PAINLESS®
PERFORMANCE PRODUCTS

Wire Harness Installation Instructions

20103: 21 Circuit – Classic Customizable Muscle Car Harness

Manual 90643

Painless Performance Products recommends you, the installer, read this installation manual from front to back before installing this harness.

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If you have any questions concerning the installation of this harness, feel free to call Painless Performance Products' Tech Line at 1-800-423-9696. The Tech Line can be reached from 8 A.M. to 5 P.M. central time, Monday through Thursday, and 8 A.M. to 4:30 P.M. on Fridays.

We have attempted to provide you with as accurate of instructions as possible and are always concerned about corrections or improvements that can be made. If you have found any issues or omissions, or simply have comments or concerning these instructions, please write us at the above address, send us a fax at (817) 244 – 4024, or email us at painless@painlessperformance.com. We sincerely appreciate your business.

Painless Performance Products, LLC shall in no event be liable in contract or tort (including negligence) for special, indirect, incidental, or consequential damages, such as but not limited to, loss of property damage, or any other damages, costs or expenses which might be claimed as the result of the use or failure of the goods sold hereby, except only the cost of repair or replacement.

2nd Edition – September 2020

CAUTION: BEFORE THE REMOVAL OF YOUR ORIGINAL HARNESS AND/OR THE INSTALL OF YOUR NEW PAINLESS HARNESS, DISCONNECT THE POWER FROM YOUR VEHICLE BY REMOVING THE NEGATIVE OR POSITIVE BATTERY CABLE FROM THE BATTERY.

- **A full-color copy of these instructions can be found online at:**
  http://www.painlessperformance.com/manuals/20103.pdf
- **If your vehicle has an existing harness, you will want to retain it for the re-use of various pigtails and connector housings particular to your application. During the removal process, avoid making any unnecessary cuts.**
- **This harness is universal. This means most/all ends are left open to allow you to cut each wire to length and make the appropriate connection. The small parts package and the bag kits with terminals and connectors included with the harness will enable you to make connections.**
- **Only printed wires have a 900-series number. These 900-series numbers are used to identify various wires and circuits in the wiring diagrams that are a part of these instructions. These 900 series numbers DO NOT reference any factory circuit number designations found on any factory schematics.**
- **This harness will not support the use of a factory or aftermarket Ammeter.**

If there are unused or unconnected wires, they will need to have their ends terminated with an insulated terminal or electrical tape. Doing so will prevent the wires from shorting and causing harness failure or fire.

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INTRODUCTION

Thank you for your purchase of a Painless Performance Products harness. This is a customizable harness; therefore, we suggest you retain your original harness for any unique plugs or connectors you may need while installing your new harness.

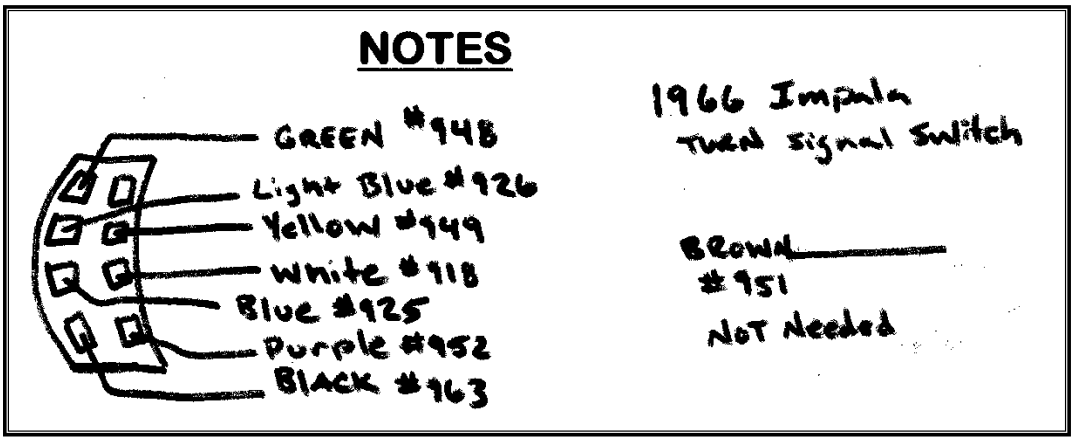
The fuse block is pre-terminated, and the proper fuses for each circuit are pre-installed. All wires are colored based on GM color codes. Also, each wire is marked with a 900-series wire number, what section the wire is in, and the wire's function. These 900-series numbers are assigned by Painless and do not correspond to any circuit numbers found on any factory wiring schematics. A **Wire Index** is located on page 130 and provides a quick reference guide for the individual wires of this harness. The Wire Index identifies the gauge, color, what is printed on the wire, and point of origin for each wire.

During this manual, you will notice wires with a slash (**Ex. BLUE/WHITE**). This indicates a wire with a stripe. The first color listed is the main wire color, and the second color will reference the stripe color. Therefore, the **BLUE/WHITE** example will be a **BLUE** wire with a **WHITE** Stripe.

Do not let the length of this instruction manual intimidate you. Much of the information contained in this manual is helpful information about each wire, where the wire comes from, where it goes, why a component needs it, etc. In many cases, there are multiple schematics as well as alternate connection options for the same wire/connection point due to this being a customizable harness. You will find that the actual install portions of this manual are straightforward and easy to follow.

Individual components and sections are tied together for easy routing of the harness. GM color-coded wires, along with the schematic diagrams found throughout this manual and the printed circuit numbers and description printed on the wire, will help you identify the different circuits during installation and later on if additions to the overall system are necessary.

As you read through this installation manual, prior to installing your new harness, you will find blank areas titled **NOTES** in each section and the back of the manual. You may find these sections beneficial for taking your notes, listing components you are connecting to on your vehicle, and listing the factory or manufacturer wires that are coming from the component. You can then use the text in the manual and the wire index in the back of the manual to identify the wire and circuit number in the Painless harness that will connect to that requirement. For example, a turn signal switch for a 1966 Impala:

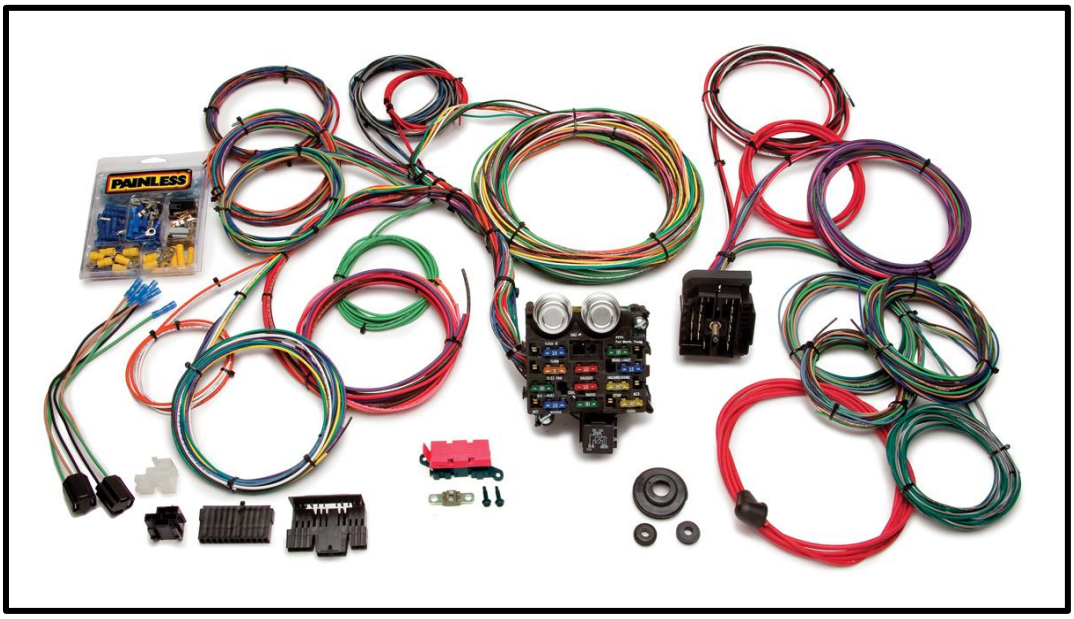


CONTENTS

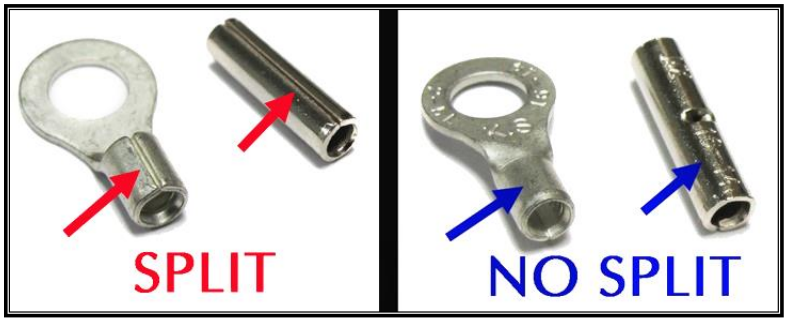
Refer to the **Contents Figure** (below) to take inventory. See that you have everything you are intended to have in this kit. If you find that anything is missing or damaged, please contact the dealer where you obtained the kit or Painless Performance at (800) 423-9696.

The Painless Wire Harness 20103 should contain the following:

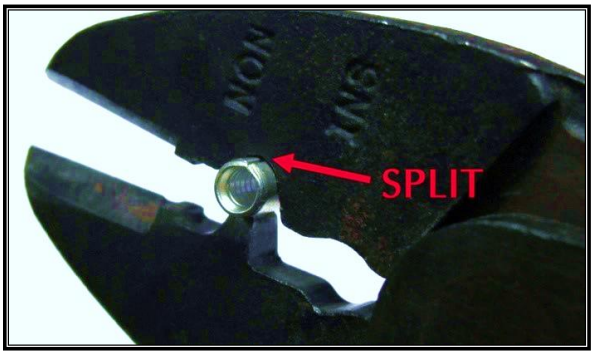
- Pre-terminated fuse block and harness.
- Pre-terminated firewall bulkhead harness.
- Parts Kits: (1) insulated loose piece terminals kit
- 2 bag kits: Alternator bag & a bag w/ zip ties and other parts
- This manual: 90643



SMALL PARTS



This Painless harness includes several parts kits containing a variety of terminals, fuses, and screws. A few of the terminals are non-insulated and require heat shrink to be applied after the terminal is properly crimped. Heat shrink is supplied with this kit.



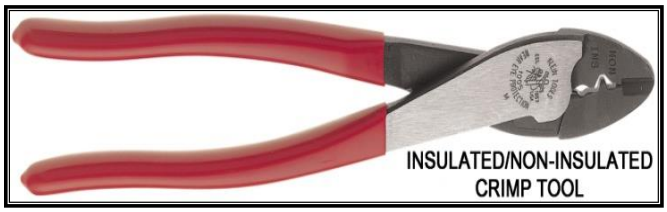
These non-insulated terminals allow you to keep a cleaner, more factory look; colored insulated terminals can look out of place. When crimping these terminals, take notice of the split in the terminal. Always make sure the split in these non-insulated terminals is facing the groove.

TOOLS NEEDED

In addition to your regular hand tools, you will need, at least, the following tools:

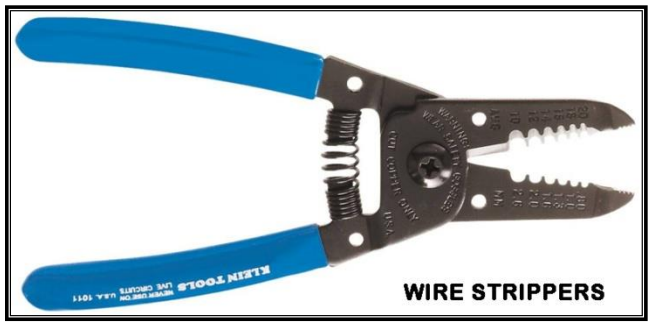
- **Wire Crimping and Stripping Tools:**

This style of hand crimper can be purchased from just about any local auto parts store, home improvement store, or can also be purchased online. You will need this style of crimper to crimp the heat shrinkable and non-heat shrinkable, insulated terminals included in the small parts kit.



Another style of crimpers is “Jaw Crimpers” or “Roll-Over Crimpers.” These crimpers will crimp factory style, non-insulated terminals. These types of terminals are provided in the kit for connecting to an HEI distributor, headlights, and factory-style alternator. Painless offers “Jaw Crimpers,” such as those seen to the right, under Painless part **#70900**.

A good set of wire strippers is required to strip wire properly. This style of wire stripper is ideal for this harness install because of its ability to properly strip wire gauges 10 to 20. These are available from just about any local auto part store, electrical supply shop, home improvement store, or can be purchased online.



- **Volt/Ohm Meter:**

A Volt/Ohm meter is always a good tool to have on hand when installing any type of electrical components in a vehicle. Most basic units provide the two functions required to diagnose electrical issues seen during a harness install. These two functions are the ability to read DC Voltage and electrical continuity or Ohms. They can be purchased from any home improvement store, local hardware store, electrical supply shop, and online.

- **Electric Drill & Drill Bits:**
  A drill and bits are needed to mount the MIDI fuse holder and the fuse block.

- **Heat Gun:**
  Especially useful for the heat-shrink found in the parts kit.

- **Small (10-amp or less) Battery Charger**
  See **TESTING THE SYSTEM** located on **page 129**.
  .

- **Factory Wire Schematic**
  This is not necessary; however, having one handy is good practice with any electrical job.

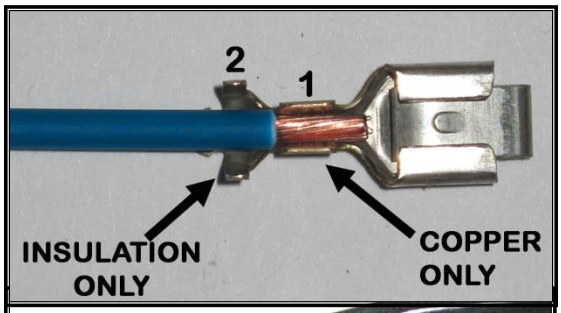
TO REMOVE A TERMINAL

With this harness being universal, many of your factory connectors or factory service pigtails will need to be re-used. Factory terminals have been provided to allow re-using the connector without having to splice to existing wires. The removal process of wires into factory style connectors is as followed:

- Notice the locking tang that holds the terminal in the connector. Locate the tang access slot on the terminal end of the connector. Push a paper clip, stiff wire, or a small flat head screwdriver into the slot to depress the locking tang on the terminal.

- Once depressed, pull the harness wire from the connector. Do not pull too hard or you could pull the wire out of the terminal; this leaves the terminal stuck in the connector. While it will still be able to be extracted from the connector, it is much easier if the wire is still intact on the terminal.

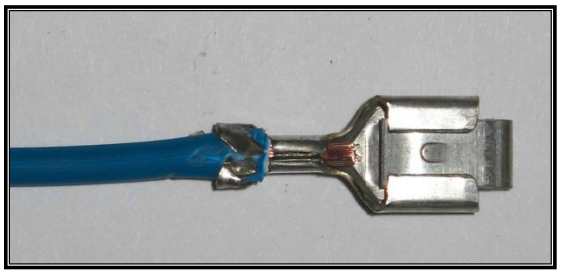
INSTALLING FACTORY STYLE TERMINALS



In the parts kit, you will see different uninsulated male and female terminals. These terminals are for factory-style connections and require rollover crimpers.

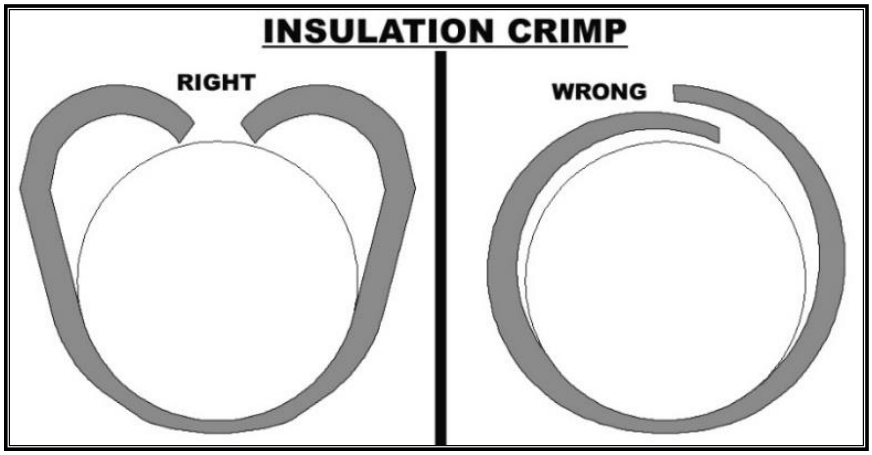
- Strip about ¼" of insulation from the wire.

- Insert the wire into the terminal. There are two terminal straps on the terminal. For instructional purposes, we will label them 1 and 2. Strap 1 crimps the exposed copper strands of the wire, while strap 2 crimps the wire insulation. Make your strip length long enough to ensure only copper strands are crimped by Strap 1 but short enough that only insulation is crimped by Strap 2. The photo to the left best demonstrates this.

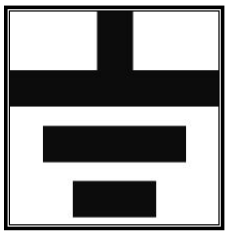


- Using the appropriate jaw on the crimpers, crimp Strap 1. The appropriate jaw depends on the wire gauge as well as the terminal stiffness. If you are unsure which jaw to use, you can always start with the biggest and work your way down until you get a tight crimp.

- With Strap 1 crimped, move onto crimping the insulation strap: Strap 2. Place Strap 2 into the appropriate jaw of the crimpers. This jaw will be larger than the one used to crimp the first strap. Crimp down on Strap 2 making sure the strap folds down into the wire, and not overlapping itself. Refer to the drawing to the left. Overlapping could cause problems with the terminal fitting into the factory connector.



GROUNDS



Throughout this instruction manual, and when looking at the Painless harness, you will see the word GROUND. Maybe you have seen the ground symbol on wiring diagrams before? What exactly is a ground and why do you need it?

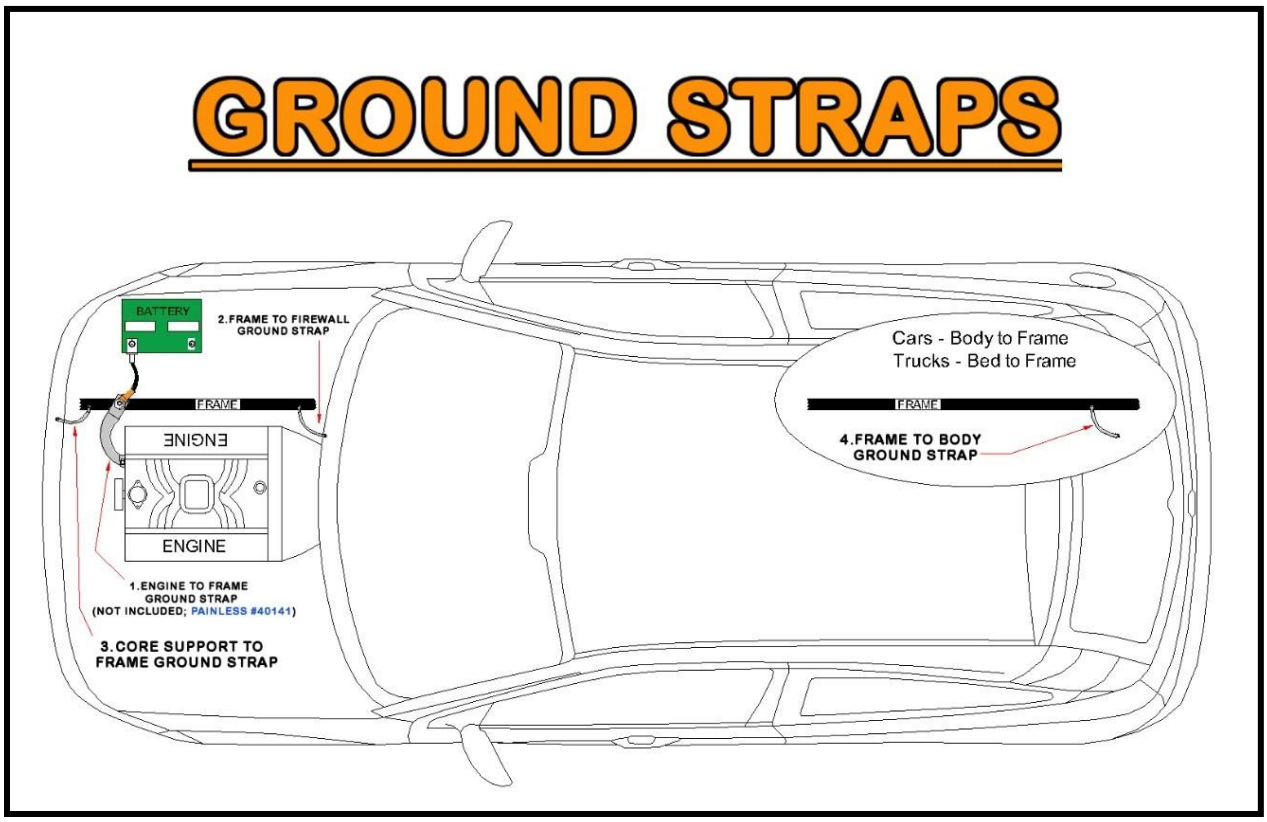
You have probably noticed the large cable coming from the negative side of your battery going down to the frame or the engine. This cable allows voltage to get back to the battery through the metal of the frame and all the other metal pieces bolted to the frame. It is also important to have ground cables going from the frame to the engine and from the frame to the body.

A ground is simply the common path electrical current follows back to the battery. A ground, or chassis ground as it is often called, is any bare metal surface found on the vehicle which is in turn connected back to the frame/negative side of the battery through mounting points and ground straps. Grounds are needed for the electrical current to complete the circuit.

There are two ways components are grounded in vehicles: through mounting or a wired connection.

Some grounds are supplied through mounting of the metal housings in which bulbs are installed, like turn signal or taillight housings. Components with plastic housings or non-conductive housings, like headlights which are glass, get their grounds through wires from the chassis harness. It will be up to you, the installer, to supply these ground wires. The only ground wires this harness contains are those for activation of the wiper motor from the wiper switch, the ground wire from the horn button to the horn relay for activation, and the ground activation wire for the dome light.

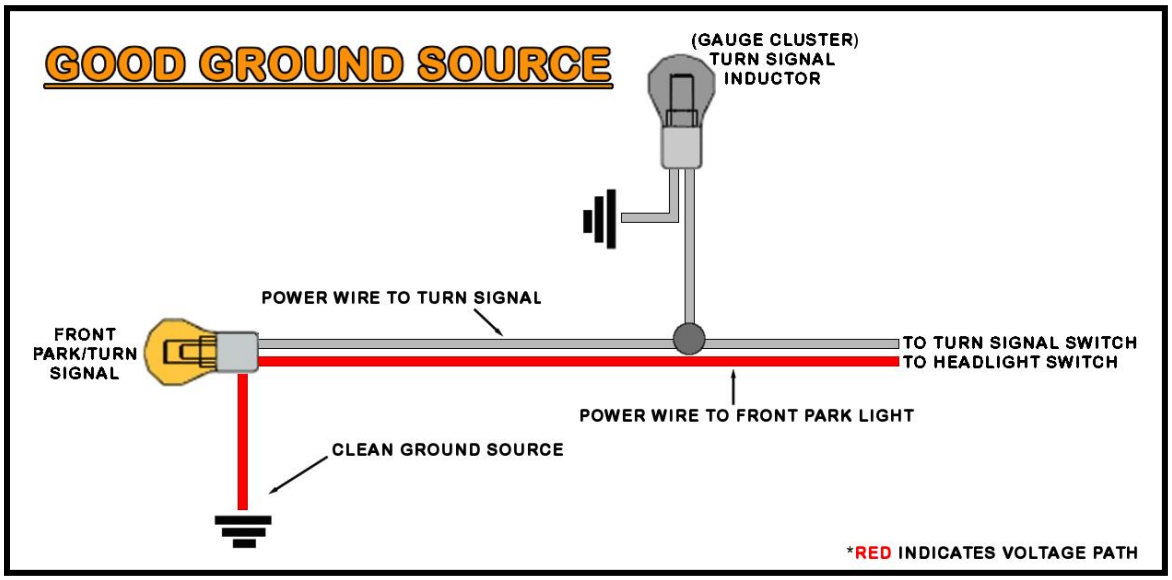
Make sure all mounting points are clean by removing any dirt, corrosion, and/or paint. This includes light housings that ground through mounting them and the harness ground wire connection point. This is especially important for cars that have recently been painted as paint build-up will cause grounding issues. 80 grit or coarser sandpaper should be all that is needed to thoroughly clean grounding points.



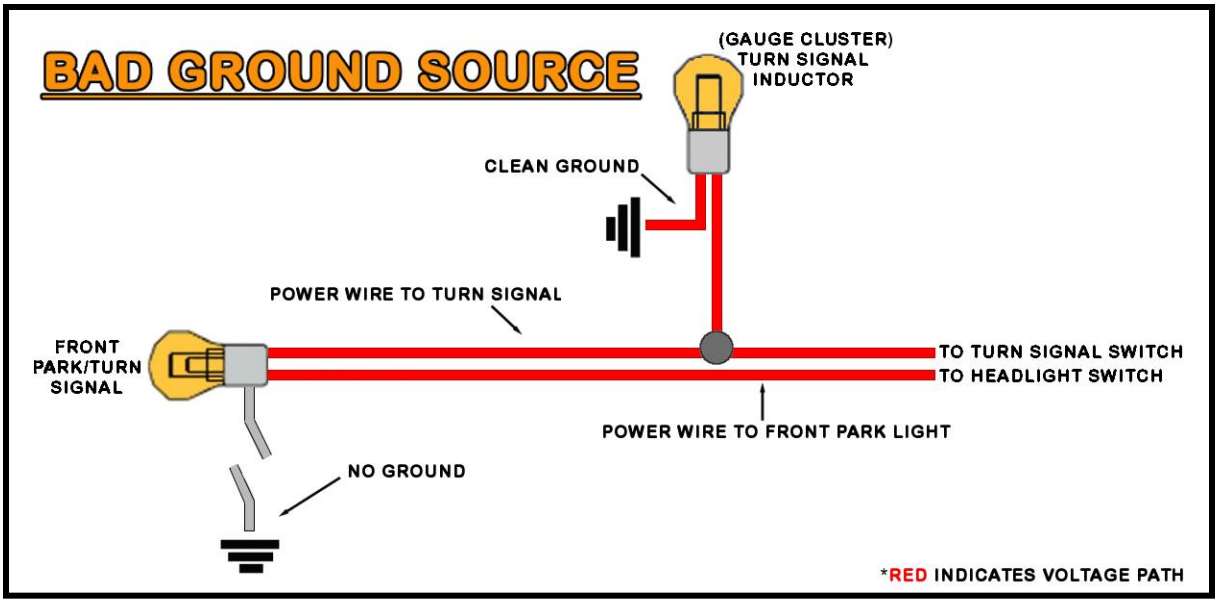
WHY ARE CLEAN GROUNDS IMPORTANT?

As an example, we will use a front turn signal that also functions as a park light. Follow the red line from right to left in the diagram below. This red line indicates the path the electrical current takes when everything is properly grounded. The diagram on the next page represents when the ground is bad. Notice which bulbs illuminate when good and bad grounds are present.

In our park light example with a good ground source, current travels from the headlight switch to the park light bulb element. Since the bulb is properly grounded, current passes cleanly through the bulb causing it to illuminate, and the current exits the bulb through the ground source back to the battery. The ground allows everything to work properly without any issues.



When a ground is not connected properly or is contaminated with dirt, corrosion, or paint, the current will then find the easiest path to ground. This is represented in the diagram below.

