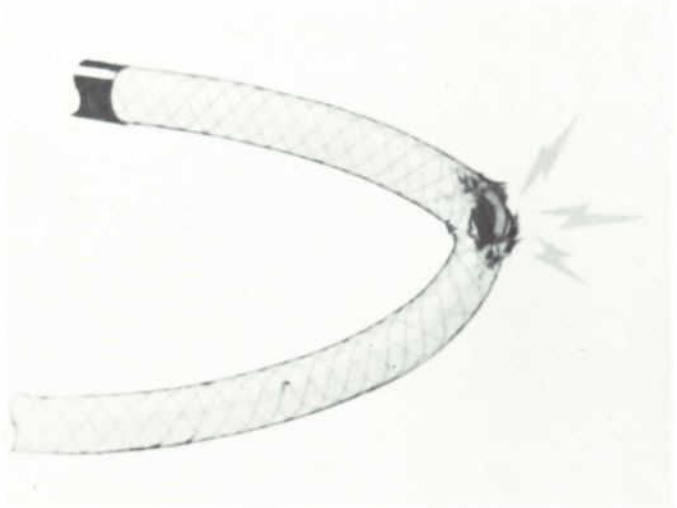
Here's how it might happen — two lights are powered by the same hot line, then the circuit is grounded.

GROUNDED CIRCUIT



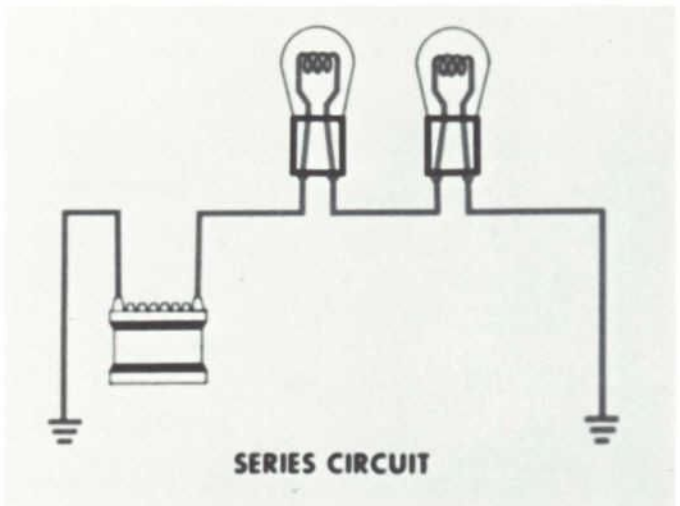
The electricity finds a shorter path to ground. The circuit is grounded — before it reaches the second light.





This might happen if, say, the insulation wore through and the lead touched bare metal.

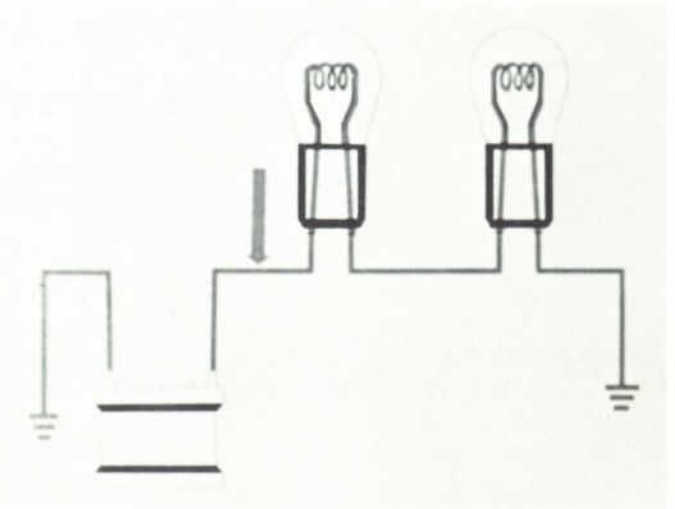
There are two types of circuits that can be used to provide power for more than one part . . . series circuits and parallel circuits. Both provide power for two or more parts, and may be either single wire or two-wire circuits. Let's look at these, one at a time.



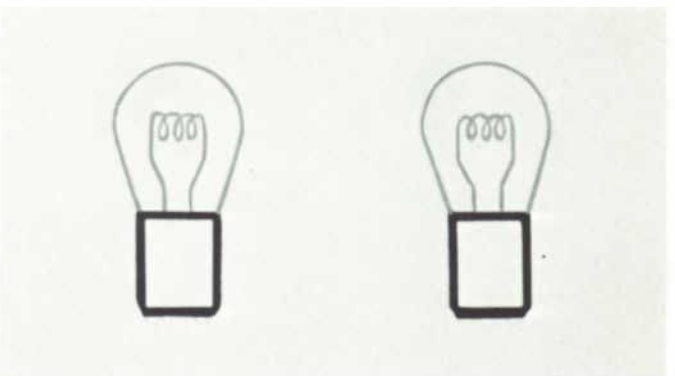
Here's an example of a series circuit. We've made it a single wire circuit, because the single wire circuit is more common on a car's electrical system. You notice that *two parts* — in this case, lights — are powered by the same hot line.

SERIES OPEN CIRCUITS

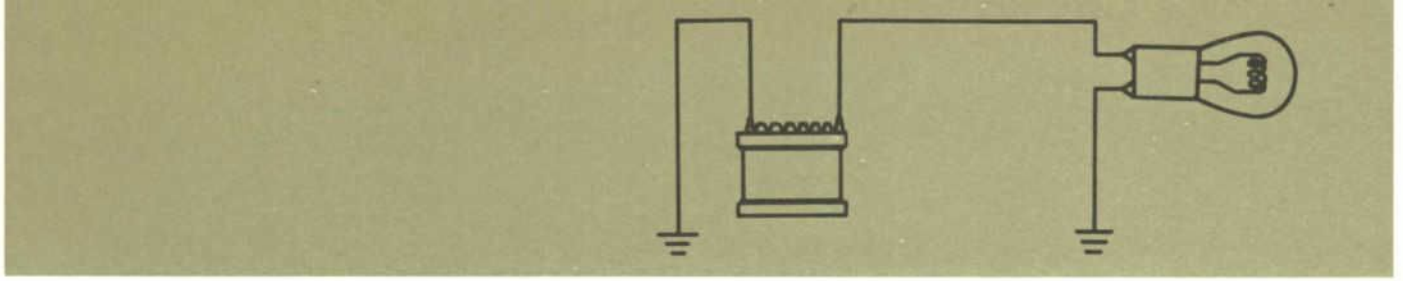
This is how the power travels in a series circuit. Power is sent *through* the first light to the second one, then the electricity goes back to the battery. It takes only one ground connection for both parts. If the entire path is complete, both lights will work.

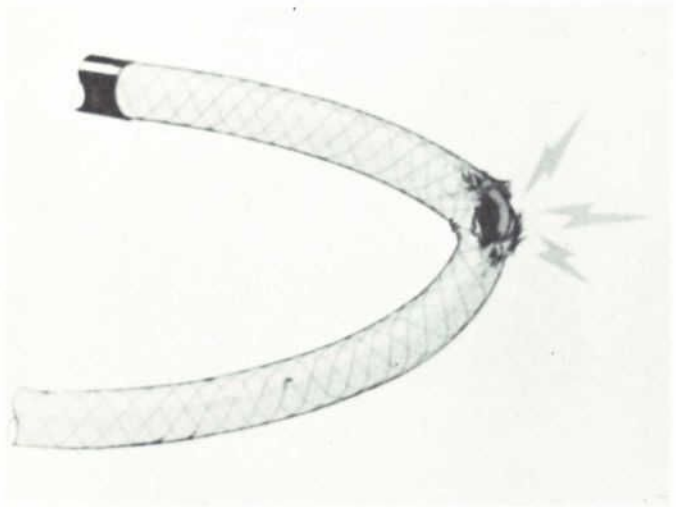


Now, suppose something happens, making this an open circuit. There's a break *here,* between the power and the first light. Both lights would not work, because the *path* is not complete.

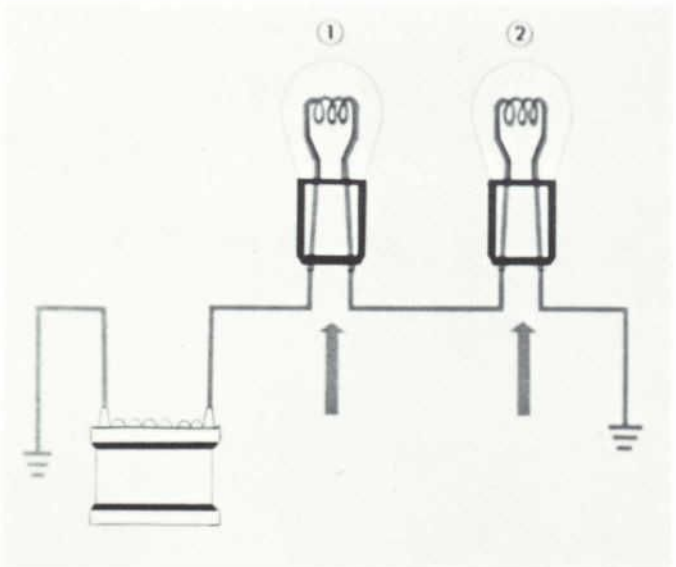


Consider what happens when a light bulb burns out. A break in the tiny wire, called a filament, means the bulb won't light. If that light is on a series circuit, it means the entire circuit goes out. The electrical path is broken. It's an open circuit.



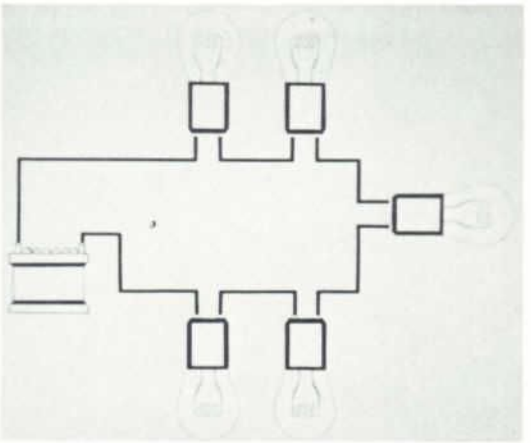


Suppose the light marked *number 1* burns out. Light number 2 won't work because there isn't a complete circuit. There's a break at number 1. Light number 2 *depends* on light number 1 for its supply of power.



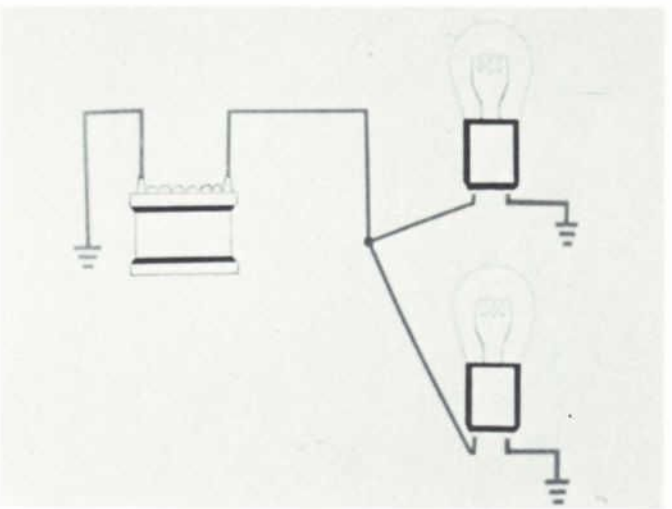
And light number 1 depends on light number 2 for its connection to ground.

All parts that are connected in a series circuit depend on each other. The failure of any one part will cause the entire *series* of parts to fail.

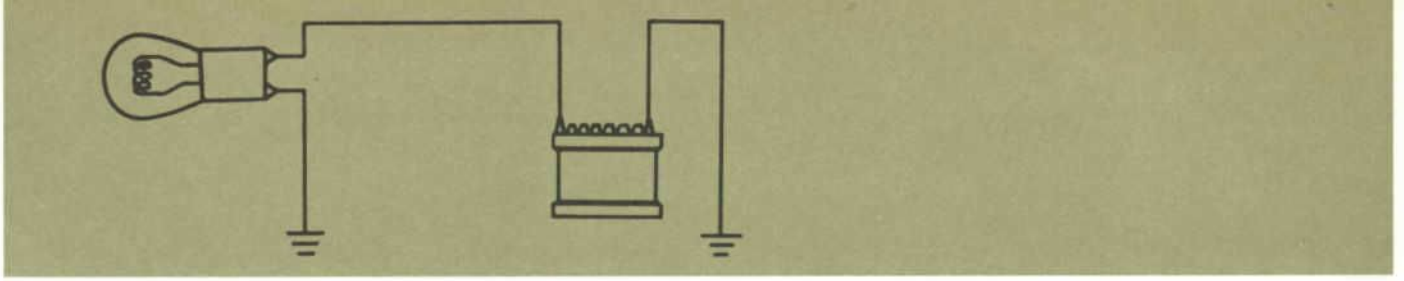


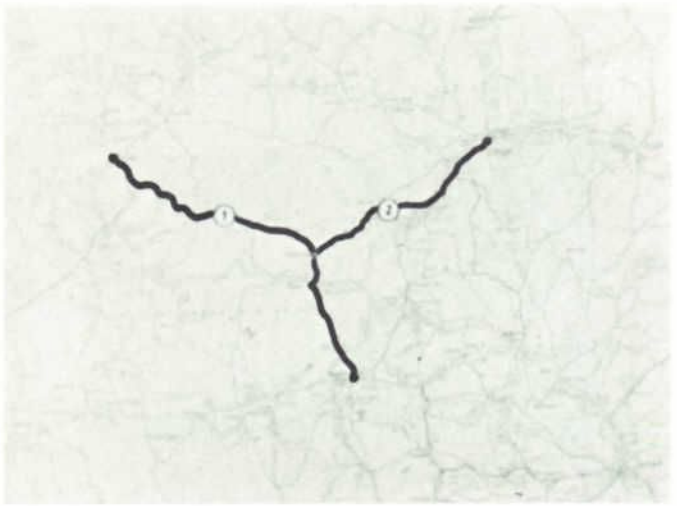
BREAKS IN PARALLEL CIRCUITS

That's one of the important differences between a series circuit and a parallel circuit. On a parallel circuit, there's a *branch* in the hot line. It feeds power to two or more parts, and the parts *don't* depend on each other for their power supply.

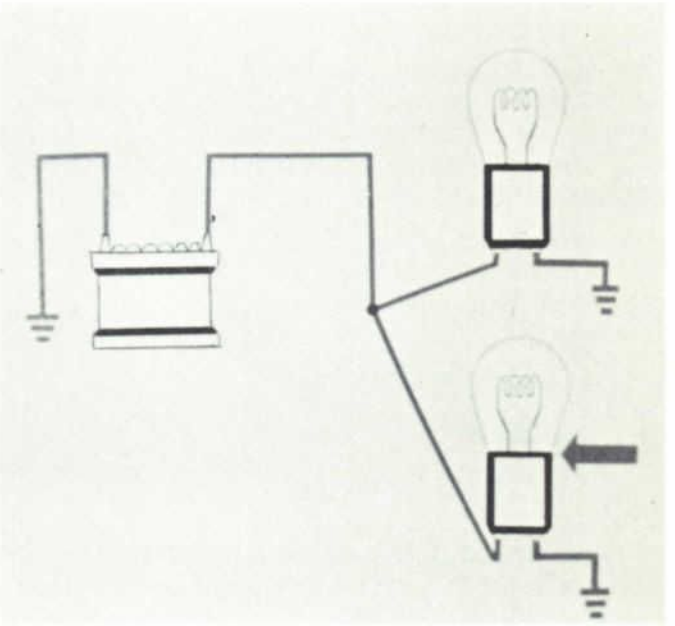


This is how power travels in a parallel circuit. The hot line *branches* before it reaches either part. In effect, this gives us two complete circuits . . . one for one light, and one for the other. This means either one of the lights may work, even if the other is burned out. That is, it will *if* its own path is complete.

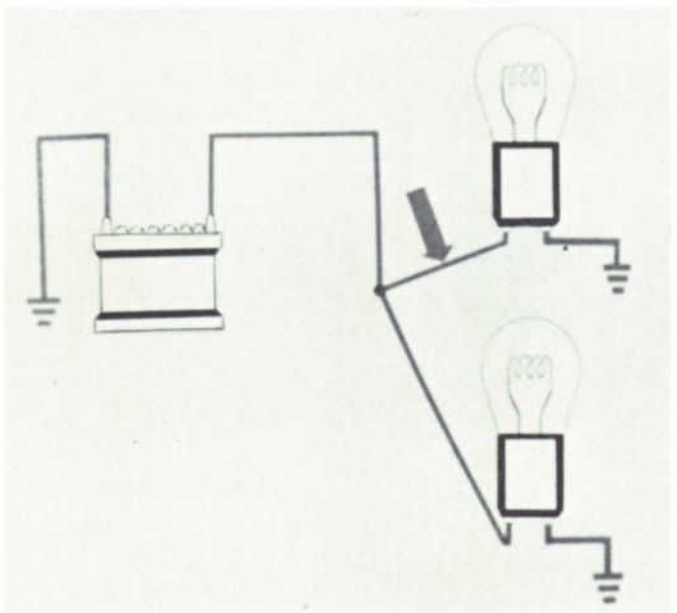




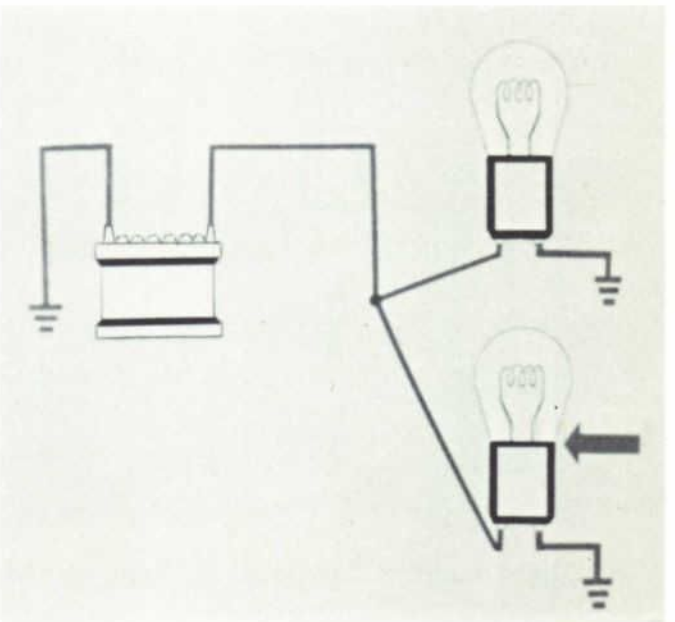
You can think of each part as having its own hot line, something like this example from a map. Highways 1 and 2 branch off at a certain point to go to different places. But until that point, the same road is used for highway 1 and highway 2.



