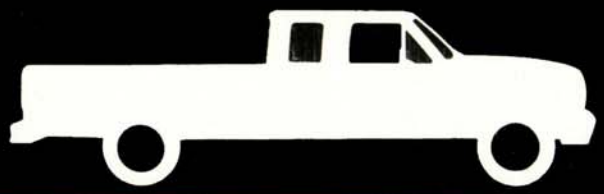
Ford

1995
F-SERIES



ELECTRICAL AND VACUUM TROUBLESHOOTING MANUAL

1995 F-Series Electrical & Vacuum TroubleShooting Manual (EVTM)

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ELECTRICAL AND VACUUM TROUBLESHOOTING MANUAL
FPS-12128-95

FORD CUSTOMER SERVICE DIVISION

Quality is Job 1

Ford Customer Service Division has developed a new format for the 1995 F–SERIES EVTM . Our goal is to provide accurate and timely electrical and vacuum service information.

1995 EVTM FEATURES

- Schematic pages now contain **Component Location** references to full–view illustrations and **Component Descriptions** that describe the system function of a component.
- **"COMPONENT TESTING"** procedures (CELL 149) that tell the user how to perform diagnostic tests on various circuits.
- **Connector End Views** are now located at the end of individual cells and are shown for connectors with five or more cavities; a circuit function chart is provided.
- **NOTES, CAUTIONS and WARNINGS** contain important safety information.
- Full view **"COMPONENT LOCATION VIEWS"** (CELL 151) to help locate on–vehicle components.
- Circuit voltages have been added to schematic pages to help simplify troubleshooting. Nonessential troubleshooting hints have been deleted.
- **Cellular Pagination:** A specific section (or cell) in all EVTMs is numbered by cell and starts with page 1. For example: **"HOW TO USE THIS MANUAL"** is CELL 2 and begins with page 2–1.
- **"IN–LINE CONNECTOR FACES"** (CELL 150) has been added for in–line connectors with six or more terminals, to aid in servicing electrical wiring.
- "C" numbers have been assigned for all electrical connectors. "C" numbers are listed in the **"LOCATION INDEX"** (CELL 152).
- **NUMBERS"** (CELL 153) has been added to aid in identifying warranty
- s contain a suffix to denote connector "gender" type (F–socket, M–

ORDERING INFORMATION

Information about how to order additional copies of this publication or other Ford publications may be obtained by writing to Helm, Incorporated at the address shown below or by calling 1-800-782-4356. Other publications available include:

- Service Manuals
- Service Specification Books
- Car/Truck Wiring Diagrams
- Powertrain Control/Emissions Diagnosis Manuals

Helm Incorporated
P.O. Box 07150
Detroit, Michigan 48207

1–1 TABLE OF CONTENTS/INDEX

Table Of Contents

Index

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.

The purpose of this manual is to show electrical and vacuum circuits in a clear and simple fashion to make troubleshooting easier. **NOTES, CAUTIONS** and **WARNINGS** containing important information appear in boxes on text pages.

- **NOTES** describe how switches and other components operate to help complete a particular procedure.
- **CAUTIONS** provide information that could prevent making an error that may damage the vehicle.
- **WARNINGS** provide information to prevent personal injury.

The **WARNINGS** list on page 2-2 contains general warnings to follow when servicing a vehicle.

Components that work together are shown together. All electrical components used in a specific system are shown on one diagram. The circuit breaker or fuse is shown at the top of the page. All wires, connectors, components and splices are shown in the flow of current to ground at the bottom of the page. If a component is used in several different systems, it is shown in several places. For example, the Main Light Switch is electrically a part of many systems and is repeated on many pages.

In some cases, a component may seem (by it... to belong to a system where it has no ... dio Illu- ... llumina- ti... nection to ... e Radio di...

Schematic pages now contain references to full-view illustrations and component descriptions for various components. The references are reverse–text blocks located next to each component and connector and refer the user to the appropriate illustration page and zone. The component descriptions summarize the system function of a component.

Schematic pages now contain circuit voltages to help simplify troubleshooting hints. 12V is used to imply battery voltage on a component connector terminal, and 0V is used to show that there should be continuity to ground on that particular terminal. Conditional voltages such as "12V with the ignition switch in RUN" will also be provided. Troubleshooting hints that can't be simplified with circuit voltages will be shown at the end of each cell.

Connector face information specific to a certain cell is now found at the end of that cell. A Connector Face Reference List is provided to locate connector faces that are shown in different cells. Component connectors with five or more terminals are illustrated. Component connectors with five or more terminals are accompanied by a pin-out chart that lists the function of all circuitry associated with that component.

In–Line connectors shown on schematic pages now contain a suffix to denote connector gender (F– socket, M– prior blade).

"GROUNDS"(Cell 10) contains ground circuitry shown in complete detail. This information is useful for checking interconnections of the ground circuits of different systems.

"POWER DISTRIBUTION" (Cell 13) contains power distribution circuitry shown in complete detail. This section displays how the various fuses are powered and in turn, how each system is powered.

"COMPONENT TESTING" (Cell 149) contains testing procedures for various switches. This information includes schematics, component terminal locations and step–by–step procedures.

"IN–LINE CONNECTORS FACES" (Cell 150) contains in–line connectors with five or more terminals. This section includes both female and male mating in–line connectors arranged in order according to connector number.

"COMPONENT LOCATION VIEWS" (Cell 151) contains full–view illustrations which show the location of all components and connectors in the vehicle.

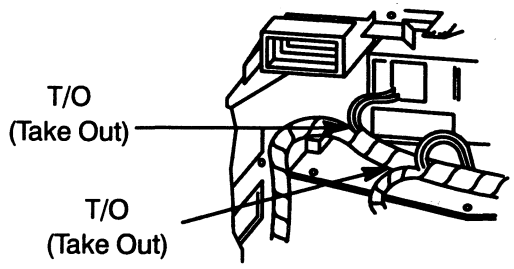
The **"LOCATION INDEX"** (Cell 152) provides the service base part numbers, locations, connector face references and illustration references for all components, connectors, splices and grounds.

HELPFUL REMINDERS

Before using the EVTM for troubleshooting, refer to the HELPFUL REMINDERS;

1. The abbreviation T/O, for take out, used in the Location Index (Cell 152), refers to the point at which a group of wires branch off the harness trunk. Refer to the wiring harness illustration.

Wiring harness at back of Instrument Panel, showing typical T/O (Take Out) locations



2. If a connector serves the same purpose in two separate versions (e.g., EFI/Carb), but is physically different, *two* connector numbers are used. However, if a connector serves the same purpose in two separate versions (e.g., EFI/Carb) and is physically the same, but the wire colors are different, only *one* connector number is used. If the same physical connector is used more than once, then more than *one* connector number is used.

3. Wiring schematics provide a picture of how and under what conditions the circuit is powered, of the current path to circuit compo- ...rounded. Each ...l (underlined ...ors are listed ...eviations are

COLOR ABBREVIATIONS

BL	**Blue**	**N**	**Natural**
BK	**Black**	**O**	**Orange**
BR	**Brown**	**PK**	**Pink**
DB	**Dark Blue**	**P**	**Purple**
DG	**Dark Green**	**R**	**Red**
GN	**Green**	**T**	**Tan**
GY	**Gray**	**W**	**White**
LB	**Light Blue**	**Y**	**Yellow**
LG	**Light Green**		

NOTE: *Whenever a wire is labeled with two colors, the first color listed is the basic color of the wire, and the second color listed is the stripe marking of the wire.*

4. When reporting Vehicle Repair Location Codes to Ford Customer Service Division, refer to Cell 160 (beginning on page 160-1). Note: Do *not* use the illustrations in Cell 151 (beginning on page 151-1) for reporting Vehicle Repair Location Code.

5. **WARNINGS**

- *Always wear safety glasses for eye protection.*
- *Use safety stands whenever a procedure requires being under a vehicle.*
- *Be sure that the* **Ignition Switch** *is always in the OFF position, unless otherwise required by the procedure.*
- *Set the parking brake when working on any vehicle. An automatic transmission should be in PARK. A manual transmission should be in NEUTRAL.*
- *Operate the engine only in a well-ventilated area to avoid danger of carbon monoxide.*
- *Keep away from moving parts, especially the fan and belts, when the engine is running.*
- *To prevent serious burns, avoid contact with hot metal parts such as the radiator, exhaust manifold, tail pipe, catalytic converter, and muffler.*
- *Do not allow flame or sparks near the battery. Gases are always present in and around the battery cell. An explosion could occur.*
- *Do not smoke when working on a vehicle.*
- *To avoid injury, always remove rings, watches, loose hanging jewelry, and loose clothing.*

HOW TO FIND ELECTRICAL CONCERNS

TROUBLESHOOTING STEPS

These six steps present an orderly method of troubleshooting.

Step 1. Verify the concern.

- Operate the complete system to check the accuracy and completeness of the customer's complaint.

Step 2. Narrow the concern.

- Using the EVTM, narrow down the possible causes and locations of the concern to pinpoint the exact cause.

- Read the description notes at the components and study the wiring schematic. You should then know enough about the circuit operation to determine where to check for the trouble. Further information can be found by referring to the Service Manual pages listed in the box at the top of the page.

Step 3. Test the cause.

- Use electrical test procedures to find the specific cause of the symptoms.

- The *Component Location reference bars* d the pictures will help you find compo- e end of location s, resis-

Step 4. Verify the cause.

- Confirm that you have found the correct cause by connecting jumper wires and/or temporarily installing a known good component and operating the circuit.

Step 5. Make the repair.

- Repair or replace the inoperative component.

Step 6. Verify the repair.

- Operate the system as in Step 1 and check that your repair has removed all symptoms without creating any new symptoms.

Some engine circuits may need special test equipment and special procedures. See the *Service Manual* and other service books for details. You will find the circuits in this manual to be helpful with those special test procedures.

TROUBLESHOOTING TOOLS

JUMPER WIRE

This is a test lead used to connect two points of a circuit. A Jumper Wire can bypass an open in a wire to complete a circuit.

WARNING

Never use a jumper wire across loads (motors, etc.) connected between hot and ground. This direct battery short may cause injury or fire.

VOLTMETER

A DC Voltmeter measures circuit voltage. Connect negative (- or black) lead to ground, and positive (+ or red) lead to voltage measuring point.

OHMMETER

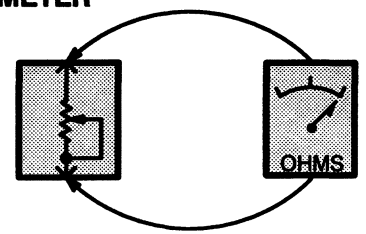


Figure 1–Resistance Check

An Ohmmeter shows the resistance between two connected points (Figure 1).

TEST LAMP

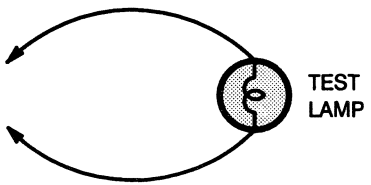


Figure 2–Test Lamp

A Test Light is a 12-volt bulb with two test leads (Figure 2).

Uses: Voltage Check, Short Check

HOW TO FIND ELECTRICAL CONCERNS (CONTINUED)

SELF-POWERED TEST LAMP

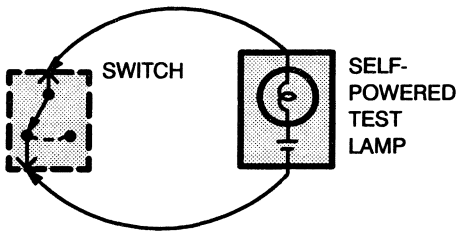


Figure 3–Continuity Check

The Self-Powered Test Lamp is a bulb, battery and set of test leads wired in series (Figure 3). When connected to two points of a continuous circuit, the bulb glows.

Uses: Continuity Check, Ground Check

CAUTION

When using a self-powered test lamp or ohmmeter, be sure power is off in circuit during testing. Hot circuits can cause equipment damage and false readings.

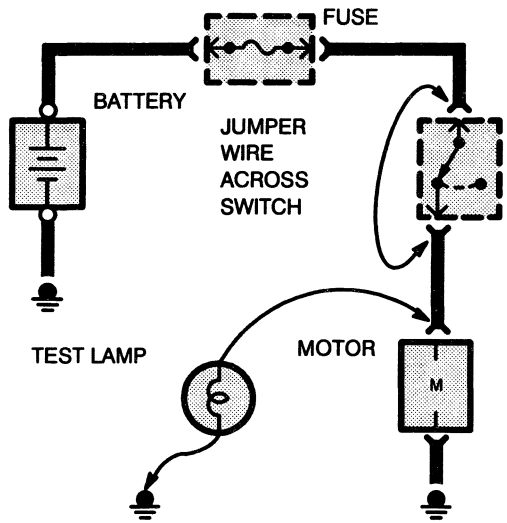


Figure 4—Switch Circuit Check and Voltage Check

In an inoperative circuit with a switch in series with the load, jumper the terminals of the switch to power the load. If jumpering the terminals powers the circuit, the switch is inoperative (Figure 4).

CONTINUITY CHECK (Locating open circuits)

Connect one lead of a Self-Powered Test Lamp or Ohmmeter to each end of circuit (Figure 3). Lamp will glow if circuit is closed. Switches and fuses can be checked in the same way.

VOLTAGE CHECK

Connect one lead of test lamp to a known good ground or the negative (-) battery terminal. Test for voltage by touching the other lead to the test point. The bulb goes on when the test point has voltage (Figure 4).

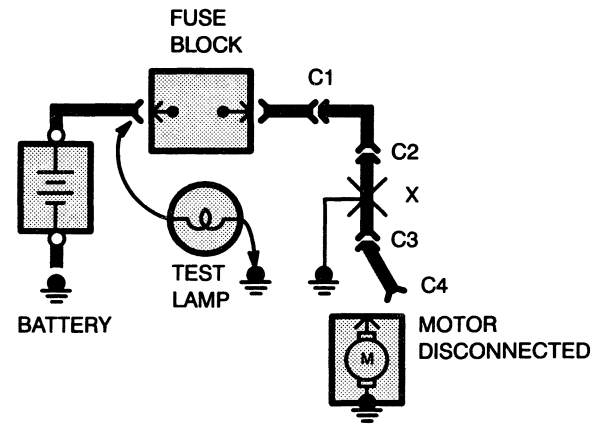


Figure 5—Short Check

HOW TO FIND ELECTRICAL CONCERNS (CONTINUED)

A fuse that repeatedly blows is usually caused by a short to ground. It's important to be able to locate such a short quickly (Figure 5).

1. Turn off everything powered through the fuse.
2. Disconnect other loads powered through the fuse:
   - Motors: disconnect motor connector (Connector C4 in Figure 5)
   - Lights: remove bulbs.
3. Turn the Ignition Switch to RUN (if necessary) to power fuse.
4. Connect one Test Lamp lead to the hot end of the blown fuse. Connect the other lead to ground. The bulb should glow, showing power to fuse. *(This step is just a check to be sure you have power to the circuit.)*
5. Disconnect the test lamp lead that is connected to ground, and reconnect it to the load side of the fuse at the connector of the disconnected component. (In Figure 5, connect the test lamp lead to connector C4.)
   - If the Test Lamp is off, the short is in the disconnected component.
   - If the Test Lamp goes on, the short is in the wiring. You must find the short by disconnecting the circuit connectors, one at a time, until the short is found. For example, in figure 5 with a ground at X, the bulb goes out when C1 or C2 is disconnected, but not after disconnecting C3. This means the short is between C2 and C3.

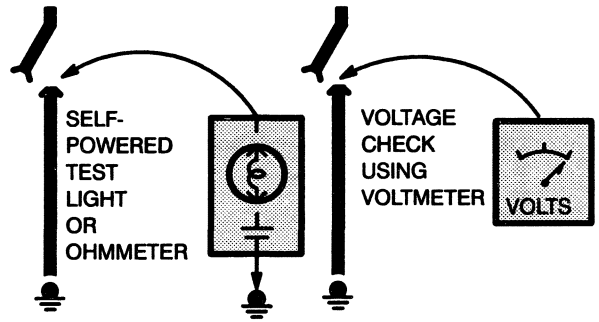


Figure 6—Ground Check

Turn on power to the circuit. Perform a Voltage Check between the suspected inoperative ground and the frame. Any indicated voltage means that the ground is inoperative (Figure 6).

Turn off power to the circuit. Connect one lead of a Self-Powered Test Lamp or Ohmmeter to the wire in question and the other lead to a known ground. If the bulb glows, the circuit ground is OK (Figure 6).

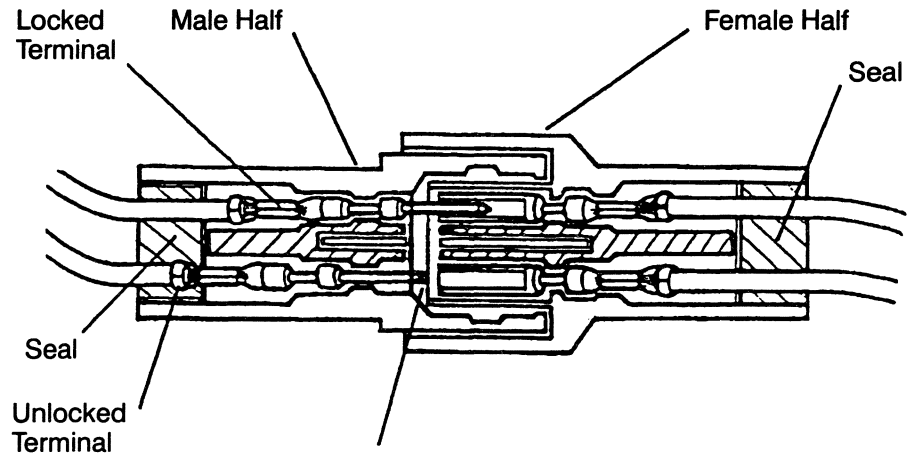
The circuit schematics in this manual make it easy to identify common points in circuits. This knowledge can help narrow the concern to a specific area. For example, if several circuits fail at the same time, check for a common power or ground connection (See *Power Distribution* or *Grounds*). If part of a circuit fails, check the connections between the part that works and the part that doesn't work.

For example, if the lo beam headlamps work, but the high beams and the indicator lamp don't work, then the power and ground paths must be good. Since the dimmer switch is the component that switches this power to the high beam lights and the indicator, it is most likely the cause of failure.

TROUBLESHOOTING WIRING HARNESS AND CONNECTOR HIDDEN CONCERNS

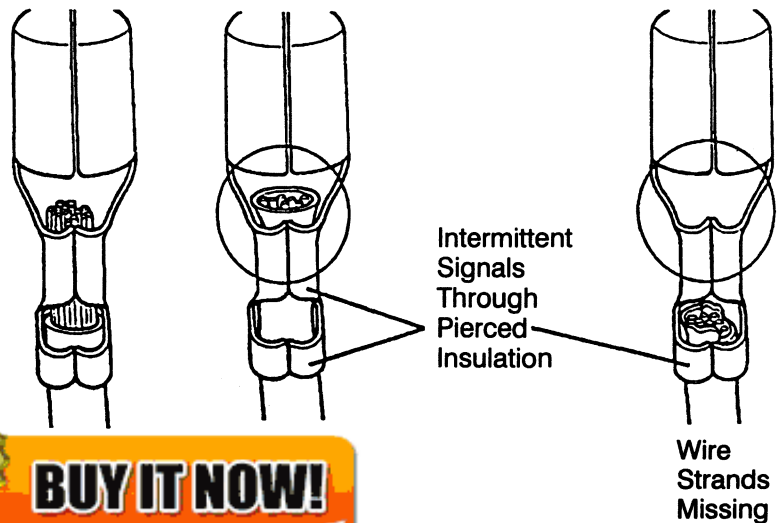
The following illustrations are known examples of wiring harness, splices and connectors that will create intermittent electrical concerns. The concerns are hidden and can only be discovered by a physical evaluation as shown in each illustration.

NOTE: When servicing gold plated terminals in a connector, only replace with gold plated terminals designed for that connector.

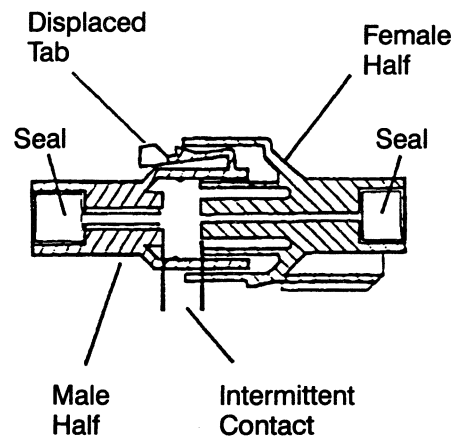


Check for unlocked terminals by pulling each wire at the cord of the connector

TERMINAL NOT PROPERLY SEATED

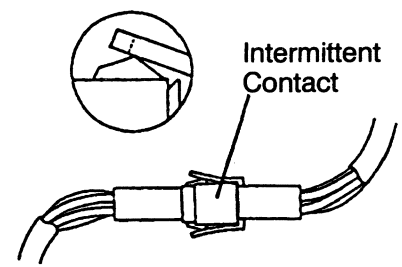


ILATION STRIPPING



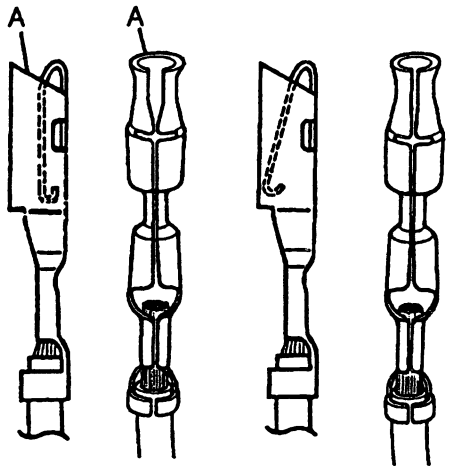
Type A

Lock may be displaced into an unlocked position; pull on the connector to verify the lock.