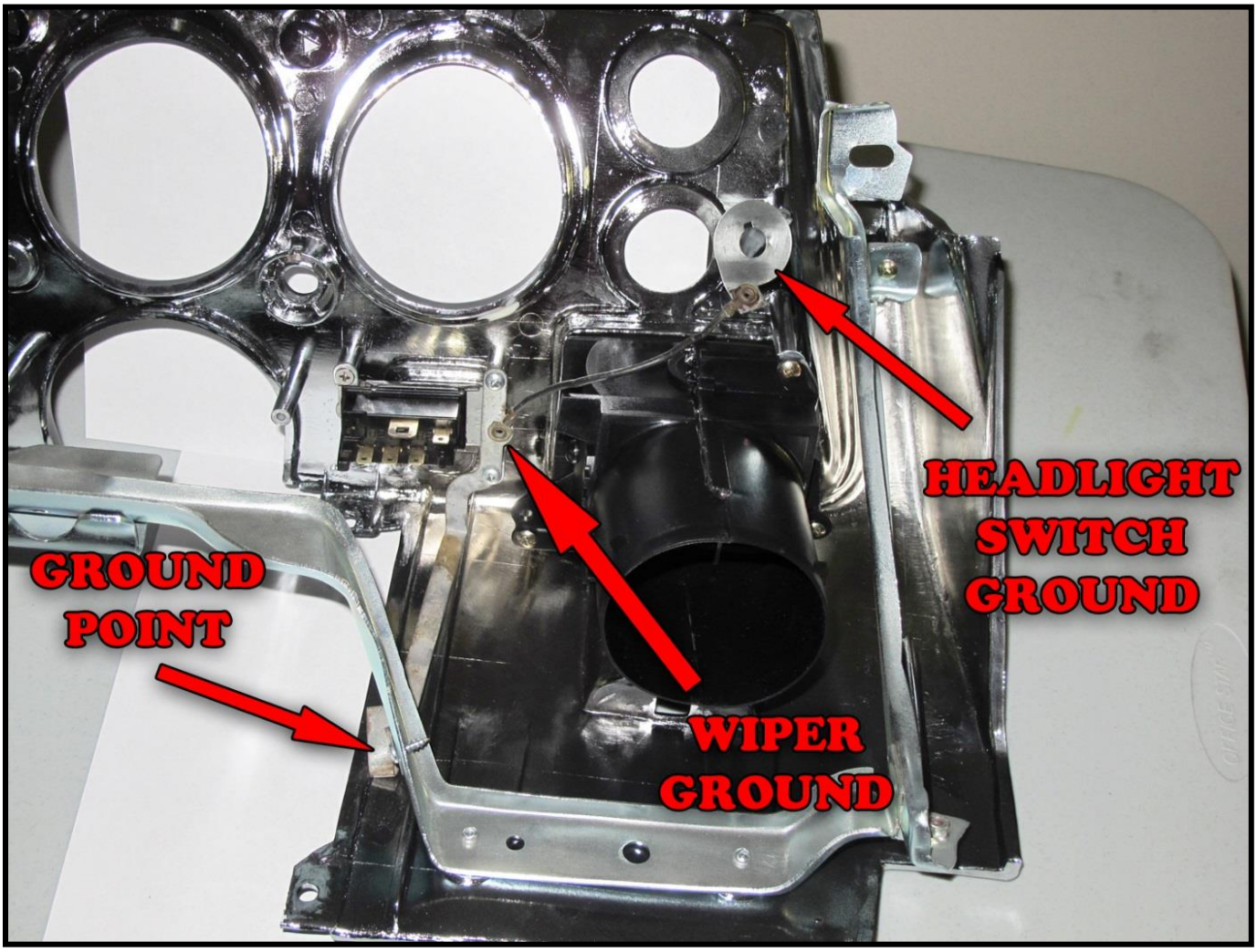


Current travels from the headlight switch to the park light bulb element. However, there is no ground at the bulb. Since the ground it normally uses is not there, the current finds another path to ground and back to the battery. When this happens, things that should not have power receive power coming from the park light bulb. Since the turn signal wire also goes to the bulb, the current will travel out of the bulb through the turn signal wire. Notice this bad ground at the front park/turn signal bulb can cause issues on the interior of the vehicle at the turn signal indicator on the dash. In this case, the turn signal indicator light is illuminated when it should not be. Also, since this one power source (which was only supposed to power one bulb) is now powering two bulbs, both bulbs may be dimmer than they would be if everything were grounded properly. This is one of the problems with diagnosing a bad ground: they can cause issues throughout the entire vehicle.

GM FACTORY & AFTERMARKET PLASTIC DASHES

Plastic dashes and gauge surrounds started being implemented in the late 1960s which affected the way many of the dash components were grounded.

Gauges and lighting were now grounded with wires but switches needing ground were done by the factory through a large strap and a ring terminal on the mounting surface of the headlight switch, all of which are tied to a dash brace.

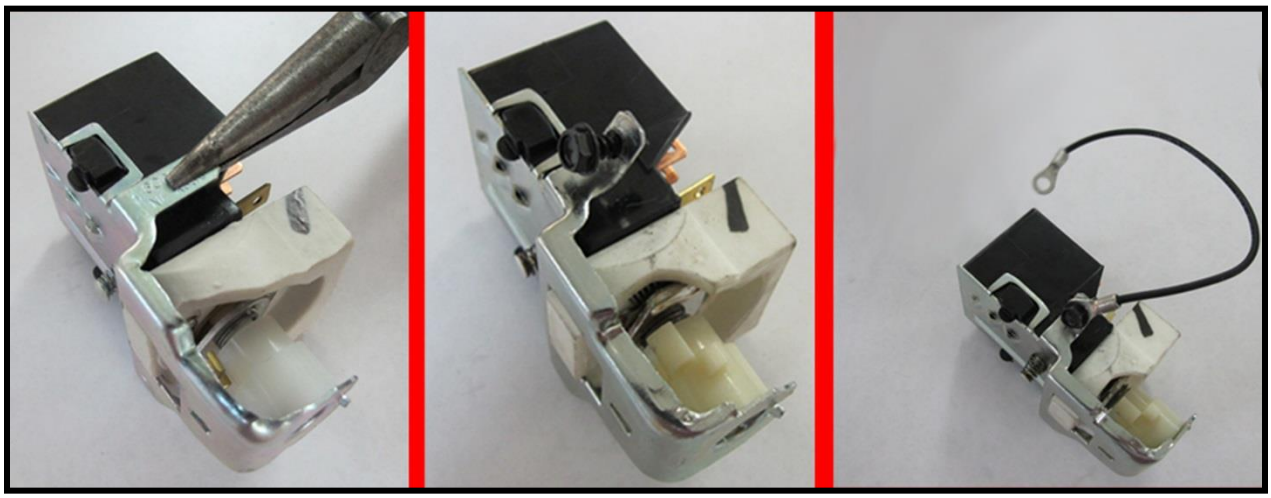


The wiper switch requires a ground because it controls the speed of the wiper motor through ground from the switch. The wiper switch was grounded by a strap to one of the switch mounting screws. If you do not have a strap, and there is evidence of where one used to be, you can simply run a ground wire from a chassis ground source to one of the mounting screws of the wiper switch. If you do not have a grounding strap, or evidence there used to be one, consult a factory schematic of your vehicle as some switches have a dedicated ground tab on the switch.

Black is a common color for a ground wire in a GM vehicle. Please be aware, that GM switches of this era had a black wire for the low-speed function to the wiper motor. Do not mistake this black wire as a ground source to the switch when referencing a factory schematic. Without a proper clean ground source to your wiper switch, your wipers will NOT work.

If you want the headlight switch to be able to activate the dome light, and the large factory ground ring is missing from your dash, you can create your own ground to the headlight switch. You will need **(2) small ½" self-tapping screws, (2) ring terminals, and a piece of scrap wire**. The headlight switch does **NOT** have to be grounded to operate the headlights, park/marker light, and gauge backlighting.

- With the headlight switch removed, use pliers to bend the pictured tab away from the switch body; about a **45° angle**.
- Install a ring terminal onto a piece of scrap wire long enough to reach a grounding point from the headlight switch.
- With one of the self-tapping screws, install the ring terminal and wire to the tab you just bent.
- Route the wire to a grounding point, cut to length, and strip ¼" of insulation from the wire. Install the other ring terminal and connect the wire to ground with the other self-tapping screw.



FUSE BLOCK

Your Painless harness contains a pre-terminated fuse block that uses modern ATC blade style fuses. There are 11 fuses controlling 21 circuits. This fuse block allows the convenience of having both flashers (turn signal and hazard), as well as the horn relay, all mounted in one location.

HORN RELAY

On the fuse block, you will find a horn relay that replaces the factory core support/firewall mounted horn relay found on many older vehicles. The fuse block mounted horn relay uses a standard 30-amp SPST relay and is ground activated from a wire in the Turn Signal Switch group of wires. Replacement relays for the horn relay can be found at any auto parts store or by ordering **Painless part number #80132**.

FLASHERS

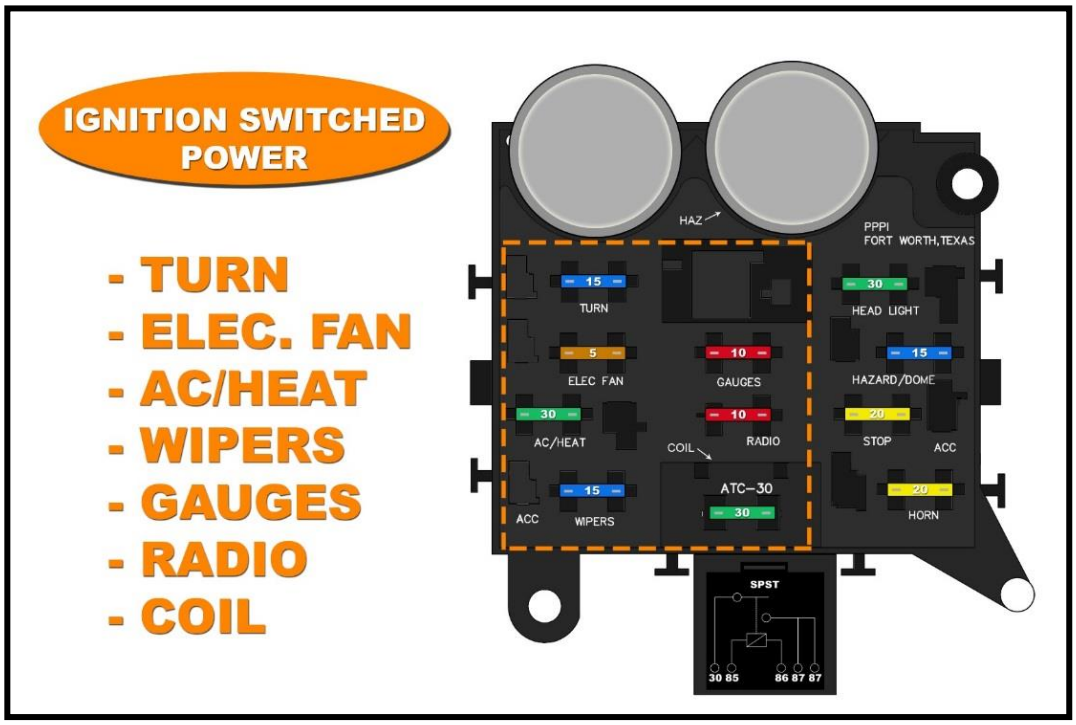
The two flashers simply switch power on and off going to the turn signal switch and hazard switch. The flasher on the right is the hazard flasher. The flasher on the left is the turn flasher.

How a flasher functions is simple. Power is switched off and on according to heat built up in the resistance wire inside the flasher. As soon as the current is drawn through the flasher, as when the turn signal or hazard switch is activated, the resistance wire heats up and contacts the output side of the flasher. This contact passes power through the flasher, into the switch and to the turn signal lamp(s). Once this contact is made, the resistance wire is no longer resisting any current, so it begins to cool; this cooling causes the flasher to lose contact. This loss of contact means that there is no longer any current going to the switch, causing the turn signal light to turn off. Once contact is lost, the resistance wire begins heating up and the entire process starts over again until the turn signal switch or hazard switch is disengaged

Some LED turn signals do not draw enough current to activate a typical thermal flasher. If you are using LED turn signals, and your turn signals do not work properly and you are certain everything is connected properly, a no-load flasher will be required **(Painless part number #80230)**.

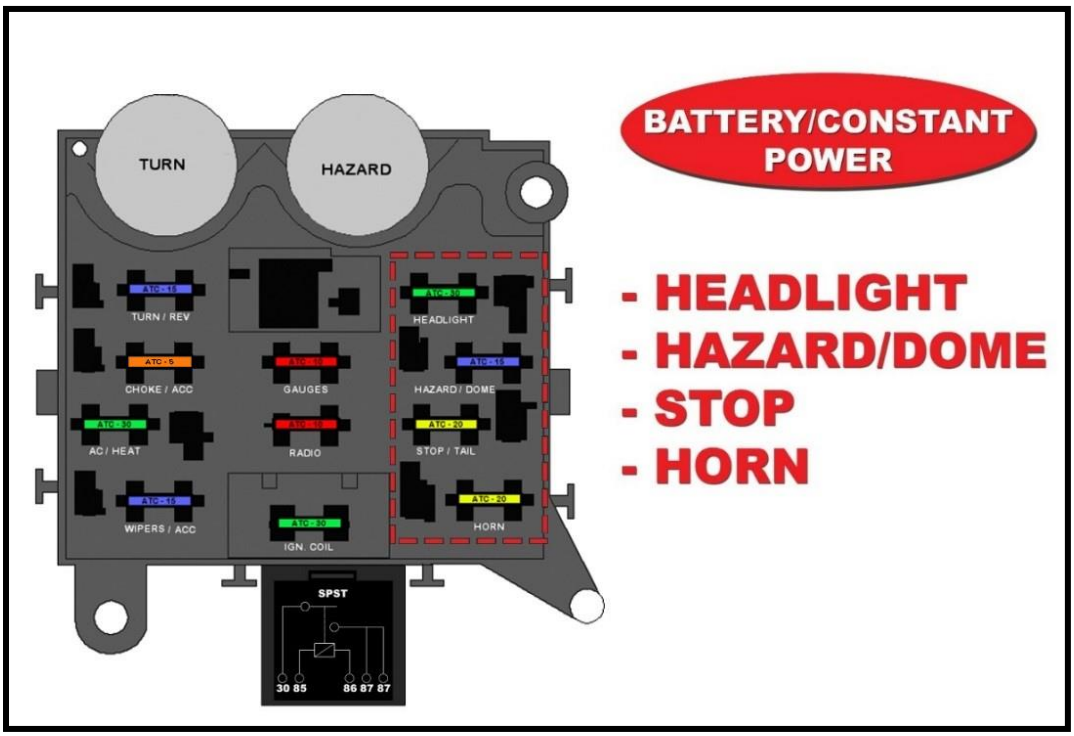
FUSE IDENTIFICATION

The following two diagrams and information will detail each fuse and which components/circuits each fuse powers.



The drawing above shows all the switched ignition fuses. These fuses are powered by wires coming from the ignition switch (wires **#931**, **#932**, and **#933)** and receive power depending on what position the ignition switch is in. **NONE OF THESE FUSES SHOULD HAVE POWER WHEN THE IGNITION IS IN THE *OFF* POSITION.** The **Ignition Switch Section** beginning on **page 92** of this manual will go into further detail about power supplied to these fuses.

The drawing below shows all the battery power fuses. These fuses are powered by a wire that comes from the MIDI fuse, seen on **page 51**. The battery power fuses always have power.



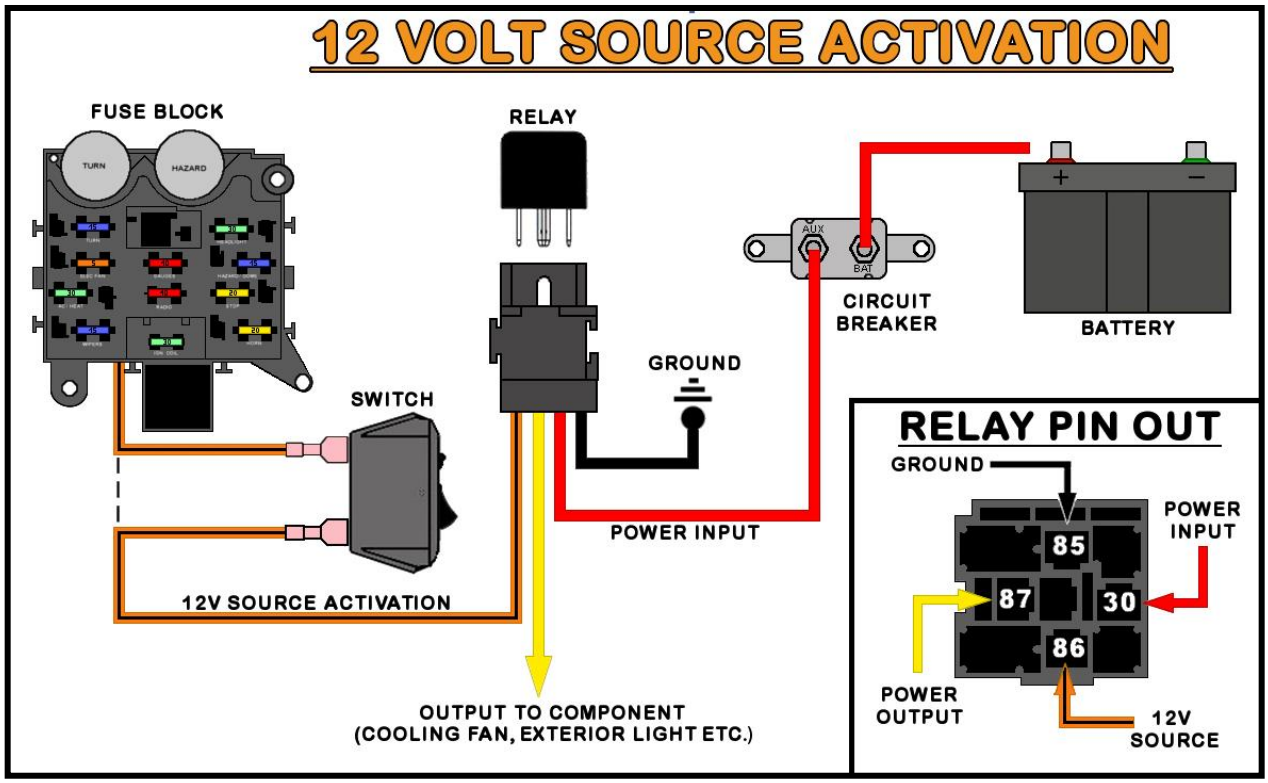
RELAYS & SWITCHES

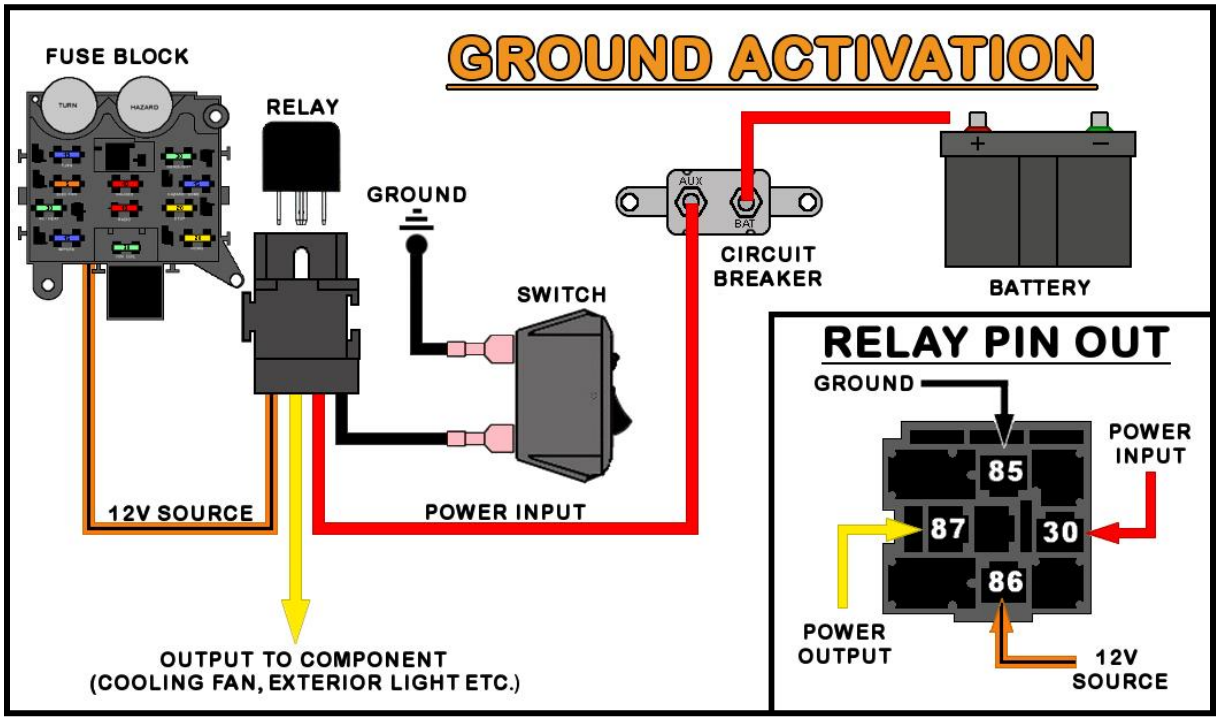
All ACCESSORY wires found in this harness can support up to 15 amps alone. Components requiring more amperage will need to be connected to a relay. The amount of amperage needed by the component will determine the size of the relay and circuit breaker needed. An ACCESSORY wire can be used as a 12-volt activation source or 12-volt source for ground activation in these circumstances. *Take a look at* ***Painless Relay Banks (part #'s 30107 & 30108) or Painless Single Relays (like part #'s 80130 & 80131)*** *to fill your relay needs at www.painlessperformance.com/webcatalog/relay.*

A 12-volt activated relay is constantly grounded. As the name implies, the relay sends power from the output side of the relay to the component being powered when 12 volts is applied. The 12-volt source can be wired directly to the relay or interrupted by a switch, as shown in the *12-Volt Source Activation* drawing.

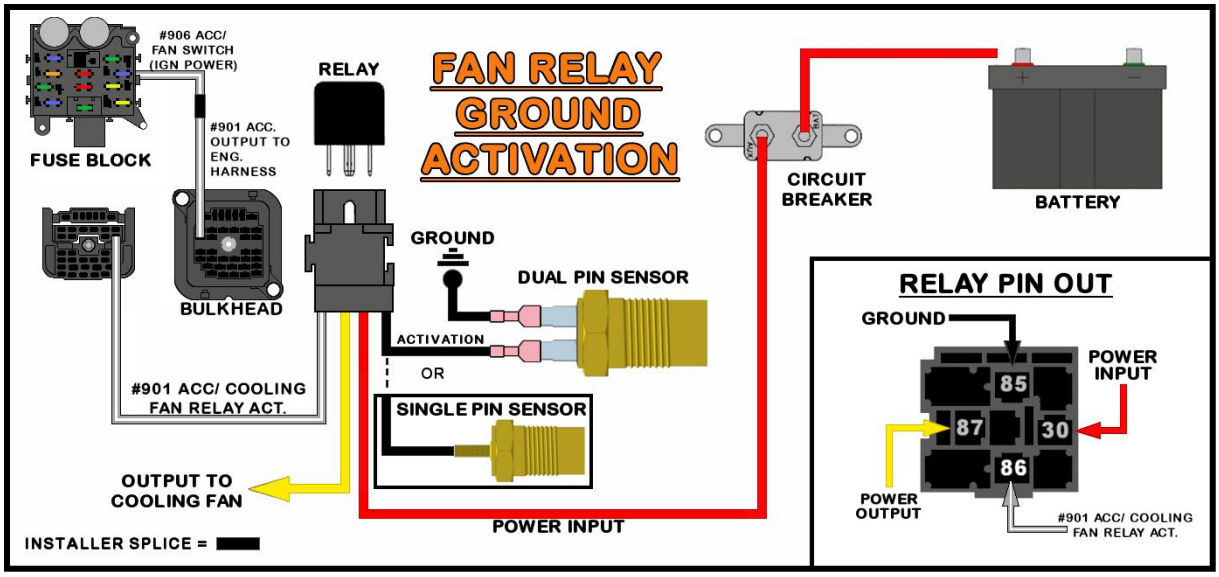
Wiring directly to the relay, as indicated by the dashed line, would be used in the case of wiring a water pump relay or any other high amperage component you would want to run continuously while the key is in the on position. In these cases, make certain the 12-volt wire you are using is an Ignition Switched 12-volt wire and not a battery constant hot.

The 12-volt activation wire can also be wired to a switch to offer the user OFF/ON capabilities. In these situations, a constant battery power source would be used. This would allow a component to be turned OFF or ON without the key in the ON position.





A ground activated relay is just the opposite of the 12-volt, activated relay; 12 volts (battery constant or switched) are supplied uninterrupted and the ground wire is switched. The Horn Relay pre-wired in the Painless harness is a Ground Activated Relay. Another example of this method is a thermostat operated fan relay. In this case, however, a thermostatic switch would replace the switch in the drawing above (see below).



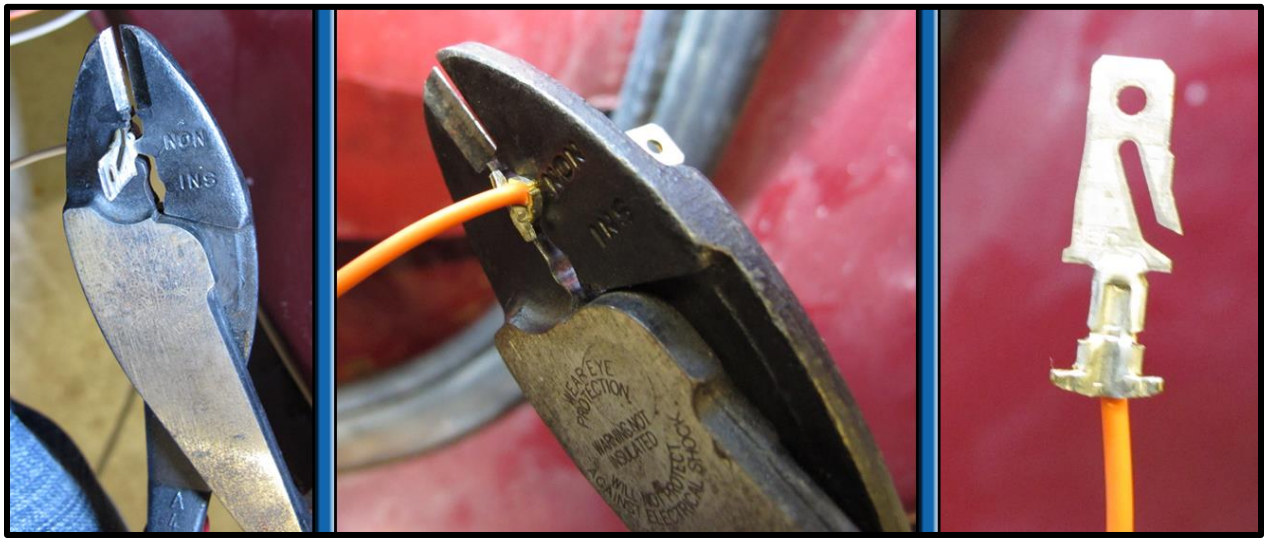
IF A TOGGLE/ROCKER SWITCH IS BEING USED WITHOUT A RELAY, MAKE SURE THE AMPERAGE OF THE COMPONENT YOU ARE POWERING DOES NOT EXCEED THE CAPABILITIES OF THE SWITCH OR SWITCH FAILURE WILL OCCUR. IF YOU NEED A RELAY KIT PAINLESS OFFERS PART #'S 30128, 30128, & 30130.

BULKHEAD

Your Painless harness contains a pre-terminated, fuse block mounted, bulkhead. This bulkhead fits the factory firewall opening of almost all GM vehicles produced from 1968 well into the mid-1990s. For those without the proper opening or any opening at all, a template and instructions can be found at the back of this manual. Additionally, a paper sticker template has also been provided with this kit to help make the appropriately sized holes.

In the event you need to run wires through the bulkhead, terminals have been provided to add wires to each of the bulkhead connectors. The bulkhead on the fuse block must be removed from the fuse block before wires can be added to it. It is easily removed by prying the locking tangs on the mounting legs of the fuse block. This can only be done when the fuse block is **NOT** mounted to the firewall.

The female terminals used on the fuse block bulkhead install onto wires as outlined on page 5. The male terminals, shown below, are installed on the engine side bulkhead. These are a rollover style terminal but require a different type of crimper due to the material thickness. Most home toolboxes do not have the expensive, long-handled ratcheting style crimpers these terminals require. A pair of crimpers used for non-insulated terminals can be used to successfully crimp these terminals if care is taken.



OLD FACTORY HARNESS REMOVAL

During the removal of the old, factory harness, avoid making any unnecessary cuts to any wires. The entire harness should be able to come out of the vehicle without any cutting at all unless someone has modified connections.

Labeling the factory harness is highly suggested as it may be helpful to look back at the factory harness during the install of the new Painless harness. Plus, taking this step helps you identify anything that may not be included in the Painless harness and will need to be re-used. Individual wires and connectors can easily be labeled using masking tape.

Take photos or make a drawing of any connections that have multiple connectors, like at the wiper motor, wiper switch, radio, etc., to help with reconnecting the new harness.

To aid in the removal and installation of the harness, first, remove the driver seat or bench seat and then the steering wheel. It is not completely necessary to remove the steering wheel; however, doing so allows you more room to work while removing the factory harness and installing the new Painless harness. Also, **if the Tail Harness is to be routed through the interior of the vehicle**, the sill plates and rear seat will need to be removed to route the wires under the sill plate and/or carpet.

In most cases, the dome light will disconnect in the trunk above the driver's side rear wheel. There is no need to remove the headliner as the wires going to the light are usually still in good shape and can be re-used.

Cars with factory heat, air conditioning, power locks/windows, and/or power antenna:

These factory accessory harnesses do not need to be removed during the removal process. They are generally separate harnesses. The power supplies for the separate harnesses simply need to be disconnected. They are usually plugged into the front of the factory fuse block or on the factory horn relay. **Those with power lock/windows should be using Painless part #20104 and not the #20103 harness that this manual covers. Painless 21-circuit harnesses, like the one you have purchased, DO NOT have circuits for power windows or power locks.**

PRE-INSTALLATION GUIDELINES

LEARNING YOUR NEW HARNESS:

Before moving your harness into your vehicle, it is a good exercise to lay the entire harness out next to your vehicle. This will allow you to identify all sections of your new Painless harness. Wires are marked to help ease the process of routing.

You will note when you pull the harness out of the box that it is organized and twist-tied into **three main sections.** These sections are:

- **BULKHEAD ENGINE/HEADLIGHT SECTION:**

The Engine Section consists of wires for connections such as oil pressure and coolant temperature sending units, coil or ignition system connections, and a wire for an electric choke on a carburetor.

The headlight section consists of wires for turn signals, parking lamps, headlights, horn power, and a 12-Volt activation wire that can be used for a fan relay.

These sections are pre-terminated and installed into the firewall bulkhead. All wires of the engine/headlight section have ample length to account for the numerous way components can be mounted inside of an engine compartment. This will allow you to route your wires cleanly and terminate at the length you find fits your build best.

- **INTERIOR SECTION:**

The Interior Section consists of wiring for the interior of the vehicle. This includes wiring for your headlight switch, dimmer switch, turn signal switch, brake switch, radio power, instrument panel, ignition switch.