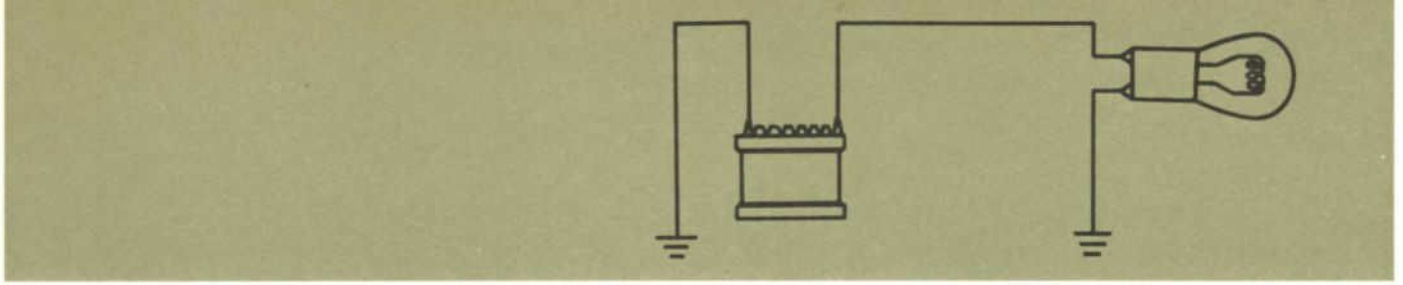
Suppose there's a break in the lower parallel line. The second light isn't working.

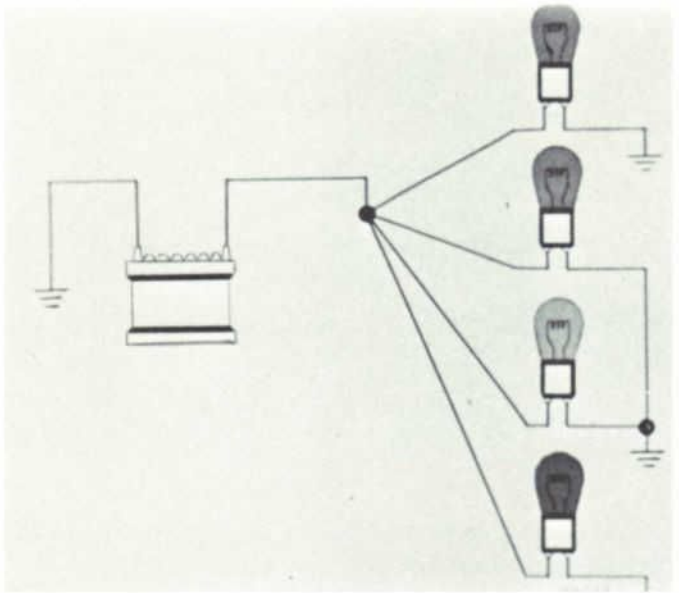


That's what would happen on the parallel circuit shown here if just one of the paths were blocked — say at the arrow. The other light would continue to work. It's not affected by a failure on the top parallel line.

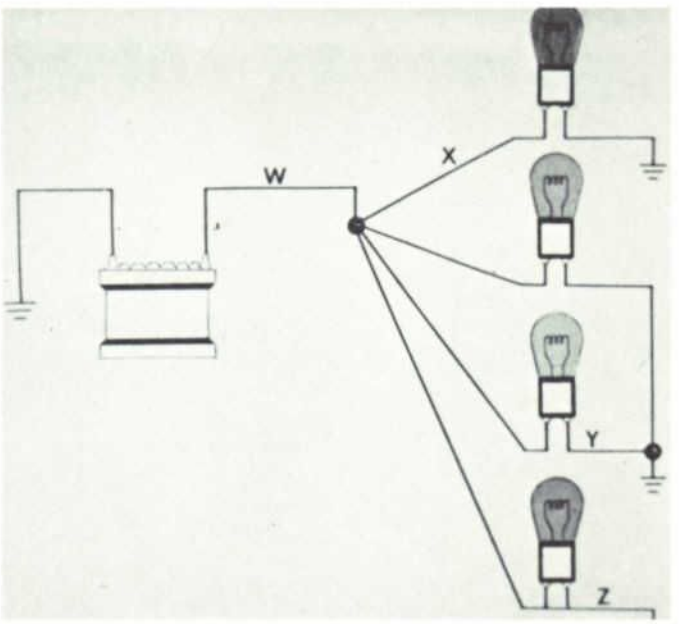


The top light will not be affected by a failure on the lower parallel line. It will continue to work, even though the lower light has quit.

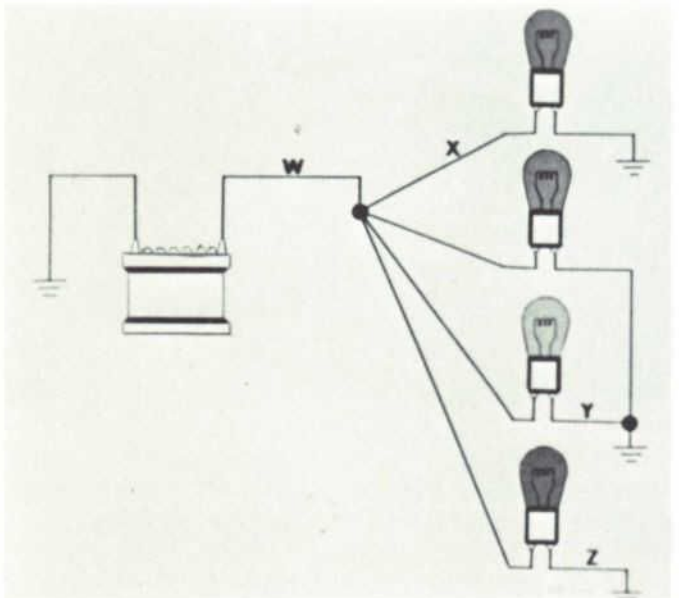




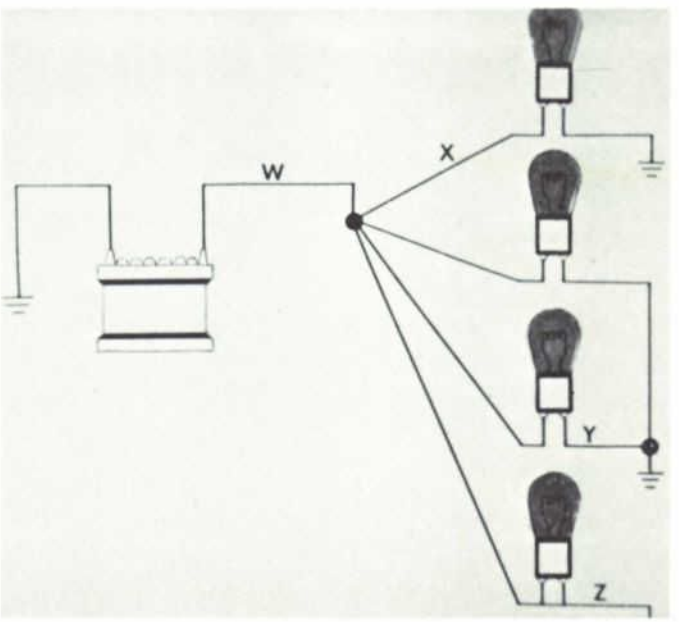
Theoretically, we can build up any number of parallel circuits on a single hot line, and the failure of any one part would not affect the others. Certain types of lights are designed so that when one bulb burns out, the others keep on burning.



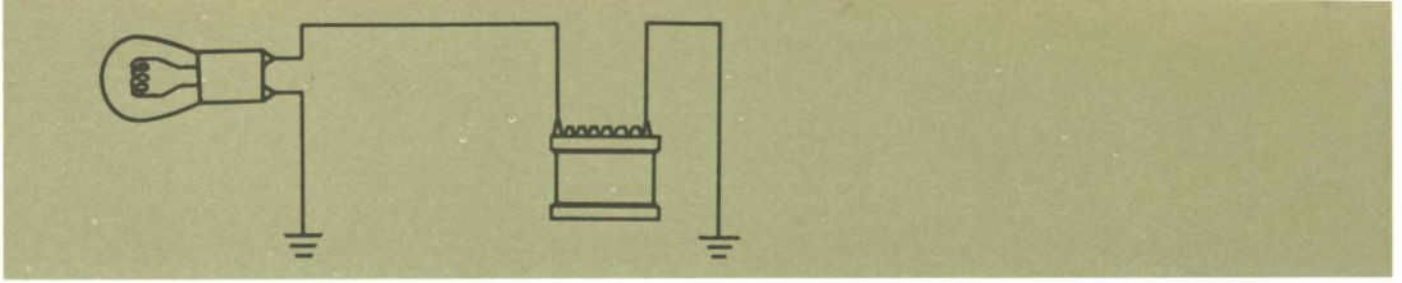
A break at X would mean that the top light would go out — the other lights would continue to work.

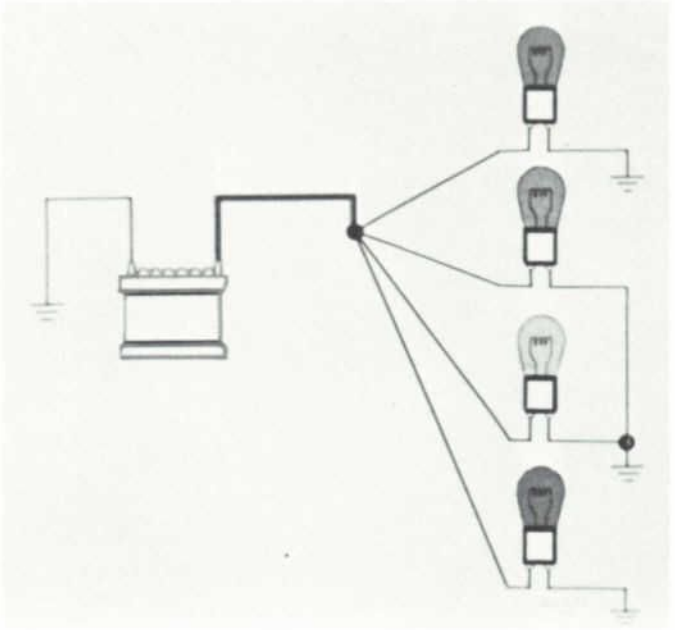


This is a parallel circuit that powers four bulbs. We've added some letters that represent possible breaks in the circuit.



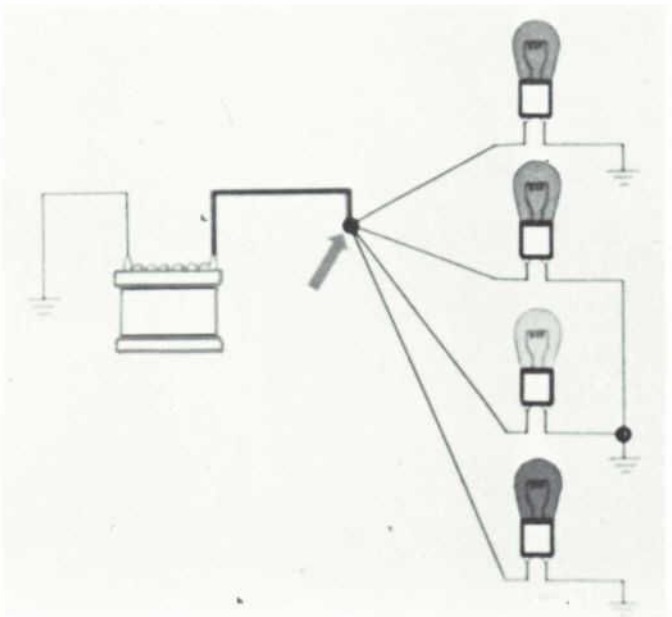
A break at W would cause failure of all four parts . . . because they all receive power through that point in the circuit.



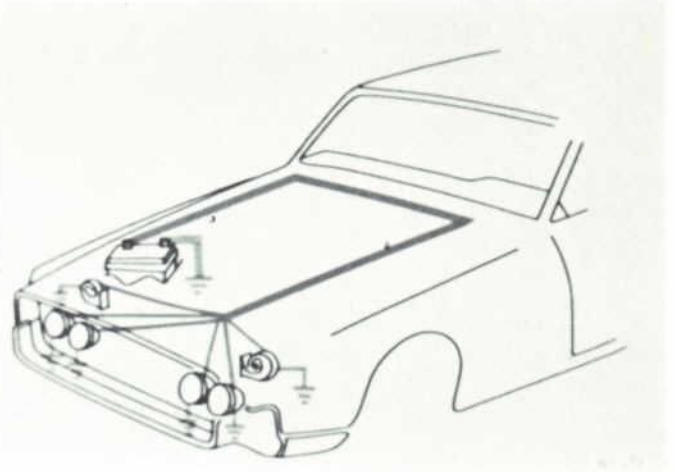


All four parts have *this* portion of the circuit in common. They all depend on it to receive power.

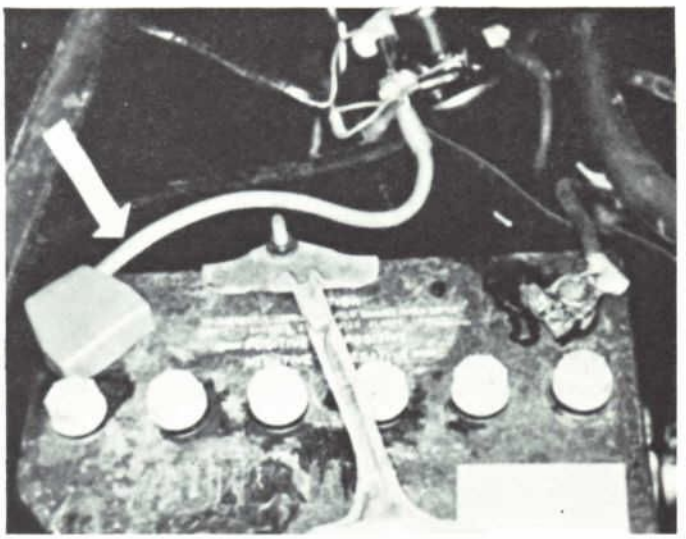
COMMON POINTS



There's a special term used for the point where a parallel circuit branches . . . it's called the *common point.* You'll hear a lot about common points as this book continues.

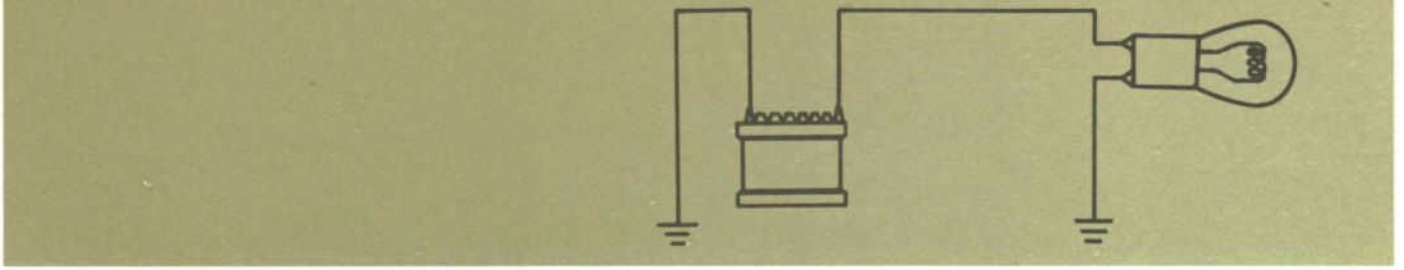


A car's electrical system has many parallel circuits and, therefore, many common points.

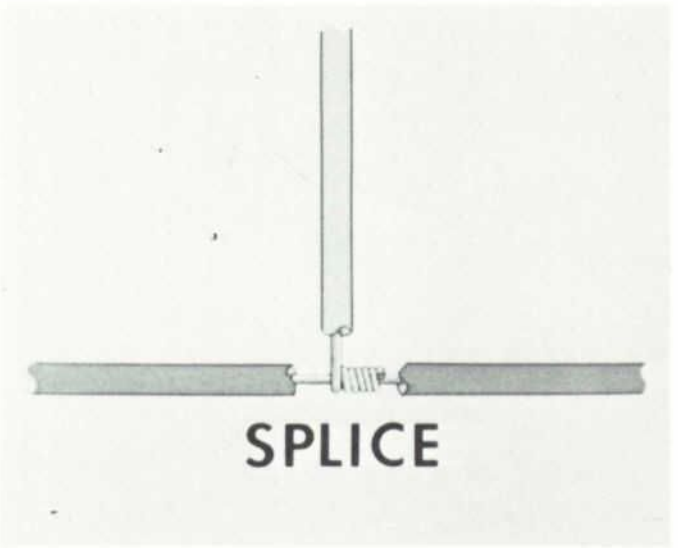


There seems to be a single connection at the battery. It starts out as one path that feeds power to many different parts.

