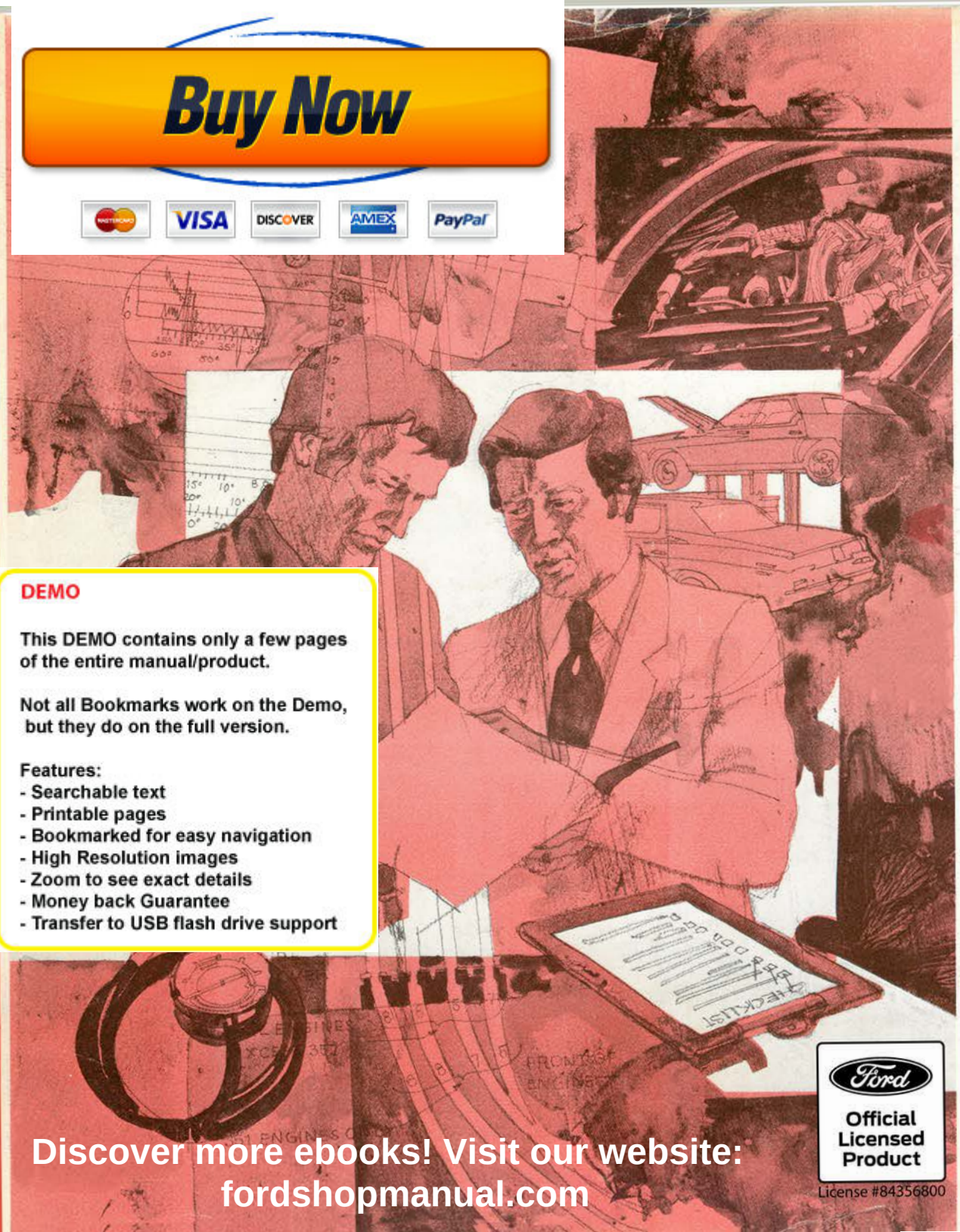
1980 BRONCO F-100/F-350 COURIER



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ELECTRICAL & VACUUM TROUBLE-SHOOTING MANUAL

1980 BRONCO F-100/F-350 COURIER

1980 Bronco F-100/F-350 Courier Electrical & Vacuum Trouble-Shooting Manual (EVTM)

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IMPORTANT SAFETY NOTICE

Appropriate service methods and proper repair procedures are essential for the safe, reliable operation of all motor vehicles as well as the personal safety of the individual doing the work. This Manual provides general directions for accomplishing service and repair work with tested, effective techniques. Following them will help assure reliability.

There are numerous variations in procedures, techniques, tools, and parts for servicing vehicles, as well as in the skill of the individual doing the work. This Manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this Manual must first establish that he compromises neither his personal safety nor the vehicle integrity by his choice of methods, tools or parts.

Introduction

Automotive trouble-shooting combines diagnosis and repair. It takes you step by step from the condition in need of correction, to the cause, and finally, to the repair. You can fix things quickly and accurately using this logical "stepped" approach.

This manual covers trouble-shooting of the electrical and vacuum systems in 1980 Ford F-100/350 Truck and Bronco vehicles. It utilizes easy-to-follow graphically-specific schematics and systems drawings. Like others in the series, it is designed to be used by the occasional and "advanced" do-it-yourselfer, as well as the professional technician. All diagnosis and repair can be conducted with common electrical and vacuum tools—no special, or unusual, tools are required.

Repair procedures, wiring colors, connectors and locations listed in this manual were correct at the time of publication. However, changes in wire color, connector locations, etc. may be made during the model year. If you should encounter this, note the variation in the section covering that system to enable you to keep your manual accurate.

Preliminary to any repair or diagnosis related to the electrical system, be certain that the battery is charged properly.

How to Use this Manual

This manual covers basic electrical and vacuum trouble-shooting procedures for 1980 Ford F-100/350 Truck and Bronco vehicles. It uses a brief "condition/step" approach to guide you through the trouble-shooting procedures. That is, you are given the IF . . . If the voltmeter reading is zero . . . and the ACTION . . . repair the lead to the component.

The intent of this manual is to help you track down the cause of covered conditions. Once you've located the cause, the manual tells you what corrective action to take. It does not, however, tell you how to repair and adjust the suspect components in most cases. If you need help in this area, refer to the 1980 Ford Light Truck Shop Manual. You can order it on the same form you used to order this.

Naturally, as an electrical and vacuum trouble-shooting manual, this publication relies heavily on schematics. To make the schematic as simple as possible, graphic symbols have been used to represent key components or parts. Instead of the wiring diagram of an alternator you'll see a picture. The same is true of the regulator and other items where internal circuitry doesn't affect trouble-shooting. In components where internal circuitry is important to trouble-shooting a wiring diagram may be shown in combination with the picture.

Contents

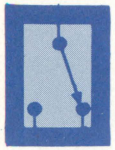
Courier Schematics
A 13-page section of Ford Courier Schematics begins on page 76

Separate contents are on page 77.

Electrical Symbols

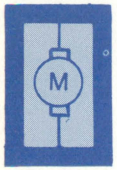

COMPONENT WITH CONNECTORS


SWITCH


SELECTOR SWITCH


SCREW TERMINAL ON COMPONENT


LIGHT

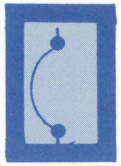


MOTOR


HEATER

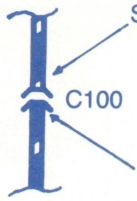

SOLENOID, SOLENOID VALVE, CHOKE, OR COIL


FUSE OR FUSE LINK


CIRCUIT BREAKER


GROUND CONNECTION

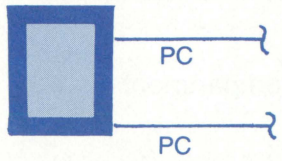

GAGE



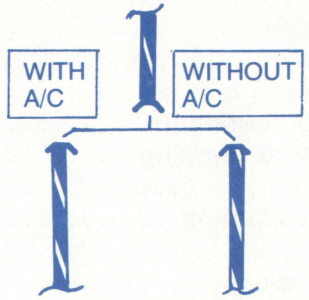
IN LINE CONNECTOR

SPLICE OR CRIMP TERMINAL

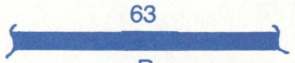
SEALED ELECTRONIC COMPONENT



PRINTED CIRCUIT WIRING



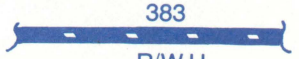
ALTERNATE CIRCUIT PATHS OR OPTIONAL WIRING



