2006-2010 DODGE CHARGER
2006-2008 DODGE MAGNUM
UPFITTERS GUIDE

ELECTRICAL

RESTRAINTS

POLICE PACKAGE

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INTRODUCTION

The Police Upfitter's Guide has been prepared with the assistance of service and engineering specialists to assist vehicle upfitters in achieving the highest standards of safety and quality in their products.

This guide is divided into topics pertinent to upfitters of police vehicles. References are made to the 2008/2009 Dodge Charger consult the Service Manual for appropriate service procedures, torques specifications, component separation clearances, and other standard information that is common with the unmodified vehicle.

The Police Upfitter's Guide does not provide information on how to remove, install, or repair vehicle parts or equipment. This guide must be used as a reference to help ensure that certain important steps in the modification process have been considered. Chrysler LLC provides this information only to assist the upfitters, and does not warrant the products, procedures, materials, or the workmanship of the upfitters. Chrysler LLC does not provide warranty coverage against failures that result from modification of the vehicle.

Following the guidelines contained in this guide does not assure the individual upfitters that the products they modify comply with the U.S. Federal or Canadian Motor Vehicle Safety Standards in effect at the time of the modification. The guidelines set forth are based on engineering analyses of the typical police vehicles. If followed, the upfitter's efforts in certifying vehicles to applicable standards should be aided. Compliance testing that may be required for certification of specific vehicle configurations or constructions is, however, the sole responsibility of the individual modifier.

GENERAL INFORMATION

DISCLAIMER

NOTE: The descriptions and the specifications contained in this guide were in effect at the time this manual was released. Chrysler LLC reserves the right to discontinue models or change specifications or designs at any time without notice and without incurring any obligation.

This publication provides general guidelines and directions for installing police related equipment on the Dodge Charger and Magnum police certified vehicles. Following these guidelines and using appropriate installation procedures is essential for the safe, reliable operation of the vehicles as well as the personal safety of the individual performing the work.

Anyone who deviates from the guidelines provided in this guide must first make sure that personal safety and vehicle integrity are not compromised by his choice of methods, tools or parts.

WARNINGS AND CAUTIONS

It is important to note that this guide contains WARNINGS against procedures which could result in an accident or bodily injury. It also contains CAUTIONS against procedures which could result in damage to the vehicle or render it unsafe. It is important to understand that these CAUTIONS and WARNINGS are not exhaustive, because it is impossible to warn of all the possible hazardous consequences that may result from failure to follow these instructions. Follow these general warnings and cautions any time work is performed on a vehicle.

To avoid injury, please obey the following Warnings and Cautions:

WARNING: ALWAYS WEAR SAFETY GLASSES FOR EYE PROTECTION.

WARNING: USE SAFETY STANDS ANYTIME A PROCEDURE REQUIRES BEING UNDER A VEHICLE.

WARNING: REMOVE THE IGNITION OFF DRAW (IOD) FUSE, THE AIRBAG FUSES, AND MAKE SURE THAT THE IGNITION SWITCH IS ALWAYS IN THE OFF POSITION, UNLESS THE PROCEDURE REQUIRES IT TO BE ON.

WARNING: SET THE PARKING BRAKE AND PLACE THE TRANSMISSION GEAR SELECTOR IN PARK WHEN WORKING ON ANY VEHICLE.

WARNING: OPERATE THE ENGINE ONLY IN A WELL-VENTILATED AREA.

WARNING: KEEP AWAY FROM MOVING PARTS WHEN THE ENGINE IS RUNNING, ESPECIALLY THE FAN AND BELTS.

WARNING: TO PREVENT SERIOUS BURNS, AVOID CONTACT WITH HOT PARTS SUCH AS THE RADIATOR, EXHAUST MANIFOLD(S), TAIL PIPE CATALYTIC CONVERTERS AND MUFFLERS.

WARNING: ALWAYS REMOVE THE FUEL TANK, DRAIN, PURGE, AND PLUG THE FUEL LINES WHEN UNDERBODY OR FLOOR PAN WELDING IS REQUIRED.

WARNING: DO NOT ALLOW FLAME OR SPARKS NEAR THE BATTERY. GASES ARE ALWAYS PRESENT IN AND AROUND THE BATTERY.

WARNING: ALWAYS REMOVE RINGS, WATCHES, LOOSE HANGING JEWELRY AND AVOID LOOSE CLOTHING.

WARNING: AFTER INSTALLING ANY EQUIPMENT OR AFTER ANY OTHER WORK IS COMPLETED, TURN THE IGNITION KEY TO THE ON POSITION AND MONITOR THE AIRBAG INDICATOR TO MAKE SURE THERE ARE NO FAULTS IN THE SUPPLEMENTAL RESTRAINTS SYSTEM.

WARNING: USE ONLY THE APPROVED POWER, GROUND, OR SIGNAL SOURCES AS DESCRIBED IN THIS MANUAL. SPLICING, CUTTING, OR ALTERING THE VEHICLE HARNESS CIRCUITS IS NOT PERMITTED.

WARNING: ALWAYS DISCONNECT THE BATTERY CABLE BEFORE PERFORMING ANY ELECTRICAL WORK ON THE VEHICLE.

VEHICLE MODIFICATION

INFORMATION CONCERNING UNITED STATES AND CANADA SAFETY STANDARDS

Chrysler LLC has prepared the following information for persons who intend to modify the 2008-2010 Dodge Charger or 2008 Dodge Magnum police prep package vehicles.

Chrysler LLC has prepared the following information for persons who intend to modify the 2008 Dodge Charger or Dodge Magnum police prep package vehicles.

The vehicle modifier or alterer is responsible for re-certifying the modified vehicle as altered pursuant to Title 49 of the Code of Federal Regulations S567.7 and S568.6 in the United States or to Section 9 of the Canadian Motor Safety Regulations in Canada. A vehicle modifier is a person or company who modifies a previously certified vehicle other than by the addition, substitution or removal of readily attachable components. Upon completion of the modified vehicle, the vehicle modifier is required by law to certify that it continues to comply with all applicable Federal and Canada Motor Vehicle Safety Standards/Regulations. In addition, the modified vehicle must continue to comply with all applicable Federal, Canada and/or California Emissions regulations. In the United States, sale of a non-complying new vehicle is illegal and is punishable by a fine of up to $27,500 (Federal) and $5,000 (California) per vehicle for emissions noncompliance, $1,000 per vehicle for safety non-compliance, plus recall and other sanctions. Other penalties apply in Canada.

This material is for informational purposes only and sets forth some general observation on this subject. Dealers and/or vehicle modifiers should seek assistance from the legal counselor of their choice to aid them in understanding their specific obligations. Specific questions concerning compliance and/or certification to safety standards and emissions and related (e.g. fuel economy) regulations should be directed to the vehicle modifiers legal counsel or the United States National Highway Traffic Safety Administration (Federal Motor Vehicle Safety Standards and Federal Economy Standards and Requirements), the Canada Department of Transport/Transport Canada (Canada Motor Vehicle Safety/Regulations, including emissions and noise regulations), Industry Canada (Interference-Causing Equipment Standards), the United States Environmental Protection Agency (United States emissions and fuel vapor requirements) or The California Air Resources Board (California emissions and fuel vapor requirements). Chrysler LLC makes no representations with regard to conformity of the modified vehicle to any Federal or Canadian Motor Vehicle Safety Standards/Regulations that may be affected by the vehicle modification; it is the responsibility of the vehicle modifier to certify that the vehicle conforms to any standards affected by the vehicle modification. Additional information concerning United States Federal Motor Vehicle Safety Standards and Canada Motor Vehicle Safety Regulations is provided in the 2005-2010 Dodge Truck Body Builder's Guide which can be found on-line at www.dodge.com/bodybuilder . The vehicles listed in the following table will conform to the safety standards noted above provided the following conditions are satisfied.

The altered vehicle's unloaded vehicle weight does not exceed the value designated in the table corresponding to the vehicle's model and engine size. "Unloaded vehicle weight", as defined in the Title 49 Code of Federal Regulations, Part 571.3, means "the weight of a vehicle with maximum capacity of all fluids necessary for operation of the vehicle, but without cargo or occupants", and following alteration it still conforms to all applicable Federal Motor Vehicle Safety Standards (or Canadian Motor Vehicle Safety Standards).

Engine Size (Liters)	Maximum Unloaded Vehicle Weight (Pounds) w/Max Options
Dodge Charger	
3.5	3966
5.7	4181
Dodge Magnum	
3.5	4044
5.7	4257

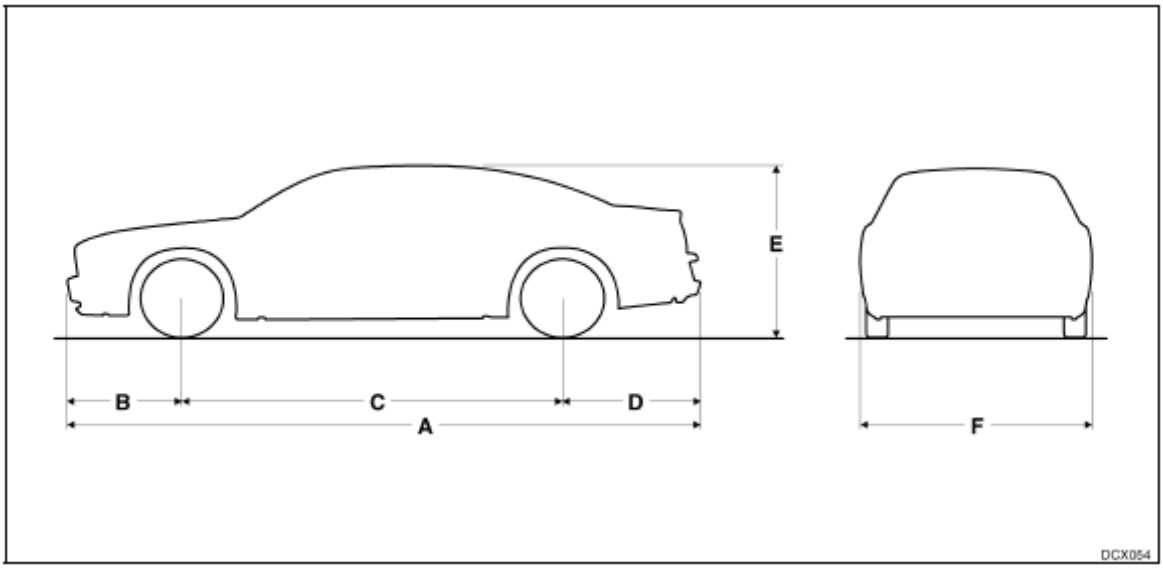
SAFETY DEVICES

Charger Police Vehicle Upfitting Guide

The Dodge Charger and Magnum are factory equipped with many safety devices and features required by the Federal Motor Vehicle Safety Standards (FMVSS) or the Canada Motor Vehicles Safety Regulations. These features, which include for example brakes, lights, tires, seat belts, airbags, the key-in-ignition chime, the brake lights, etc., should not be modified or disabled.

The United States Code (USC), Section 30122 Making Safety Devices and Elements Inoperative, states that “A manufacturer, distributor, dealer, or motor vehicle repair business may not knowingly make inoperative any part of a device or element of design installed on or in a motor vehicle or motor vehicle equipment in compliance with an applicable motor vehicle safety standard prescribed under this chapter unless the manufacturer, distributor, dealer, or repair business reasonably believes the vehicle or equipment will not be used (except for testing or a similar purpose during maintenance or repair) when the device or element is inoperative.”

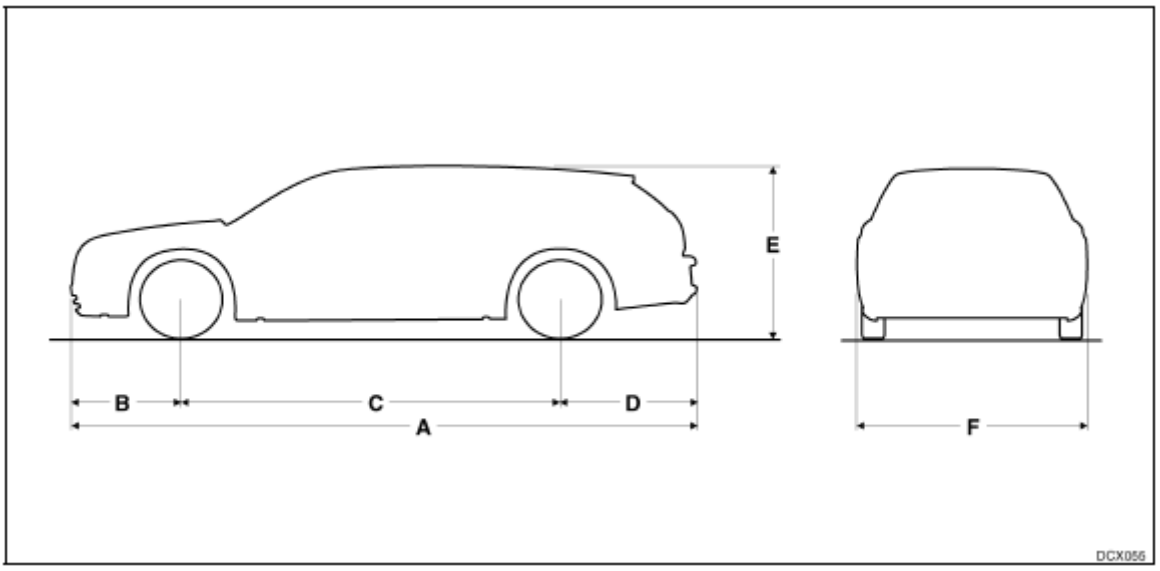
VEHICLE DIMENSIONS CHARGER



The Dodge Charger vehicles have the following overall exterior dimensions:

- Length (A) = 5,082 mm (200.1 in.)
- Front overhang (B) = 924 mm (36.4 in.)
- Wheelbase (C) = 3,048 mm (120.0 in.)
- Rear overhang (D) = 1,109 mm (43.7 in.)
- Height (E) = 1,479 mm (58.2 in.)
- Width (F) = 1,891 mm (74.5 in.)

VEHICLE DIMENSIONS MAGNUM



The Dodge Magnum vehicles have the following overall exterior dimensions:

- Length (A) = 5,021 mm (197.7 in.)
- Front overhang (B) = 886 mm (34.9 in.)
- Wheelbase (C) = 3,048 mm (120.0 in.)
- Rear overhang (D) = 1,087 mm (42.8 in.)
- Height (E) = 1,481 mm (58.3 in.)
- Width (F) = 1,881 mm (74.1 in.)

BUMPER HEIGHTS

Every time a vehicle is modified, measure the front and rear bumper heights to verify compliance with the FMVSS/CMVSS Part 581 - Bumper Standard, and with the Chrysler LLC specifications. Take bumper height measurements with the vehicle at curb weight. Measure the bumper heights as follows:

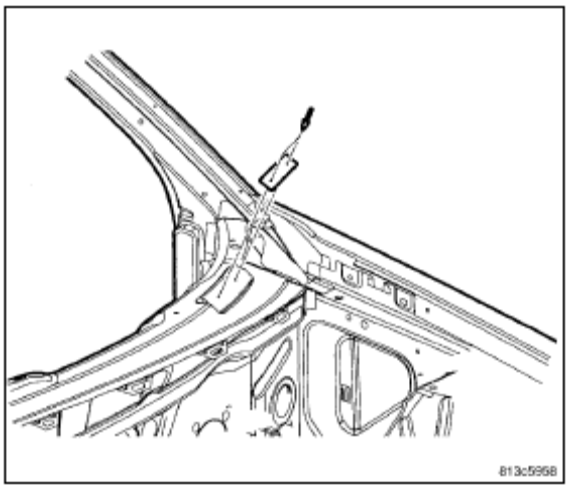
NOTE: Take the measurements from the bottom of the bumper structural beam, not from the bumper fascia surface.

- Place the vehicle on a flat, level surface.
- Place the transmission gear selector lever in the PARK position.
- Exit the vehicle.
- At the center of the bumper, measure the vertical distance from the floor surface to the bottom of the front bumper structural beam.
- At the center of the bumper, measure the vertical distance from the floor surface to the bottom of the rear bumper structural beam.
- Record and compare the measurements with the specifications below.

Front bumper height	393.4 ±12.5 mm (15.5 ±0.5 inches)
Rear bumper height	367.6 ±12.5 mm (14.5 ±0.5 inches)

VEHICLE IDENTIFICATION

VEHICLE IDENTIFICATION NUMBER (VIN)
The VIN plate is attached to the body, and is visible through the lower left corner of the windshield. The VIN contains 17 characters that provide data concerning the vehicle. Refer to the decoding chart to determine the identification of a vehicle.



To protect the consumer from theft and possible fraud, the manufacturer is required to include a check digit at the ninth position of the VIN. The check digit is used by the manufacturer and government agencies to verify the authenticity of the vehicle and official documentation. The formula to use the check digit is not released to the general public.

VIN DECODING INFORMATION

POSITION	INTERPRETATION	CODE = DESCRIPTION
1	Country of Origin	2 = Manufactured by Chrysler Canada Inc.
3	Vehicle Type	B = Dodge (Sedan) D = Dodge (Wagon
		3 = Passenger Car 4 = Multipurpose Passenger Vehicle Without Side Air Bags Sales Code (CGS) (Wagon) 8 = Multipurpose Passenger Vehicle With Side Air Bags Sales Code (CGS) (Wagon)

POSITION	INTERPRETATION	CODE = DESCRIPTION
4	Restraint System	H = Restraint System Air bags Front Next Generation Multi-Stage Sales Code (CG1) With Side Air Bags Sales Code (CGS) J = Restraint System Air Bags Front Next Generation Multi-Stage Sales Code (CG1) Without Side Air Bags Sales Code (CGS) K = Restraint System Advanced Multi-Stage Front Air Bags Sales Code (CG3) With Side Air Bags Sales Code (CGS) L = Restraint System Advanced Multi-Stage Front Air Bags Sales Code (CG3) With Side Air Bags Sales Code (CGS) 4 = Multipurpose Passenger Vehicle Without Side Air Bags Sales Code (CGS) (Wagon) 8= Multipurpose Passenger Vehicle With Side Air Bags Sales Code (CGS) (Wagon)
	Gross Vehicle Weight Rating	E = 1361-1814 kg (3001-4000 lbs) (Wagon) F = 1815-2267 kg (4001-5000 lbs) (Wagon)
5	Vehicle Line	A = Charger (RWD) V = Magnum (RWD)
6	Series	4 - H High Line
7	Body Style	3 = 4 Door Sedan Tall 7 = Wagon Tall
8	Engine	G = 3.5L V-6 cyl. High Output 24 Valve MPI Gasoline Sales Code (EGG) H = 5.7L V-8 cyl. HEMI® Multiple Displacement Gasoline Sales Code (EZB) V = 3.5L V-6 cyl. 24 Valve High Output Gasoline, Sales Code (EZB) (Wagon) 2 = 5.7L V-8 cyl. HEMI® Multiple Displacement Gasoline Sales Code (EZB) (Wagon)
9	Check Digit	0 through 9 or X
10	Model Year	8 = 2008
11	Assembly Plant	H = Brampton Assembly
12 Through 17	Vehicle Build Sequence	Six Digit Number Assigned By Assembly Plant

VEHICLE EMISSION CONTROL INFORMATION (VECI) LABEL

All vehicles are equipped with a combined VECI label. This label is located in the engine compartment and contains the following information:

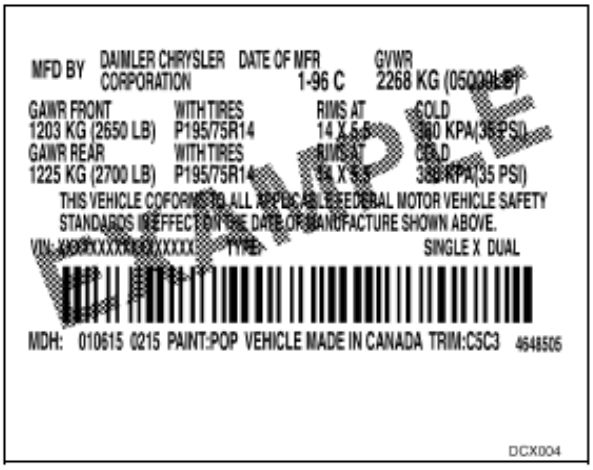
- Engine family and displacement
- Evaporative family
- Emission control system schematic *(Catalyst and O2 configuration)*
- Certification application
- Spark plug and gap *(Some applications)*

The label also contains an engine vacuum schematic *(Some Applications)*. There are unique labels for vehicles built for sale in the state of California and the country of Canada. Canadian labels are written in both the English and French languages. These labels are permanently attached and cannot be removed without defacing the information and destroying the label.

VEHICLE CERTIFICATION LABEL

A vehicle certification label is attached to every Chrysler LLC vehicle. The label certifies that the vehicle conforms to all applicable Federal Motor Vehicle Standards. The label also lists:

- Month and year of vehicle manufacture
- Gross vehicle weight rating (GVWR). The gross front and rear axle weight ratings (GAWRs) are based on a minimum rim size and maximum cold tire inflation pressure.
- Vehicle identification number (VIN)
- Type of vehicle
- Type of rear wheels
- Bar code
- Month, day and hour (MDH) of final assembly
- Paint and trim codes
- Country of origin

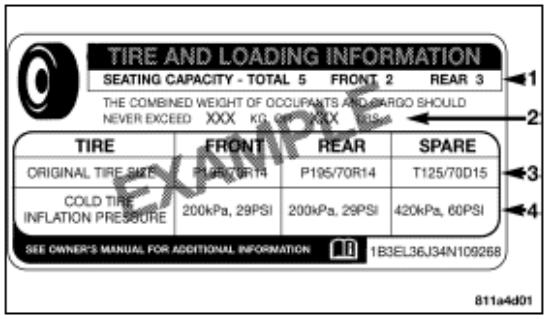


The label is located on the driver-side door shut-face.

TIRE AND LOADING INFORMATION LABEL

The tire and loading information label is located on the driver's side B-pillar and contains the following information:

- Number of people that can be carried in the vehicle.
- The total weight the vehicle can carry.
- The tire size designed for the vehicle.
- The cold tire inflation pressures for the front, rear, and spare tires.



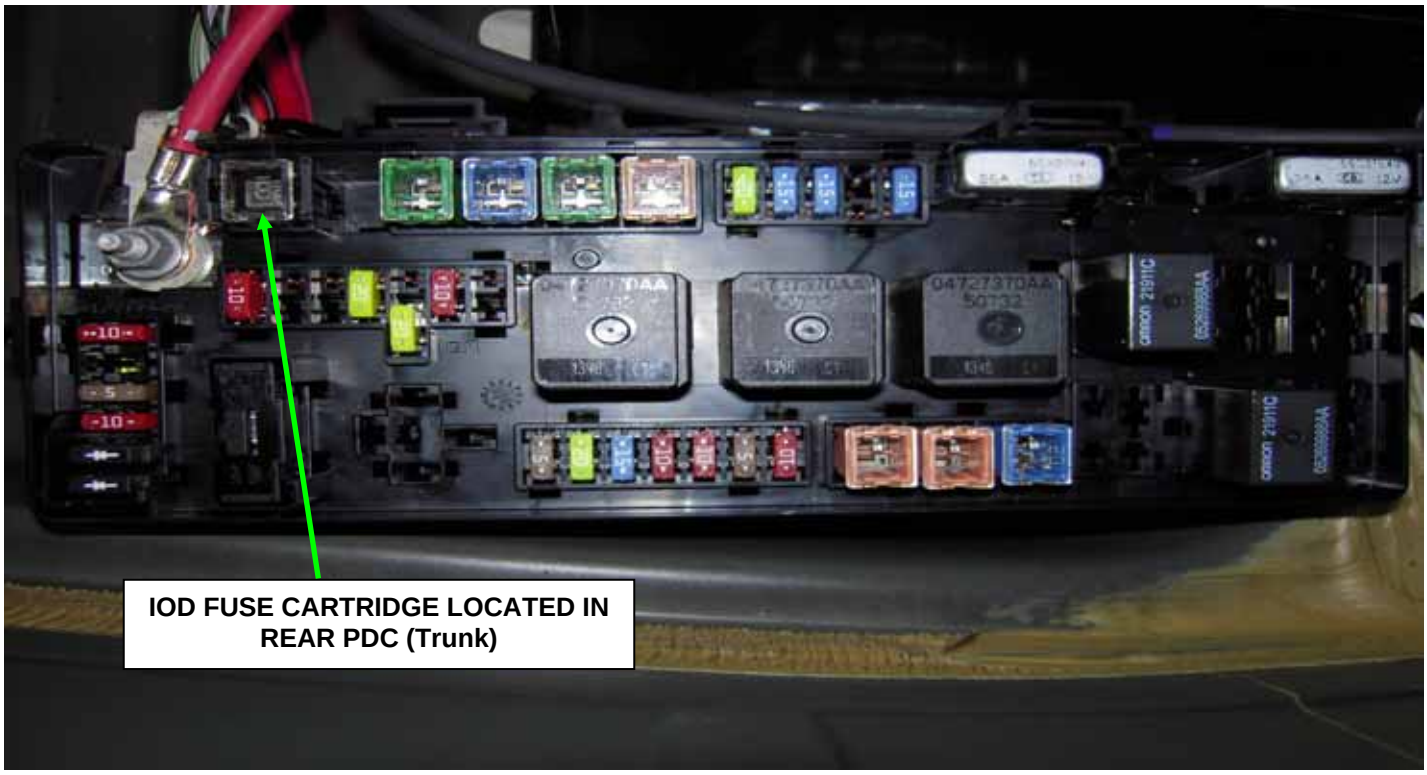
NEW VEHICLE STORAGE

If a vehicle is not immediately delivered to the customer, store the vehicle according to the following guidelines:

1. If possible, store the vehicle indoors, in a clean and dry place. If vehicles must be stored outside;
   - Avoid storage locations near obvious sources of industrial or environmental contamination (such as, trees, factories, steam or vapor vents, railroad tracks, etc.)
   - Maintain tight security to help prevent vandalism. Inspect the vehicle regularly to check for such damage.
   - If the vehicle must be parked on an incline, park it with the front end higher than the rear. This prevents hydrostatic lock caused by fuel draining into the engine.
   - Rinse the vehicle at least once a week. Wash away the snow more often since it can trap harmful contaminants. Dry all horizontal surfaces.
2. Remove the IOD fuse to prevent battery drain and possible damage.
3. Check the engine coolant and anti-freeze protection.

WARNING: THE BATTERY IN THIS VEHICLE HAS A VENT HOSE THAT SHOULD NOT BE DISCONNECTED AND SHOULD ONLY BE REPLACED WITH A BATTERY OF THE SAME TYPE (VENTED). FAILURE TO FOLLOW THIS WARNING CAN RESULT IN SERIOUS OR FATAL INJURY.

4. Check the vehicle battery at least once a month for proper charge (at least 12.4 volts). Charge the battery as necessary to help prevent freezing and deterioration. Always make sure that the battery vent tube is properly connected to the battery and to the floor pan.
5. Check the vehicle tires and inflate them to the maximum recommended levels. To avoid flat spotting, move the vehicle at least once a month so that a different portion of the tire tread contacts the ground.
6. Leave the parking brake in the OFF position.
7. Keep all windows closed, all doors locked, and all trim covers intact and in place.
8. Do not use chalk, crayon or any marker containing abrasives on painted, plated, or glass surfaces.
9. Use protective thin plastic film to avoid soiling seats when moving a vehicle.



ELECTRICAL BASICS

Electricity is a form of energy. Although we can't see this energy, we can sense its effects through our senses of sight, hearing, touch and smell. The energy generated by electricity is used to perform various types of work. Electrical energy can be created, stored, controlled and made to perform certain functions in electrical circuits. We see the effects of electrical energy when a light bulb illuminates, hear its effects when a horn sounds, feel its effects in the form of static electricity and smell it when its heating effects become excessive (fig. 1).