Like a tree with many branches, the electrical system of a car branches, too. Only its branches are called *parallel circuits.* And the points at which the circuits branch off are called *common points.*

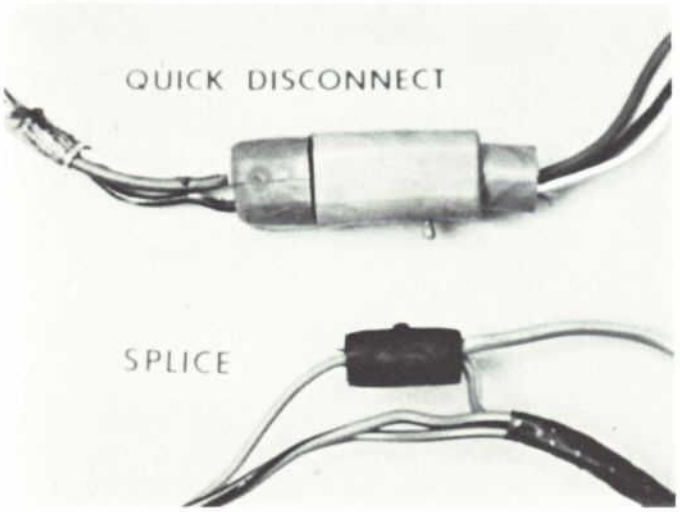


This completes the first half of Ready Reference Book. You can now do the first half of the workbook.

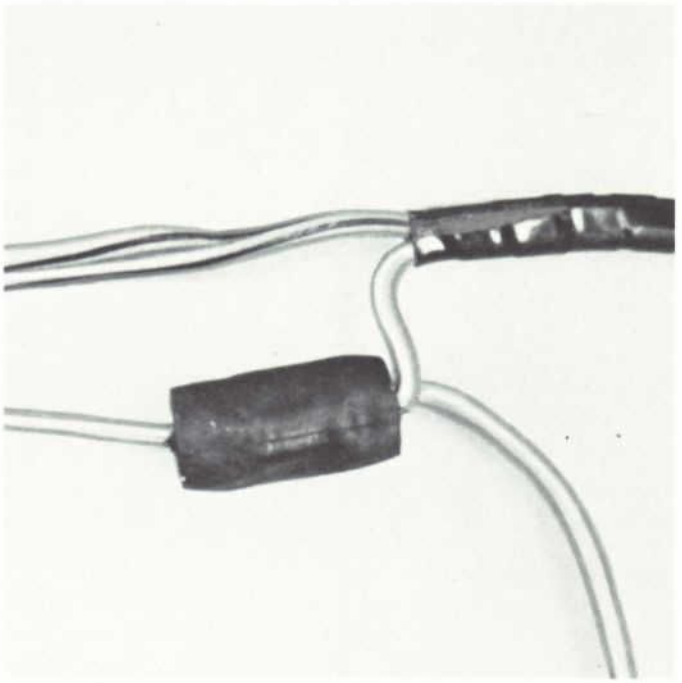


First, the *splice.* Two or more wires are joined together electrically and physically at a certain point. This means electricity flowing through the one wire branches when it reaches the splice, feeding power to the other wires.

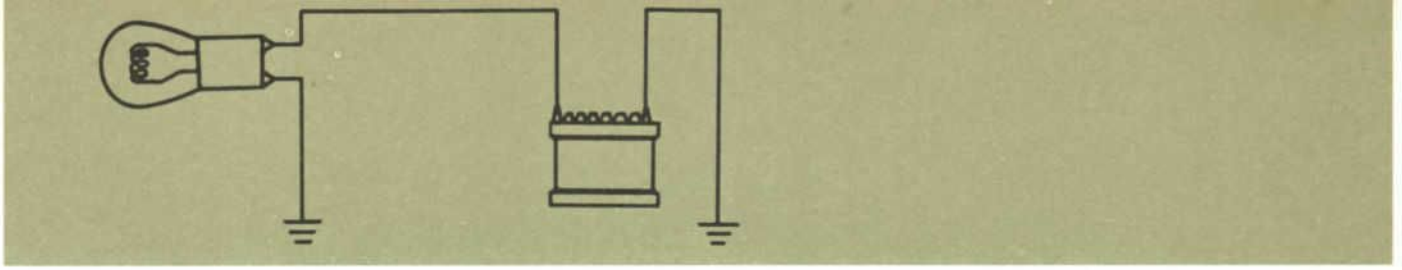
SPLICES

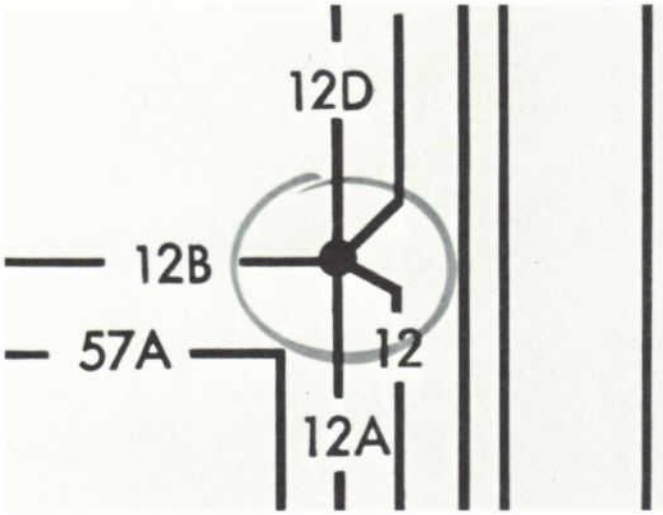


There are two kinds of connections that may be common points. One is a *splice,* and the other is a plug called a *quick disconnect.* Let's look at these, one at a time.

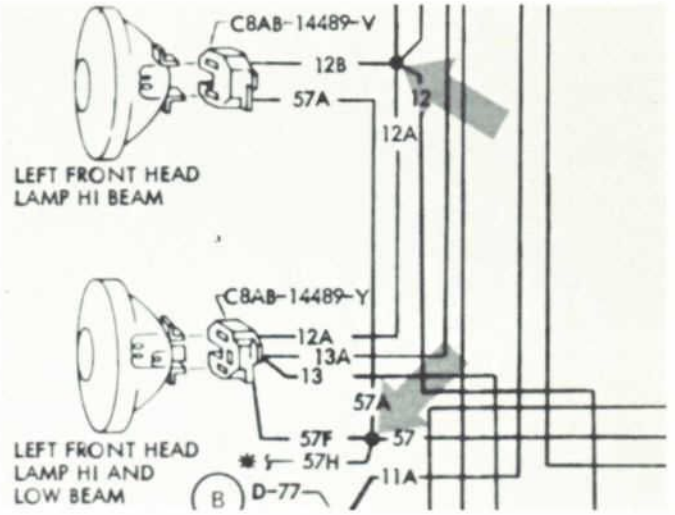


This is what an actual splice might look like if you had to locate one on a car.

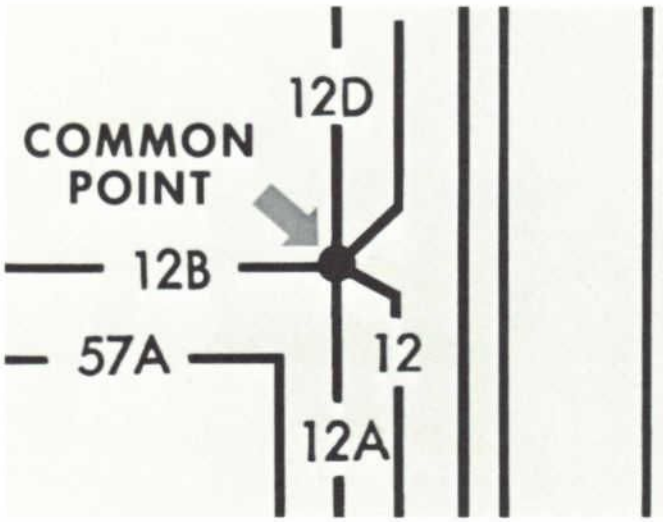




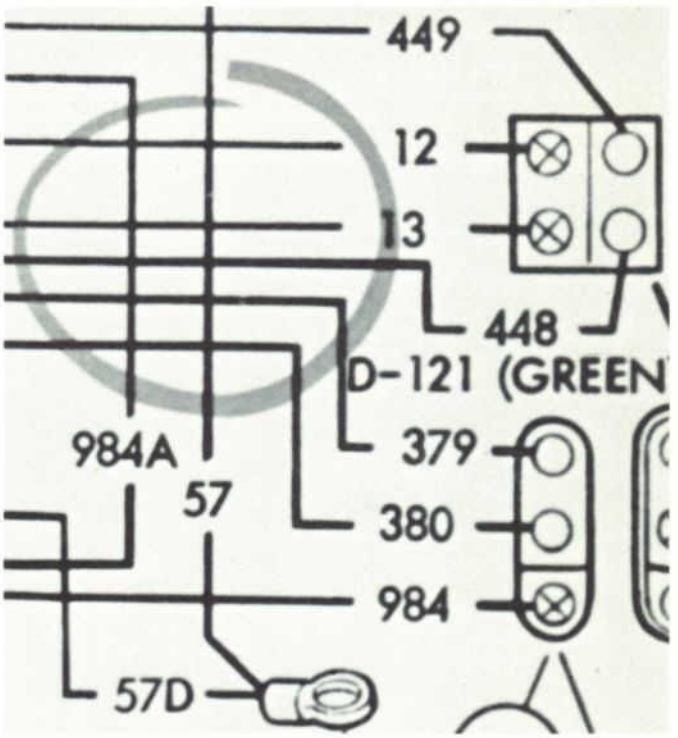
And here's what it would look like on a diagram. A heavy black dot is the symbol used to mean "splice."



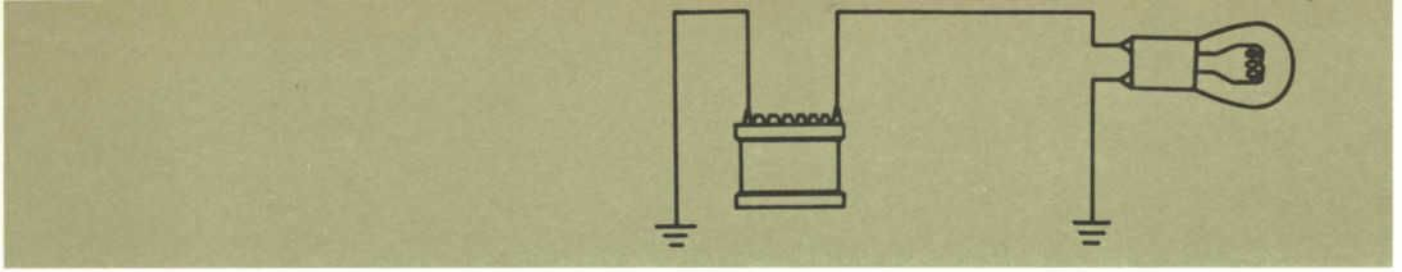
There are two splices shown on this diagram.

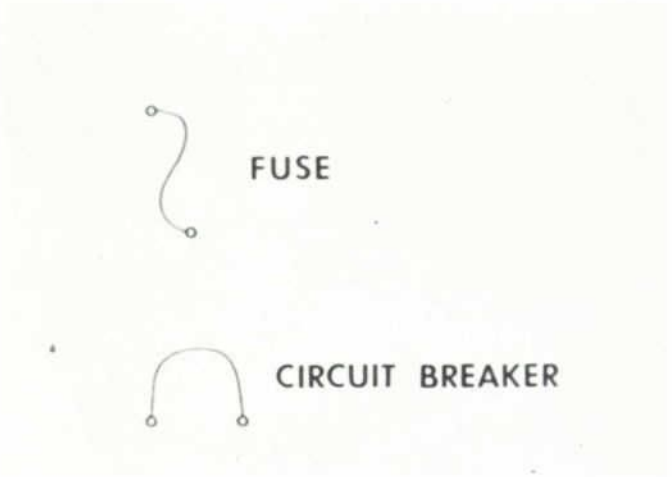


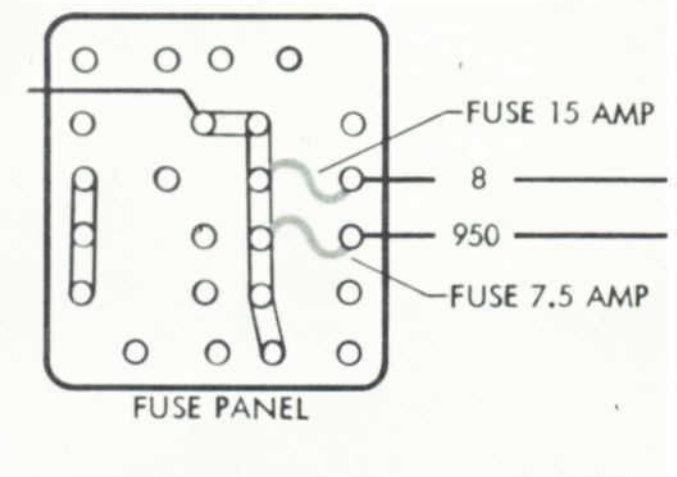
A splice is always a common point. Whenever you find the splice symbol on a diagram, you know you've found a common point. You've also found a parallel circuit . . . a circuit that branches from a common point so that it can feed power to two or more different parts.



You may have wondered if a splice was meant here. No, because there isn't a black dot symbol. The lines are drawn this way just for convenience — to save space on the diagram. The wires cross each other, but they aren't connected, electrically or in any other way. A splice is indicated only when the wires are connected to each other at that point. There isn't any connection here.



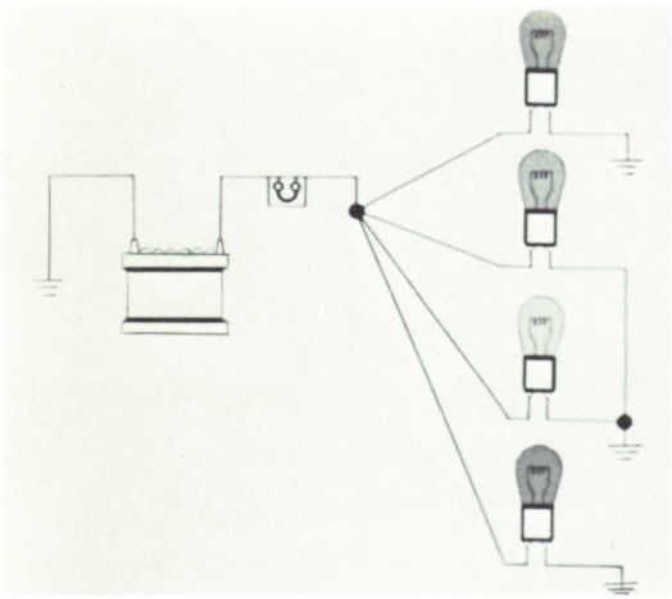




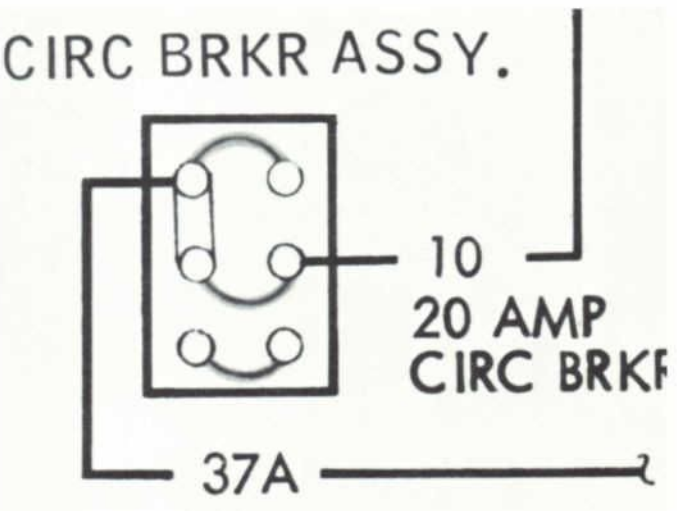
FUSES AND CIRCUIT BREAKERS

Briefly, we'd like to show you two more symbols that will appear on your wiring diagrams — the symbol that means "fuse" and the symbol that means "circuit breaker."

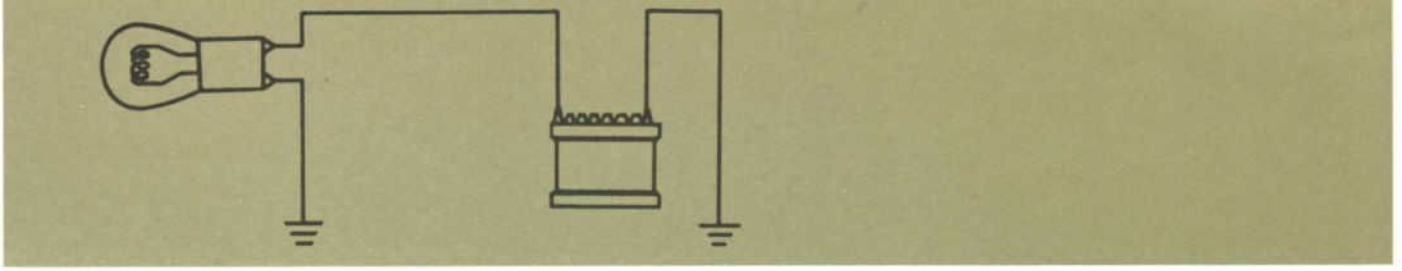
With a circuit that runs through a fuse, it's the fuse that blows out when there's an overload.