- **TAIL SECTION:**

The **Tail Section** consists of wiring for taillights, brake lights, rear turn signals, dome light, fuel sending unit, third brake light, and backup lights.

MODIFICATIONS

Modifications can and should be made to the harness prior to any actual installation.

DO NOT SKIP THESE PRE-INSTALLATION STEPS

- Read through this manual with the harness laid out in front of you. Entire sections may need to be re-routed or separated due to the way or where the fuse block is to be mounted and how you want to route wires. Also, take note of wires you may not need and remove them from the harness. This will clean up the appearance of the install. Painless does not recommend removing any power wires from the fuse block as they can be used to power other things.

- **Interior Routing:** Out of the box the core harness exits the right side of the fuse block. Some may find that the harness exiting the top of the fuse block would make for a cleaner install and the harness easier to route. To re-route the core harness, simply remove the bulkhead connector by gently prying the locking tabs on the mounting legs of the fuse block and re-direct the core harness up towards the flashers. Before reconnecting the bulkhead, read through the manual to see if any other modifications need to be made.

- **Tail Section:** the **TAIL SECTION** will route through the interior of the car. Some installers may find it easier to route this section to exit the bottom or the left side of the fuse block to make it easier to route under a door sill plate to the rear of the car. To re-locate this bundle, zip ties installed by Painless on the core of the harness will need to be removed so this section of wires can be re-located.

- **Dimmer Switch:** Locate the three wires that make up the **Dimmer Switch Section**. These wires are 14-gauge and colored **LT. GREEN**, **TAN**, and **BLUE/YELLOW**. If you have a later model GM steering column with the dimmer switch on the side of the column, these wires can be left alone. If you have a floor-mounted dimmer switch, it may be helpful to re-route these wires no to exit the bottom of the fuse block if the fuse block is being mounted above the switch on the firewall.

- **Reverse Switch:** Locate the two **LT. GREEN** wires, **#956** & **#958**, intended for reverse/back up lights. If you have a column-mounted reverse switch, these two wires can be grouped with the turn signal and brake switch wires. If you have a reverse switch on a floor-mounted shifter or a transmission-mounted reverse switch that you plan to access through the transmission tunnel or floorboard, these wires can stay in their current location. If you have a transmission mounted reverse switch and need to access the connection in the engine compartment, re-route the **#956** & **#958** wires to the bulkhead. These wires will need to connect into the fuse block bulkhead and the cut off ends installed into the engine bulkhead.

- **Temp Light:** Locate the **Instrument Panel Section**. Vehicles with a factory engine temperature indicator light, instead of an actual gauge, may choose to connect a wire to the tab on the ignition switch labeled “GND” or ground. This will send a ground source to the light when the ignition switch is in the “START” position. This will illuminate the light, letting the operator know the light is functioning. When the key is returned to the “ON/RUN” position, the switch no longer provides ground and the light goes out. To connect this Indicator light so it functions in this manner, either run the **GREEN #921** from the temp sender to the ignition switch and from the ignition switch to the light or from the temp sender to the light and from the light to the ignition switch. Ignition switch diagrams on **pages 94 – 96** show this connection.

- **Back Lighting:** Things like the radio, aftermarket gauges, a gear indicator, heater/AC panel, and some headlight/wiper switches require a power source for backlighting. This backlighting will illuminate or in the case of newer radio/head units, will dim, the component when the headlight is in the ON position. Wire or wires can be spliced to the **BROWN #930** wire in the **Instrument Panel Section** or in the **Headlight Switch Section** to provide a power source.

- **Wiper Switch:** Power wires have been placed in the harness at the wiper motor, as GM systems require, and at the wiper switch, as Ford and Chrysler systems require.

  GM wipers will not need the **ORANGE/WHITE #905** wire at the wiper switch. This wire can be traced back to the bulkhead and cut or it can be used to power another accessory requiring a switched ignition 12v power source, not to exceed 15 amps.

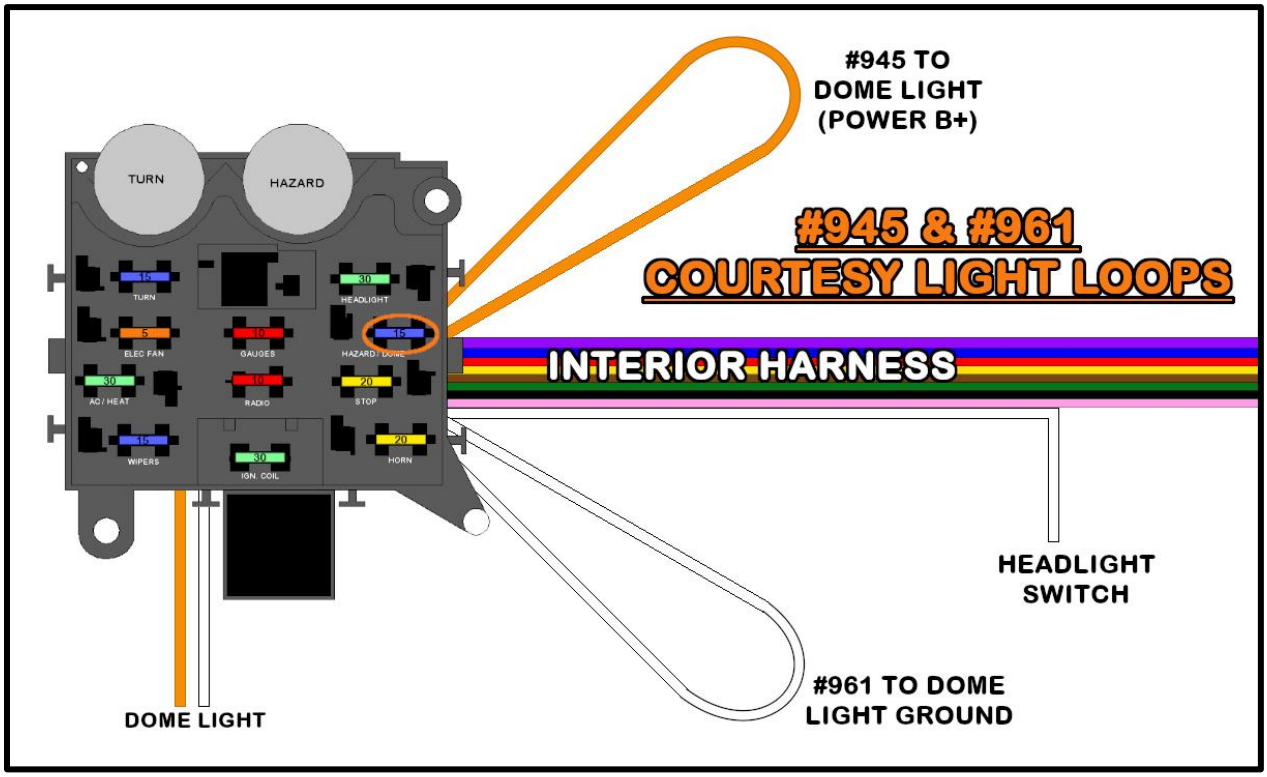
  Please be aware, this harness comes set-up for most 2-speed GM systems. Intermittent, 3-speed, and Ford/Chrysler systems will need to have wires added. These wires will need to go from the wiper switch, through the bulkhead, and to the Wiper Motor. Terminals have been provided to allow adding additional wires to the bulkhead.

- **Courtesy Light Loops**: Locate the **WHITE** and **ORANGE** wire loops at the fuse block. These loops are both wires needed for Dome Light activation.

    - As the harness comes from Painless, it is set up for GM and Chrysler style ground activation and the only way the dome light will operate is via the headlight switch.

    - These loops allow the installer the option of cutting them and creating splices to add courtesy lights, jamb switches, and other accessories typically found on these circuits.

    - **Those with Ford vehicles**, these loops also allow converting these circuits to power activation of the lighting like factory Ford vehicles used. Please skip to page 22 at this time for the proper instructions and diagrams for correctly setting up the power activated courtesy/dome light circuit.

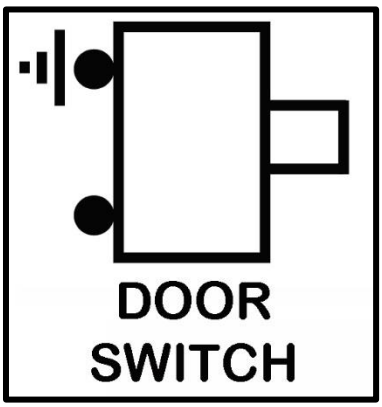


    - If you do not want to wire in jamb switches or courtesy lights, the **WHITE** **#961** wire in the **Tail Section** and the other end of the **#961** wire in the **Headlight Switch Section** can the pulled taut in order to remove the loop from the harness. The same can be done with the **ORANGE** **#945** wire in the **Tail Section**.

How to Determine How Your Vehicle Is Activated:

Looking at the wire connection side of the jamb switches on your vehicle, if you see a single pin jamb switch on **ANY** jamb, you have ground activated lights. Some driver side front doors on ground activated systems have 2 or three pins due to a key buzzer and other warnings. All 1960s-70's GM and Chrysler vehicles are ground activated.

You can also refer to a factory wire diagram. On the diagram, locate the door switches. If any of the switches have the ground symbol, as shown, your lights are ground activated.

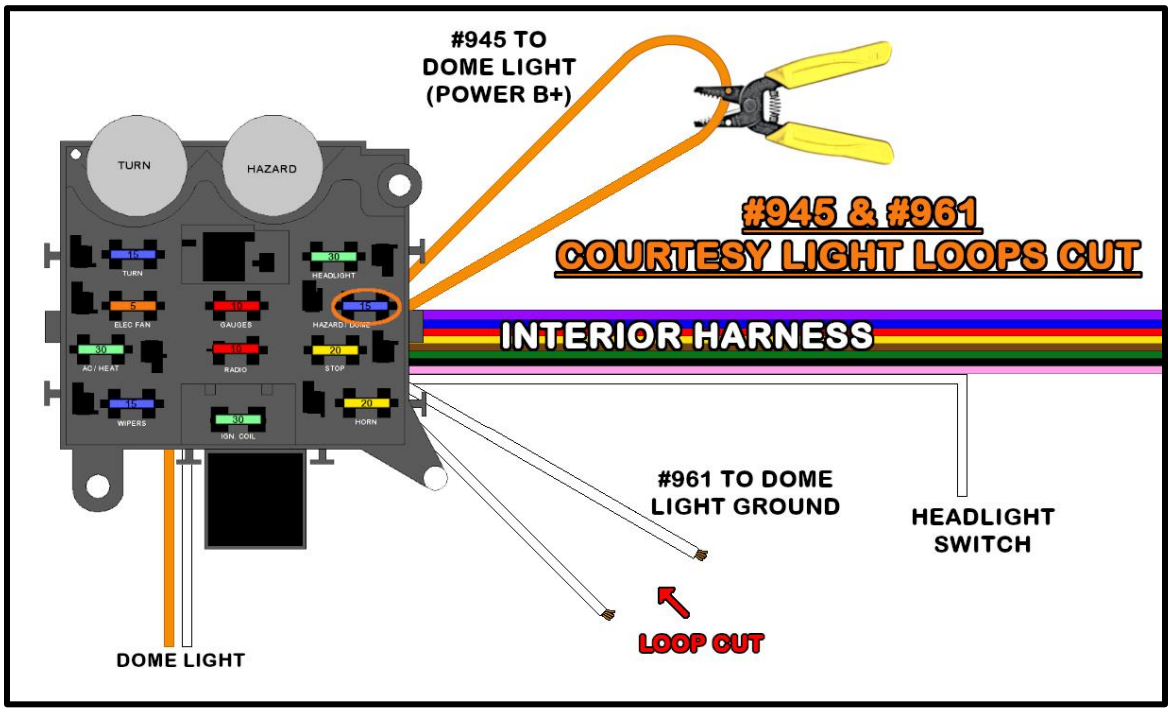


On the diagram, if you see two wires coming from the door switch, trace both wires. One wire will connect to the courtesy/dome light(s), follow the other wire to see if it goes to a ground splice or if it connects to power. If your door jamb switch switches power, as the 1960s-70s Ford vehicles do, modifications to this harness must be made.

GM, Chrysler, & Ground Activated Vehicles:

To wire in jamb switches and/or console lights, please refer to the following diagrams and instructions:

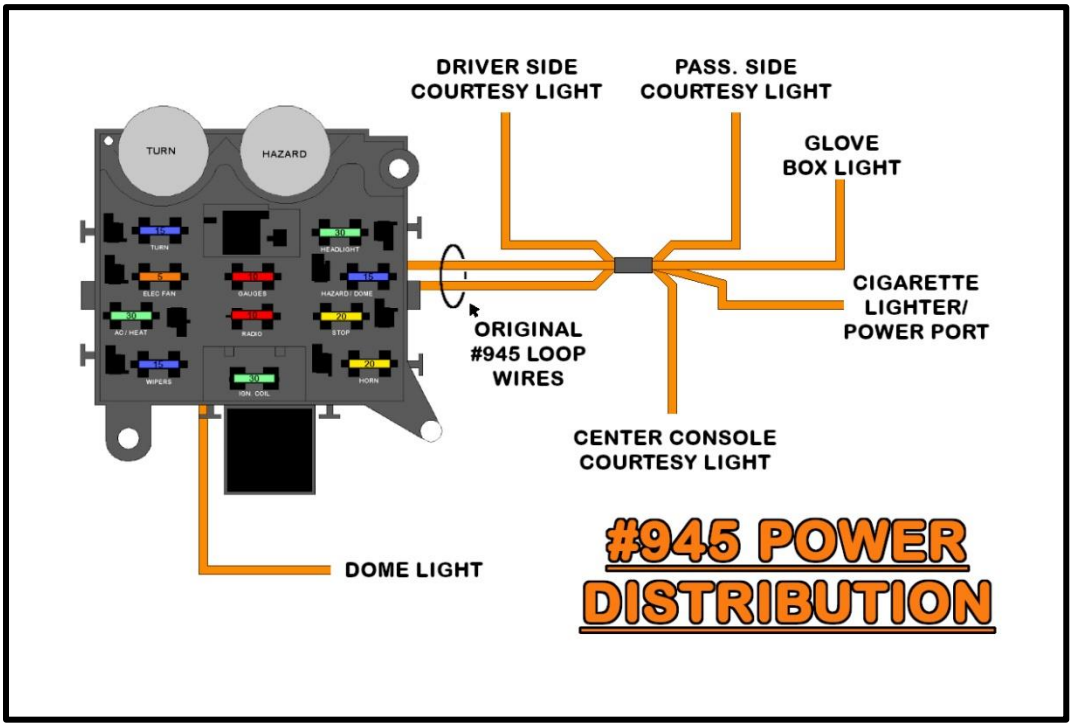
- Cut both loops and strip ¼" of insulation from the wires. If you only want to add jamb switches, **do not** cut the ORANGE **#945** loop.

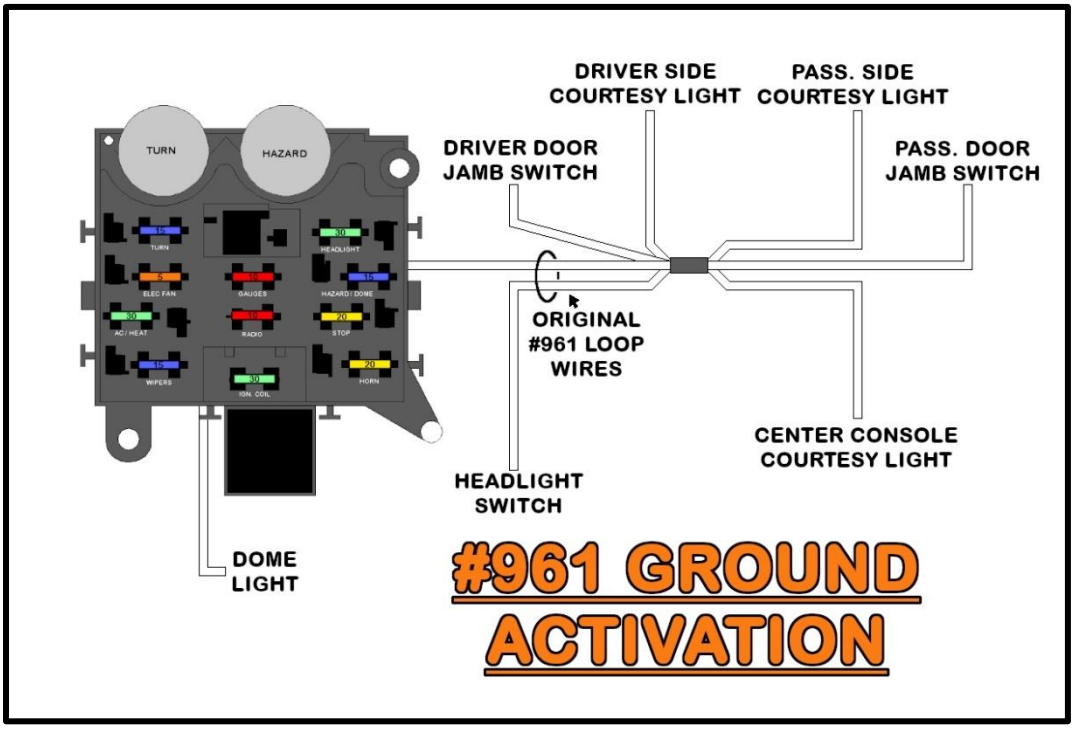


- The dome light connection in the **Tail Section** will typically connect in the trunk above the driver side rear wheel to a factory pigtail. This means the ORANGE **#945** and the WHITE **#961** wires will have a considerable amount of length removed. These pieces of wire cut from the **Tail Section** can be used for your jamb switch and courtesy light connections.

- Loosely measure from the fuse block mounting location in your vehicle to the dome light connection to ensure you do not cut too much wire from your dome light connections in the **Tail Section**.

- Use the diagrams to figure out how many additional wires you will need to add, what length these wires will need to be, and which side of the splice each wire will need to be coming from. Also, take into account that these wires can be doubled up, or chained, to connect one component to the others. Although not pertaining to this courtesy light circuit, this “chaining” method is displayed in the gauge diagrams beginning on page 106. This can be useful when a splice gets complicated with too many wires.





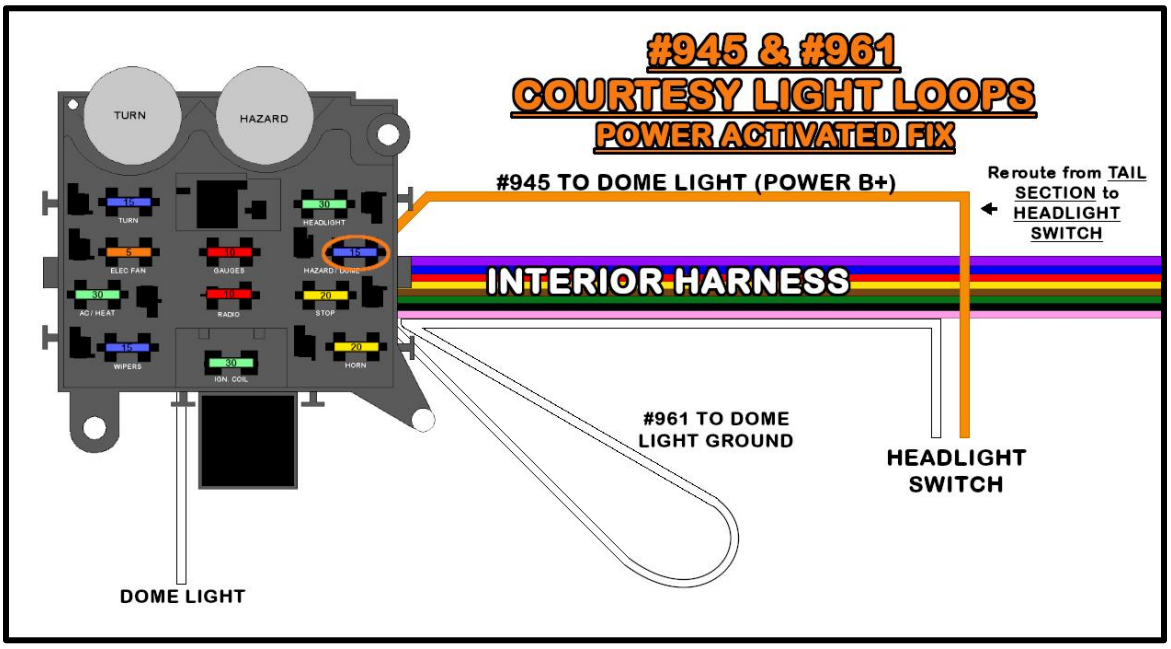
Ford & Power Activated Vehicles:

Ford vehicles and others that have power activated courtesy/dome lights **MUST** make modifications for the dome light to work. In such installs, the ORANGE **#945** wire will provide power into the door switches and to the headlight switch and the **WHITE** **#961** wire will provide power from the door switches and the headlight switch to power the light(s). The lights of power activated circuits ground through the housing or are connected to chassis ground with a wire (not provided).

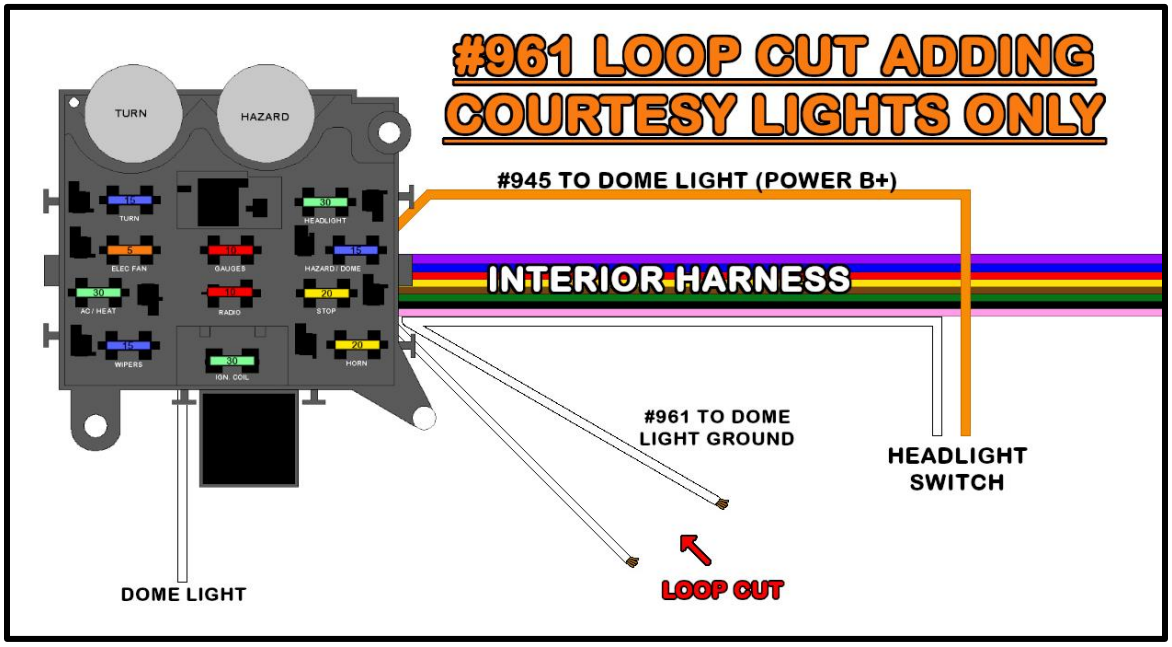
If you only want to activate the dome light with the headlight switch and **DO NOT** wish to activate the dome light with jamb switches, a slight modification to the harness will need to be made. Power for the dome light will need to be routed to the Headlight Switch.

- Locate the ORANGE **#945** wire in the **Tail Section**. Pull this wire from the **Tail Section** and re-route it to the headlight switch. This will now provide the power supply the Headlight Switch needs to activate the dome light.

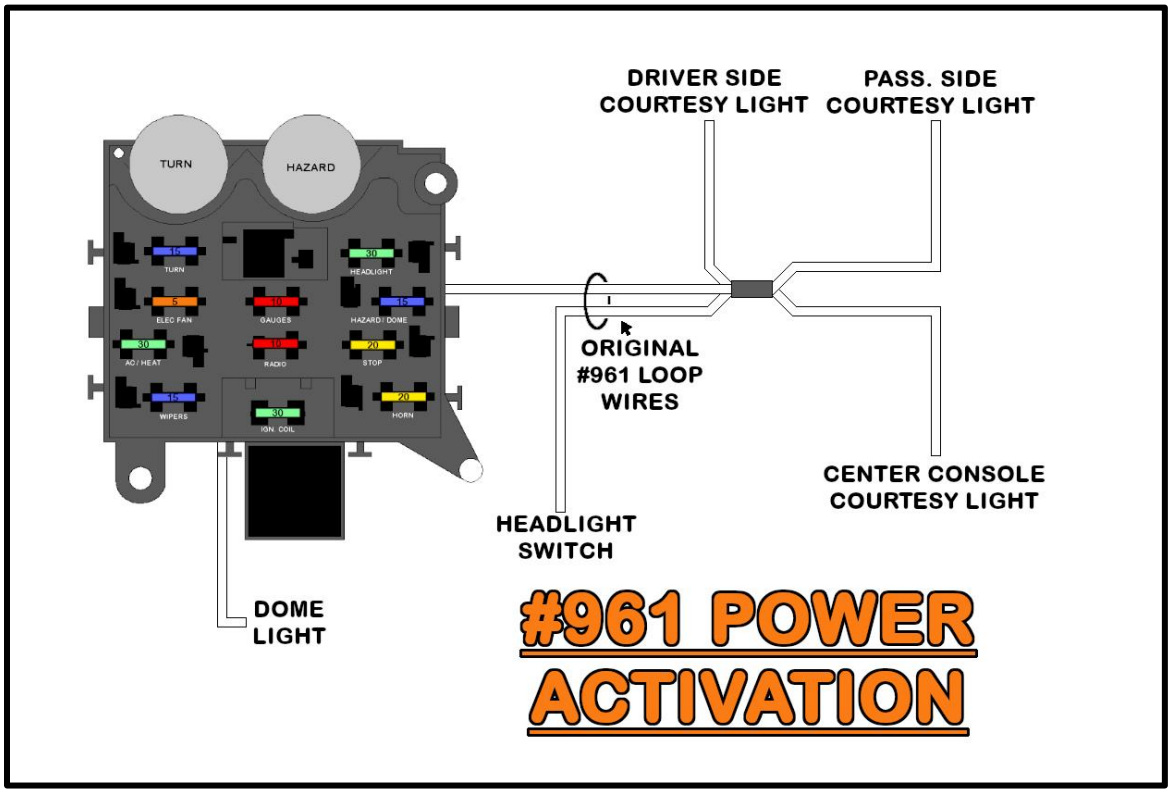
If a trunk light is being installed, see the diagram on page 24. It will be easier to cut the loop instead of pulling the wire from the tail section, as the trunk light power supply would just have you re-routing another wire to the **Tail Section**.



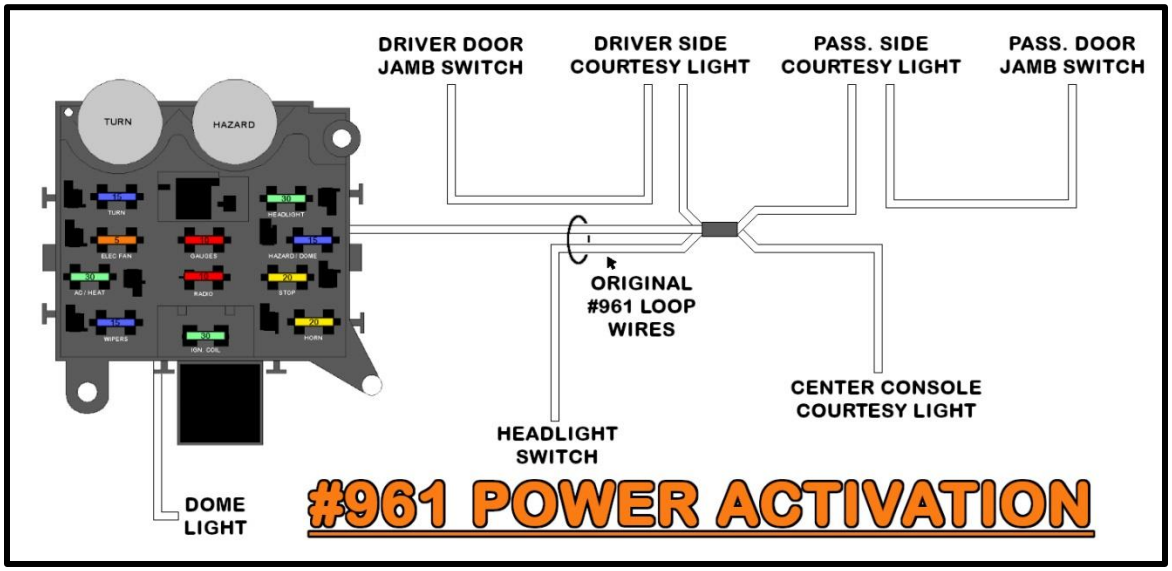
- If you also wish to add courtesy lights to under the dash, a center console, pillar lights, etc., the **WHITE** **#961** loop will need to be cut.



- Create a splice or splices that will provide a wire to each courtesy light. This splice will receive power from the **#961** at the headlight switch and provide power to additional lights.