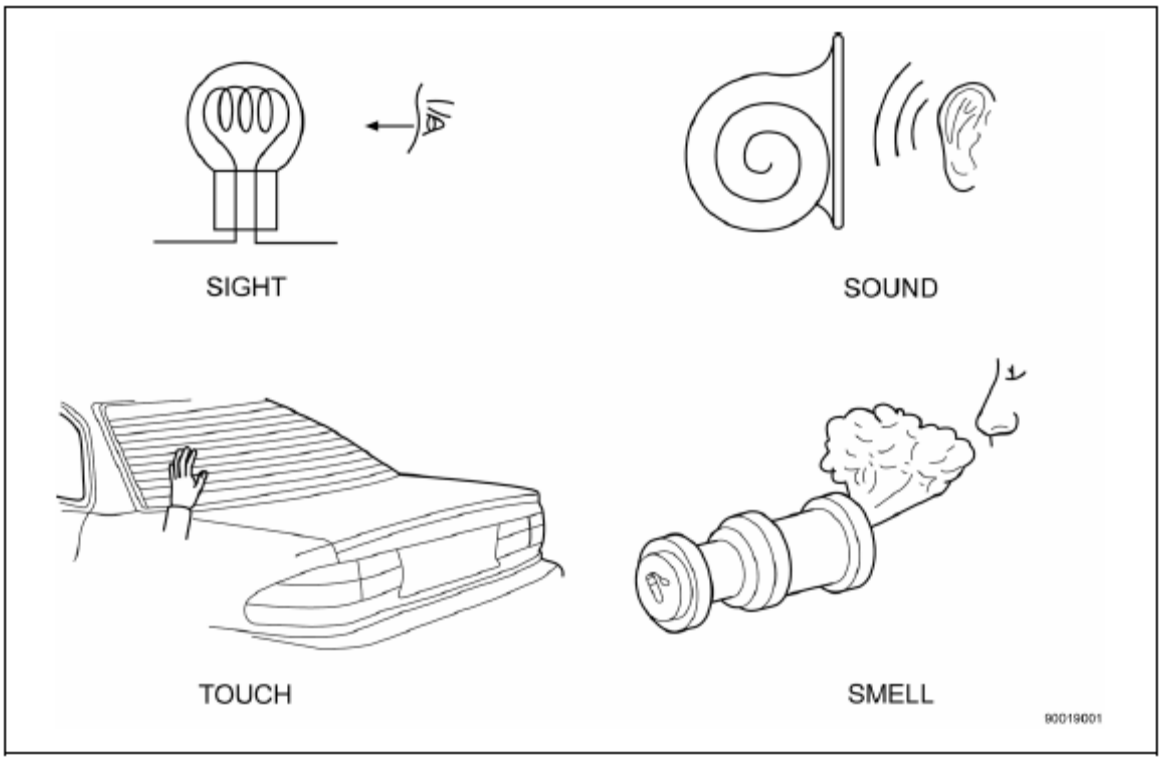


Fig. 1

ELECTRON FLOW

Simply stated, the most specific definition of electricity or electrical current, is a flow of *free* electrons. To understand this definition, let's take a look at how electrons flow.

Current Flow Conventions

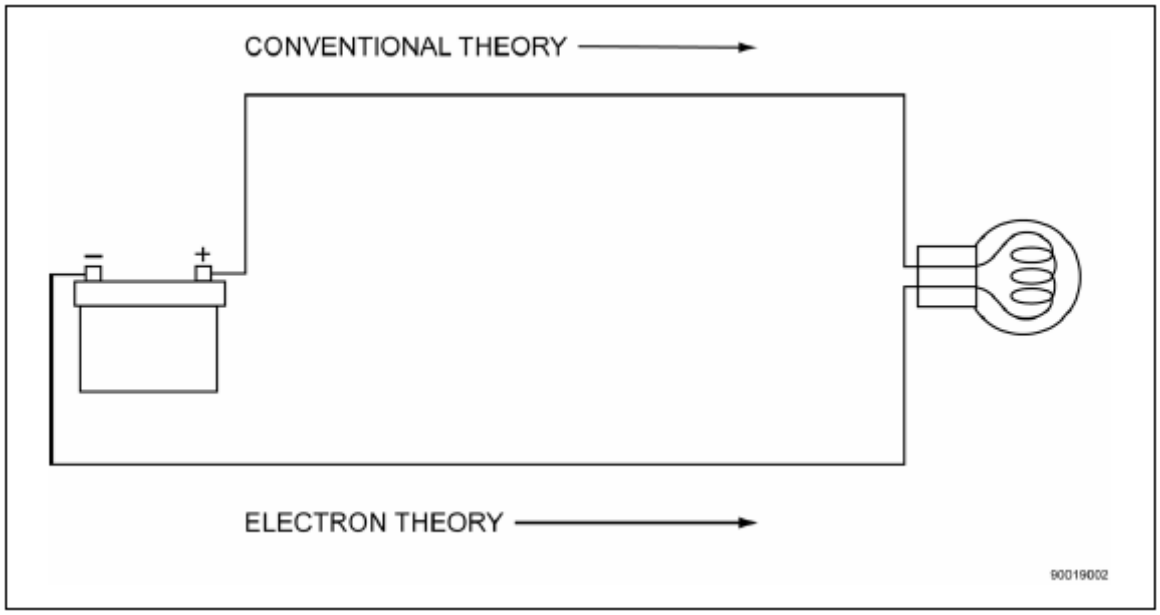


Fig 2

Two different theories describe how current flows through a conductor. The *electron theory* commonly used in the electronics field states that current flows from negative (-) to positive (+), because the flow is from an area where there is an excess of electrons (relatively negative), to an area where there is a lack of electrons (relatively positive).
The conventional theory, which is used in this course, states that current flows from positive (+) to negative (-) because excess electrons flow from an area of high potential (+) to an area of low potential (-).

Conductors, Insulators and Semi-Conductors

Remember the “solar system” analogy that described electrons traveling in rings around the nucleus of an atom, can be compared to planets circling the sun? Each ring can contain a certain number of electrons before it is “filled.” The outermost ring may or may not be filled, depending on the specific atom or element. The number of electrons in the outer ring determines if the element is a conductor, an insulator or a semiconductor.

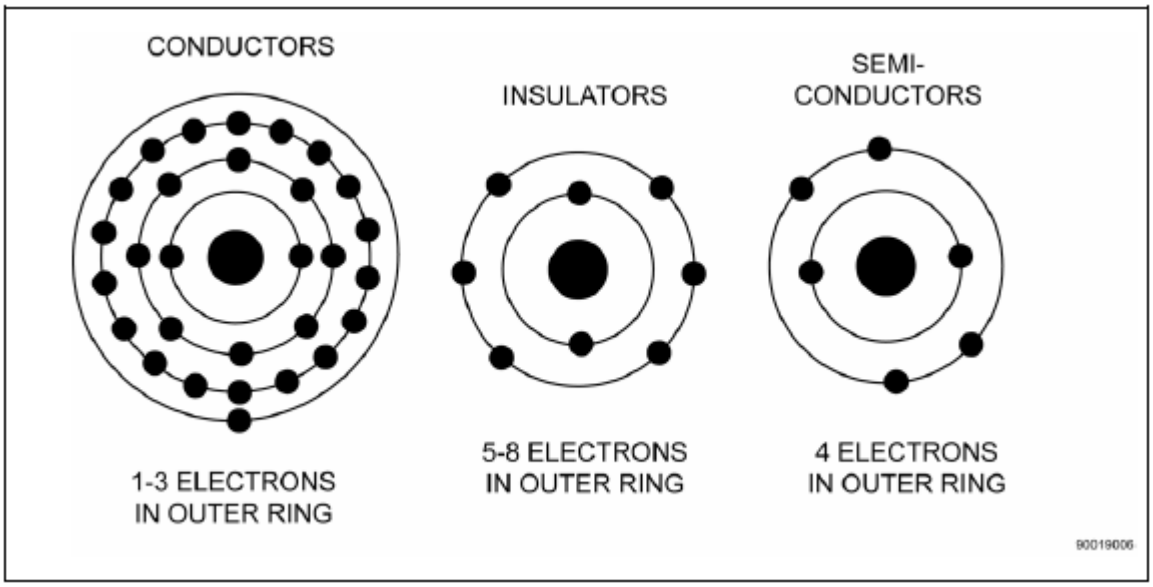


Fig 3

Materials with one to three electrons in the outer ring of the atom are conductors. Copper, with one electron in the outer ring is a good example. A conductor is a material that allows electrons to pass easily through it, in much the same way that water passes through a pipe. Common examples on a vehicle are the electrical wires and the metallic components such as the engine, sheet metal parts and the frame. Materials with five to eight electrons in the outer ring of the atom are called insulators. Just as the hard shell of a pipe directs the movement of water, insulating materials such as *air, glass, rubber* and *plastic*, control or direct the flow of electrons. Materials with exactly four electrons in the atom outer ring, such as *carbon*, *germanium* and *silicon* are called semi-conductors. They have properties of both conductors and insulators and their exact function depends on other conditions existing in the circuit at a given time.

SOURCES OF ELECTRICITY

Electricity can be generated in several different ways such as magnetism, chemical reaction, friction, heat and pressure. All methods involve conversion from another form of energy.

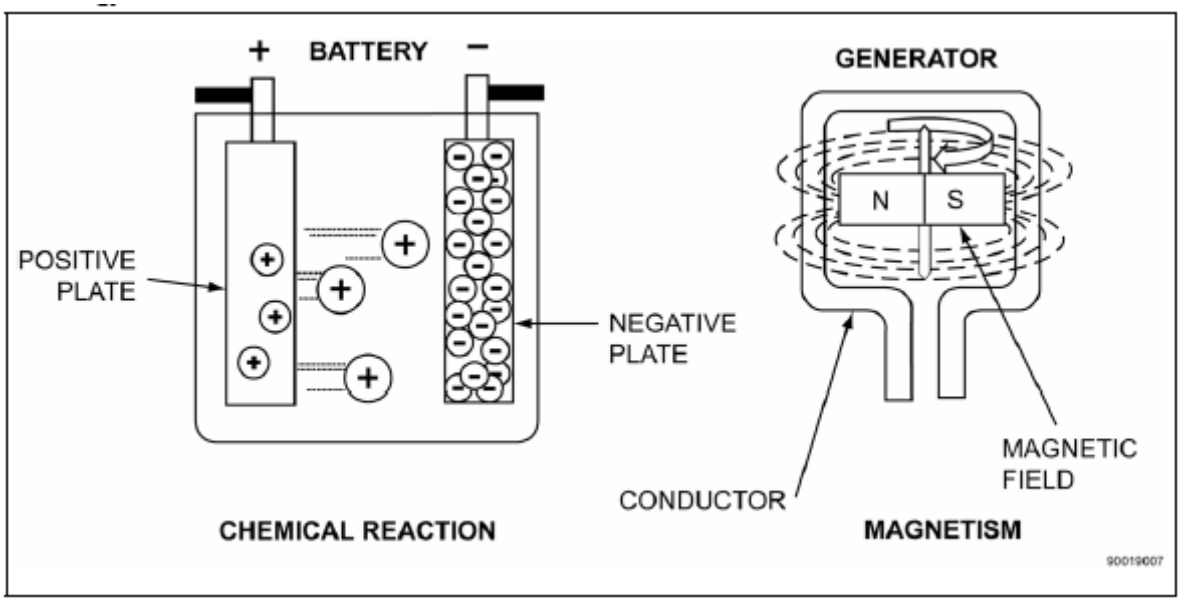


Fig 4

The **battery** is an electrochemical device that provides the necessary power to start the engine and to operate the electrical system for brief periods when the engine is not running. It is a storage device that dampens electrical surges and acts as a reserve power source when current demands are more than the generator can output. The **alternator** converts magnetism into an electrical current to power the electrical system when the engine is running, and to keep the vehicle battery charged. Because the engine drives the alternator, you could say that the vehicle electrical energy, ultimately comes from the fuel in the tank.

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A vehicle uses electricity to make some of its systems and components work. The electricity in a vehicle is produced by The battery, and an alternator which can be compared with a water pump. As a water pump moves the water molecules, the alternator moves the electrons. As a water pump pushes a certain amount of water molecules, the alternator pushes a certain amount of electrons, and as a water pump pushes the water molecules with a certain pressure, the alternator pushes the electrons with a certain pressure. The amount of electrons pushed by the alternator is called amperage, and the “pressure” is called voltage. Electricity is distributed to the battery and to various components through a network of conductors called a wiring harness. The same way the water is pushed through pipes, is the same way the electrons are pushed through metallic conductors called wires. As the pipe diameter limits the number of water molecules that can travel at any given point, the size of the wire limits the amount of the electrons that can travel at any given point. In 1827 George Simon Ohm published what is called today Ohm’s law. According to Ohm’s law, the relation between voltage (V), amperage (I), and the resistance (R) encountered by the electricity while traveling through conductors is V = I x R. The rate at which a device converts the electricity to a different form of energy (visual, acoustical, mechanical, or hydraulic) is called power, and is measured in watts. An equation that expresses the relationship between volts (V), amperes (A), and watts (W), is V x A = W. This equation is necessary when making calculations for making proper and safe electrical installation of new equipment and new wiring harnesses in a vehicle. For example to calculate the current needed by an amplifier rated at 120W, use the equation as follows: 12V x A = 120W, => A = 120W/12V, => A = 10.

VOLTAGE, CURRENT AND RESISTANCE

Electrical Terms

When we describe the behavior of electricity, we refer to its actions in specific electrical terms such as **voltage**, **current, resistance** and **power**.

	Unit of Measure
• Voltage is pressure or force.	Volt=Voltage
• Current is the flow of electrons.	Amp=Current
• Resistance is opposition or electrical friction.	Ohm=Resistance
• Power is the amount of work being performed.	Watt=Power

Although we cannot see electricity, we can measure it. To understand the behavior of electricity, we must see the relationship between voltage, current and resistance.

Voltage

Voltage is an electrical pressure caused by a potential force or difference in the electrical charge between two points. It can force current to flow through a conductor, but not through an insulator. Voltage can exist without current flow. A good example is the storage battery in a vehicle. A voltage or potential exists at the battery posts, but no current flows until the battery is connected to an electrical circuit. The basic unit for measuring voltage is the **volt**.

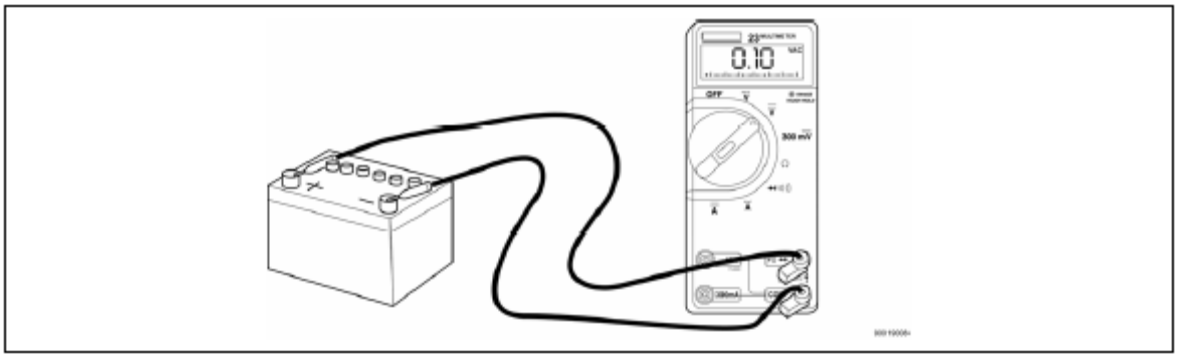


Fig 5 Measuring Voltage (ALWAYS in Parallel)

Voltage is ALWAYS measured with the meter connected in parallel. This is due to Ohm's Law and the impedance of the meter, usually 10MΩ or at the very least 1MΩ. Example (12V/10,000,000=.0000012milliamps of current flow)

Table 1 Voltage

VOLTAGE	BASIC UNIT	UNITS FOR VERY SMALL AMOUNTS		UNITS FOR VERY LARGE AMOUNTS	
Symbol	V	μV	mV	kV	MV
Term	Volt	Micro-volt	Milli-volt	Kilo-volt	Mega-Volt
Multiplier	1	0.000001	0.001	1,000	1,000,000

VOLTAGE DROP RULES

High Current Circuits: As a rule you are allowed a .1 of a volt per connection never to exceed .5 volt in the entire circuit. Examples of these circuits are the starter, alternator, wiper motor, blower motor.

Low Current Electronic Circuits: As a rule you are usually never allowed to exceed .1 of a volt for the entire circuit. Examples of these circuits are fuel system inputs (sensors), resistive multiplexed circuits, vehicle networking circuits.

CURRENT

A controlled, concentrated flow of free electrons is called current flow. Current flow cannot take place without an electromotive force (voltage) and complete path in which to flow. The basic unit of current is the **ampere**, or "**amp**."

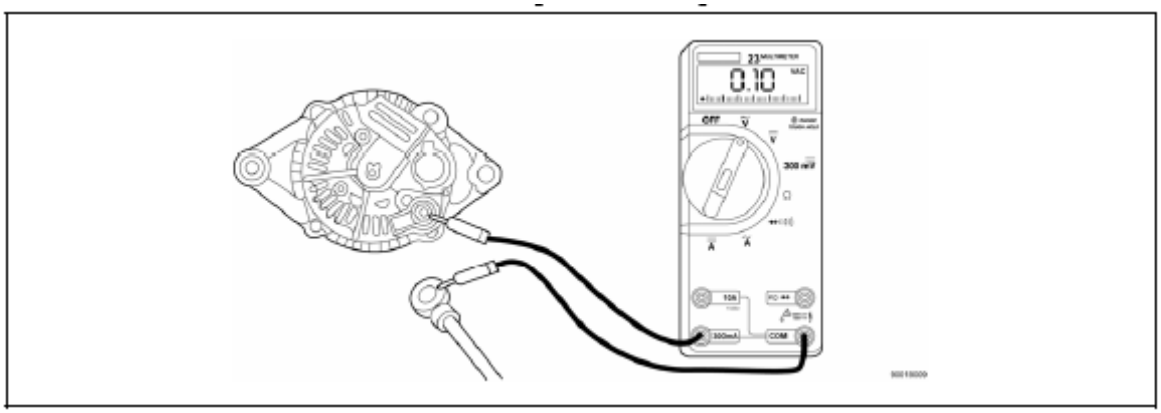


Fig 6 Measuring Current Flow

Current flow is ALWAYS measured in series when using the ammeter.

Table 2 Measuring Current Flow

CURRENT	BASIC UNIT	UNITS FOR VERY SMALL AMOUNTS		UNITS FOR VERY LARGE AMOUNTS	
Symbol	A	μA	mA	kA	MA
Term	Ampere (Amp)	Micro- ampere	Milli- ampere	Kilo- ampere	Mega- ampere
Multiplier	1	0.000001	0.001	1,000	1,000,000

Direct Current and Alternating Current

When electrons constantly flow through a conductor in one direction, it is called *direct current* or *DC*. This is the type of current produced by batteries, including the vehicle battery. The electrical components in a car are powered by direct current. When the current repeatedly changes back and forth from positive to negative, it is called *alternating current*, or *AC*. The electrical supply in your home is 120-volt alternating current which changes it polarity from positive to negative and back to positive, 60 times every second. This has traditionally been called 60-cycle AC. In modern terminology, the expression "cycles per second" (or "cycles," for short) has been replaced with the term Hertz (Hz). So your house current is now called 60 Hz. The vehicle generator produces an alternating current of approximately 14.5 volts. This alternating current is *rectified*, or changed to direct current to operate the vehicle electrical system and keep the battery charged.

IGNITION-OFF DRAW

The term Ignition-Off Draw (IOD) identifies a normal condition where power is being drained from the battery with the ignition switch in the Off position. A normal vehicle electrical system will draw from five to thirty-five milliamperes (0.005 to 0.035 ampere) with the ignition switch in the Off position, and all non-ignition controlled circuits in proper working order. Up to thirty-five milliamperes are needed to enable the memory functions for the Powertrain Control Module (PCM), digital clock, electronically tuned radio, and other modules which may vary with the vehicle equipment.

A vehicle that has not been operated for approximately twenty days, may discharge the battery to an inadequate level. When a vehicle will not be used for twenty days or more (stored), remove the IOD fuse from the Junction Block (JB). This will reduce battery discharging.

Excessive IOD can be caused by:

- Electrical items left on.
- Inoperative or improperly adjusted switches.
- Inoperative or shorted electronic modules and components.
- An internally shorted generator.
- Intermittent shorts in the wiring.
- Aftermarket installed items (Lightbars, 2-way radios, laptops, night vision systems, video cameras, routers)

If the IOD is over thirty-five milliamperes, the problem must be found and corrected before replacing a battery. In most cases, the battery can be charged and returned to service after the excessive IOD condition has been corrected.

CAUTION:

If using a test light for checking IOD. It is imperative that you know the current draw of the device. The two test lamps to the right have different bulbs. The Snap-On light is a “High Impedance” bulb. There is about 45 milli-amps of current flow with this test lamp. The lamp on the bottom features an incandescent “Low Impedance” bulb as a result there is about a 300 miili-amp draw.

Note: Neither lamp is better than the other, both serve a purpose. With the IOD specification of 35 milliamps max it is apparent that the test lamp on the bottom is inappropriate to use at it requires 9X the allowable IOD specification for the bulb to light.

There are two main types of test lamps, the 12-volt test lamp and the self-powered test lamp. The **12-volt test lamp** has no power of its own. Its gets power from the circuit being tested, which means the circuit must be tested “live.” This lamp provides a quick way to see if voltage is present at the test point. It could also indicate a high resistance condition if the lamp glows dimly. The **self-powered test lamp** contains its own battery. It is used to test continuity by being placed in series with the tested circuit. This lamp must be used with the power **off** in the circuit.

Using a Test Lamp

A 12-volt test lamp can be used for checking for power by grounding the alligator clip and moving the test probe from connection to connection until power is lost. This type of lamp can also be used to detect an Ignition Off Current Draw (IOD) by connecting it between the negative battery post and the negative battery cable. If after various modules “time out,” the lamp remains illuminated when connected, a current draw is present. **Note: Self-powered test lamp. A 12-volt or self-powered test lamp should not be used on low power electronic circuits because its low internal resistance can damage sensitive electronic parts.**

NOTE: The Charger Police packages unlike their civilian versions have very little load shedding. The following Police package items will cause the battery to discharge if left on: Dome lamp, map lamps, both front spot lamps, trunk light, Underhood lamp. Anything that is installed that uses the circuitry of the Police PDC plus any additional Upfitter installed items.

CHECKING FOR IOD

IOD Pre-Test

When checking IOD to determine the cause of a drained battery the possibility exists that it could me a module that is not going to sleep because of either a hardware or software problem. Sometimes unplugging or powering down the module will temporarily resolve the problem. In order to determine current flow without removing a fuse or powering down a component you can check voltage drop across the fuse. For cartridge style fuses you will need to remove the cover for access. Not all fuse sizes are shown and the values are for reference only.

IOD Voltage Drop Table

FUSE VALUE	FUSE TYPE	DIVIDE BY
5	MINI	16.5
10	MINI	7.5
15	MINI	4.5
20	MINI	3.5
25	MINI	2.5
30	MINI	2.0
20	CARTRIDGE	1.0
30	CARTRIDGE	1.5
40	CARTRIDGE	1.0
50	CARTRIDGE	0.5

Diehl 2004

EXAMPLE CALCULATION

Voltage Drop Measured Across Fuse	Fuse Type	Divide By value from chart above
10mv (10)	Mini	3.5

10/3.5= 2.85 amp draw

Note: Multimeter MUST be set to milli-volts for the measurement.

Note: The purpose of this test is to determine what circuit(s) on the vehicle is problematic. This allows for conformation of a problem before attempting to install the ammeter in series with the battery negative. The most critical part of connecting the ammeter with the battery is not to break the electrical connection in the circuit while connecting the meter. If the connection is lost then generally the IOD issue will temporarily resolve itself.

IGNITION-OFF DRAW TEST

1. Verify that all electrical accessories are off. Turn off all lamps, remove the ignition key, and close all doors. If the vehicle is equipped with an illuminated entry system or an electronically tuned radio, allow the electronic timer function of these systems to automatically shut off (time out). This may take up to three minutes.

2. Determine that the underhood lamp is operating properly, then disconnect the lamp wire harness connector or remove the lamp bulb

3. Disconnect the battery negative cable.

4. Set an electronic digital multi-meter to its highest amperage scale. Connect the multi-meter between the disconnected battery negative cable terminal clamp and the battery negative terminal post. Make sure that the doors remain closed so that the illuminated entry system is not activated. The multi-meter amperage reading may remain high for up to three minutes, or may not give any reading at all while set in the highest amperage scale, depending upon the electrical equipment in the vehicle. The multi-meter leads must be securely clamped to the battery negative cable terminal clamp and the battery negative terminal post. *If continuity between the battery negative terminal post and the negative cable terminal clamp is lost during any part of the IOD test, the electronic timer function will be activated and all of the tests will have to be repeated*

5. After about three minutes, the high-amperage IOD reading on the multi-meter should become very low or nonexistent, depending upon the electrical equipment in the vehicle. If the amperage reading remains high, remove and replace each fuse in the Power Distribution Center (PDC) and TIPM, one at a time until the amperage reading becomes very low, or nonexistent. *If you have performed the IOD pretest above focus on the fuse(s) where voltage drop occurred*. Refer to (Group 4 Vehicle Quick Reference) of the service literature for the appropriate wiring information for complete PDC and TIPM fuse, circuit breaker, and circuit identification. This will isolate each circuit and identify the circuit that is the source of the high-amperage IOD. If the amperage reading remains high after removing and replacing each fuse and circuit breaker, disconnect the wire harness from the generator. If the amperage reading now becomes very low or nonexistent, diagnose and repair the Charging System as necessary. After the high-amperage IOD has been corrected, switch the multi-meter to progressively lower amperage scales and, if necessary, repeat the fuse and circuit breaker remove-and-replace process to identify and correct all sources of excessive IOD. It is now safe to select the lowest milliampere scale of the multi-meter to check the low-amperage IOD.

CAUTION: **Do not open any doors, or turn on any electrical accessories with the lowest milliampere scale selected, or the multi-meter may be damaged.**

6. Observe the multi-meter reading. The low-amperage IOD should not exceed thirty-five milliamperes (0.035 ampere). If the current draw exceeds thirty-five milliamperes, isolate each circuit using the fuse and circuit breaker remove-and-replace process in **Step #5** . The multi-meter reading will drop to within the acceptable limit when the source of the excessive current draw is disconnected. Repair this circuit as required; whether a wiring short, incorrect switch adjustment, or an inoperative component is the cause.

Resistance

Resistance is the opposition to current flow and is present in **all** electrical circuits. Resistance is what converts electricity into other forms of energy such as light, heat and motion. The basic unit of resistance is the ohm, sometimes represented by the Greek letter omega (Ω).

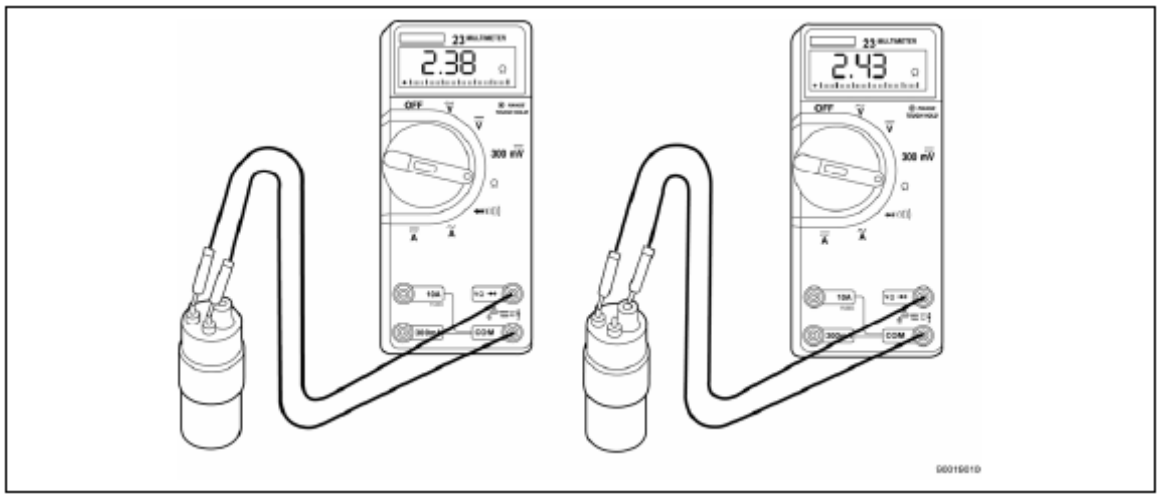


Fig 7 Measuring Resistance

Resistance is measured with an ohmmeter with no power applied to the circuit or component.

Caution: If resistance is measured with power applied to the circuit, the meter can be damaged or the meter fuse (if equipped) may blow.

Note: On high current circuits voltage drop is preferred to measuring resistance when diagnosing.

Table 3 Measuring Resistance

RESISTANCE	BASIC UNIT	UNITS FOR VERY SMALL AMOUNTS		UNITS FOR VERY LARGE AMOUNTS	
Symbol	Ω	μΩ	mΩ	kΩ	MΩ
Term	Ohm	Micro-ohm	Milli-ohm	Kilo-ohm	Mega-ohm
Multiplier	1	0.000001	0.001	1,000	1,000,000

Factors Affecting Resistance

The resistance of a conductor is affected by five different factors: conductor material, diameter, length, physical condition and temperature. Materials such as copper, aluminum and silver with plenty of free electrons, have low resistance and are good conductors. Materials such as rubber, plastic and air are combinations of elements that have a lack of free electrons. They have high resistance and are poor conductors.