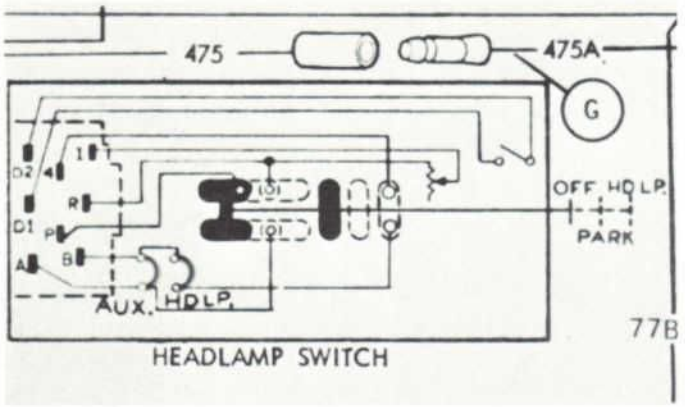


Circuit breakers and fuses are used when there's a possibility of a circuit overload — too much electrical current flowing through. This could burn out the lights, ruin switches or motors, damage other parts. Every circuit is designed to carry just so much electrical current — no more.

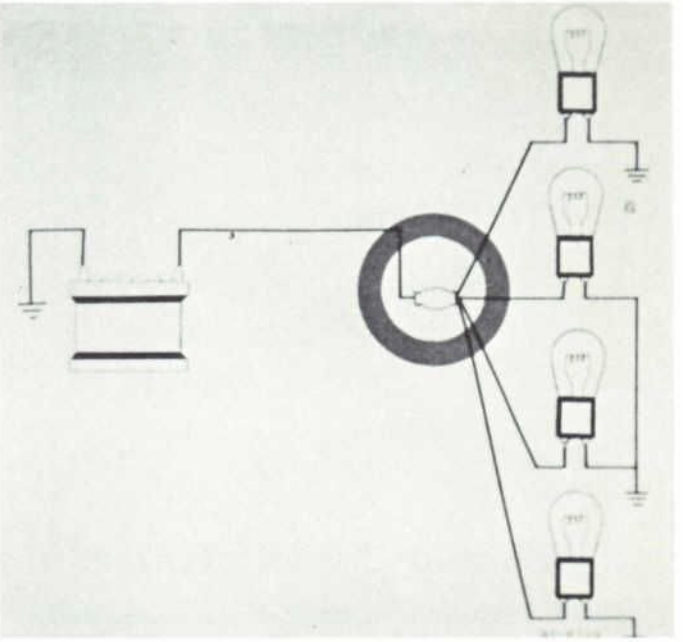


A circuit breaker works differently. It can open a circuit temporarily if too much current is going through. This keeps other parts from being damaged.

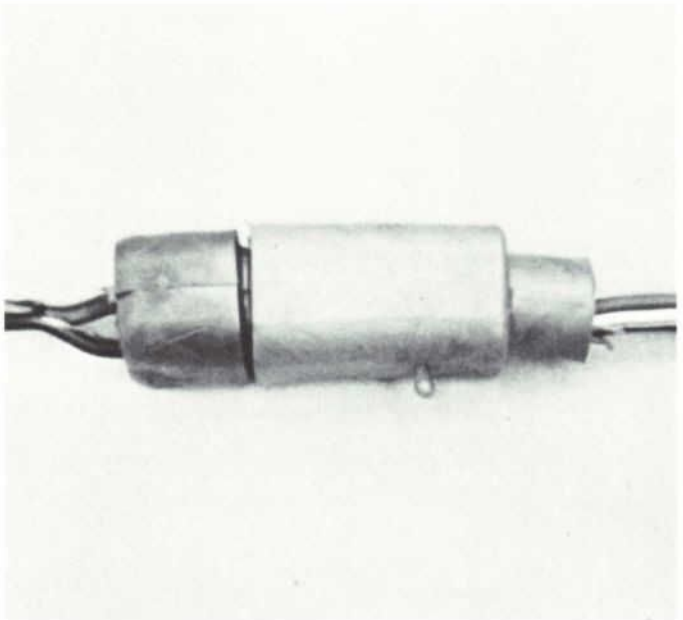




The switch in this diagram has a circuit breaker built right into it. You see the symbol for "circuit breaker" right inside the switch.

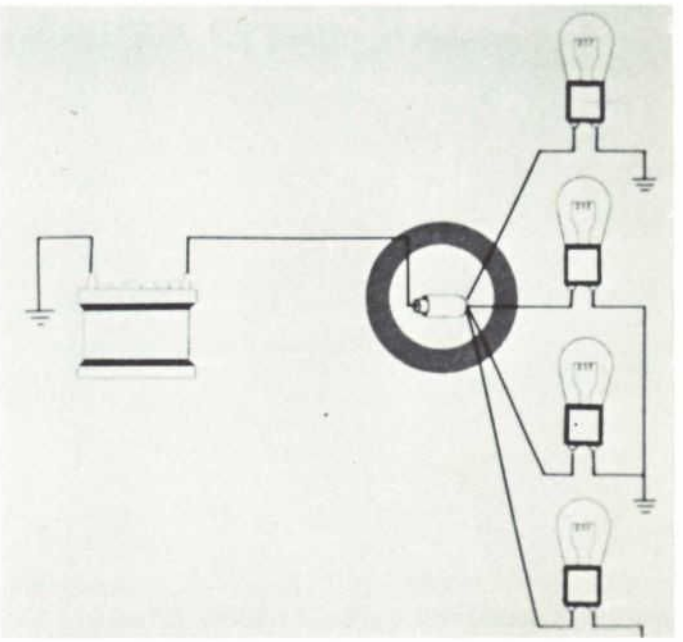


A splice could be used here . . . but such a splice might be difficult to maintain. Four separate wires spliced into one might make a weak connection.

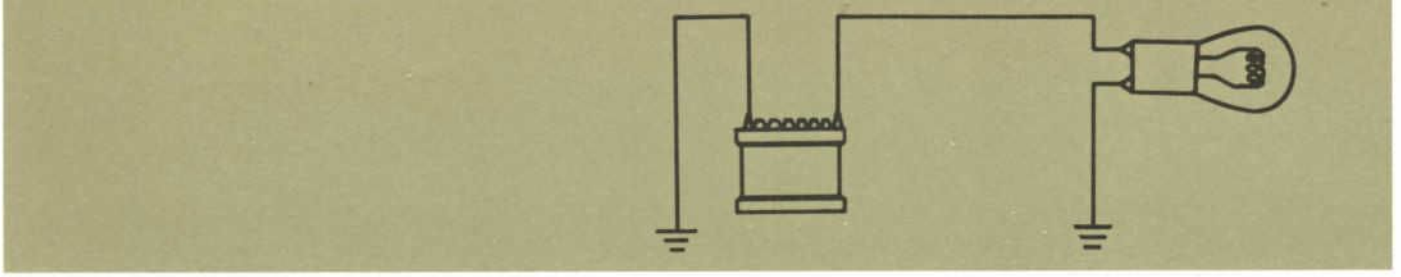


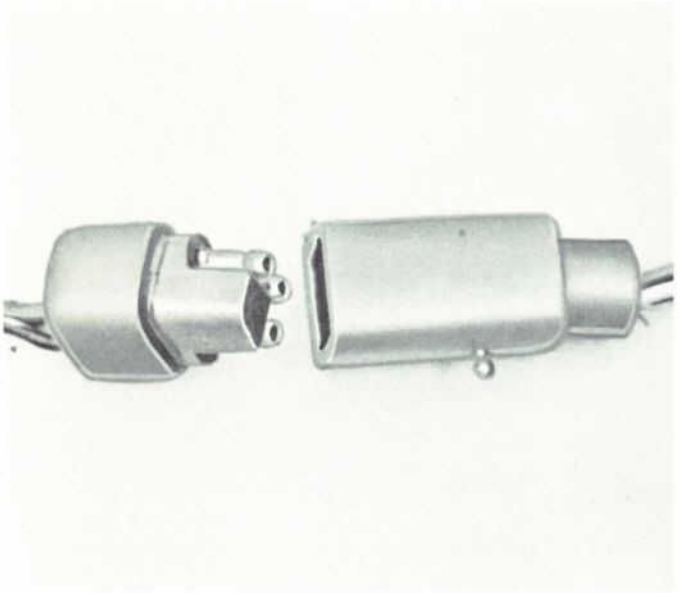
QUICK DISCONNECTS

Now, let's go back and look at the other kind of connection we mentioned. This *quick disconnect plug* may be used instead of a splice to connect parallel circuits. Or it may be used just to break up a lengthy line at some convenient point.

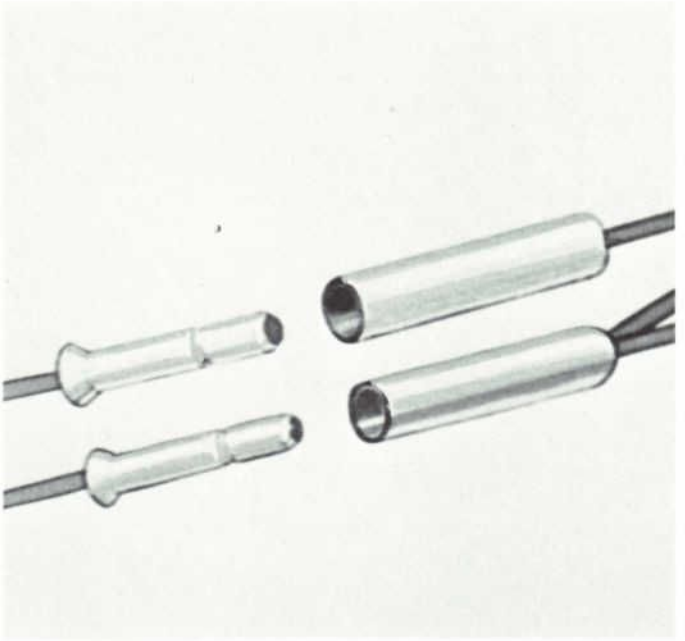


There are advantages to using a quick-disconnect. It makes for a sturdy connection; it's convenient and less expensive than a splice.

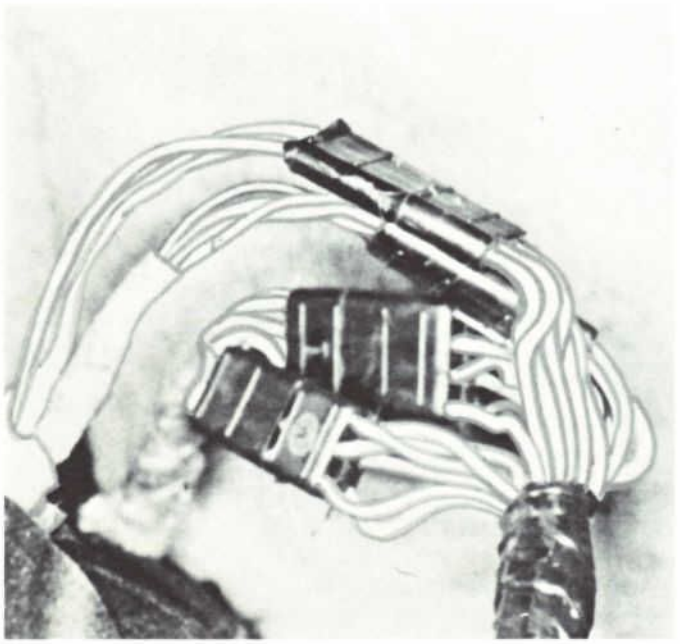




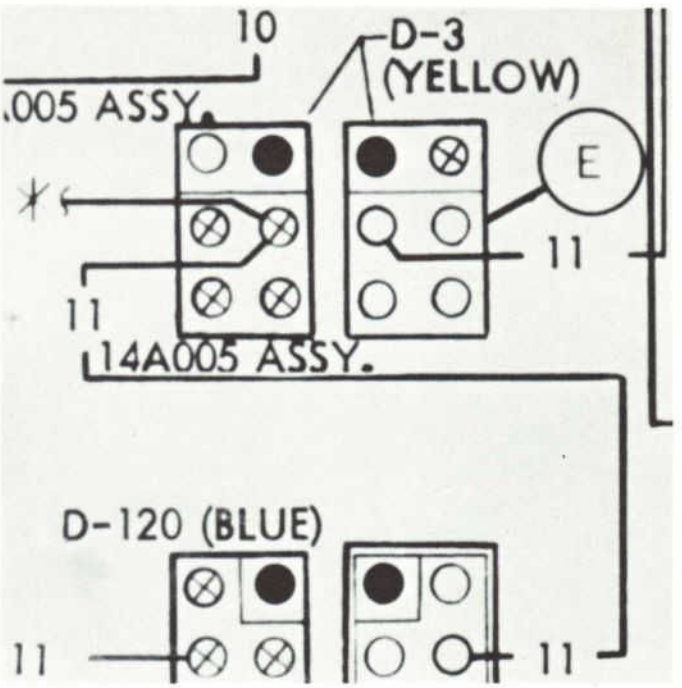
And it can be pulled apart quickly and easily for testing, replacement or repair.



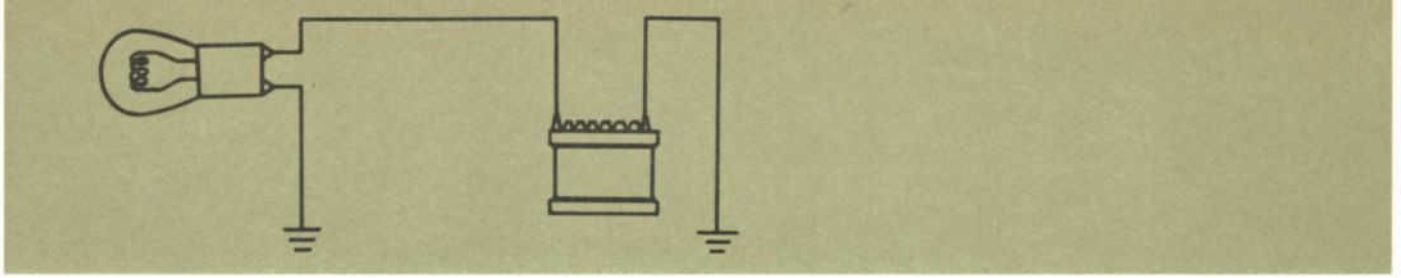
A quick disconnect plug may be used to connect parallel circuits . . .

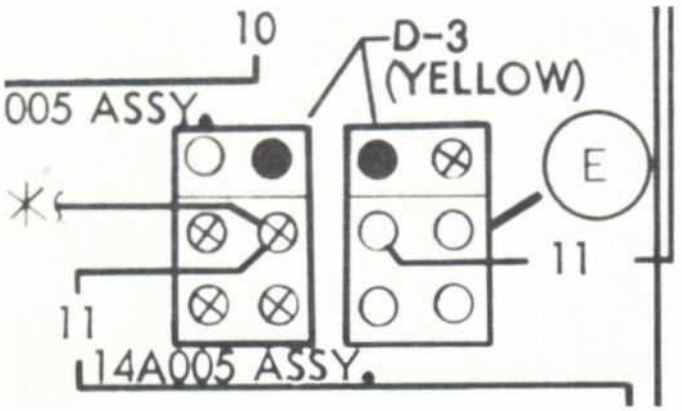


You'll find a lot of them when you start troubleshooting.

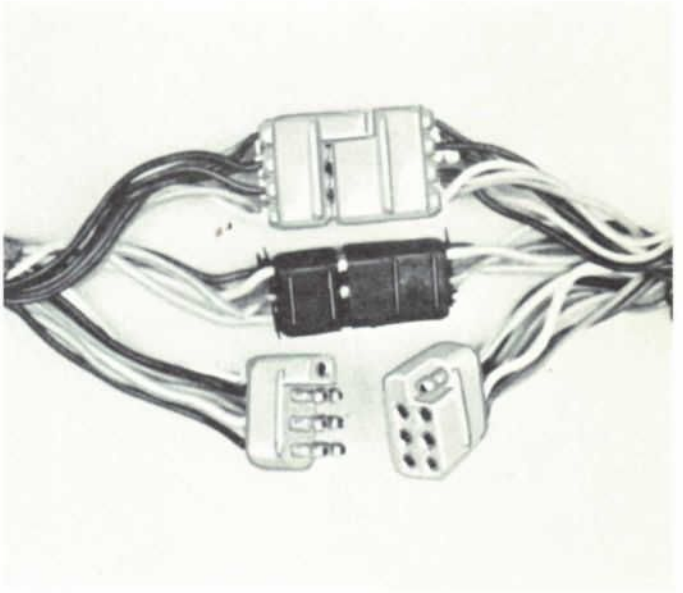


. . . or it may be used just to break up a long lead into convenient sections. Either way, it's a good spot for testing.