Type B

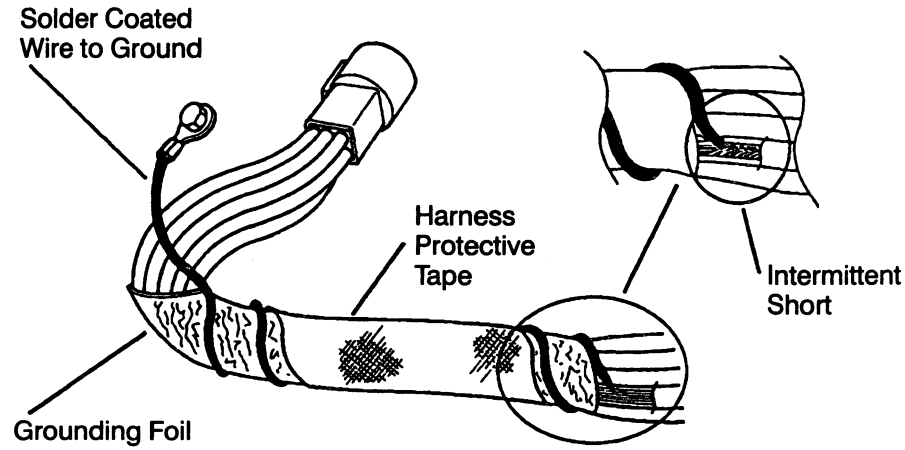
PARTIALLY MATED CONNECTORS



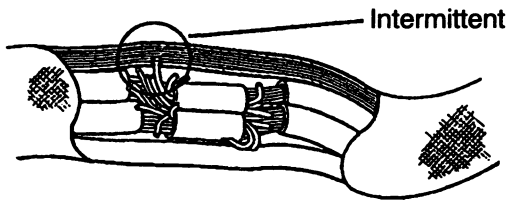
Any probe entering the terminal may enlarge the contact spring opening creating an intermittent signal. Insert the correct mating terminal (Location A) from the service kit and feel for a loose fit.

DEFORMED (ENLARGED) FEMALE TERMINALS

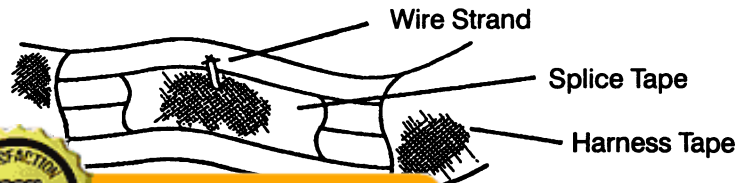
Solder coated wire pierced through the insulation of another circuit.



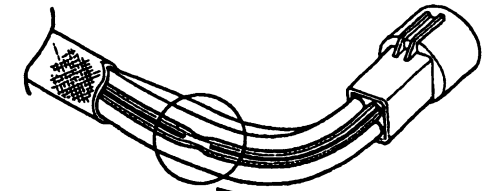
ELECTRICAL SHORT INSIDE THE HARNESS



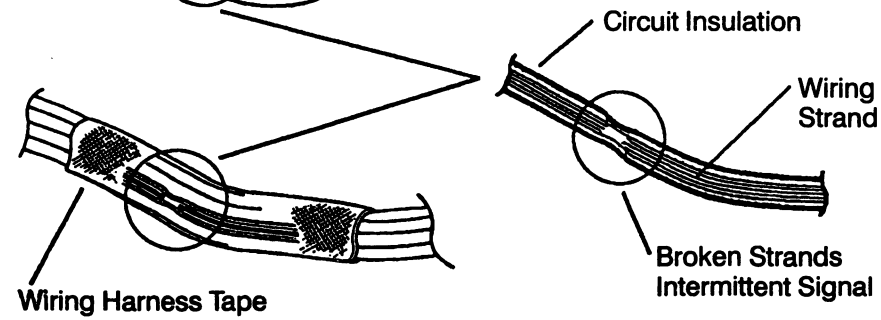
Operate the system and flex the harness at splice location noted in Section 152.



ITHIN THE HARNESS



Remove the tape and flex/feel each circuit for reduction in diameter at break.



BROKEN WIRE STRANDS IN HARNESS

HOW TO FIND THE VACUUM CONCERNS

These six steps present an orderly method of troubleshooting.

Step 1. Verify the concern.

- Operate the system and observe all symptoms to check the accuracy and completeness of the customer's complaint.

Step 2. Narrow the concern.

- Narrow down the possible causes and location of the concern to pinpoint the exact cause.

Step 3. Test the cause.

- Use test procedures to find the specific cause of the symptoms.

Step 4. Verify the cause.

- Confirm that you have found the right cause by operating the parts of the circuit you think are good.

Step 5. Make the repair.

- Repair or replace the inoperative component.

Step 6. Verify the repair.

- Operate the system as in Step 1. Check that your repair has removed all symptoms without creating any new symptoms.

NOTE: Vacuum system problems fall into

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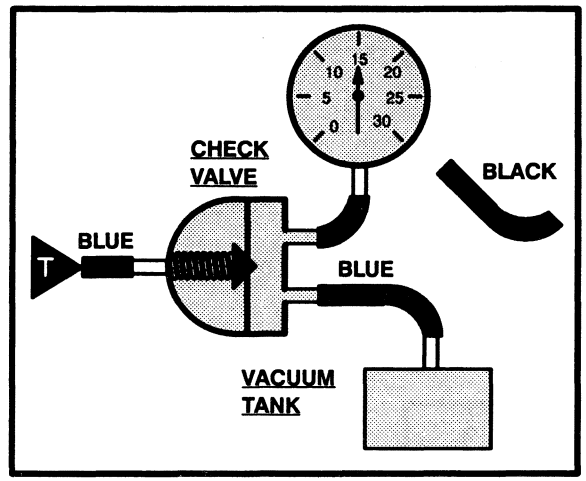


Figure1 - System Supply Test

Vacuum Supply Test

1. Connect Vacuum Tester to system side of Check Valve (Figure 1).
2. Start engine. Gauge should show approximately 15 inches of vacuum.
3. Turn off engine, and observe gauge:
   - If vacuum holds, supply OK.
   - If vacuum fails, replace Check Valve or Tank.

Leak Test

1. Connect Vacuum Gauge and Vacuum Pump (Figure 2) to system hose in place of tank.
2. Open valve and start pump. Operate control in all modes.
3. Listen for hiss and observe gauge.

NOTE: Hissing is normal at Function Control when changing modes.

If system hisses or loses vacuum, find system leak as follows:

4. Turn on Vacuum Pump and check vacuum build-up.
5. Stop pump; vacuum should drop.
6. Clamp supply hoses with needlenose pliers, one at a time, until vacuum stops dropping (Figure 2).
7. Check vacuum schematic to find components in that line.
8. Clamp hoses through circuit to find leak.

Component Test

1. Connect Vacuum Tester to component.
2. Pump Vacuum Tester. Check that all components operate correctly and vacuum holds.
3. Replace components if vacuum does not hold.

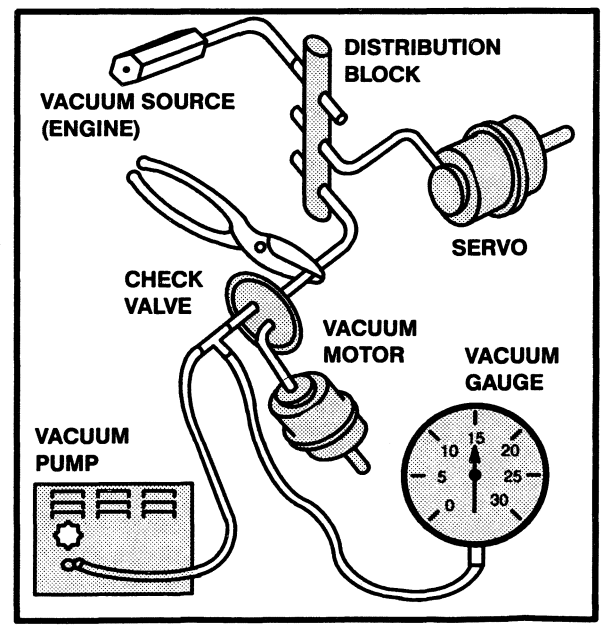
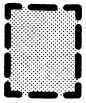
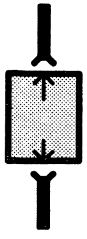


Figure 2 - Testing For Leaks In Typical Vacuum System

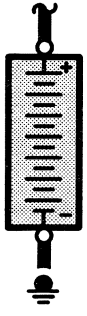
ELECTRICAL SYMBOLS



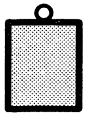
DASHED COMPONENT BOX
ONLY PART OF THE COMPONENT IS SHOWN ON THE PAGE: THE COMPONENT IS SHOWN COMPLETE IN ANOTHER LOCATION



COMPONENT WITH CONNECTORS



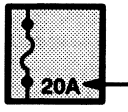
BATTERY



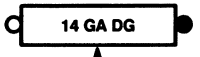
SCREW TERMINAL ON COMPONENT

SOLID STATE

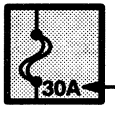
SEALED ELECTRONIC COMPONENT
ANY CIRCUITRY SHOWN INSIDE THE BOX IS A FUNCTIONAL EQUIVALENT ONLY AND IS NOT EXACT



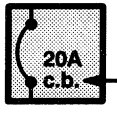
FUSE
CURRENT RATING



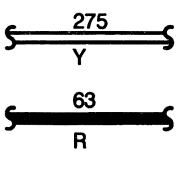
FUSIBLE LINK
WIRE SIZE AND COLOR



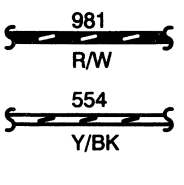
MAXI–FUSE
or
FUSIBLE LINK CARTRIDGE
CURRENT RATING



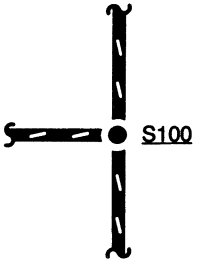
CIRCUIT BREAKER
CURRENT RATING



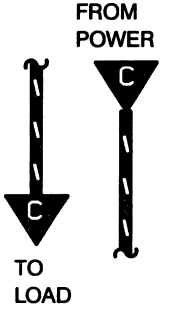
SOLID WIRE



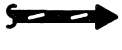
STRIPED WIRE



SPLICE OR CRIMP TERMINAL

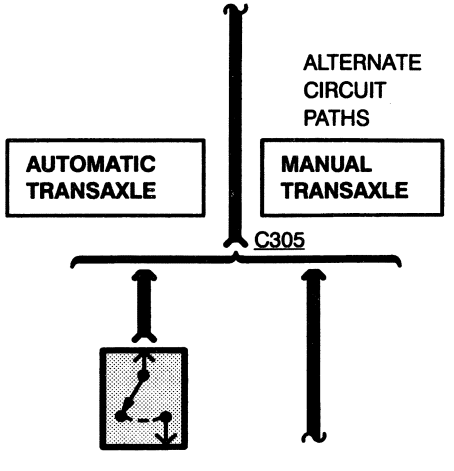


"CUT" WIRES REFERENCED BETWEEN PAGES
ARROWS SHOW CURRENT FLOW FROM POWER TO GROUND

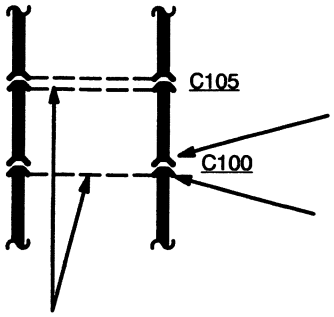


BACKUP LIGHTS

"REFERENCE" WIRES
COMPLETE WIRING SHOWN ON ANOTHER PAGE



ELECTRICAL SYMBOLS



SOCKET

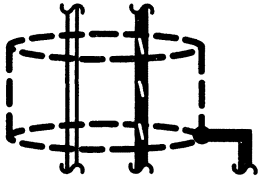
IN-LINE CONNECTOR

PIN OR BLADE

SINGLE OR DOUBLE DASHED LINE INDICATES THAT WIRE ON LEFT ALSO PASSES THROUGH THE SAME CONNECTOR

SEE GROUNDS
PAGES 10-1, 10-2

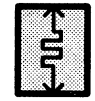
DASHED WIRE
CIRCUITRY IS NOT SHOWN IN COMPLETE DETAIL, BUT IS COMPLETE ON ANOTHER PAGE



SHIELD
WIRES ARE COVERED BY A SHIELD

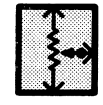
FIELD COIL OR CHOKE

MOTOR



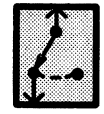
HEATING ELEMENT

THERMISTOR



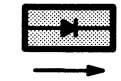
RHEOSTAT OR POTENTIOMETER

SOLENOID

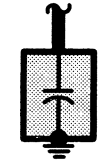


SWITCH

GANGED SWITCHES
CONTACTS MOVE AT THE SAME TIME



DIODES
CURRENT FLOWS IN DIRECTION OF ARROW ONLY



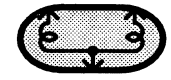
CAPACITOR

TRANSISTOR

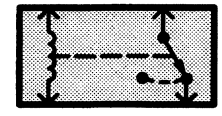
GAUGE

LIGHT BULB

LIGHT EMITTING DIODE (LED)

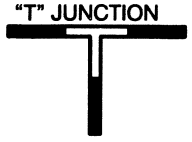


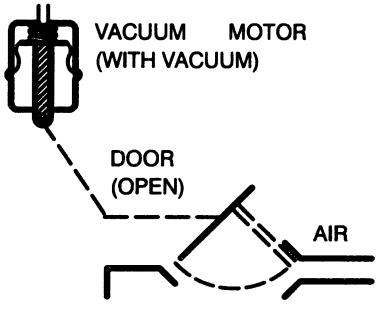
DUAL FILAMENT LIGHT BULB



RELAY
CONTACTS CHANGE POSITION WITH CURRENT THROUGH COIL

VACUUM SYMBOLS



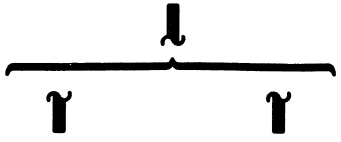


VACUUM ON VACUUM MOTOR PULLS DOOR OPEN TO LET AIR PASS THROUGH

TO SYSTEM

"CUT" HOSES REFERENCED BETWEEN PAGES ARROW SHOWS FROM MANIFOLD FITTING TO COMPONENT

FROM VACUUM DISTRIBUTION



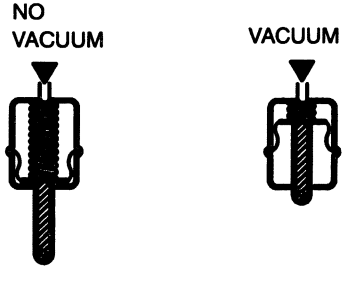
ALTERNATE VACUUM PATHS

NOTE

Other vacuum symbols used on vacuum system diagrams are fully explained on those pages.

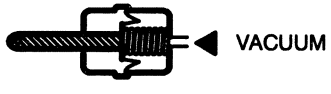
VACUUM MOTOR OPERATIONS

SINGLE DIAPHRAGM MOTOR



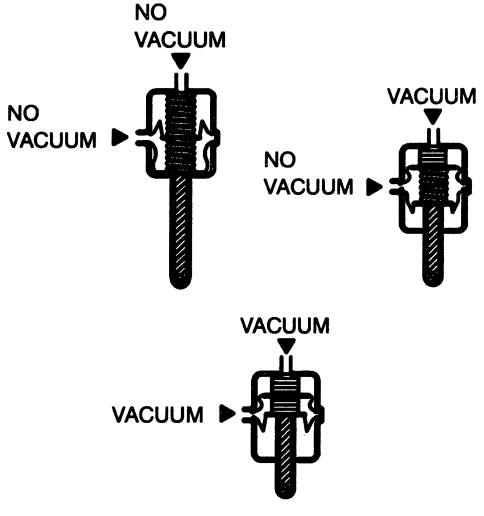
Vacuum motors operate like electrical solenoids, mechanically pushing or pulling a shaft between fixed positions. When vacuum is not a shaft is pushed all the way out by a

SERVO MOTOR



Some vacuum motors, such as the Servo Motor in the Speed Control, can position the actuating arm at any position between fully extended and fully retracted. The Servo is operated by a control valve that applies varying amounts of vacuum to the motor. The higher the vacuum level, the greater the retraction of the motor arm. Servo Motors work nearly the same way as two-position motors, except for the way the vacuum is applied. Servo Motors are generally larger and provide a calibrated control.

DOUBLE DIAPHRAGM MOTOR



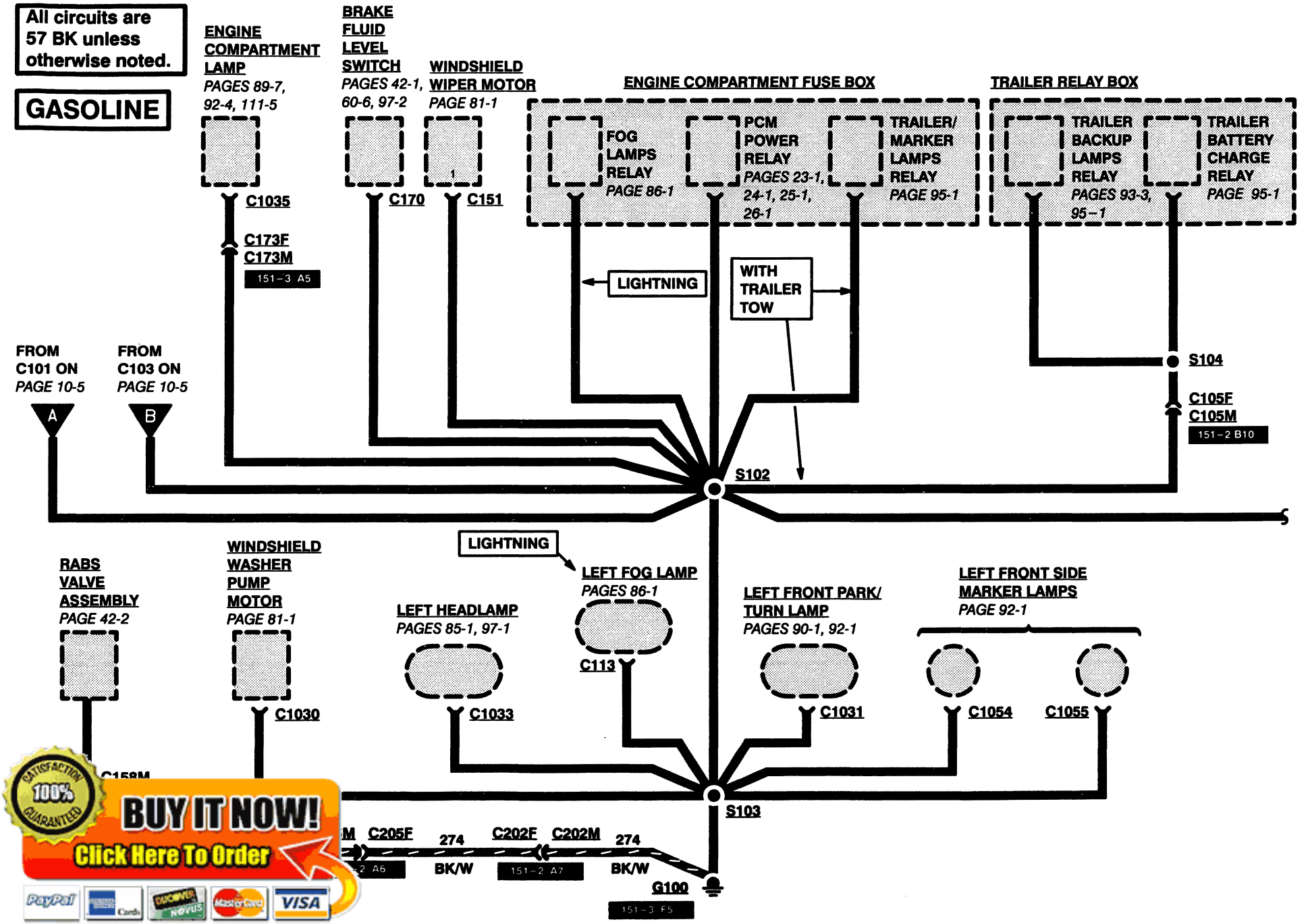
A double diaphragm motor has three positions (it is actually two motors in one housing). When the top port gets vacuum, the shaft pulls half-way in. When both ports get vacuum, the shaft pulls all the way in.