All other things being equal, a long wire has more resistance than a shorter wire. The bigger the diameter of a conductor, the less resistance it has to the flow of current just as a large diameter pipe allows more water to flow (at the same pressure) than does a small diameter pipe.

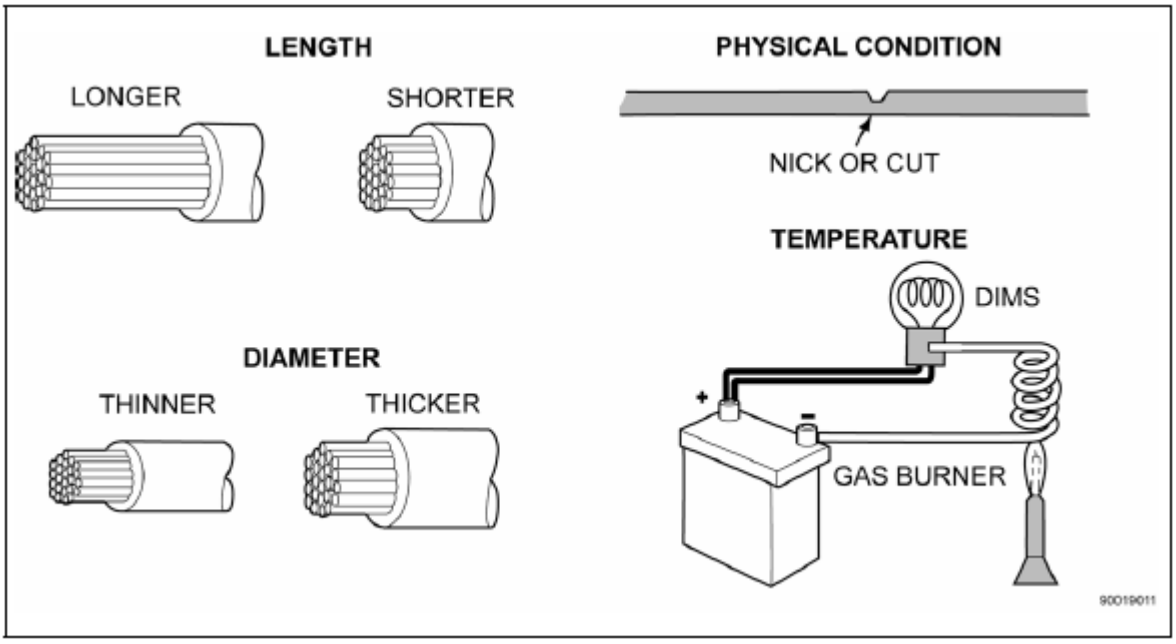


Fig 8 Factors Effecting Resistance

The physical condition of a conductor is important. A nicked or partly broken wire has the same characteristics as a smaller diameter wire. There is a higher resistance in the affected area. High resistance conditions can result from:

- Nicks from improper stripping causing the wire to break
- Over crimping causing broken wire strands
- Water path in nicked area
- Corrosion

Most conductors have an increase in resistance as their temperature increases. For example, a lamp filament might measure a half ohm when cold and more than six ohms when hot. A theory-minded technician who works things out mathematically might get some unexpected results if this not taken in account.

Power and Work

Compressed air stored in a tank isn't much good just sitting there. No work is performed until the air flows through a device such as an impact wrench or pneumatic cylinder.

Similarly, work is performed when electrical pressure (voltage) produces a flow of electrons (current) through a load device such as a lamp, motor or stereo amplifier. Electrical power, which produces work, is measured in watts and is equal to voltage (in volts) times current (in amps). In equation form, W = E x I. Electrical power can be measured with a watt/hour meter.

Table 4 Measuring Power & Work

POWER	BASIC UNIT	UNITS FOR VERY SMALL AMOUNTS	UNITS FOR VERY LARGE AMOUNTS	
Symbol	W	mW	kW	MW
Term	Watt	Milli-Watt	Kilo-Watt	Mega-Watt
Multiplier	1	0.001	1,000	1,000,000

VOLTAGE, CURRENT, AND RESISTANCE IN CIRCUITS

The key to understanding electrical circuits and developing a logical diagnostic procedure, is a solid knowledge of how voltage, current and resistance are related in an electrical circuit, and the affect that each one has on the other.

OHM'S LAW

George Simon Ohm, a German scientist, is responsible for discovering the law that bears his name. Simply stated, Ohm's Law says that one volt will push one ampere of current through one ohm of resistance. Looking at the Ohm's Law equation, you can derive the following general rules:

- Assuming resistance doesn't change, as voltage increases, current flow increases, or as voltage decreases, current flow increases.
- Assuming voltage doesn't change, as resistance increases, current flow decreases, or as resistance decreases, current flow increases.

Ohm's Law Formula

Ohm's Law not only helps us understand the relationship between voltage, current and resistance, but also can help to calculate a missing electrical quantity if the other two quantities are known. In Ohm's Law, "E" represents electromotive force in volts. "I" represents current flow in amps, and "R" represents a circuit load or resistance in ohms.

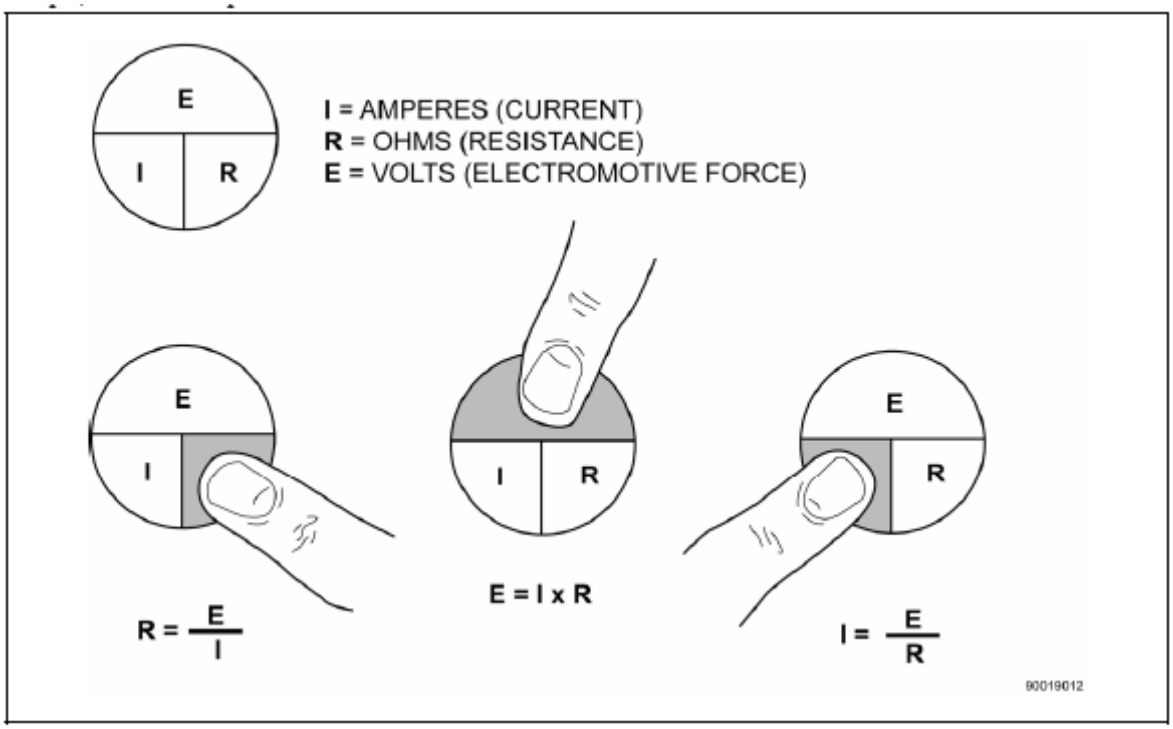


Fig 9 Ohm's Law Formula

- To find the value of E, multiply I times R.
- When I is the unknown quantity, divide E by R.
- When R is the missing value, divide E by I.

Using the pie illustrated above, you can cover the unknown value and perform the math problem indicated. In actual troubleshooting of automotive electrical systems, you won't spend much time calculating precise values for voltage, current and resistance. It's more practical to look at the problem logically and determine which of the three variables is out of line. High resistance for example, causes low current at a give voltage. High current could be caused by excessive voltage or low resistance (such as a short circuit). Low source voltage causes low current at a given resistance.

ELECTRICAL CIRCUITS

Electricity can't work for us until it flows in a pre-determined path called a circuit. A simple electrical circuit consists of:

- Power source (battery/alternator)
- Protection device (fuse, fusible link, circuit breaker)
- Conductor (usually a wire)
- Load device which performs some type of work such as a lamp or a motor
- Control device (often a switch or relay)
- A return path (usually vehicle chassis ground)

In a simple circuit, electrons flow from the positive terminal of the power source through the conductors, circuit protection device, switch, load device and return to the negative terminal of the power source through a "ground" path, which can be a wire or metallic part of the vehicle. This is considered to be a closed or complete circuit. Circuit control on recent vehicles is often on the ground side. It can also be a relay control on the power side.

"Ground" Symbol and Chassis Ground

The idea of a closed circuit is reflected in wiring diagrams that show a continuous loop from the power source through the load and back to the power source. In a vehicle, however, the negative side of the circuit is usually provided by the chassis itself, which is connected to the negative post of the vehicle battery. An electrical connection made to the vehicle chassis called a "chassis ground." To simplify wiring diagrams, the ground side of the circuit (negative side) is not represented by a line, but by the ground symbol (fig.10). At first glance this may look as though the circuit is not complete, but every ground symbol on a diagram is connected to the negative side of the battery. It's just as though there were a wire connecting all the ground symbols together.

Note: There are many different symbols used to represent ground. The symbol used in the bottom view of fig. 15 is one example.

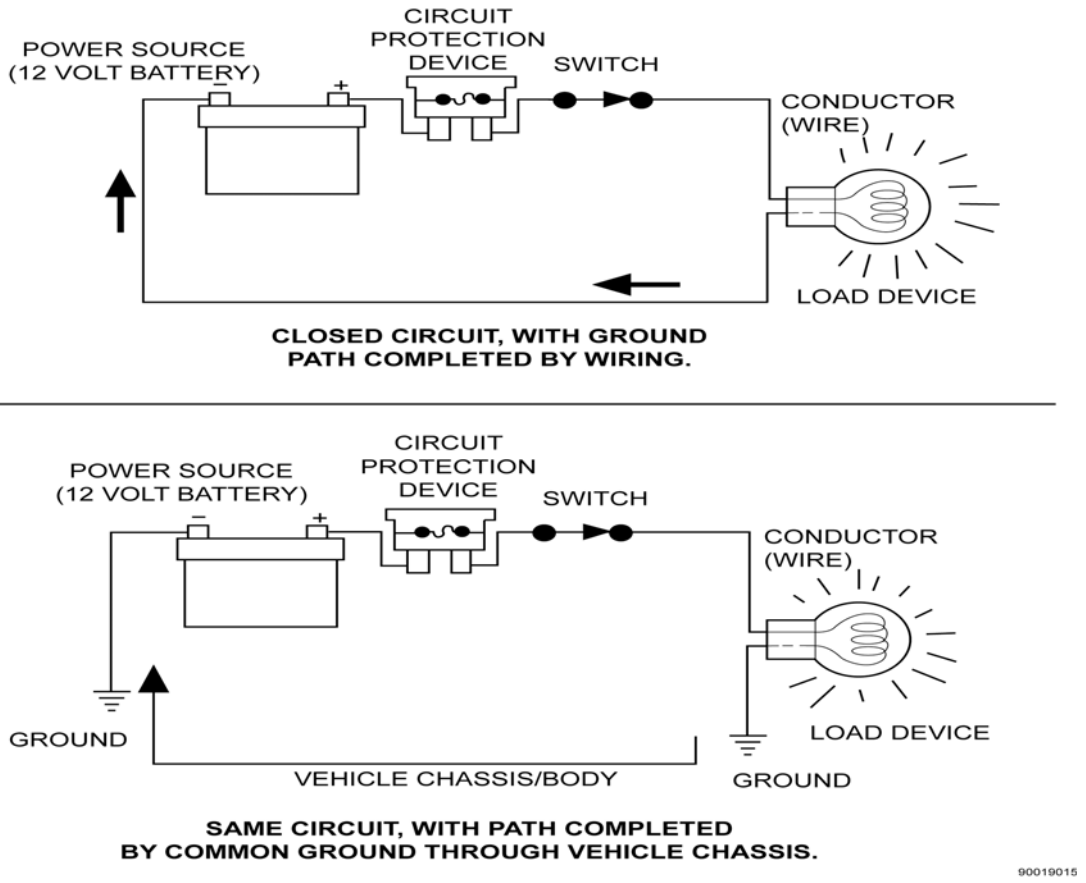


Fig 10

TYPES OF CIRCUITS

There are three types of electrical circuits used on a vehicle: series, parallel and seriesparallel. Each of these circuits has a specific set of rules that control the flow of electrons in the circuit.

Series Circuit
In a series circuit, current flow follows **one** continuous path from the power source through the circuit components and back to the power source. An open anywhere in the circuit stops the current flow through the entire circuit (fig. 11).

Series Circuit Rules

1. Current flow is the same anywhere in the circuit, regardless of the number of load devices.
2. To find the total resistance, simply add all the individual resistances in the circuit.
3. The voltage drop across each device can be calculated using Ohm's Law. The sum of all the voltage drops will always be equal to the voltage of the power supply.

Ohm's Law Relationship
With the applied voltage constant, an increase in resistance causes a reduction in current flow, and a decrease in resistance causes an increase in current flow. Low voltage causes a decrease in current flow and higher voltages cause an increase in current flow. Voltage drop or loss is directly related to the resistance of the load device. The higher the resistance of the load device, the higher the voltage drop across it.

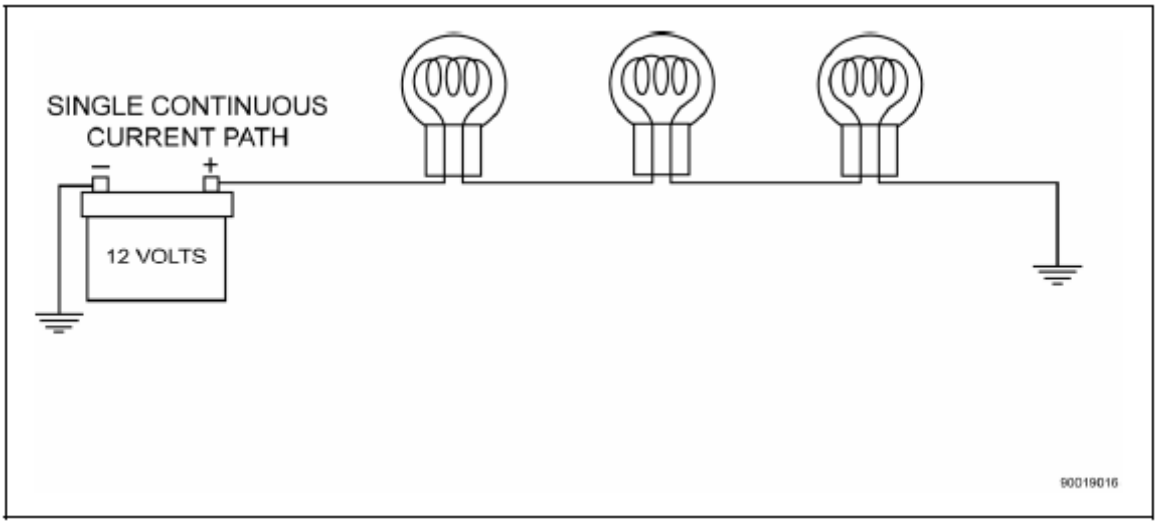


Fig 11 Series Circuit

PARALLEL CIRCUIT

A parallel circuit provides **two or more** paths or branches (sometimes called “legs”) through which the current flows. The points where the current flow splits into parallel branches or rejoins again are called *junctions.* An open in one branch does not stop the current flow in the remaining branches. Similarly, high or low resistance in one branch only affects components in that branch (fig. 12).

Parallel Circuit Rules

1. The voltage applied to each load device is the same as the source voltage (assuming one load on each branch).
2. Current flow through each load device is determined by its resistance and any branch resistance.
3. The total resistance of a parallel circuit (Rp) is always less than the lowest resistance value of any of the branches.

Calculating the total resistance is a little trickier than it is with series resistances, where the values are simply added together. The formula for calculating the total resistance of parallel load looks like this:

$$\frac{1}{R_p} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \ldots}$$

90019122

The bottom half (denominator) of the fraction is calculated first. It adds the reciprocals of each individual resistance (R1, R2, etc.) up through Rn, the last resistance in the circuit. The reciprocal of that sum is the total resistance for the circuit. For example, the branch currents in fig. 17 are all equal to .25A. Therefore, by Ohm’s Law, the resistance of each bulb is equal to 48Ω. By using the above equation:

$$\frac{1}{R_p} = \frac{1}{48} + \frac{1}{48} + \frac{1}{48} + \frac{1}{48} = \frac{4}{48} = \frac{1}{12}$$

90019123

And then taking the reciprocal, the total resistance is calculated as:

$$\frac{1}{R_p} = 12\Omega$$

90019124

4. To find the total current flow in a parallel circuit, simply add all of the branch currents.

OHM'S LAW RELATIONSHIP

Since the voltage is the same in all branches, the gain or loss of a branch does not affect the applied voltage. The loss of one or more branches reduces the total current flow in the circuit. Remember that the total resistance of a parallel circuit is always less than the lowest resistance value in any branch. Low voltage decreases current flow through the branches; high voltage increases current in the branches.

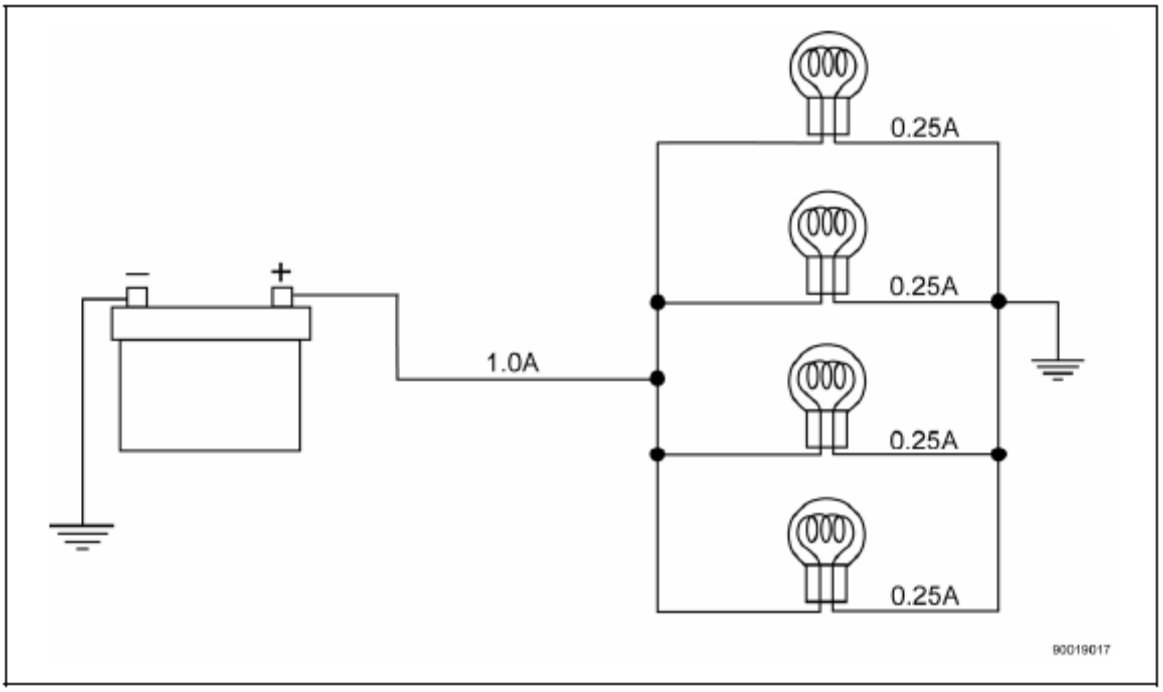


Fig 12 Parallel Circuit

SERIES-PARALLEL CIRCUIT

As its name implies, the series-parallel circuit is a combination of the series and the parallel circuit. Most automotive circuits are this type. One of the most common series-parallel circuits is the back-up lamp circuit. The ignition switch, back-up lamp switch and fuse are in series with the battery, and the lamps are wired in parallel. To apply Ohm's Law to a series-parallel circuit, the series and parallel portions of the circuit must be treated separately. The best approach is to mathematically combine all the parallel loads (resistance) into one "equivalent" resistance. That resistance can then be added to all the series resistance to determine the total resistance for the circuit. Total current flow for the circuit can be calculated by dividing the source voltage by the total resistance. Voltage drops and current flows can now be obtained by applying Ohm's Law individually to each component as necessary.

Series-Parallel Circuit Rules

1. Current flowing in the series portion of the circuit is equal to the sum of the branch currents.
2. To find the total resistance of a series-parallel circuit, add the total resistance of the series portion to the total resistance of the parallel portion of the circuit.
3. To find the voltage drop of the parallel branches, subtract the voltage drop of the series portion of the circuit from the source voltage.

Ohm's Law Relationship

High or low resistance in the series portion of the circuit affects the entire circuit. High resistance in a parallel branch reduces total current flow but current flow stays the same in other branches. The total resistance of a parallel circuit is always less than the lowest total resistance value of any branch.

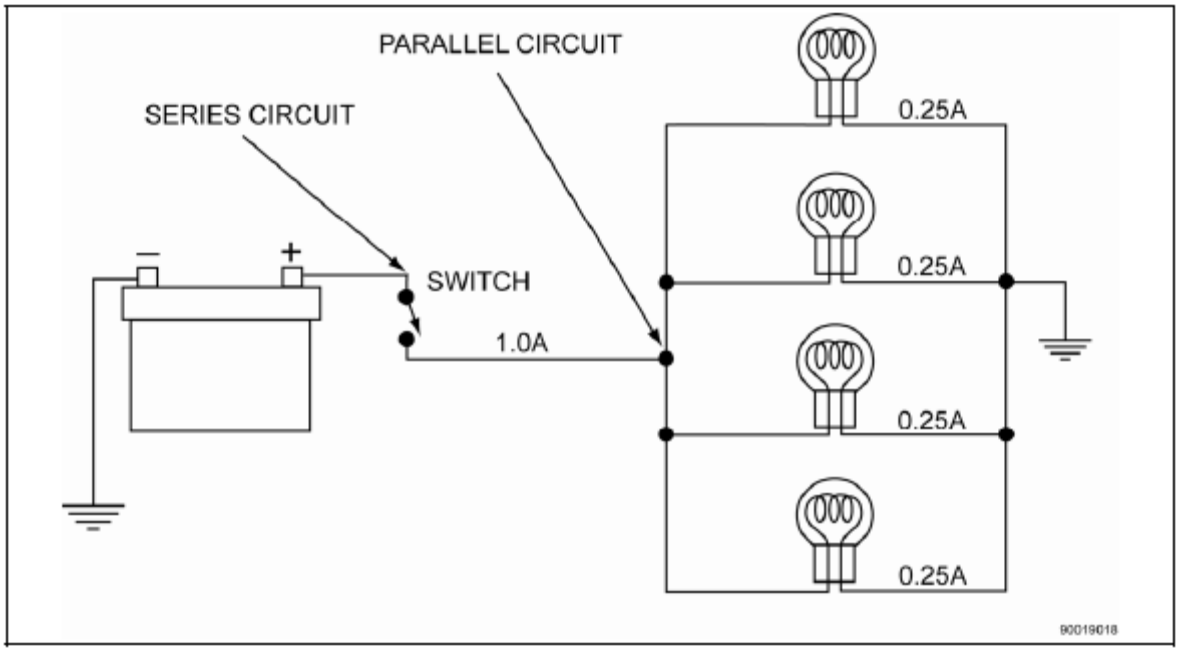


Fig 13 Series Parallel Circuit

TYPES OF CIRCUIT PROBLEMS

There are three basic types of circuit problems or faults: high resistance, low resistance, and component failure. The causes of these types of problems can be identified using a logical diagnostic process and the proper test equipment.

HIGH RESISTANCE FAULTS

High resistance faults include opens in the circuit and areas where connections may be loose, dirty or corroded. The symptoms can include a lamp that dims, a motor that runs slowly or a component that doesn't operate at all. A high resistance fault does not cause a fuse to blow, a circuit breaker to open or wires to melt.

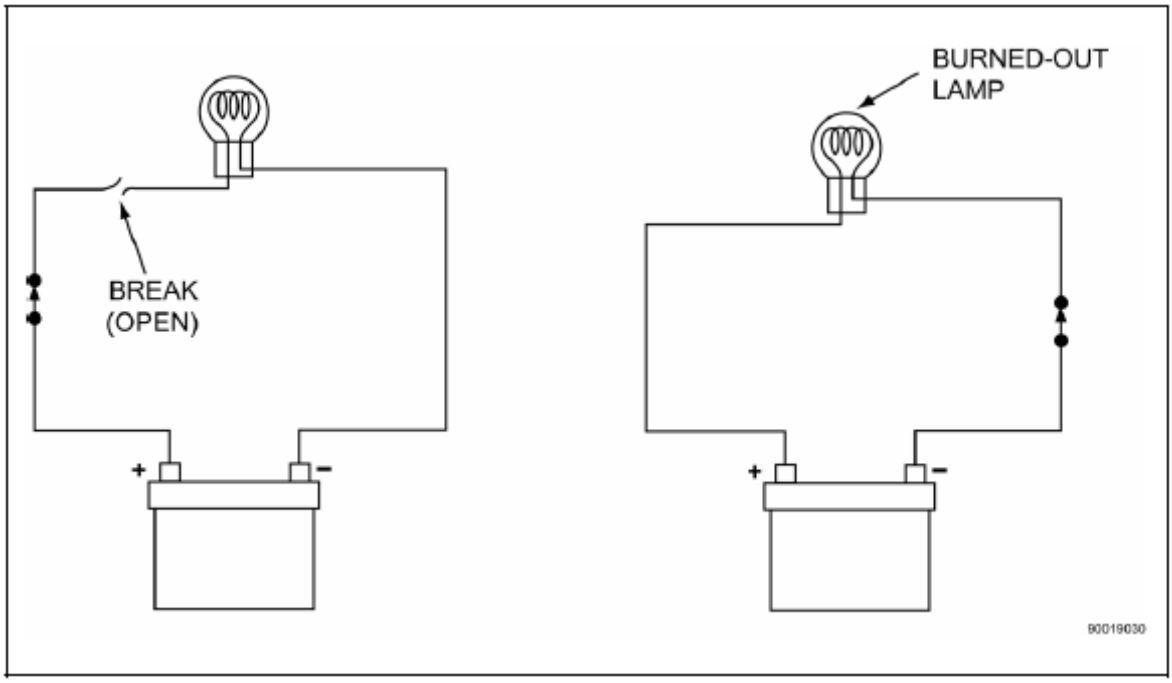


Fig 14 Open Circuit

If the current path is broken at any point, current stops flowing and the circuit is considered to be "open." A switch provides a way of intentionally controlling an open. However, a broken wire, defective circuit protection device, tripped or open switch, tripped or open load device or an interruption in the ground path back to the power source may cause opens. In newer vehicles, switches and other control devices are normally located on the ground side of the circuit to minimize arcing across the contacts as they are opened and closed.