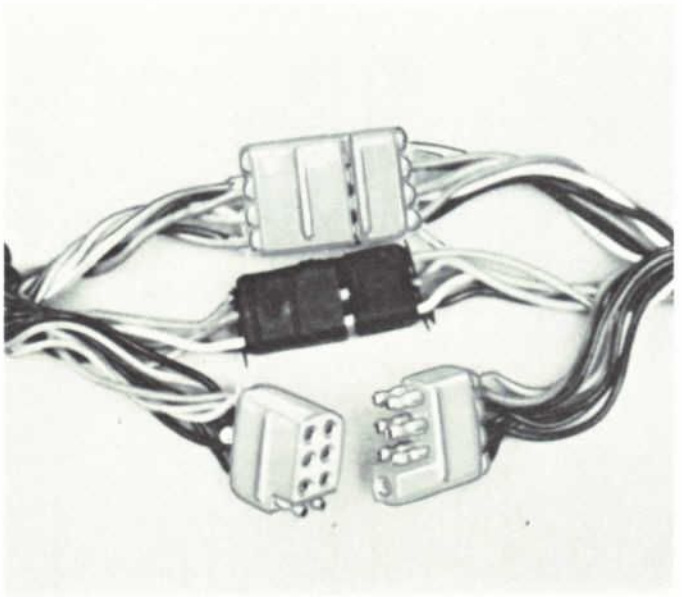


Here's a closer look. The letter E in the circle designates the quick disconnect's location on the pictorial diagram. The color of quick disconnect (E) is spelled out (yellow) as shown above.

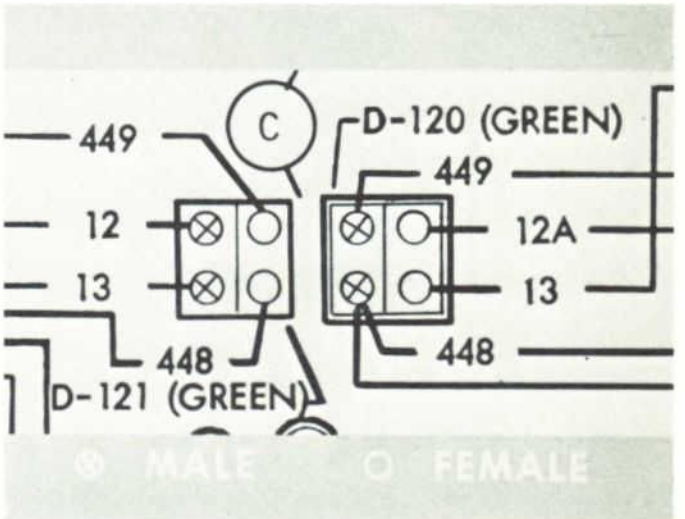


MALE AND FEMALE ELEMENTS

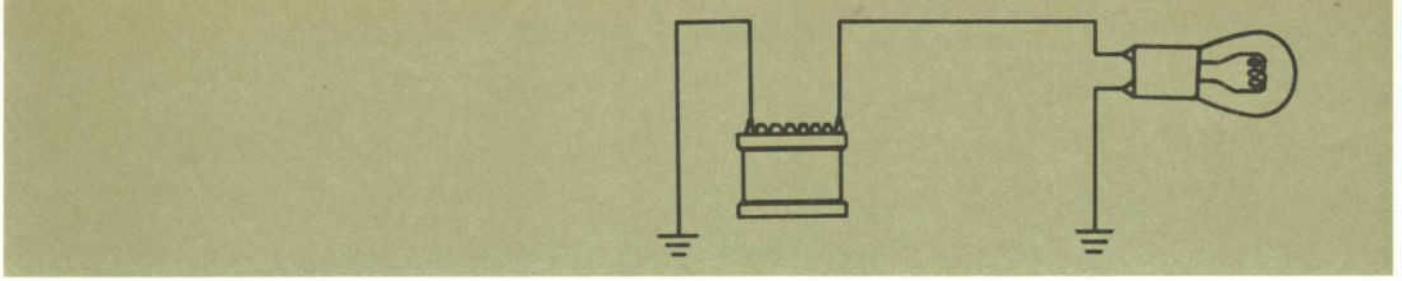
You've probably noticed . . . the X's and O's have a specific meaning. The X's stand for the elements that stick out, and the O's represent the holes they fit into.

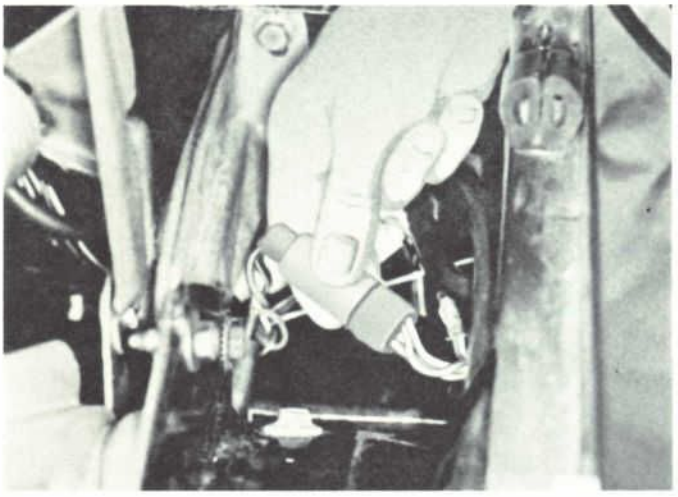


This shows the sides of the quick disconnect in an open book fashion — the two sides fit together when the plug is closed.

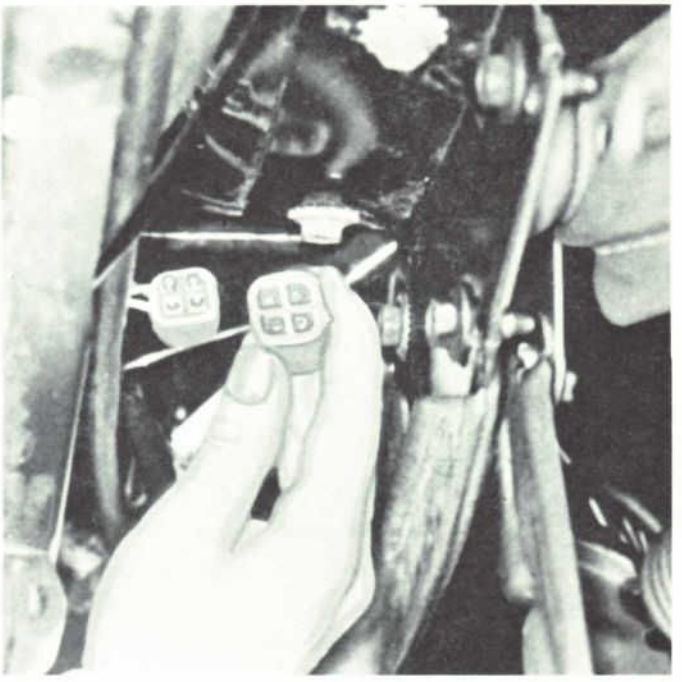


The elements marked with X's are called *male* elements, the O's are the *female* ones. You can tell by counting the X's and O's what a specific plug will look like. You can use this information another way, too.

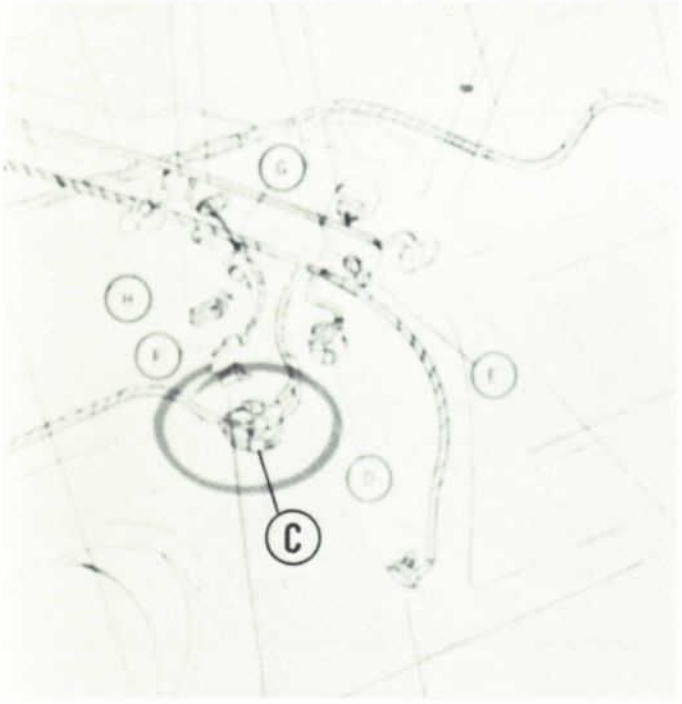




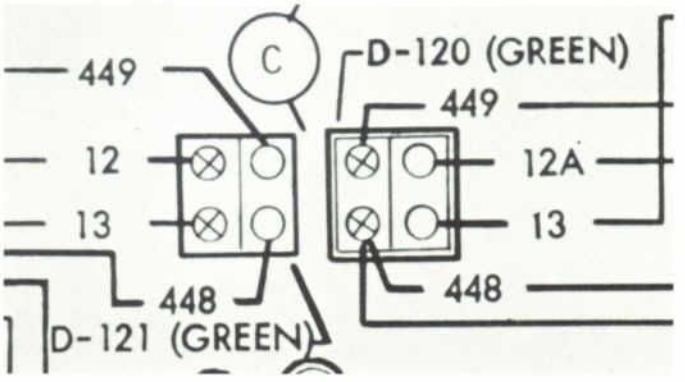
When you find a certain plug on the car and want to know which wires are connected to it . . .



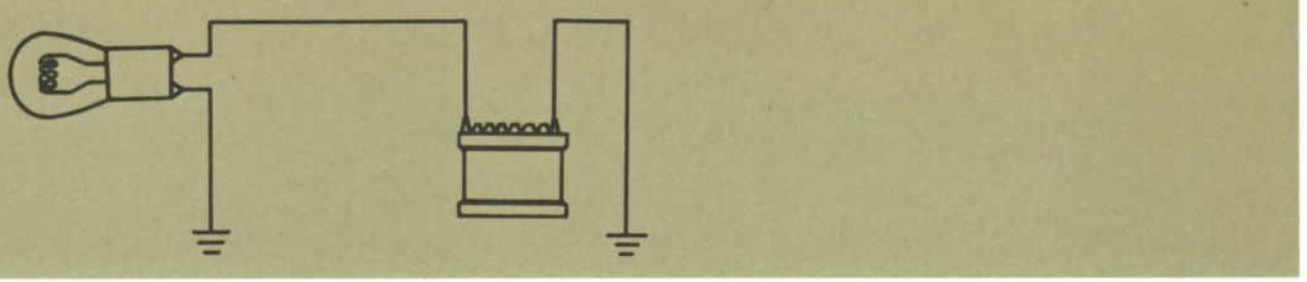
. . . and then find it on the wiring diagram — two males and two females on each side. This is how the quick disconnect plug would probably appear on a car.



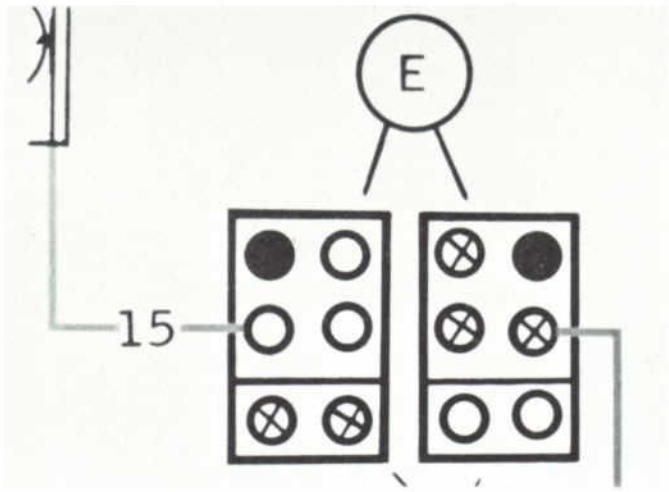
. . . you look for the picture of the plug on the pictorial diagram. The pictorial diagram is designed to give you "land marks" to go by when you're locating wires, quick disconnects or other specific electrical parts on a car. You note its approximate location and alphabetic designation on the pictorial diagram . . .



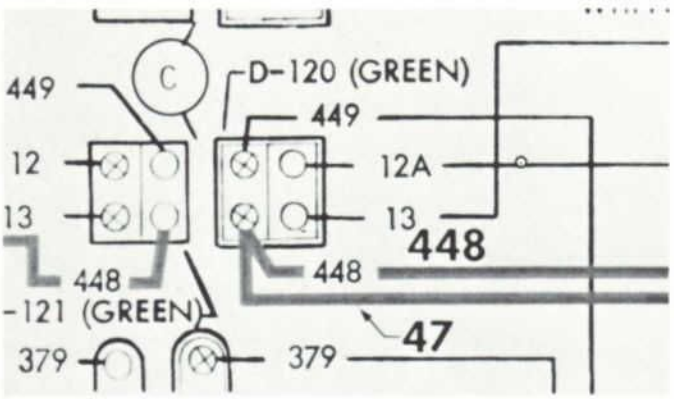
As you remember, we said a common point might be at either a splice or a point inside one of these plugs.



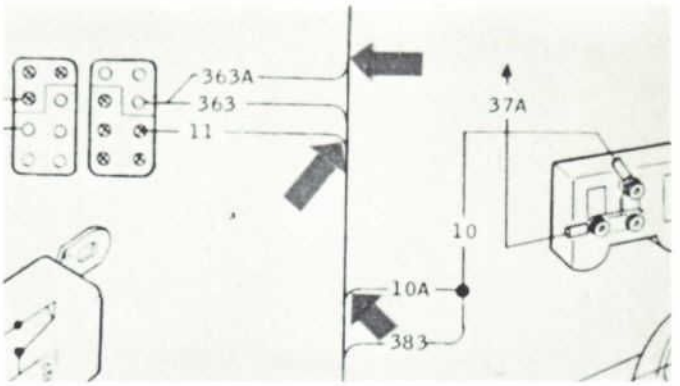
TYPES OF QUICK DISCONNECTS



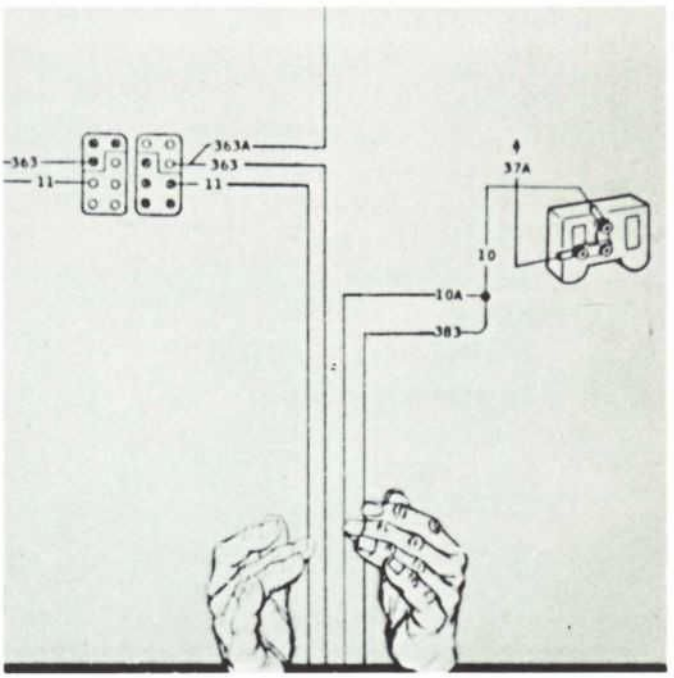
In this quick disconnect, wire number 15 comes into a female element and continues through the male one. There's only one wire involved.



This one is a little different. One wire comes in, and two continue. And the numbers aren't the same. Wires 47 and 448 are in parallel . . . Line 448 is their common route. And the point at which they connect — inside the plug — is the common point. There are two different wires involved now, and it's a parallel circuit.

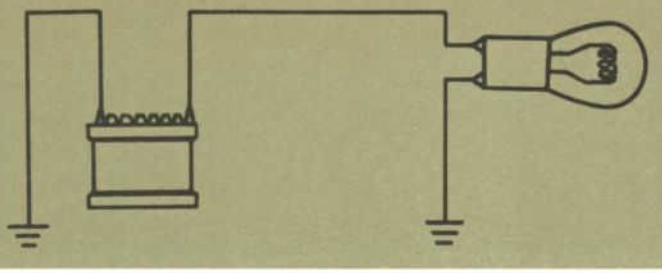


Before continuing, we'd like to point out a drawing style that is used on some diagrams. It makes it look as if the wires branch off from one lead — but they *don't*.

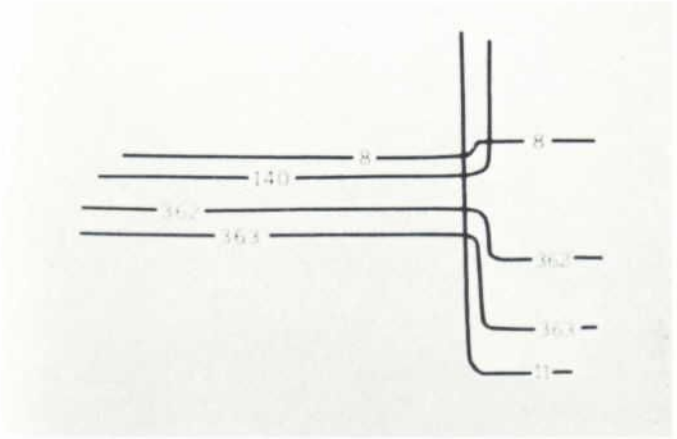


To emphasize that they don't meet and aren't connected electrically, we've drawn the same wires, only separately. *This* is what is meant by that diagram — that the wires are actually separate.

But to save space on some diagrams, they've been pushed together and shown as a single line. The same wires are still represented — the numbers tell us so.