10–1 GROUNDS

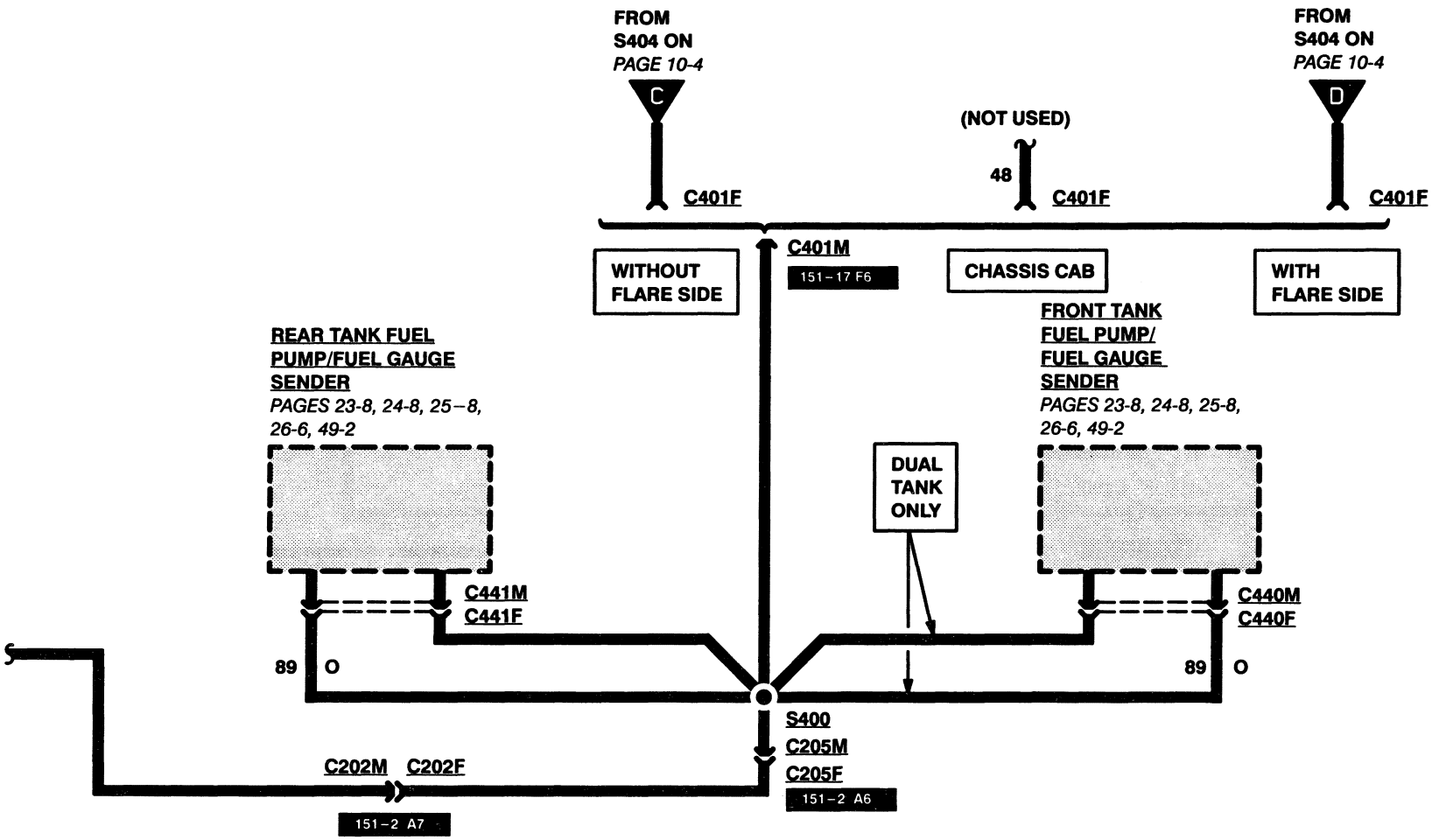
1995 F–SERIES

All circuits are 57 BK unless otherwise noted.

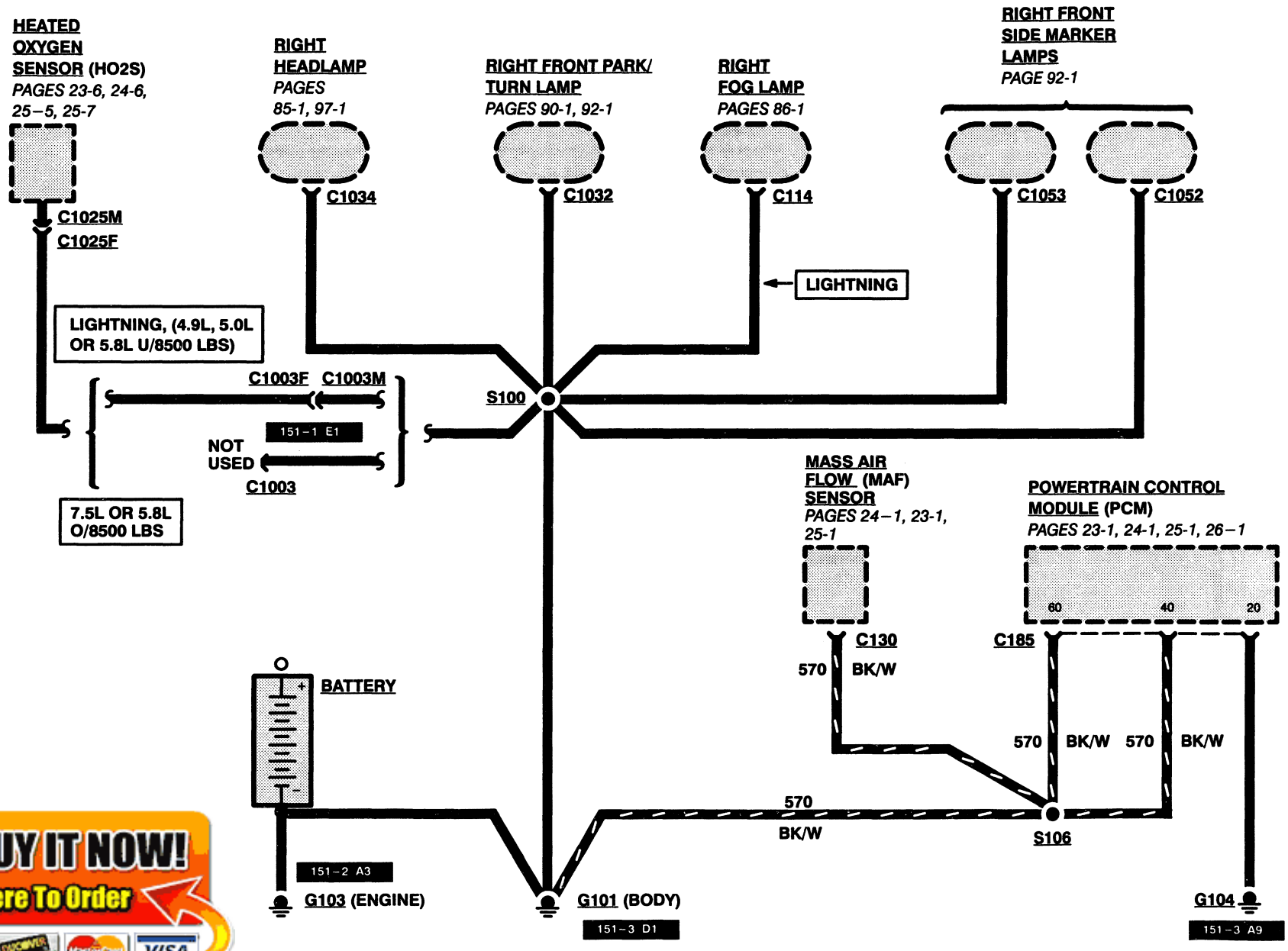
GASOLINE



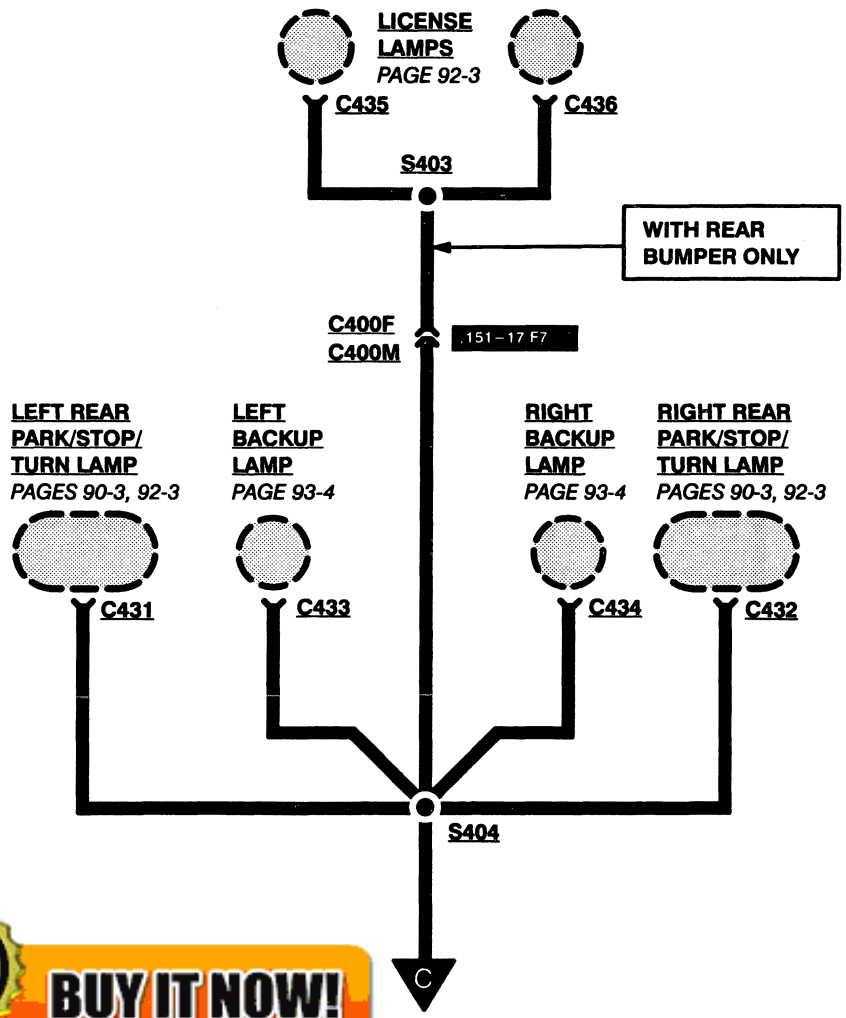
GASOLINE



GASOLINE

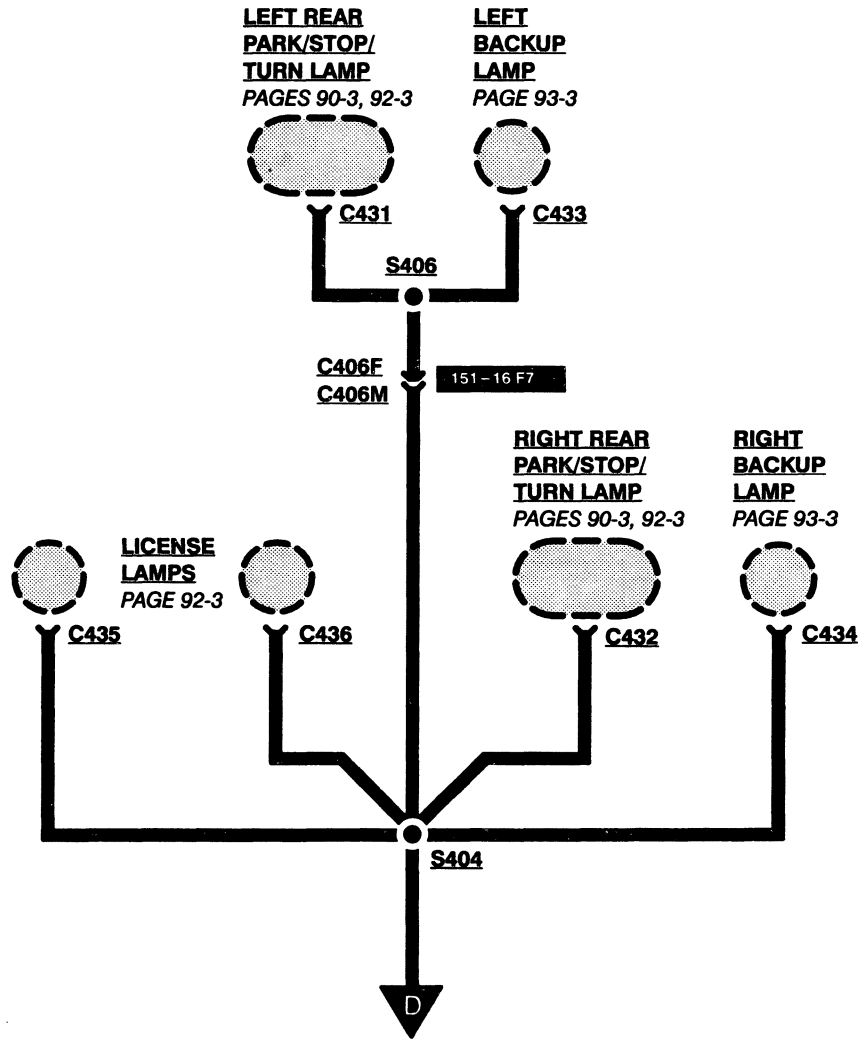


WITHOUT FLARE SIDE



C401 ON
GE 10-2 (GASOLINE)
10-7 (DIESEL)

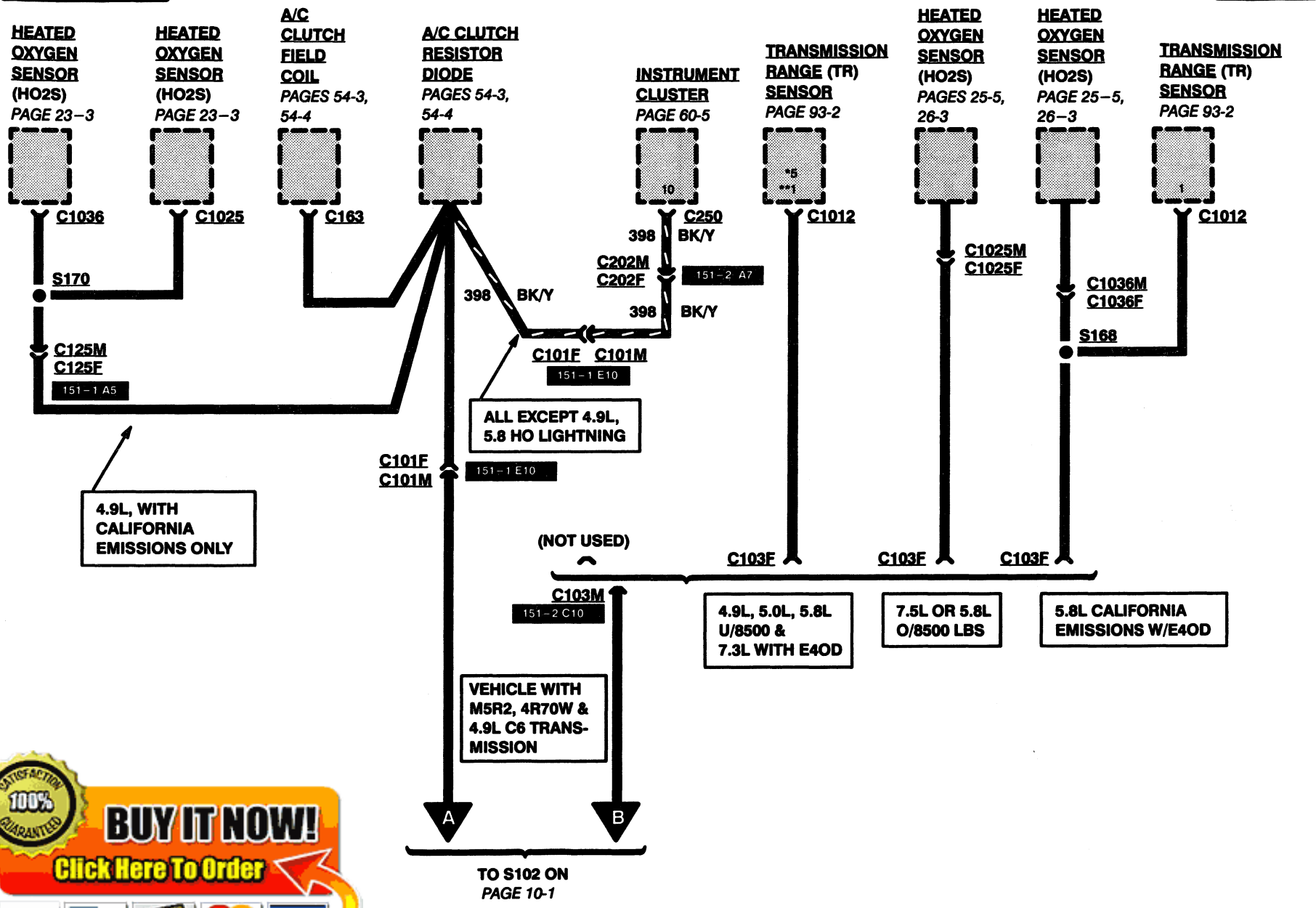
WITH FLARE SIDE



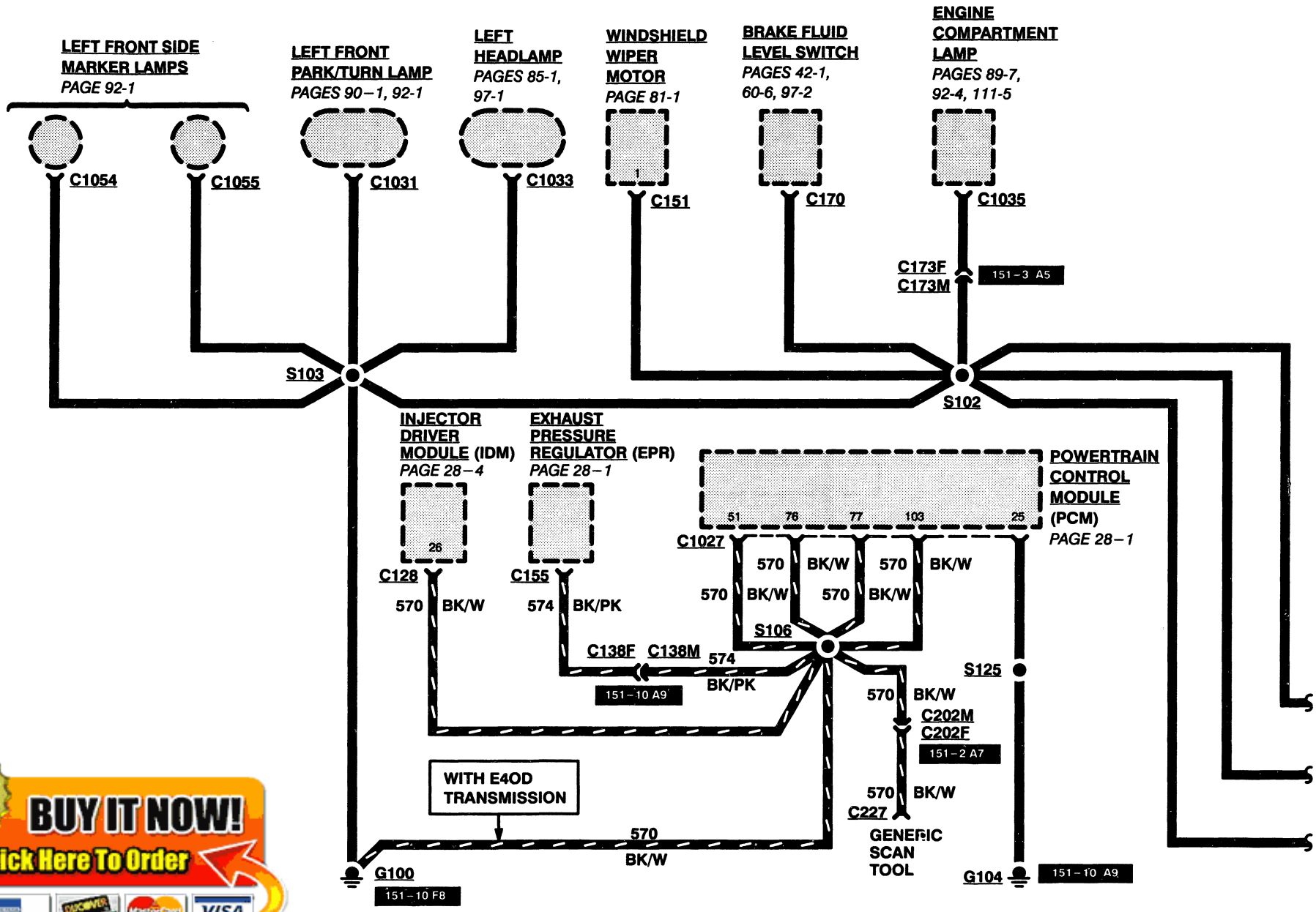
TO C401 ON
PAGE 10-2 (GASOLINE)
PAGE 10-7 (DIESEL)