HIGH RESISTANCE CIRCUITS

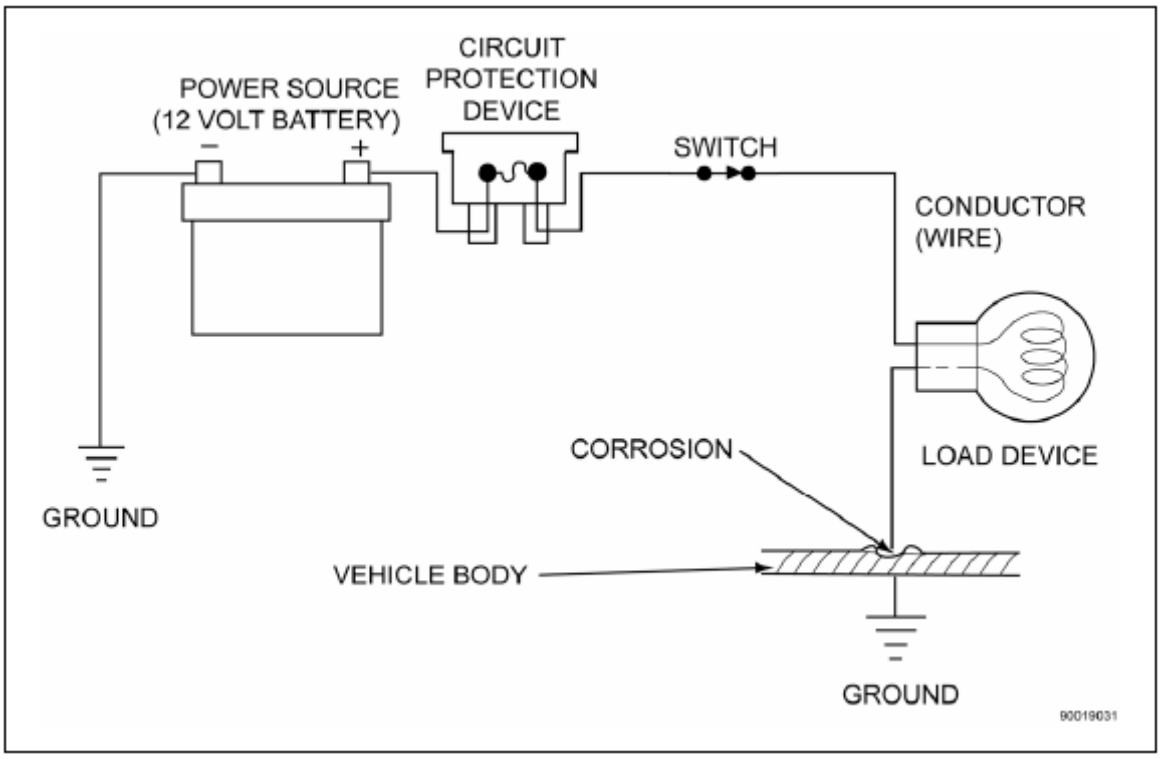


Fig 15 High Resistance Circuit

A circuit with high resistance still has a path for current flow, but the amount of current flow is reduced in high resistance areas. This is probably the most common automotive electrical problem. Frequent causes of high resistance in circuits are:

- Dirty switch or relay contacts
- Loose or corroded connections

Very often, a poor ground causes a high resistance fault. Remember that electricity has to travel a complete path from the power source through the device and back to the power source. Most components are directly wired only to the positive side of the vehicle electrical system. The negative or ground side of the circuit is provided by the chassis itself that is connected to the negative post of the battery. If there is poor metal-to-metal contact between the device and the chassis, a bad ground will result. This usually is caused by corrosion or a loose attachment and is often the reason for intermittent problems with the device.

Another source of high resistance is corrosion caused by water, dirt, road salts and other contaminants entering wiring harnesses through openings in the insulation, exposed terminals and other unprotected areas. Contaminants are often trapped in the harnesses, between wires and around splice areas. The outward appearance of a wiring harness does not always indicate that the harness is being attacked by corrosion. Corrosion does its damage by adding resistance to the circuit, causing the current to decrease. Motors can slow down, lamps can dim or flicker and some components can stop working completely. Even small amounts of corrosion can have a large effect on the return voltage from a sensor. Corrosion can also be located on battery terminals, at engine chassis and body ground connections. Remember that high resistance on the ground side of the circuit has the same effect on current flow as high resistance on the power side of the circuit.

LOW RESISTANCE FAULTS

These faults include short circuits and circuits that have unintentional grounds. Symptoms can include a blown fuse, a circuit breaker that opens or cycles, a component that doesn't operate or operates when it shouldn't, burned wire insulation and a circuit or component using more current than it should.

Short Circuit

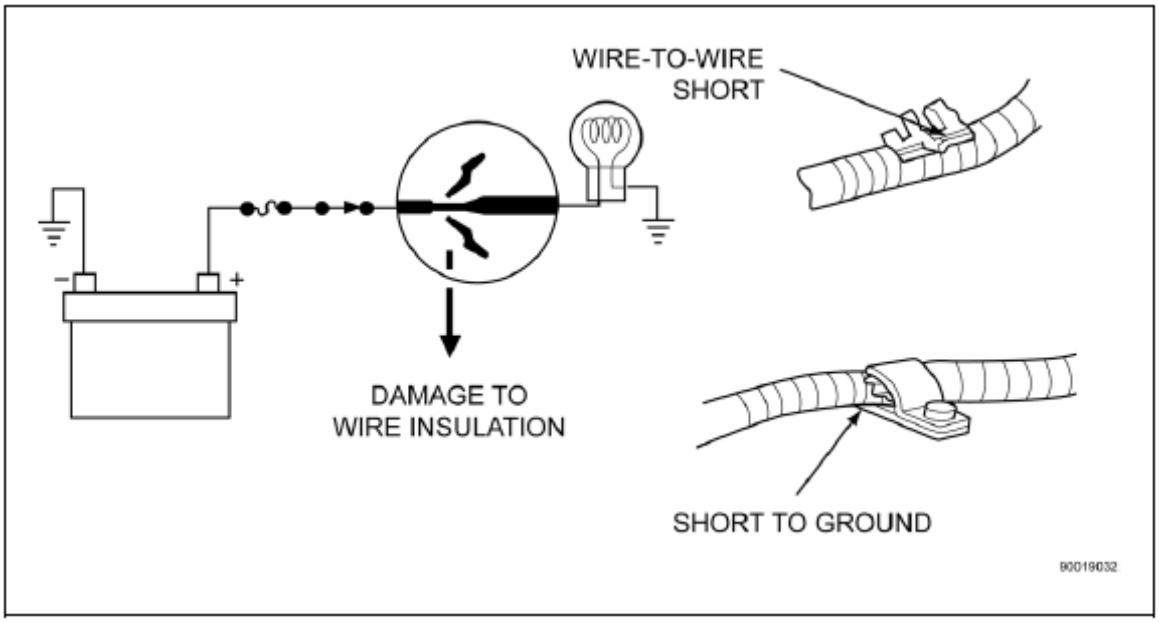


Fig 16 Short Circuits

If the normal path is bypassed at any point causing it to flow back to the power source before it has traveled the complete path, the circuit is "shorted." Damaged insulation or improper wiring harness routing commonly cause short circuits.

"Shorts" cause trouble because electricity always takes the path of least resistance. Electrical circuits can be shorted to ground or to other circuits, causing those circuits to operate when they shouldn't. Frequently a short causes a fuse or fusible link to blow or the circuit breaker to cycle open and closed when the circuit is shorted bypassing the load device. (A power window, seat or door lock circuit breaker remains open as long as the fault remains in the circuit.)

Unintentional grounds are another form of short circuit. These can occur when the ground is altered so that it returns to the power source through an unintended path. If the ground occurs before the load device, the fuse blows or the circuit breaker opens, causing current to stop flowing. When the ground occurs between the load device and the control device, the circuit operates at all times. Occasionally the ground path of one circuit comes into contact with the ground path of an unrelated circuit, causing both circuits to operate at the same time.

Defective Components

Mechanical control systems with numerous moving parts have been replaced with more reliable electronic systems and the parts themselves are produced with high quality. Certain electrical parts do wear out from time to time and have to be replaced. Lamps, batteries, motors, fuses and switches are among the most "consumable" electrical devices on a car. When only one device in a circuit is not working, the device itself should be tested before troubleshooting the complete circuit. When some electrical components fail, the result is excess current flow in the circuit. Some common examples are starter motors, blower motors and electric cooling fan motors.

BASIC TEST METERS

Basic test meters include voltmeters, ammeters and ohmmeters. These meters are used to check the quality of an electrical circuit or an electronic component. These meters are usually combined into a single test equipment device called a Multimeter.

Multimeter

The Multimeter is usually capable of measuring current flow, voltage and resistance. This instrument allows you to see what is happening inside an electrical circuit.

Types of Multimeters

There are two basic types of millimeter used today; the *analog* multimeter that uses a calibrated dial face and a moving needle to indicate numerical values, and the *digital* multimeter that has an electronic digital display. Because analog multimeters have a low internal resistance (impedance), they draw power from the circuit, just like adding another load device. In other words, an analog meter actually becomes part of the circuit that it's testing. That's not a problem for general electrical testing, but for electronics work, the low impedance can lead to inaccurate readings and could possibly even ruin a low current device (such as an O2 sensor) being tested. This is the reason that they are not recommended for use on newer vehicle electronic systems.

On the other hand, most digital multimeters have a high internal resistance or impedance that makes the power draw so low that it doesn't affect the circuit being measured. The internal circuitry of a digital multimeter provides a greater degree of accuracy and prevents possible damage to low power circuits. We will be using a meter called a DVOM (Digital Volt/Ohm Meter) or DMM (Digital Multi-Meter) with an industry standard 10 mega ohm (10 million ohm) impedance. This compares to an impedance of 20k ohm (20,000 ohms or 20kΩ) per volt for a typical analog meter.

Caution: *A similar situation can occur with digital multimeters having an impedance < 10 Mega Ohms. Most DMM are either 1 or 10 Mega Ohms for impedance. When checking sensitive electronic circuits (Voltage Drop) Chrysler recommends the use of a 10 Mega Ohm meter. The only recommended usage for DMM with an impedances of < 10 Mega Ohms is on high current circuitry such as starters, alternators, wiper motors, and power accessories.*

DMM Set-Up

Because most DMMs are capable of measuring current in amperes, voltage in volts and resistance in ohms, several test lead plug-ins and selector knob positions are available. You must select the proper jacks and the correct selector knob position for the test you are performing. Refer to the instruction manual provided with the DMM if you are in doubts.

It is important to observe polarity when measuring current or voltage. Typically, the red lead should be connected to the positive (hot) side of the component being measured, and the black lead should be connected to the negative (ground) side. If the leads are reversed, the meter displays a negative (-) sign next to the numerical display. Polarity is not important when measuring resistance **except** for some solid-state devices such as **diodes**. Table 5 Multimeter Measurements illustrates examples of the type of measurements that can be made with a DMM.

Auto Ranging

Most digital meters have an automatic ranging function that selects the proper range for the quantity being measured. Some DMMs only display 3 ½ digits. Large numbers are converted to smaller numbers and displayed with a symbol that indicated the multiplier being used. For example, 1000 volts is displayed as 1 kV (kilovolt). A half digit is a readout character that can only display the numeral "1." A 3 1/2 –digit readout can display values up to 1999. On meters that do not have auto ranging, use the jacks and/or selector for the desired range. Table 6 illustrates the typical symbols displayed by a Fluke Model 23 DMM.

Table 5 Multimeter Measurements

SYSTEM/ COMPONENT	MEASUREMENT TYPE															
	VOLTS AC	VOLTS DC	MILLIVOLTS	OHMS	CONTINUITY	DIODE TEST	AMPS DC *	HZ	% DUTY CYCLE	DWELL	RPM **	TEMP.	PRESSURE ***	VACUUM ***	MIN/MAX	BAR GRAPH
CHARGING SYSTEM																
Alternators	•	•		•		•	•								•	
Computer Regulators		•					•	•	•	•					•	
Connectors			•	•	•										•	
Diodes (AC Ripple)	•		•												•	
Diode Rectifier		•			•											
Regulators		•		•			•								•	•
STARTING SYSTEM																
Battery		•					•					•			•	
Connectors		•	•	•												
Interlocks (Neutral Safety Switch)		•		•	•										•	
Solenoid		•	•	•	•										•	
Starters		•	•				•				•				•	
FUEL/AIR SYSTEM																
Engine Speed											•					
Engine Vacuum														•		
Feedback Carburetor	•	•		•				•	•	•						
Fuel Injection (Electronic)		•		•				•	•							•
Idle Air Motors				•				•	•						•	•
Fuel System Pressure													•			
MAF Sensor	•							•							•	
MAP and BP Sensors		•						•								•
Throttle Position Sensor		•		•											•	•
IGNITION SYSTEM																
Coils		•														
Condenser (Capacitors)		•		•												•
Contact Sets	•	•	•	•				•	•							•
Distributor Cap				•												
Ignition Modules		•	•	•												•
BODY ELECTRIC																
Compressor Clutch		•	•	•	•											
Lighting Circuits		•		•	•											
Relay and Motor Diodes					•											
Transmissions				•	•									•	•	
ENGINE MANAGEMENT																
Temperature Sensors		•		•								•			•	
Connectors		•	•	•	•										•	
Hall-Type Sensor	•	•	•	•				•			•					•
O_2 Sensors			•					•			•				•	•
Oil Pressure													•			
COOLING SYSTEM																
Connectors		•	•		•										•	
Fan Motor		•		•	•											
Radiator												•			•	
Relays			•	•											•	
Temperature Switches	•	•		•							•	•				

* Used with Fluke 80i-410 or 80i-1010 Current Clamp
** Used with Optional RPM 80 Inductive Pickup Accessory
*** Used with Optional PV500 Pressure Vacuum Module

MULTIMETER DISPLAY

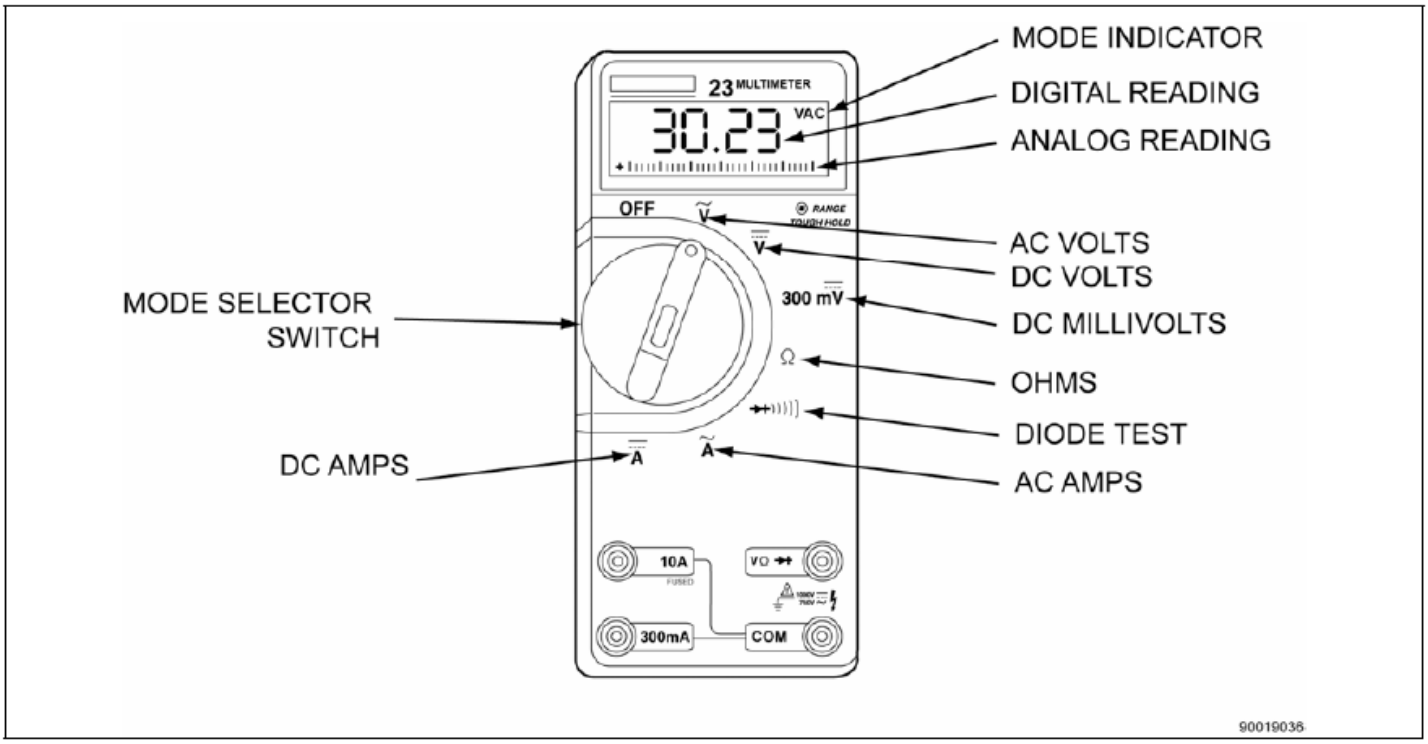


Fig 17 DMM Display (Typical)

WIRING

Wiring Types

All wiring and circuit protection devices that are either replaced or added to the vehicle must be of the correct size for the loads they will operate. They must also be SAE (Society of Automotive Engineers) compliant. http://www.sae.org This means that all wiring will:

GENERAL

- Be either stranded copper or of a copper alloy conductor.
- Be of a size (Gauge) rated at 125% of the maximum current the circuit is protected.
- Star washers for circuit ground connections must not me used.
- Voltage drop for high current circuits should not exceed .5 Volt through the entire circuit.
- Voltage drop for low current electronic circuits should not exceed .1 Volt for the entire circuit.
- All circuits need to be wired in accordance with **SAE J1292** *Automobile, Truck, Truck-Tractor, Trailer, and Motor Coach Wiring.*

WIRING & HARNESS CONSTRUCTION

- Insulated wire and cable will conform to ***SAE J1127*** *Low Voltage Battery cable, or* ***SAE J1128*** *Low Voltage Primary Cable, Type SXL, GXL, or TXL.*
- Conductor and wire stranding materials other than copper can be used if all the requirements for electrical, environmental, and physical conditions will be met as required by the circuit application.
- The dimensions and physical properties of the electrical conductor insulation must meet the requirements of either **SAE J1127** or **SAE J1128**.
- All wiring splices and connectors (Terminals) shall be of a crimp style in accordance with Technical Service Bulletin (TSB) 08-006-00Rev. A (Dated 12/29/00) where applicable. Utilizing wiring repair kit P/N 05073029AB
- Connections that utilize wire piercing, insulation displacement, or wire nuts are NOT permitted.
- Wiring and harnesses must be contained/restrained in such a manner as to prevent damage that can result from liquid contaminants, environmental factors, heat, ice accumulation, and chafing.
- Wiring should be marked and identified at a minimum of every 2 feet with the identification tied to a wiring diagram.
- Drip loops must be installed where water wicking/intrusion may of a potential issue.
- All heat shrink tubing and terminals that are exposed to the environment and will not be an a weather pack connector need to of the sealant type. (Marine Grade) Mopar P/N 04778570 Heat Shrink Tubing.
- Use convolute tubing in areas of high temperature, potential pinch areas, and abrasion will occur. In general convolute for automotive applications will be made of one of the following two materials nylon or polyethylene.
    - Nylon: Is good to about 350° F. Use in the engine compartment or anywhere where the harness will be 6 inches or closer to exhaust system components.
    - Polyethylene: if the environmental temperature will not exceed 200° F then polyethylene is sufficient.
    - All convolute will need to have tape placed around it where all bend points occur to ensure the wiring will not protrude from the convolute or have direct exposure to excessive heat.
- Do not allow wiring to hang below the unibody rails.
- Do not run wiring and or harnesses through wheel wells
- Ground fasteners must never be placed adjacent to any components comprising the liquid side of the fuel system such as the fuel tank, fuel filler neck, vapor canister etc.

SHIELDING

When possible all high current wiring with heavy magnetic fields should be isolated from all low current sensitive electronic circuits. High current noisy circuit grounding needs to be kept independent of low current electronic circuits which will in most cases have their own clean filtered/suppressed ground.

If the for mentioned is not possible and it appears the EMI (Electro Magnetic Interference may be an issue, then adhere to the following practices.

- Keeps the length of the conductor going beyond the shield as short as possible. This will increase the efficiency of the shield.
- Shielded wire should be used with one side grounded.
- Tape or insulate the shielding ends that stop by any open connectors. This will help eliminate potential wiring terminal shorting to the shielding.
- For EMI suppression that uses bare coaxial shielding either tape or braid style, be sure to seal all the splices in the wiring assemblies.
- If a resistor, diode, or a resistor diode combination will be used for spike suppression be sure to place them as close to the load device as possible. Connect all diodes noting the polarity.

CIRCUIT PROTECTION STANDARDS

If mechanical style circuit protection devices are used they need to comply with the appropriate SAE standard below:

- SAE J156 Fusible Links
- SAE J553 Circuit Breakers
- SAE J554 Electric Fuses (Cartridge Type)
- SAE J1888 High Current Time Lag Electric Fuses
- SAE J2077 Miniature Blade Type Electrical Fuses

CIRCUIT CONSIDERATIONS

- Terminals, connectors, switches, and relays need to support 125% of the maximum current for which the circuit is protected.
- If designing a circuit or calculating to see if it is feasible to add additional load devices to an existing circuit, assume no more than 80% of the fuse rating for continuous circuit operation. This will help avoid intermittent fuse failure due to potential in rush (start-up) current of load items.
- Never replace a smaller fuse or circuit breaker with one of a larger rating.
- If adding additional battery powered accessories be sure to place the auxiliary PDC/Fuse box as close to the battery as possible.
- In installing accessories that require be operated when other circuits are energized. Use the energized circuit as a supply circuit to the control side of a relay (Terminals 85 & 86) then provide separate power and circuit protection for (Terminals 30 & 87).

RELAYS

A relay is an electro-mechanical switching device that consists of a coil, a resistor or a diode, depending on application, and a set of electrical contacts. The contacts are held in a de-energized position by spring pressure. When voltage and ground are applied to the coil, the coil becomes an electromagnet and pulls the contacts to the energized position. When either the voltage or ground is removed from the coil, the magnetic field collapses and spring pressure returns the contacts to the de-energized position. The resistor or diode connected in parallel to the coil has a clipping effect that suppresses the voltage spike that occurs when the magnetic field of the coil collapses. The switch contacts on a relay are described as *normally open* (NO) or *normally closed* (NC). Normally open contacts complete the circuit when the coil is energized and open the circuit when the coil is de-energized. Conversely, normally closed contacts open the circuit when the coil is energized and close the circuit when the coil is de-energized. Because the coil can be energized electrically from a location away form the relay, a relay can be thought of as a remote-operated switch. Since it doesn't take much current to energize the coil, relays also allow a physically small, low current switch to control to a high current device.

Relays will either be diode or resistor suppressed on the coil/control side of the relay, pins 85 & 86. Diode suppressed relays have a "snap like action" associated with them when the magnetic field collapses within the coil. This allows for a quicker dissipation of the voltage spike that was created when the magnetic field collapsed. Diode suppressed relays are directional in terms of the orientation of the diode within the relay. Relays can also be of the intermittent or continuous duty type. For example the ABS Pump Motor relay is an intermittent duty design as compared to a fuel pump relay which is designed for continuous use. This requires that the relay contact material (Pins 30, 87, 87A) be constructed of different materials. The result of this is, only replace relays with ones of the same suppression type and duty rating.

ISO Relay

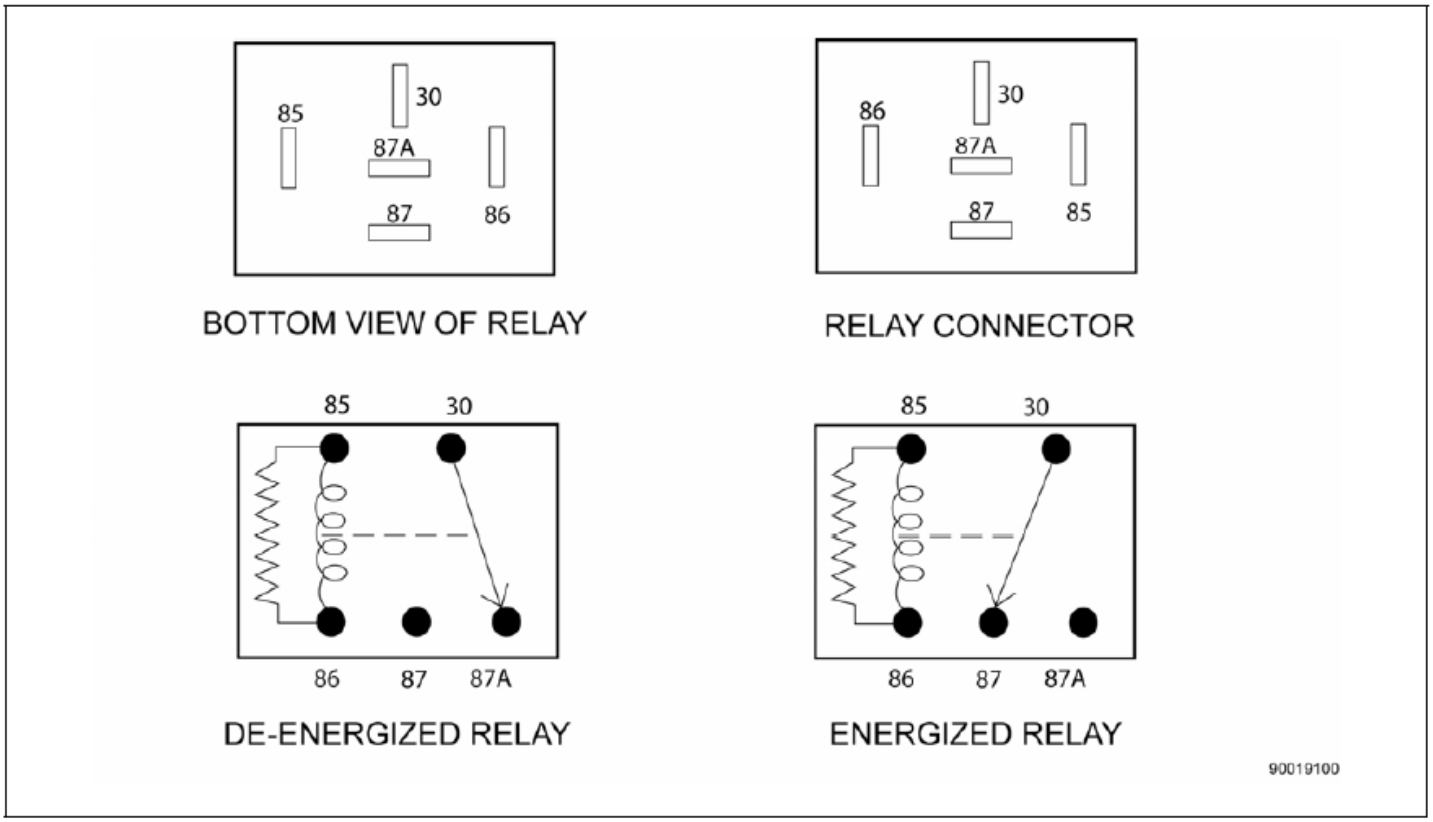


Fig 18 ISO Relay

ISO relays conform to the specifications of the International Organization for Standardization for common size and terminal pattern. ISO relays are used in many applications such as the starter, horn, electric fan, air conditioning clutch, auto shut down, fuel pump and convertible top circuits (fig.18).

- Terminal 30 is usually connected to battery voltage. This battery voltage source can be switched on or off by the ignition switch, or un-switched, connected directly to the battery.
- Terminal 87A is connected to Terminal 30 in the de-energized position.
- Terminal 87 is connected to Terminal 30 in the energized position. When energized, the relay supplies battery voltage to Terminal 87, or removes battery voltage from a device connected to Terminal 87A.
- Terminal 86 is connected to the electromagnet and is usually connected to a switched battery voltage source.
- Terminal 85 is connected to the electromagnet and is usually connected to a switched or un-switched ground.