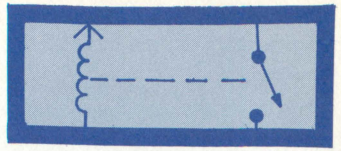
SOLID WIRE

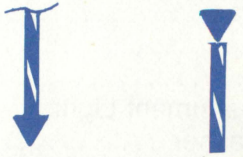
STRIPE WIRE

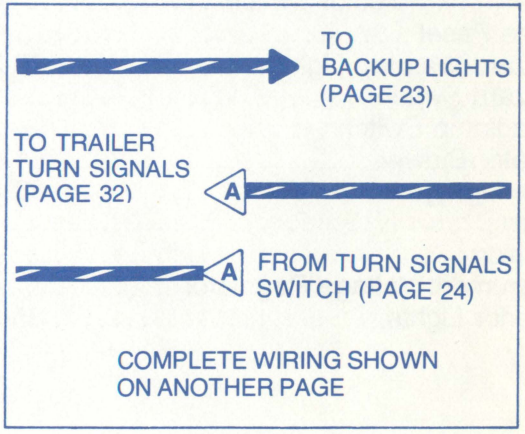
DOT WIRE



HASH WIRE


RELAY CONTACTS CLOSE WITH CURRENT THROUGH COIL


ARROWS SHOW CURRENT FLOW FROM POWER TO GROUND



WIRE COLOR CODES

Color Designates	Color Desginates	Color Designates
BK . . black	GY . . gray	PK . . pink
BR . . brown	LB . . . light blue	R . . red
DB . . dark blue	LG . . light green	T . . turquoise
DG . . dark green	O . . . . orange	W . . white
G . . . green	P . . . . purple	Y . . yellow

Where two colors are indicated for a wire, the first color is the basic color, and the second is that of auxiliary marking.

The letter "D" indicates auxiliary marking consists of dots. "H" indicates hash marks. Where neither "D" or "H" is shown, the auxiliary marks are *stripes*.

Tools For Electrical System Trouble-Shooting

Test Light

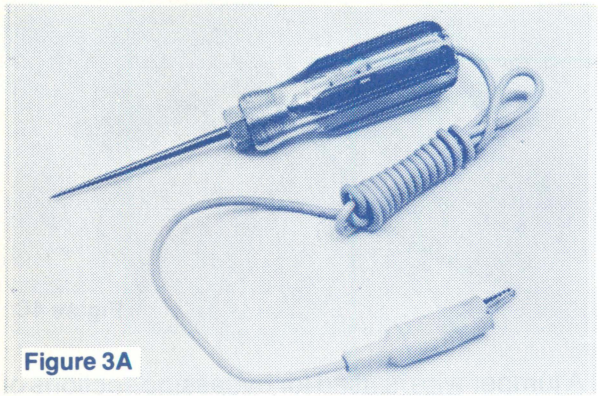
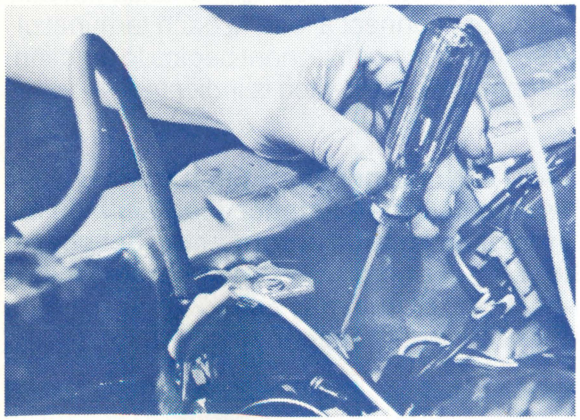


Figure 3A

The unpowered test light consists of a 12-volt light fitted with two leads and some sort of clip or probe for contact with electrical circuits. The leads are neither POSITIVE or NEGATIVE, so no polarity problems exist when using the unpowered test light.

How To Use the Test Light

1. **Checking For Power.** Connect one test lead to a good ground or the NEGATIVE terminal of the battery. Use the other lead to check for power at wires, connectors or components. When the light comes on, there is power at the location.



2. **Investigating When a Fuse Blows.**

a. Turn off all equipment powered through the fuse to be tested.

b. Disconnect all unswitched components powered through the fuse to be tested . . . if a motor, unplug the connector . . . if a light, remove the bulb.

c. Turn the ignition switch to RUN, if necessary, to supply power to the fuse (to test equipment such as radios, windshield wipers, etc).

d. Connect a test lead to the hot end of the blown fuse and the other to ground. If the light glows, there is power to the fuse. Move the grounded lead to the other end of the fuse. Provided that all components have switches, and that all these switches are off, if the light stays OFF, a short in one of the components on that fuse is indicated. If it comes ON, a short to ground in the wiring is indicated.

3. **Locating a Wiring Short To Ground.** If a wiring ground is indicated, isolate the unwanted ground by removing the connectors in the circuits one at a time. Begin with the connector closest to the fuse holder, and work your way along the circuit.

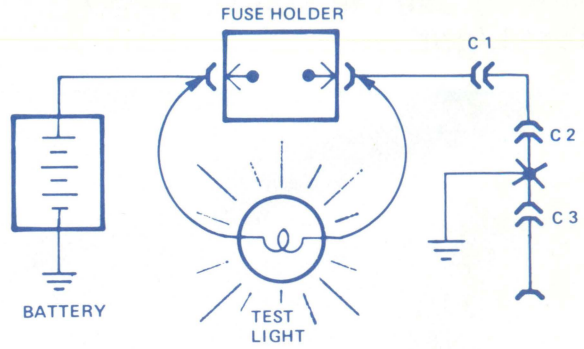


Figure 3B—Testing for Short to Ground

Using figure 3B, here's how that works:

a. Disconnect C-1 and check if the test light is glowing. (In this case, it will not be.)

b. RECONNECT C-1, and disconnect C-2, again checking the test light. (In this case, the light won't glow.)

c. RECONNECT C-2, and disconnect C-3. (Here, the test light will glow, showing you that the unwanted ground is between C-2 and C-3.)

Remember, reconnect each connector before testing the next one in sequence.

Tools for Trouble-Shooting

How to Use the Self-Powered Test Light

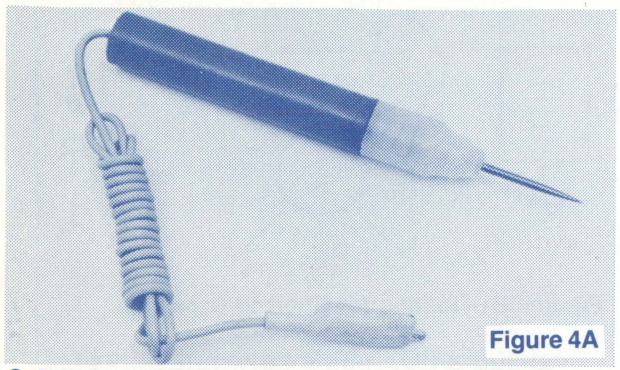


Figure 4A

Self-Powered Test Light

The self-powered test light is a light and battery holder assembly fitted with test leads. The light, battery and test leads are connected in series so that when the test leads are connected to two points on a continuous circuit, the light glows.

CAUTION: Disconnect the NEGATIVE battery cable from the battery before using the self-powered test light. Then disconnect the POSITIVE battery cable. Alternatively, remove the fuse that protects the circuit being tested.

1. **Checking Circuit Continuity.** Remember, the powered test light glows when a complete circuit is made, in other words, when the circuit shows continuity. To check for continuity, connect a test lead to each end of the circuit—or segment of a circuit—where current flow is suspected of being broken. (Figure 4A). If the light remains OFF, the break is between the two test leads.

   Note that if the circuit includes a high-resistance element such as a motor or lamp, the powered test light may not glow. You'll have to test each lead to the motor or lamp separately.

To check a switch for continuity, disconnect the switch terminals to isolate it from the rest of the circuit. Connect the powered test light to the terminals and operate the switch in all positions. In a multi-terminal switch, such as an ignition or headlamp switch, check each terminal at each position. (You'll have to determine which terminal is meant to be "ON" at each position of the switch.) If the light comes ON at each terminal meant to be ON at each position, the switch is functional.