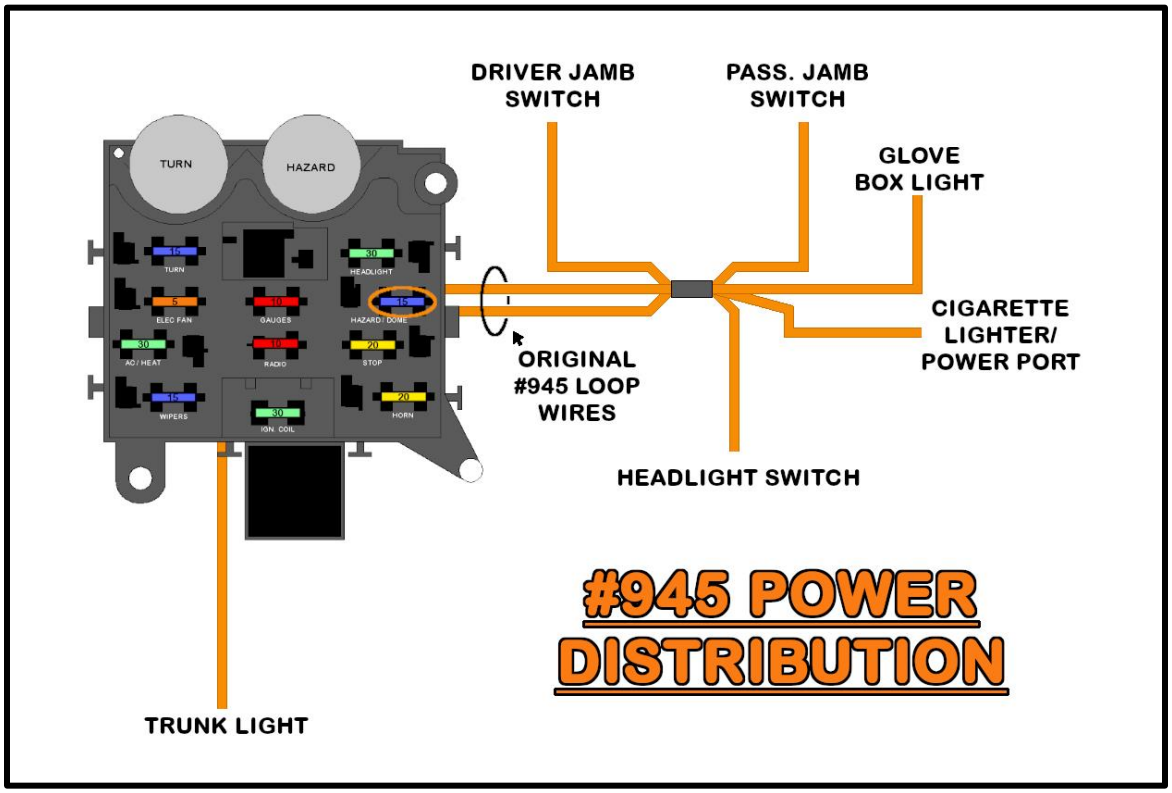


- If jamb switches are desired, use the diagram below. The only difference between the diagrams is the addition of the jamb switches and showing how wires can be doubled up at a light to avoid additional splices.



- If jamb switches are also being used to activate the courtesy/dome lights, a splice like the one shown below will need to be created. This is done by cutting the **ORANGE** **#945** loop, if a trunk light is being used, or cutting the extra length of wire from the re-routed **ORANGE** **#945** wire now going to the headlight switch.

- Additional components such as a glove box/map light, cigarette lighter/power port, and/or trunk light can also be connected to the **#945** power circuit.



ENGINE BULKHEAD HARNESS:

- **Washer Pump:** Ford, Chrysler, and other vehicles with wiper switches that switch power to the pump will not need either of the two **BLK/YLW**, **#983 & #905,** wires. These wires may be removed from the bulkhead or can be used to power an accessory requiring a switched ignition power source, not to exceed 15 amps combined. Gm systems will need these power wires to connect to the wiper motor and washer motor as GM switches switch ground to these components.

  Locate the **BLUE #984** and **BLK/YLW #983** wires in the bundle of wires labeled WIPER MOTOR coming from the engine bulkhead. If you have a fender-mounted washer pump these two wires will need to be re-grouped with the wires of **Headlight Section**. If your washer pump is located on the motor like shown on page 37, these wires can stay where they are currently located, and the extra length can be removed when the other wiper motor wires are cut to length as instructed in the **Wiper Motor Section.**

- **External Voltage Regulator**: If you are using a charging system that requires an external voltage regulator take notice to its mounting location. If you find that the regulator is mounted on the core support, you may want to re-route the **WHITE #914** and **RED #995** from the **Start/Charge Section** to the **Headlight Section**.

- **GREY/WHITE #901** in the **Headlight Section** will provide an accessory relay, like a cooling fan relay, a switched, ignition, 12v activation source. THIS IS NOT AN INPUT POWER SOURCE FOR THE RELAY, ONLY AN ACTIVATION SOURCE. If a relay is to be mounted on the core support, make certain to route this wire to that location.

  Diagrams and information on the various usage of this **#901** wire can be found beginning on page 113.

- If you have air conditioning, take notice of where the pressure switch is located. If it is at the condenser on the core support, where most aftermarket companies locate it, the **BLACK/WHITE #902** wire for A/C compressor activation will need to be relocated from the **Engine Section** to the **Headlight Section**. This will route the activation wire with the front lighting wiring. A wire will then need to be added that will connect the output side of the pressure switch to the A/C compressor.

- If you have mechanical gauges, or aftermarket gauges that require their own 2- or 3-wire sensors, you can remove the sending unit wires running from the **Engine Section** to the **Instrument Panel Section**.

When bundling wires into groups, use zip-ties, split loom, or tape. The exposed wires in the engine compartment and wires running to the rear of the vehicle are best protected by wire loom or covering. *Painless offers the **Power Braid Kit part #70920** and the **Classic Braid #70970** to fill this need. These kits include everything you will need to properly protect your new chassis harness.*

PowerBraid Kit

FUSE BLOCK MOUNTING & BULKHEAD INSTALL

To begin mounting the fuse block, find a suitable location with easy access if a fuse needs to be replaced. Most of the time, the vehicle's original fuse block location is ideal. This harness is designed with the intent of the fuse block being mounted on the driver's side of the vehicle and under the dash. **This fuse block must be mounted inside the vehicle** as it is not suitable for wet conditions.

- **For vehicles without the proper bulkhead opening**, locate the template supplied with this kit. This sticker, and the paper template at the back of this manual, will allow you to cut the appropriate size holes to mount the bulkhead and fuse block.

  This template shows center points to allow using a **1 ¼" hole saw** for the radiuses on the corners. A rotary cut off tool, like a Dremel, or some other cut off tool will also be needed to cut the straight sides.

  Once cut, use the bolts and nuts pre-installed on the fuse block to mount the fuse block to the firewall.

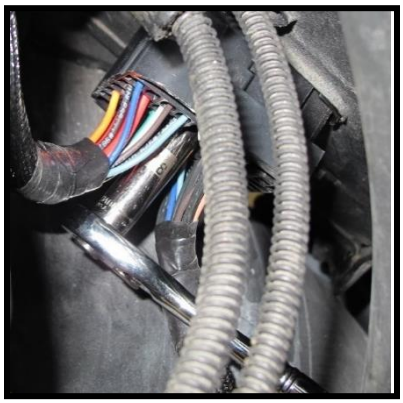
- **GM vehicles with the correct factory bulkhead holes**, locate the **(2) 3" long stainless screws** included with this kit. These screws will allow the fuse block to be mounted to the firewall in the same holes the factory fuse block left behind.

- Before mounting, ensure the wires are exiting the fuse block to your liking.

ENGINE BULKHEAD MOUNTING

If desired, grease can be applied to the bulkhead to help seal the connections and empty cavities

- Find the tube of dielectric grease in the parts kit and apply a small amount of grease into each terminal of the **Engine Bulkhead Connector**.



- Push the engine bulkhead onto the firewall connector as far as you can, it will not go on all the way because of the bolt. Be sure the connector is on straight, as the terminals of the bulkhead can easily bend.

- Using a **⅜" socket**, tighten the mounting thru-bolt on the engine bulkhead to the firewall connector. **DO NOT OVERTIGHTEN!** The bulkhead connector can/will crack and the threaded insert in the firewall bulkhead can strip or loosen the threaded insert in the fuse block mounted bulkhead connector.

HARNESS ROUTING

Loosely route all the wire groups to their designated connection points. **NO CONNECTIONS OR CUTTING WILL TAKE PLACE AT THIS TIME.** Harness routing is and should be a time-consuming task. Taking your time will enhance the appearance and quality of the installation. Please be patient and **TAKE YOUR TIME. REMEMBER TO ROUTE THE HARNESS AWAY FROM SHARP EDGES, EXHAUST PIPES, HOOD, TRUNK AND DOOR HINGES, ETC.**

WHILE ROUTING WIRES: If you are to go through an inner fender well, core support, or any other metal pass-through YOU MUST INSTALL A RUBBER GROMMET.

EXTERIOR:

- Route **Headlight Section** down the inner driver side fender to the core support. In some cases, you can route this section inside the fender and over the wheel well to help hide the wires to keep the install clean. Loom will need to be added to the harness prior to routing the harness over the wheel well.

  GREY/WHITE #901 in **Headlight Section** will provide an accessory relay, like a cooling fan relay, a switched ignition 12v activation source. If a relay is to be mounted on the core support, make certain to route this wire to that location.

- Once at the core support, isolate the wires for the left-hand side and right-hand side lights. The **BROWN #927**, **LT. GREEN #908,** and **TAN #909** will have different lengths, (3) long and (3) short, with the short wires running to the first group of lights you come to.

- Take notice at this time to the **GREEN #924** horn wire, and where the horn(s) are located. If you have multiple horns, route the **#924** wire to the closest horn. You can loop this wire and then route to the 2nd horn. When the time comes to make the connection to the first horn you will just cut the loop and install both wires into one terminal for the horn connection, as instructed on page 34.

- Route the wires for the passenger side lights across the core support to the other side of the vehicle. On most vehicles, the radiator hold-down will need to be removed to allow access to the channel that runs along the top of most core supports where factory wiring was once run. This routing of the front light section makes good use of the supplied zip ties.

- Route **Engine Section**, **Start/Charge Section,** and **RED #916** towards the center of the firewall. Routing of the individual wires will be easier to accomplish during the time of their specific connections.

INTERIOR:

- Route the wires intended for dash-mounted components/switches towards their connection points on the dash at this time. Pay attention to the **Accessory Section** as this bundle contains wires that can/will be routed to different places.

- Route wires away from moving components such as brake, clutch, and throttle pedals. Also, take into consideration the movement of the heater and air conditioning cables.

- As wires are routed, use tape or the supplied zip ties to group wires and isolate specific connections from other wires. Taking your time now will ensure you have a clean, well thought out install.

- Route the **Tail Section** group of wires either through the interior of the vehicle to the rear.

- At the back of the vehicle, route the wires to the left and right connections as indicated by the print found on the wires.

- Once all the wires are routed and running to the general location of their components, you can begin making connections. We prefer to start with the **Headlight Section** and work from the front of the vehicle to the back.

HEADLIGHT SECTION

Headlight Section of this Painless Harness includes all the power wires needed to properly hook up both driver and passenger side headlights, front turn signal lights, and park/marker lights. There is also a power wire from the fuse block mounted horn relay to power the horn(s). All wires in the **Headlight Section** can be seen in the *Headlight Section Schematic* on **page 36**.

Ground wires will need to be provided for both front turn signals. Grounds for the headlights can be sourced through the wire on the provided pigtails.

If halogen bulbs are being used, a separate headlight relay kit MUST be used. Due to the higher amperage demands of halogen lights, these lights will cause the circuit breaker in the headlight switch to fail. A headlight relay harness provides battery power through the relays directly to the headlight bulbs. The headlight switch will activate the relays, thus drawing only one amp of current. This is beneficial for both the longevity of the headlight switch and the brightness of headlight bulbs themselves. **Painless offers part #30814 for dual/quad headlights and #30815 for single headlight vehicles**.

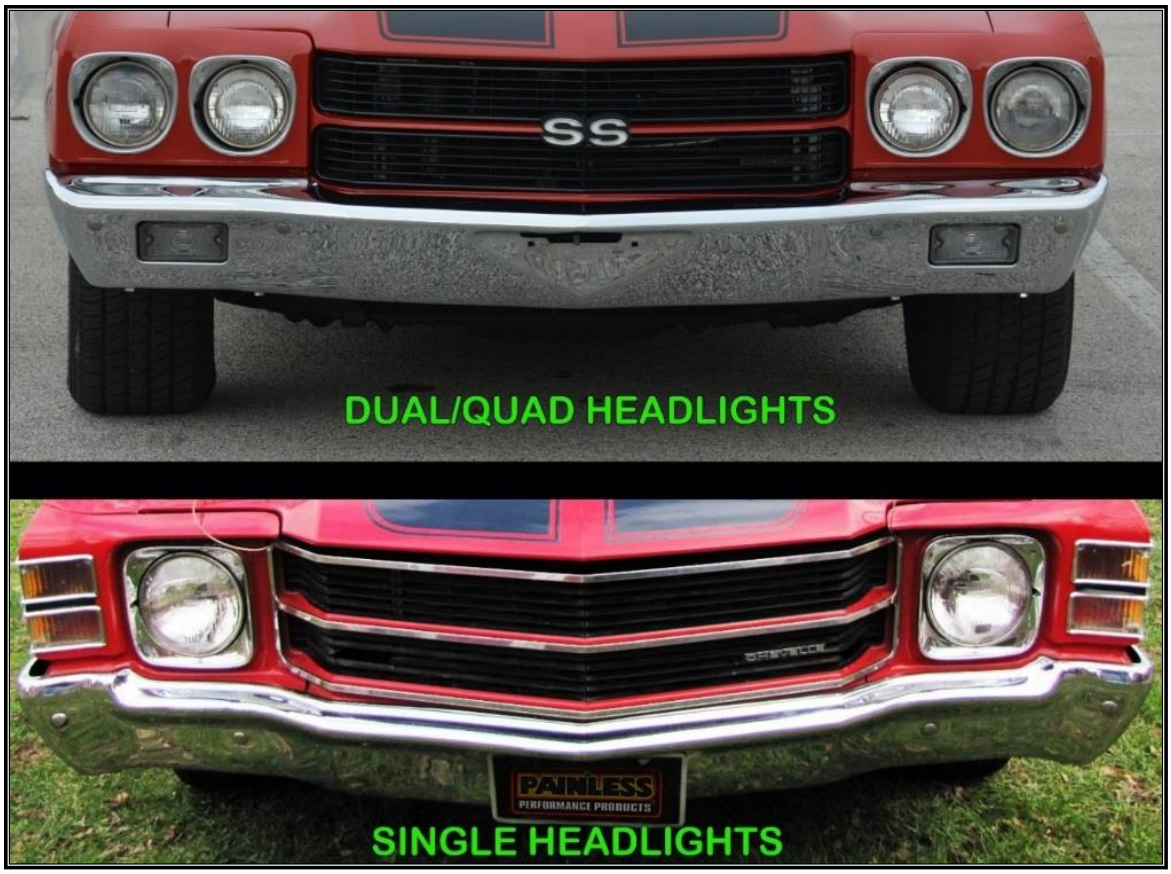
LEFT / DRIVER SIDE HEADLIGHT

Your first connection in **Headlight Section** will be the Left/Driver Side Headlight. Two wires are provided for connection to the Left Headlight, they are:

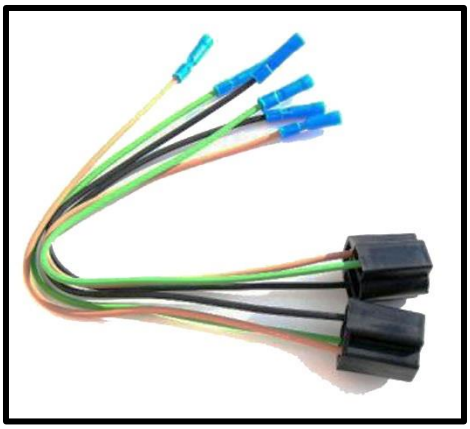
LT. GREEN: 16-gauge wire, printed **[HEADLIGHT SECTION] #908 TO HEADLIGHT HIGH BEAM**; this wire provides power to the high beam filament of the headlamp. This wire runs from the dimmer switch and has power when the dimmer switch is in the high beam position and the headlight switch is in the headlight ON position.

TAN: 16-gauge wire, printed **[HEADLIGHT SECTION] #909 TO HEADLIGHT LOW BEAM**: this wire provides power to the low beam filament of the headlamp. This wire runs from the dimmer switch and has power when the dimmer switch is in the low beam position and the headlight switch is in the headlight ON position.

If your vehicle is equipped with dual/quad headlights, meaning the vehicle has a high/low beam light and also a separate high beam light on each side, as shown below, additional pigtails will need to be purchased (**Painless #80300**). The **LT. GREEN** wire from one of these pigtails will also splice to the **LT. GREEN** **#908** wire. The **TAN** wire of the pigtail going to your high beam light will not be used and can be removed from the pigtail. See the diagram on **page 36** for a visual reference.



Pre-terminated connectors have been provided in the parts kit to allow proper connection to these style headlights.



- Most factory headlights were grounded to the core support. If your vehicle has this grounding location, cut the pre-installed splice off the **BLACK** wire of the pigtail and ground the **BLACK** wire to the core support.

  You may also elect to run a separate ground wire to the headlamp(s). A ground wire must be provided by you, the installer.

- Route the **#908** & **#909** wires for left/driver side headlamp connection to the back of the headlamp. Removing the headlamp may be necessary.

- Taking the length of the pigtail wires into consideration, cut the **#908** & **#909** wires to length and strip ¼" of insulation from them and match the colors of **#908** & **#909** to the wires of the pigtail.

LEFT PARK / SIDE MARKER LIGHT

The driver side, fender-mounted marker light is the next connection. Some vehicles may not have this light. If this is the case with your install, skip to the next section, LEFT TURN / PARK LIGHT on page 33.

The side marker can serve one or two purposes: One, it can work simply as a front marker/park light or two, it can work as a park light as well as a turn signal. Both functions are dependent on how you wire the lamp socket.

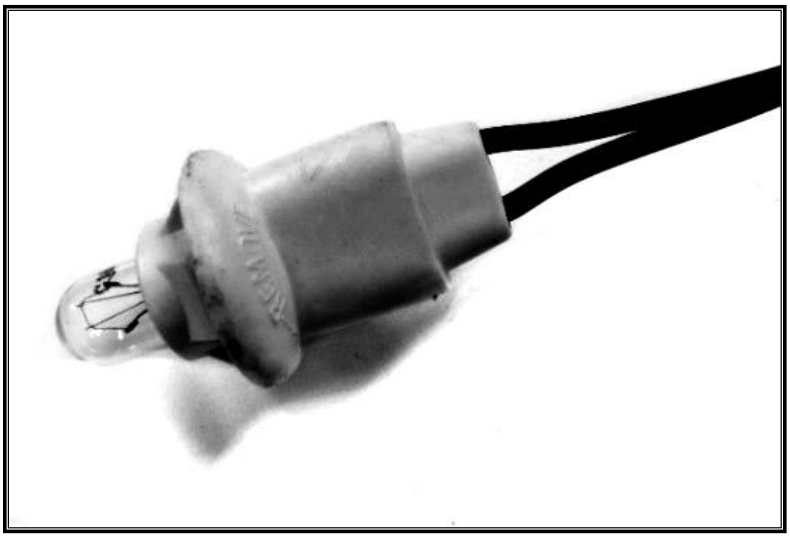
The park light feature is activated by a power source coming from the headlight switch. This light illuminates any time the headlight switch is in the “PARK” or “ON” position. The turn signal feature is provided by a power source coming from the turn signal switch.

The left side marker requires two wires to work properly; the way you want the light to function determines if both wires need to connect to the park/marker light. These wires are:

BROWN: 18-gauge wire, printed **[HEADLIGHT SECTION] #927 TO FRONT PARK LIGHTS** this is a power wire for the park and marker light function. This **#927** is spliced to the other **#927** wire in the **Headlight Section**. This wire has power anytime the headlight switch is in the Park/Taillights ON or Headlights ON position.

LT. BLUE: 18-gauge wire, **[HEADLIGHT SECTION] #926 TO LEFT FRONT TURN SIGNAL**, this wire is the power for the turn signal function. This wire comes from the turn signal switch and has interrupted switched power from the turn flasher anytime the left turn signal is activated. It also receives interrupted battery power from the hazard flasher anytime the hazard switch is in the ON position.

- Most vehicles will need to use an installer sourced light socket like the one seen below. These can either be cut from your factory harness or purchased from most auto supply stores using part **#PT60** or **#S74**. These sockets use a wedge base **#194** bulb,



- Looking at the backside of the marker lamp housing, you will see that it has a keyed opening to correspond with the tabs on the socket. Temporarily install the socket into the marker light assembly

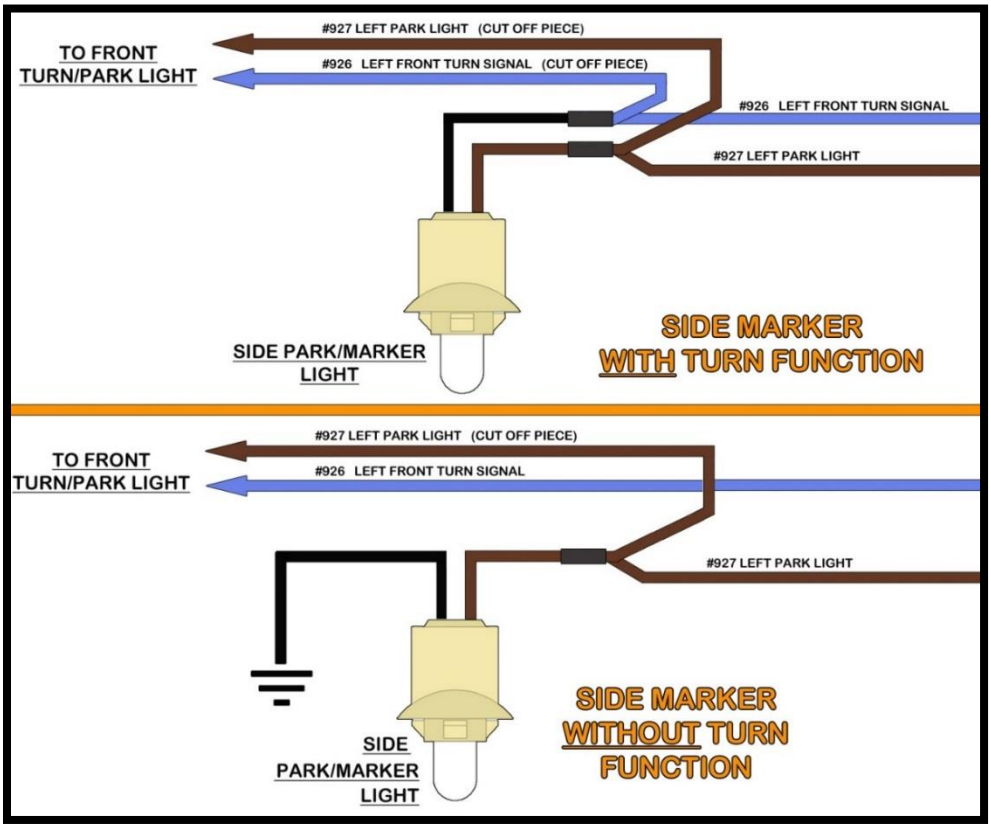
- Route the **BROWN #927** wire to one of the wires of the socket and cut the **#927** to length; **save the cutoff piece of #927**. It does not matter which wire on the socket the **#927** connects to.

- If you **do not** want the park/side marker lights to also work as turn signals, connect the other wire from the socket to a chassis ground source. If you are using a new socket, it may already have a ring terminal preinstalled.

- For the park/marker light to also work as a turn signal, route the **LT. BLUE #926** wire to the other wire of the socket and cut the **#926** to length, **save the cutoff piece of #926**.

- Using splices from the parts kit, connect the **#926** and **#927** wires to the lamp socket. Double up with the cutoff pieces to allow connection to the front turn/park light as shown in the diagram below.

If you are connecting the **#926** turn signal wire to the park/side marker light, you will notice that there are no means for a direct ground to be applied to the light. This is because the path to ground will travel from this park/side marker socket to the front turn signal socket, through either one of the wires, and ground through the front turn/park light. The front turn/park signal socket is a higher wattage bulb. So, when the ground passes through that bulb it will not cause the front lamp to illuminate since it has a greater power requirement than the park/side marker light.



LEFT TURN / PARK LIGHT

The Left Turn/Park Light of the Painless harness consists of 2 wires. These wires are:

BROWN: 18-gauge wires, printed **[HEADLIGHT SECTION] #927 TO FRONT PARK LIGHTS**, this wire provides power to the park lights. This wire splices to a single **BROWN** wire leading to the headlight switch. This wire has power anytime the headlight switch is in the Park/Taillights ON position.

LT. BLUE: 16-gauge wire, printed **[HEADLIGHT SECTION] #926 TO LEFT FRONT TURN SIGNAL**, this wire is the turn signal power. This wire has interrupted switched power from the turn signal flasher any time the left turn signal is activated, and the ignition is in the ON position. It also receives interrupted battery power from the hazard flasher any time the hazard switch is in the ON position.

If your turn signal has a dual filament bulb and only two wires, you do not need to connect a separate ground wire. Your light socket grounds through the mounting of the lens/bucket. If your vehicle has been freshly painted, you will need to clean the paint from the mounting surface of the light housing. The use of a small star washer on the mounting screws can ensure your light housing is grounded properly.

If you find that your turn signal requires a ground wire, this connection must be sourced by you, the installed.

If your light has a single filament bulb, your lens will only act as a turn signal, because the **#927** wires will not have a connection point. Check your local laws to see if front park lights are required; you could be in violation of the law without them. If you can run without the front park lights, the **#927** wires, along with the single wire going to the headlight switch they splice to, can be removed from the Painless harness.

- In some cases, your turn signal will have wires hard wired to the light and exiting the turn signal assembly, usually into a connector of some sort. Remove this connector and use the blue insulated pin/socket terminals to connect the **#926** & **#927** wires to the turn signal.

- For those with a turn signal that requires a light socket, either cut the socket from your old harness or contact your favorite auto parts supplier for a new one. Many of these light sockets can be purchased as a pigtail. Splices have been provided to connect the **#926** & **#927** wires to the turn signal pigtails

- Route the wires needed for installation to the turn signal. Cut the wires to length and strip ¼" of insulation from all wires.

HORN

The **Headlight Section** has a single wire dedicated to connecting to a horn. ***Most horns ground through their mounting and only require a power connection. This wire is:

GREEN: 14-gauge wire, printed **[HEADLIGHT SECTION] #924 TO HORN**, this is a power wire that comes from the fuse block mounted horn relay. It is ground activated by the horn button on the steering column, and only has power when the horn button is pressed.

- Route the **#924** wire to the horn and cut to length. If you pass this wire through any metal surfaces, you will find small grommets in the parts kit to protect the wire. If you have two horns, save the cutoff portion of **#924**.

- If you have a tab on the horn, insulated "spade" style terminals have been provided in the parts kit.

#10 ring terminals have been provided for those with "screw" or "post & nut" connections. If your horn has a wire to connect to, then a splice from the parts kit will work for this connection

- Strip **¼" of insulation** from the **#924** wire and crimp the appropriate terminal onto the wire. If you have more than one horn, strip **¼" wire** from the cutoff piece of **#924** and double the cutoff piece of **#924** to the **#924** coming from the relay. A terminal to connect this wire to the horn will need to be sourced by the installer, doubled up 14-gauge wires will require a **10-gauge terminal**.

- If your horn requires a ground wire, it will need to be provided by the installer.

ACCESSORY / FAN RELAY

While this Painless harness does not include any wiring specifically for a fan relay. The **GREY/WHITE #901** wire in the **Headlight Section** can be used for a 12v activation of a relay. This wire is:

GREY/WHITE: 18-gauge wire, printed **[HEADLIGHT SECTION] #901 ACC/COOLING FAN RELAY ACT.**; this wire will only have power if it is connected to the **GREY/WHITE #906** wire on the interior of the vehicle. This wire can be used for the activation of the relay coil only and **MUST NOT** be used to directly power a cooling fan.