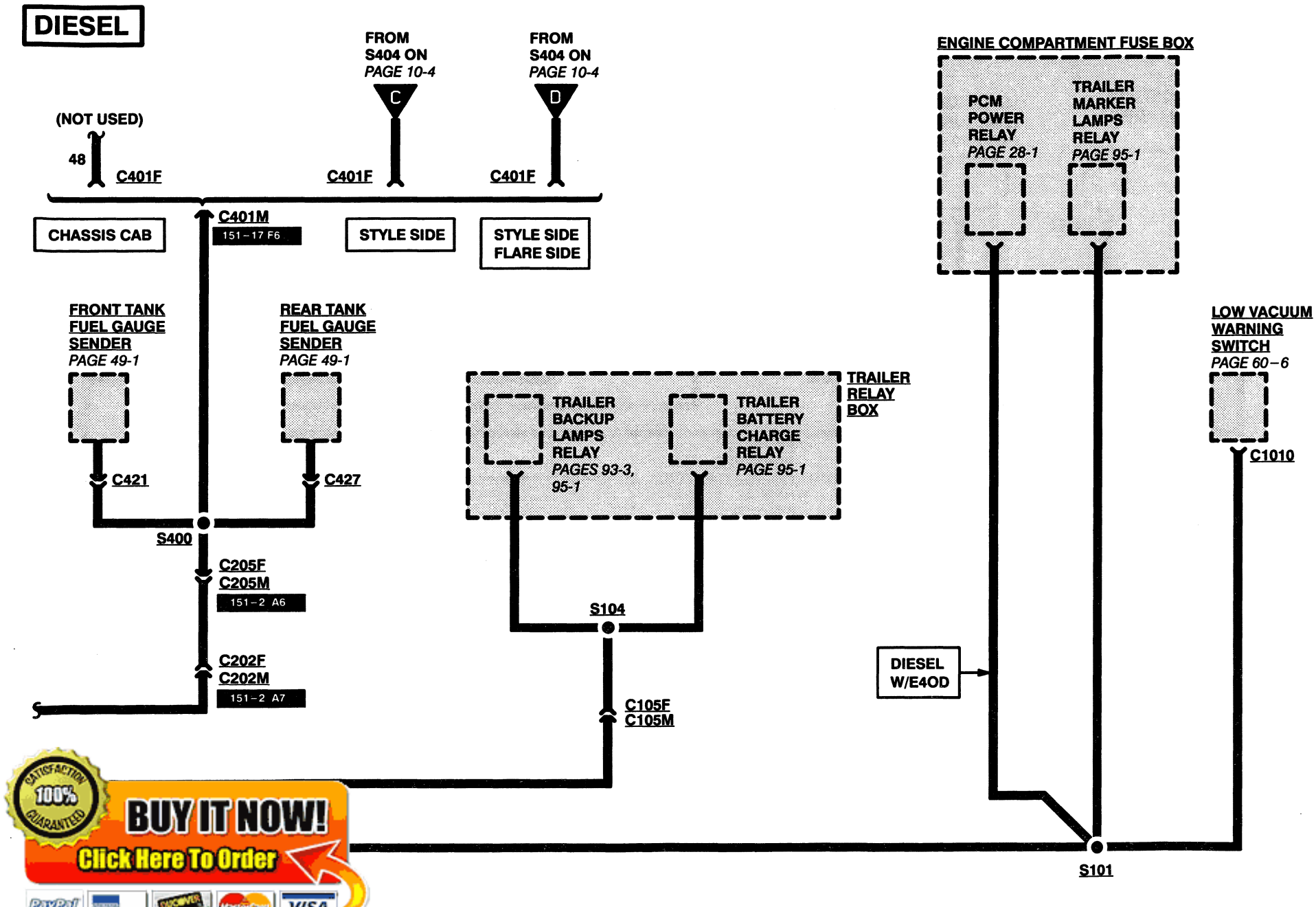
GASOLINE

* W/4R70W
** W/E4OD

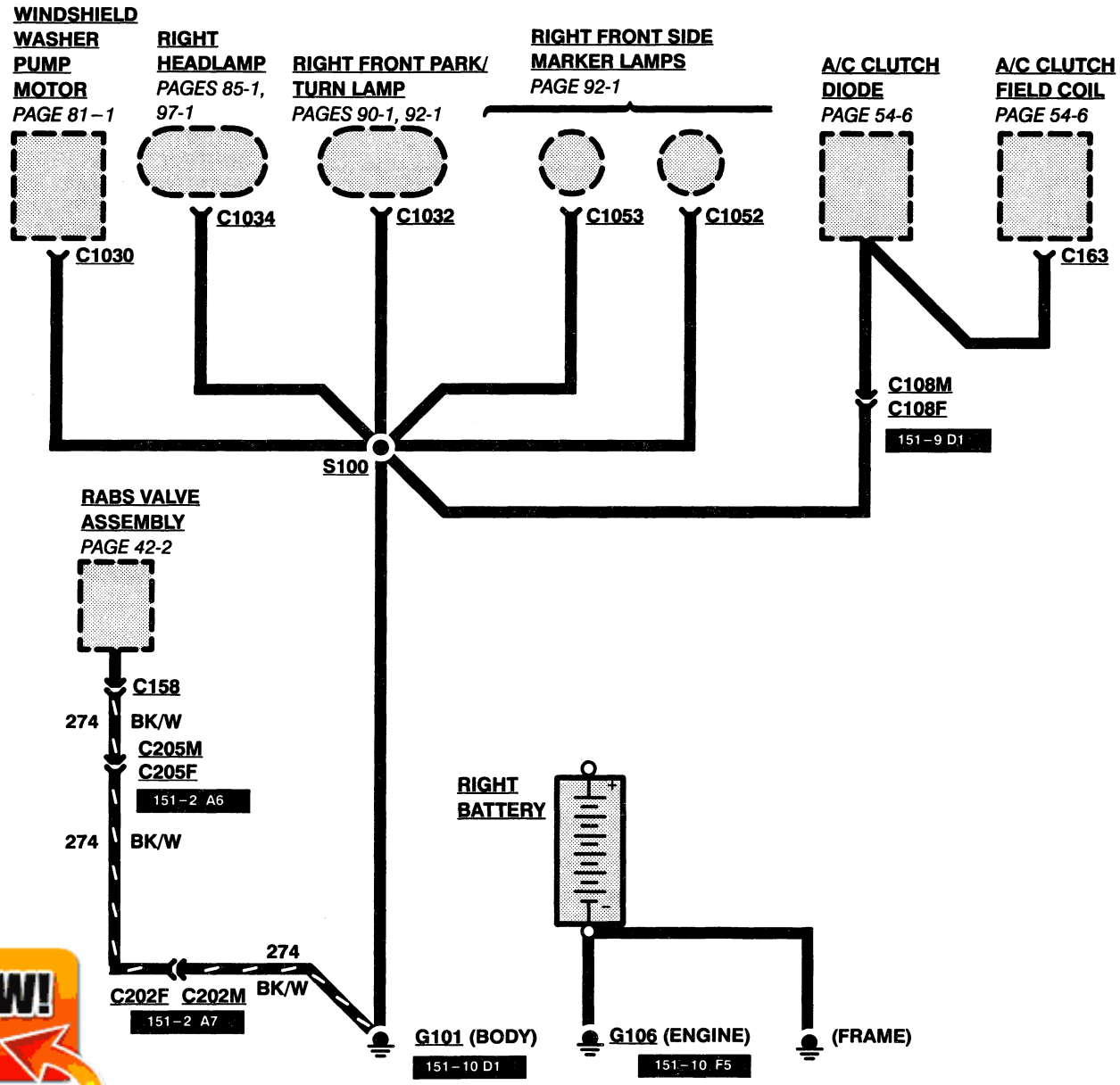


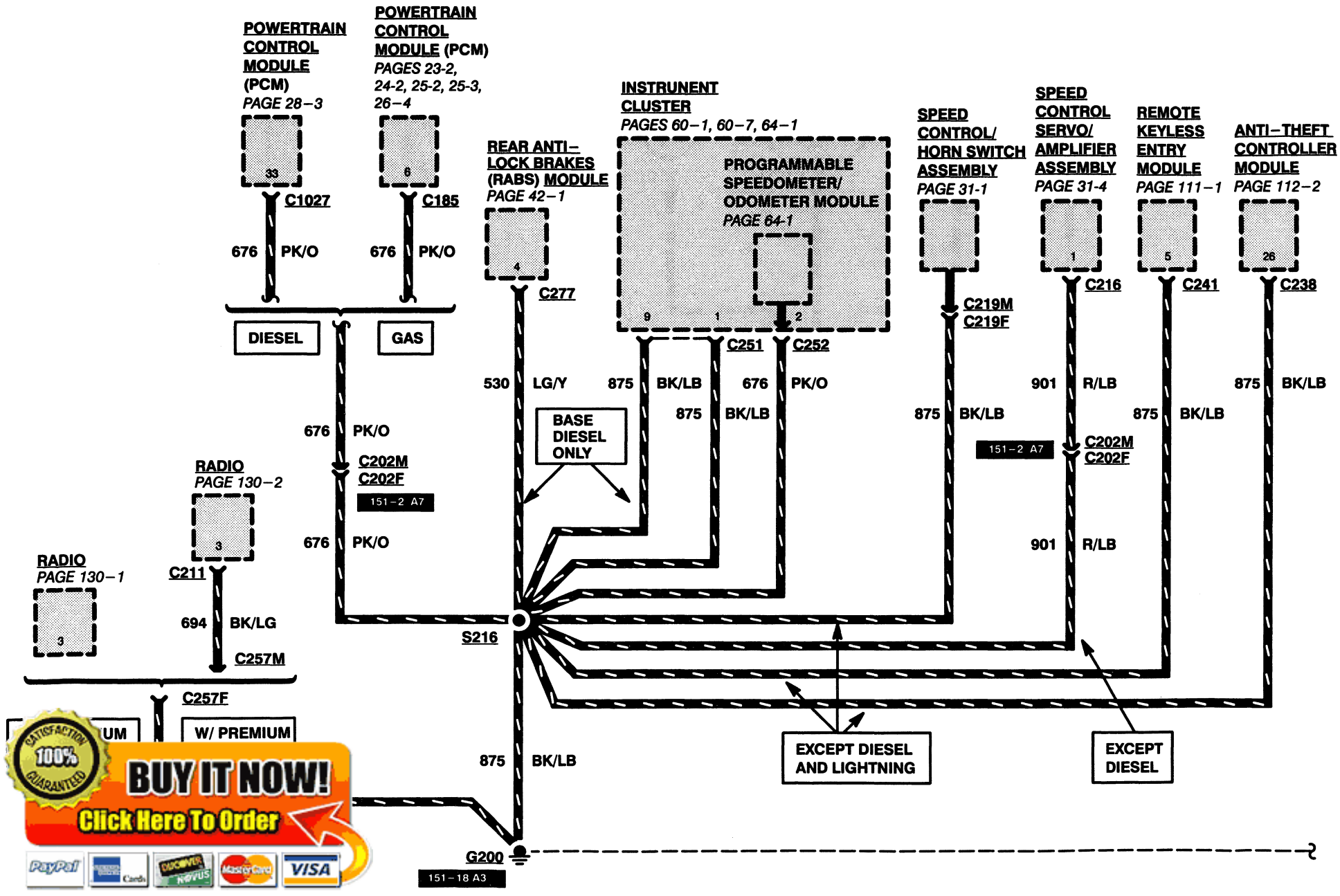
DIESEL

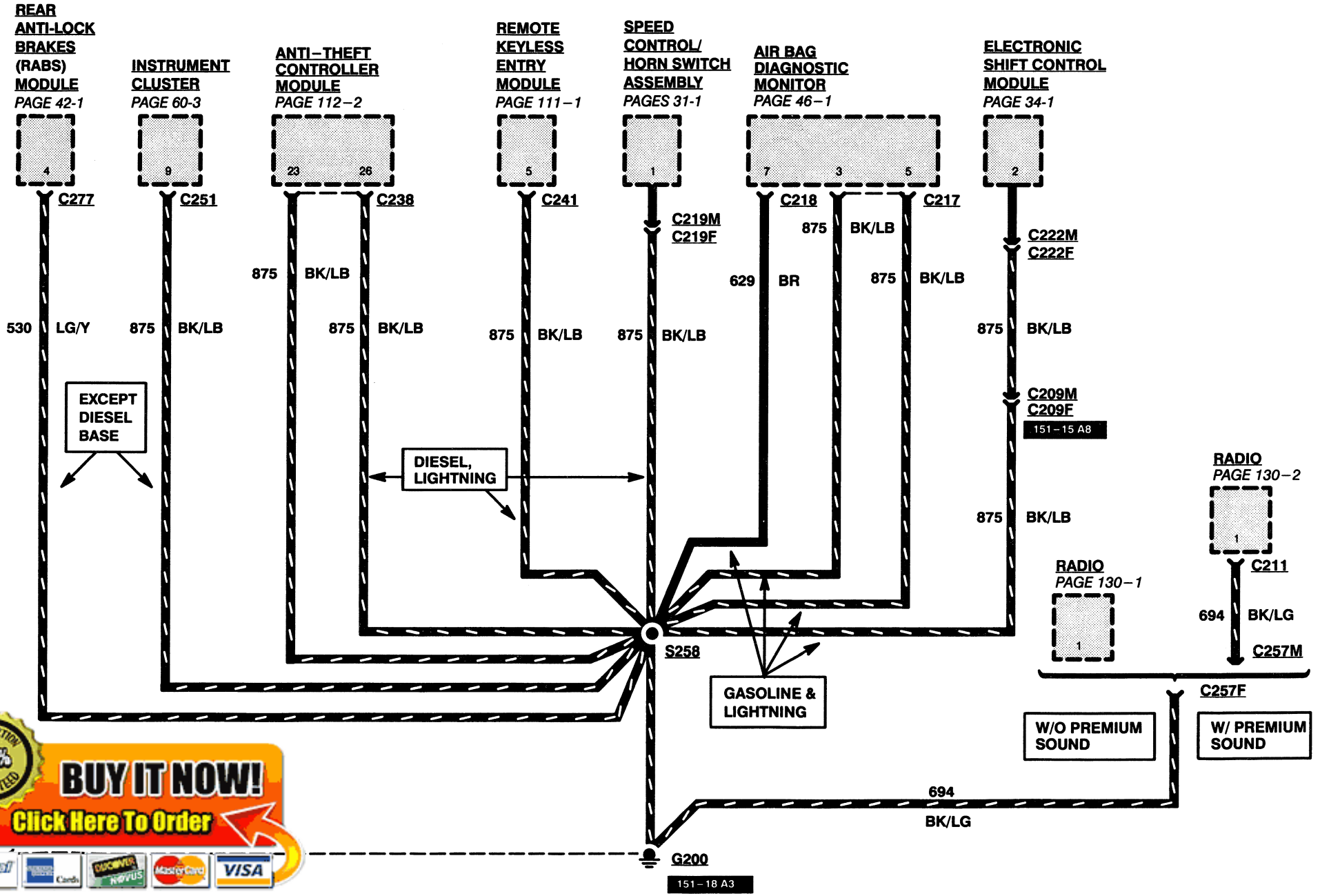




DIESEL

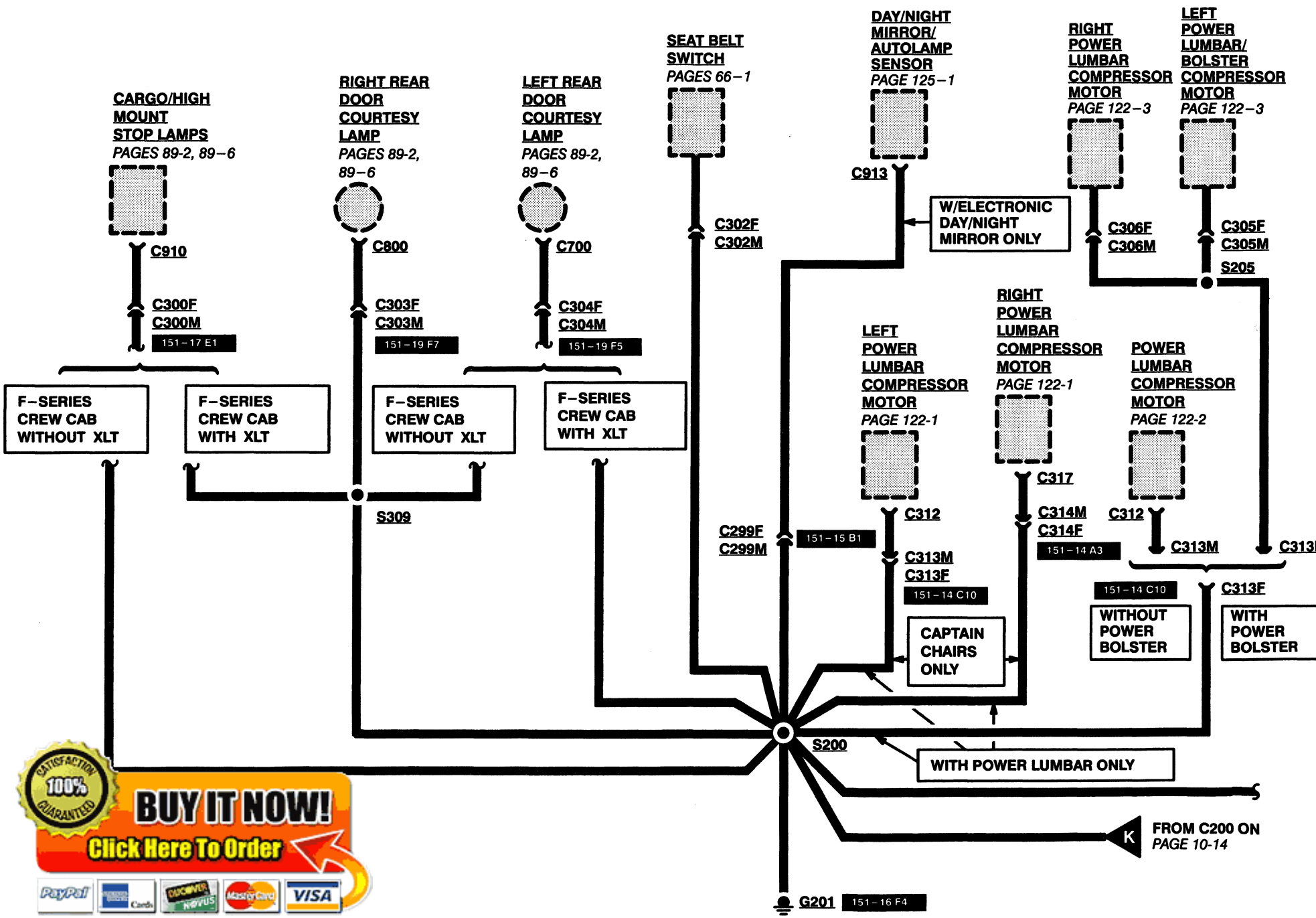




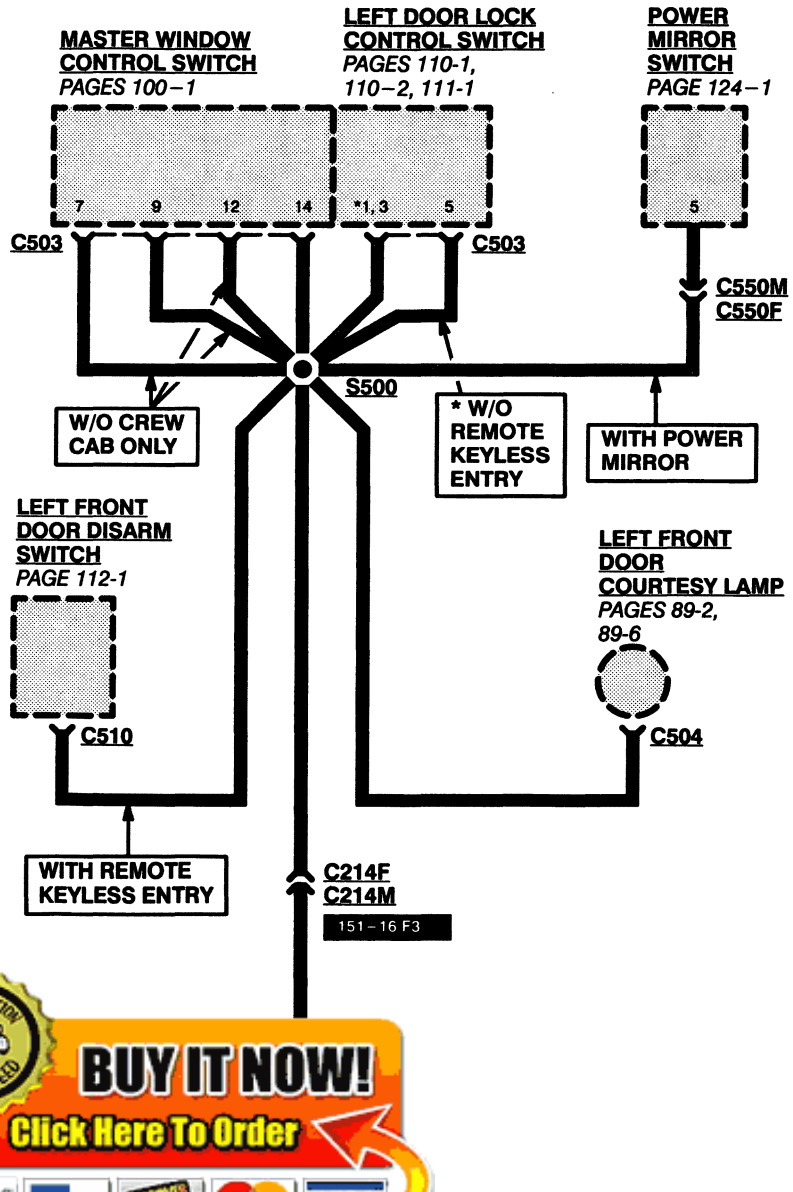


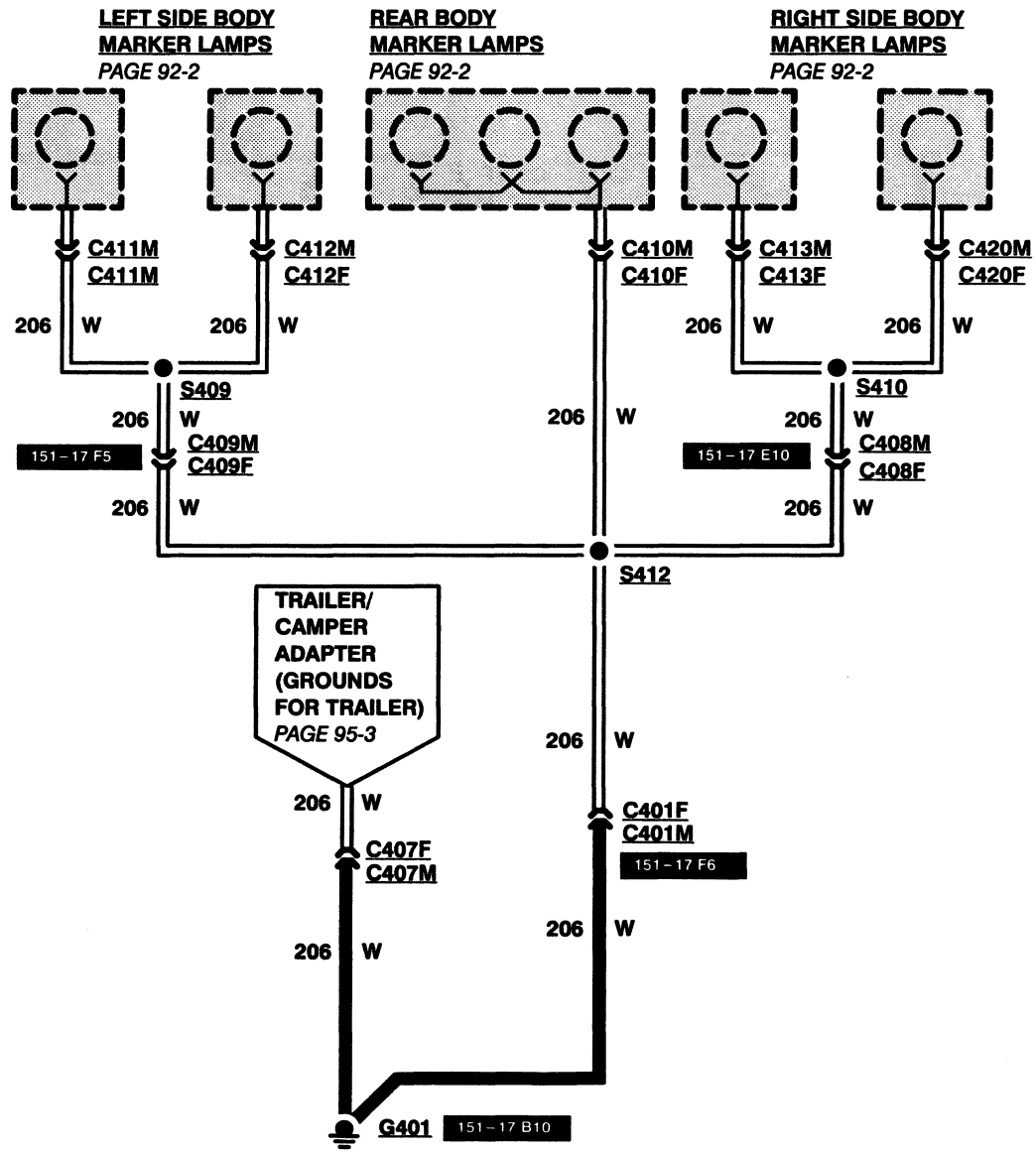
10–11 GROUNDS

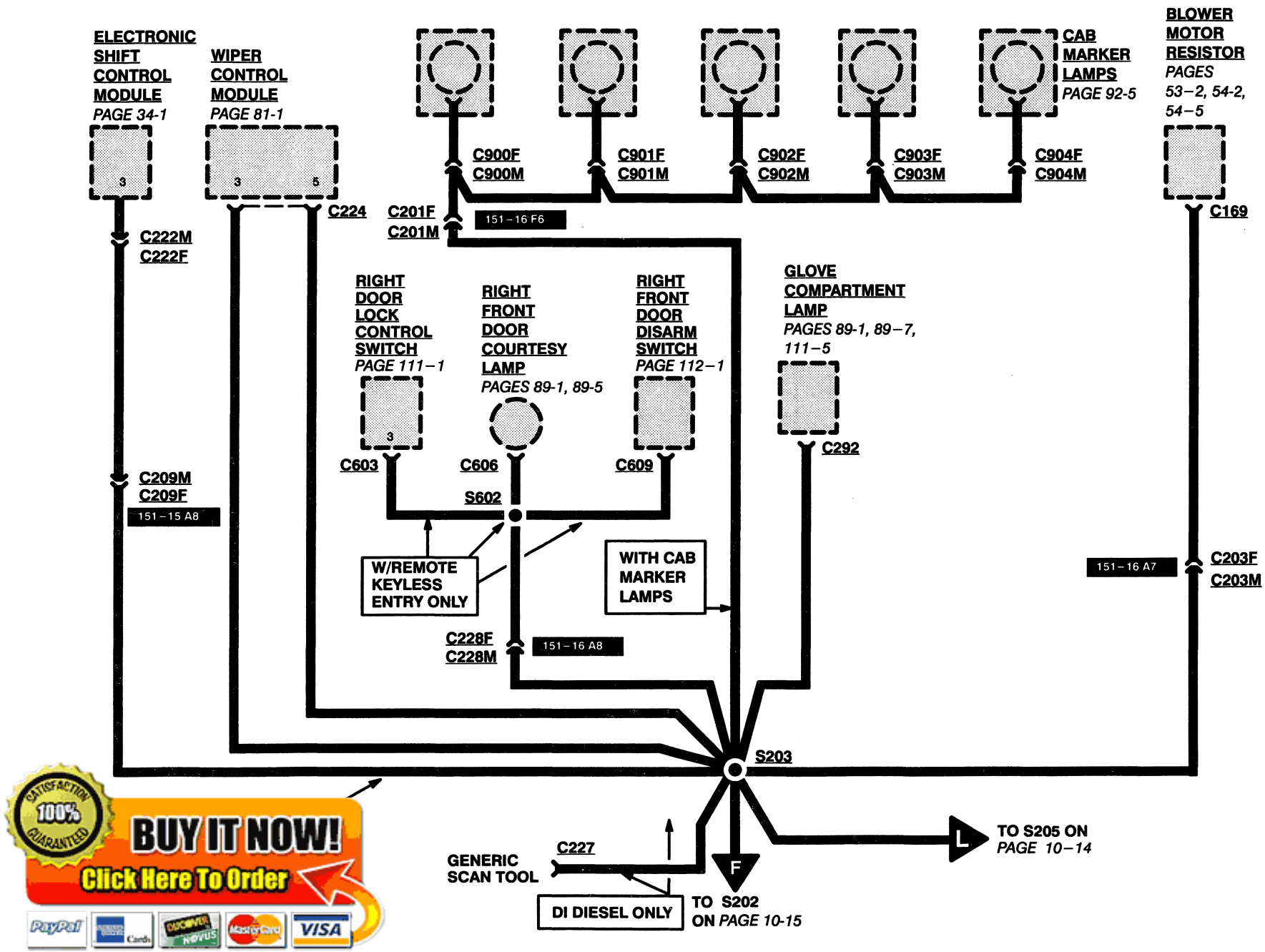
1995 F–SERIES

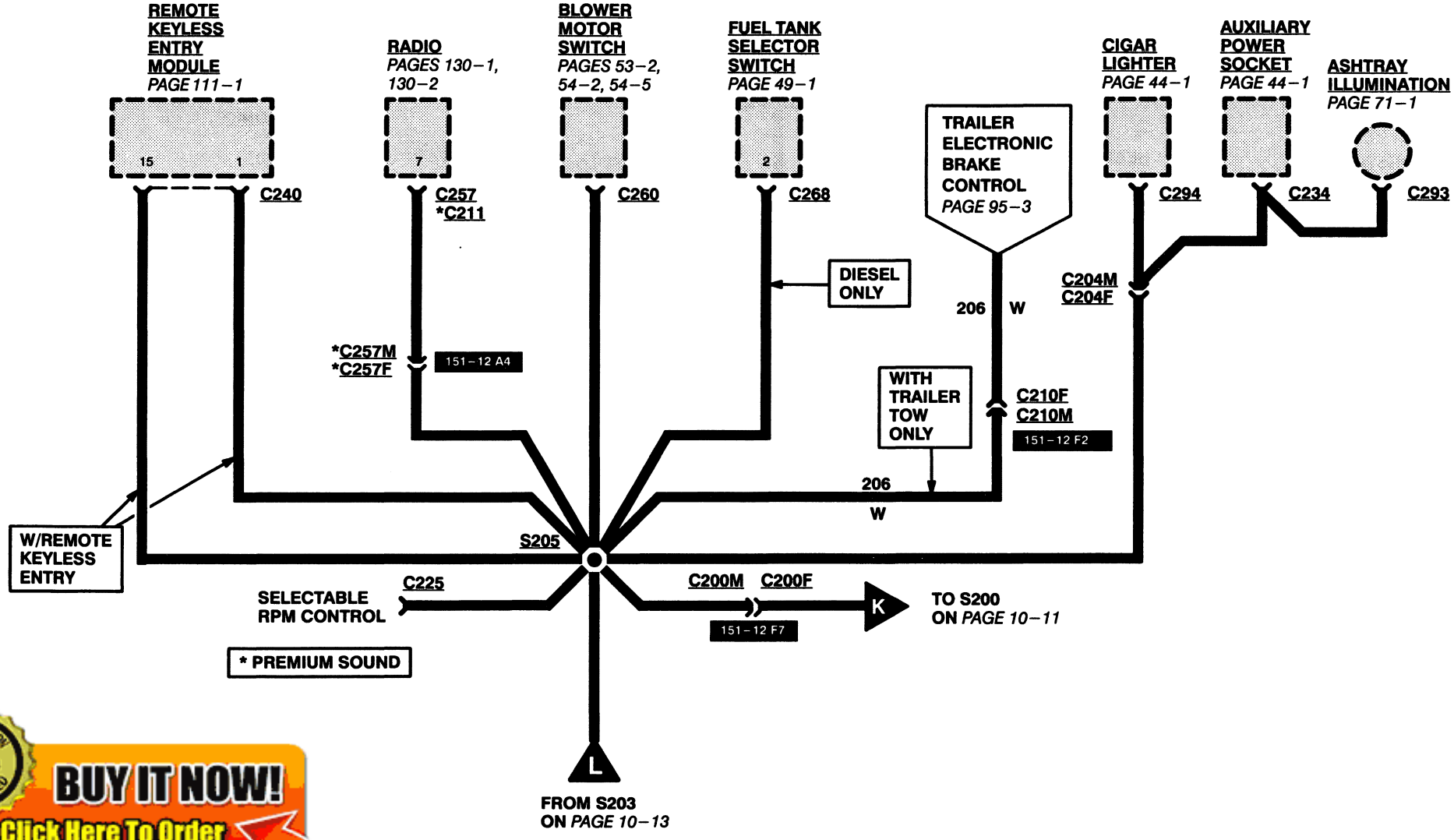


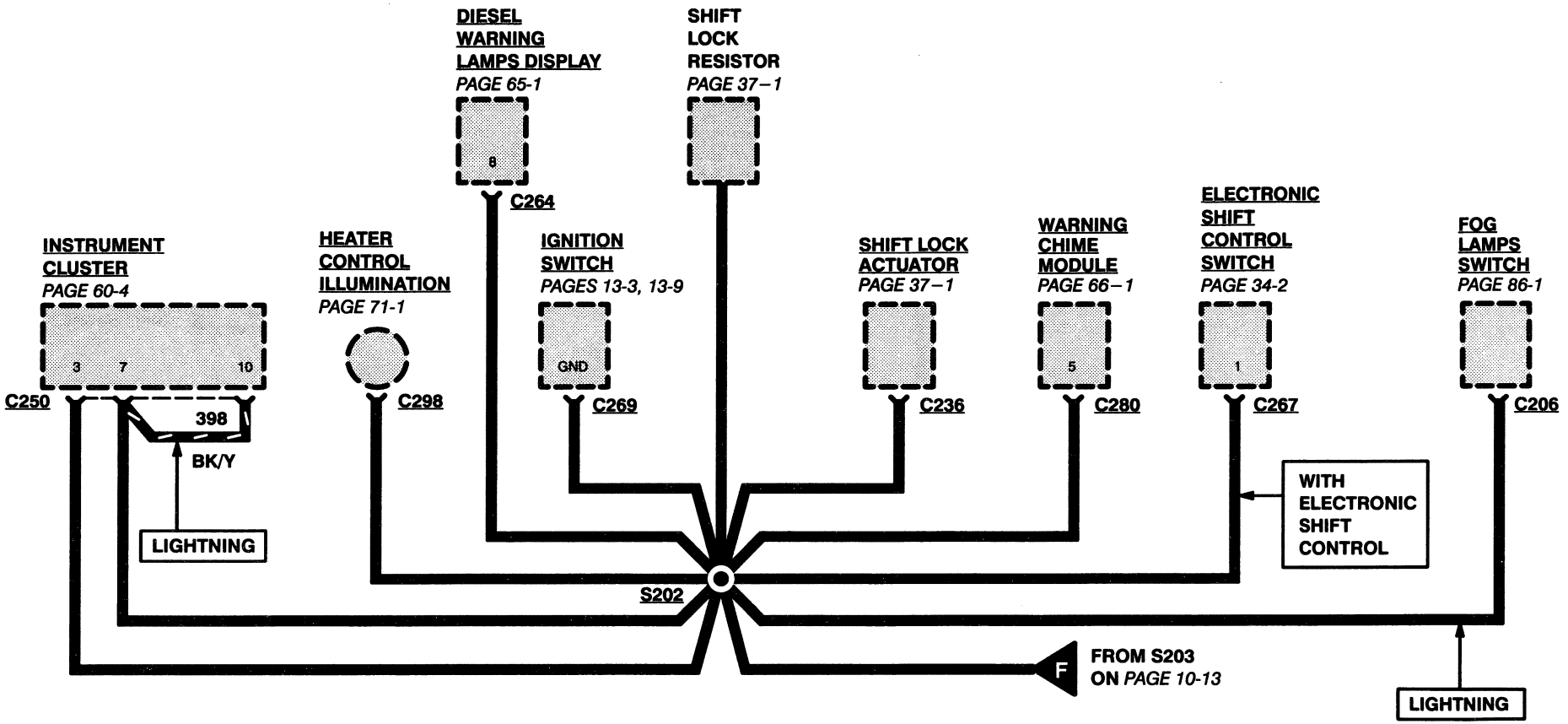
F350 DUAL REAR WHEEL









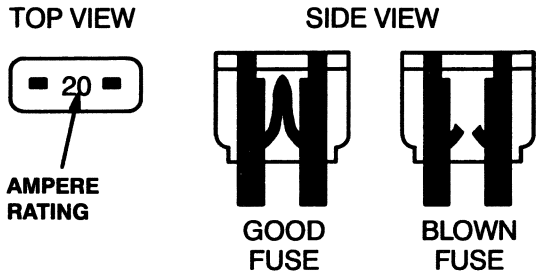


Refer to Location Index, Cell 152, for Component, Connector, Splice, Ground and Base Part Number descriptions and locations.

CIRCUIT PROTECTION DEVICES

Electrical circuits on this vehicle may be protected by fuses, fusible links, fusible link cartridges, circuit breakers, or a combination of these devices.

BLADE TYPE FUSE

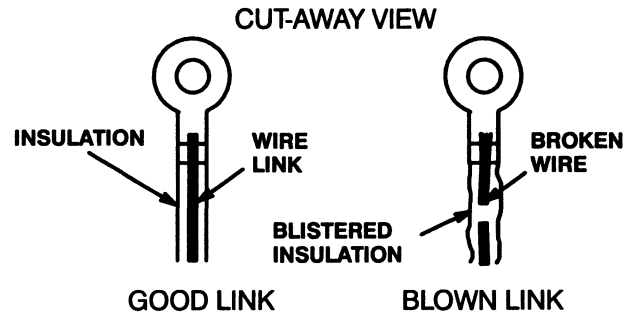


Blade type fuses have a transparent plastic housing. To check a fuse, pull it from the fuse panel and look at the fuse element through the housing. Always replace a blown fuse with a new fuse that has the same ampere rating.

The ampere rating of a blade type fuse can also be determined by following the color code shown here:

BLADE FUSE COLOR CODING	
AMPERE RATING	HOUSING COLOR
3	Violet
4	Pink
5	Tan

FUSIBLE LINK



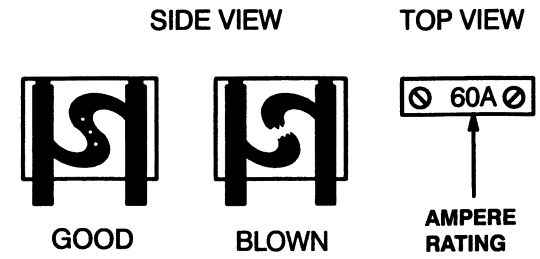
Fusible links are short lengths of wire that are smaller in diameter than the wires they are protecting. Fusible link wire is covered with a special thick, non-flammable insulation. An overload condition causes the insulation to blister. If the overload condition continues, the wire link will melt. To check a fusible link, look for blistered insulation. If the insulation is okay, pull lightly on the wire. If the fusible link stretches, the wire has melted.

When replacing fusible links, first cut the protected wire where it is connected to the fusible link. Then, tightly crimp or solder the new link to the protected wire.

Fusible links are often identified by color coding of the insulation, as shown here:

FUSIBLE LINK COLOR CODING	
WIRE LINK SIZE	INSULATION COLOR
20 GA	Blue
18 GA	Brown or Red
16 GA	Black or Orange
14 GA	Green
12 GA	Gray

FUSIBLE LINK CARTRIDGE



Fusible link cartridges have a transparent colored plastic housing. To check a fusible link cartridge, look at the fuse element through the side of the housing.