MICRO RELAYS

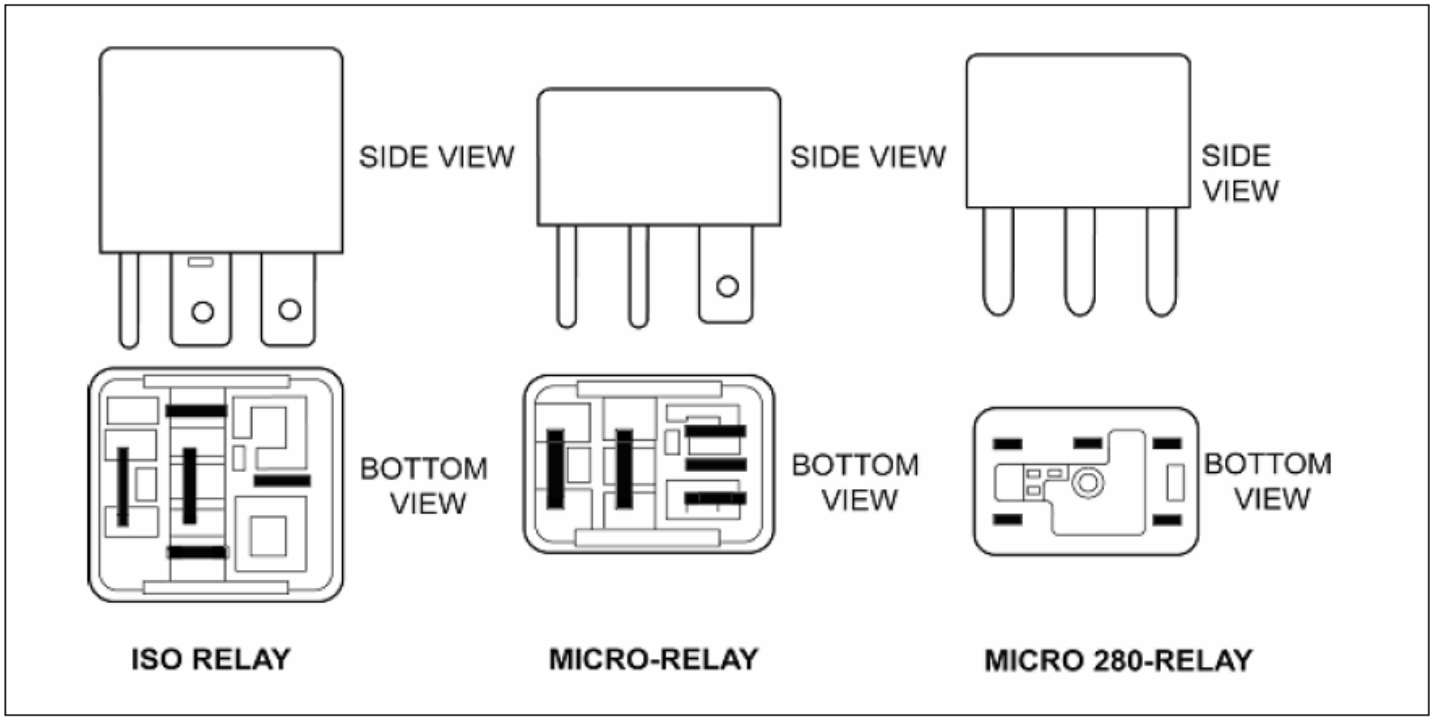


Fig 19 ISO Micro, and ISO Micro 280 Relays

Micro relays and micro 280 relays perform the same function as ISO relays but are smaller in size and have different terminal patterns.

RESISTORS

Carbon (Fixed Value) Resistors

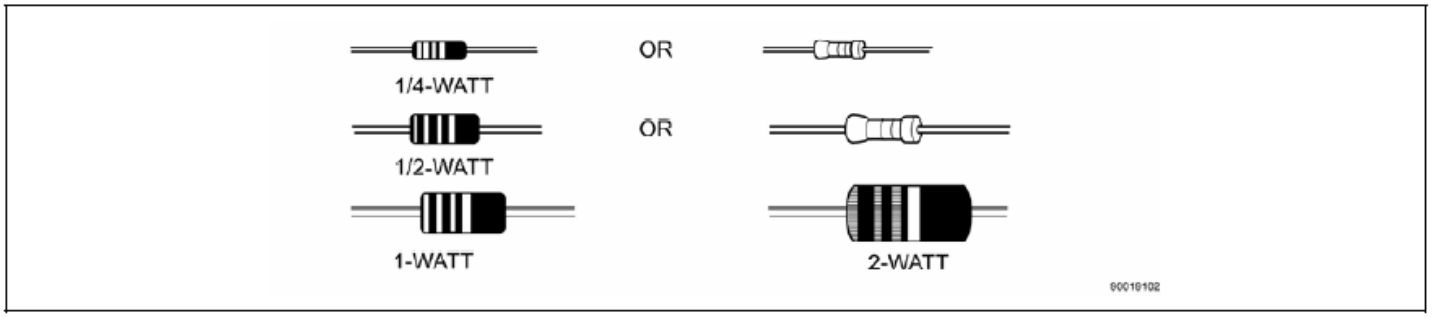
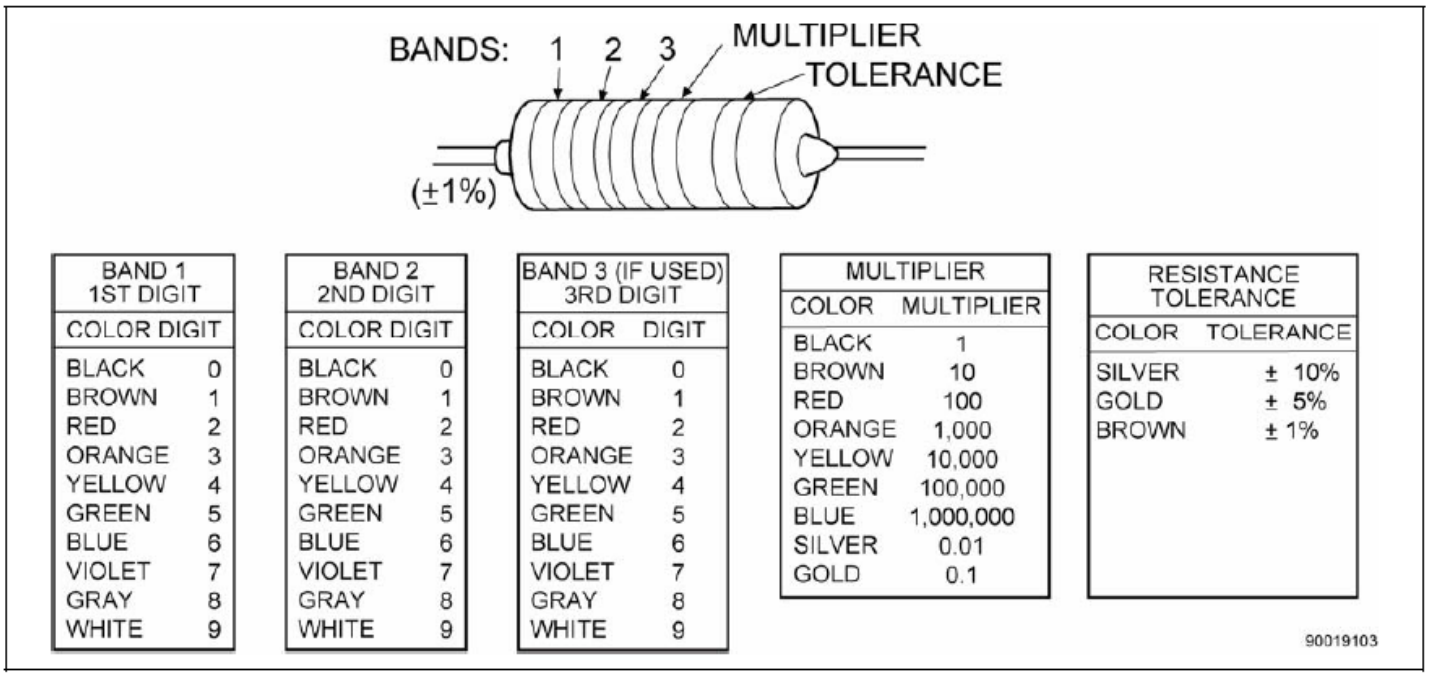


Fig 20 Carbon Resistors

A typical fixed value resistor is made of powdered carbon mixed with a glue-like binder. The resistance value is set by the ratio of carbon to binder – more carbon, less resistance. Some resistors have their value stamped on them.



BAND 1 1ST DIGIT	
COLOR	DIGIT
BLACK	0
BROWN	1
RED	2
ORANGE	3
YELLOW	4
GREEN	5
BLUE	6
VIOLET	7
GRAY	8
WHITE	9

BAND 2 2ND DIGIT	
COLOR	DIGIT
BLACK	0
BROWN	1
RED	2
ORANGE	3
YELLOW	4
GREEN	5
BLUE	6
VIOLET	7
GRAY	8
WHITE	9

BAND 3 (IF USED) 3RD DIGIT	
COLOR	DIGIT
BLACK	0
BROWN	1
RED	2
ORANGE	3
YELLOW	4
GREEN	5
BLUE	6
VIOLET	7
GRAY	8
WHITE	9

MULTIPLIER	
COLOR	MULTIPLIER
BLACK	1
BROWN	10
RED	100
ORANGE	1,000
YELLOW	10,000
GREEN	100,000
BLUE	1,000,000
SILVER	0.01
GOLD	0.1

RESISTANCE TOLERANCE	
COLOR	TOLERANCE
SILVER	± 10%
GOLD	± 5%
BROWN	± 1%

Fig 21 Resistor Color Codes

Usually the protective housing has four or five color code bands.

- The first color band is the first digit of the value, e.g., yellow = 4.
- The second color band is the second digit, e.g., black = 0.
- The third color band is the multiplier, e.g., brown = 10.
- If there is a fourth band, it is the tolerance, e.g., gold = ± 5%
- If five bands are used, the first three are digit bands, the fourth is the multiplier and the fifth band is the tolerance.

Resistors are often rated in watts as well as ohms. Wattage will be important to know (calculate) when designing, enhancing, or augmenting an electrical circuit on the vehicle. For example if you are going to replace the incandescent lighting with LED lighting you will need a resistor with a large wattage rating. Generally the higher the wattage and the smaller the tolerance (i.e. 1%) the more expensive the resistor will be.

ALTERNATOR OUTPUT

The amount of direct current produced by the alternator is controlled by the electronic voltage regulator (EVR) (field control) circuitry contained within the powertrain control module (PCM). The PCM uses the inlet air temperature sensor or ambient temperature sensor to control the charge system voltage. This temperature, along with data from monitored line voltage, is used by the PCM to vary the battery charging rate. The system voltage is higher at cold temperatures and is gradually reduced as the calculated battery temperature increases. The ambient temperature sensor is used to control the battery voltage based upon ambient temperature (approximation of battery temperature). The PCM maintains the optimal output of the generator by monitoring battery voltage and controlling it to a range of 13.5 - 14.7 volts based on battery temperature. The amperage rating of the Dodge Charger and Magnum police vehicles alternator is 160A full output, and 135A max idle at SAE standard of 27°C (80°F). The alternator output capacity depends on the engine speed and the temperature in the engine compartment as follows:

NOTE: If the voltage drops under 12V while the engine idles, the PCM automatically increases the engine speed to 1200 RPM in order to increase the charging voltage.

Condition	Engine Speed	Alternator Temperature	Output Current
Idle	624 RPM	93°C (200°F)	90A
PARK idle	1200 RPM	93°C (200°F)	120A
Run (max)	2500 RPM	93°C (200°F)	140A

VEHICLE COMPONENTS ELECTRICAL LOADS

The amount of electrical power available for police equipment can be calculated based on the vehicle components electrical load. The vehicle electrical load depends on the number of features powered at the same time. The following table shows typical vehicle loads based on average voltage of 13.5V.

Component	Condition	Load (Amps)
Base vehicle	Key ON/Engine OFF	5.1
Base vehicle	Engine idle	22.8
Radiator fan	Low	21.5
Radiator fan	High	31.6
Radiator fan	Both	48.3
Passenger compartment climate control (with A/C ON)	Low/Recirculated	8.1
Passenger compartment climate control (with A/C ON)	Low/Vent	8.2
Passenger compartment climate control (with A/C ON)	High/Recirculated	22.5
Passenger compartment climate control (with A/C ON)	High/Vent	21.8
Passenger compartment climate control (heating mode	Low/Def Floor	7.5
Passenger compartment climate control (heating mode	High/Def Floor	18.5
Rear window defrost	—	28.2
Windshield wiper	Low (average)	8.5
Windshield wiper	High (average)	10.8
Headlamps	Low beam	20.2
Headlamps	High beam	28.6
Parking lamps	Instrument panel dimmable lights OFF/Low	10.4
Parking lamps	Instrument panel dimmable lights ON/High	12
Turn signal lamps	Average	7.1
Stop lamps	—	9.6
Spot lamp	LH only	7.4
Spot lamps	Dual	14.8
Radio	Mid volume	5.5

Typical 2006-2010 Charger Electrical Loads

INSTALLING ADDITIONAL ELECTRICAL EQUIPMENT

Prior to determining what equipment is to be installed into the police vehicle, assess the power demands of the equipment as well as the power available from the vehicle. To reduce the risk of running out of power, develop a power load strategy as follows:

- Add up the current requirements of all the pieces of equipment to be installed onto a police vehicle.
- Compare the total current requirements with the vehicle's current producing capability while taking into consideration the current needs of regular vehicle equipment such as A/C, headlamps, parking lamps, wipers etc.

If the police equipment current requirements exceed what the vehicle is expected to provide, the battery begins to discharge in order to provide power to the equipment that cannot be provided by the generator. After some time, the vehicle shuts off as the battery voltage level drops under the minimum voltage required to keep the engine running. To minimize electrical system overload, consider the current requirements of the equipment before it is purchased and installed. For example, the radios and the light bars built using the most recent technology use substantially less current than those built using technology that is 8-10 years old. Also the habits of the police officer while using the vehicle can make a difference in the current consumption as well. For example, turning the A/C (the largest non-police equipment current user) off while the empty vehicle is sitting at the scene of an accident with the lights flashing until the officer returns, makes more power available for lights and for other police equipment.

The reserve capacity of the battery can be taken into consideration when calculating the entire load.

Reserve Capacity: The number of minutes a battery can provide 25 amps of current at 80° F without falling below 10.5 volts.

If after taking everything into consideration there still appears there will be frequent periods where the current demands will exceed the capability of the charging system then a load manager should be installed and programmed according to the authority having jurisdiction. (AHJ)

AVAILABLE POWER/GROUND SOURCES

WARNING: THE BATTERY IN THIS VEHICLE HAS A VENT HOSE THAT SHOULD NOT BE DISCONNECTED AND SHOULD ONLY BE REPLACED WITH A BATTERY OF THE SAME TYPE (VENTED). FAILURE TO FOLLOW THIS WARNING CAN RESULT IN SERIOUS OR FATAL INJURY.

WARNING: ALWAYS DISCONNECT THE BATTERY CABLE BEFORE PERFORMING ANY ELECTRICAL WORK ON THE VEHICLE.

CAUTION: The battery cable pass-through tightening torque is critical for proper operation of the starting system. Additional connections (double stacking) at the battery cable pass-through studs are not permitted.

CAUTION: Use only the approved power and ground connection sources as described in this section. No splicing or tapping into the vehicle wiring harness is permitted.

VEHICLE POWER DISTRIBUTION

Power originates with the battery that is mounted in the right rear corner of the trunk and below the cargo load floor.

There are 3 battery positive leads within the trunk. The largest battery cable runs to the engine compartment. A second smaller cable goes from the B+ to the PDC in the trunk. The third B+ is for the Police PDC that is located beneath the glove box and next to the right kick panel. This B+ feed goes from the trunk PDC and runs parallel to the starter and engine compartment battery feed.

Warning: The Charger battery contains a vent tube that exits through the floor pan. Be sure that this vent tube is always kept clear of any type of restriction. The tube is used to vent the hydrogen sulfide gas that is produced during battery operation.

Figure 1

Figure 2

CCA: The amount of current in (amps) that a battery can supply for 30 seconds at 0°F while producing at least 7.2 volts. Cold Cranking Amps

RC: The number of minutes a battery can provide 25 amps of current at 80° F without falling below 10.5 volts. Reserve Capacity

Volts	Specific Gravity	% Charge
12.60	1.257	100%
12.40	1.226	75%
12.20	1.195 Approx	50%
12.00	1.165 Approx	25%

Warning: The Chargers' battery contains a vent tube that exits through the floor pan. Be sure that this vent tube is always kept clear of any type of restriction. The tube is used to vent the hydrogen sulfide gas that is produced during battery operation.

From the battery power runs along the right side of the vehicle up to the passengers' side of the bulk head. At this point a connection is made going from inside of the car into the engine compartment. See Fig. 3-6

Figure 3

A Fuel pump module access plug sending unit 1 of 2
B Police PDC 120 amp supply cable is contained within the black harness
C Venturi style fuel pump and fuel sending unit 2 of 2

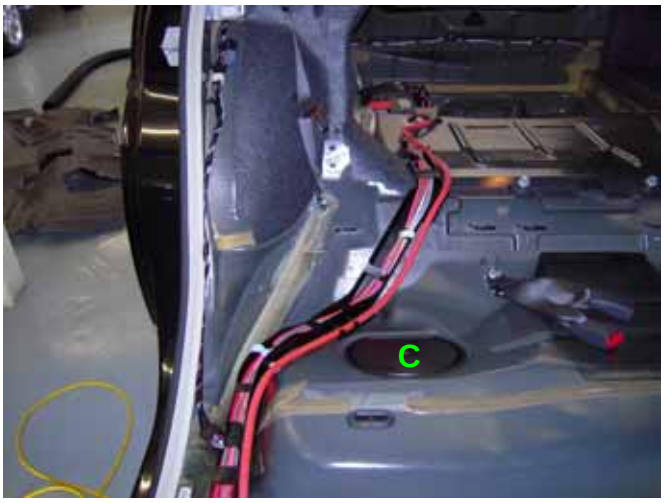


Figure 4

C Venturi style fuel pump and fuel sending unit 2 of 2

Note: The large battery cable shown in fig 3-6 does not supply power to any of the Police package electrical circuits.

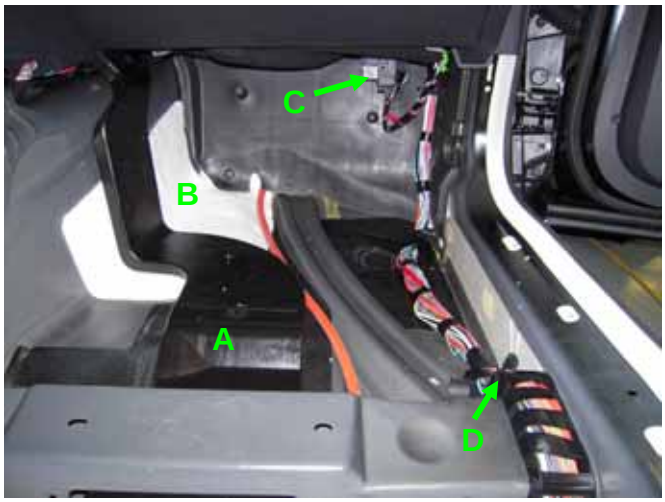


Figure 5

A Rear Heat
B Thermo Blanket 3Way Catalyst opposite blanket
C Police PDC
D Main **w**iring trough contains 120 amp Police PDC power feed

Figure 6

Z Battery pass through cable. Engine compartment & starter power supply.

Warning: Stacking of terminals is **NOT** permitted on this stud

The large battery cable shown in Fig. 3-6 is **NOT** involved in supplying power to any of the factory installed police wiring harnesses.

VEHICLE POWER DISTRIBUTION

POWER DISTRIBUTION CENTER (PDC) STUD

If a power source is required in the trunk, a connection can be made at the PDC stud. No more than one eyelet with a properly sized and fuse protected circuit can be added to the PDC stud.

GROUND CONNECTIONS

The Dodge Charger and Magnum are equipped with numerous ground nuts and studs located in the engine compartment, passenger compartment and in the trunk cargo area. If grounding of additional equipment is required it is strongly recommended to use these ground points. Sheet metal drilling and use of sheet metal screws are not recommended as they are subject to corrosion and poor grounding. When using the ground nuts or studs, no more than 2 ground eyelets per nut or stud can be stacked.

NOTE: For complete ground points location information refer to the 8W section of the appropriate model year Dodge Charger and Magnum Service Manual.

Ground Locations

Ground	General Location
G100	Left front side of the engine compartment
G101	Right front side of the engine compartment
G102	Right side of the engine compartment
G104	Right side of the engine compartment
G105 (3.5L)	On engine near the harness take out for the Ignition Coil No. 5
G105 (5.7L)	Rear of the engine
G106 (3.5L)	Left side of the engine
G106 (5.7L)	Rear of the engine
G107 (3.5L)	Right side of the engine near the generator
G108	Left side of the engine
G109	On the right shock tower
G110	On engine harness
G111	Right front of engine
G200	Left side of the instrument panel near the harness take out for the ignition switch
G201	Passenger side of the instrument panel
G202	Driver side of the instrument panel near the take out for the instrument cluster
G300	On the floor pan under the driver seat
G301	On the floor pan under the passenger seat
G302	Right front side of the of the cargo pan
G303	Right rear side of the cargo pan
G304	Next to the decklid latch

GROUND LOCATIONS

G100 LT front Side Engine Compartment

G101 RT Front Side of Engine Compartment

G105 Right Rear Cylinder Head

G109 on the Right Shock Tower

G302 Right Front Side of Cargo Pan

G303 Right Rear Side of Cargo Pan

GROUND LOCATIONS

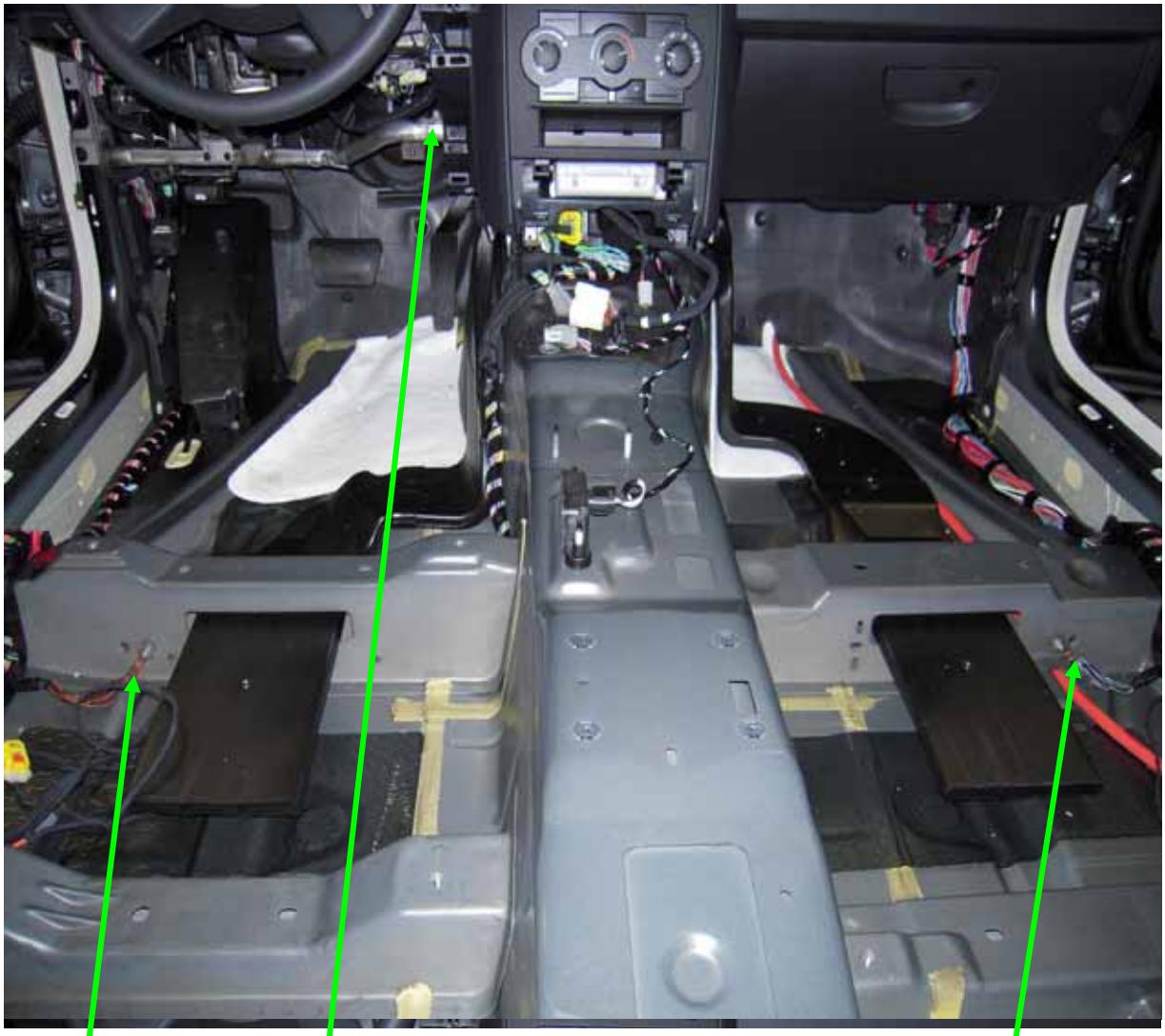
G200 LT Side of IP by Ignition Switch (WIN)

Drivers Side Beneath Instrument Cluster RT Side

G300 Floor Pan Under Drivers Seat

G301 Floor Pan Under Passengers Seat

GROUND LOCATIONS



FACTORY INSTALLED POLICE PACKAGE ELECTRICAL

CHASSIS POWER FLOW

The factory installed police upfitting package is comprised of the following 2 subsystems:

- Electrical
  - High current electrical (Police PDC)
  - Lo current electrical (Chassis electrical interface)
- Body Mechanical

The electrical system can be broken down as follows:

- High Current Components
  - Wiring from rear PDC (Trunk) to Police PDC
  - Police PDC (Right kick panel)
  - Wiring from Police PDC to center console (12-way) connector
  - Wiring from center console to front bumper, consisting of 3 twisted pairs of 18 gauge wire.
  - Right A pillar wiring for spot lamp
  - Left A pillar wiring for spot lamp
  - Over head wiring for LED and incandescent Police dome lamp

- Lo current electrical
  - Police Taxi Interface Module (PTIM)
    - 24-Way PTIM Connector
    - 3-Way Police radio connector

The body mechanical areas are as follows:

- Chassis mechanical
  - Easy pass wiring grommet
  - Chassis modification awareness
  - Supplemental restraint system
  - Fascia removal for upfitting
  - Vehicle interior detrim for upfitting

FACTORY INSTALLED POLICE PACKAGE ELECTRICAL

POLICE POWER DISTRIBUTION CENTER (PDC)

The Police power distribution center is located below the glove box and to the left of the right kick panel. The Police PDC consists of 6 individual 20 amp electrical circuits that collectively can supply 120 amps of current. This PDC is protected by an inline 125 amp fuse that is located in the PDC supply cable in the trunk. The fuse itself is approximately 1 foot from the rear PDC B+ stud.

The 6 independent 20 amp circuits are broken into the following two groups:

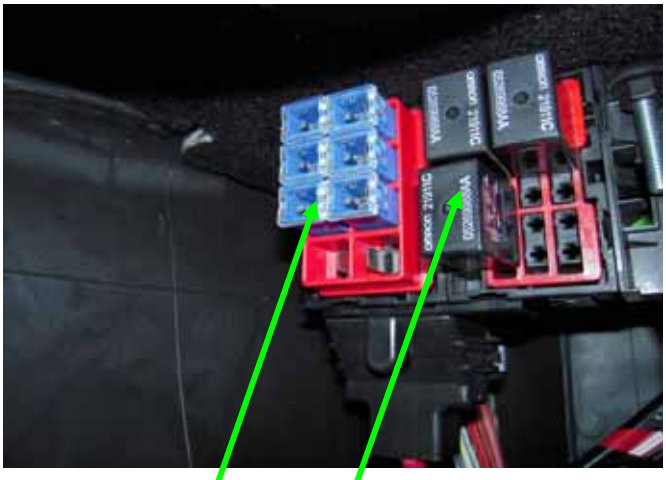
- 3 are hot all the time (B+ fed)
- 3 are switched ignition feed via 3 relays mounted within the Police PDC.

  Note: *The 3 switched ignition fed relays are all supplied power on the control side of the relay from the "Accessory Delay Relay" in the rear PDC. The "Accessory Delay Relay" control circuit is supplied power via a high side driver in the TIPM. This means that after the car is shutoff these 3 relays will stay powered up until the TIPM goes to sleep. If for some reason either CAN-C or CAN-B will not go to sleep then these 3 relays will still energized.*

The 6 circuits leave the Police PDC and travel to a 12-way connector in the center console.