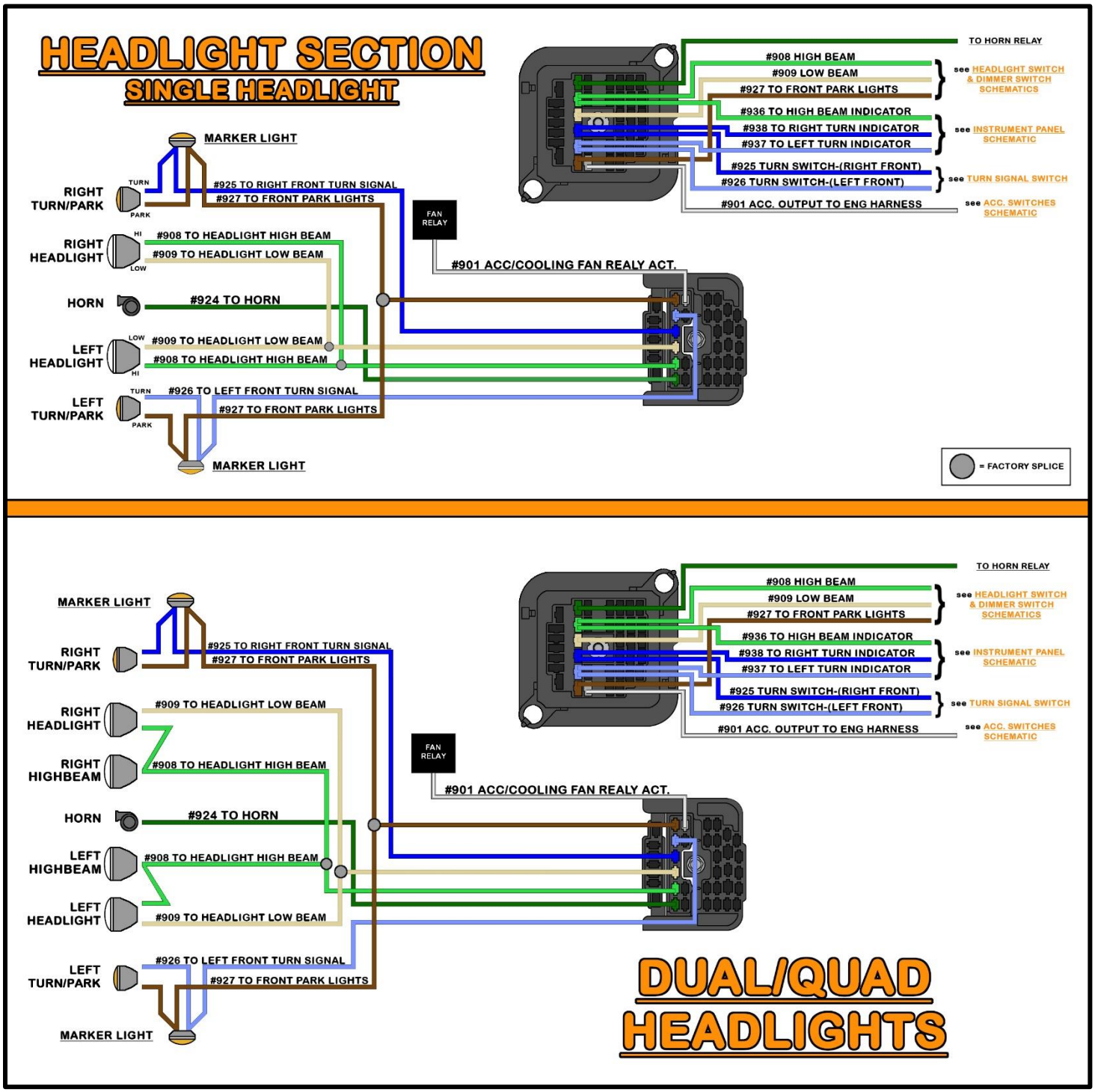
Diagrams and explanations of multiple uses of this wire can be found beginning on **page 112.**

RIGHT TURN / PARK LIGHT & HEADLIGHT

The connections on the right/passenger side of the vehicle all connect in the same manner as those on the left/driver's side. The only difference you will find is the turn signal wire for the right turn signal is a different color than the one used for the left turn signal. The right turn signal will be:

BLUE: 18-gauge wire, printed **[HEADLIGHT SECTION] #925 TO RIGHT FRONT TURN SIGNAL**, this wire is the turn signal power, and goes to the turn signal switch. This wire has interrupted switched power from the turn signal flasher any time the right turn signal is activated, and the ignition is in the ON position. It also receives interrupted battery power from the hazard flasher any time the hazard switch is in the ON position.

FRONT LIGHTING NOTES:

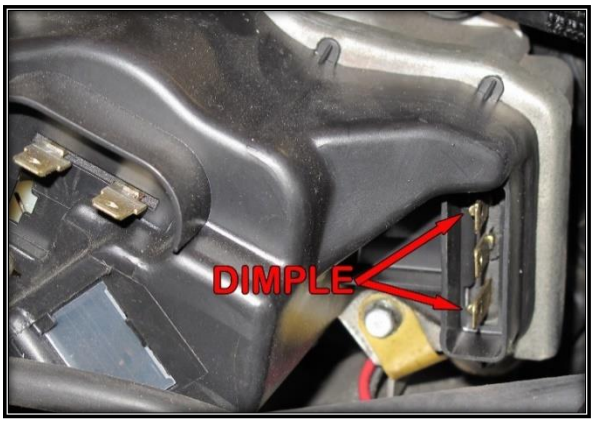

HEADLIGHT SECTION
SINGLE HEADLIGHT
MARKER LIGHT
RIGHT TURN/PARK
TURN
PARK
#925 TO RIGHT FRONT TURN SIGNAL
#927 TO FRONT PARK LIGHTS
RIGHT HEADLIGHT
HI
LOW
#908 TO HEADLIGHT HIGH BEAM
#909 TO HEADLIGHT LOW BEAM
HORN
#924 TO HORN
LEFT HEADLIGHT
#909 TO HEADLIGHT LOW BEAM
#908 TO HEADLIGHT HIGH BEAM
LEFT TURN/PARK
#926 TO LEFT FRONT TURN SIGNAL
#927 TO FRONT PARK LIGHTS
MARKER LIGHT
FAN RELAY
#901 ACC/COOLING FAN REALY ACT.
TO HORN RELAY
#908 HIGH BEAM
#909 LOW BEAM
#927 TO FRONT PARK LIGHTS
see HEADLIGHT SWITCH & DIMMER SWITCH SCHEMATICS
#936 TO HIGH BEAM INDICATOR
#938 TO RIGHT TURN INDICATOR
#937 TO LEFT TURN INDICATOR
see INSTRUMENT PANEL SCHEMATIC
#925 TURN SWITCH-(RIGHT FRONT)
#926 TURN SWITCH-(LEFT FRONT)
see TURN SIGNAL SWITCH
#901 ACC. OUTPUT TO ENG HARNESS
see ACC. SWITCHES SCHEMATIC
= FACTORY SPLICE

MARKER LIGHT
RIGHT TURN/PARK
#925 TO RIGHT FRONT TURN SIGNAL
#927 TO FRONT PARK LIGHTS
RIGHT HEADLIGHT
#909 TO HEADLIGHT LOW BEAM
RIGHT HIGHBEAM
#908 TO HEADLIGHT HIGH BEAM
HORN
#924 TO HORN
LEFT HIGHBEAM
#908 TO HEADLIGHT HIGH BEAM
LEFT HEADLIGHT
#909 TO HEADLIGHT LOW BEAM
LEFT TURN/PARK
#926 TO LEFT FRONT TURN SIGNAL
#927 TO FRONT PARK LIGHTS
MARKER LIGHT
FAN RELAY
#901 ACC/COOLING FAN REALY ACT.
TO HORN RELAY
#908 HIGH BEAM
#909 LOW BEAM
#927 TO FRONT PARK LIGHTS
see HEADLIGHT SWITCH & DIMMER SWITCH SCHEMATICS
#936 TO HIGH BEAM INDICATOR
#938 TO RIGHT TURN INDICATOR
#937 TO LEFT TURN INDICATOR
see INSTRUMENT PANEL SCHEMATIC
#925 TURN SWITCH-(RIGHT FRONT)
#926 TURN SWITCH-(LEFT FRONT)
see TURN SIGNAL SWITCH
#901 ACC. OUTPUT TO ENG HARNESS
see ACC. SWITCHES SCHEMATIC
DUAL/QUAD HEADLIGHTS

WIPER MOTOR SECTION

The **Wiper Motor Section** comes setup for GM 2-speed systems. If you have anything other than a 3-speed system, instructions were given on page 25 to add additional wires. If you do not have a wiper system, these wires can be removed from the harness.

The wiper motor connection will require a factory schematic or referring to the old harness. The factory connector will probably have to be re-used as the tabs of most motors have dimples that universal insulated terminals do not fit. Terminals have been provided to allow re-use of the factory connector. The wires that make up the wiper motor connection can be seen in the *Wiper Schematic* on the next page.



Locate the wires in the Painless harness labeled “WIPER MOTOR”, these three wires are:

BLACK: 16-gauge wire, printed **[WIPER MOTOR] #979 LOW/PARK**, this is a signal to the low-speed tab on the wiper motor. This wire will provide a ground signal to the wiper motor when the wiper switch is in the “ON/LOW” position

LT. BLUE: 16-gauge wire, printed **[WIPER MOTOR] #977 HIGH**, this is a signal to the high-speed tab on the wiper motor. This wire will provide a ground signal to the wiper motor when the wiper switch is in the ON/LOW position, also when in the “ON/HIGH” position, and when the wiper switch “WASH” button is pushed

BLACK/YELLOW: 16-gauge wire, printed **[WIPER MOTOR] #905 WIPER MOTOR POWER**, this wire supplies switched ignition power to the wiper motor from the 15-amp WIPER fuse on the fuse block. This wire will be doubled at the bulkhead with the power to the washer pump.

- On the motor, there are tabs sticking out, as shown above. These are the connection points for the wiper motor. Using a factory schematic or referencing your factory harness, connect the power and ground activation wires to the wiper motor. Terminals have been supplied to allow re-using your factory connector. Make certain to take a photo or make a drawing of the connector pinout before removing the factory wires.

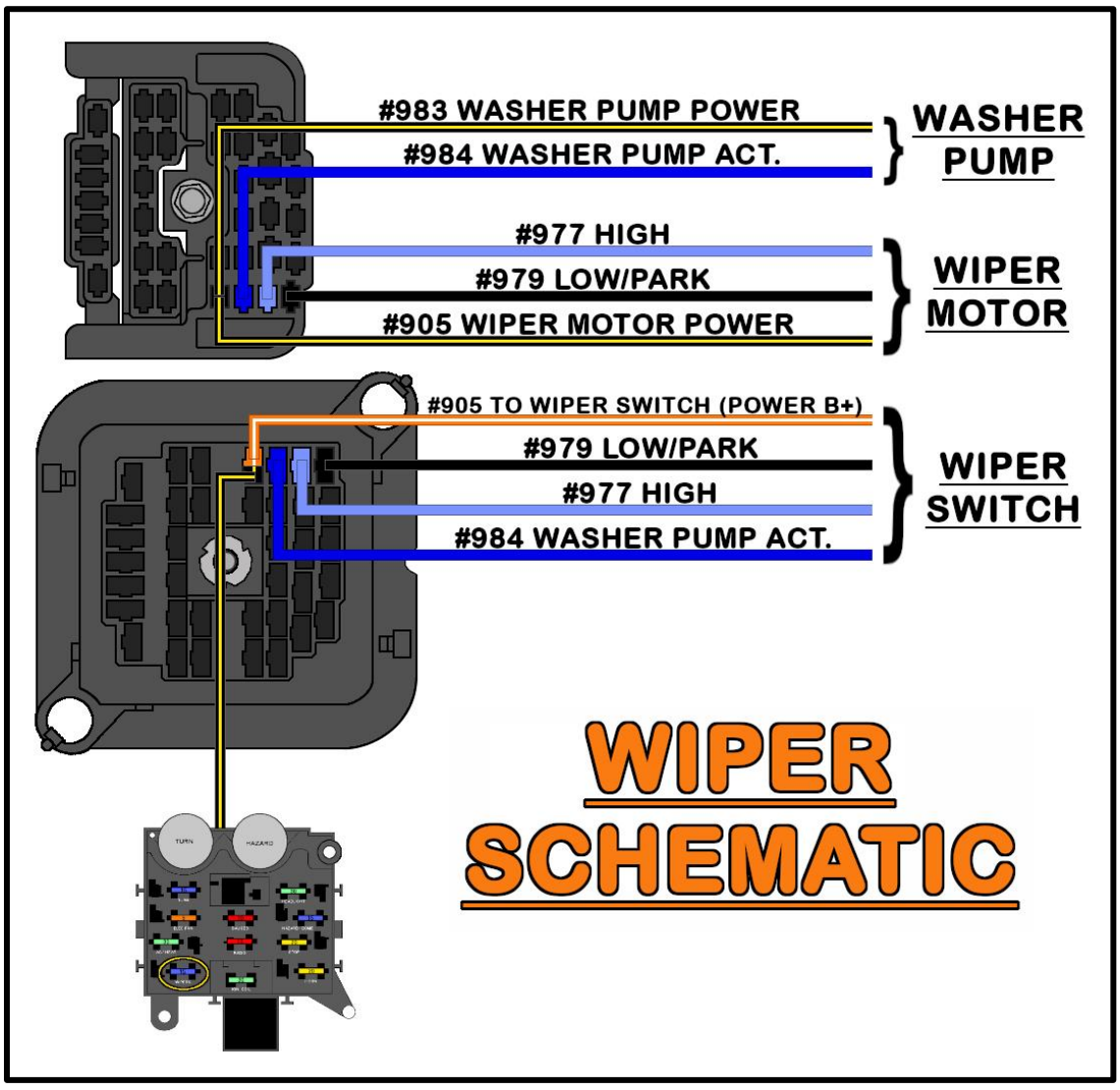
WASHER PUMP

The washer pump receives a ground signal from the wiper switch to activate the pump. Once activated, it pumps washer fluid from the reservoir to the washer nozzles. The wires for the washer pump have added length to support both reservoir-mounted pumps on the fender and wiper motor mounted pumps. These wires can be seen in the *Wiper Schematic* below. They are:

BLUE: 16-gauge wire, printed **[WASHER PUMP] #984 WASHER PUMP ACTIVATION**, this wire provides the washer pump with a ground source from the wiper switch when the switch is in the WASH position.

BLACK/YELLOW: 16-gauge wire, printed **[WASHER PUMP] #983 WASHER PUMP POWER**, this wire supplies switched ignition power to the washer pump from the 15-amp WIPER fuse on the fuse block. This wire will be doubled at the bulkhead with the power to the washer pump.

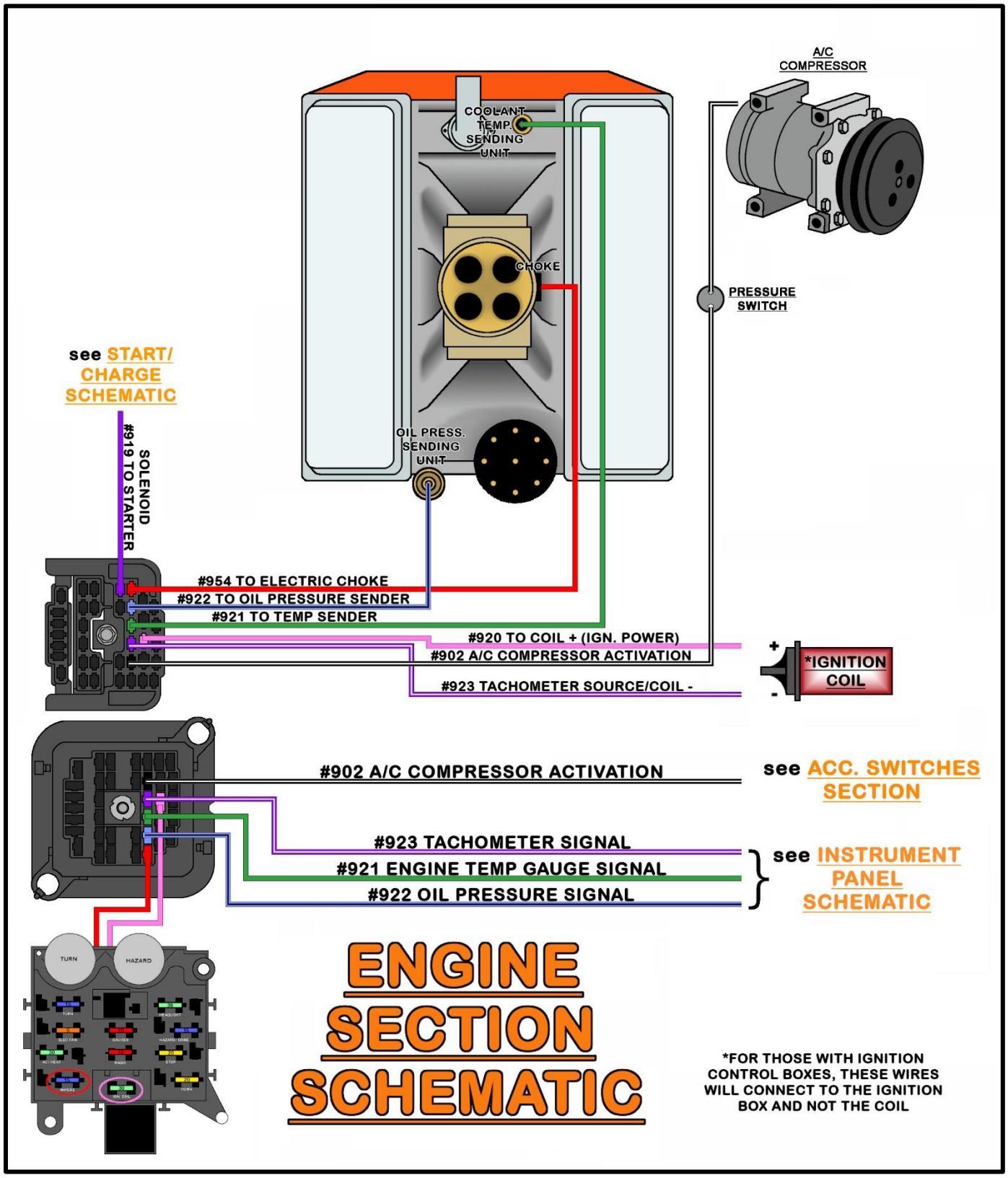
- Using a factory schematic or referencing your factory harness, connect the power and ground activation wire to the washer pump. Terminals have been supplied to allow re-using your factory connector. Make certain to take a photo or make a drawing of the connector pinout before removing the factory wires.



ENGINE SECTION

Engine Section consists of seven wires, some of which may or may not have already been re-routed to other places in the vehicle. These wires connect to the oil pressure and coolant temperature sending units for gauges or lights, the coil or ignition system, the A/C compressor clutch, and an electric choke on a carburetor. Likewise, the last wire is for the Starter Solenoid and will be covered in the **Start/Charge Section**. Locations of all these components will vary from vehicle to vehicle, so no specific routing instructions can be given.

All wires of the **Engine Section** have ample length to account for the numerous way components can be mounted inside an engine compartment. For example, an ignition box mounted on the inner fender requires more length of wire than a firewall mounted coil.


A/C
COMPRESSOR
COOLANT
TEMP.
SENDING
UNIT
CHOKE
PRESSURE
SWITCH
see START/
CHARGE
SCHEMATIC
#919 TO STARTER
SOLENOID
OIL PRESS.
SENDING
UNIT
#954 TO ELECTRIC CHOKE
#922 TO OIL PRESSURE SENDER
#921 TO TEMP SENDER
#920 TO COIL + (IGN. POWER)
#902 A/C COMPRESSOR ACTIVATION
#923 TACHOMETER SOURCE/COIL -
+
*IGNITION
COIL
-
#902 A/C COMPRESSOR ACTIVATION
see ACC. SWITCHES
SECTION
#923 TACHOMETER SIGNAL
#921 ENGINE TEMP GAUGE SIGNAL
#922 OIL PRESSURE SIGNAL
see INSTRUMENT
PANEL
SCHEMATIC
TURN
HAZARD
ENGINE
SECTION
SCHEMATIC
*FOR THOSE WITH IGNITION
CONTROL BOXES, THESE WIRES
WILL CONNECT TO THE IGNITION
BOX AND NOT THE COIL

COOLANT TEMP SENSOR

GREEN: 18-gauge wire, printed **[ENGINE SECTION] #921 TO TEMP SENDER**, this wire sends a resistive ground signal to the engine coolant temp gauge. If you are using an aftermarket mechanical gauge, this wire is not needed. See the *Engine Section Schematic* on the previous page.

The coolant temp sending unit or temp switch can be mounted in the intake manifold or the side of either cylinder head. These will have a peg, tab, or threaded post to connect to, as seen in the photo above. Ring terminals and insulated spade terminals have been provided. Your factory notched connector will need to be re-used if your sender has a round disk on top.

Two-wire sending units, found on vehicles with indicator light clusters, (meaning there is no temp gauge only a temp light) usually require a chassis ground source on one side of the sending unit. Trace your factory harness or better yet, consult a wiring diagram from your year/make/model vehicle to see what your requirements are.

Two-wire temperature sensors on fuel injected engines are for engine computer input, not for gauge signal.

Also, if connecting to an engine in a vehicle that has electric cooling fans, make certain you know the difference between the coolant temp sensor and the electric fan thermostatic switch; both sensors can look identical.

If you are installing a new temp sensor or are unsure of the temp sensor currently mounted in your engine, make sure there is no sealant tape on the sensor threads. The tape can interfere with the ground source the sensor needs to read correctly. Anti-seize works well on the threads.

- Route this **GREEN #921** wire to the coolant temp sensor, cut to length, strip ¼" insulation, and crimp on the appropriate terminal for your connection, and connect.

OIL PRESSURE SENSOR

LT. BLUE/BLACK: 18-gauge wire, printed **[ENGINE SECTION] #922 TO OIL PRESSURE SENDER**, this wire sends a ground signal to the oil pressure gauge. If you are using an aftermarket mechanical pressure gauge, this wire is not needed. See the *Engine Section Schematic* on **page 40**.

The oil pressure sending unit will generally be located near the oil filter or on the back of the block behind the intake manifold.

- Route this **LT. BLUE/BLACK #922** wire to the oil pressure sending unit, crimp-on the appropriate terminal for your connection, and connect.

Terminals have been provided for those with the style of sensor seen above. Your factory notched connector will need to be re-used; rollover crimpers will be needed to install this terminal.

Two-wire sending units found on vehicles with indicator light clusters, meaning there is no oil gauge only an oil light, usually require a chassis ground source on one side of the sending unit. Trace your factory harness or better yet, consult a wiring diagram from your year/make/model vehicle to see what your requirements are.

If you have a two-wire sensor on a newer, fuel-injected, donor engine, it will not work for your pressure gauge. Two-wire sensors on fuel injected engines are for fuel pump control and are not designed for oil pressure gauge readings. These types of sensors are generally found on GM TBI and TPI engines.

ELECTRIC CHOKE

RED: 18-gauge wire, printed **[ENGINE SECTION] #954 TO ELECTRIC CHOKE**, this wire provides a switched ignition power source to the choke from the 15-amp WIPER fuse. It has power when the ignition switch is in the ON/RUN position.

When you turn your key to the “ON/RUN” position, the voltage this wire carries heats the bi-metal spring called the “choke thermostat.” This spring will unravel as it is heated causing the choke to slowly open. When the ignition is turned to the “OFF” position, power is no longer on this wire, causing the spring to begin to cool and contract, closing the choke.

- If you do not have an electric choke, you do not need this wire and it can be capped off and stowed. **If you are using a Turbo 400 transmission, see the instructions below before terminating the #954 wire.**

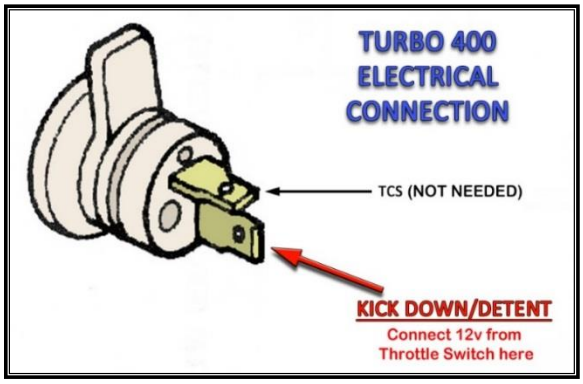
- Route the **RED** **#954** wire to the + terminal of the electric choke, install the supplied terminal and connector, and connect. **If you are using a Turbo 400 transmission, and a throttle switch is in the engine compartment, see the instructions below before terminating the #954 wire.**

- Double up the cut off piece of **#954** at the choke to provide power to the Turbo 400 kick down throttle switch.

- Ensure the choke is properly grounded (the ground wire is not supplied in the Painless harness) before continuing with the installation. This is normally provided with the carburetor.

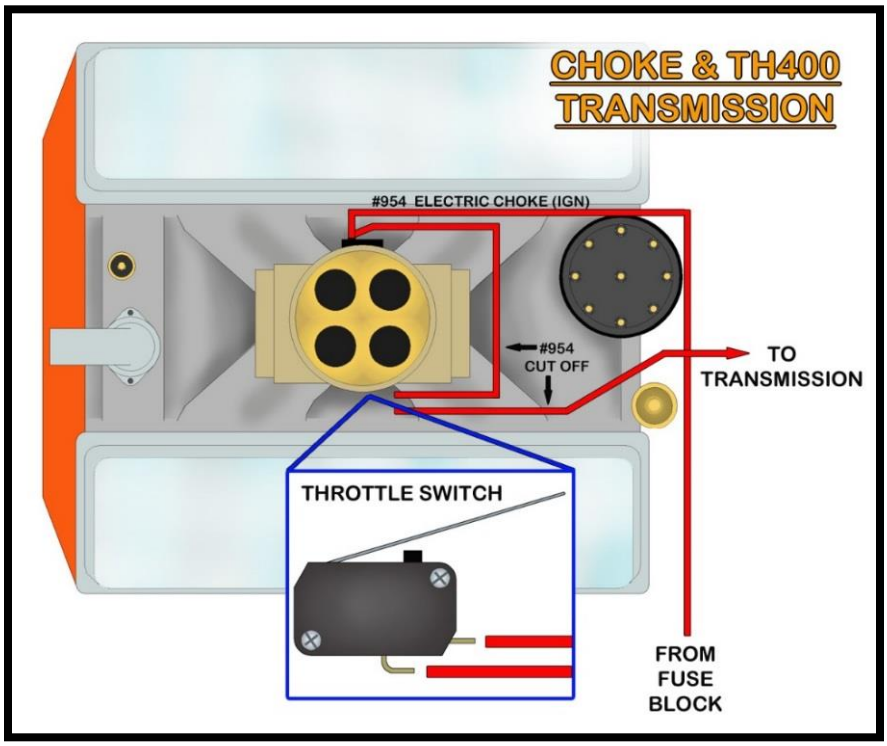
Turbo 400 Transmission

The Turbo 400 transmission requires a 12v power source to downshift the transmission under wide-open throttle. This is done with a throttle switch either located on the accelerator pedal inside the vehicle or on the throttle linkage on top of the engine.



- Double up the cut off piece of **#954** at the choke. Route this cutoff piece of **#954** to one side of the throttle switch and cut to length. Use terminals from the parts kit to connect the wire.

- If you have a factory, accelerator pedal mounted switch, you can use a switched power source inside the vehicle or you can route the cutoff piece of **#954** to the interior, connect at the throttle switch, and then route it back out to the transmission.

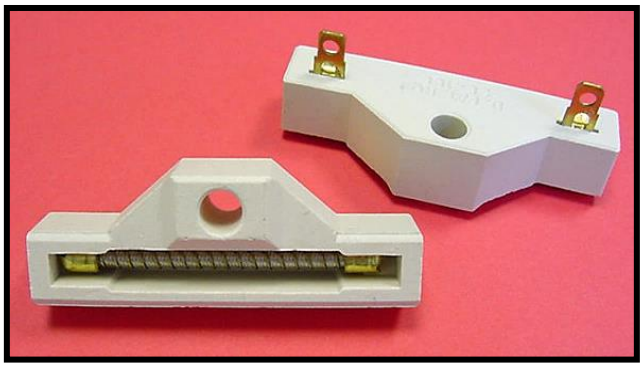


COIL

A single wire, coming from the fuse block, supplies power to the coil/ignition system. The connection of this wire varies depending on what ignition system (factory or aftermarket) you use. The wire needed to supply a switched ignition power source is:

PINK: 14-gauge wire, printed **[ENGINE SECTION] #920 TO COIL + (IGN. POWER)**, this wire comes from the 30-amp COIL fuse. This wire has power anytime the ignition switch is in the ON and START positions. This wire provides the coil/ignition system with switched power in 1 of 4 ways:

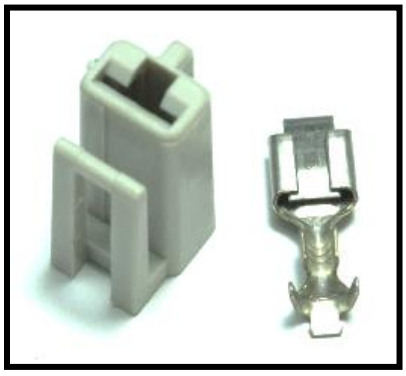
- If the Coil you are using is not internally resisted, a ballast resistor, along with the installer provided bypass wire shown on **page 46,** will be required. If a coil is not internally resisted and a ballast resistor is not used, the coil will overheat within a few minutes to the point that it will no longer work. A ballast resistor can be obtained at your local parts store using part number **RU11**. See the *Ballast Resistor Connection Diagram* on **page 46**.



- HEI coils, internally resisted coils, and most aftermarket ignition boxes do not require the use of a ballast resistor. The **#920** wire connects directly to the + side of the coil. See the *Coil Connection (NO Ballast Resistor) Diagram* on **page 46**.

- If you use an aftermarket ignition box, such as an MSD, Accel, etc., this PINK **#920** wire will supply the ignition box with the switched power source it requires. This wire goes to the aftermarket ignition box and not the Coil; the ignition box will provide the Coil + connection. This **#920** wire may need to be pulled from the **Engine Section** and routed to where the box is mounted. See the ignition box manufacturer's instructions for a specific connection point of this power source. *MSD Ignition Connection* on **page 47** has been provided.

- If you have converted to fuel injection, are using a standalone harness, such as a Painless fuel injection harness, and coil power is supplied through the fuel injection harness, in LT1/LS1 and newer applications, this PINK **#920** wire provides the fuel injection harness with the switched power source the harness requires. If you use a Painless fuel injection harness, this PINK **#920** wire will connect to the open-ended PINK wire of the fuel injection harness labeled **"IGN"** or **"Fuse Block IGN."**



- Route this PINK **#920** wire to its proper connection point and cut to length, install the appropriate terminal for your connection, and connect.

Terminals and a factory-style connector, seen in the photo to the left, have been supplied to allow connecting to the + side of an HEI Coil.

Tachometer

PURPLE/WHITE: 18-gauge wire, printed **[ENGINE SECTION] #923 TACHOMETER SOURCE/COIL -**, this wire sends a tachometer signal from the coil to the gauge cluster. This wire only needs to be connected if you are using a tachometer (factory or aftermarket). See the *Engine Section Schematic* on **page 40**. If you do not have a tachometer, this wire may be removed from the harness. Depending on your ignition system (factory or aftermarket), or use of fuel injection, the connection of this **#923** wire can vary:

- Standard factory type installs with an HEI distributor, or external coil ignition systems, require the **#923** wire to be connected to the negative (-) side of the coil. Refer to the diagrams on **pages 46 & 47** for proper connection.