To replace a fusible link cartridge, pull it from the fuse box or panel. Always replace a blown fusible link cartridge with a new one having the same ampere rating.

The ampere rating of a fusible link cartridge can also be determined by following the color code shown here:

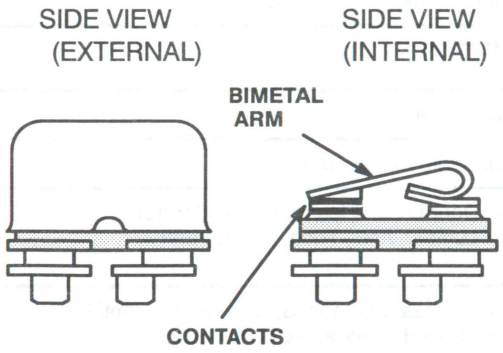
FUSIBLE LINK CARTRIDGE COLOR CODING	
AMPERE RATING	HOUSING COLOR
30	Light Green
40	Amber
50	Red
60	Blue

CIRCUIT BREAKER

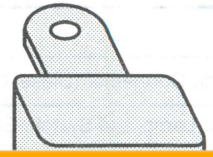
Some circuits are protected by circuit breakers (abbreviated "c. b." in fuse chart). They can be Fuse Panel mounted or in-line. Like fuses, they are rated in amperes.

Each circuit breaker conducts current through an arm made of two types of metal bonded together (bimetal arm). If the arm starts to carry too much current, it heats up. As one metal expands faster than the other, the arm bends, the contacts open and current flow is broken. A circuit breaker can be the cycling or non-cycling type.

FUSE PANEL MOUNTED CYCLING TYPE

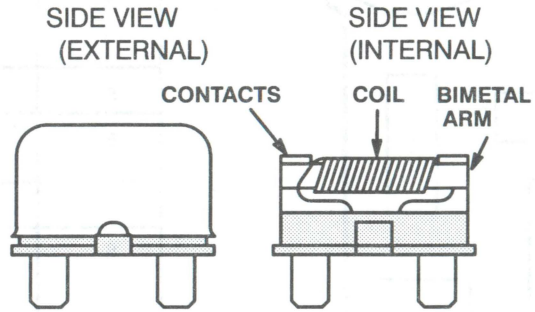


IN-LINE MOUNTED CYCLING TYPE

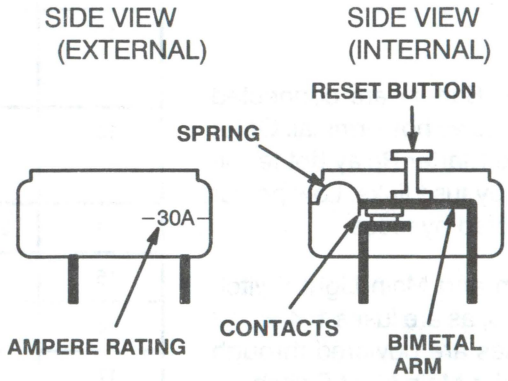


In the cycling type, the bimetal arm cools and straightens out. This cycle repeats as long as the overcurrent exists and power is applied.

FUSE PANEL MOUNTED NON-CYCLING TYPE



FUSE PANEL MOUNTED MANUAL RESET TYPE



Two types of non-cycling circuit breakers are used: one is reset by removing power from the circuit, and the other is reset by depressing a reset button.

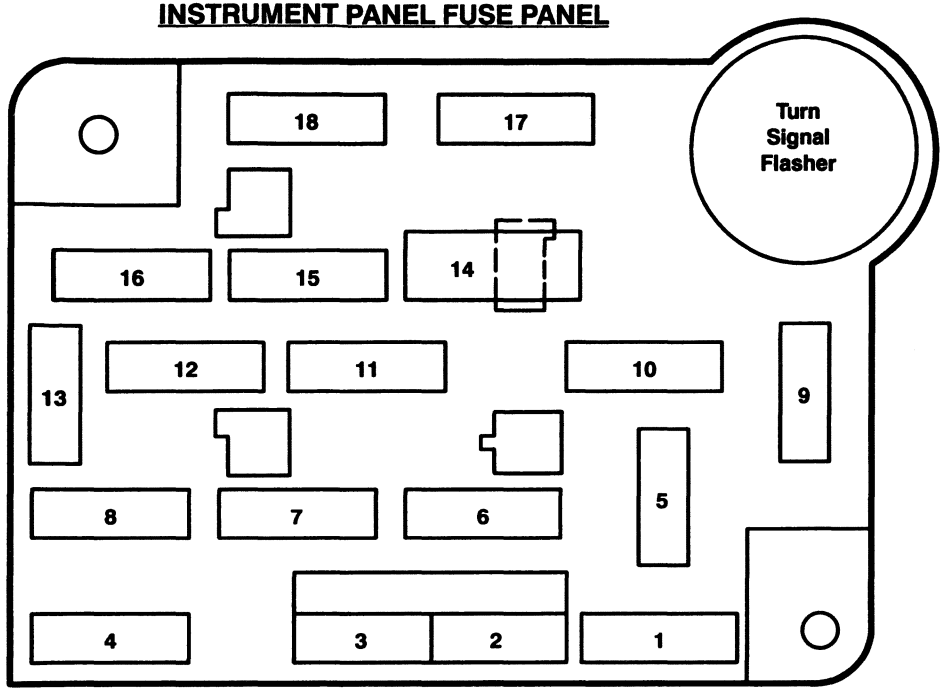
In the first type, there is a coil wrapped around the bimetal arm. When an overcurrent exists and the contacts open, a small current passes through the coil. This current through the coil is not enough to operate a load, but it does heat up both the coil and the bi-metal arm. This keeps the arm in the open position until power is removed.

In the second type, a spring pushes the bimetal arm down and holds the contacts together. When an overcurrent condition exists and the bimetal arm heats up, the bimetal arm bends enough to overcome the spring and the contacts snap open. The contacts stay open until the reset button is pushed and the contacts snap together again.

DIODE

Diodes are electrical devices that permit current to flow in one direction only. The current flows in the direction indicated by the arrow.