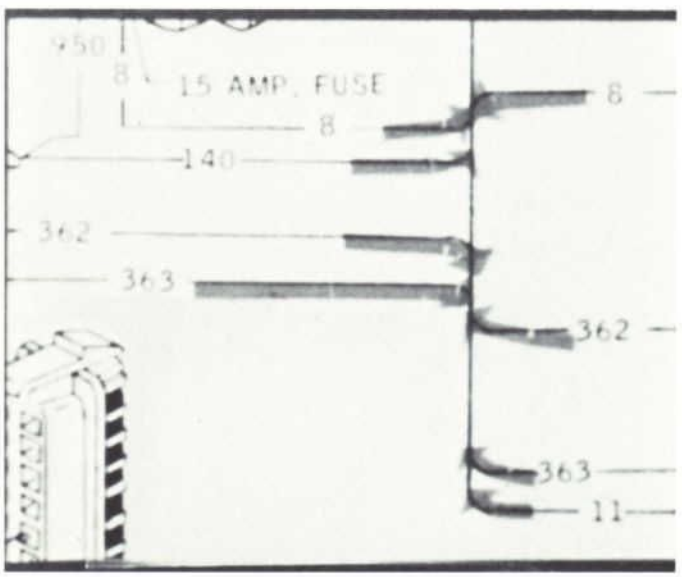


HINTS FOR TRACING WIRES THROUGH A DRAWING

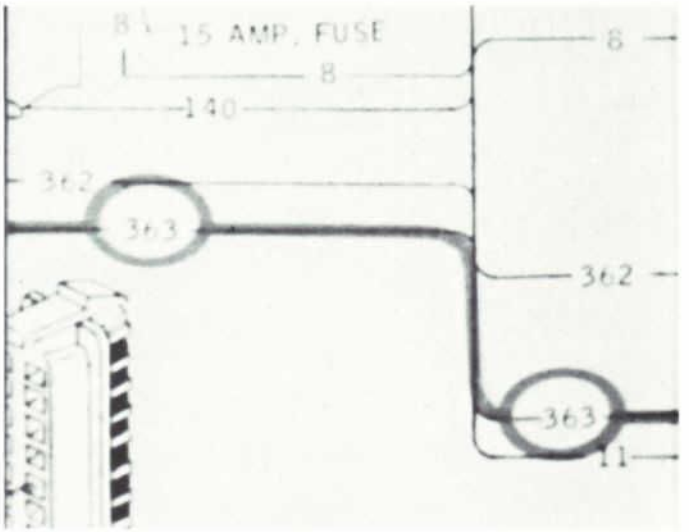


Now we're going to give you some *hints* about tracing wires through a drawing like this.

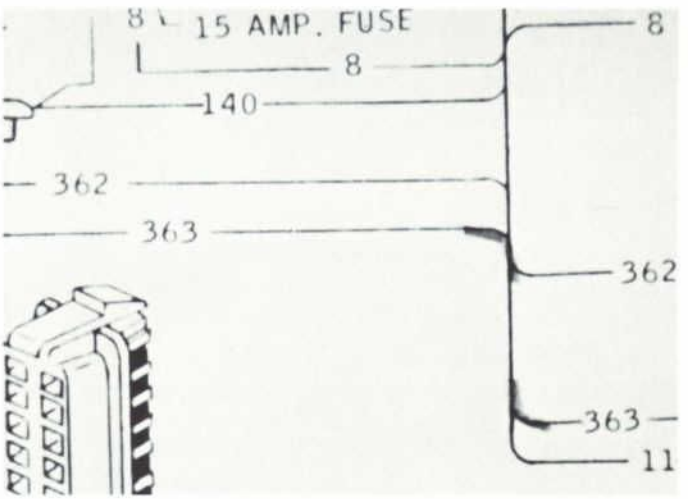
CURVE DIRECTIONS



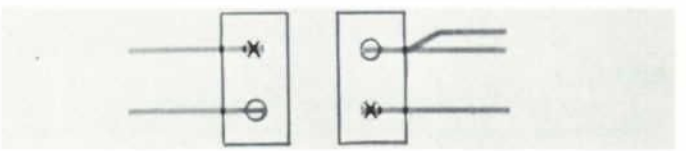
Notice that when each of the wires enter or leave this common route on the diagram, there's a definite curve towards one direction or another. There's a reason for this. The direction of the curve tells you where to go from here when you're tracing a particular path.



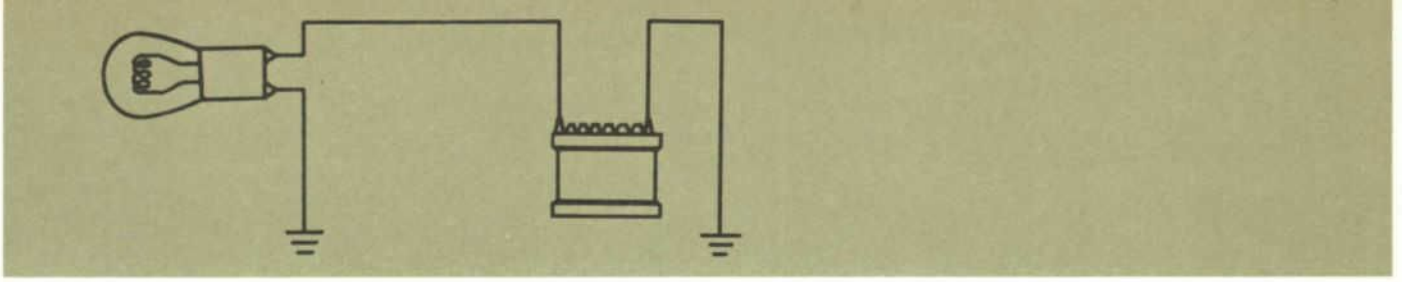
For instance, look at wire number 363. It enters the common line with a curve that goes down. You look a little further down . . . and you see 363 branch off again, this time to the right.

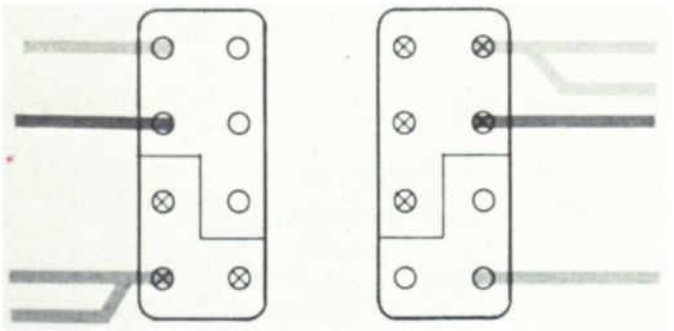


If you were tracing wire 363 from either direction, the curves would tell you where to go.



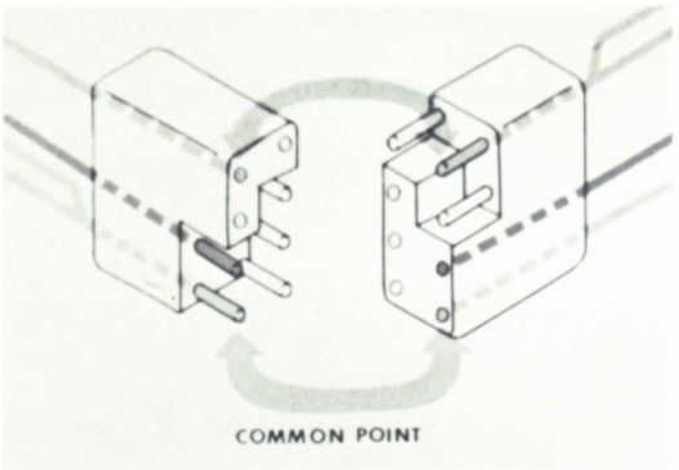
A parallel circuit is shown here. A wire comes into the plug and two wires continue. That's the mark of a parallel circuit — one that branches into two or more at a common point.



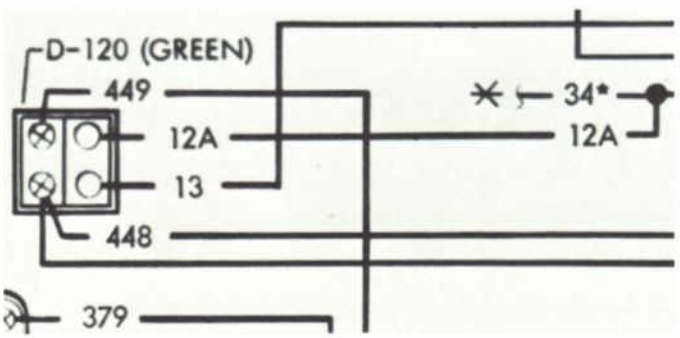


There are two parallel circuits, and two common points here. We see that four elements are involved — two male and two female elements.

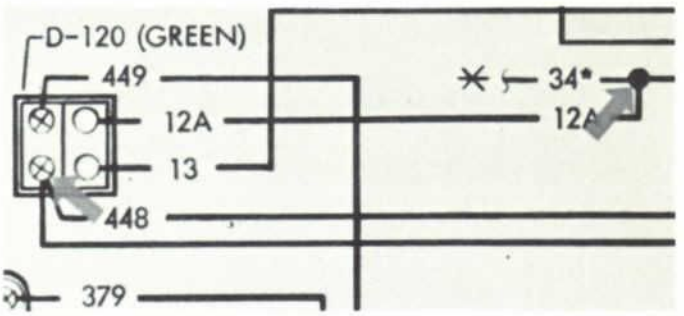
COMMON POINTS



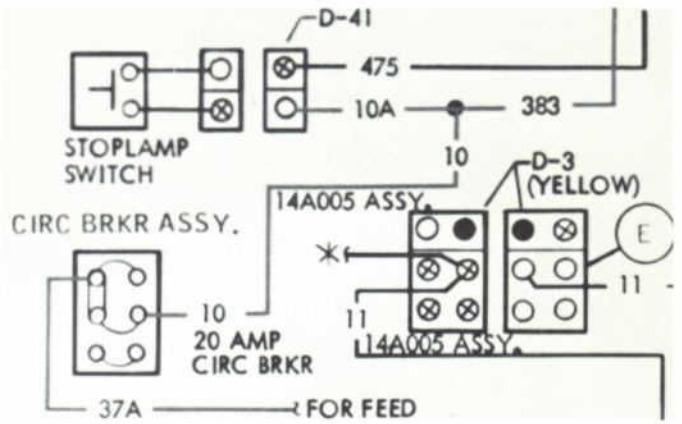
But remember, this plug fits together to make the connection. Therefore, there are two common points.



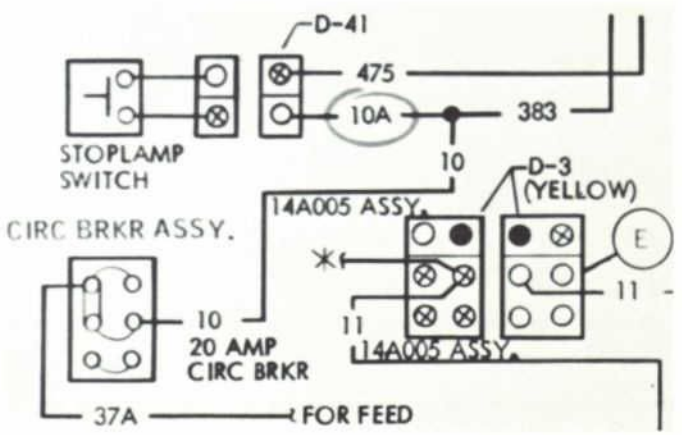
Two common points are shown on this diagram.



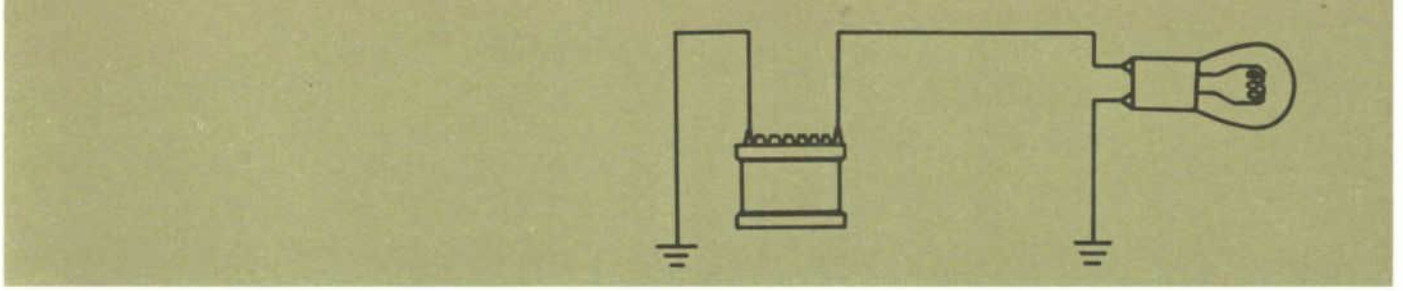
One of the common points is at the quick disconnect, and the other is at the splice.



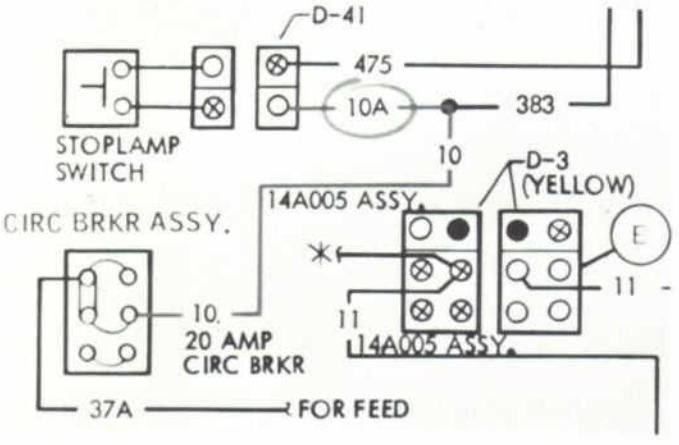
Here, you see a circuit breaker with two wires leading into it, 37A and 10. Then 10 joins two other wires at a splice. Remember, the heavy black dot is the symbol for "splice." There's a parallel circuit here because wire 10 brings power from the feed circuit to wires 10A and 383.



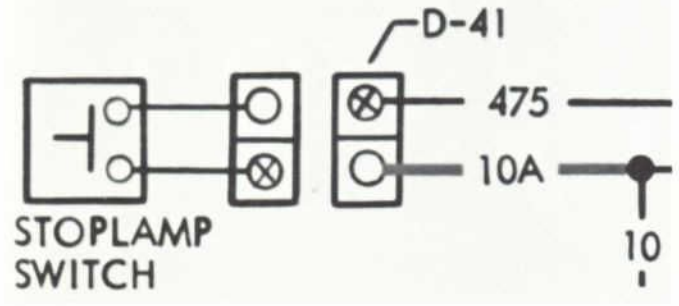
You may have wondered why the number 10 is used again here, with an "A" behind it. In a way, wire 10A is a continuation of wire 10.



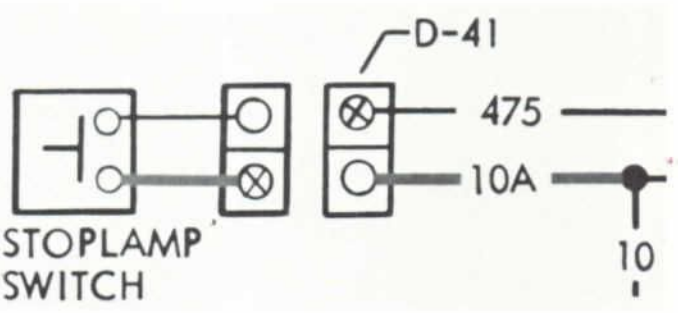
It might be compared to this situation on a map. Highway 30 splits into a northern and southern route. The number 30 doesn't continue — 30N and 30S are used instead. Traffic following highway 30 up to this point continues by way of either 30-north or 30-south.



Now, let's follow 10A on the diagram and see where it's going.



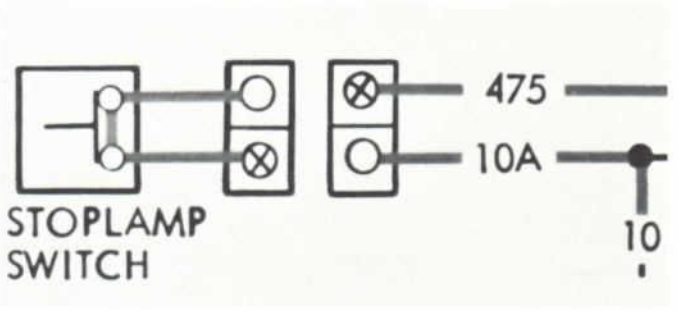
Here, wire 10A enters the quick disconnect through a female element.



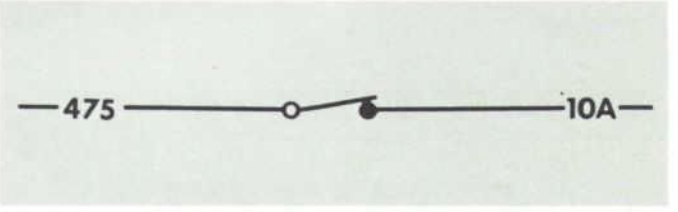
It continues through the quick disconnect plug. The primary function of a quick disconnect is a *connection* — the continuation of a circuit. So, wire 10A continues. It goes on to the stop lamp switch.

We've traced part of one electrical path, from one point to another. And the path is continuing.