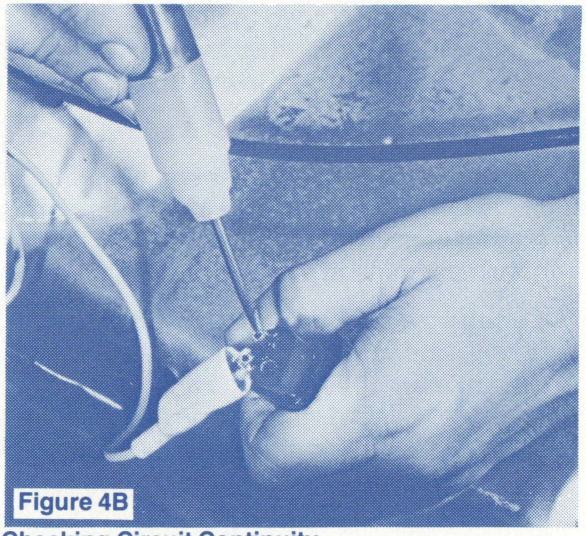


Figure 4B

Checking Circuit Continuity

2. **Checking Ground.** When a loss of ground or an unwanted ground is suspected, connect one light lead to the point in question and the other lead to a good ground. If the light comes ON, it shows that the point is connected to ground. If it remains OFF, the point is not connected to ground.

Jumper Wire

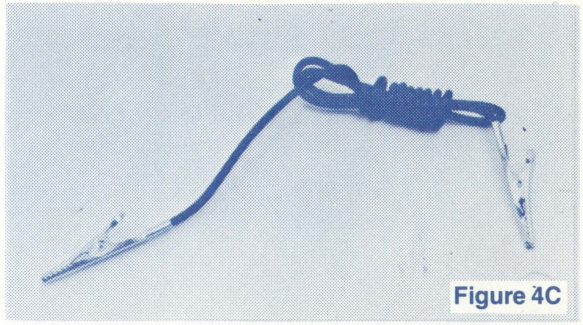


Figure 4C

A jumper wire is used for bypassing sections of a circuit or a component to temporarily "bridge" an open circuit. A jumper wire can be purchased or easily made. You can make several of different lengths for convenience when testing. To make your own jumper cables, simply attach alligator clips to each end of a length of heavy wire (such as 16 gauge automotive primary wire) so that extra resistance won't be placed into the circuit. When you need a probe for momentary "jumping", simply insert a small nail into one of the clips.

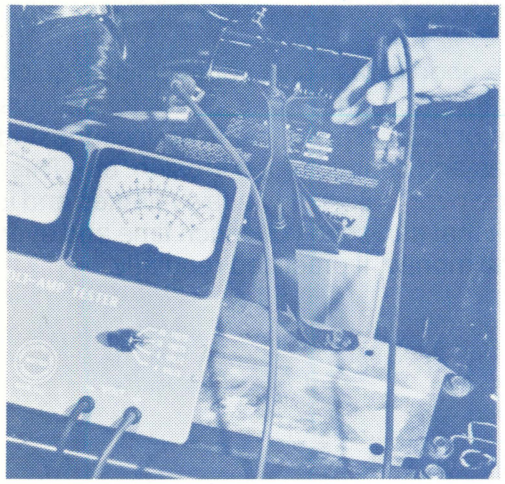
How to Use the Jumper Wire

Checking a Switch Circuit. Turn the switch to the ON position. If the components do not begin to function, connect a lead to each terminal of the switch. If the component begins to function, a malfunction in the switch is indicated.

CAUTION: Do not use a jumper wire to bypass a high-resistance load such as a lamp or motor that is connected between the hot circuit and ground. This creates a direct short circuit and may cause personal injury, fire or other damage to the vehicle.

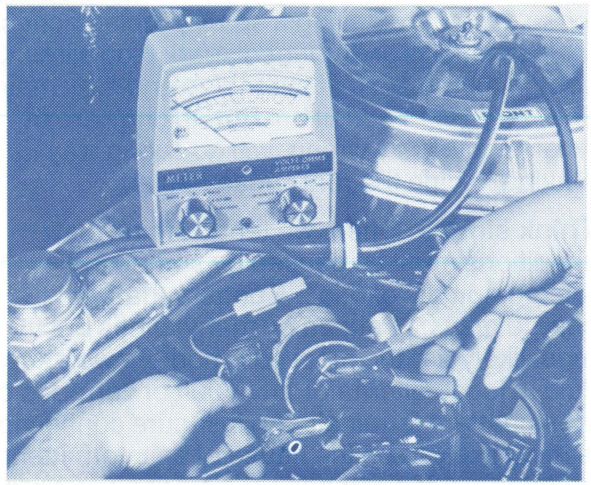
Tools for Trouble-Shooting

Voltmeter



A DC voltmeter is primarily used to measure voltage between a component or circuit to ground. Connect the negative lead of the meter to a ground and the positive lead to the point where voltage is to be measured. If your meter has various scales (such as 4, 8, 16 and 40 volts) use the lowest appropriate scale for the greatest accuracy. By measuring different points in a circuit (before and after a switch, for example) you can measure voltage drop. Excessive voltage drop most often indicates a corroded, loose, or damaged connection. An excessive voltage drop can also indicate a malfunctioning component.

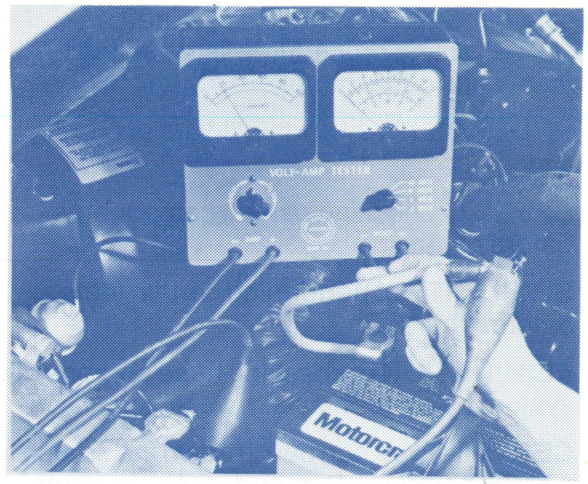
Ohmmeter



An ohmmeter measures the resistance between two points. Before installing an ohmmeter, disconnect the NEGATIVE terminal of the battery—measuring on a hot circuit will cause false readings and damage your meter.

If you suspect a section of circuit having an excessive resistance, simply attach a lead to each end of the circuit (on a switch, to each terminal) and read the resistance.

DC Ammeter



An ammeter measures current draw: They are often used to determine the operating condition of motordriven mechanisms such as the blower and power window.

To read current flow:

- Connect the ammeter in *series* with the circuit.
- Connections may be made anywhere beyond a common point such as the point of current flow out of the resistor pack. It may be connected either between the resistor pack and motor or the motor and ground.
- Refer to the Shop Manual for Current draw specifications for specific motor-driven mechanisms.

Trouble-Shooting . . . The Basics

Trouble-shooting is nothing more—or less—than a logical method of defining a condition, tracking down its cause and making necessary repair or adjustment. The trouble-shooting procedures listed in this manual take into account . . .

- **PROBABILITY** of certain things occurring in a system;
- **SPEED** of checking certain components before others;
- **SIMPLICITY** of performing certain tests before others;
- **ELIMINATION** of checking huge portions of a system by performing simple tests;
- **CERTAINTY** of narrowing down the search to a small portion before performing in-depth tests.

While these steps will take you directly to the cause of covered conditions, there are a few basic trouble-shooting elements that will make you a quicker and more accurate trouble-shooter. These steps may seem readily evident, but they must be followed for top-notch trouble-shooting. They are easy to follow and with a little practice become an "automatic" part of each trouble-shooting task.

First, verify the condition. This means simply make sure you understand what the symptoms are before you begin. For example, your vehicle won't crank. Before you begin extensive trouble-shooting, check if the transmission shift lever is in PARK or NEUTRAL (on automatic transmission vehicles, naturally). If this "corrects" the condition, chances are you have no problem at all.

Next comes a quick visual inspection. That is, check for the obvious. If the battery won't hold a charge, open the hood to see if the drive belt is loose. If you are having a spark problem, check for loose fitting or damaged spark plug wires. Of course, these are just examples and they may not "cure" your condition. But, taking care of what is obviously wrong will go a long way in making finding the real cause easier!

Think simple. Often, we tend to think that conditions must be caused by something uncommon or "exotic". A battery that won't charge may be caused by many things but the most likely are the most common—low battery fluid, a loose alternator drive belt or corroded or loose battery terminals. An insecure connection is most likely to be the cause of an intermittent problem—not a component. Overlooking simple causes will only make trouble-shooting unnecessarily difficult.

Don't assume. Don't assume that because you've cured the symptom, you've corrected the condition. A new battery will end a low-voltage condition, but if the reason that the first battery went dead still exists, chances are the new battery will meet with the same fate. Don't assume that a new part is necessarily a good working part. It is only a new part. Once you've put it into the system, test it. And, most important, don't skip that component if the symptom re-occurs.