Starter Cable left of harness with 120 amp Police PDC

Police PDC Right Kick Panel



Police PDC

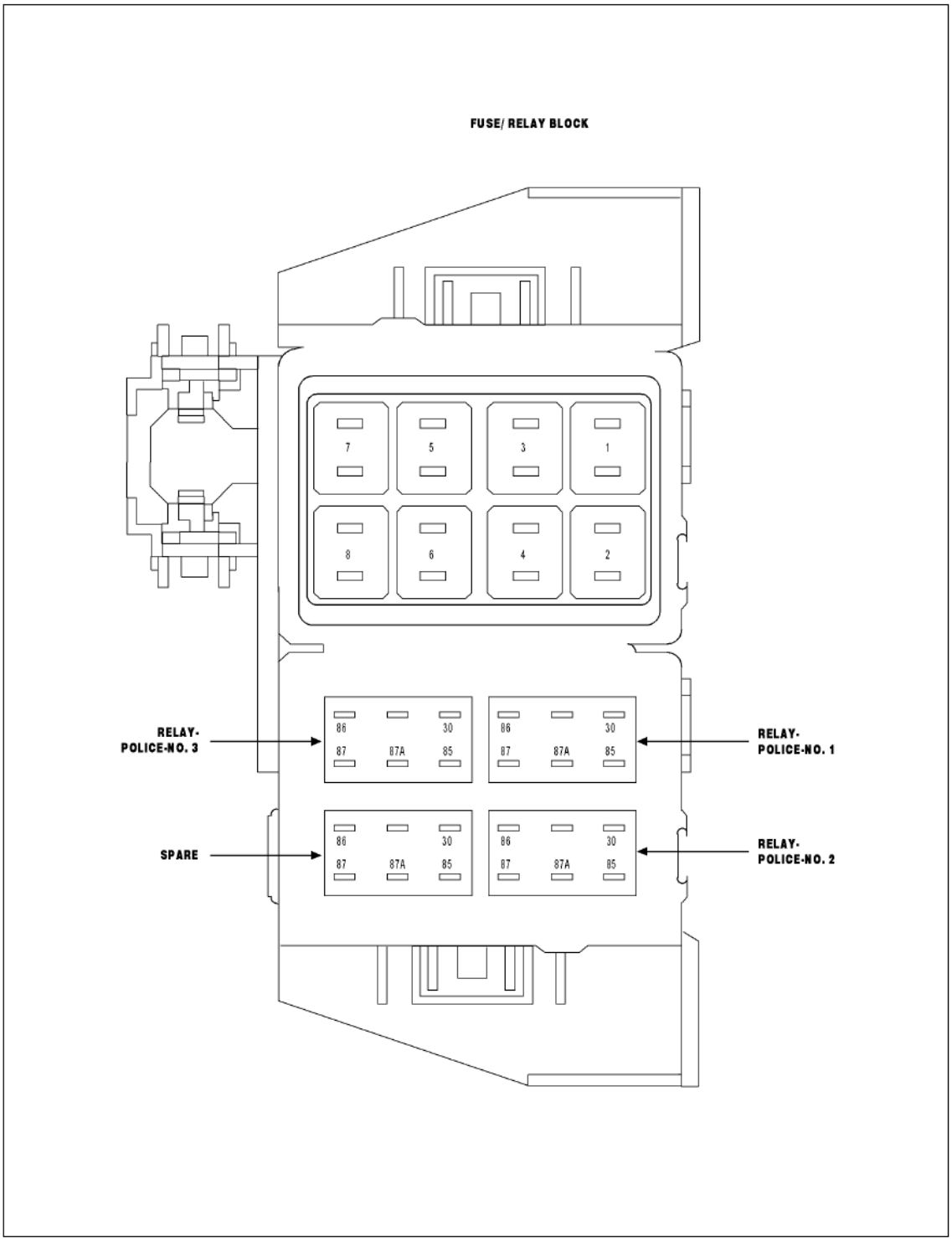
3 Switched Ignition Relays

6 (20 Amp) Fuse Cartridges

125 amp Police PDC Fuse
Fuse is in the trunk next to the battery.

POLICE POWER DISTRIBUTION CENTER (PDC)

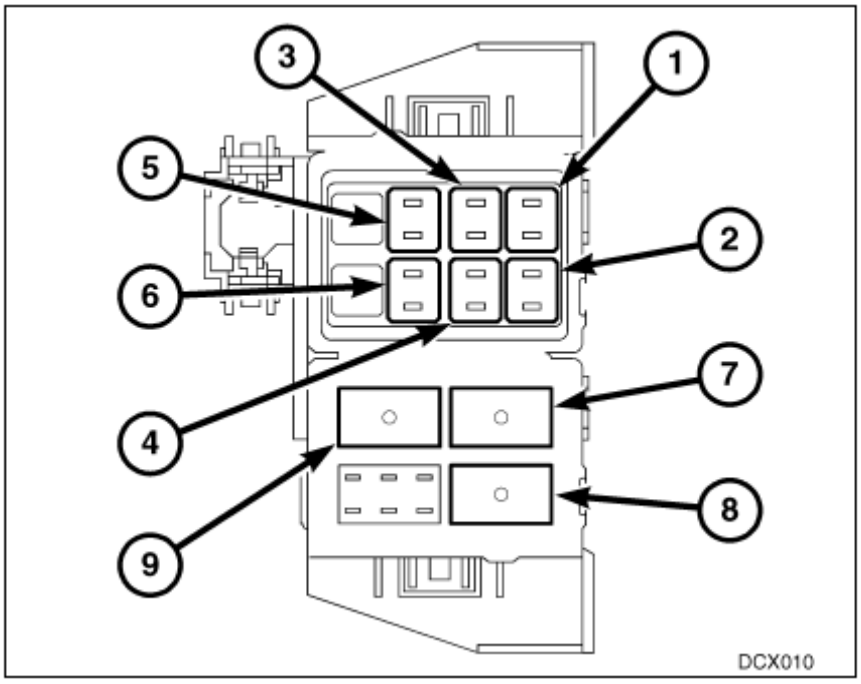
WIRING SCHEMATICS



POLICE PDC

POLICE POWER DISTRIBUTION CENTER (PDC)

WIRING SCHEMATICS



ITEM	COMPONENT	LOCATION IN 12-WAY CENTER CONSOLE CONNECTOR
1	Fuse 1 (20A)	Cavity 1
2	Fuse 2 (20A)	Cavity 4 (To Terminal 30 of Police Relay 1)
3	Fuse 3 (20A)	Cavity 2
4	Fuse 4 (20A)	Cavity 6 (To Terminal 30 of Police Relay 2)
5	Fuse 5 (20A)	Cavity 3
6	Fuse 6 (20A)	Cavity 5 (To Terminal 30 of Police Relay 3)
7	Police Relay 1	Cavity 4
8	Police Relay 2	Cavity 6
9	Police Relay 3	Cavity 5

12-WAY CENTER CONSOLE CONNECTOR

NOTE: A police accessories mating connector is available in the MOPAR® kit P/N 05191127AB.

The police accessories connector is a 12–way (LT. GRAY) connector and provides connection to the following:

POLICE POWER DISTRIBUTION CENTER (PDC)

WIRING SCHEMATICS

The police accessories connector is a 12–way (LT. GRAY) connector and provides connection to the following:

Cavity	Circuit	Function
1	A100 16RD/WT	Fused (20A) Battery (+) Voltage
2	A101 16VT/RD	Fused (20A) Battery (+) Voltage
3	A102 16WT/RD	Fused (20A) Battery (+) Voltage
4	F100 16PK/VT	Fused (20A) Accessory Voltage (with key in ON or ACC – Police 1 Relay Output)
5	F101 16VT/PK	Fused (20A) Accessory Voltage (with key in ON or ACC – Police 3 Relay Output)
6	F102 16WT/PK	Fused (20A) Accessory Voltage (with key in ON or ACC – Police 2 Relay Output)
7	Z950 18BK/TN	Supplemental equipment wiring circuit For complete information refer to the Supplemental Equipment Wiring in this section
8	Z951 18BK/WT	Supplemental equipment wiring circuit For complete information refer to the Supplemental Equipment Wiring in this section.
9	Z952 18BK/OR	Supplemental equipment wiring circuit For complete information refer to the Supplemental Equipment Wiring in this section.
10	Z953 18BK/LG	Supplemental equipment wiring circuit For complete information refer to the Supplemental Equipment Wiring in this section.
11	Z954 18BK/RD	Supplemental equipment wiring circuit For complete information refer to the Supplemental Equipment Wiring in this section.
12	Z955 18BK/DB	Supplemental equipment wiring circuit For complete information refer to the Supplemental Equipment Wiring in this section.

POLICE POWER DISTRIBUTION CENTER (PDC)

WIRING SCHEMATICS

FUSES (F/RB)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	20A	A100 16RD/WT	FUSED B(+)
2	20A	F3 16YL/RD	FUSED B(+)
3	20A	A101 16VT/RD	FUSED B(+)
4	20A	F4 16RD/YL	FUSED B(+)
5	20A	A102 16WT/RD	FUSED B(+)
6	20A	F5 16WT/YL	FUSED B(+)
7	-	-	-
8	-	-	-

RELAYS (F/RB)

RELAY-POLICE-NO. 1

CAVITY	CIRCUIT	FUNCTION
30	F3 16YL/RD	FUSED B(+)
85	Z911 20BK/WT	GROUND
86	F880 20PK/DG	FUSED ACCESSORY DELAY RELAY OUTPUT
87	F100 16PK/WT	POLICE NO. 1 RELAY OUTPUT
87A	-	-

RELAY-POLICE-NO. 2

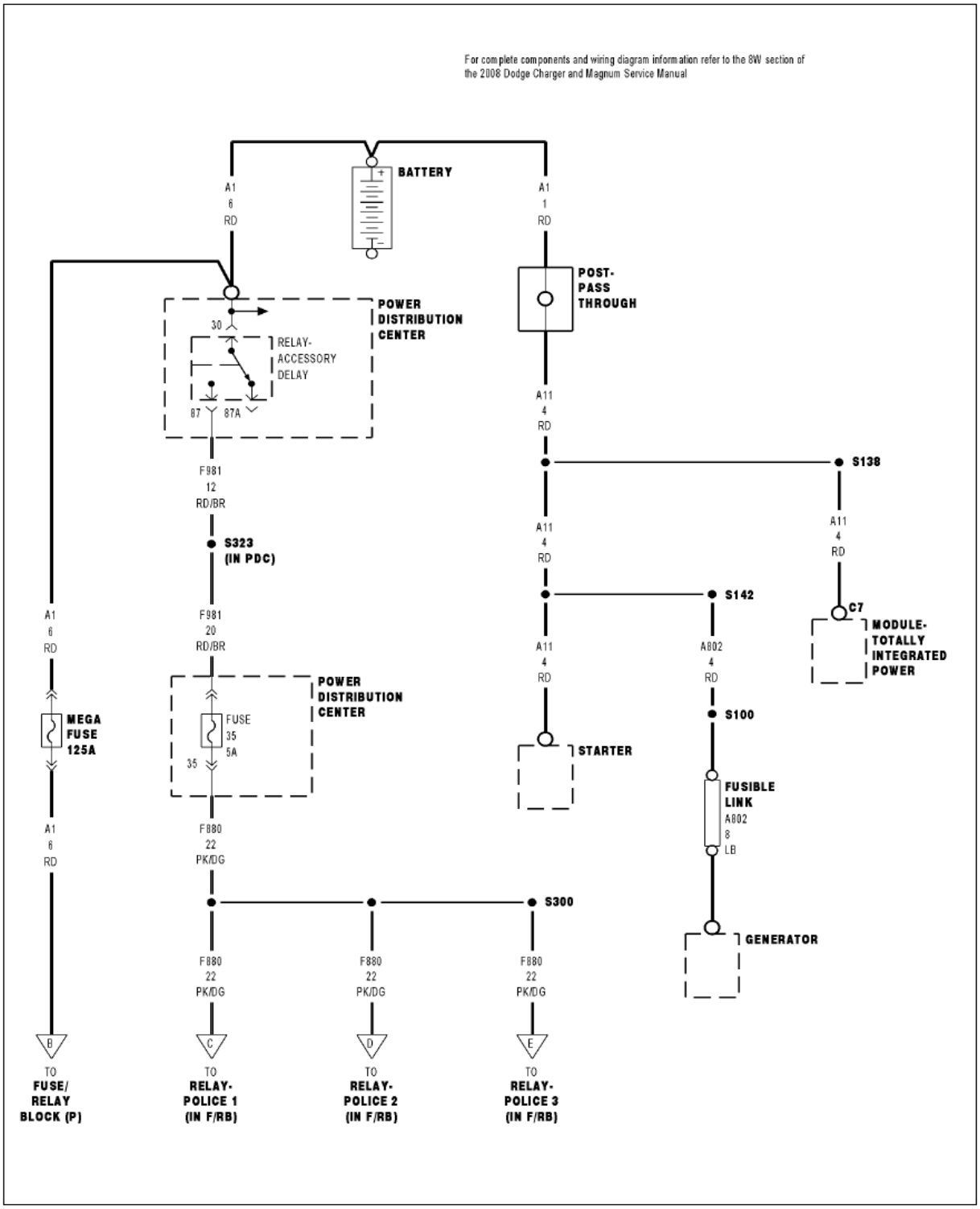
CAVITY	CIRCUIT	FUNCTION
30	F5 16WT/YL	FUSED B(+)
85	Z911 20BK/WT	GROUND
86	F880 20PK/DG	FUSED ACCESSORY DELAY RELAY OUTPUT
87	F102 16WT/PK	POLICE NO. 2 RELAY OUTPUT
87A	-	-

RELAY-POLICE-NO. 3

CAVITY	CIRCUIT	FUNCTION
30	F4 16RD/YL	FUSED B(+)
85	Z911 20BK/WT	GROUND
86	F880 20PK/DG	FUSED ACCESSORY DELAY RELAY OUTPUT
87	F101 16VT/PK	POLICE NO. 3 RELAY OUTPUT
87A	-	-

Police PDC Relay & Fuse Cavity Locations & Functionality

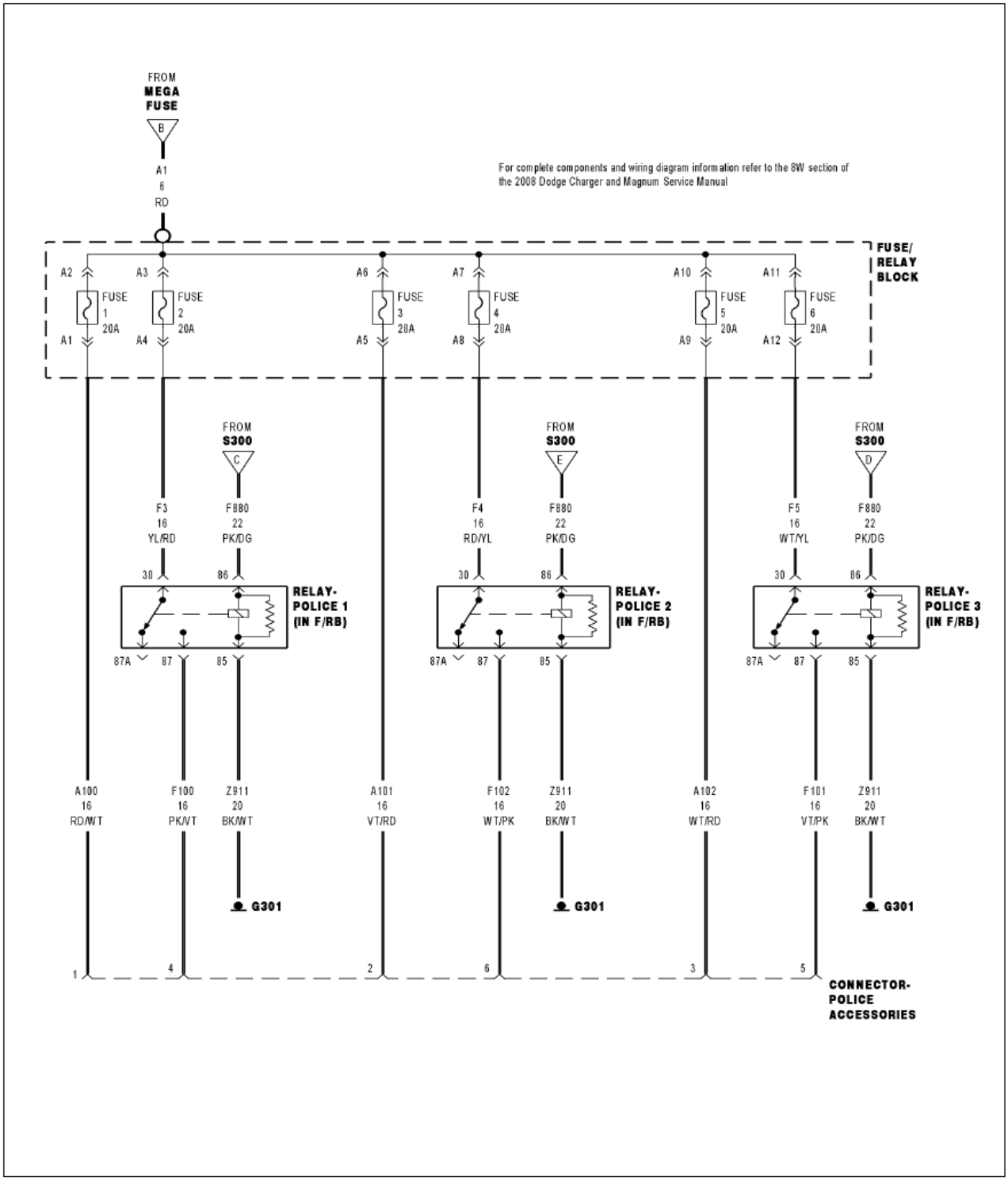
WIRING SCHEMATICS



Police PDC B+ Power & Relay control side power supply

POLICE POWER DISTRIBUTION CENTER (PDC)

WIRING SCHEMATICS



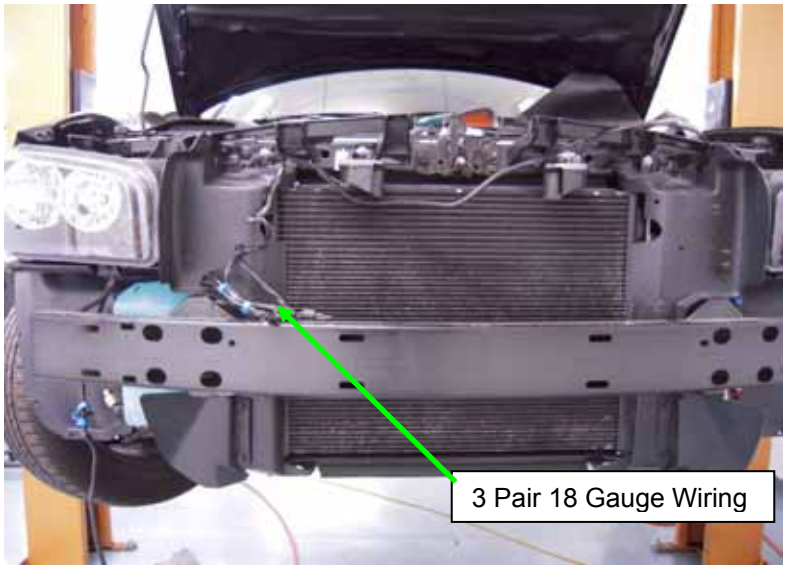
Police PDC Relay Output (Pin 87) power supply

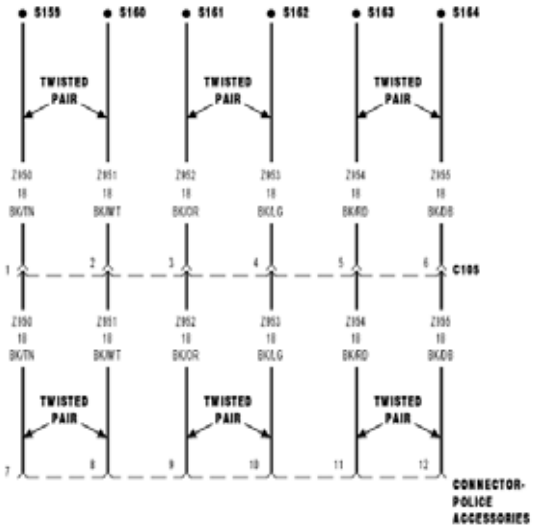
POLICE POWER DISTRIBUTION CENTER (PDC)

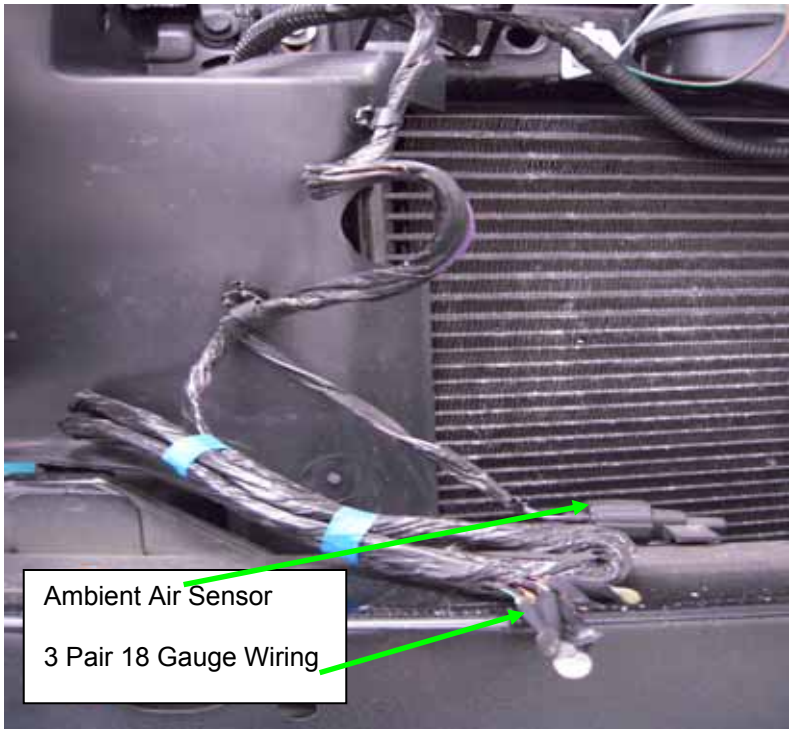
WIRING SCHEMATICS

SUPPLEMENTAL EQUIPMENT WIRING

Supplemental equipment wiring consisting of 3 pairs of 18 gauge wires for speakers, sirens, or other controls is provided standard on each police vehicle. The wires are part of the headlamp and dash and body wiring harnesses and run from the 12–way (police accessories) connector and end at the front of the vehicle.

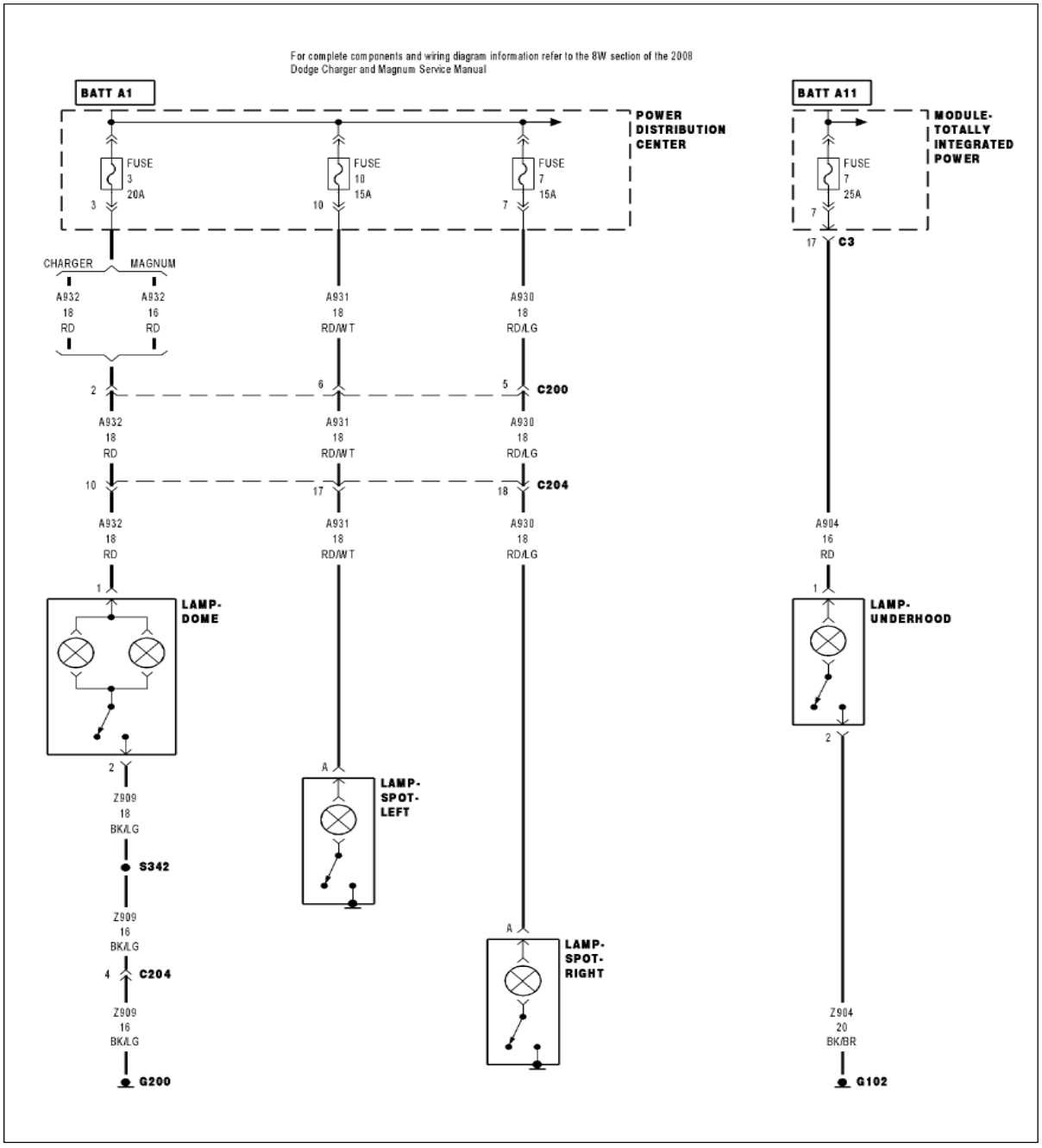






LEFT & RIGHT SPOT LAMPS, POLICE DOME LAMP

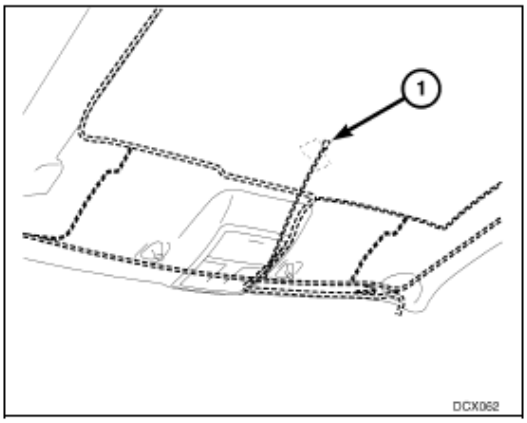
The wiring for both front spot lamps and the optional Police dome lamp is installed in the vehicle regardless of whether or not they are installed. Each spot lamp circuit has its own 15 amp fuse and the dome lamp has its own 20 amp fuse. This means should you choose not to use any of these circuits for their original intent, you have the potential to have an additional 50 amps of current to work with.



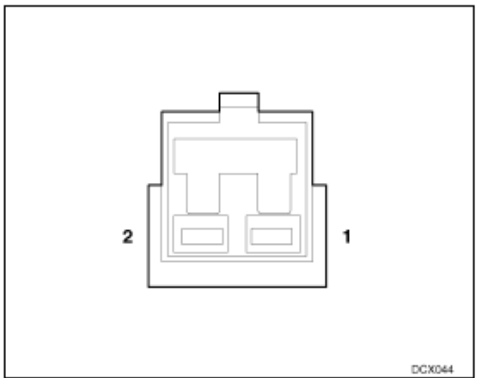
Police Package Interior (Dome)/Exterior (Spot Lamp) Lighting

POLICE DOME LAMP

Each police vehicle comes equipped with wires for a police dome lamp whether the vehicle comes equipped with a police dome lamp or not. The police dome lamp connector (1) is available above the front center section of the headliner.



The police dome lamp is a 2–way (BLACK) connector, and is wired as follows:



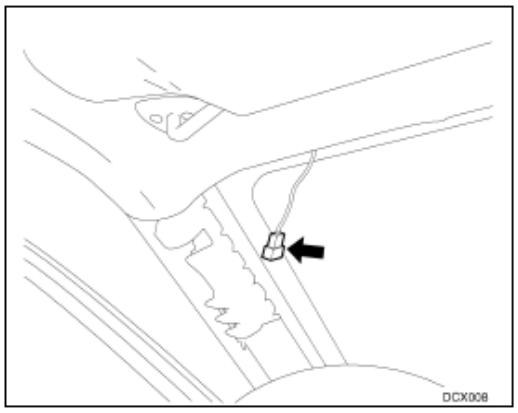
Police Dome Lamp Connector

Cavity	Circuit	Function
1	A932 18RD	Fused B(+)
2	Z909 18BK/LG	Ground

SPOT LAMPS

The left side spot lamp wire is shown, the right side spot lamp wire is similar.

Each police vehicle comes equipped with wires for spot lamps, and it may be ordered as left only, or both sides. If the vehicle is not equipped with spot lamps, the spot lamp wires and connectors are available above the front end corners of the headliner. To access the spot lamp connectors, remove the A–pillar trim panel, reach above the front end corner of the headliner and pull the spot lamp wire. Some resistance may be encountered while pulling the wire as it is spot glued to the headliner.