INSTRUMENT PANEL FUSE PANEL



Fuse Value Amps	Color Code
3	Violet
4	Pink
5	Tan
10	Red
15	Light Blue
20	Yellow
25	Natural
	Light Green

Power Distribution

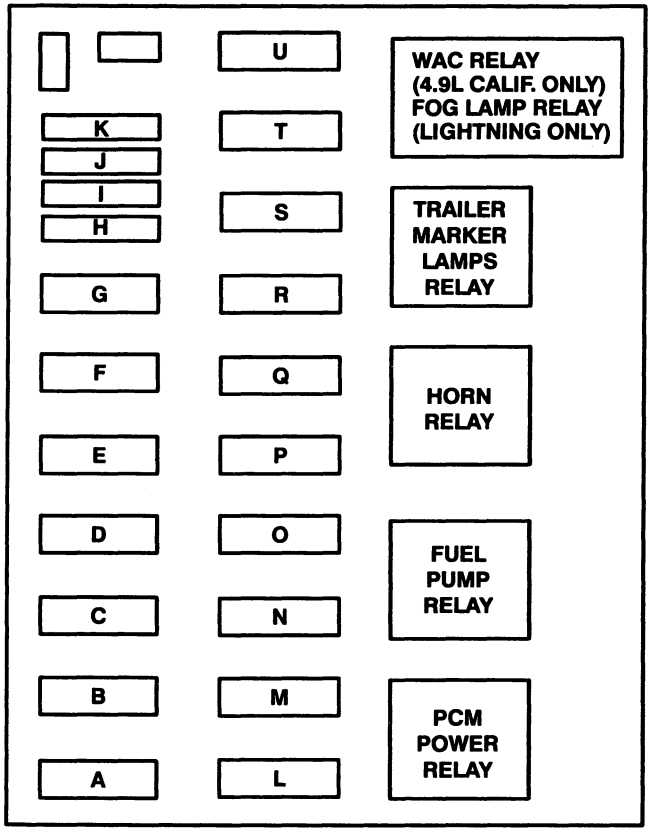
The Generator and Battery are connected together at the Starter Relay hot terminal. Other circuits originate at the Starter Relay hot terminal and are protected by fuse links. Low power circuits are also protected by fuses.

The Ignition Switch and Main Light Switch are powered at all times, as are fuses 1, 4, 8, 12 and 16. The other fuses are powered through the Ignition Switch or the Main Light Switch.

Fuse Position	Amps	Circuits Protected
1	30	Air Conditioner/Heater
2	30	Interval Wiper/Washer
3	3	Idle Position Switch (Diesel Only)
4	15	Exterior Lamps, Trailer Marker Lamps Relay, Warning Chime, Instrument Illumination, Keyless Entry, Anti–Theft, Trailer Brake Control Unit
5	10	Air Bag Diagnostic Monitor
6	15	Fuel Tank Selector (Diesel Only), Anti–Theft, Keyless Entry, Air Conditioner/Compressor Clutch
7	15	Turn Lamps
8	15	Courtesy Lamps, Engine Compartment Lamp, Power Mirrors, Vanity Mirrors, Speedometer Memory, Warning Chime, Keyless Entry
9	25	Power Point
10	4	Instrument Illumination
11	15	Radio, Radio Display Dim
12	20 c.b.	Power Door Lock, Electronic Shift Control, Power Lumbar, Anti–Theft, Keyless Entry
13	15	Stop and Hazard Lamps, Stop Sense For: Anti-lock Brakes, Speed Control, PCM, Shift Lock
14	20 c.b.	Power Windows
15	20	Anti-lock Brakes
16	15	Cigar Lighter, Data Link Connector (Diesel Only)
17	10	Trans Control Indicator Lamp and Switch, Brake Fluid Level Switch, Warning Chime, Diesel Warning Lamps Display, Fuel Water Switch, Low Vacuum Warning Switch, Instrument Cluster, Electronic Shift Control Switch Lamps
18	10	Speedometer, Electronic Shift Control, Air Bag Diagnostic Monitor, Day/Night Mirror, Selectable RPM Control (Diesel Only), Speed Control (Diesel Only), Shift Lock

GASOLINE

ENGINE COMPARTMENT FUSE BOX

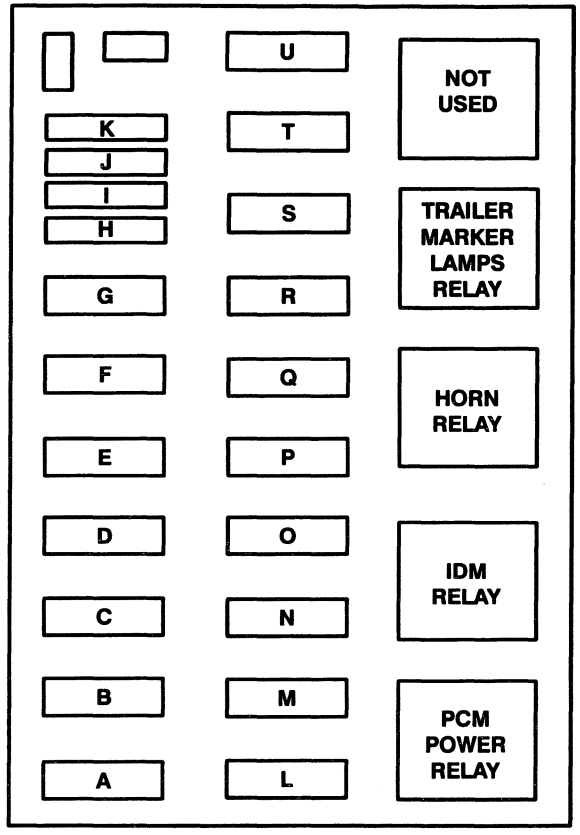


TRAILER RELAY BOX

Fuse Position	Amps	Circuits Protected
A	20	Radio
B	15	Fog Lamp Relay (Lightning Only)
C	30	Horn Relay, Daytime Running Lamps, Headlamp Flash–to–Pass
D	25	Trailer Marker Lamps Relay, Trailer Backup Lamps Relay
E	15	Heated Oxygen Sensor (HO2s) , Backup Lamps, Trailer Battery Charge Relay, Daytime Running Lamps, Speed Control
F	10	Trailer Right Stop/Turn Lamps
G	10	Trailer Left Stop/Turn Lamps
Maxi-Fuse Position	**Amps**	**Circuits Protected**
H	—	(Not Used)
I	20	PCM Power Relay, Powertrain Control Module (PCM)
J	20	See Fuses 15 and 18, Starter Relay
K	—	(Not Used)
L	50	See Fuses 5, 9, and 13
M	—	(Not Used)
N	50	See Fuses 1 and 7 and Fuse E
O	20	Fuel Pump Relay
P	50	Generator charge indicator, Instrument Cluster. See Fuses 2, 6, 11, 17 and Maxi-fuse U. Also see Circuit Breaker 14.
Q	30	Trailer Battery Charge Relay
R	40	Main Light Switch, Headlamps {Fog Lamp Indicator Lamp, Fog Lamp Relay Coil (Lighting Only)}
S	50	See Fuses 4, 8 and 16. Also see Circuit Breaker 12.
T	30	Trailer Electronic Brake Control Unit
U	20	Ignition system, PCM Power Relay Coil

DIESEL

ENGINE COMPARTMENT FUSE BOX



TRAILER RELAY BOX

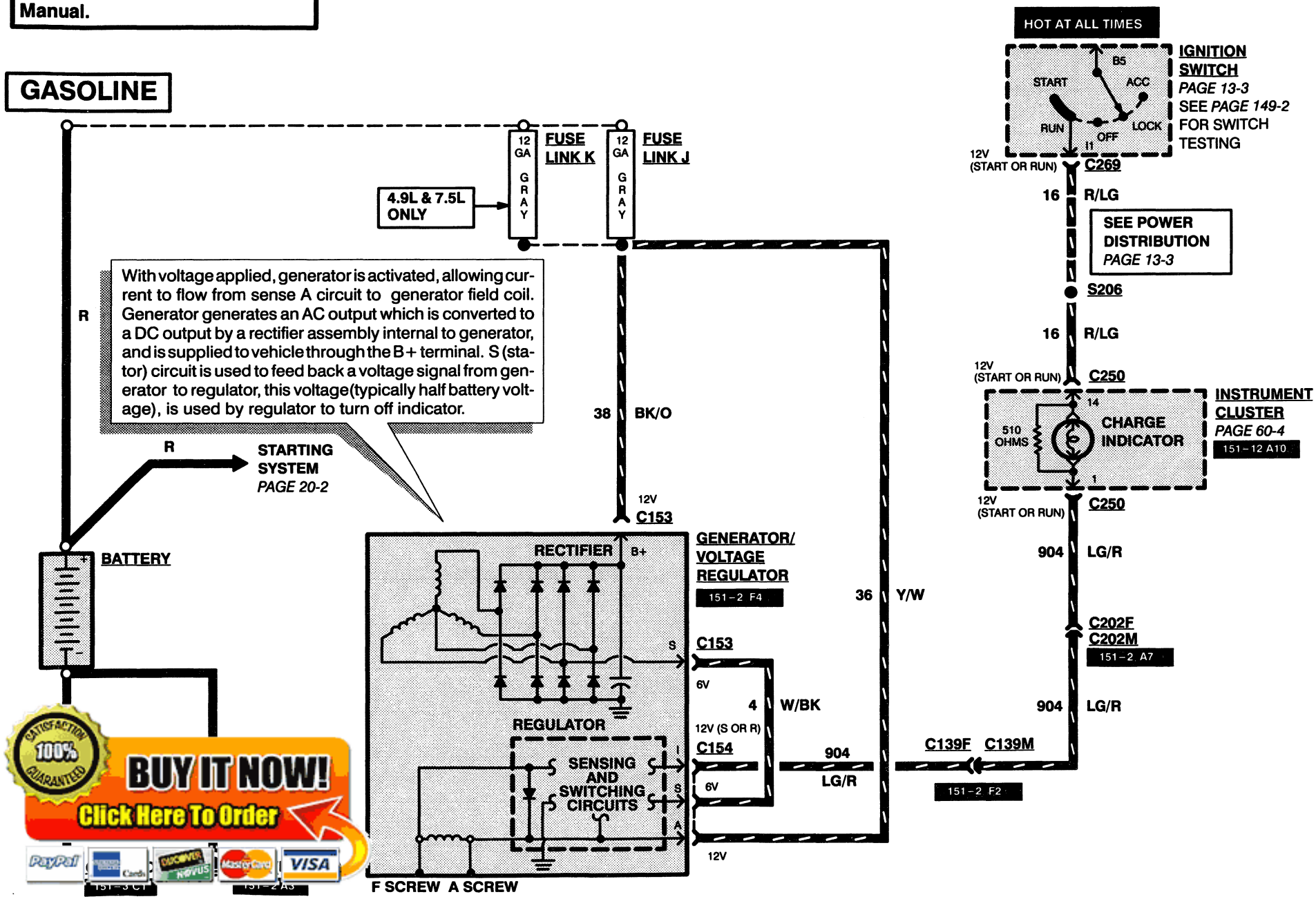
Fuse Position	Amps	Circuits Protected
A	20	Radio
B	15	Ambulance (Diesel 200 amp Generator/Voltage Regulator Only)
C	30	Horn Relay, Daytime Running Lamps, Headlamp Flash–to–Pass
D	25	Trailer Marker Lamps Relay, Trailer Backup Lamps Relay
E	15	Backup Lamps, Daytime Running Lamps, Trailer Battery Charge Relay
F	10	Trailer Right Stop/Turn Lamps
G	10	Trailer Left Stop/Turn Lamps
Maxi-Fuse Position	**Amps**	**Circuits Protected**
H	30	Injector Driver Module (IDM) Relay
I	20	Powertrain Control Module (PCM), PCM Power Relay, Electronic Transmission Control, Injector Pressure Regulator, Injector Driver Module
J	20	See Fuses 15 and 18, Starter Relay
K	—	(Not Used)
L	50	See Fuses 5, 9 and 13
M	—	(Not Used)
N	50	See Fuses 1 and 7 and Fuse E
O	—	(Not Used)
P	50	Generator charge indicator, Instrument Cluster. See Fuses 2, 3, 6, 11, 17 and Maxi-fuse U. Also see Circuit Breaker 14.
Q	30	Trailer Battery Charge Relay
R	40	Main Light Switch, Headlamps
S	50	See Fuses 4, 8 and 16. Also see Circuit Breaker 12.
T	30	Trailer Electronic Brake Control Unit
U	30	Fuel Line Heater, 200 amp Generator/Voltage Regulator, , PCM Power Relay Coil, Glow Plug Controller

12–1 CHARGING SYSTEM

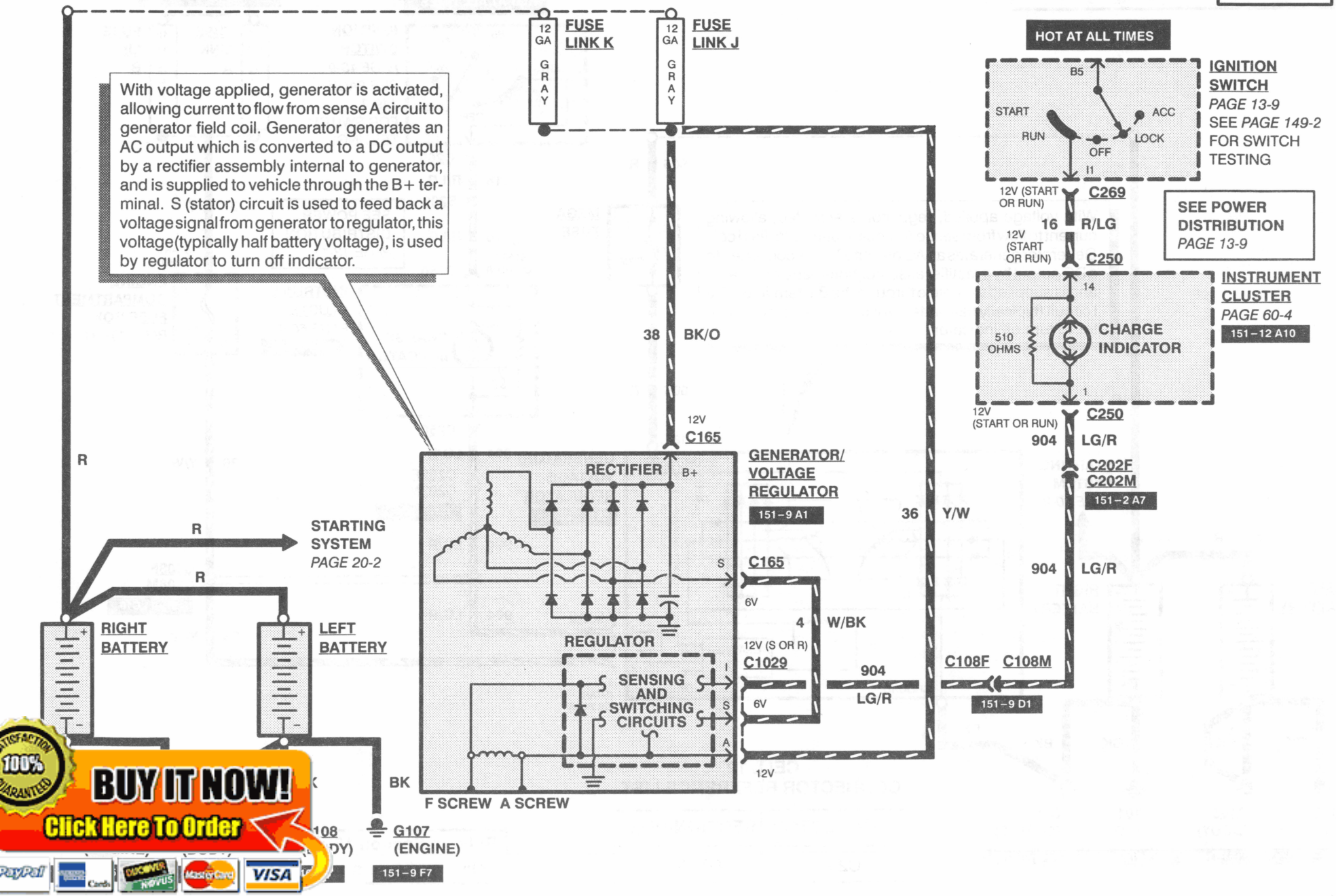
1995 F–SERIES

For diagnostic information, refer to section 14–00 of the Service Manual.

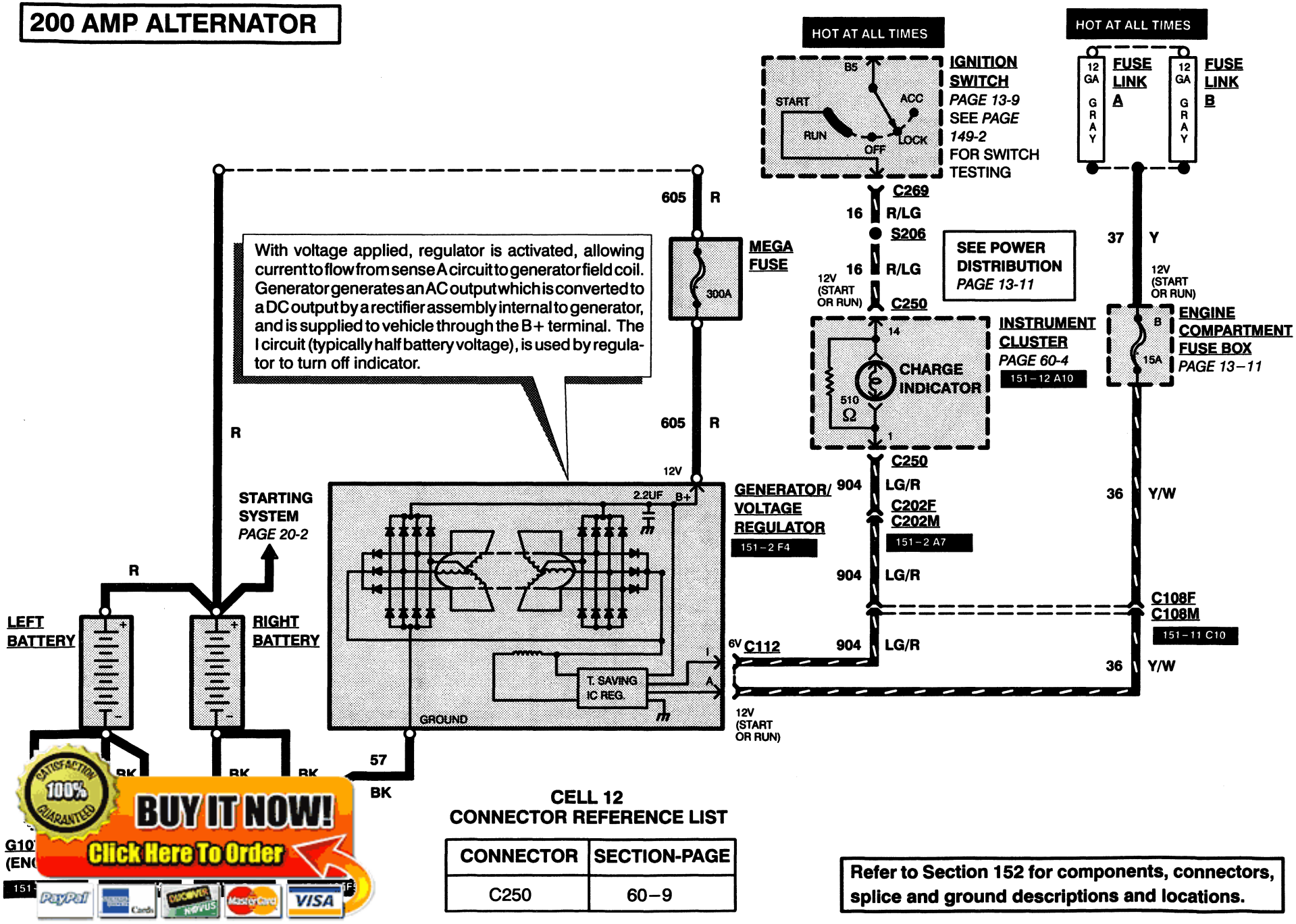
GASOLINE



DIESEL



200 AMP ALTERNATOR



CELL 12
CONNECTOR REFERENCE LIST

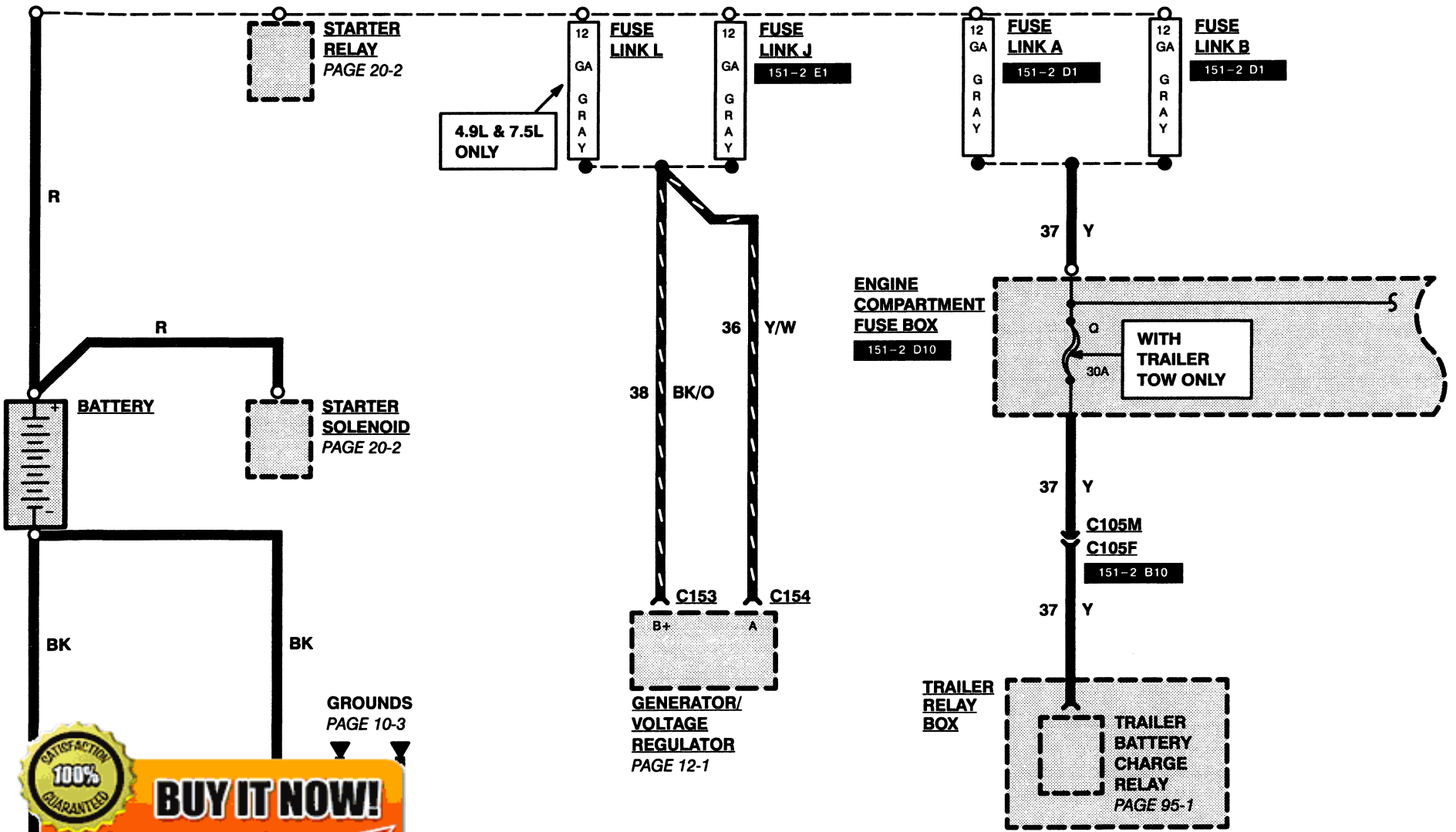
CONNECTOR	SECTION-PAGE
C250	60-9

Refer to Section 152 for components, connectors, splice and ground descriptions and locations.