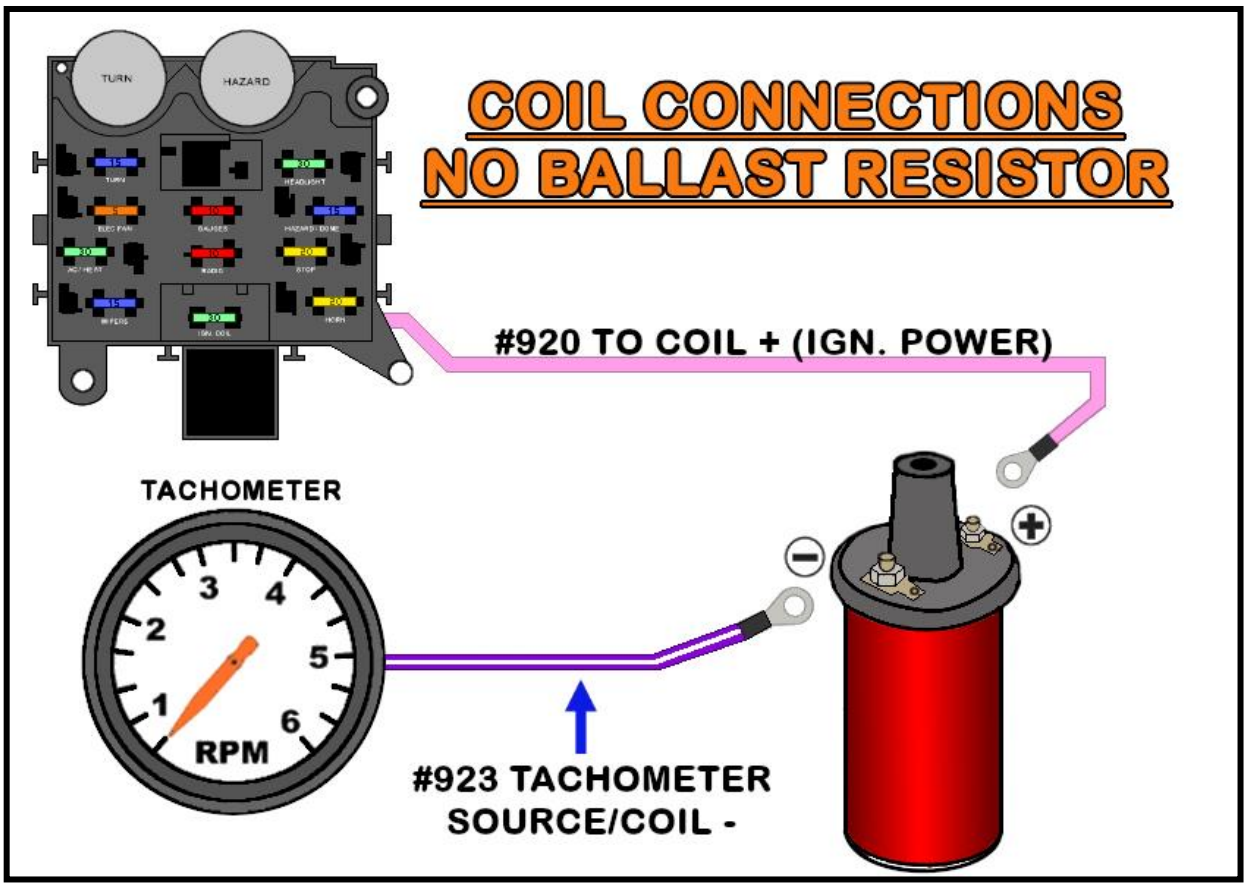
- If you are running fuel injection and the tach output wire of the fuel injection harness does not reach the tachometer, this **#923** wire will connect to the tach output wire from the ECM.

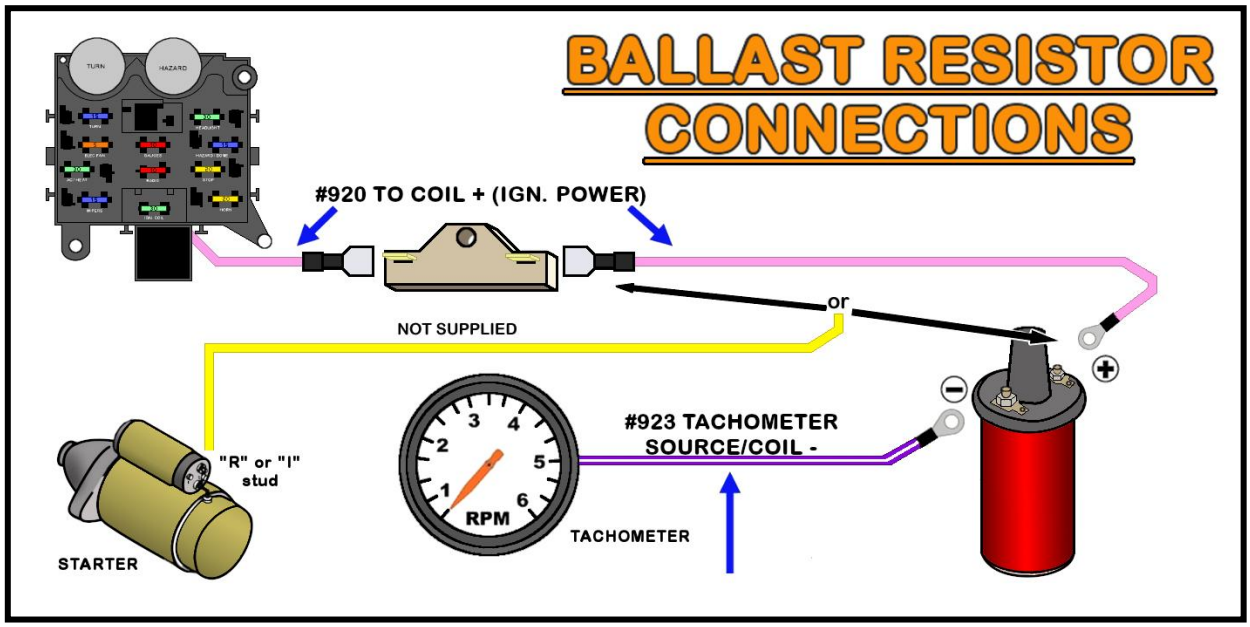
- If an aftermarket ignition box is being used, such as an MSD, Accel, etc., this **#923** wire will connect to the tach output found on the ignition box. Refer to the *MSD Ignition Connection* on **page 47** and the ignition manufacturer's installation procedure.

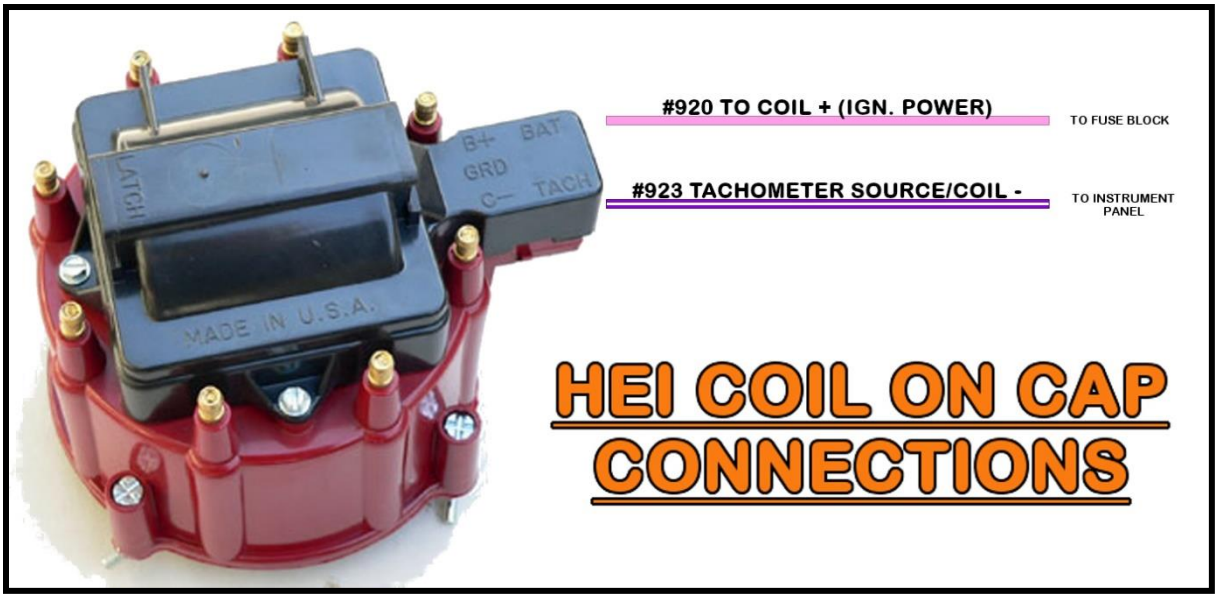
- Route this #**923** tach signal wire to its proper connection point and cut to length, install the appropriate terminal for your connection, and connect.

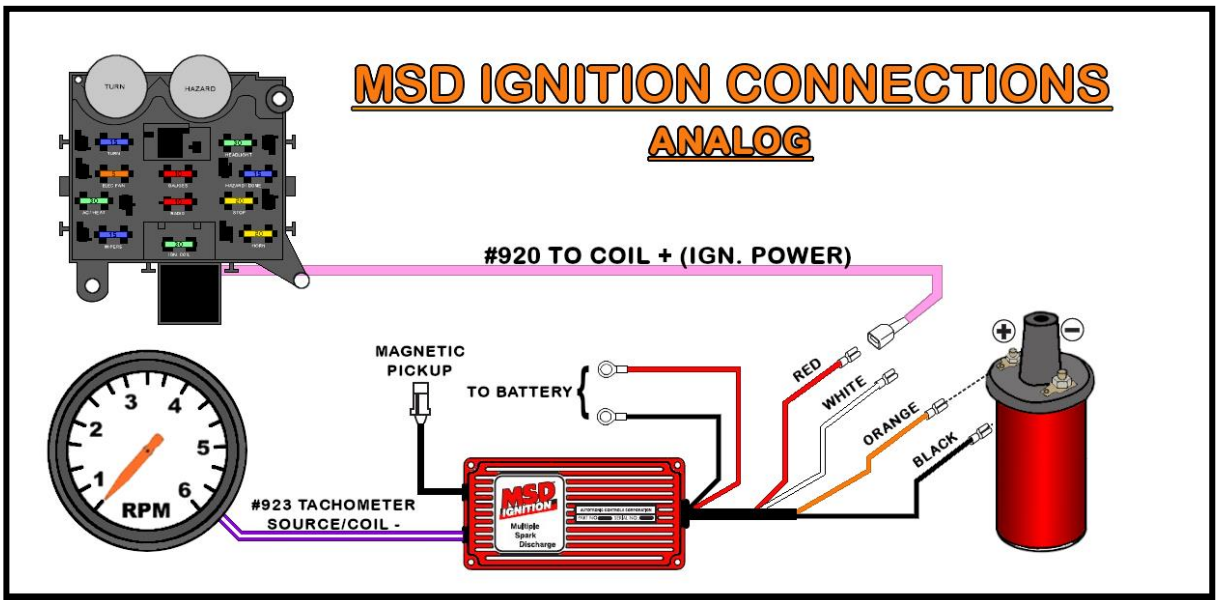
.

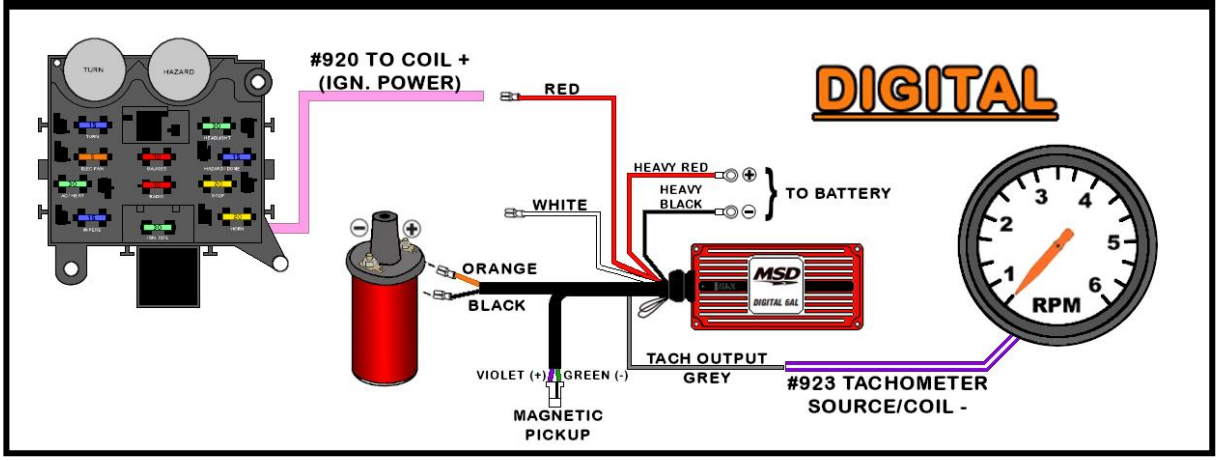
Use one of the following four diagrams to properly connect the coil power (**#920**) and tachometer (**#923**). Not shown in the diagrams are the wire(s) connecting the coil and the distributor, these are not included.





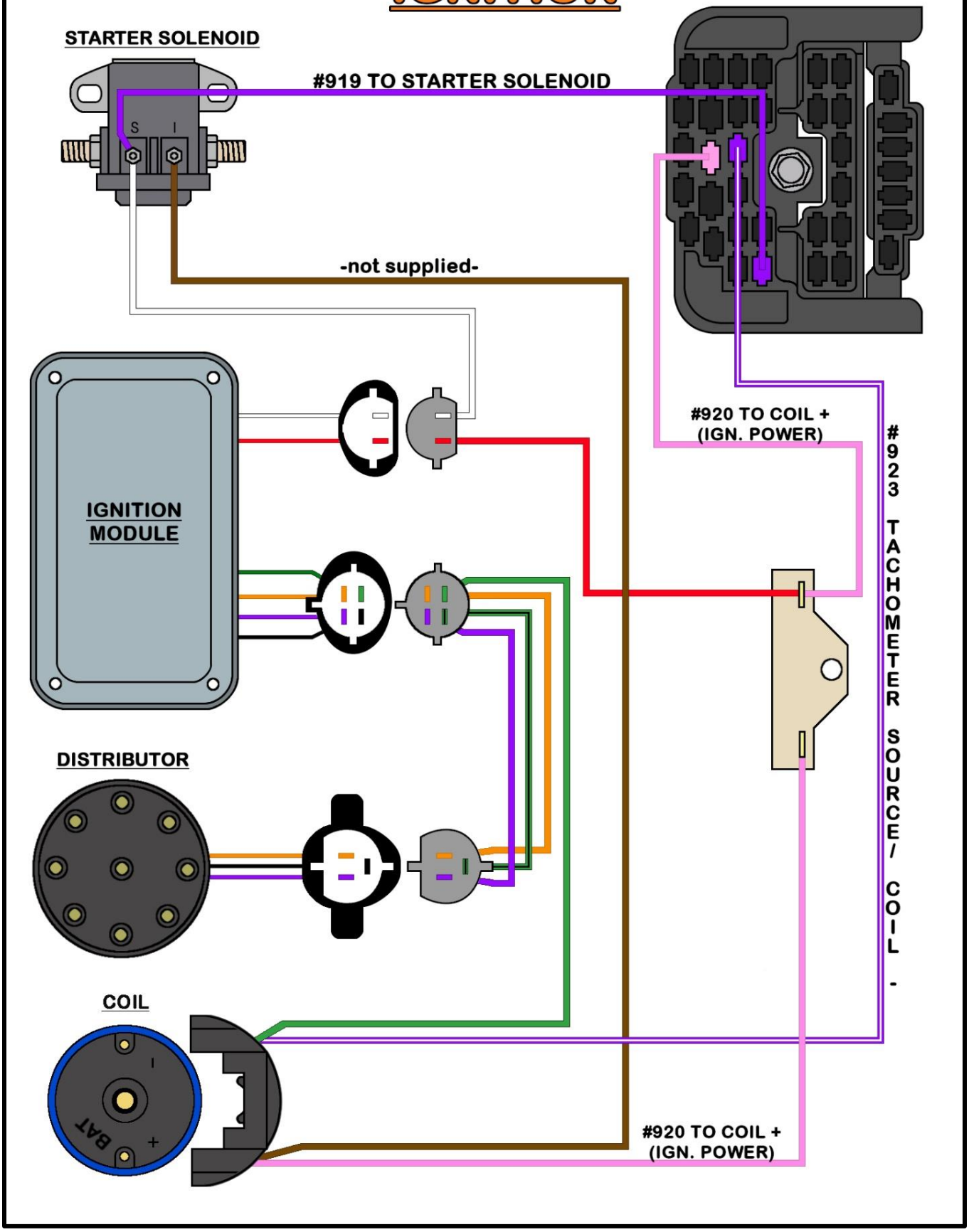

#920 TO COIL + (IGN. POWER)
TO FUSE BLOCK
#923 TACHOMETER SOURCE/COIL -
TO INSTRUMENT PANEL
HEI COIL ON CAP CONNECTIONS
MADE IN U.S.A.
B+ BAT
GRD
C— TACH

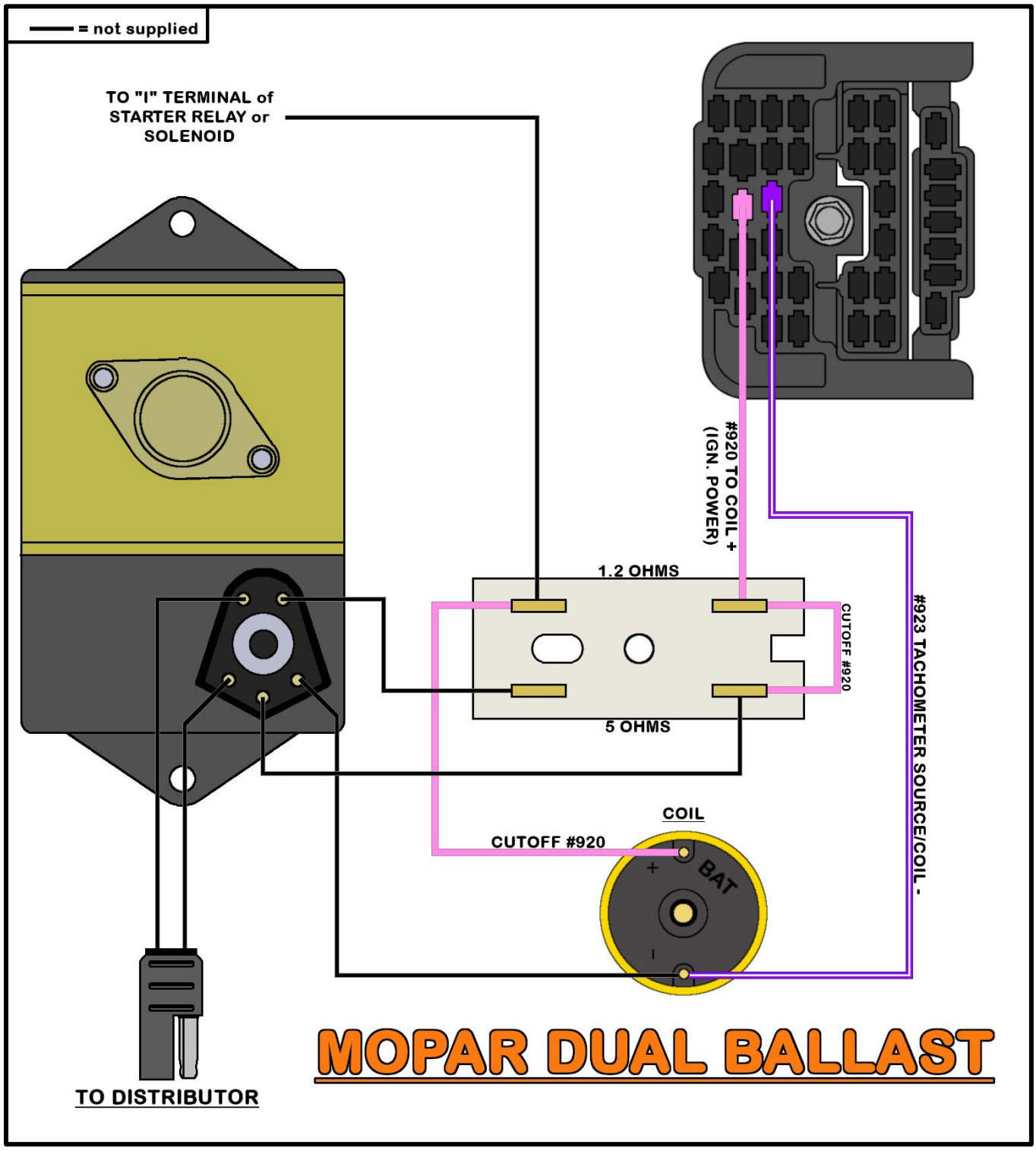

MSD IGNITION CONNECTIONS
ANALOG
#920 TO COIL + (IGN. POWER)
MAGNETIC PICKUP
TO BATTERY
RED
WHITE
ORANGE
BLACK
RPM
#923 TACHOMETER SOURCE/COIL -
MSD IGNITION
Multiple Spark Discharge


DIGITAL
#920 TO COIL + (IGN. POWER)
RED
HEAVY RED
HEAVY BLACK
TO BATTERY
WHITE
ORANGE
BLACK
TACH OUTPUT
GREY
VIOLET (+)
GREEN (-)
MAGNETIC PICKUP
#923 TACHOMETER SOURCE/COIL -
RPM
MSD
DIGITAL 6AL

FORD DURASPARK IGNITION

*wires from connectors not supplied, see Painless part #30812




= not supplied
TO "I" TERMINAL of STARTER RELAY or SOLENOID
#920 TO COIL + (IGN. POWER)
1.2 OHMS
CUTOFF #920
5 OHMS
#923 TACHOMETER SOURCE/COIL -
COIL
CUTOFF #920
BAT
+
-
TO DISTRIBUTOR
MOPAR DUAL BALLAST

A/C COMPRESSOR CLUTCH

Before connecting this wire, see the A/C – Heat Section on pages 116 – 118 for diagrams and further details on how to connect a factory or aftermarket system.

BLACK/WHITE: 14-gauge wire, printed **[ENGINE SECTION] #902 A/C COMPRESSOR ACTIVATION**, this wire is intended to provide power to the A/C compressor clutch. This wire comes from the A/C switch inside the vehicle to the binary or trinary safety switch and then to the compressor.

This wire can also be used to provide power to the blower motor on vehicles that power the blower motor on heat only vehicles that powered the blower motor through the bulkhead instead of a separate harness that exited the passenger side of the firewall.

- In the engine compartment, route the **#902** wire to your binary or trinary safety switch if one is being utilized. In most cases with aftermarket systems, this will be mounted near the condenser on the core support. Cut the **#902** wire to length and connect. Attach the cut-off portion to the other pin of the pressure switch and route it to the A/C compressor clutch and connect.

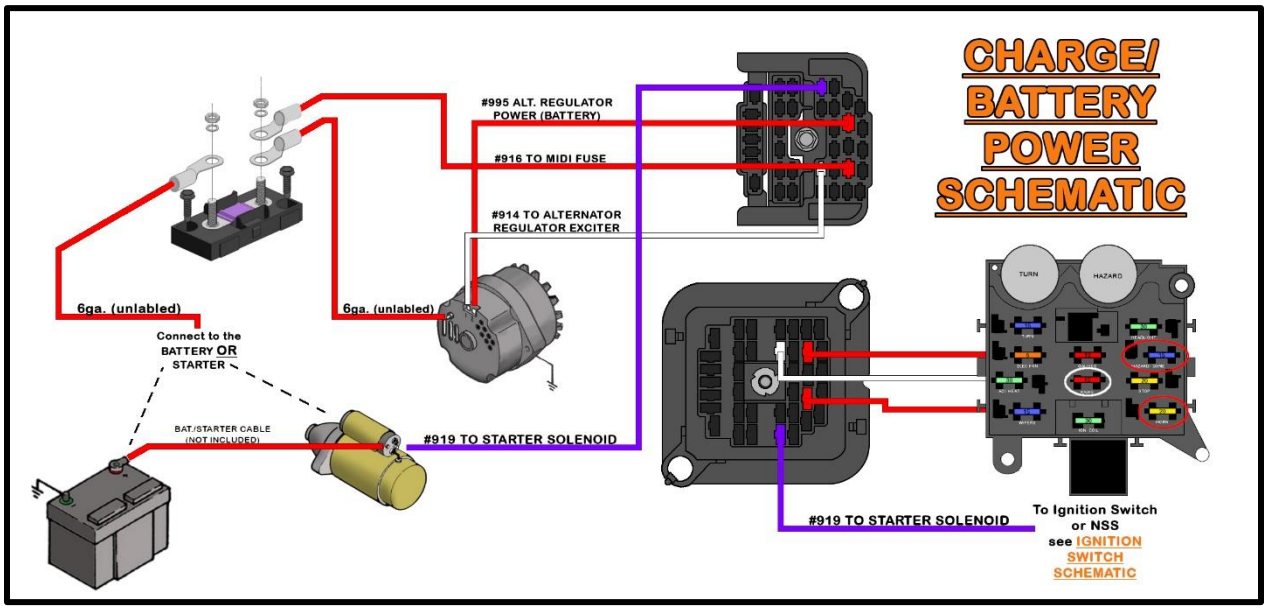
  Those using a trinary switch, use the diagram on page 117 to wire the fan control portion of the switch. Cut off wire or wire supplied by a separate fan relay harness will be needed as this chassis harness does not include this wire except **#901** as shown.

  This wire can be repurposed or removed if you are not using an A/C system.

This wire will only have power when connected to a power source inside the vehicle.

START/CHARGE SECTION

The **Engine Section** consists of three wires for connections to the alternator, starter solenoid, and inline MIDI fuse (included with the kit). Locations of these components vary from vehicle to vehicle so no specific routing instructions can be given.



Locate the bag kit provided with the Painless harness kit labeled “ALTERNATOR.” This bag kit contains the hardware needed to make the appropriate connections to the alternator as well as a covered inline fuse holder.

ALTERNATOR

The alternator connections vary depending on the alternator your vehicle currently has installed. The alternator may also need to be removed to gain access to the connection points.

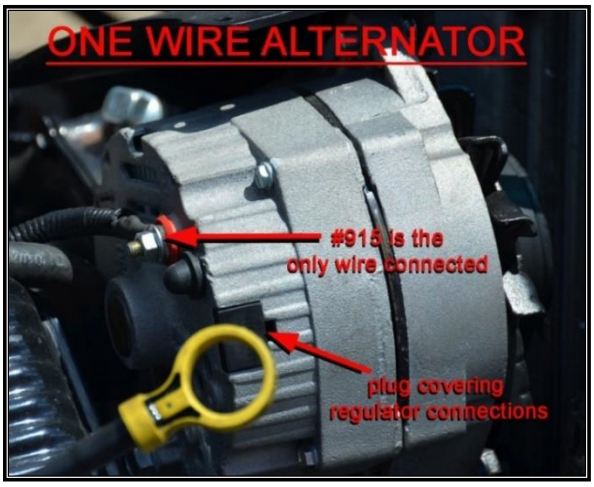
The one connection all alternators have in common is the output post. This sends power from the alternator to the battery. This connection is made using the large gauge **RED** wire rolled in the kit, it is:

RED: 6-gauge wire, not printed, **#915 ALTERNATOR OUTPUT,** this wire provides power out of the alternator to the MIDI fuse and from the MIDI fuse to the battery. This wire is not part of the harness but is a separate, rolled piece of wire provided with the kit. When connected, this wire always has power from the battery. See *Charge/Battery Power Schematic* on **page 51**.

- Locate the rubber alternator boot and a large, un-insulated ring terminal from the "ALTERNATOR" bag that has the right size opening for your alternator post. A piece of the provided red heat shrink may be used along with the boot or just by itself over the terminal crimp if the alternator boot is not desired.

- If the rubber boot is being used, the end will need to be cut, as shown in the photo to the right, to allow the large gauge wire to pass through.

- If the heat shrink is being used, slide it onto the **#915** wire, followed by the rubber boot. A small amount of lubricant such as WD-40 may be applied on the inside of the rubber boot to allow the boot to slide down the wire easier.
- With the boot on, strip about ⅜" of insulation from the charge wire and crimp the ring terminal on. You can use a hammer crimper if you hand crimper will not accept this large gauge wire/terminal.
- Connect this wire to the B+/Output stud on the alternator. Once the nut on the output post stud has been tightened, slide the boot over the nut and ring terminal installed on the alternator.



If your vehicle has an aftermarket, **ONE WIRE ALTERNATOR**, meaning it does not require a switched 12v source or regulator connections, or if the Painless or other aftermarket fuel injection harness you are using has an alternator connector, **then this output wire is the only wire used in this section at the alternator.**

Locate the 2 wires intended for alternator regulator connections; they will be grouped together in the **Engine Section**. These wires are:

RED: 14-gauge wire, printed **[START/CHARGE SECTION] #995 ALT. REGULATOR POWER (BATTERY)**, this is the sense wire, it provides a battery power source, or voltage sense, that all voltage regulators require. This wire always has power and comes from the large battery supply splice in the harness. This wire will not be needed if you have a one wire alternator or a GM CS series alternator. See the various alternator illustrations on **pages 54 – 65** and the *Charge/Battery Power Schematic* on **page 51**.