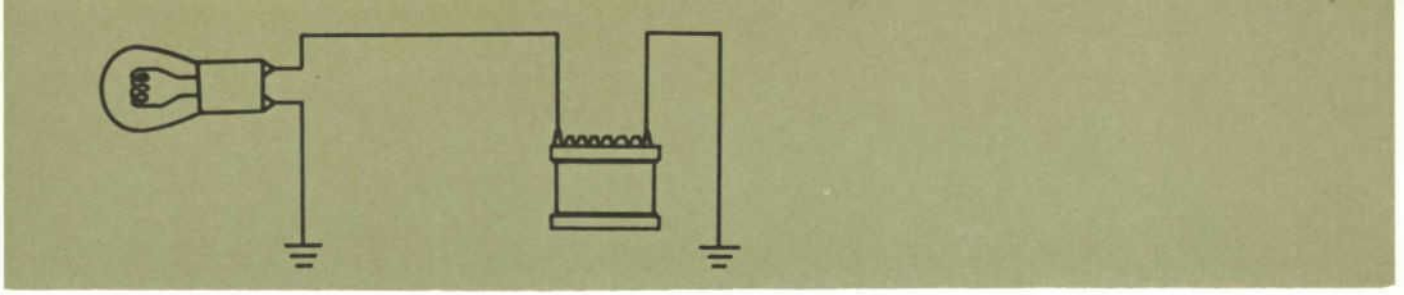
SWITCHES

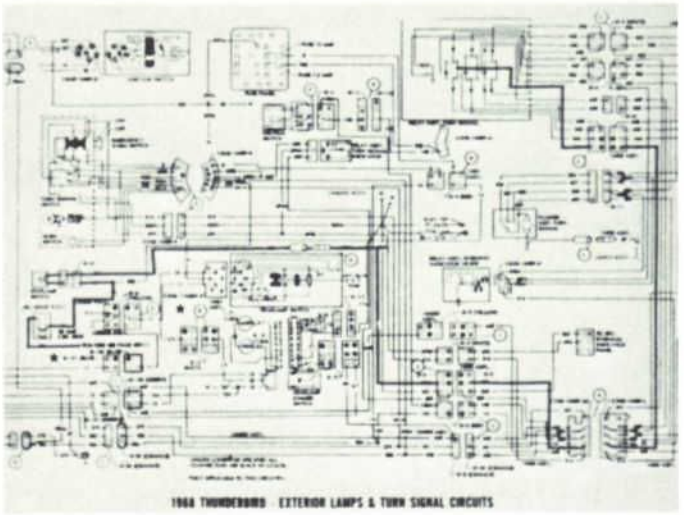


Now, there's a switch, but there's no ground symbol. Because of this, we know the diagram is telling us that the circuit continues *through* the switch.

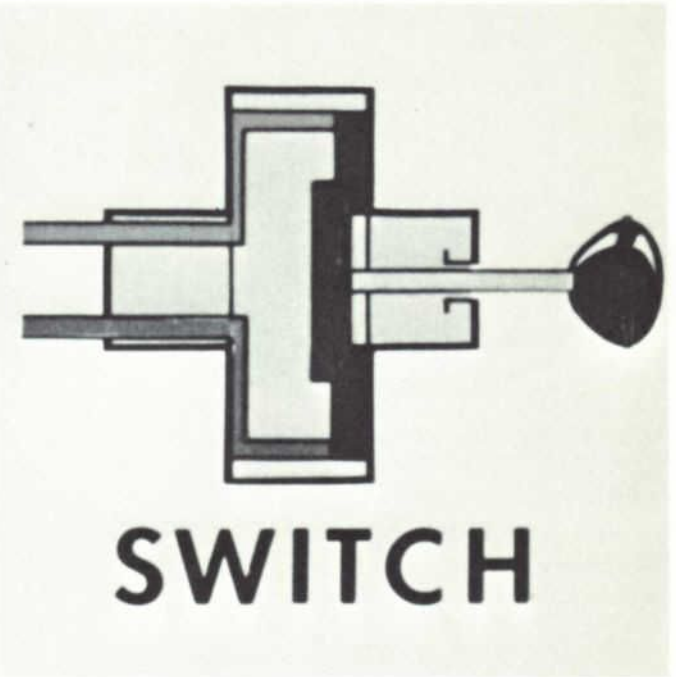


We can explain what happens inside the switch this way: We're following 10A. It has come into the stop lamp switch — a switch that is actuated whenever someone steps on the brake pedal. The contacts inside the switch come together and a connection is made. Power flows through 10A to wire 475.

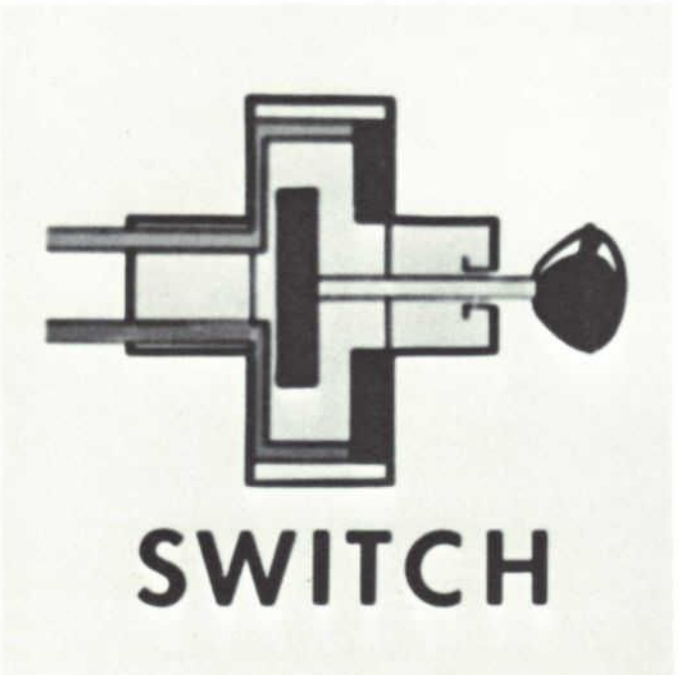




This actuates all of the rear lights through the turn signal relay. Now, let's back up a little and just talk about switches and relays.

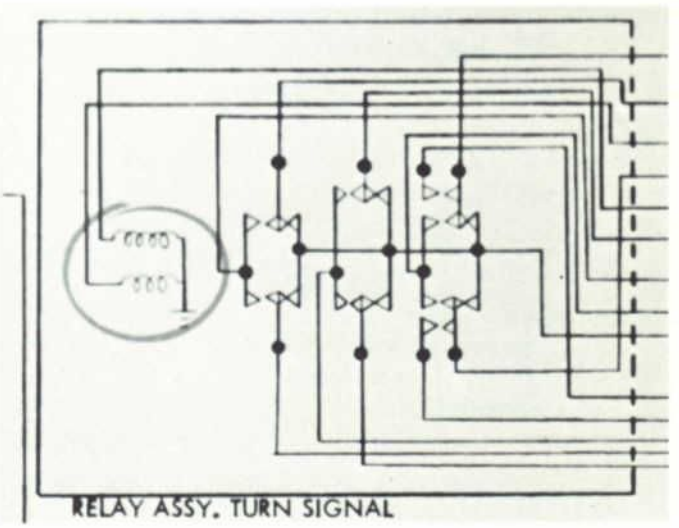


Now the contacts in the switch are closed. The electricity has a path it can follow. You pull out the light switch. That closes the contacts inside the switch so that the circuit is complete, and the lights go on. Switches always operate *mechanically*.

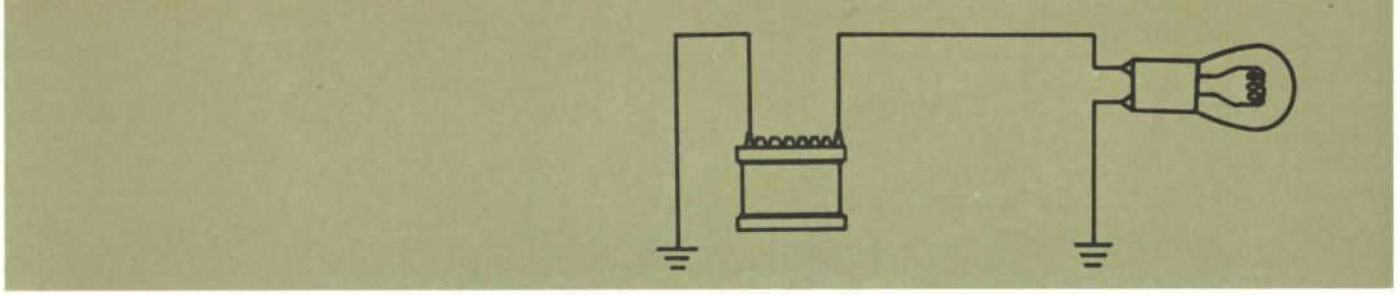


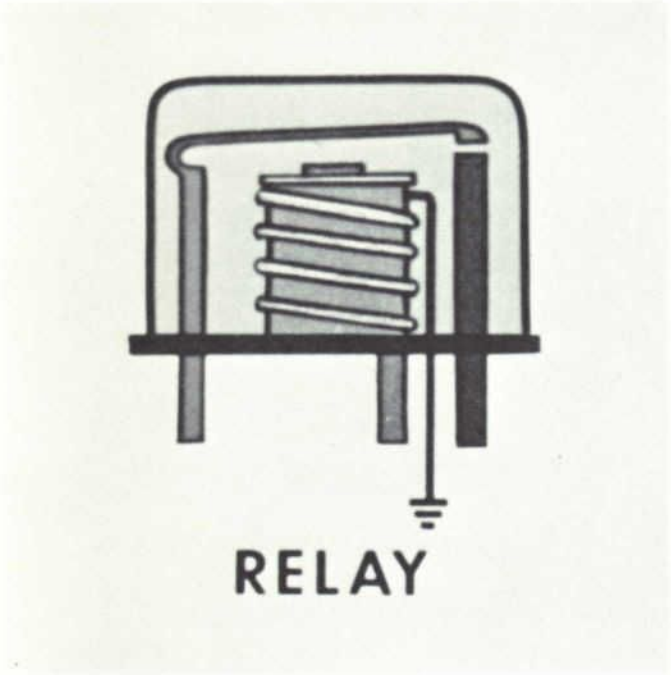
Here is a simple drawing of a switch. Inside, you see contact points. When they're open like this, the current can't pass.

RELAYS

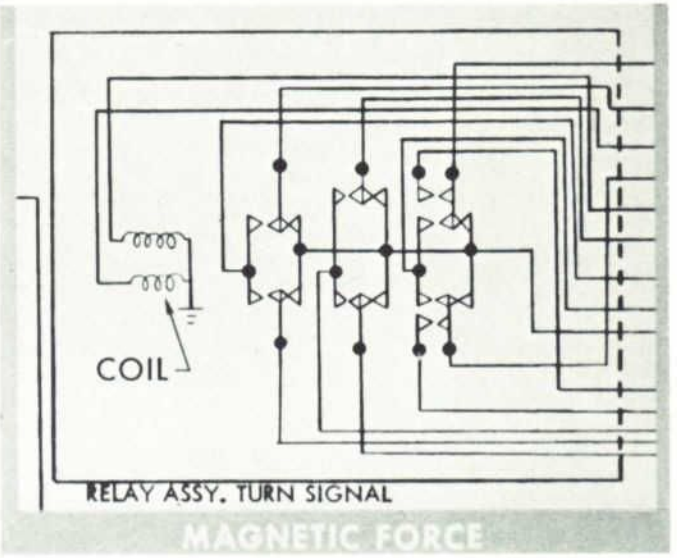


With a relay, much the same thing happens. Only, instead of being operated *mechanically*, like the headlight switch, or the stop lamp switch . . .

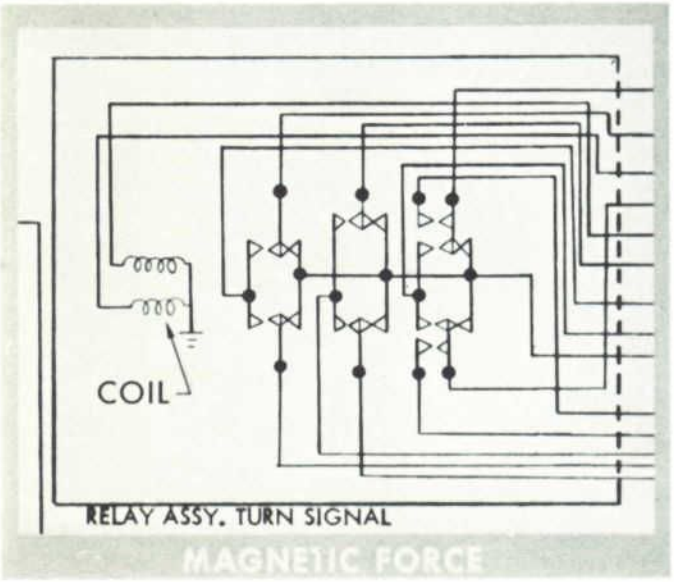




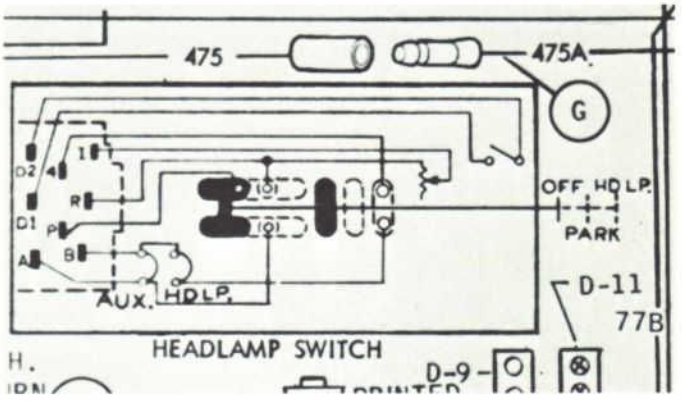
. . . a *relay* is actuated *electrically*.



Relays always operate *electrically*. Circuits are opened or closed by a magnetic force that's created when electricity passes through the coil.

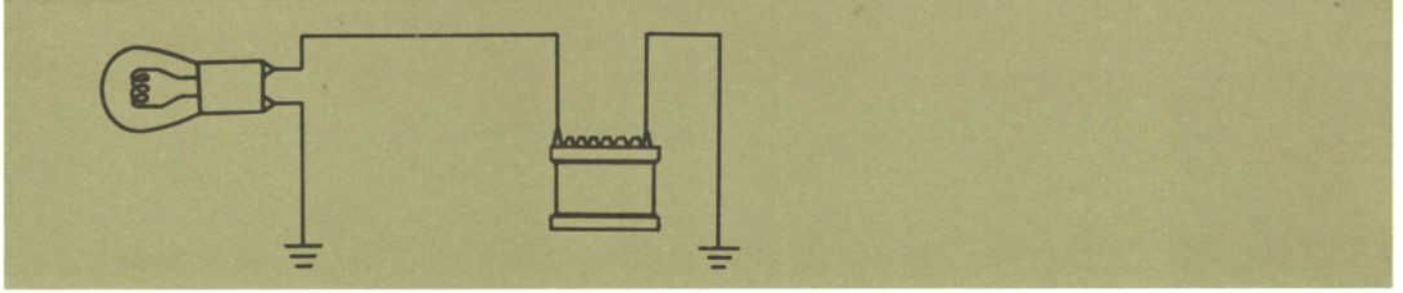


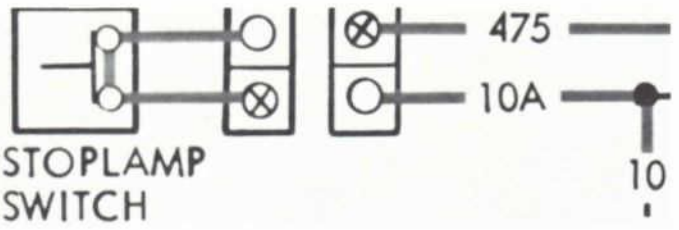
Electricity enters the coil inside a relay, and creates a magnetic force. This force is strong enough to move the contacts to either an open or closed position. This opens or closes the circuit.



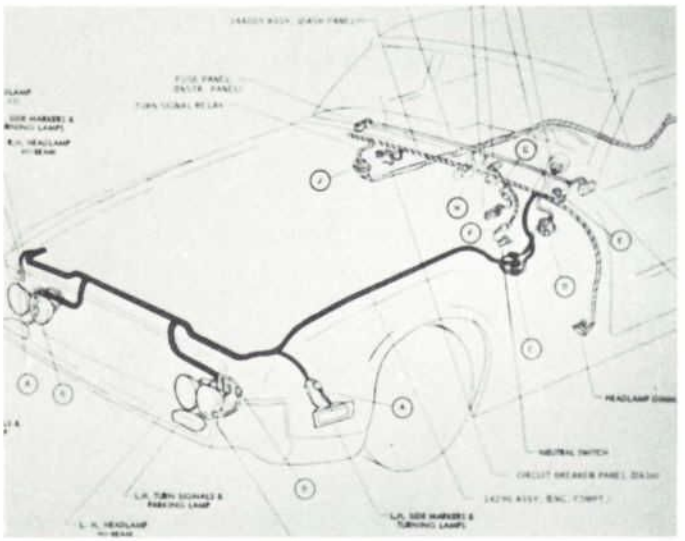
This is what the headlamp switch looks like on a wiring diagram.

The circuit is open, because the contacts inside the switch aren't touching. On wiring diagrams, you'll find that switches and relays are always shown in the position they'll be in when *no* power is flowing through the circuits.