Remember, trouble-shooting is easy. These preceding "hints" are designed to help you develop a trouble-shooter's outlook . . . to help you quickly locate and correct any conditions that may occur.

Quick Visual Inspection Can Stop Trouble—Before It Starts!

It is a good idea to give your vehicle a quick visual inspection. That is, check for obviously worn or broken parts, loose or unconnected hoses and connectors, corrosion, etc. This "once over" takes only a few minutes and is a habit that can save you much time and even some money, if practiced regularly.

Trouble-Shooting . . . The Basics

The Battery . . .

The battery is the key part of your vehicle's electrical system. Therefore, particular care should be given to it to assure proper operation and full voltage.

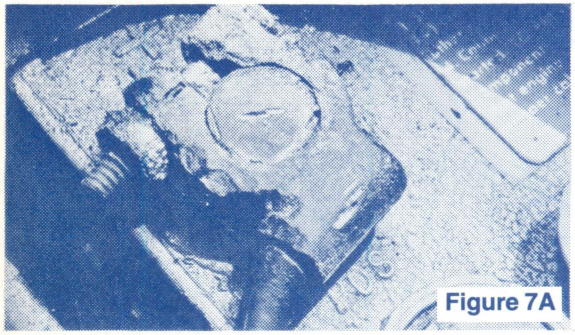


Figure 7A

One of the most common unwanted conditions of the battery is corroded battery posts. (Figure 7A). This corrosion can rob enough power from the battery (through high resistance) that a fully charged battery may not be able to crank the engine. To clean the terminals, loosen the ground (NEGATIVE) terminal clamp bolt, and remove the clamp with a terminal puller. Do the same for the POSITIVE terminal. Clean both the inside of the cable clamp and the terminal post on each side of the battery with a wire brush or a battery post tool. When re-connecting, be sure to get a good "mate" between clamp and post and tighten clamp bolt securely.

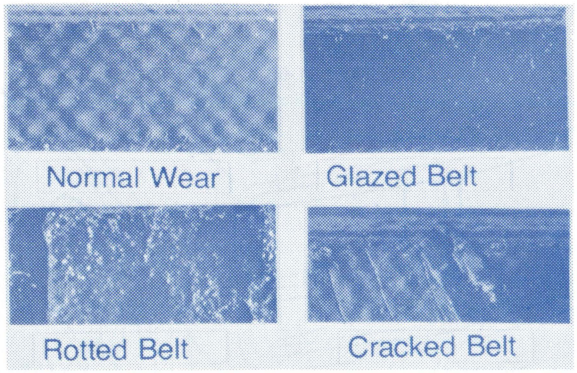
Sealed, maintenance-free batteries are standard for 1980. Use a voltmeter to check the state of charge. If the reading is below 12.48 volts (open circuit voltage), charge the battery. (A maintenance-free battery does not require addition of water during its normal service life.)

Quick Visual Inspection . . .

Alternator . . .

Loose or slipping drive belts can cause the alternator to put out insufficient power. To tighten the alternator drive belt, loosen the two bolts holding the alternator, pry with an appropriate tool between the alternator end case (where the mounting bolts are attached) and engine until the belt is tight and tighten the bolts while maintaining proper belt tension. (Pry only against the end-plate—end where the mounting bolts are attached. Prying against the case will break the case. A belt tension gauge gives the best measurement of belt tightness. If no gauge is available check by hand. You probably have proper belt tension when firm hand pressure causes about an inch of depression along the belt.

If a belt becomes glazed or grease or other material gets on its surface, it may slip and the alternator will not generate full power. Replace these belts. Use the chart below to determine belt condition.



When Working on the Electrical System . . .

It is a good idea to remove the NEGATIVE cable from the battery when working on the vehicle's electrical system—except when conducting tests that require the battery's use. This prevents the possibility of accidently shorting a circuit and the resulting possibility of blown fuses, component damage, fire and personal injury. Removing the POSITIVE cable DOES NOT ALWAYS accomplish this.

If both battery terminals have been disconnected, always reconnect the POSITIVE one first, being sure to observe proper cable/battery polarity. Take care to never short across the terminals of the battery (by laying a wrench across them, allowing wiring to contact both poles, or the like). This can damage the battery, blow fuses, damage components and result in possible personal injury.

Other Electrical Checks . . .

Repair or replace any of the following. Loose or damaged ignition wires. / Loose, corroded or damaged electrical connections and splices. / Frayed wires that can cause inadvertant shorting. / Wires, connectors or components where sparking is evident.

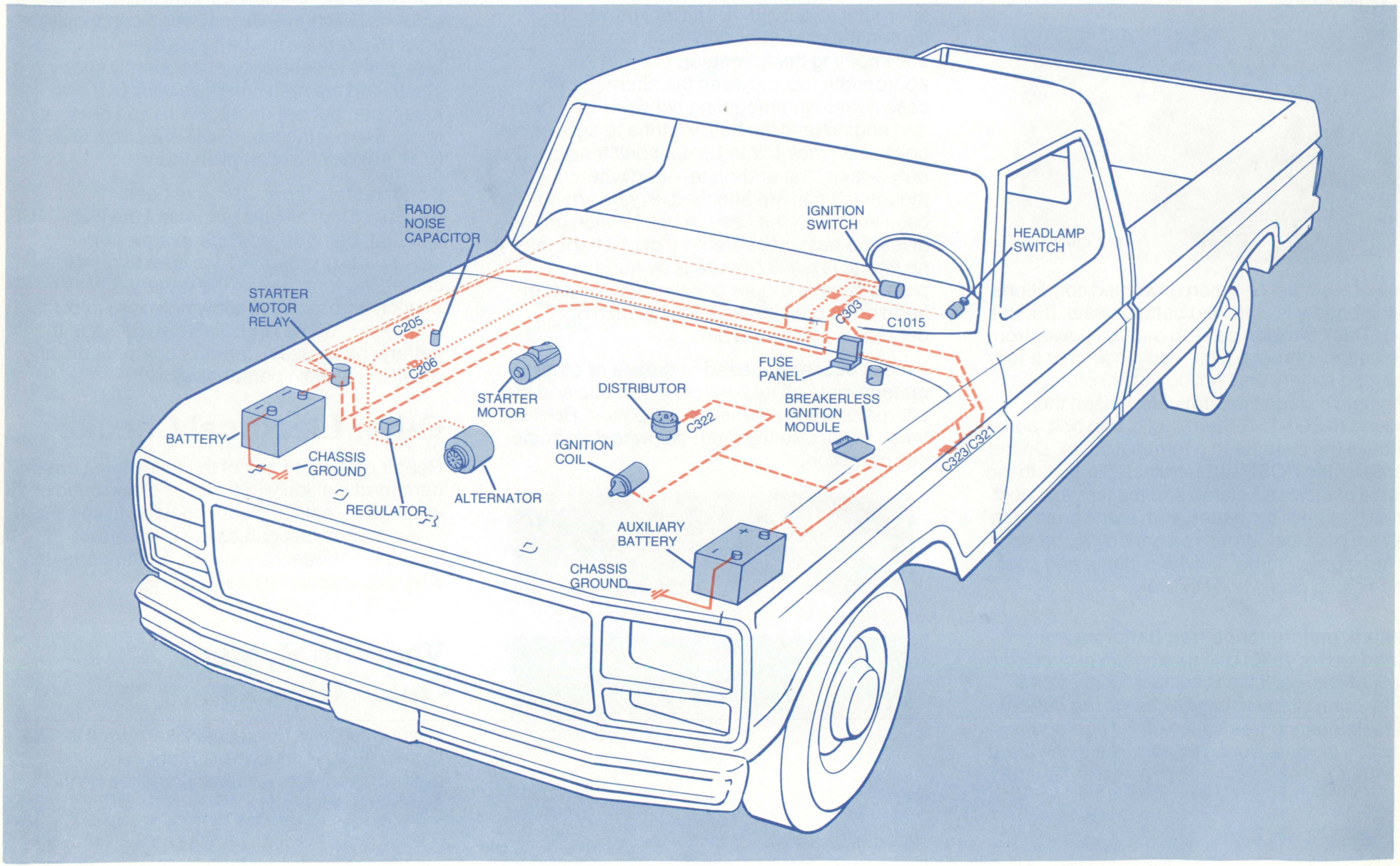
Vacuum System Quick Checks . . .

Vacuum system quick checks are simple. The hoses must be intact—without cuts, deterioration, etc. And, they must be on the connector securely.

Charging/Power Distribution Systems

— — — Charging System

····· Starting/Ignition System



Charging System

The Charging Circuit

The charging circuit contains . . .