WHITE: 14-gauge wire, printed **[START/CHARGE SECTION] #914 TO ALTERNATOR REGULATOR EXCITER**, this is the indicator light wire and has switched ignition power from the fuse block. This wire will not be needed if you have a one-wire alternator.

If you have a one wire alternator, and only if you have a one wire alternator, you need to insulate the ends of these wires and stow them in the harness, **THEY ARE POWER WIRES**. **#995** may also be connected to the output post of the alternator to avoid removing it from the harness since this wire goes into the big battery power splice.

CHARGE INDICATOR LIGHT

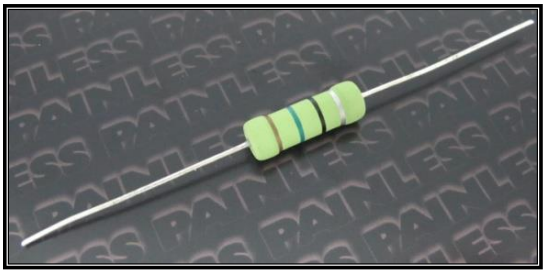
Those wanting to add a charge indicator light will need to re-route the **WHITE #914** wire found in the **Alternator Section** of wires. This wire will be connected to the light and then out the other side of the light to the alternator voltage regulator. The way the light will function is this:

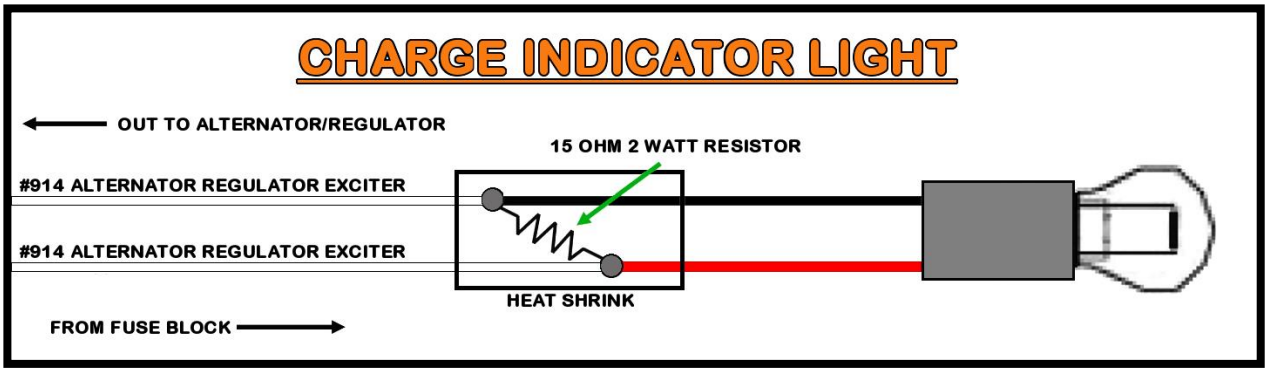
Electrical current moving from the fuse block, through the filament, and out to the alternator causes the light to illuminate. This light illuminates when the key is in the ON/RUN position and the alternator is not charging because the engine is not running or when the alternator is not working properly. Once the alternator is charging, the voltage regulator no longer needs the switched ignition voltage supplied by the **#914** wire, which stops the current flow. Since power is no longer flowing through the filament, the bulb does not illuminate.

If you are using a one-wire alternator, a charge light cannot be installed since you do not have an alternator exciter wire going to the regulator.

- Connect the **WHITE #914** wire to one side of the light; the remainder of **#914** connects to the other side of the light to provide power out to the voltage regulator**.** See the diagram below.

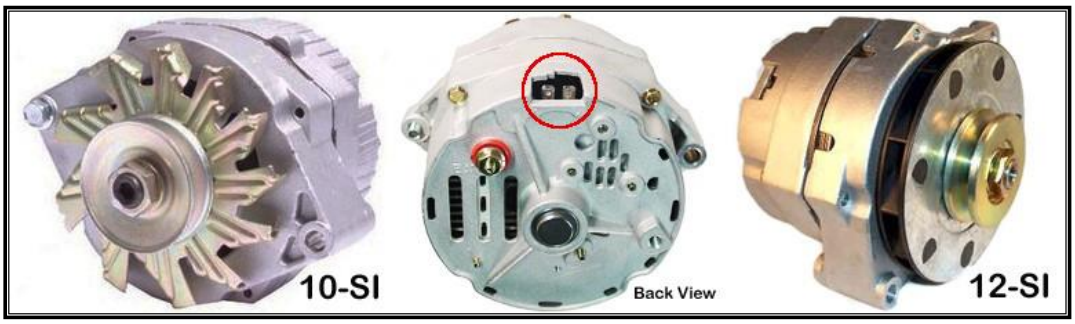
It is also recommended, but not necessary, to wire in a 15 ohm 2-watt resistor between the power in and power out, as seen in the diagram below. This provides enough power to the voltage regulator to allow the alternator to still charge in the event the bulb burns out. This resistor can be found through online, electronic component suppliers such as Mouser or Allied Electronics under part #**OY150KE**.





The remaining alternator connections vary based on which alternator is being used. Choose the alternator that best represents the alternator found on your vehicle from those on the next few pages. Then, follow the instructions provided for your alternator.

GM SI SERIES ALTERNATORS



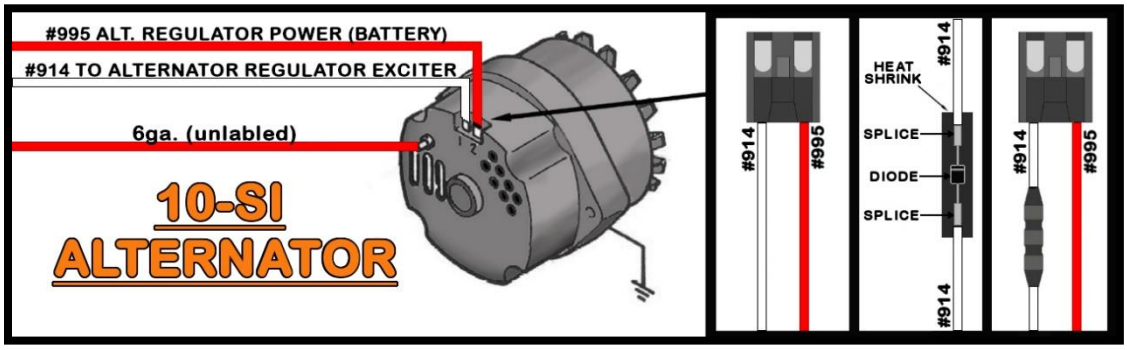
The 10-SI and 12-SI alternators are easy to identify. They have an external fan behind the pulley (the 12-SI has enclosed style fan blades) and a 2-pin connection. This 2-pin connection is circled on the second example in the image above. These are also commonly referred to as “Delco” or “Delcotron” alternators.

The two wires (**RED #995** and **WHITE #914**) connect to the two posts on the back edge of the alternator.

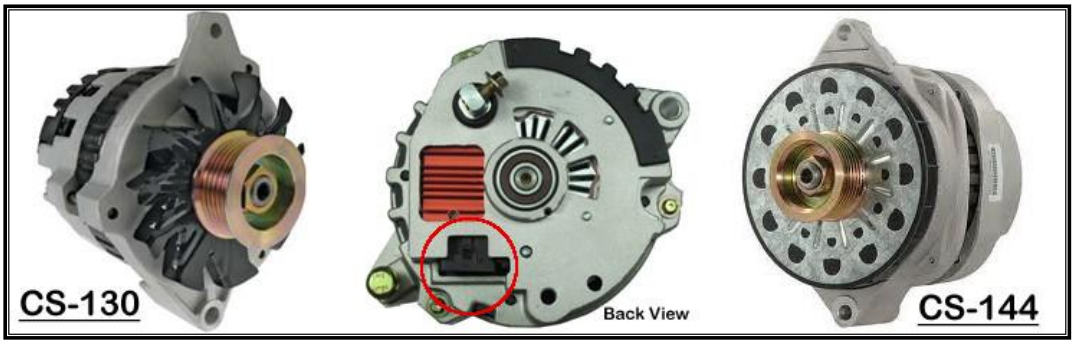
- Route the two wires to the numbered 1 & 2 terminals on the alternator and cut to length. Strip ¼” of insulation from both wires.
- A factory-style connector and terminals, seen in the photo to the right, are provided in the “ALTERNATOR” bag. Crimp a terminal onto each of the two wires.
- Insert the wires into the connector as shown in the diagram below. When the terminal pin-out is complete, plug the connector into the alternator.

You may experience “engine run-on.” This is caused when the alternator back feeds voltage down the **#914** wire after the key has been turned off. This allows the ignition system to still function causing the engine to continue running even though the key is turned off or even removed from the ignition. If this should happen, unplug the alternator connector to shut the engine off. If you experience this, a remedy has been provided.

As shown in the photo above and the diagram below, a diode, splices, and heat shrink are provided. If engine run-on occurs, simply install the diode as shown. When the diode is installed inline of the **#914** wire with the stripe towards the alternator it lets current flow towards the alternator, but not away from the alternator back feeding the ignition system, thus fixing the run-on issue.

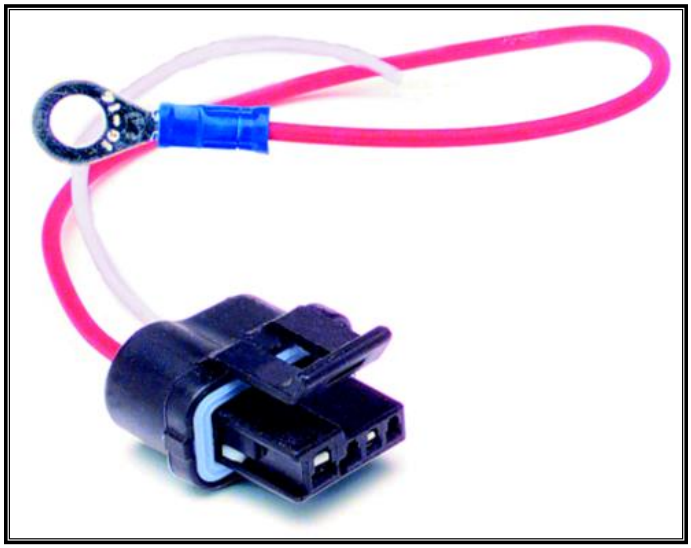


GM CS-130 SERIES ALTERNATORS

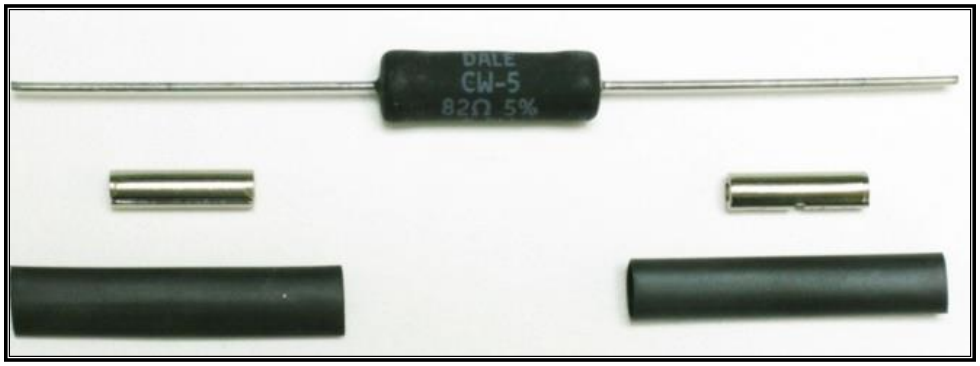


The CS-130, CS-121, and CS-144 alternators closely resemble the SI series alternators. They have an external fan behind the pulley and, generally, a plastic casing on the side and back. These alternators have a 4-pin, sealed connector, shown in the photo below and circled in the image above. The regulator will be marked P, L, S, F. This type of alternator was used on GM TPI and LT1 fuel injected engines among other late 1980s to mid-1990's GM vehicles.

The two wires **RED #995 REGULATOR BATTERY POWER** and **WHITE #914 ALTERNATOR EXCITER**, connect to the regulator on the back of the alternator.

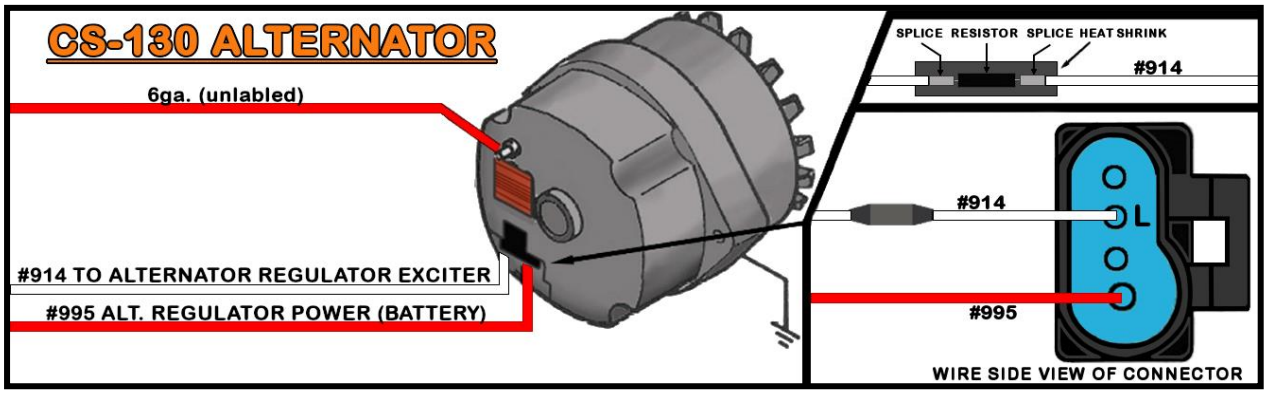


- Route the two wires to the connector on the alternator and cut to length. Strip ¼" of insulation from both wires.
- The factory 4-pin alternator connector from a factory GM harness is needed (seen to the right). It is not included with this Painless chassis harness.
- The CS-130 alternator requires a resistance on the **WHITE #914** wire. Without this resistance, the regulator on the alternator will burn up. A resistor, splices, and heat shrink, seen below, are provided in the "ALTERNATOR" bag kit. The resistor* will simply need to be installed inline on the **#914** wire as shown in the diagram on the next page.

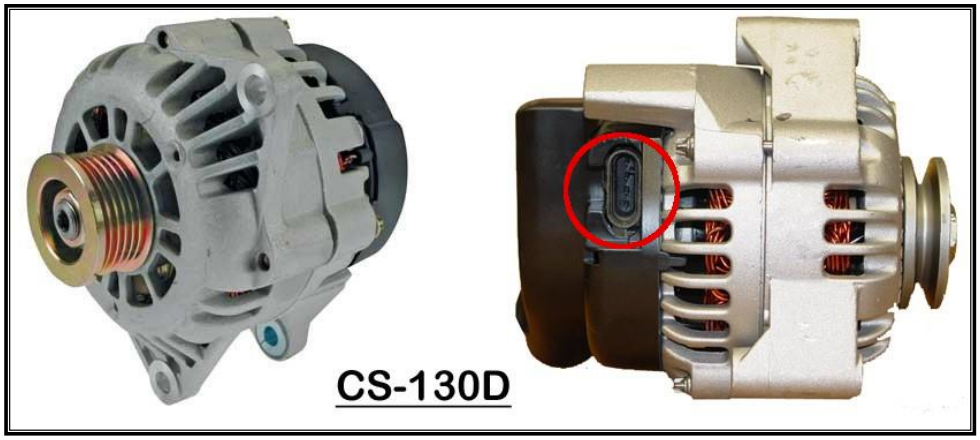


***In factory applications where this alternator was used, a charge indicator light created the necessary resistance. **For those with an instrument panel with a charge indicator light, the resistor is not needed**. However, the **#914** wire needs to be routed to one side of the charge indicator light and the other side of the light then routes out to the alternator. A charge indicator light was explained in more detail on **page 53**.

- Use 2 of the splices and heat shrink provided in the “ALTERNATOR” bag kit to splice the CS-130 pigtail to the **#914** and **#995** wires according to the diagram below.



GM CS-130D SERIES ALTERNATORS



The CS-130D can be spotted by the lack of an external fan behind the pulley. These alternators have an internal fan and a plastic casing on the back. These alternators have an elongated, oval, 4-pin, sealed connector, seen circled in the image above. The regulator will be marked P, L, I, S. This type of alternator was used on many engines, including the GM LS series, Vortec, and Gen. III Vortec truck fuel injected engines.

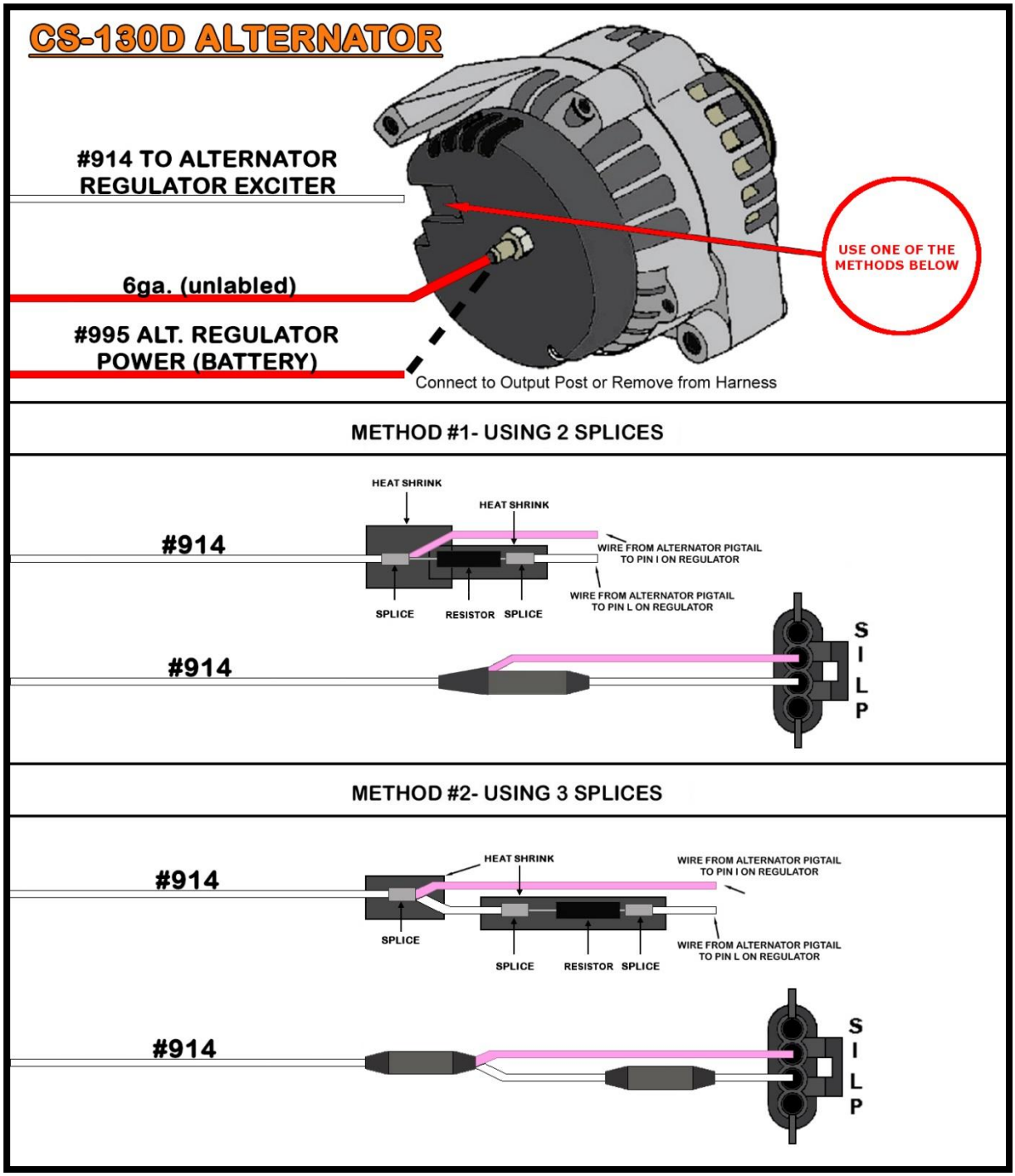
There are two wires in the **Alternator Section**: **RED #995 REGULATOR BATTERY POWER** and **WHITE #914 ALTERNATOR REGULATOR POWER (IGN)**. For the CS-130D alternator, only the **WHITE #914** is used. The **#995** may be connected to the alternator output post or removed from the harness.

- Route the **WHITE #914** to the connector on the alternator and cut to length. Strip ¼" of insulation.
- The factory, 4-pin alternator connector from a factory GM harness or a CS-130D pigtail purchased from Painless (**part #30705**; see photo), needs to be used.
- The CS-130D alternator requires a switched power source to pin "I" of the regulator and a resisted power source on the wire going to pin "L" of the regulator. Without this resistance, the regulator on the alternator will burn up. A resistor, splices, and heat shrink, seen on page 55, are provided in the "ALTERNATOR" bag kit. The resistor simply needs to be installed inline on the pin "L" wire, **#914**, as shown in the diagrams on the next page.

In factory applications where this alternator was used, a charge indicator light created the necessary resistance. **For those with an instrument panel with a charge indicator light, the resistor is not needed**. However, the **#914** wire needs to be routed to one side of the charge indicator light and the other side of the light then routes out to the alternator. A charge indicator light was explained in more detail on page 53.

- Using a splice and heat shrink provided in the "ALTERNATOR" bag kit, splice the CS-130D pigtail to the **WHITE #914** wire according to one of the diagrams on the next page.

Both diagrams accomplish the same task: they use the **WHITE** **#914 ALTERNATOR REGULATOR POWER (IGN)** wire to provide a switched power source and a resisted power source to the 2 wires of a CS-130D alternator pigtail/connector when a charge indicator light is NOT being used. Pick the method that easiest for you to understand.



GM EXTERNALLY REGULATED ALTERNATORS

The two wires (**RED #995** and **WHITE #914**) connect to the regulator.

- Route the two wires of the Painless harness to the connection point on the regulator, cut to length, and strip ¼" of insulation from both wires.

- The factory, 2-pin alternator connector and 4-pin regulator connector from a factory GM harness need to be used. Due to a lack of usage by most customers, these connectors are not included with this Painless chassis harness. If you do not have these connectors, they can be obtained online, at a local auto parts store, or you can use the loose piece insulated terminals in the parts kit to make connections.

- Connect the **WHITE #914** wire to the "4" terminal on the regulator.

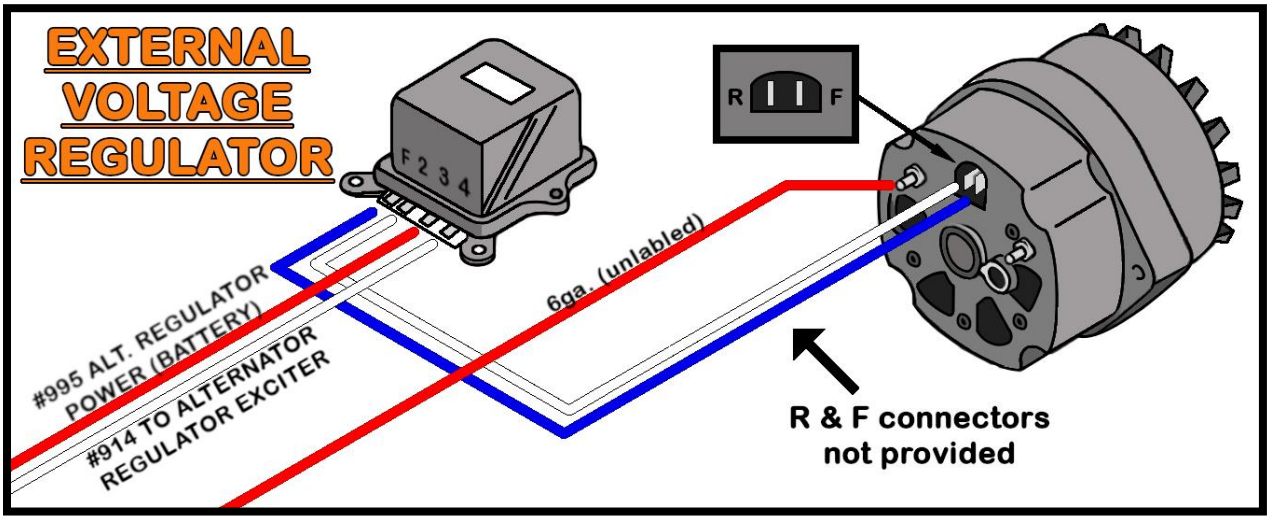
- Connect the **RED #995** to the "3" terminal on the regulator.

Two 14-gauge wires, which run from the regulator to the alternator, and a 14-gauge wire for a ground need to be provided by the installer to finish the connections. **These wires are not in the Painless harness**.

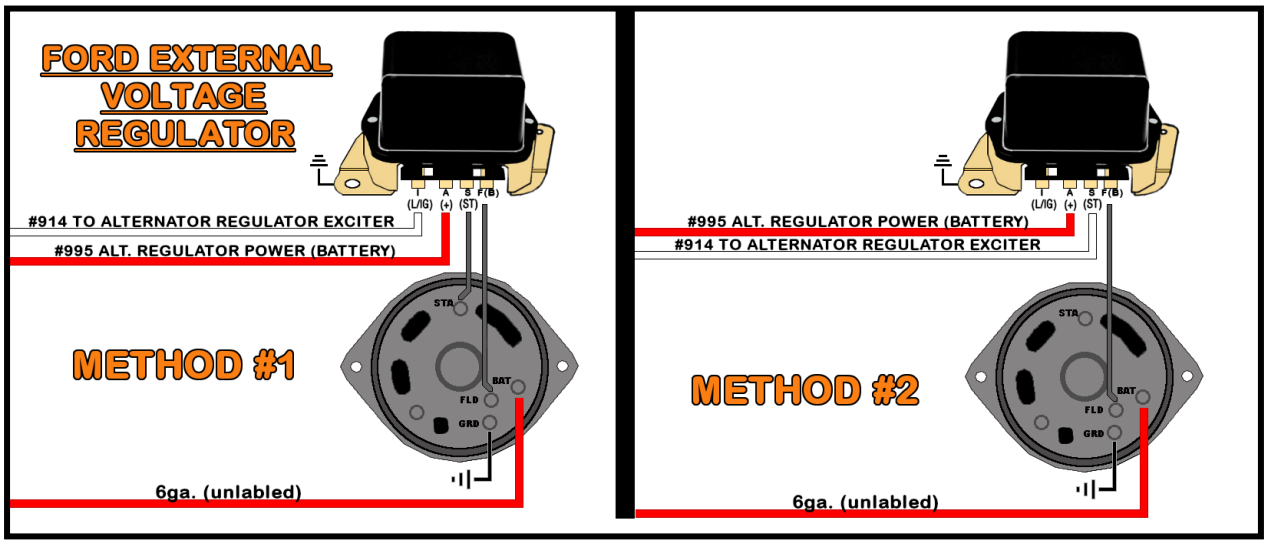
- Connect the "2" terminal on the regulator to the "R" terminal on the alternator. This was a white wire from the factory.

- Connect the "F" terminal on the regulator to the "F" terminal on the alternator. This was a blue wire from the factory.

- The last connection will be connecting a wire from the "G" post on the alternator to a chassis ground source.



FORD EXTERNALLY REGULATED ALTERNATORS

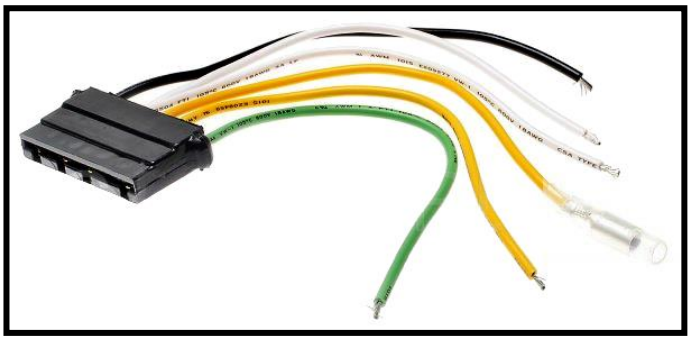


Note: Your Alternator may not appear exactly as represented above. However, the circuits are wired in the same manner.

The two remaining wires, a 14-gauge **RED** wire printed **#995 REGULATOR BATTERY POWER** and a 14-gauge **WHITE** wire labeled **#914 ALTERNATOR EXCITER**, will connect to the regulator.

- Route the two wires of the Painless harness to the connection point on the regulator and cut to length. Strip ¼" of insulation from both wires.

- The 4-pin regulator connector from a factory harness will need to be used. Due to a lack of usage by most customers, these connectors are not included with this Painless chassis harness. If you do not have these connectors they can be obtained online, at a local auto parts store, or you can use the loose piece insulated terminals in the parts kit to make connections.



- The two methods to power the regulator depicted in the diagrams above are explained on the next page. The difference in the diagrams is where the **#914** wire connects, which in turn, will decide how many wires run from the regulator to the alternator. Please be advised that a charge indicator light will only work if the regulator is wired according to Method 1.