Left Side Spot Lamp: is shown, right side is similar

The spot lamp circuits are fused in the power distribution center as follows:

Spot Lamp Connectors

Spot Lamp	Circuit	Power Distribution Center Fuse	Fuse Rating
Left	A931 18RD/WT	Fuse 10	15A
Right	A930 18RD/LG	Fuse 7	15A

STEALTH MODE

STEALTH MODE SWITCH

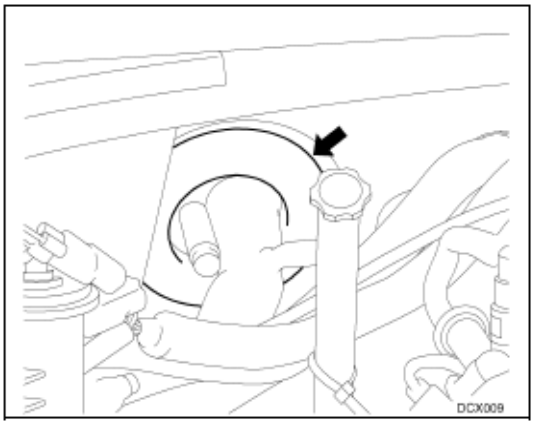
In stealth mode all of the police vehicle interior lights including the instrument cluster and the radio indicators are turned off. The only **exception** is the transmission gear position indicator which dims to the lowest legal limit.

NOTE: The police dome lamp is individually powered, has its own ON/OFF switch, and is not turned off automatically when the rest of the interior lighting is switched to stealth mode.

Stealth mode is activated by turning the dimmer control thumb wheel on the headlamp switch. The system also provides an output signal through the police interface module to allow stealth mode and dimming of the interior lamps used on aftermarket police equipment controls.

EASY PATH WIRING GROMMET

An additional wiring grommet is provided between the engine and passenger compartments. The easy path wiring grommet is located in the bulkhead on the right side of the engine compartment and is standard on all police vehicles. The end of the grommet rubber tube must be cut off to pass wiring from the engine compartment into the passenger compartment. To avoid water ingress into the passenger compartment, a drip loop must be provided on the engine compartment side of the added wiring. In addition, use RTV silicone or electrical tape to reseal the grommet rubber tube and wiring.

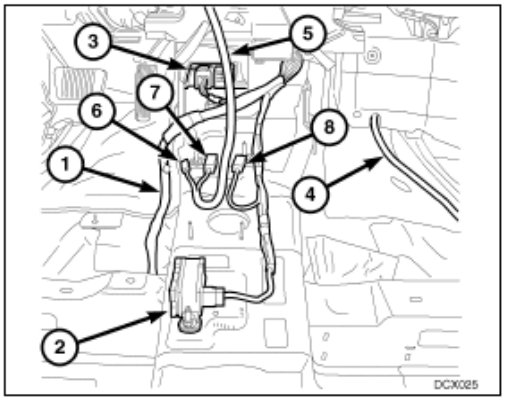


WIRING HARNESS ROUTING

Always consider the routing of the vehicle wiring harness when planning to install additional equipment. Take care to avoid damaging the wiring when drilling and/or installing fasteners. No wiring harness relocation is permitted.

- If additional holes will be drilled to run wiring all holes must be de-burred and should have a grommet(s) installed.
- Grommets need to be able to stand up to the conditions they will live in. They need to have similar characteristics to wire, convolute, and tape.

The following graphics represent the location of the wiring harnesses and the safety related components inside the vehicle. Make sure to avoid damaging the wiring or the safety related components when installing additional equipment.

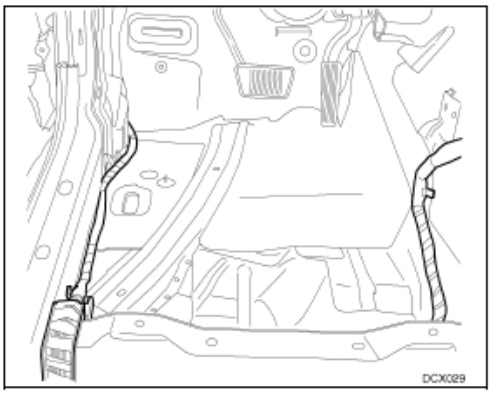


BODY HARNESS – CENTER TUNNEL AREA

1. Body harness
2. Dynamics electronic stability program (ESP) sensor
3. Occupant restraint controller (ORC) module
4. Battery B+ cable
5. I/P harness
6. Police radio connector (LT. GRAY)
7. Police/taxi interface connector (NATURAL)
8. Police accessories connector (LT. GRAY)

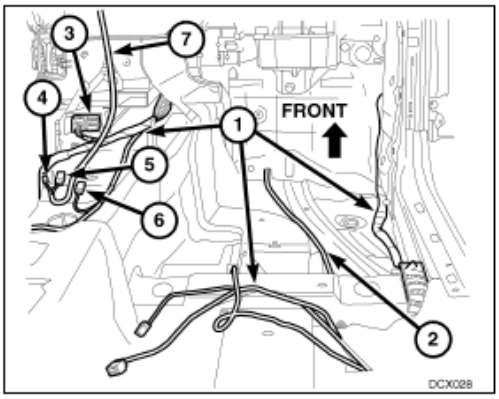
The following graphics represent the location of the wiring harnesses and the safety related components inside

the vehicle. Make sure to avoid damaging the wiring or the safety related components when installing additional equipment.



BODY HARNESS – LEFT FRONT FLOOR AREA

BODY HARNESS – LEFT FRONT FLOOR AREA



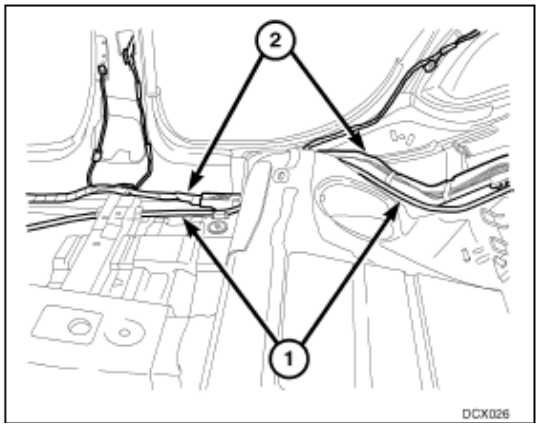
BODY HARNESS – RIGHT FRONT FLOOR AREA

1. Body harness
2. Battery B+ cable
3. Occupant restraint controller (ORC) module
4. Police radio connector (LT. GRAY)
5. Police/taxi interface connector (NATURAL)
6. Police accessories connector (LT. GRAY)
7. I/P harness

BODY HARNESS – RIGHT FRONT FLOOR AREA

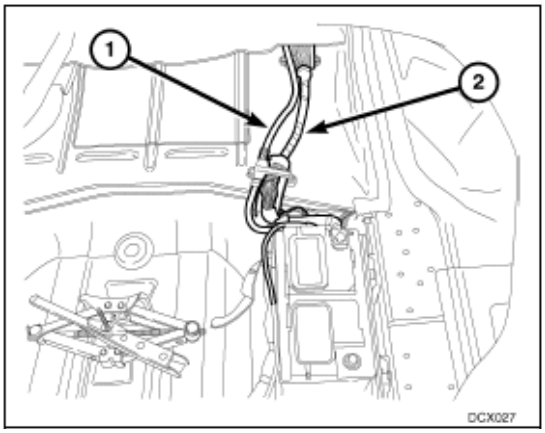
The following graphics represent the location of the wiring harnesses and the safety related components inside

the vehicle. Make sure to avoid damaging the wiring or the safety related components when installing additional equipment.



BODY HARNESS – RIGHT REAR FLOOR AREA
1. Battery B+ cable
2. Body harness

BODY HARNESS – RIGHT REAR FLOOR AREA
1. Battery B+ cable
2. Body harness



BODY HARNESS – TRUNK/CARGO AREA
1. Battery B+ cable
2. Body harness

BODY HARNESS – TRUNK/CARGO AREA
1. Battery B+ cable
2. Body harness

The following graphics represent the location of the wiring harnesses and the safety related components inside

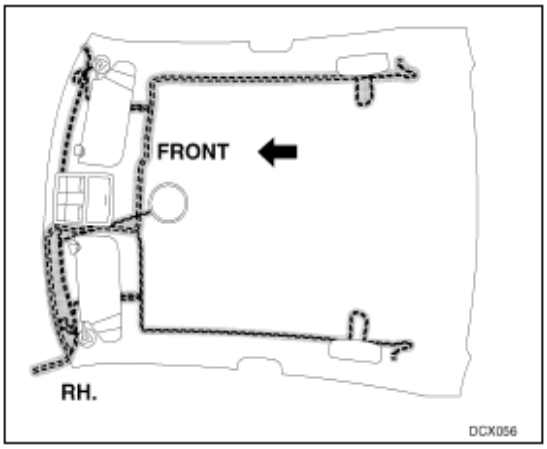
the vehicle. Make sure to avoid damaging the wiring or the safety related components when installing additional equipment.

BODY HARNESS – Left rear door and wheel well area (Black Cover is Fuel Pump Access)

BODY HARNESS – Drivers floor pan left & driveshaft tunnel left

BODY HARNESS – Driveshaft tunnel left (Drivers Side)

BODY HARNESS – Drivers B-Pillar seat belt area



HEADLINER HARNESS

FACTORY INSTALLED POLICE PACKAGE ELECTRICAL

LOW CURRENT ELECTRICAL (Police Taxi Interface Module) PTIM

The PTIM is an Upfitter interface that is designed to prevent Police lighting and accessories from becoming part of the proprietary vehicle electrical architecture. This in part is due to both the high side driven exterior lighting and the CAN C and B data buses that are used. The PTIM is a go between for Upfitter installed equipment that needs access to CAN messaging such as requesting that the headlamps and tail lamps function as wig wags to being able to easily access a brake pedal signal.

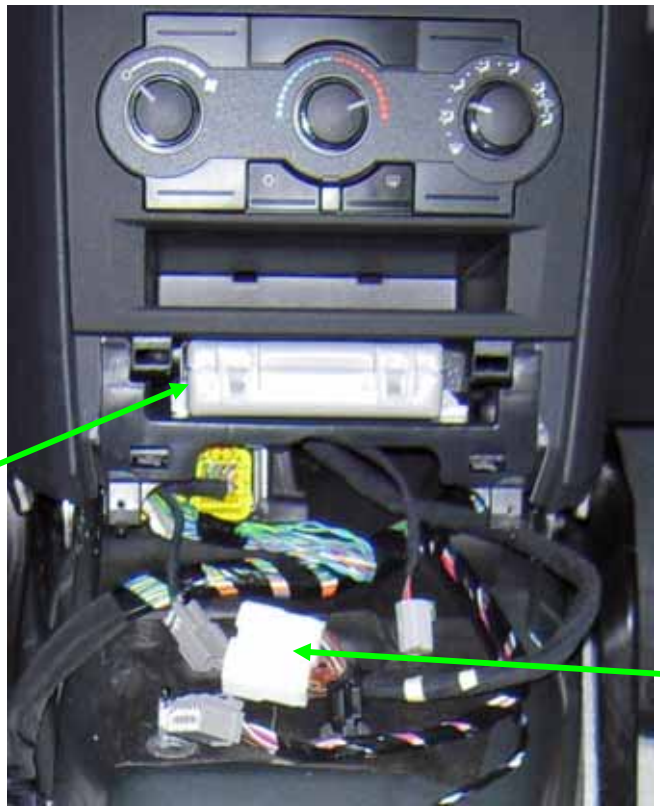
There are 2 generations of PTIM, 2006-2007 Model Years and the 2008-2010 Model Years. Both generation of modules offer the same functions, inputs, and outputs however they do this in different ways. The pin functionality is different on 19 of the 24 pins for the two different generations of modules. The next few pages contain a chart that contains the following:

- Cavity number
- Circuit ID and functionality
- Any special Upfitter requirements for 2006-2007 MY
- Any special Upfitter requirements for 2008-2010 MY

The major Upfitter and test technician requirements for the 2006-2007 MY concerns cavities 1-5. When either upfitting the vehicle or performing diagnostics a 47k Ω resistor needs to placed in series in the circuit. There is no current limiting resistor inside the PTIM for these circuits. If the resistor is not used, damage to the PTIM will occur as the current capacity of these circuits will be substantially exceeded.

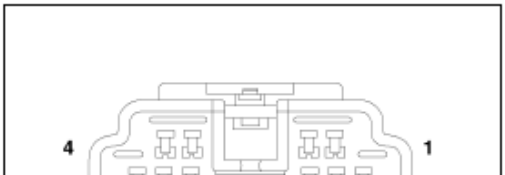
The other item to be aware of regarding the PTIM is the fact that the 24-way console connector cavity functionality does not match numerically with the connector on the PTIM. For example the “Brake Lamp Switch Sense” circuit is in cavity 4 of the 24-way center console connector but it is in cavity 12 of connector C2 of the PTIM.

Police Taxi Interface Module



NOTE: A police/taxi interface mating connector is available in the MOPAR® kit P/N 05191127AB.

The police/taxi interface connector is a



2006-2010MY PTIM CHART

Note: Where applicable the differences between the 2006-2007MY PTIM and the 2008-2010MY PTIM are noted.

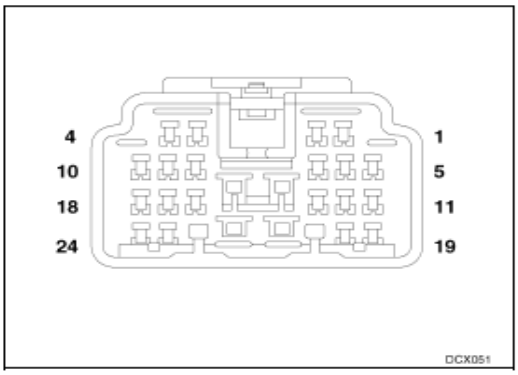
Cavity	Circuit	Function	Upfitter Requirements 2006-2007	Upfitter Requirements 2008-2010
1	W500 20BR/OR	Front flashing lights (WigWags) *12V Input to PTIM*	47k Ω Resistor installed in series with the circuit	NONE Current limiting resistor is internal to the PTIM
2	W501 20BR/VT	Rear flashing lights (WigWags) *12V Input to PTIM*	47k Ω Resistor installed in series with the circuit	NONE Current limiting resistor is internal to the PTIM
3	W511 20BR/WT	Police radio input *12V Input to PTIM*	47k Ω Resistor installed in series with the circuit	NONE Current limiting resistor is internal to the PTIM
4	W512 20BR/VT	2006-2007 VTSS Mute signal ***12V Input to PTIM*** / 2008-2010 Brake lamp switch sense ***9V Output from PTIM***	47k Ω Resistor installed in series with the circuit	N/A
5	W513 20BR/GY	Horn mute signal *12V Input to PTIM*	47k Ω Resistor installed in series with the circuit	NONE Current limiting resistor is internal to the PTIM
6	W514 20BR/YL	2006-2007 Fuel level status signal ***12V PWM Output*** / 2008-2010 P/N switch sense ***9V Output from PTIM***	N/A	N/A
7	W515 20BR/LB	2006-2007 Driver seatbelt switch sense ***9V Output from PTIM*** When buckled / 2008-2010 VTSS/Panic alarm on signal ***9V Output from PTIM***	N/A	N/A
8	W516 20BR/DB	2006-2007 MIL Malfunction indicator lamp ***12V Output from PTIM*** when MIL is on / 2008-2010 Headlamp switch sense ***9V Output from PTIM***	N/A	N/A
Cavity	**Circuit**	**Function**	**Upfitter Requirements**	**Upfitter Requirements**

			2006-2007	2008-2010
9	W517 20BR/LG	2006-2007 VTSS alarm on signal ***12V Output from PTIM***	N/A	N/A
		2008-2010 Side airbag status signal ***12V Output from PTIM*** when airbag deploys		
10	W518 20BR/DG	2006-2007 Horn switch sense ***9V Output from PTIM*** when horn switch is pressed	N/A	N/A
		2008-2010 Front airbag status signal ***12V Output from PTIM*** when airbag deploys		
11	2006-2007 W519 20BR/TN	2006-2007 P/N switch sense ***9V Output from PTIM***	N/A	N/A
	2008-2010 W530 20BR/DG	2008-2010 PTIM CAN B bus (+)		
12	2006-2007 W520 20BR/OR	2006-2007 Brake lamp switch sense ***9V Output from PTIM***	N/A	N/A
	2008-2010 W531 20BR/LG	2008-2010 PTIM CAN B bus (-)		
13	W521 20BR/WT	2006-2007 Headlamp switch sense ***9V Output from PTIM***	N/A	N/A
		2008-2010 Cluster dimmer switch sense ***2-12V Output from PTIM***		
14	W522 20BR/VT	2006-2007 Side airbag status signal ***12V Output from PTIM*** when airbag deploys	N/A	N/A
		2008-2010 Engine running signal ***12V Output from PTIM***		
15	W523 20BR/GY	2006-2007 Front airbag status signal ***12V Output from PTIM*** when airbag deploys	N/A	N/A
		2008-2010 Driver door ajar switch sense ***9V Output from PTIM*** with door open		
16	Z384 20BK	Signal ground that is noise suppressed	N/A	N/A
17	2006-2007 W524 20BR/YL	2006-2007 Driver door ajar switch sense ***9V Output from PTIM*** with door open	N/A	N/A
	2008-2010 NOT USED	N/A		
18	2006-2007 W525 20BR/LB	2006-2007 Cluster dimmer switch sense ***2-12V Output from PTIM***	N/A	N/A
	2008-2010 NOT USED	N/A		
19	W526 20BR/DB	Vehicle speed signal 12V 10HZ/Mph Pulse width modulated	N/A	N/A
20	2006-2007 W527 20BR/LG	2006-2007 PTIM CAN B bus (+)	N/A	NONE Current limiting

	2008-2010 W536 20BR/YL	2008-2010 Horn mute signal ***12V Input to PTIM*** disables horn function		resistor is internal to the PTIM
21	2006-2007 W528 20BR/DG	2006-2007 PTIM CAN B bus (-)	N/A	NONE Current limiting resistor is internal to the PTIM
	2008-2010 W537 20BR/VT	2008-2010 VTSS Mute signal ***12V Input to PTIM***		
22	2006-2007 W529 20BR/TN	2006-2007 Engine running signal ***12V Output from PTIM***	N/A	N/A
	2008-2010 W538 20BR/OR	2008-2010 Fuel level status signal ***12V PWM Output***		
23	2006-2007 NOT USED	N/A	N/A	N/A
	2008-2010 W539 20BR/DB	2008-2010 Driver seatbelt switch sense ***9V Output from PTIM*** When buckled		
24	2006-2007 NOT USED	N/A	N/A	N/A
	2008-2010 W540 20BR/DG	MIL Malfunction indicator lamp ***12V Output from PTIM*** when MIL is on		

NOTE: A police/taxi interface mating connector is available in the MOPAR® kit P/N 05191127AB.

The police/taxi interface connector is a 24–way (NATURAL)
connector and is wired as follows:



OCCUPANT RESTRAINT SYSTEM

WARNING

INSTALLING A CONVENTIONAL PRISONER PARTITION IS NOT RECOMMENDED ON VEHICLES EQUIPPED WITH LEFT AND RIGHT SIDE CURTAIN AIRBAGS, AS POLICE CAGES MAY INTERFERE WITH THE DEPLOYING AIRBAG. THE AREA WHERE THE SIDE CURTAIN AIRBAG IS LOCATED SHOULD REMAIN FREE FROM ANY OBSTRUCTIONS.

IF YOUR VEHICLE IS EQUIPPED WITH LEFT AND RIGHT SIDE CURTAIN AIRBAGS, CARE MUST BE TAKEN WHEN INSTALLING ANY TYPE OF ROOF EQUIPMENT. DRILLING AND INSTALLATION OF FASTENERS OR OTHER EQUIPMENT THAT MAY INTERFERE WITH THE SIDE CURTAIN AIRBAGS AND AIRBAG WIRING HARNESS IS NOT PERMITTED. MAKE SURE THAT NO EQUIPMENT OR FASTENERS ARE LOCATED IN THE AIRBAG DEPLOYMENT ZONE.

DO NOT PLACE OBJECTS OR MOUNT EQUIPMENT IN FRONT OF THE AIRBAG MODULE COVER OR IN FRONT OF THE SEAT AREAS THAT MAY COME IN CONTACT WITH A DEPLOYING AIRBAG. FAILURE TO FOLLOW THIS INSTRUCTION COULD RESULT IN PERSONAL INJURY.

DO NOT PLACE DASH, TUNNEL OR CONSOLE-MOUNTED EQUIPMENT OUTSIDE OF THE SPECIFIED ZONE. FAILURE TO FOLLOW THIS INSTRUCTION COULD RESULT IN PERSONAL INJURY.

IF EQUIPPED WITH OCCUPANT CLASSIFICATION SYSTEM (OCS), THE SEATWEIGHT SENSOR IS A SENSITIVE, CALIBRATED UNIT AND MUST BE HANDLED CAREFULLY. DO NOT DROP OR HANDLE ROUGHLY. IF DROPPED OR DAMAGED, REPLACE WITH ANOTHER SENSOR. FAILURE TO DO SO MAY RESULT IN OCCUPANT INJURY OR DEATH.

IF EQUIPPED WITH OCS, THE FRONT PASSENGER SEAT MUST BE HANDLED CAREFULLY AS WELL. WHEN REMOVING THE SEAT, BE CAREFUL WHEN SETTING ON FLOOR NOT TO DROP. IF DROPPED, THE SENSOR MAY BE INOPERATIVE, COULD RESULT IN OCCUPANT INJURY, OR POSSIBLY DEATH.

IF EQUIPPED WITH OCS, WHEN THE PASSENGER FRONT SEAT IS ON THE FLOOR, NO ONE SHOULD SIT IN THE FRONT PASSENGER SEAT. THIS UNEVEN FORCE MAY DAMAGE THE SENSING ABILITY OF THE SEAT WEIGHT SENSORS. IF SAT ON AND DAMAGED, THE SENSOR MAY BE INOPERATIVE, COULD RESULT IN OCCUPANT INJURY, OR POSSIBLY DEATH.

ANY WEIGHT ADDED BY PLACING OR INSTALLING EQUIPMENT ON THE PASSENGER FRONT SEATMAY TURN THE PASSENGER AIRBAG DISABLE (PAD) INDICATOR LIGHT ON. FOR A COMPLETE OPERATION ESCRIPTION OF THE OCS SYSTEM, REFER TO THE VEHICLE OWNER'S MANUAL. OCCUPANT RESTRAINT SYSTEM COMPONENTS *NOTE: This system is only used on the 2006 vehicle. If the seat is removed or repaired the Occupant Classification System Calibration Test will need to be performed with the scantool and Miller Special tool 9077 OCS calibration weight set. (Miller Special Tools 800-801-5420 or http://www.millerspecialtools.com*

The occupant restraint system is comprised of the following components:

- Left front impact sensor
- Right front impact sensor
- Driver airbag
- Driver side airbag
- Passenger airbag
- Passenger side airbag
- Occupant restraint controller (ORC) module
- Driver seat belt tensioner
- Passenger seat belt tensioner
- Left side impact sensors
- Right side impact sensors

The occupant restraint system is comprised of the following components:

- Left side curtain airbag
- Right side curtain airbag
- Driver seat track position sensor
- Passenger seat track position sensor

AIRBAG DEPLOYMENT ZONES

There are 3 zones to be aware of:

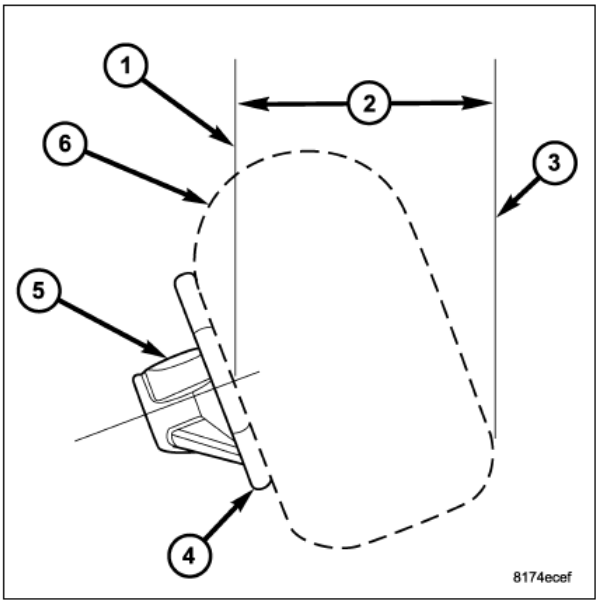
- Driver airbag deployment zone
- Passenger airbag deployment zone
- Side curtain airbags deployment zone
- Side airbags deployment zone

DRIVER AIRBAG DEPLOYMENT ZONE

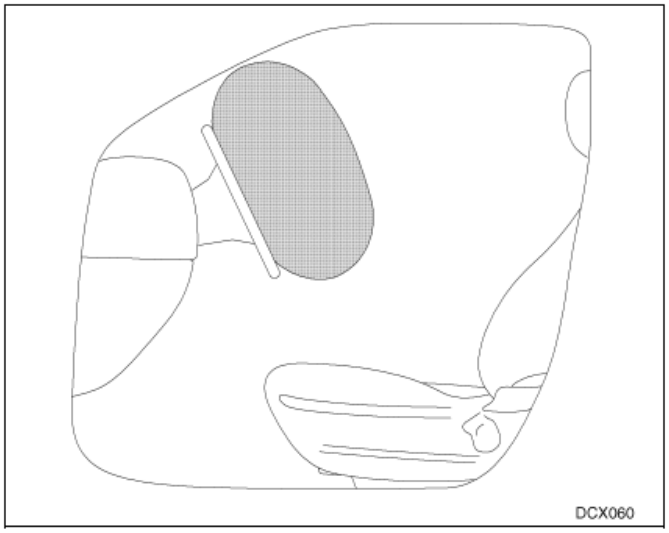
NOTE: Illustration represents the maximum dynamic deployment shape.

The driver airbag deployment zone is identified as follows:
1. Vertical plane passing through the center of the steering wheel
2. 475 mm (18.7 in.)
3. Vertical plane passing through the maximum rearward point that the driver airbag cushion reaches
4. Steering wheel
5. Driver airbag retainer/housing
6. Driver airbag cushion

NOTE: Illustration represents the maximum dynamic deployment shape.



NOTE: Illustration represents the final deployment shape.

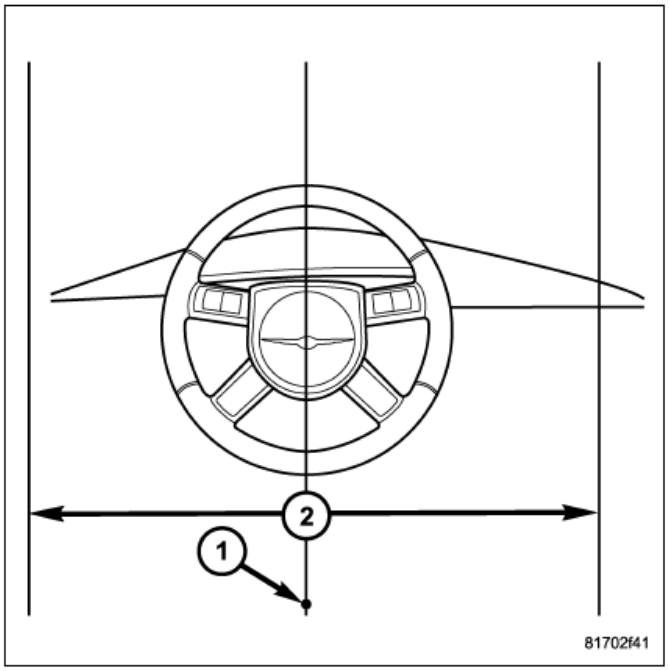


DRIVER AIRBAG/STEERING COLUMN SPECIFICATIONS

Driver Airbag Cushion Position	
DAB diameter when full	673 mm (26.5 in.)
DAB depth when full	381 mm (15 in.)
Maximum rearward displacement during fill	475 mm (18.7 in.)
Steering Column Tilt Position Range	
±2.7 degrees from steering column tilt pivot point	
21.0 degrees from vertical is the nominal position	

The driver airbag lateral deployment zone is identified as follows:

1. Driver seating reference
2. Driver airbag cushion lateral deployment zone is 711 mm (28.0 in.)

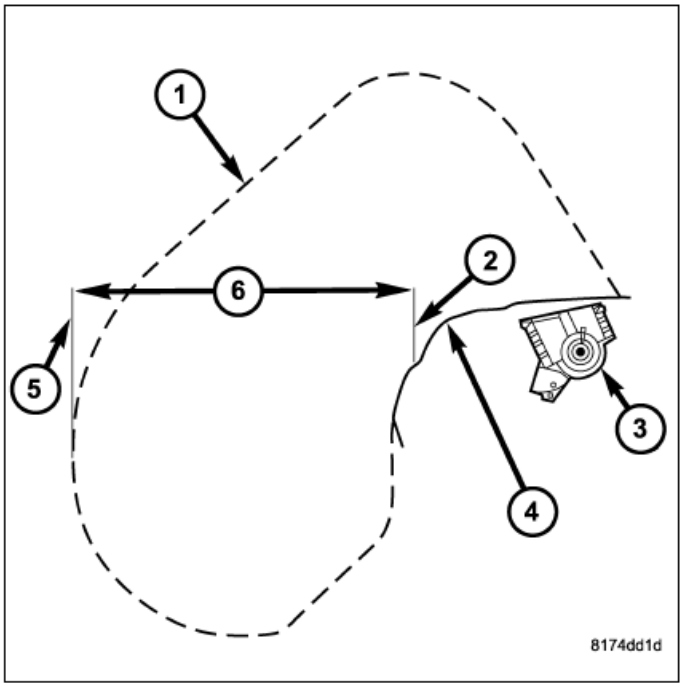


PASSENGER AIRBAG DEPLOYMENT ZONE

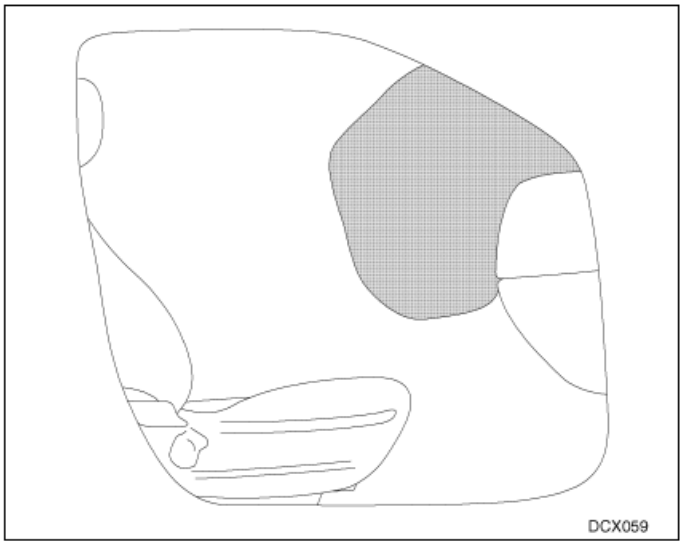
The passenger airbag deployment zone is identified as follows:

1. Passenger airbag cushion
2. Vertical plane from point of instrument panel
3. Passenger airbag module
4. Instrument panel
5. Vertical plane passing through the maximum rearward point that the passenger airbag cushion reaches
6. 470 mm (18.5 in.)