- 12-volt battery
- alternator
- voltage regulator

How the Circuit Works

- The battery supplies power for starting and to operate electrical systems when the engine is not running.
- The alternator supplies power to operate the vehicle and to recharge the battery when the engine is running.
- The voltage regulator responds to alternator output and battery state of charge and meters alternator output to meet electrical demand and charge the battery as required.

Trouble-Shooting Procedures

Charging system conditions include . . .

- dead battery
- battery using water excessively
- alternator warning light that doesn't light
- alternator warning light that doesn't go out

Charging system quick checks include . . .

- alternator belt tension
- battery cable clamps for corrosion and proper fit
- connectors at alternator, regulator and starter relay for tight fit and clean connections
- fuse link integrity
- broken, damaged or shorted wires

Alternator Warning Light

Alternator warning light fails to come on with ignition switch at ON . . .

- unplug regulator wiring connector
- turn ignition switch to RUN (do not start)
- jumper between regulator wiring connector I terminal to ground.

If the warning light does not glow . . .

- check for burned out bulb
- repair wiring to the light

If the light does glow . . .

- replace the regulator

Alternator warning light stays on at all engine speeds . . .

- perform charging system tests

Charging System Tests

To test for current drain . . .

- connect 12-volt test light in series with the POSITIVE cable terminal and the POSITIVE battery post
- turn off all switches and lights

If the light glows . . .

- check to be sure it is not electric clock
- pull fuses one at a time until light goes out
- check that circuit for possible shorts

To test for alternator/regulator operation . . .

- turn engine off
- connect voltmeter to battery terminals
- turn off all electrical accessories
- record voltage as BASE VOLTAGE
- turn ignition switch to ON

If alternator warning light comes on . . .

- start the engine (Alternator warning light should turn off)
- run engine at 2000 rpm (approximately)
- with accessories off, record NO LOAD VOLTAGE

If NO LOAD VOLTAGE is 1 to 2 volts above BASE VOLTAGE . . .

- turn on headlights to high beam
- turn heater blower to high
- with engine at 2000 rpm, record LOAD VOLTAGE

If LOAD VOLTAGE is at least 0.5 volts higher than BASE VOLTAGE . . .

- alternator and regulator are OK

If NO LOAD VOLTAGE is over 2 volts above BASE VOLTAGE . . .

- stop engine
- clean and tighten regulator mounting bracket and screws for good ground
- Repeat NO LOAD VOLTAGE test

NOTE: If NO LOAD VOLTAGE is too low, go to appropriate step.

Charging System

If NO LOAD VOLTAGE is still too high . . .

- unplug connector from regulator
- repeat NO LOAD VOLTAGE test

If not, the NO LOAD VOLTAGE is within specification . . .

- replace regulator

If NO LOAD VOLTAGE is still too high . . .

- check and repair harness for a short supplying current directly to the alternator field, instead of through the regulator.
- reconnect regulator
- repeat NO LOAD VOLTAGE test

If NO LOAD VOLTAGE is too high . . .

- replace regulator

If NO LOAD VOLTAGE is less than BASE VOLTAGE . . .

- disconnect regulator

If voltmeter does NOT drop to BASE VOLTAGE . . .

- check wiring harness for a short that is supplying field current directly to the alternator without passing through the regulator.

If voltmeter drops to BASE VOLTAGE . . .

- jumper terminals A and F on regulator connector
- turn off headlights and heater blower
- set engine at fast idle

If voltmeter now reads ABOVE BASE VOLTAGE . . .

- replace regulator.

If voltmeter does NOT read ABOVE BASE VOLTAGE . . .

- check wiring harness or alternator.

If LOAD VOLTAGE is not up to specification . . .

- connect jumper from alternator case to a good ground.

If LOAD VOLTAGE is now normal . . .

- repair ground to alternator—clean and tighten alternator mountings.

If LOAD VOLTAGE is still not normal . . .

- connect HEAVY jumper wire from battery positive terminal to "B" terminal of alternator.

If LOAD VOLTAGE is now normal . . .

- check circuit #38 (Black/Orange Stripe) for problem.

To check WIRING HARNESS

Determine LOAD VOLTAGE—remember it should be at least 0.5 volts higher than BASE VOLTAGE. Connect jumper wire from battery positive terminal to "F" terminal on alternator.

If LOAD VOLTAGE is now at specification . . .

- check "F" circuit (35, Orange/Light Blue Stripe)

If LOAD VOLTAGE is still not normal . . .

- remove jumpers, plug in regulator connector, and connect voltmeter to measure voltage at the "S" terminal of the alternator. It should be 1/2 of the LOAD VOLTAGE.

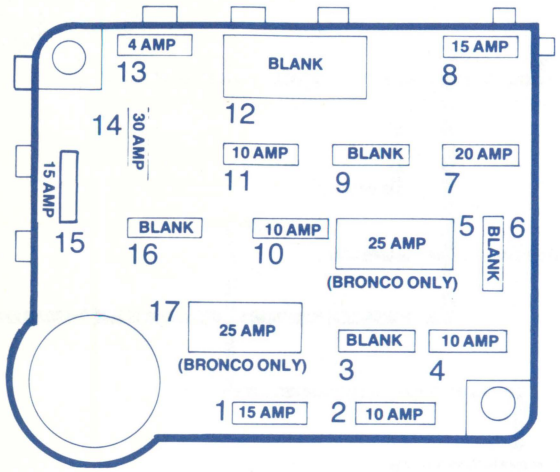
If there is NO VOLTAGE . . .

- check for short in "S" circuit (4, White/Black Stripe). In warning light systems, now check available voltage at "S" terminal of regulator. If no voltage here, check for open in circuit 4.

If wiring checks out OK, problem must be in alternator.

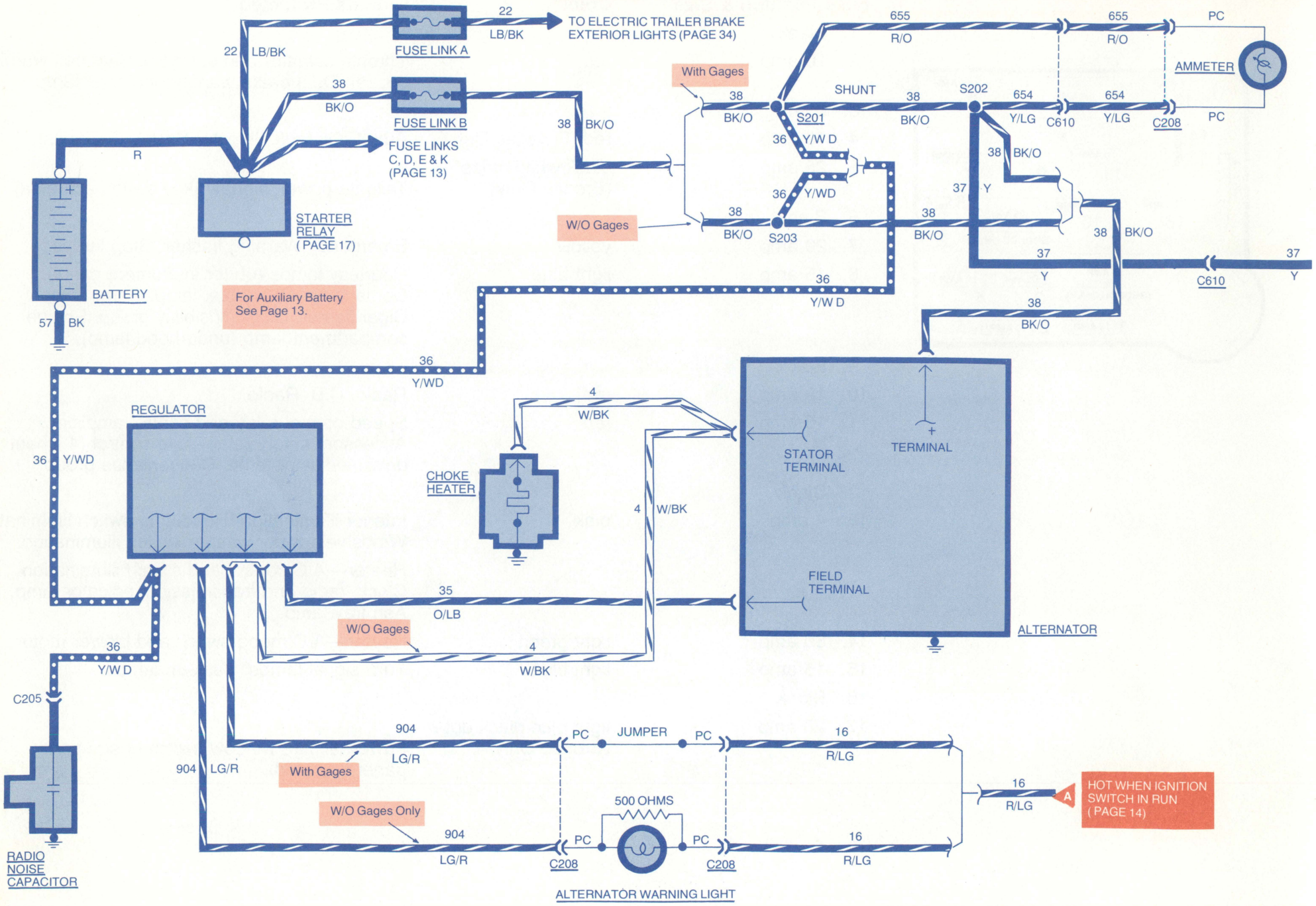
Component	Location	Connector Description
Accessory Safety Relay	L.H. front fender apron, aft	
Alternator Voltage Regulator	Engine compartment, R.H. front	
Choke Heater	On RH side of carburetor	
Junction Block	R.H. front fender apron, forward	
Connector C612	Near starter motor relay	Round, brown, 2 terminals
Connector C610	Near starter motor relay	Round, brown, 8 terminals
Connector C1205	At accessory safety relay	Plug shape, 2 terminals
Connector C1014	At L.H. "A" pillar	Oval, brown, 4 terminals
Connector C1107	Near junction block	Pin type, blue, 2 terminals
Splice S202	In harness, near starter motor relay	
Splice S203	In harness, near starter motor relay	
Splice S208	In harness, near T/O to headlamp switch	
Splice S209	In harness, near junction block	
Splice S211	In harness, near T/O to starter motor relay	
Splice S212	In harness, near T/O to blower motor	
Splice S303	In harness, near light switch	
Splice S401	In harness, near ignition switch	
Splice S1102	In harness, near trailer lamp relay	