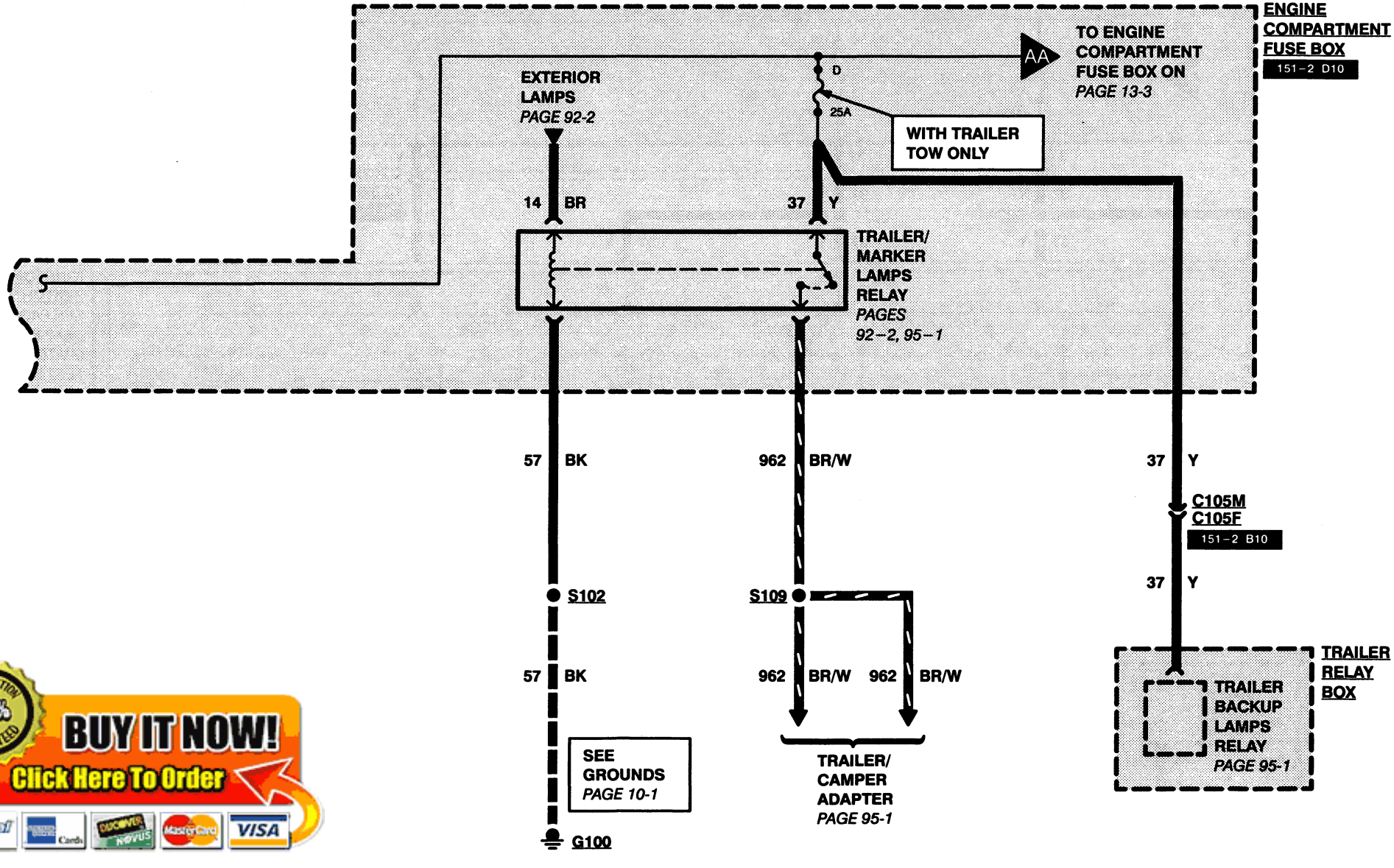
13–1 POWER DISTRIBUTION

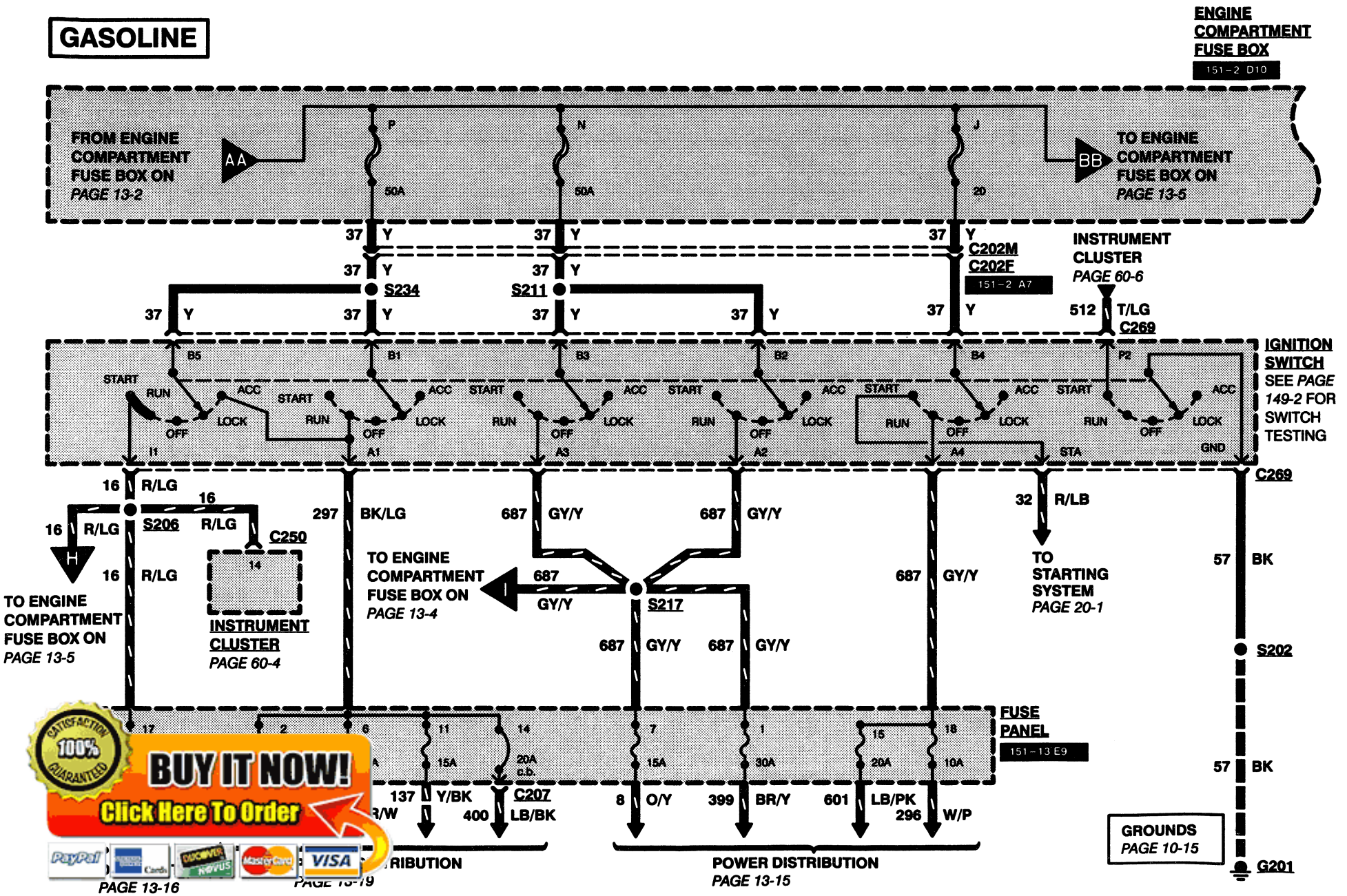
For diagnostic information, refer to section 18–01 of the Service Manual.

GASOLINE



GASOLINE





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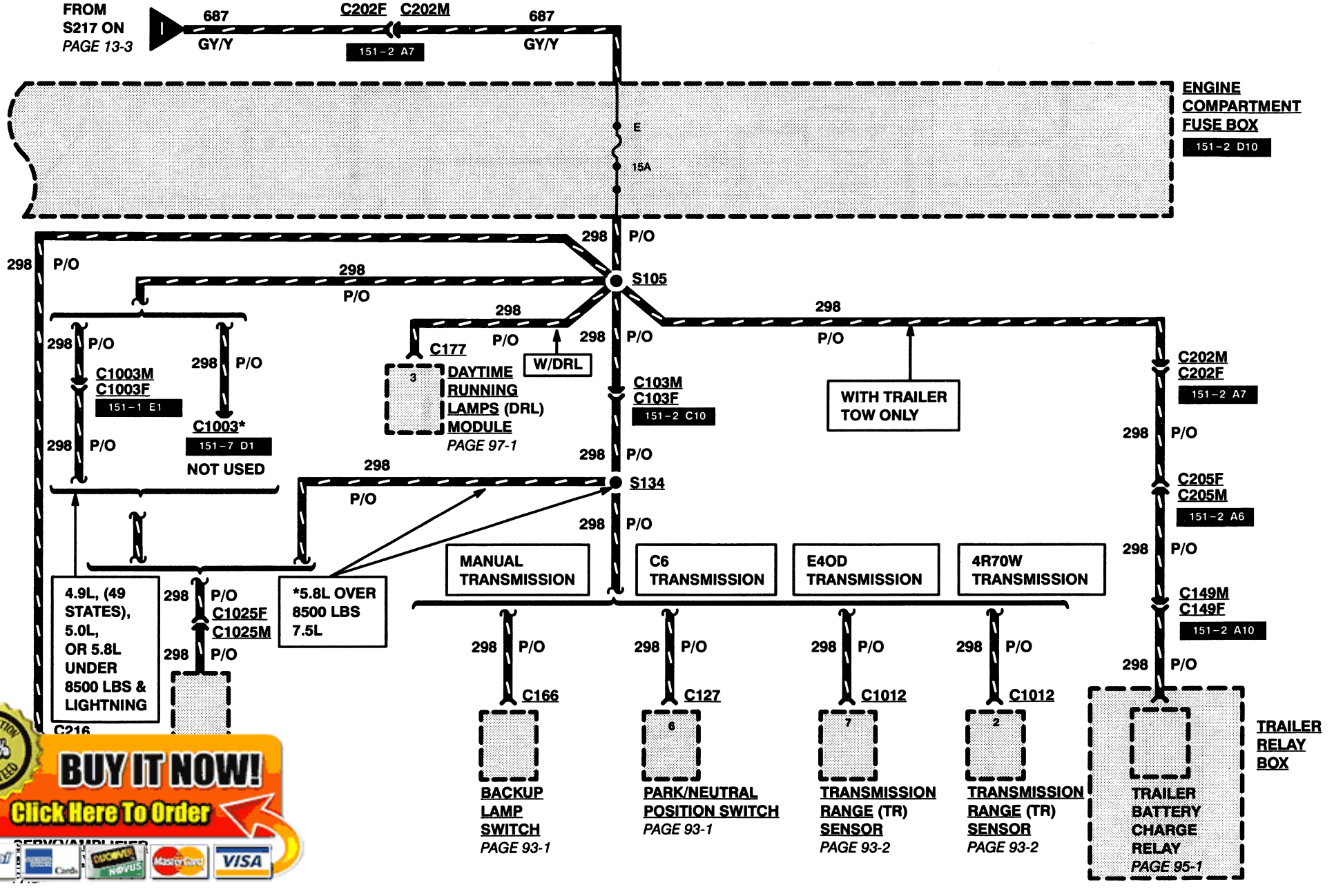

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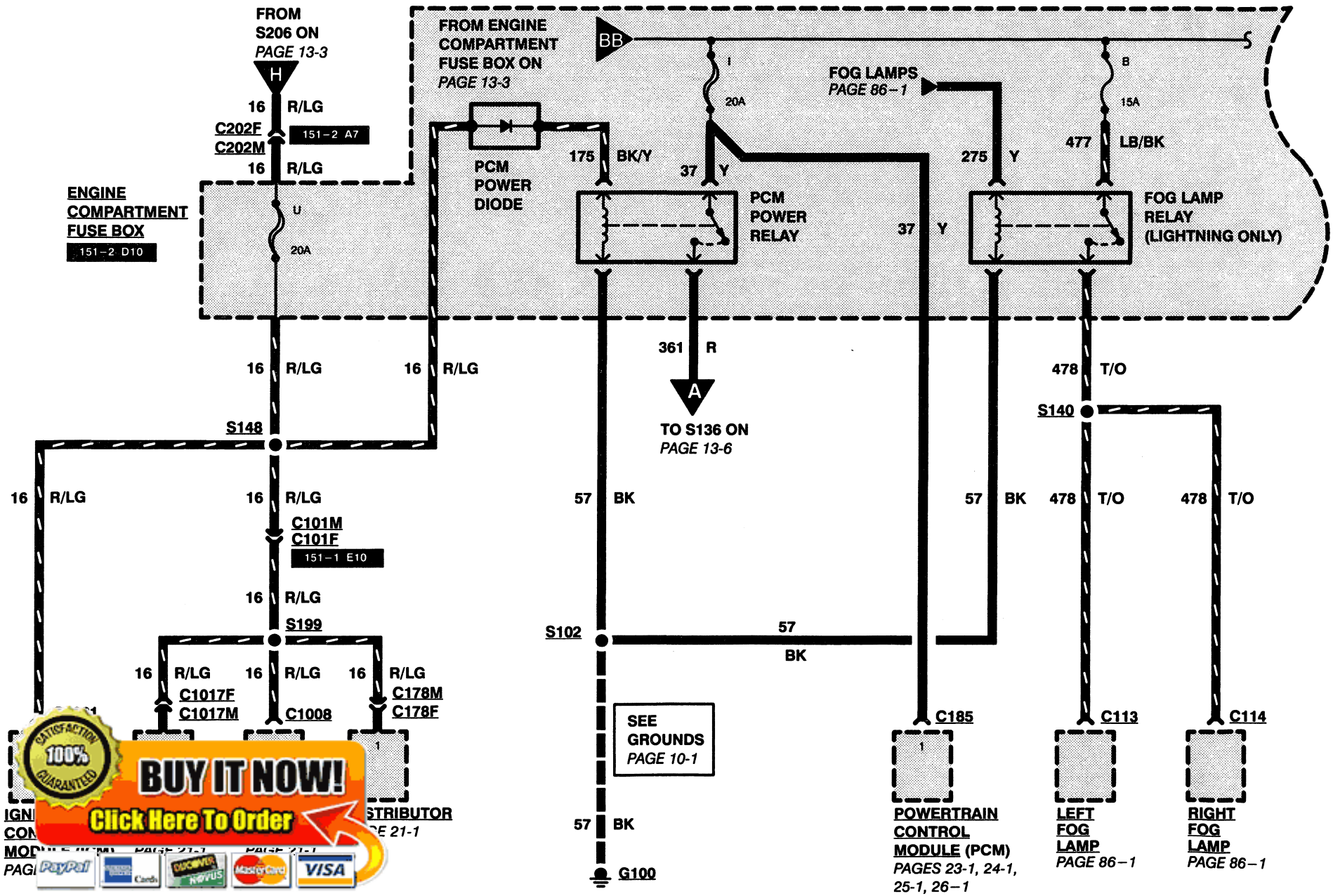