NOTE: Illustration represents the maximum dynamic deployment shape.

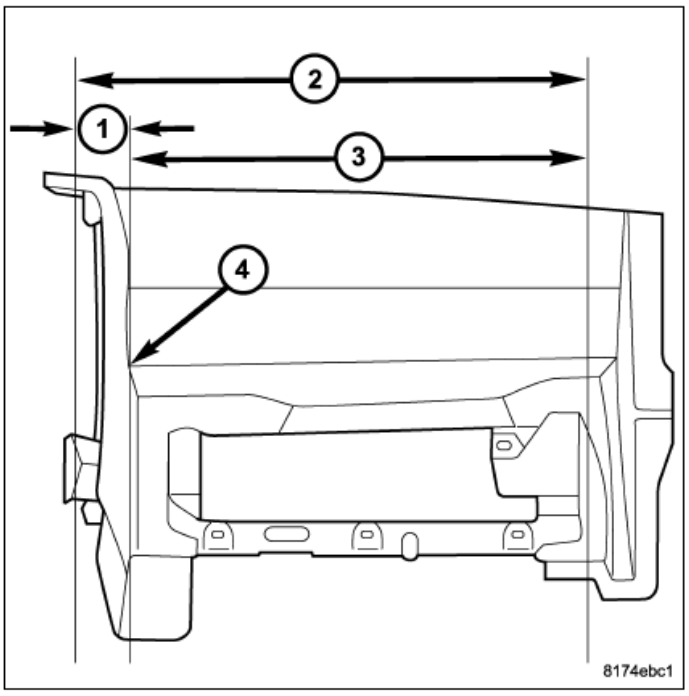


NOTE: Illustration represents the final deployment shape.



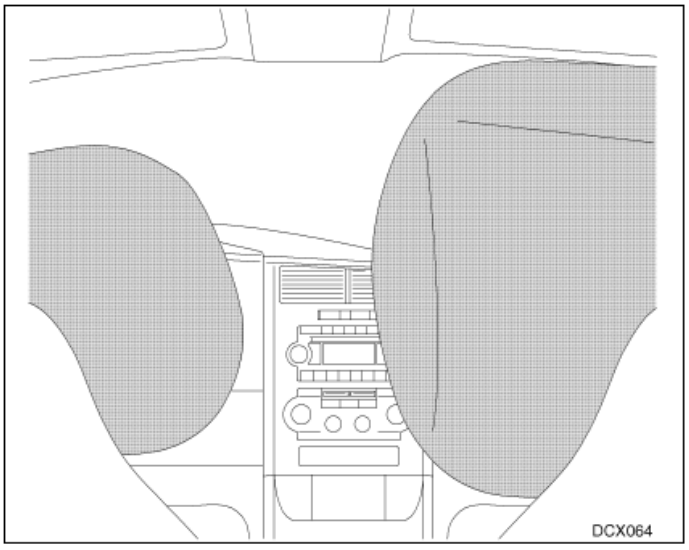
The passenger airbag lateral deployment zone is identified as follows:

1. 71 mm (2.8 in.)
2. Passenger airbag cushion deployment zone
3. 518 mm (20.4 in.)
4. Reference point



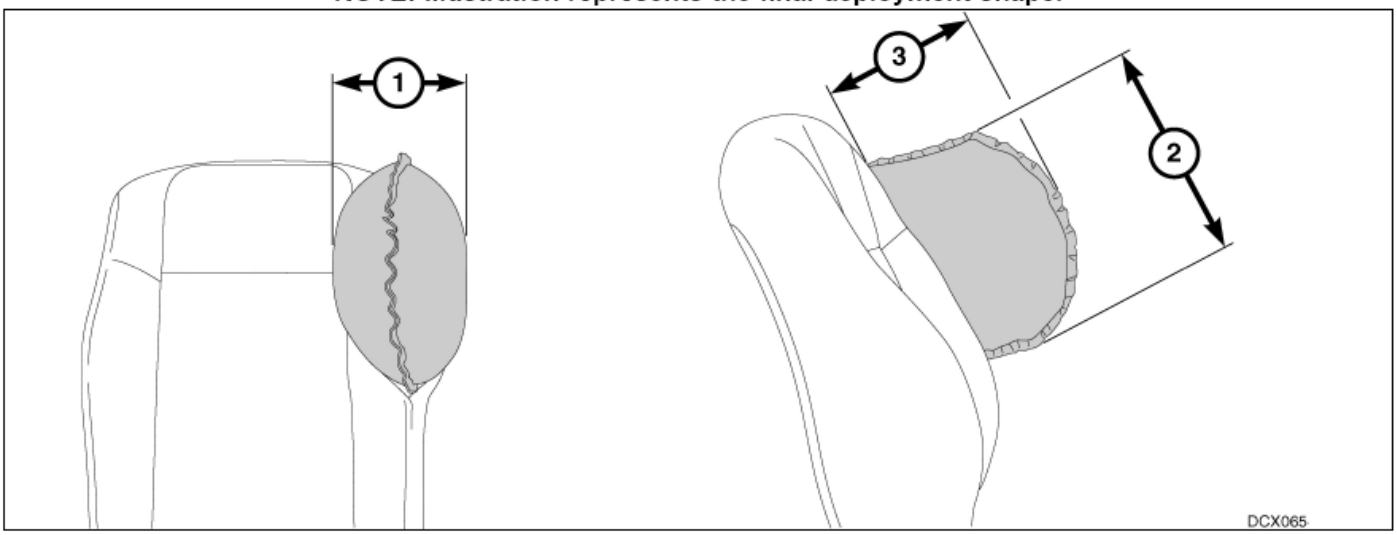
INSTRUMENT PANEL CENTER STACK AREA

Make sure to allow sufficient space so the driver and passenger airbag deployment is not impeded by any equipment mounted in the instrument panel center stack and console area.



SIDE AIRBAG DEPLOYMENT ZONE

NOTE: Illustration represents the final deployment shape.



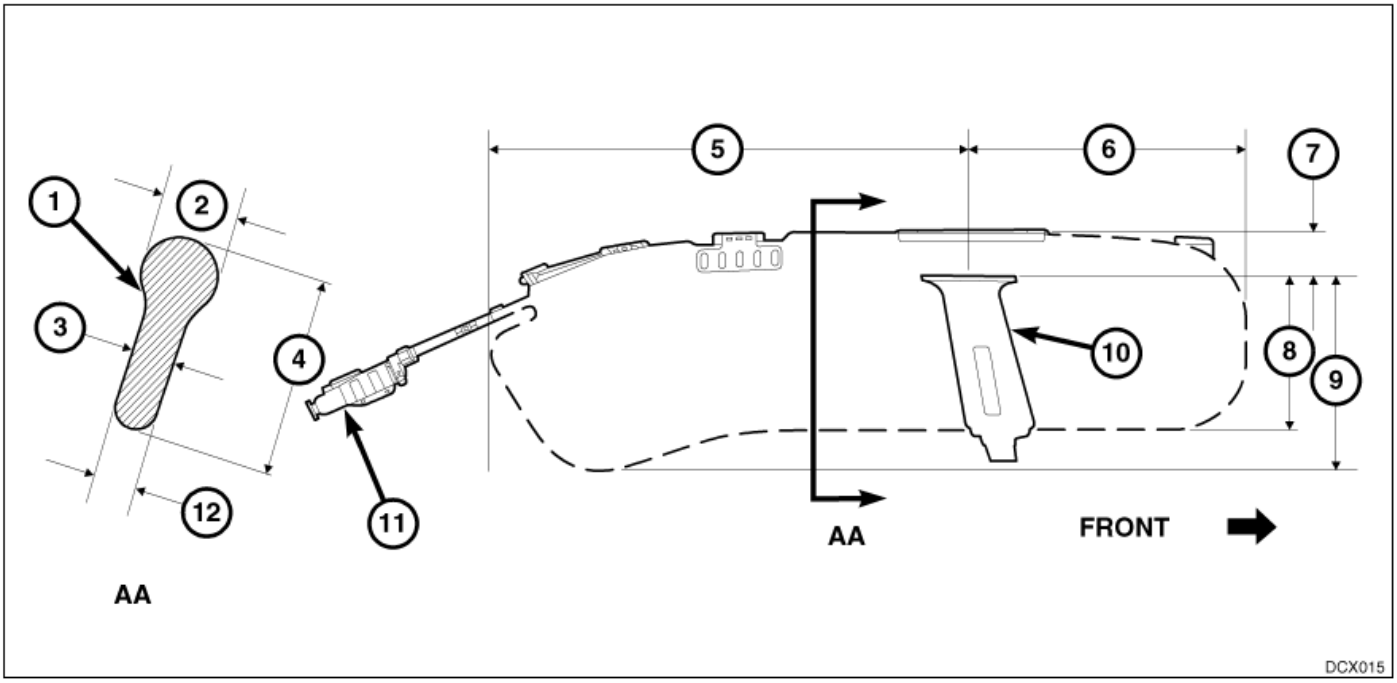
The side airbag deployment zone is identified as follows:

1. 200 mm (7.9 in.)
2. 315 mm (12.4 in.)
3. 285 mm (11.2 in.)

If your vehicle is equipped with left and right seat mounted side airbags, do not have any accessory or equipment items installed in the deployment zones.

SIDE CURTAIN AIRBAG DEPLOYMENT ZONE

If your vehicle is equipped with left and right side curtain airbags, do not have any accessory items installed which will alter the roof. Do not add roof racks that require permanent attachments (bolts or screws) for installation on the vehicle roof. Do not drill into the roof of the vehicle for any reason. Do not install any equipment on the A, B, C, or D pillar above the bottom of the side glass.



The side curtain airbag deployment zone is identified as follows:

1. Cross–sectional area side view
2. 155.0 mm (6.1 in.)
3. 79.0 mm (3.1 in.)
4. 401.3 mm (15.8 in.)
5. 970.3 mm (38.2 in.)
6. 559.0 mm (22.0 in.)
7. 91.4 mm (3.6 in.)
8. 310.0 mm (12.2 in.)
9. 389.0 mm (15.3 in.)
10. B-pillar trim
11. Side curtain airbag inflator module
12. 89.0 mm (3.5 in.)

VEHICLE MODIFICATIONS

CAUTION: It is imperative that all occupant restraint system components remain in their original location and orientation. Any modification, removal, or relocation of components may be detrimental to the occupant restraint system performance and is prohibited. Any vehicle modification that may affect the occupant restraint system characteristics should be verified through vehicle calibration/impact testing.

OCCUPANT RESTRAINT SYSTEM WIRING
All occupant restraint system wiring must remain intact and may not be used for any other purpose. This includes the driver and front passenger seat wiring. Any electrical connector that is yellow is part of the occupant restraint system and should not be modified or used for other purposes.

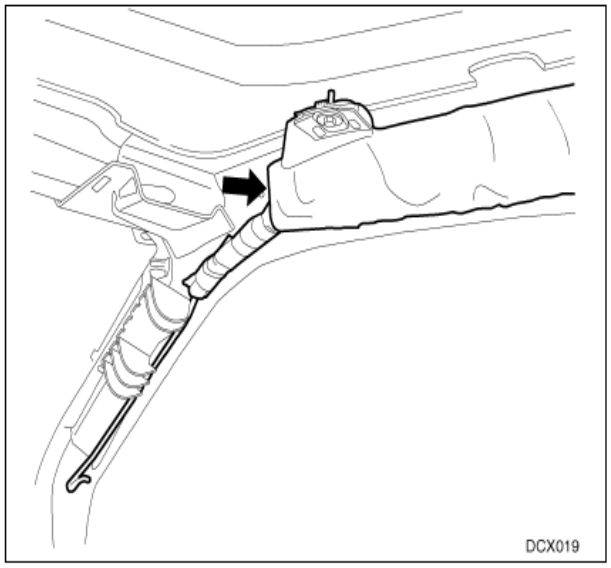
OCCUPANT RESTRAINT SYSTEM VERIFICATION
After any modification work is complete, confirm the occupant restraint system readiness as follows:
• Turn the ignition key to the ON position. The airbag lamp in the instrument cluster illuminates for 6 to 8 seconds, and then turns off. If the airbag lamp fails to illuminate, repeatedly cycles on and off, or does not turn off, have the condition corrected by an authorized Chrysler LLC dealership before shipping the vehicle to the customer.

PASSENGER COMPARTMENT

ROOF MOUNTED EQUIPMENT
If the vehicle is equipped with side curtain airbags, take care when installing equipment in the roof area to avoid drilling or installing fasteners in the side curtain airbags area. Also make sure that no equipment installed inside the vehicle interferes with the airbag deployment areas. If additional wiring needs to be routed on the sides of the roof, take care so the installed harness does not impede the airbag deployment. Point fasteners used to attach roof mounted equipment outward from the passenger compartment to minimize risk of head injury and not alter the head impact protection system (FMVSS 201) that is standard on these vehicles. Do not allow fasteners to extend into the passenger compartment, even between the roof and headliner.

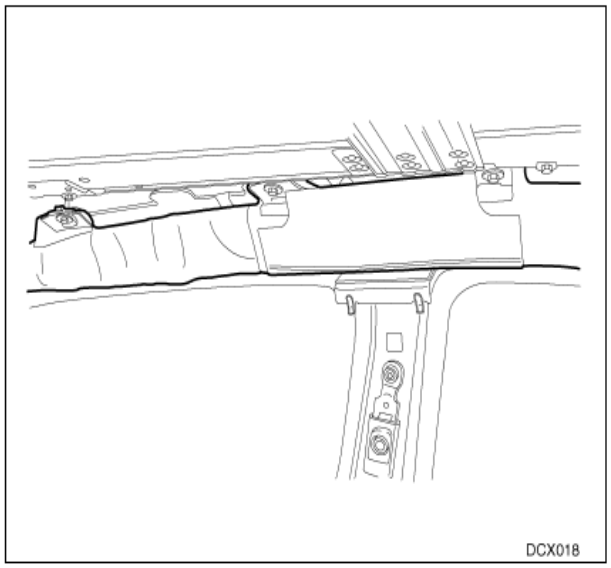
The following graphics represent the location of the side curtain airbags. Installing equipment or installing fasteners that interfere with the side curtain airbag components or impede the side curtain airbags deployment is not permitted.

NOTE: Right side curtain airbag shown, left side similar.



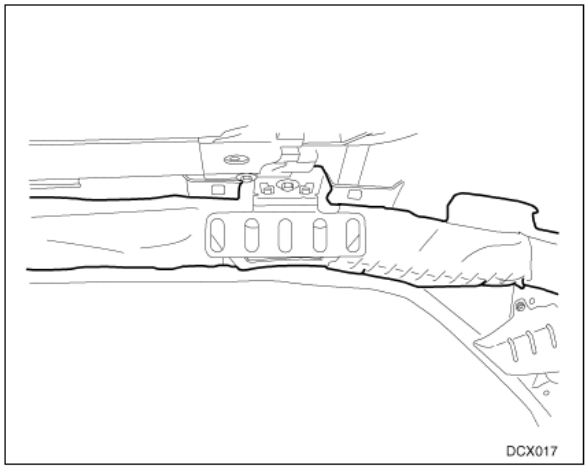
SIDE CURTAIN AIRBAG – FRONT ROOF AREA

NOTE: Right side curtain airbag shown, left side similar.



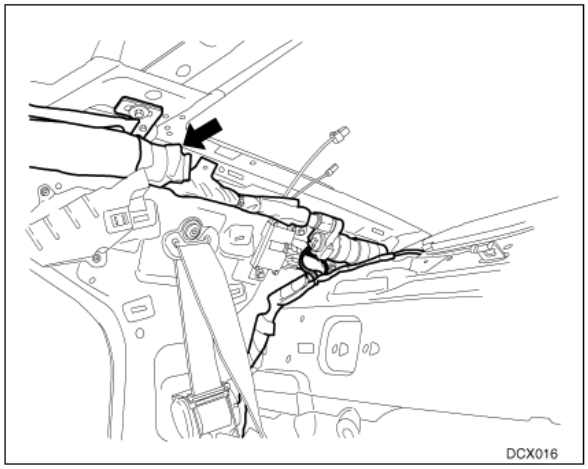
SIDE CURTAIN AIRBAG – CENTER ROOF AREA

NOTE: Right side curtain airbag shown, left side similar.



SIDE CURTAIN AIRBAG – REAR ROOF AREA

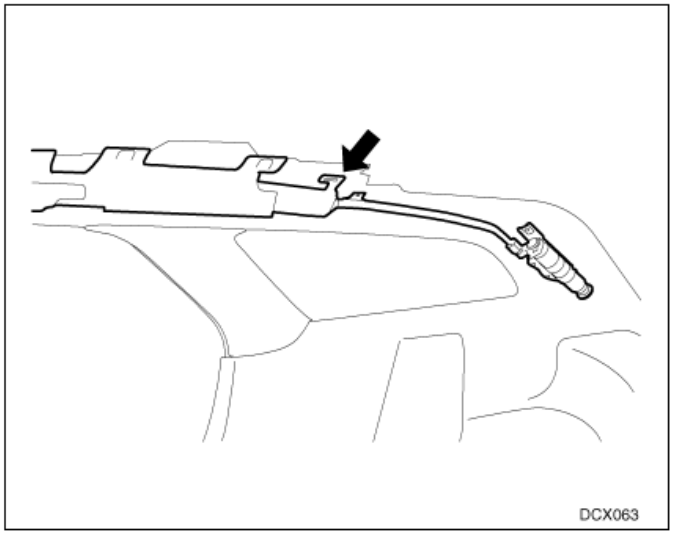
NOTE: Right side curtain airbag shown, left side similar.



SIDE CURTAIN AIRBAG – C-PILLAR AREA (CHARGER)

SIDE CURTIAN AIR BAG DODGE MAGNUM

NOTE: Right side curtain airbag shown, left side similar.



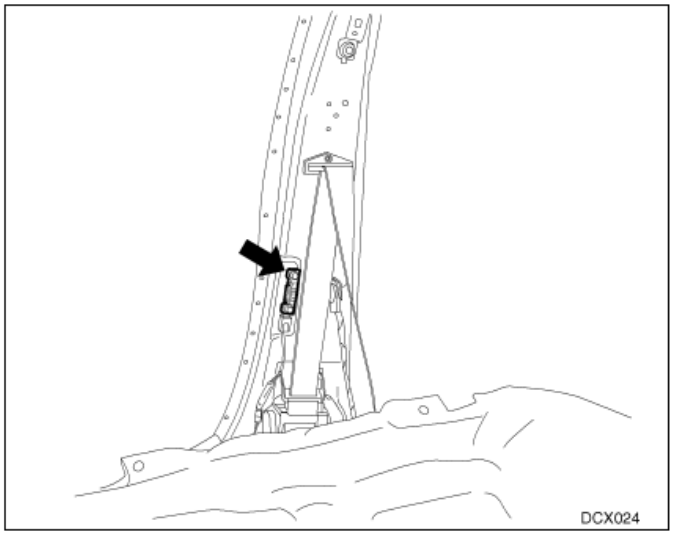
SIDE CURTAIN AIRBAG – C AND D-PILLAR AREA (MAGNUM)

SIDE IMPACT SENSORS

If the vehicle is equipped with side curtain airbags, 4 side impact sensors are mounted inside the vehicle. The location and the orientation of the side impact sensors are critical for correct operation of the occupant restraint system. Do not use the side impact sensor mounting screws as equipment mounting attachment points.

An impact sensor is mounted on the inside of each B-pillar beneath the trim panel.

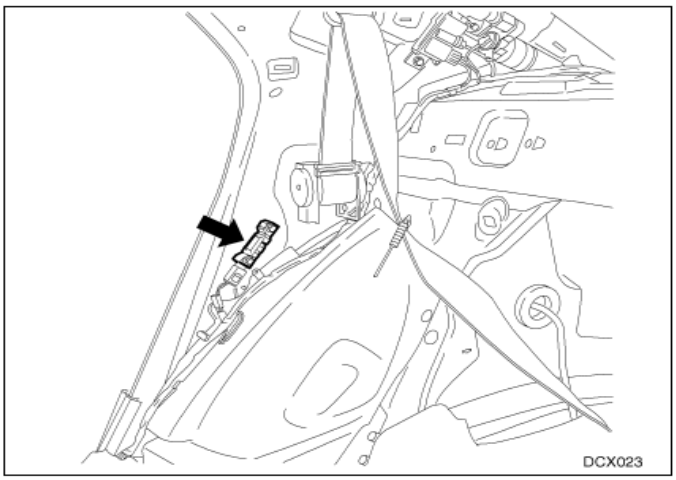
NOTE: Right side B-pillar impact sensor shown, left side similar.



SIDE CURTIAN AIR BAG DODGE CHARGER

An impact sensor is mounted on the inside at the base of each C-pillar beneath the trim panel.

NOTE: Right side C-pillar impact sensor shown, left side similar.



SEAT BELTS

All 5 seat belts are equipped with seat belt retractors. The position, orientation, and the mounting bolt torque value are critical for correct operation of the seat belt retractors. Do not move any seat belt mounting point and do not use the seat belt bolts to install equipment. When installing equipment make sure that no interference with the seat belts exist when they are in use. If any of the seat belt mounting bolts are temporarily removed make sure that they are reinstalled properly and that the bolts are tightened to correct torque value. For torque values and complete removal and installation of the seat belts information, refer to the 2008 Dodge Charger and Magnum Service Manual.

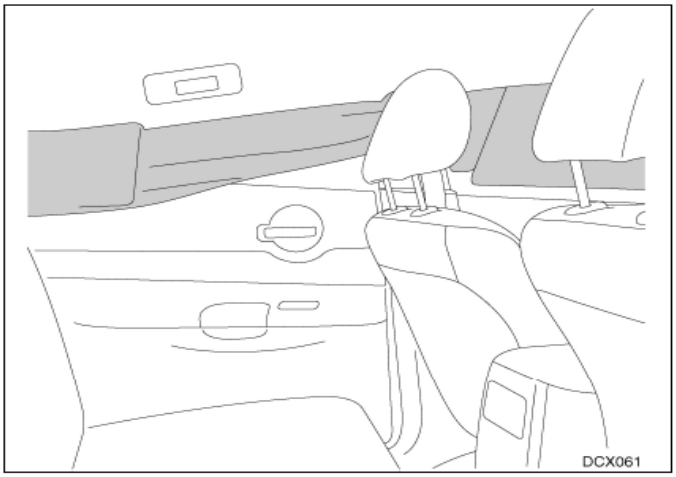
PRISONER PARTITION

If installation of a prisoner partition is intended, the vehicle in question needs to be ordered without left and right side curtain airbags.

WARNING: INSTALLING A PRISONER PARTITION IS NOT RECOMMENDED ON VEHICLES EQUIPPED WITH LEFT AND RIGHT SIDE CURTAIN AIRBAGS, AS THE PRISONER PARTITION MAY INTERFERE WITH AIRBAG DEPLOYMENT AND RESULT IN SERIOUS OR FATAL INJURY IN AN ACCIDENT.

Make sure the area where the side curtain airbag is located remains free from any obstructions.

NOTE: Left side curtain airbag deployed shown, right side curtain airbag similar.



Make sure the prisoner partition does not interfere with the passenger seat and with the seat belt retractors. Once installed, make sure that the prisoner partition does not restrict the front seats and the seat belt operation. In addition, the prisoner partition must block the access to the front passenger seat tracks by a person sitting in the back seat.

FRONT SEAT & GRILL AREA

SEATS

CAUTION: When installing additional equipment around the front seats, consider the following restrictions:

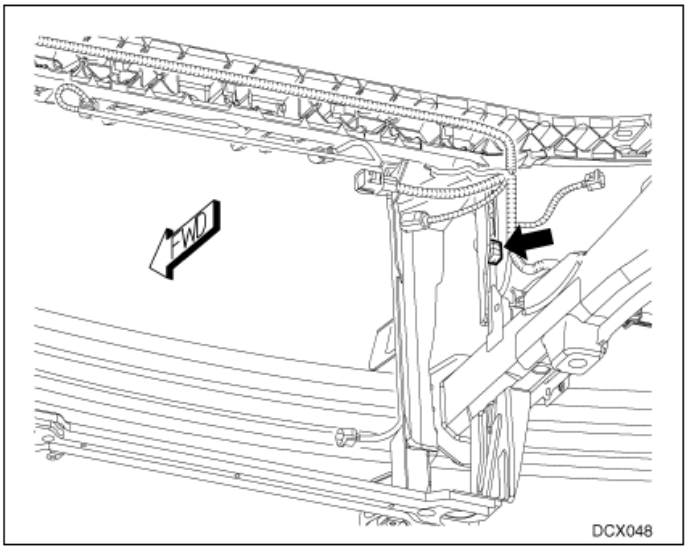
- **Make sure no equipment is installed or attached to the passenger seat.**
- **No seat modifications of any type are permitted.**
- **Make sure that no equipment interferes with the seats when the seating position is adjusted.**
- **Do not use the seat mounting bolts to attach any piece of equipment. If the seats are removed from the vehicle, tighten the seat bolts to the appropriate torque value specified in the 2008 Dodge Charger and Magnum Service Manual.**

FRONT GRILL AREA

FRONT IMPACT SENSORS

Two front impact sensors are installed on the Dodge Charger and Magnum, one each for the left and right sides of the vehicle. Each front impact sensor is mounted with two screws to the backs of the right and left vertical members of the radiator support within the engine compartment. The location and the orientation of the front impact sensors are critical for correct operation of the occupant restraint system. Do not use the front impact sensor mounting screws as equipment mounting attachment points.

NOTE: Right front impact sensor shown, left front impact sensor similar.



REAR SEAT BACK REMOVAL

Below are pictures showing (1) the rectangular slots that retain the spring clips (2) on the seat back.

Rectangular slots (1) that spring clips (2) go into.

Spring clips (2) that snap into rectangular slots (1). There is one on each side of the seat back.

To remove the seat back you need a trim stick/bar. If the stick/bar is angled it is much easier to depress and release the spring clips. The spring clips are about 6 inches down from the top of the speaker shelf. Depressing the spring about ½ inch will release it.

FLOOR COVERING

CONSTRUCTION

The vinyl floor in the Charger is of a multi-compartmental design. There are 3 floor modules that comprise the entire floor. The modules are as follows:

- Drivers
- Passengers (Front)
- Passengers (Rear)

In the event of material failure or environmental contamination each of the 3 modules can be ordered separately.

Floor Covering Modules