Fuse Panel

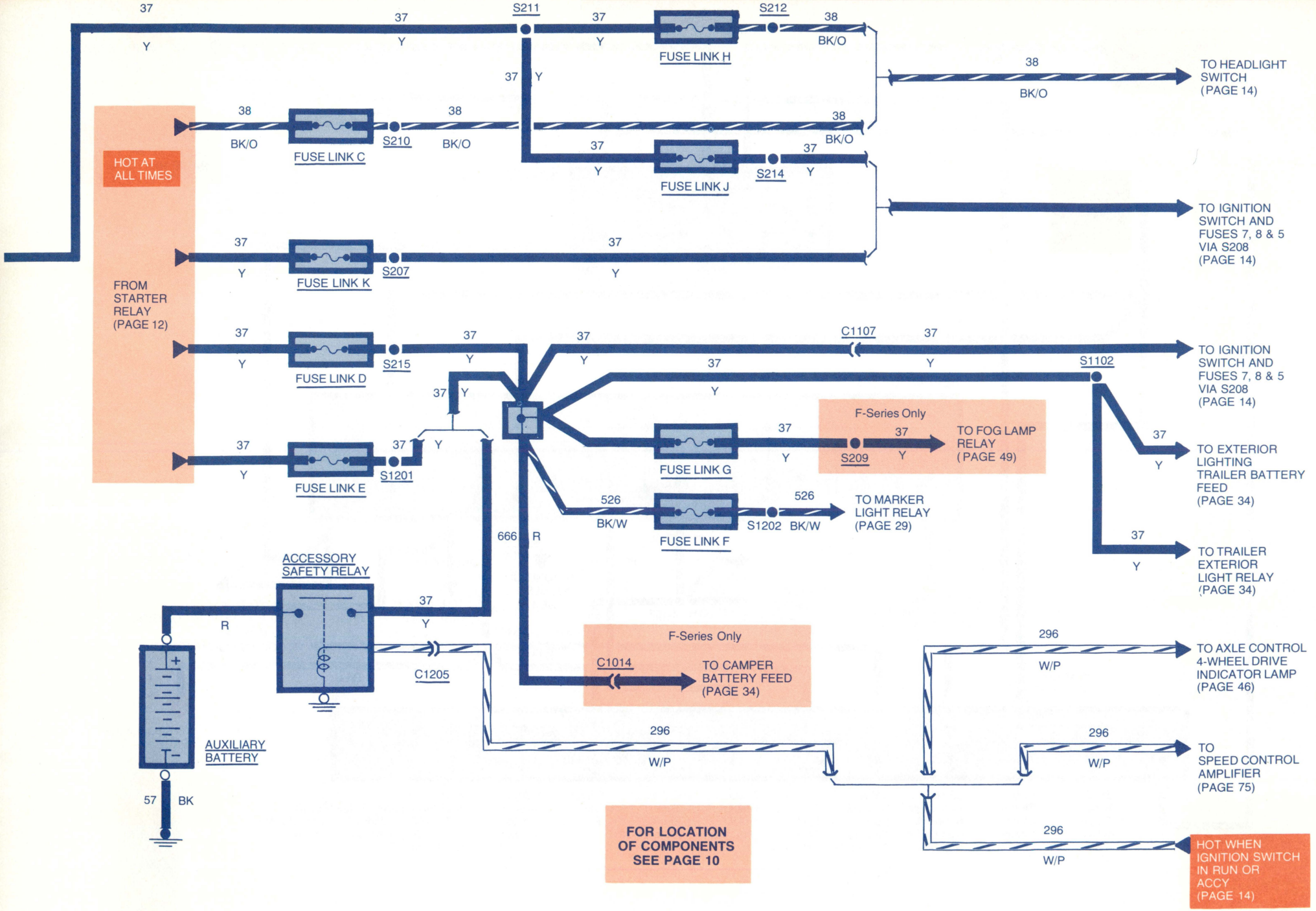


Fuse Position & Size	Color	Circuits Protected
1. Blank		
2. 10 amp	red	Throttle actuator and solenoid. Seat belt warning buzzer. Dual brake warning indicator lamp.
3. Blank		
4. 10 amp	red (F-Series Only)	Aux. Fuel Tank Selector Switch (F-Series).
5. 25 amp	black/white stripe (Bronco Only)	Tailgate power window (key switch actuated).
6. Blank		
7. 20 amp	yellow	Emergency Warning flasher. Stop lamps.
8. 15 amp	light blue	Courtesy lamps (under instrument panel). Dome lamp. Glove box lamp. Cargo lamp. Cigar lighter. Clock. Visibility group. Engine compartment lamp (underhood lamp).
9. Blank		
10. 10 amp	red	Radio. C.B. Radio.
11. 10 amp	red	Speed control relay and control amplifier. Accessory safety relay. Axle control (4 wheel drive) indicator lamp. Convenience group.
12. Blank		
13. 4 amp	pink	Interior illumination. Headlamp switch illumination. Windshield wiper/washer switch illumination. Heater—A/C control and switch illumination. Clock, radio and transmission indicator lamp. Ash tray lamp.
14. 30 amp	light green	Heater—A/C mode switch and blower motor.
15. 15 amp	light blue	Turn signal lamps. Back-up lamps.
16. Blank		
17. 25 amp	light blue/black dot (Bronco Only	Power tailgate window switch (instrument panel operated)