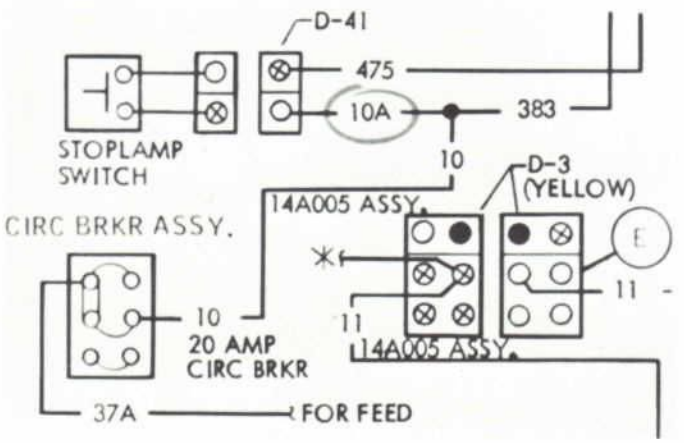




When wire 10A brings power in and the contacts close, the electrical path continues through the switch on wire 475. Let's suppose you wanted to locate wire 10A on the car because you wanted to check for power at that point.

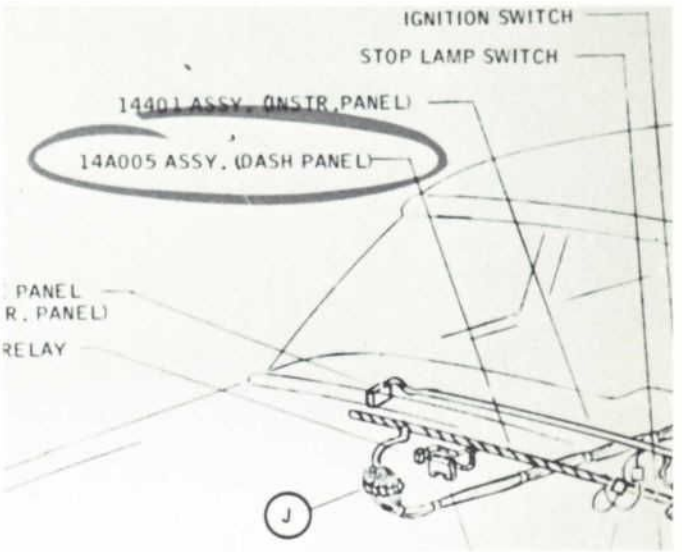


We go to the *pictorial* diagram.



We're looking for clues to the location of wire 10A.

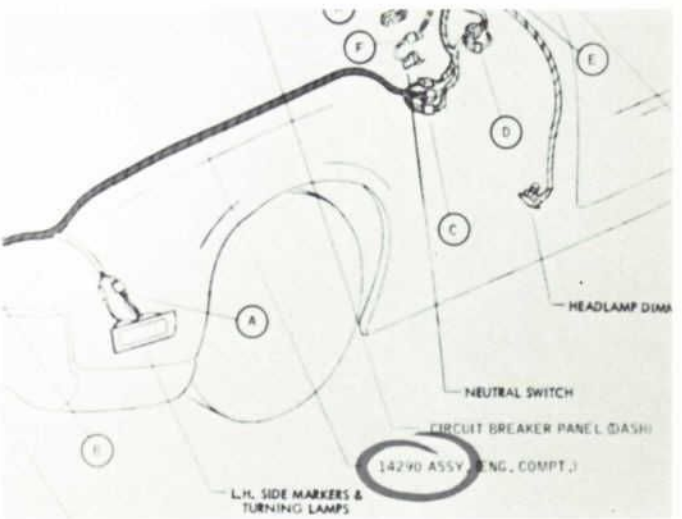
ASSEMBLIES



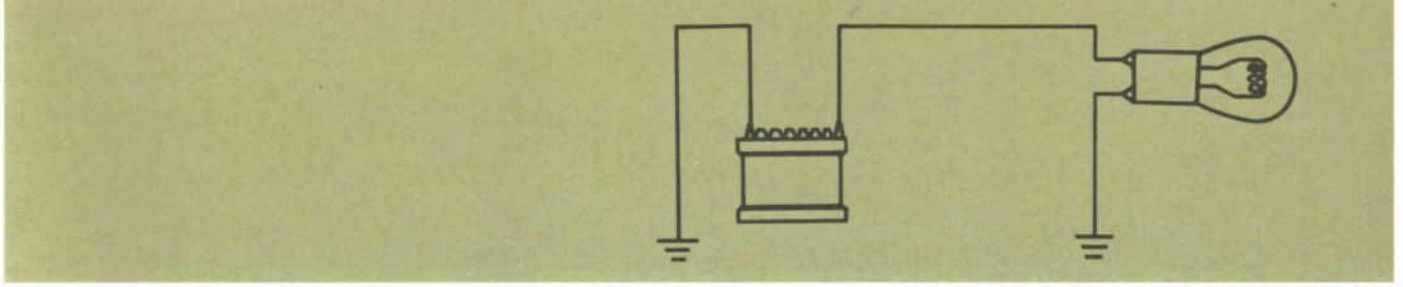
Here's an important clue . . . a big number, followed by the abbreviation for *"assembly."*

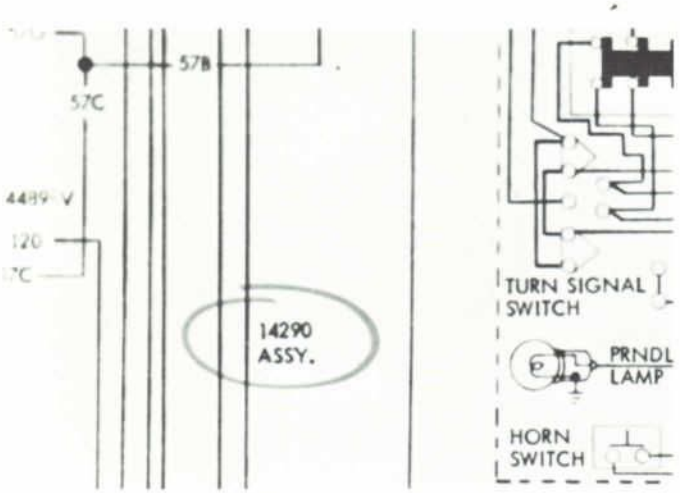
It appears on both diagrams.

An assembly is a specific grouping of wires, plugs and other parts that are linked together by location or some related functions.

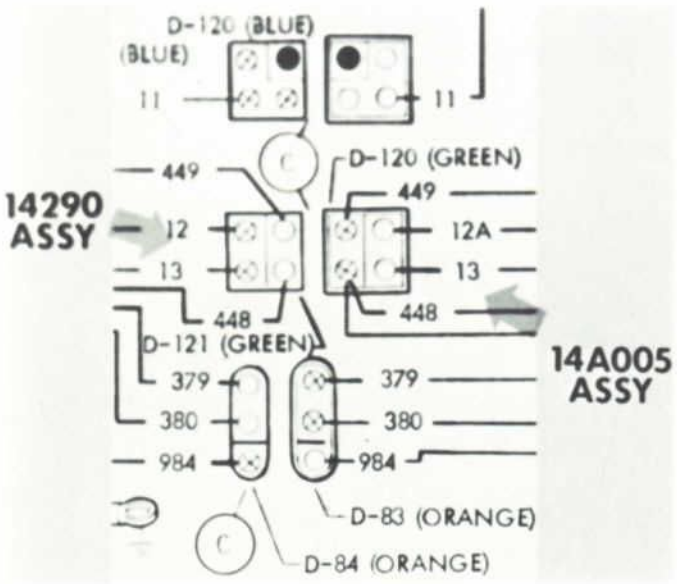


For instance, here's the 14290 assembly. It includes leads to the headlights, and to certain ground connections.



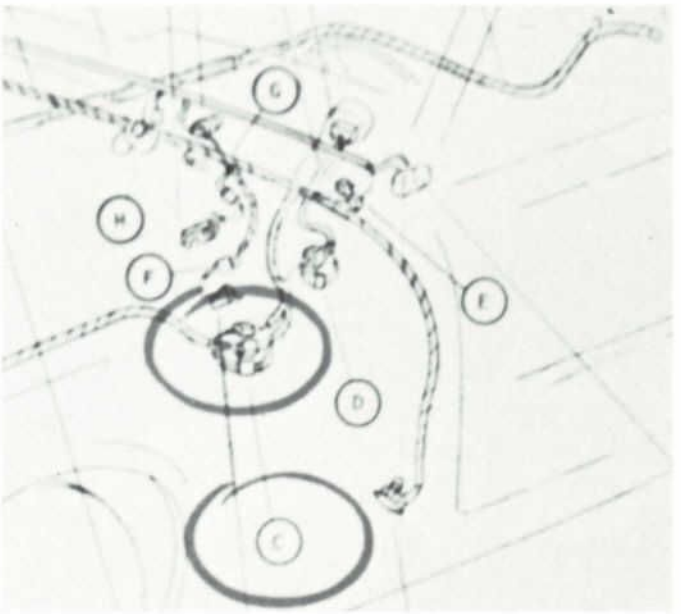


Now, this assembly is also shown on the wiring diagram . . . which means that all these wires and parts that are called out as 14290 may be found towards the front of the car, as shown on the pictorial diagram.

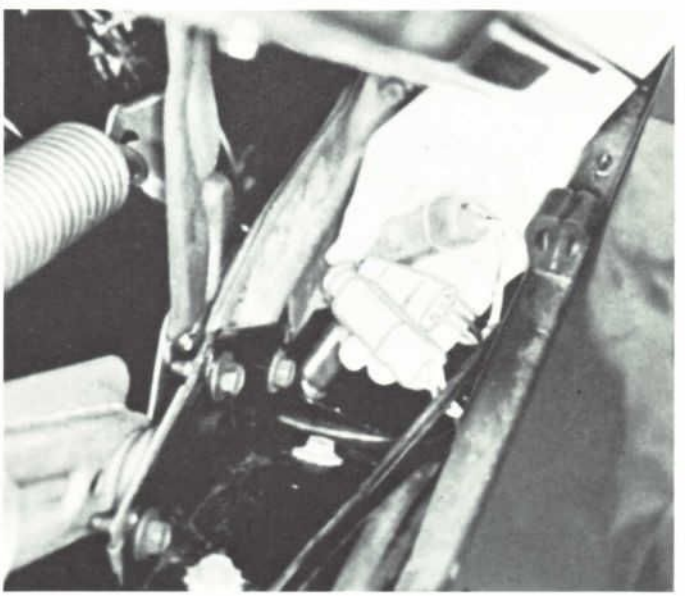


On the wiring diagram, the 14290 hooks up with the 14A005 assembly — at a quick disconnect — with alphabetic designation C.

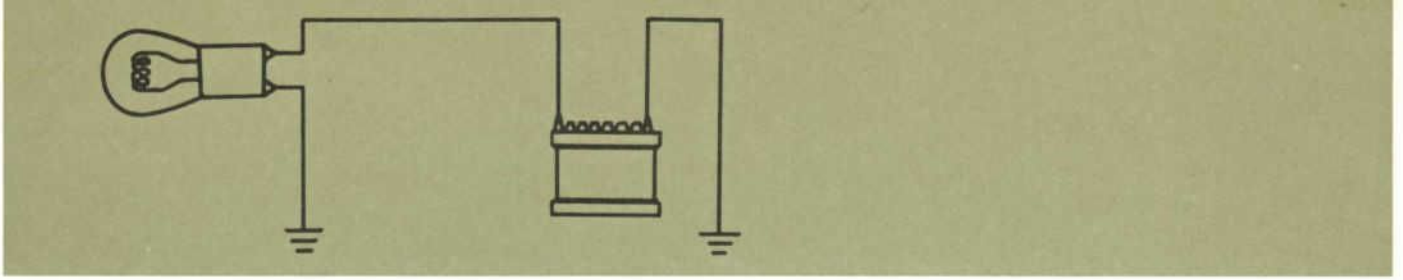
LOCATING THE ASSEMBLY

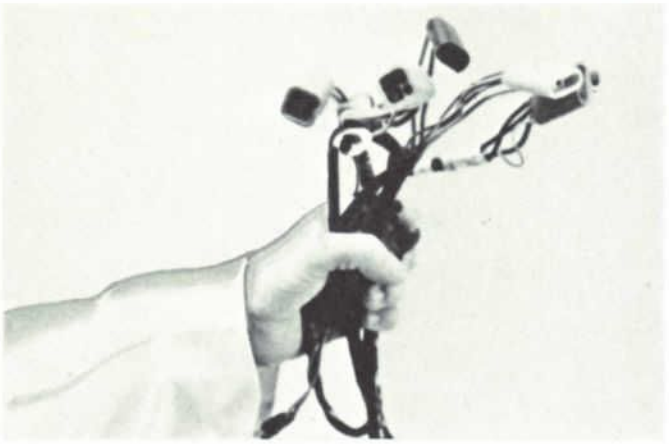


On the pictorial diagram the two assemblies connect in this area. The designation C tells us so. Now, our object is to find the 14A005 assembly on the car, because the wire we traced — 10A — is part of that assembly.



On the car, we find a group of quick disconnect plugs, right where the pictorial diagram said they should be. From here, the 14A005 assembly goes through the cowl, under the dashboard.

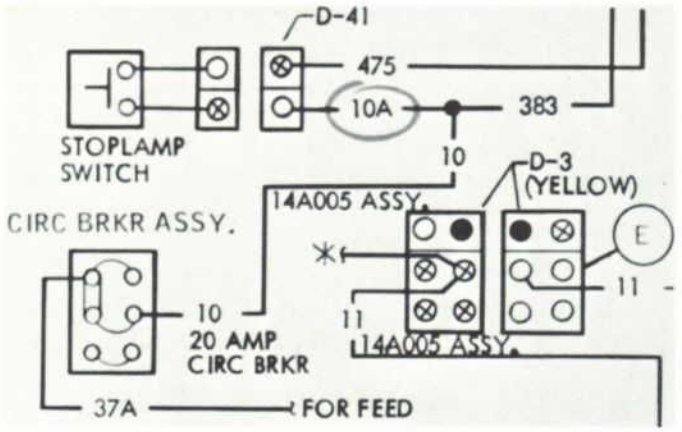




The wires come out of the bundle whenever they go through a quick disconnect plug. Here, the colors may be seen, and we can begin identifying wires by their color as well as their position on the car.

The bundle itself has a name — it's called a *harness,* or *loom.*

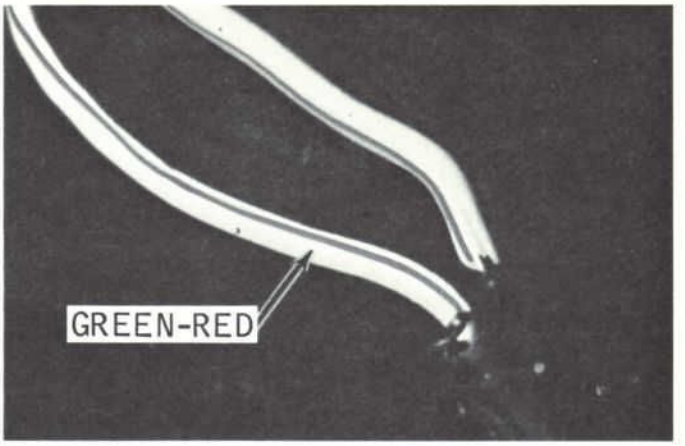
FINDING THE WIRE



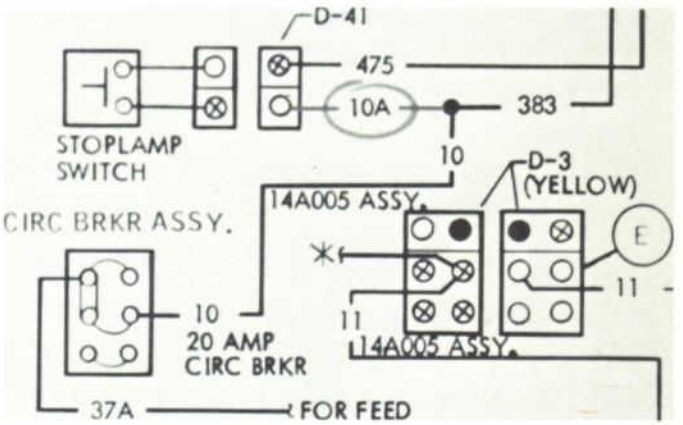
We're now to a point where we need to know what color is represented by number 10A. You look on the wiring color code.

	438A	438	YELLOW-BLACK STRIPE
		440	WHITE
		441	VIOLET
		442	GREEN-ORANGE STRIPE
10A	10	443	GREEN-RED STRIPE
THRU	12D	444	GREEN-BLACK STRIPE
		445	ORANGE-BLUE STRIPE

Wire 10A is listed as being green-red stripe.

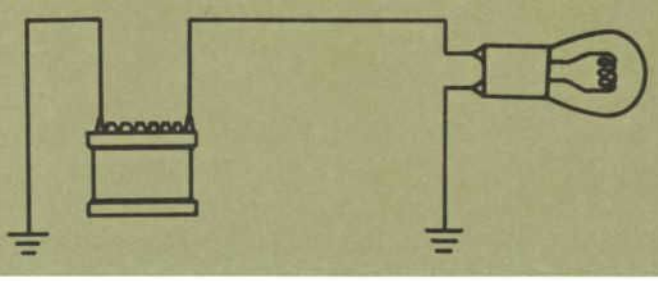


And here's what it will look like. Green with a red stripe. Now, to find it on the car.



When we examined the pictorial, we learned the 14A005 assembly is located under the dash panel.

The green wire with a red stripe goes into the stoplamp switch *here.* This is it — Wire 10A.



SUMMARY

Now you can make your power check.

You've learned how to locate and trace a wire on a wiring diagram, then find it on a vehicle.

Using the basic electrical information outlined in this booklet and the appropriate wiring diagram, you should now be able to find *any* wire on *any* Ford vehicle, to make a power check.

By doing so, you will be able to quickly locate and correct many electrical problems and thereby be a more efficient service technician.

Complete second half of workbook.

Ford

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