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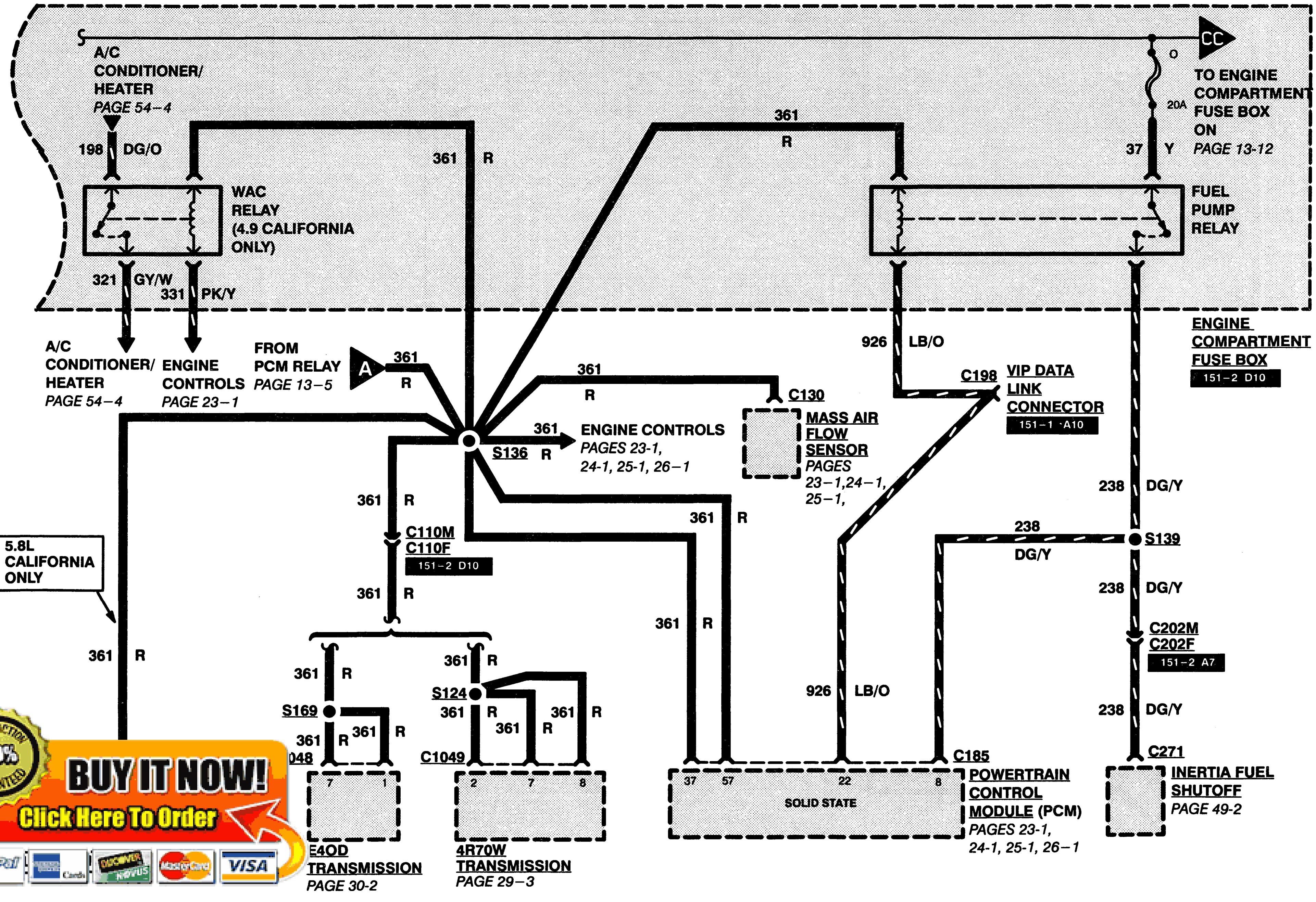
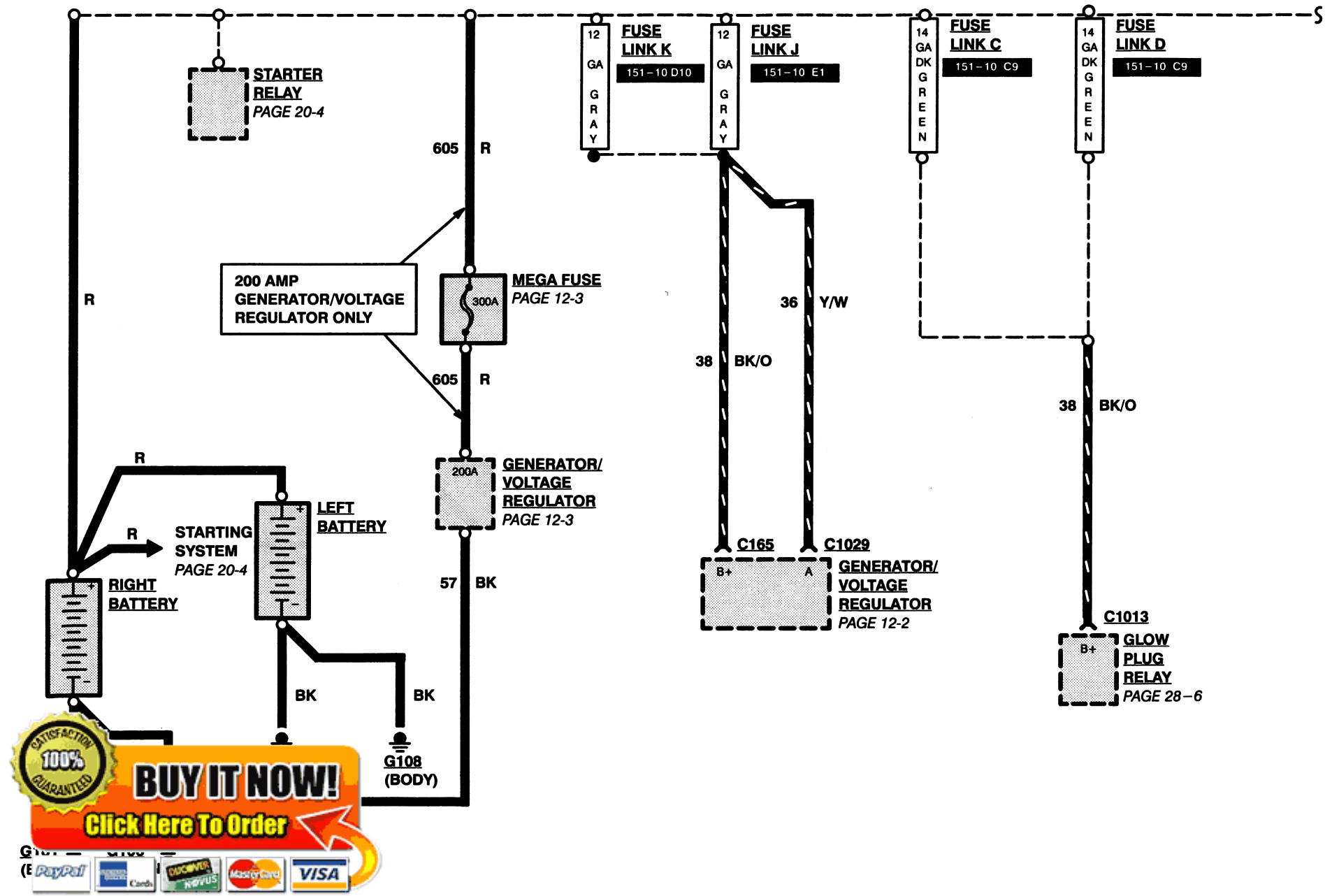
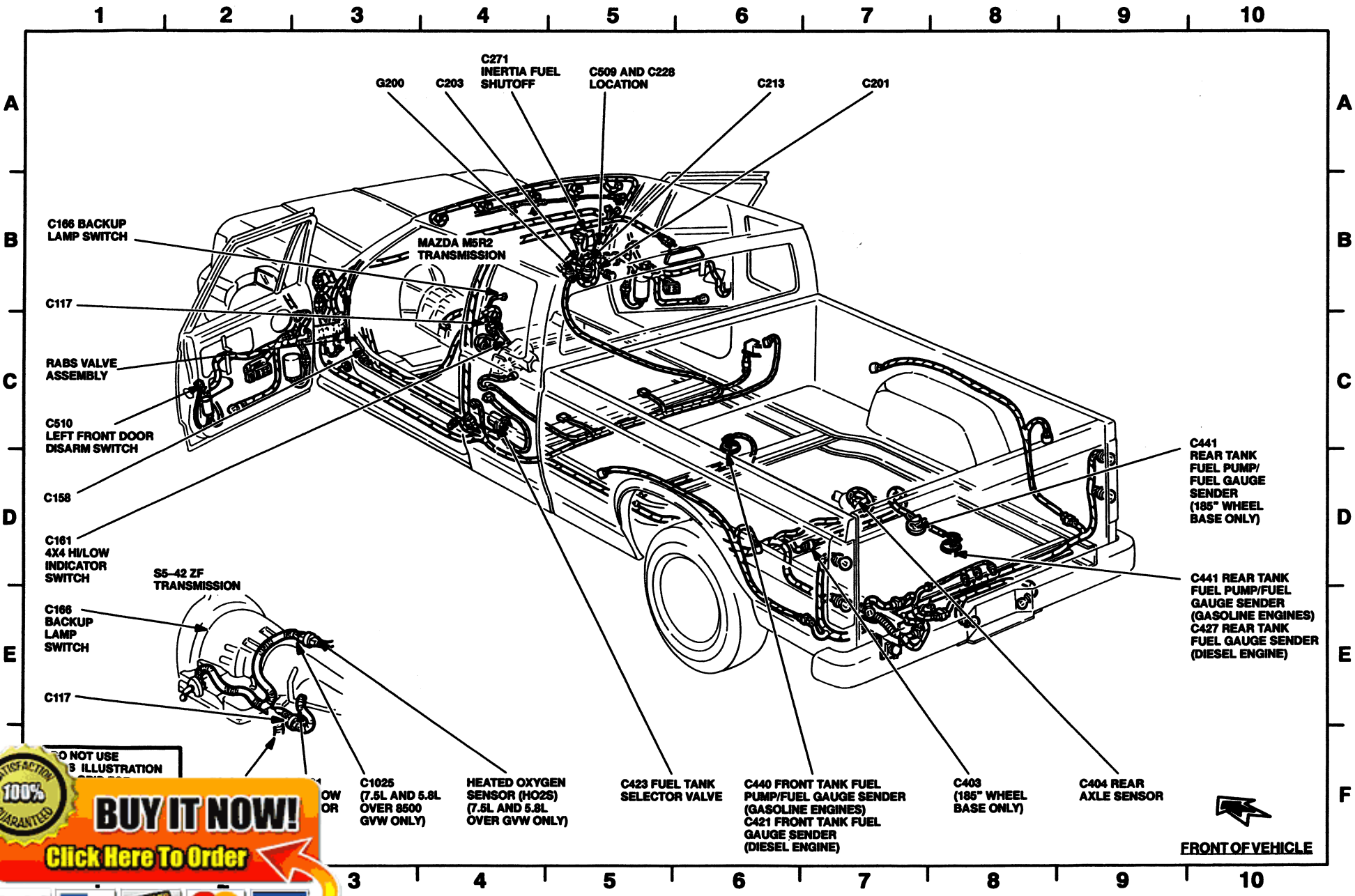
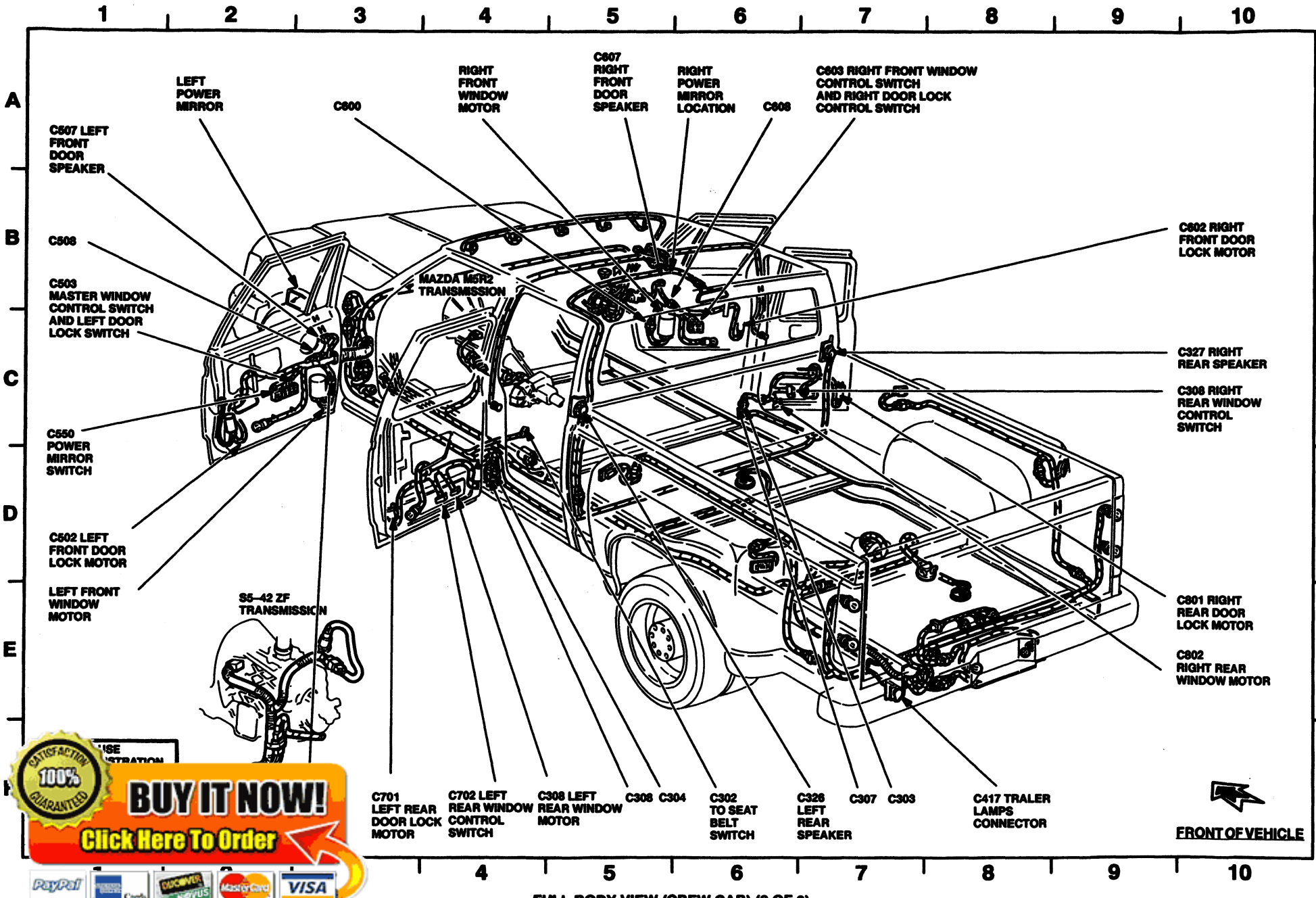


DIESEL

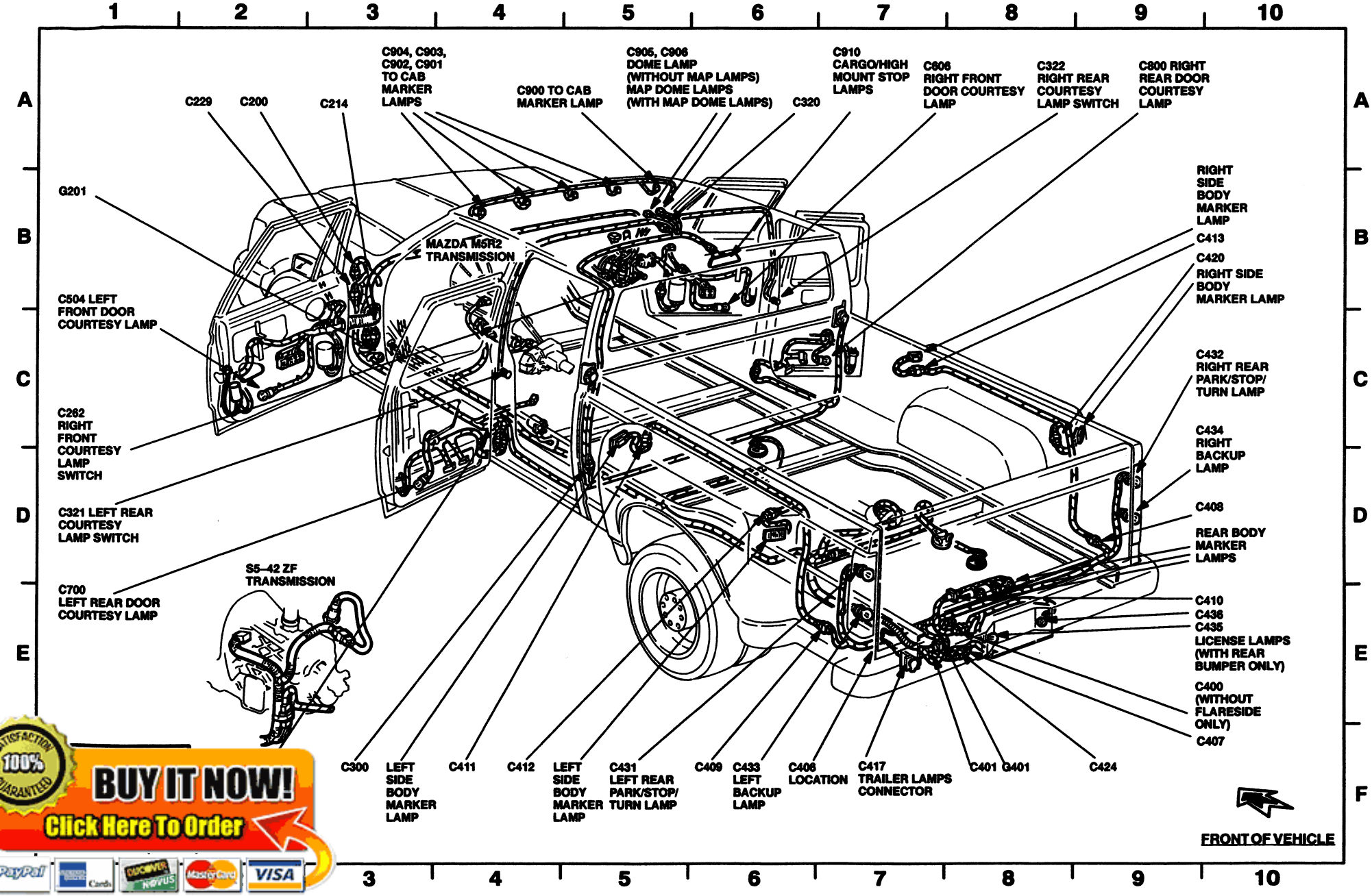




FULL BODY VIEW (CREW CAB) (1 OF 3)



FULL BODY VIEW (CREW CAB) (2 OF 3)



FULL BODY VIEW (CREW CAB) (3 OF 3)

152–1 LOCATION INDEX

Component	Base Part No.	Location	Connector	Page Zone	Connector Page
4R70W Transmission	7000	Below center of vehicle	C1049	151- 15-B10	29–5
4x4 Hi/Low Indicator Switch (C6 Transmission)	7E440	Below vehicle, on front of transfer case	C161	151- 15- F2	
4x4 Hi/Low Indicator Switch (E4OD Transmission)	7E440	Below vehicle, on front of transfer case	C161	151- 15- D1	
4x4 Hi/Low Indicator Switch (Mazda M5OD Transmission)	7E440	Below vehicle, on front of transfer case	C161	151- 18- D1	
4x4 Hi/Low Indicator Switch (S5-42 ZF Transmission)	7E440	Below vehicle, on front of transfer case	C161	151- 20- F3	
Acceleration Sensor	14N089	Top RH side of engine	C402	151- 5- A4	
A/C Clutch Cycling Pressure Switch (4.9L)	19E561	RH rear of engine compartment, on accumulator	C162	151- 3- A3	
A/C Clutch Cycling Pressure Switch (5.0L)(5.8L)	19E561	RH rear of engine compartment, on accumulator	C162	151- 5- A2	
A/C Clutch Cycling Pressure Switch (7.3L)	19E561	RH rear of engine compartment, on accumulator	C162	151- 10- B1	
A/C Clutch Cycling Pressure Switch (7.5L)	19E561	RH rear of engine compartment, on accumulator	C162	151- 8- A3	
A/C Clutch Field Coil (4.9L)	19703	LH front of engine	C163	151- 3- F4	
A/C Clutch Field Coil (5.0L)(5.8L)	19703	LH front of engine	C163	151- 5- F5	
A/C Clutch Field Coil (7.3L Diesel)	19703	LH front of engine	C163	151- 10- F7	
A/C Clutch Field Coil (7.5L)	19703	LH front of engine	C163	151- 8- F5	
A/C Clutch Resistor Diode (4.9L)	1N4003 27 ohms @ 5W	LH side of engine compartment, taped to harness, near C101		151- 3-C10	
A/C Clutch Resistor Diode (5.0L)(5.8L)	1N4003 27 ohms @ 5W	LH side of engine compartment, taped to harness, near C101		151- 5-C10	
A/	1N4003 27 ohms @ 5W	LH front of engine, taped to harness, near A/C clutch field coil		*	
	1N4003 27 ohms @ 5W	LH side of engine compartment, taped to harness, near C101		151- 8-C10	

* Not Available

Component	Base Part No.	Location	Connector	Page Zone	Connector Page
A/C-Heater Control Assembly	19980	Center of I/P	C296	151- 15- A2	
A/C High Pressure Cut Out Switch (4.9L)	19D594	LH side of engine compartment	C126	151- 1- F9	
A/C High Pressure Cut Out Switch (5.0L) (5.8L)	19D594	LH side of engine compartment	C126	151- 5- A4	
A/C High Pressure Cut Out Switch (Lightning)	19D594	LH side of engine compartment	C126	151- 6- F7	
A/C High Pressure Cut Out Switch (7.3L Diesel)	19D594	LH side of engine compartment	C126	151- 11- A7	
A/C High Pressure Cut Out Switch (7.5L)	19D594	LH side of engine compartment	C126	151- 7- F6	
Air Bag Diagnostic Monitor	043B13	Behind LH side of I/P	C217,C218	151- 12- F3	46–3
Ambient Air Temperature (AAT) Sensor (7.3L Diesel)	12A697	Top center of engine	C164	151–11 C10	
Ambient Temperature Sensor	19E702	RH front of engine compartment	C131	*	
Anti–Theft Controller Module	19A366	Behind center of I/P	C237,C238	151- 12- A4	112–4
Ashtray Illumination	15052	Lower center of I/P, in ashtray assembly	C293	151- 13- F5	
Auxiliary Power Socket	15055	Lower center of I/P	C234	151- 13- F7	
Backup Lamp Switch (Mazda M5OD Transmission)	15520	Below center of vehicle, top LH side of transmission	C166	151- 18- B1	
Backup Lamp Switch (S5-42 ZF Transmission)	15520	Below center of vehicle, top LH side of transmission	C166	151- 18- E1	
Backup Lamps (All Except Chassis Cab)	13405/13404	Rear of vehicle, on respective sides	C433,C434	151- 19-F4, D9	
Backup Lamps (Chassis Cab)	13405/13404	Rear of vehicle, on respective sides	C447,C448	151- 19-F4, D9	
Barometric Pressure (BARO) Sensor (7.3L Diesel)	9F479	Below I/P at base of steering column	C2000	151- 12- F5	
Blower Motor (4.9L)	18527	RH side of safety wall	C168	151- 3- C1	
Blower Motor (5.0L)(5.8L)	18527	RH side of safety wall	C168	151- 5- B1	
Blower Motor (7.3L)	18527	RH side of safety wall	C168	151- 10- C1	
Blower Motor (7.5L)	18527	RH side of safety wall	C168	151- 8- B1	
...wer Motor Resistor (4.9L)	19A706	RH side of safety wall, on plenum	C169	151- 3- B1	
.....	19A706	RH side of safety wall, on plenum	C169	151- 5- A2	
.....	19A706	RH side of safety wall, on plenum	C169	151- 10- A1	
.....	19A706	RH side of safety wall, on plenum	C169	151- 8- A1	
.....	18578	Center of I/P	C260	151- 13- A4	

Component	Base Part No.	Location	Connector	Page Zone	Connector Page
Brake Fluid Level Switch (4.9L)	2L454	LH rear of engine compartment, on brake fluid reservoir	C170	151- 3- A8	
Brake Fluid Level Switch (5.0L)(5.8L)	2L454	LH rear of engine compartment, on brake fluid reservoir	C170	151- 5- A8	
Brake Fluid Level Switch (7.3L)	2L454	LH rear of engine compartment, on brake fluid reservoir	C170	151- 9- A8	
Brake Fluid Level Switch (7.5L)	2L454	LH rear of engine compartment, on brake fluid reservoir	C170	151- 8- A9	
Brake ON/OFF (BOO) Switch	13480	Behind LH side of I/P, top LH side of brake/clutch pedal support	C279	151- 12- F7	
Brake Pressure Switch (5.0L) (5.8L)	*	Near LH front rail	C102	151- 5- A9	
Brake Pressure Switch (7.3L Diesel)	*	Near LH front rail	C102	151- 10- A7	
Brake Warning Resistor/Diode Assembly	14A601	LH rear of engine compartment, taped in harness near C202		151- 3-B10	
Brush Assembly	3600	Top of steering column, below steering wheel	C219	151- 12-F10	
Cab Marker Lamps	15442	Top front of cab roof	C900,C901 C902,C903 C904	151- 17- A3	
Camshaft Position (CMP) Sensor	*	Front center of engine	C144	151- 9- F4	
Cargo/High Mount Stop Lamps	15550	On top rear of cab	C910	151- 17- A5	
Charge Indicator Lamp Relay	10B999	RH side of engine compartment, on wheelwell, below starter relay	C172	151- 11- F7	
Cigar Lighter	15055	Lower center of I/P, in ashtray assembly	C294,C295	151- 13- F4	
Clutch Pedal Position Switch	11A152	Behind LH side of I/P, top RH side of brake/clutch pedal support	C261	151- 12- F4	20–5
Clutch Pedal Position Switch Jumper	14B155	Behind LH side of I/P, taped to main harness, near steering column	C261	*	
Cold Idle Solenoid	*	Top center front of engine	C174	151- 9- F5	
Cold Timing Advance Solenoid	*	Top center front of engine	C175	151- 9- F7	
Courtesy Lamp Diode	*	In harness 14A504			
Day/Night Mirror/Autolamp Sensor	13A018	In center of windshield header	C913	151- 15- A4	
D[illegible]unning Lamps (DRL) Jumper	14A464	Front LH side of lower radiator support	C177	151- 3- F8	
[illegible]	15A272	Front LH side of lower radiator support	C177	151- 3-D10	97–3
[illegible]	*		C1037	*	
D[illegible]	10B987	Top LH side of I/P, right of instrument cluster	C264	151- 12- A5	65–2
Dis[illegible]	12127	Top LH front of engine	C178	151- 2- E9	21–2
Dis[illegible]	12127	Top center front of engine	C178	151- 4- F8	21–2

* N[illegible]

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June 1994

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