Charging System

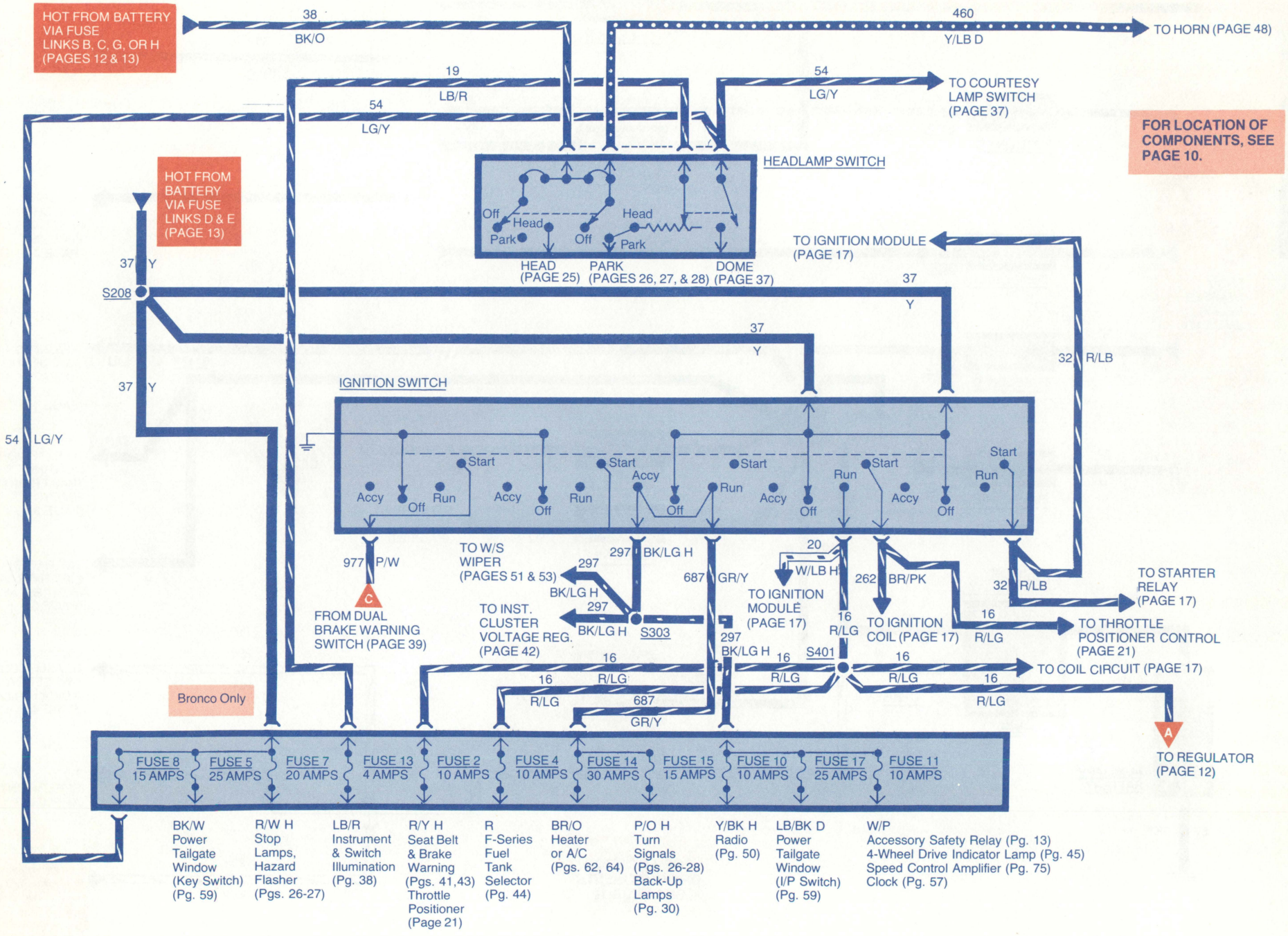


Power Distribution



FOR LOCATION OF COMPONENTS SEE PAGE 10

Power Distribution



Vacuum Systems— General Information

Vacuum Trouble-Shooting

Vacuum trouble-shooting follows the same basic rules as does electrical trouble-shooting. And, the trouble-shooting procedures take the same factors into account . . .

- probability
- speed
- elimination
- certainty

As in all trouble-shooting the same basic steps—or shortcuts—to becoming an expert are:

Verify the condition. This simply means that you make sure you really have a problem before you start fixing it. Try to duplicate the malfunction before you proceed.

Quick visual inspection. Look for the obvious. If you're having vacuum feed problems—check first for things that are readily evident. Things like a disconnected hose.

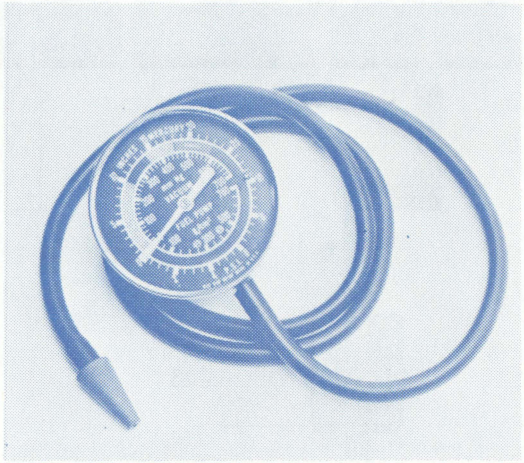
Think simple. Even unusual problems can be caused by very simple malfunctions. For instance, low vacuum reading is quite likely to be caused by a loose, crimped or slightly cut hose. An intermittant problem is apt to be caused by something loose—not necessarily broken.

Don't assume. Once you've cured the symptom, you may still have the root of the condition to tackle. And, remember new parts are just that—new. Don't assume they are good working parts. The vacuum section of the manual follows the same "condition/step" approach as the electrical part. Also, what to do—not how to do it—is stressed. That is, which repairs to make, not how to make them.

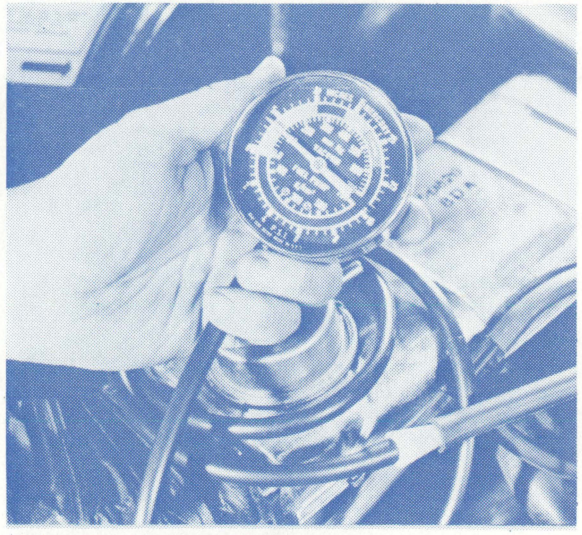
Trouble-Shooting Tools

Vacuum Gage

This tool is used to measure the amount of vacuum in a supply line, component, reservoir, etc. The vacuum gage is especially useful for detecting a fluctuating supply or leaky hose.



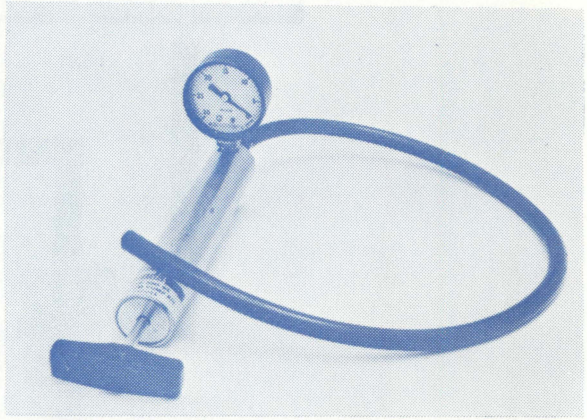
Typical Vacuum Gage



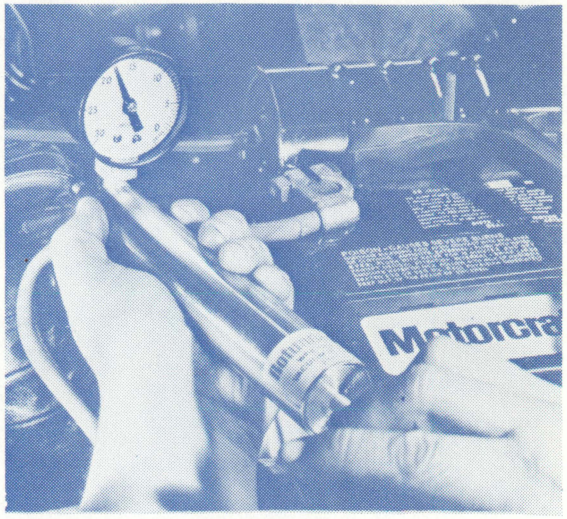
Using The Vacuum Gage

Vacuum Tester

This tool (Rotunda 21-0014, or equivalent) enables you to create a specific amount of vacuum for test and diagnosis procedures. This enables you to check the operation of parts of vacuum circuits and individual components. The needle drops to show vacuum decrease such as when a vacuum component functions.

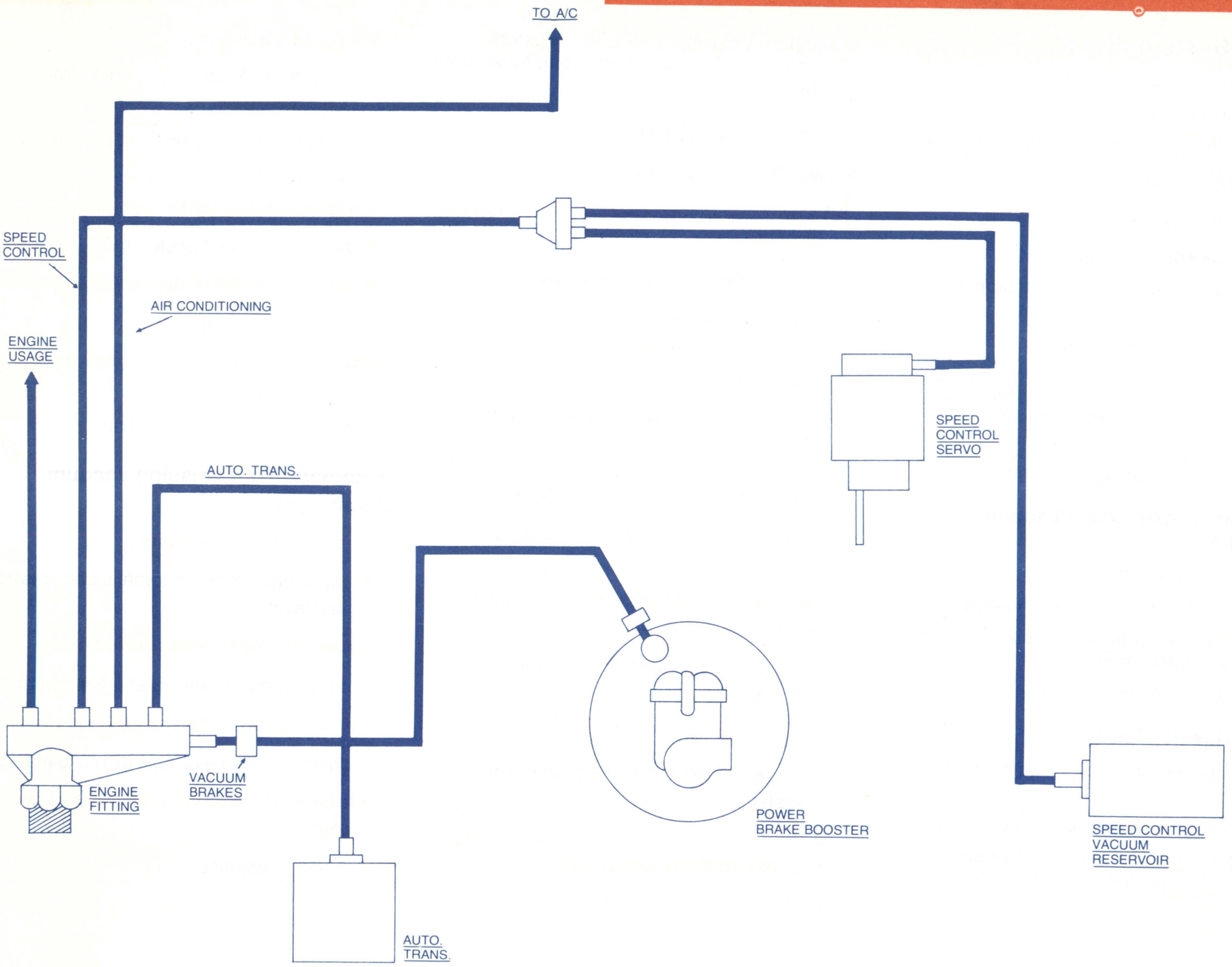


Typical Vacuum Tester



Using The Vacuum Tester

Vacuum Distribution



Vacuum Systems

Brake/Transmission Vacuum Supply

How the System Works

The system contains

- power brake booster
- automatic transmission vacuum diaphragm
- vacuum reserve tank

Power Brake Booster

When the brake pedal is depressed . . .

- inside booster, valves supply vacuum to rear of a diaphragm
- the diaphragm is pulled back
- this action gives an "assisted force" to the master cylinder—making it possible to brake the vehicle with less pedal pressure
- when pedal is released, the vacuum supply is ended and the diaphragm is vented

Automatic Transmission Vacuum Diaphragm

The vacuum diaphragm . . .

- is connected directly to intake manifold
- engine vacuum controls hydraulic pressures inside the transmission
- the result is even, smooth shifting

Vacuum Reserve Tank

Because engine vacuum varies with throttle position . . .

- the reserve tank is used to store vacuum
- this "stored" vacuum is used as a steady source of vacuum for components in the heater A/C system
- temporary closing of vacuum actuated components is avoided when engine vacuum drops

Trouble-Shooting

Power Brake Booster

If a problem in the power brake booster is suspected . . .

- check master cylinder fluid level

If fluid level is correct, or additional fluid doesn't correct condition . . .

- set engine at idle
- connect vacuum gauge to booster feed

If vacuum is less than 10 inches (Hg) . . .

- check vacuum available at intake manifold
- if less than 10 inches, repair or adjust engine

If intake manifold vacuum is at least 10 inches . . .

- check supply hose to booster for damage or blockage

If hose is OK . . .

- check for vacuum leak elsewhere in system

If 10 or more inches of vacuum is being supplied to the power booster . . .

- place transmission in NEUTRAL
- turn off engine
- release parking brake
- pump brake to exhaust vacuum from system
- start engine, while applying pressure to brake pedal

If brake pedal tends to "fall away" . . .

- the power brake booster is OK

In no effect is felt under foot pressure . . .

- replace the booster

If pedal operation feels spongy under foot pressure . . .

- bleed hydraulic system of air

Automatic Transmission Vacuum Diaphragm

If you suspect a problem . . .

- check and correct automatic transmission fluid level

If this does not correct condition . . .

- check vacuum available to diaphragm

If it is less than 10 inches (Hg) . . .

- check vacuum available at intake manifold

If intake manifold vacuum is less than 10 inches . . .

- repair or adjust engine

Vacuum Systems

Brake/Transmission Vacuum Supply

If intake manifold vacuum is 10 inches or more . . .

- check supply hose for leakage and blockage

If hose is OK . . .

- check for a leak or disconnected hose elsewhere in the system

If condition still exists . . .

- attach vacuum tester
- draw 18 inches (Hg) vacuum

If the diaphragm will not hold 18 inches of vacuum (the needle drops) . . .

- replace the diaphragm

Vacuum Reserve Tank

If a malfunction is suspected . . .

- disconnect vacuum supply line at the engine
- plug the line
- disconnect the outlet line from tank
- attach vacuum tester
- draw 10 inches (Hg) vacuum on tank

If the reading on the tester drops . . .

- repair or replace the tank

If level remains constant on tester gauge . . .

- attach vacuum tester to check valve
- vacate to 10 inches (Hg)
- remove plug from the supply line

If reading drops . . .

- replace check valve

NOTE: Further information will be found in Ford Transmission Publications.

Speed Control

Elements of the System

- an OFF-ON switch
- SET-ACC (ACCELERATE) and COAST switches
- Resume switch
- a throttle actuating servo
- an amplifier assembly
- a speed sensor
- a linkage
- check valve assembly
- a vacuum reserve tank and hoses

How the System Works

To operate the speed control system . . .

- drive at least 30 mph
- quickly depress and release the SET-ACC switch
- to decrease speed touch brake and reset or push COAST switch and release when desired speed is reached
- to increase speed touch brake and reset or push SET-ACC switch and release when desired speed is reached
- to turn off speed control, turn OFF-ON switch to OFF or touch brake pedal.
- to resume speed (after pressing brake), press resume button—vehicle will resume set speed

Trouble-Shooting

If speed control system does not operate, operates erratically, or operates intermittantly, perform a visual inspection . . .

- check for frayed wires
- check for damaged vacuum reserve tank
- check for damaged, worn or poorly fitted hoses and electrical wires and connectors
- check speedometer cable for binding or improper connection
- check for binding at the servo and throttle linkage
- check for free play in excess of 1/4 inch in the bead chain

If any of these conditions exist . . .

- correct them

If this does not resolve the situation . . .

- review operating procedures

If system is being operated correctly and still does not work properly . . .

- Refer to Video Reference Book, The Resume Speed Control System, Course No. 3701-007, or have system repaired by an authorized Ford dealer.

Component	Location	Connector Description
Speed Control Amplifier	High on dash panel, RH side of steering col.	
Connector C301	On speed control amplifier	Irregular, 3 terminals
Connector C305	Under I/P, near steering col.	Quarter circle, gray, 22 terminals
Connector C713	Under I/P, near steering col.	Quarter circle, gray, 33 terminals
Connector C717	At speed control amplifier	Rectangular, gray, 6 terminals
Connector C714	At speed control amplifier	Rectangular, green, 6 terminals
Connector C726	At speed control servo	Rectangular, brown, 6 terminals
Connector C727	At speed senser	Plug shape, brown, 2 terminals
Splice S601	In harness, near T/O to speed control switch	
Ground G703	Eyelet attached to LH side of "Y" brace	