Method #1:

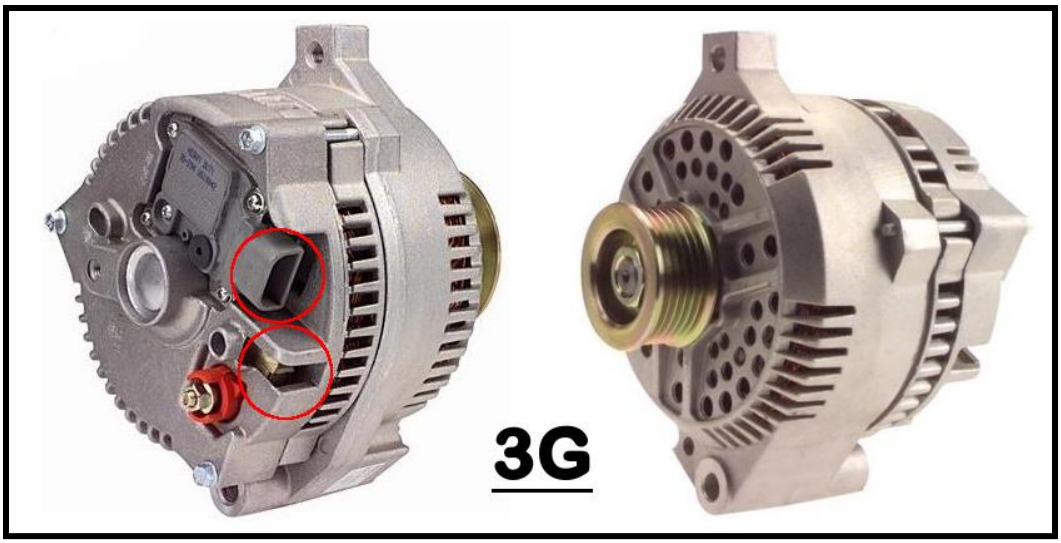
- Connect **RED** **#995** to the Voltage Regulator “A” terminal.
- Connect **WHITE** **#914** wire to the Voltage Regulator “I” terminal.
- Connect a 14-gauge wire from the Voltage Regulator “S” terminal to the Alternator Stator (S) terminal.
- Connect a 14-gauge wire from the Voltage Regulator “F” terminal to the Alternator Field (F) terminal.
- The Alternator case must be clean, and free from corrosion where it contacts the block. An additional connection from the ground stud on the rear of the alternator to the engine ground is highly recommended.

Method #2: An alternate (and less-used) method is to omit the Alternator Stator wire:

- Connect **RED** **#995** to the Voltage Regulator “A” terminal.
- Connect **WHITE** **#914** wire to the Voltage Regulator “S” terminal. Since the **#914** is on the “S” terminal of the regulator, “S” or stator post on the alternator will not be connected.
- Connect a 14-gauge wire from the Voltage Regulator “F” terminal to the Alternator Field (F) terminal.
- The Voltage Regulator Ignition (I) terminal is not connected.
- The Alternator case must be clean, and free from corrosion where it contacts the block. An additional connection from the ground stud on the rear of the alternator to the engine ground is highly recommended.

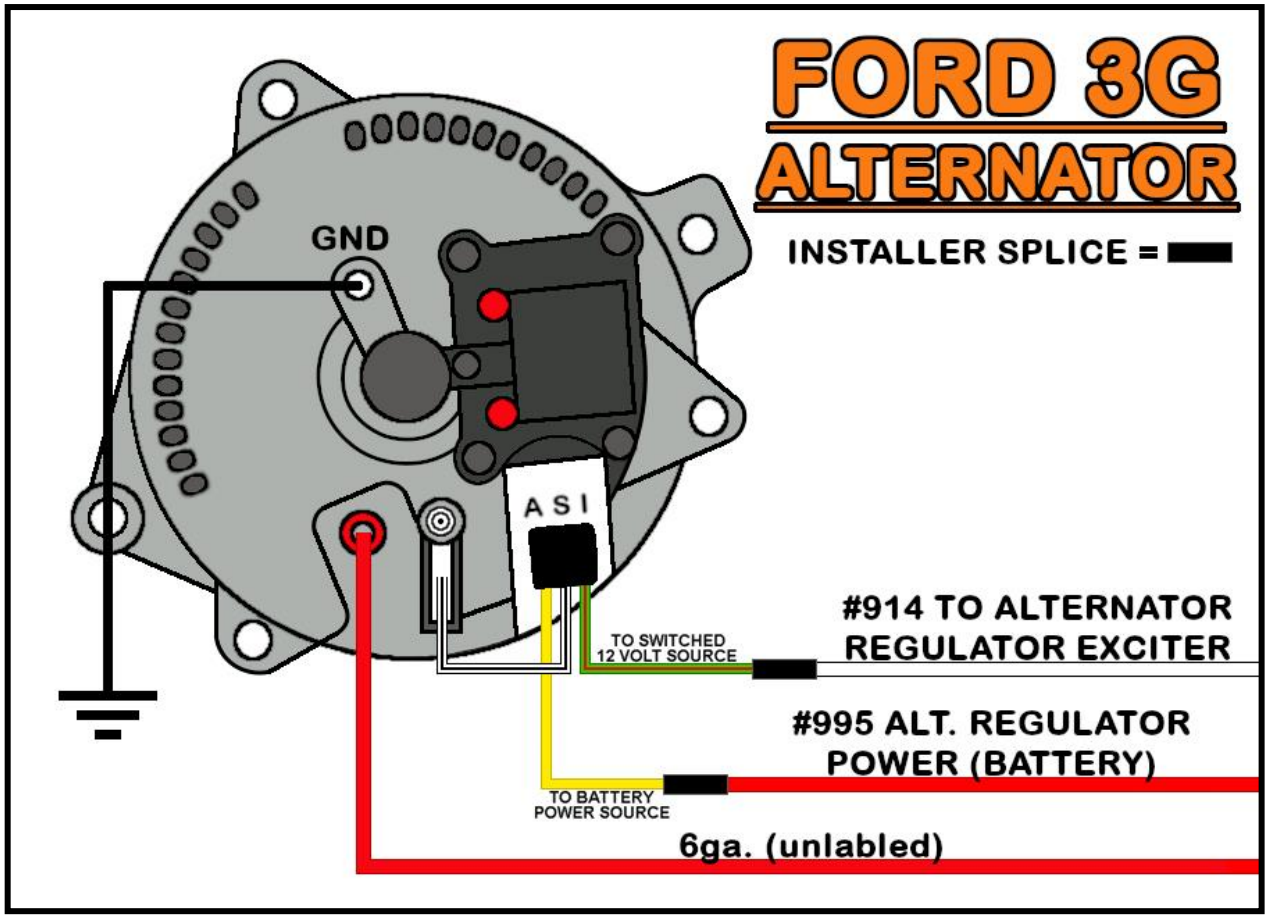
NOTE: The base of the Voltage Regulator **MUST** be grounded for it to function correctly.

FORD 3G ALTERNATOR



The two wires **RED #995 REGULATOR BATTERY POWER** and **WHITE #914 ALTERNATOR EXCITER**, connect to the pigtails on the back of the alternator.

There are two connectors, a D-shaped 3-pin and a single pin (circled in the image above), from the factory Ford harness, which need to be used. Also, the installer will need to supply an inline fuse with a rating of 125 amps or more for this alternator. Due to a lack of usage by most customers, these connectors and fuse are not included with this Painless chassis harness. If you do not have these connectors and fuse, they can be obtained through Painless by purchasing our **Ford 3G Alternator Harness (p/n: 30831)** online, at https://www.painlessperformance.com.



- The 3G alternator requires a switched power source to pin **I** of the regulator, this will be the **#914** wire. Route the **WHITE** **#914** to the **LT. GRN/RED** wire of the "I" terminal on the regulator pigtail and cut to length. Strip ¼" of insulation.

- Route the **RED** **#995** to the **YLW** wire of the "A" Terminal on the regulator pigtail and cut to length. Strip ¼" of insulation.

- The 3G alternator requires a constant battery power source to pin **A** of the regulator, this will be the **#995** wire. Using a provided splice and connect the 3G harness to the **WHITE** **#914** & **RED** **#995** wires according to the diagram above.

The 2G and 4G alternators wire up in the same manner as the 3G with regard to the "I" and "A" terminals on the regulator.

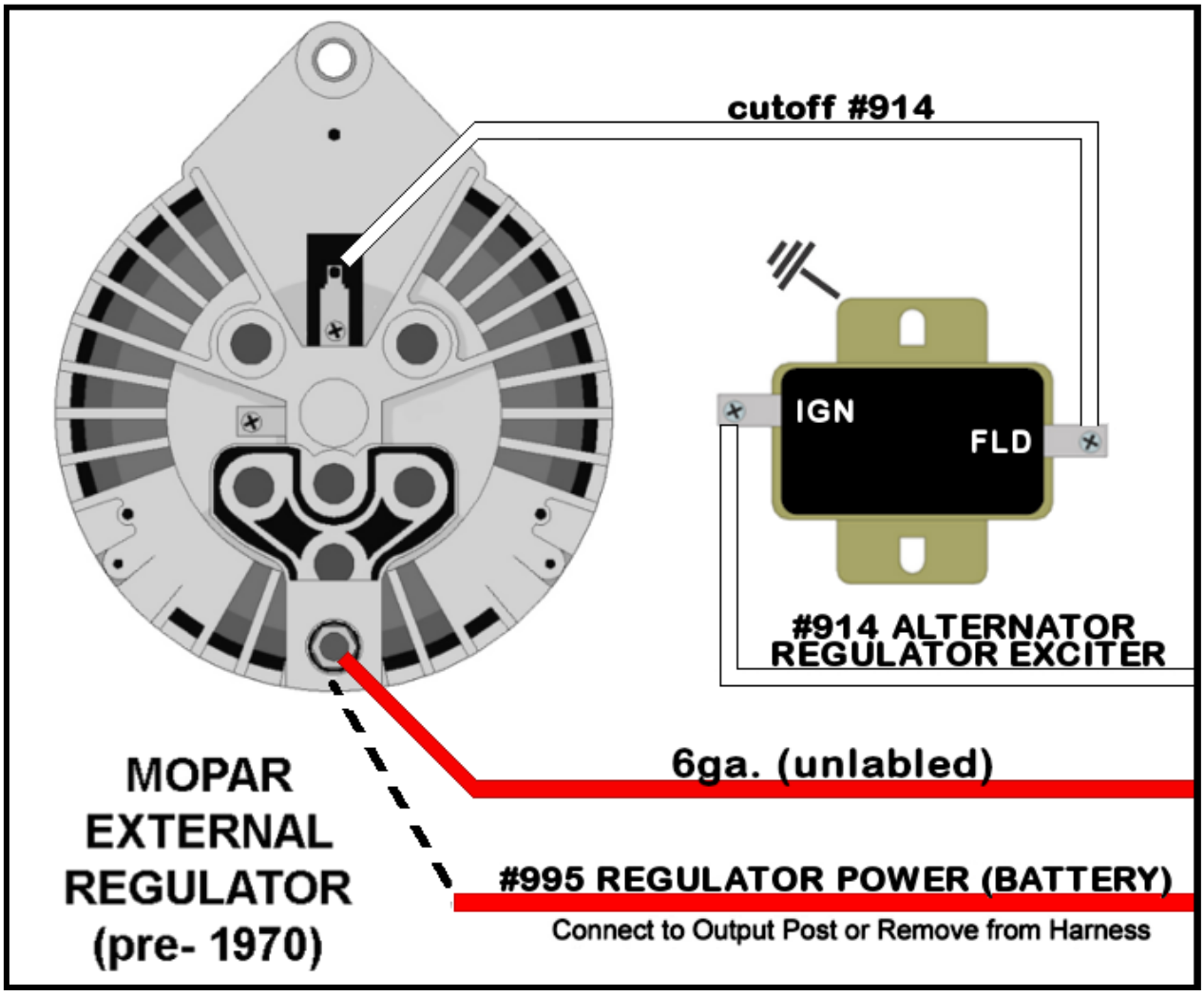
MOPAR EXTERNALLY REGULATED ALTERNATOR

Mopar uses one of two kinds of voltage regulators: An electronic regulator and a mechanical one. In both applications, the **RED** **#995** is not needed and can be removed from the harness or attached to the alternator output post.

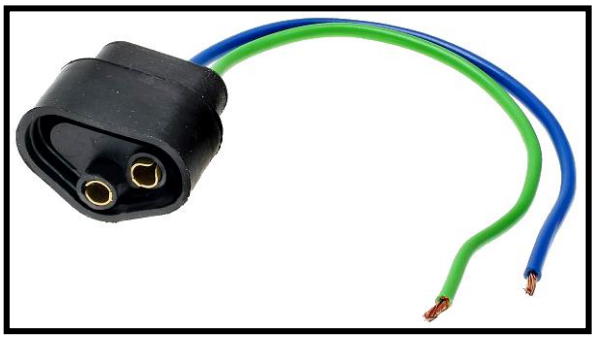
Mechanical Regulator

The mechanical regulators, pre-1970, will have two posts marked “IGN” and “FLD”. One post will exit one side of the regulator, while the other post will exit the other side. This regulator will use an alternator that has a single field terminal, as shown below.

- The **WHITE** **#914** wire is connected to the “IGN” terminal of the regulator.
- The “FLD” terminal of the regulator is connected to the field terminal of the alternator. The **#914** wire left from the first connection should have sufficient length for this.



Electrical Regulator

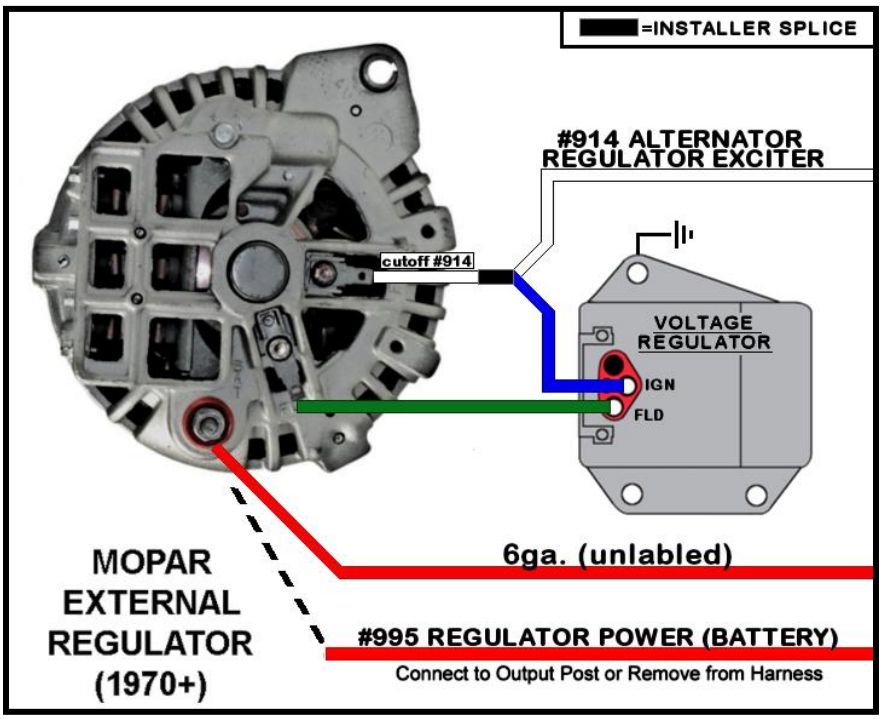


The electrical regulators, 1970+, will also have two posts marked “IGN” and “FLD”, but both posts will be found on top of the regulator and will require a connector. This regulator will use an alternator that has two field terminals, as shown in the diagram above.

The factory, 2-wire regulator connector from the harness needs to be used. Due to a lack of usage by most customers, these connectors are not included with this Painless chassis harness. If you do not have these connectors, they can be obtained online, at a local auto parts store.

- Plug the connector into the voltage regulator.
- Then, route the **WHT #914** wire to the **BLUE** factory wire running from the “IGN” terminal on the regulator connector. Cut to length and strip ¼” of insulation.
- Splice the **BLUE** factory wire and the **WHT #914** wire together with the cutoff portion of the **#914** wire using a butt-splice from the parts kit (see image above).
- Then, route the **WHT #914** wire to one of the “FLD” tabs of the alternator. Cut to length, strip ¼” of insulation, and connect using an insulated spade terminal from the parts kit.
- Route the **GRN** factory wire from the regulator connector to the other “FLD” tab of the alternator and connect.

Finally, make sure **BOTH** the alternator and the voltage regulator housing are grounded.



MIDI FUSE

A large, inline MIDI fuse is included in the “ALTERNATOR” bag kit. This inline fuse provides a fused link between the alternator and battery.

- Find a suitable location to mount the supplied fuse holder using the **(2) self-tapping screws** provided. A drill with a **¼” nut driver** is required to drill holes for the mounting screws.

With the fuse holder now mounted, locate the following two wires:

RED: 10-gauge wire, printed **[START/CHARGE SECTION] #916 TO MIDI FUSE**, all power sources in this Painless harness originate from this wire. This wire provides battery power to the fuse block, which in turn supplies battery power to the ignition switch, which provides switched power. During normal operation, this wire always has constant battery power.

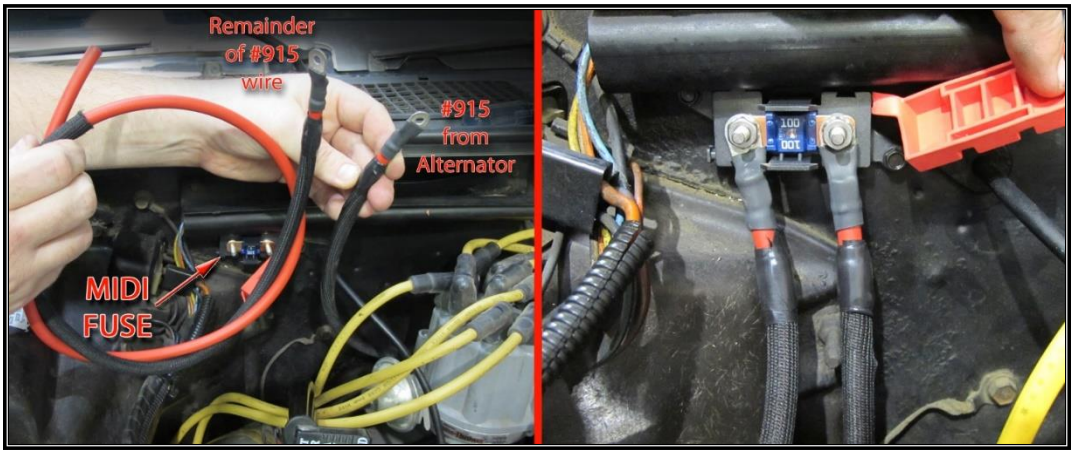
RED: 6-gauge wire, rolled separate from the harness, not printed, **#915 ALTERNATOR OUTPUT,** this wire provides power from the alternator to the battery through the MIDI fuse. See *Charge / Battery Power Schematic* on **page 51**. The other end of this wire connects to the output post of the alternator.

- Route the **#915** and **#916** wires to one side of the fuse holder and cut the wires to length. DO NOT DISCARD THE CUT OFF PORTION OF **#915**.

The length of excess wire cut from the **#915** wire will be used to connect the other side of the fuse to the “+” side of the vehicle’s battery or to the battery post on the starter solenoid. DO NOT CONNECT THE **#915** TO THE ACTUAL BATTERY AT THIS TIME. If routed to the starter solenoid, this wire will NOT replace the battery cable needed by the starter from the positive side of the battery to the “BAT” or (+) post of the starter solenoid.

- Make connections to both sides of the fuse holder with the large ring terminals with the small, **#10 hole** provided with the kit. You can use a pair of pliers if your crimpers will not accept this large gauge wire/terminal. The heat shrink supplied with this kit is intended to cover the crimped end of each of these (2) ring terminals. A schematic showing these connections can be found on **page 51**.

- Once you install the ring terminals onto both studs of the fuse holder, the fuse can be installed, and everything can be tightened down with the two retaining nuts provided with the fuse holder. Once everything is tightened, the cover can be reinstalled. Depending on how your crimp flares the ring terminal, the cover may or may not need slight trimming to snap into place.



STARTER SOLENOID

The connections to the starter solenoid vary depending on your ignition system, the location of a neutral safety/clutch switch, and your connection point on the battery power source for the MIDI fuse.

One connection to the starter solenoid all vehicles share is:

PURPLE: 12-gauge wire, printed **[ENGINE SECTION] #919 TO STARTER SOLENOID**, this wire will supply the solenoid with a switched power source from the ignition switch. This power will activate the starter solenoid causing it to turn the engine over for startup. This wire will only have power when the ignition switch is in the *Start/Crank* position.

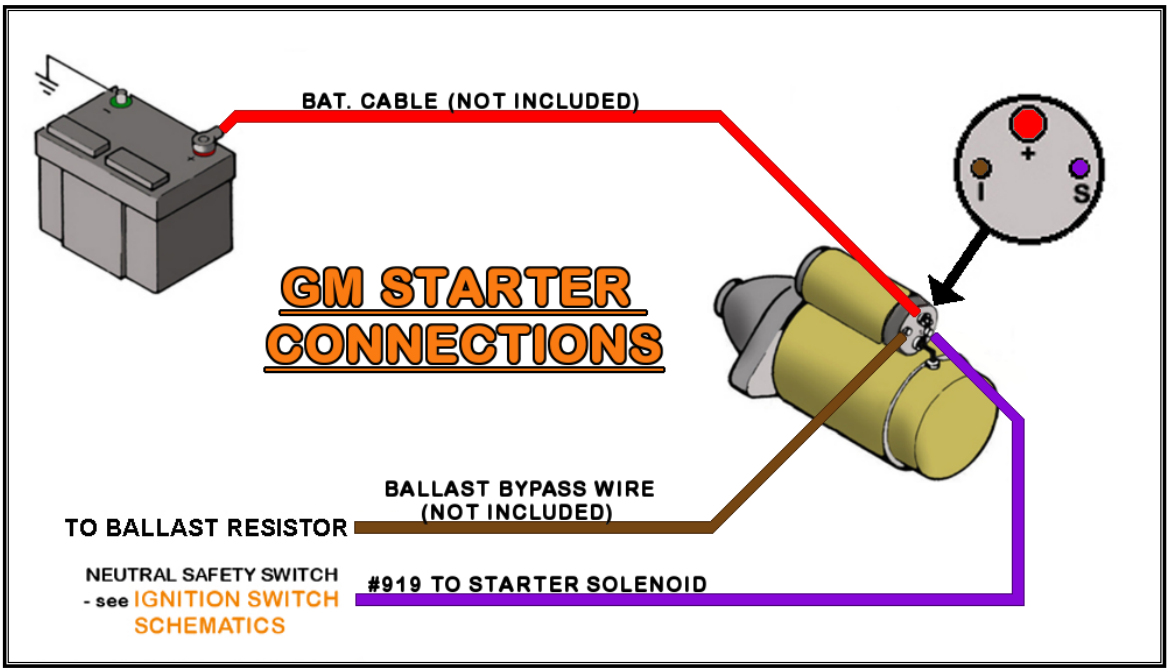
Note: If you are using a transmission mounted neutral safety switch (NSS), this wire will need to be routed to the NSS, cut to length, and connected. The cut-off portion of **#919** will connect to the other side of the NSS and route to the starter solenoid "S" terminal.

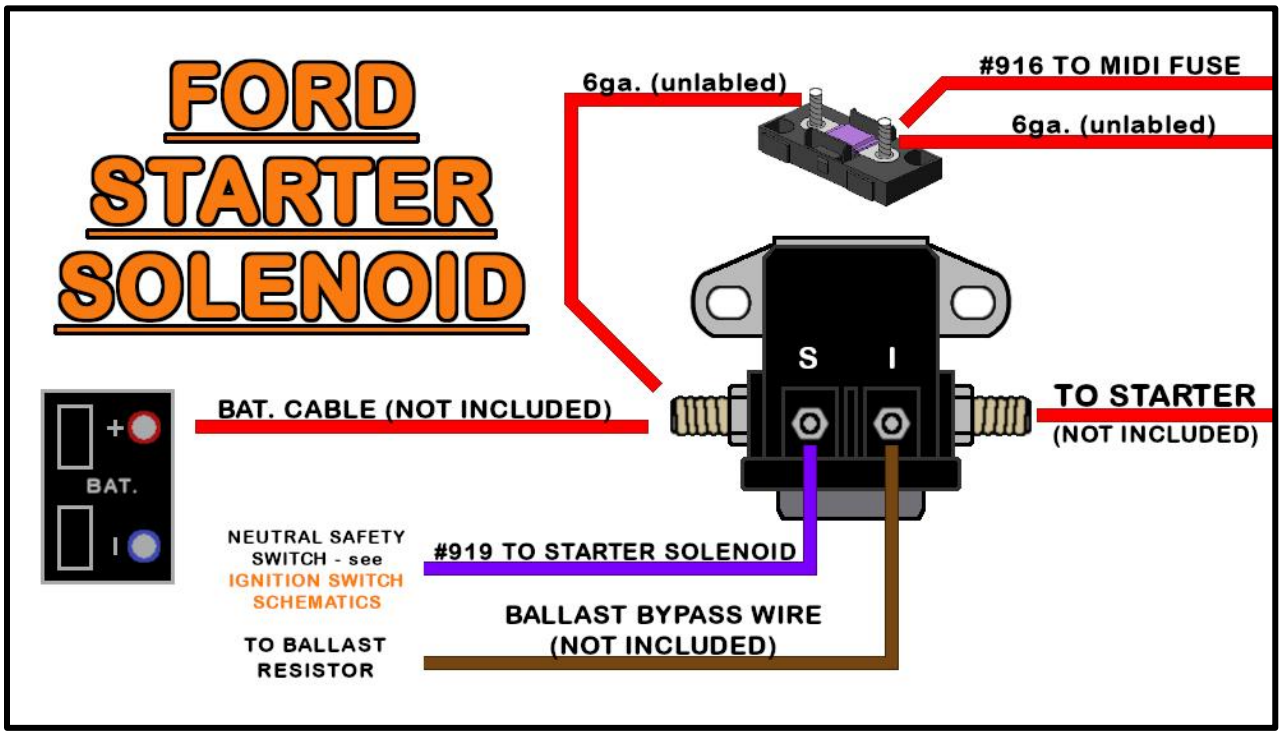
- Route the **PURPLE** **#919** and the ballast bypass, if needed, to the starter solenoid and cut to length. If the remainder of **#916** from the MIDI fuse is being connected to the "BAT" or (+) post of the starter solenoid, it may be routed at this point as well. Be sure to keep all wires away from the exhaust manifold or header.

- Locate ring terminal and heat shrink from the parts kit that best fits the posts found on the starter solenoid and install onto the wires going to the starter solenoid. Be sure to apply heat shrink the insulation to protect the crimp.

- The **PURPLE** **#919** wire will connect to the "START" or "S" post on the solenoid and the bypass wire, if needed, will connect to the "I" or "R" post of the solenoid.

- If you are connecting the battery supply to the MIDI fuse to the battery cable/post on the starter, connect it now. **BE SURE THE BATTERY CABLE IS DISCONNECTED FROM THE BATTERY BEFORE MAKING THIS CONNECTION.**





Mopar Starter Relays

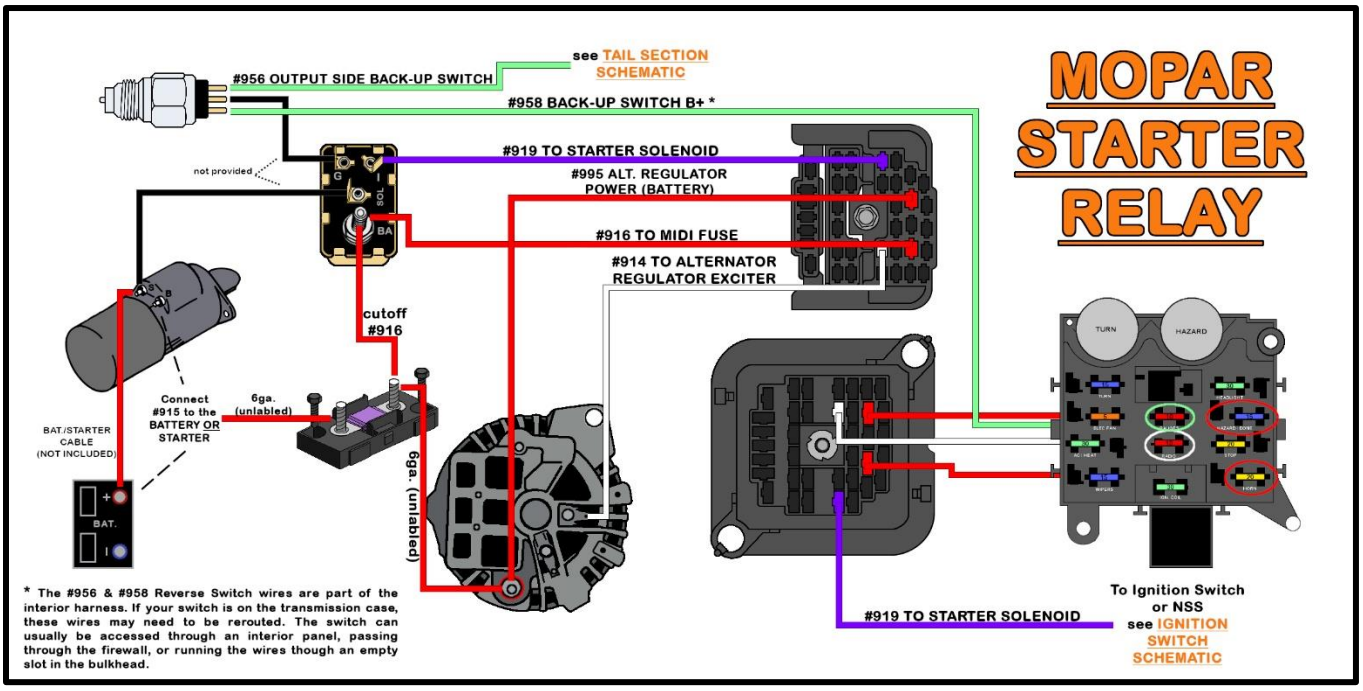
Use the following instructions and diagrams if you are wiring in a Mopar starter relay. Please be aware that if a ballast resistor is being used, you will need a relay with a ballast terminal. Locate heat shrink and ring terminals from the parts kit that best fit the posts/terminals found on the starter relay, crimp and connect.

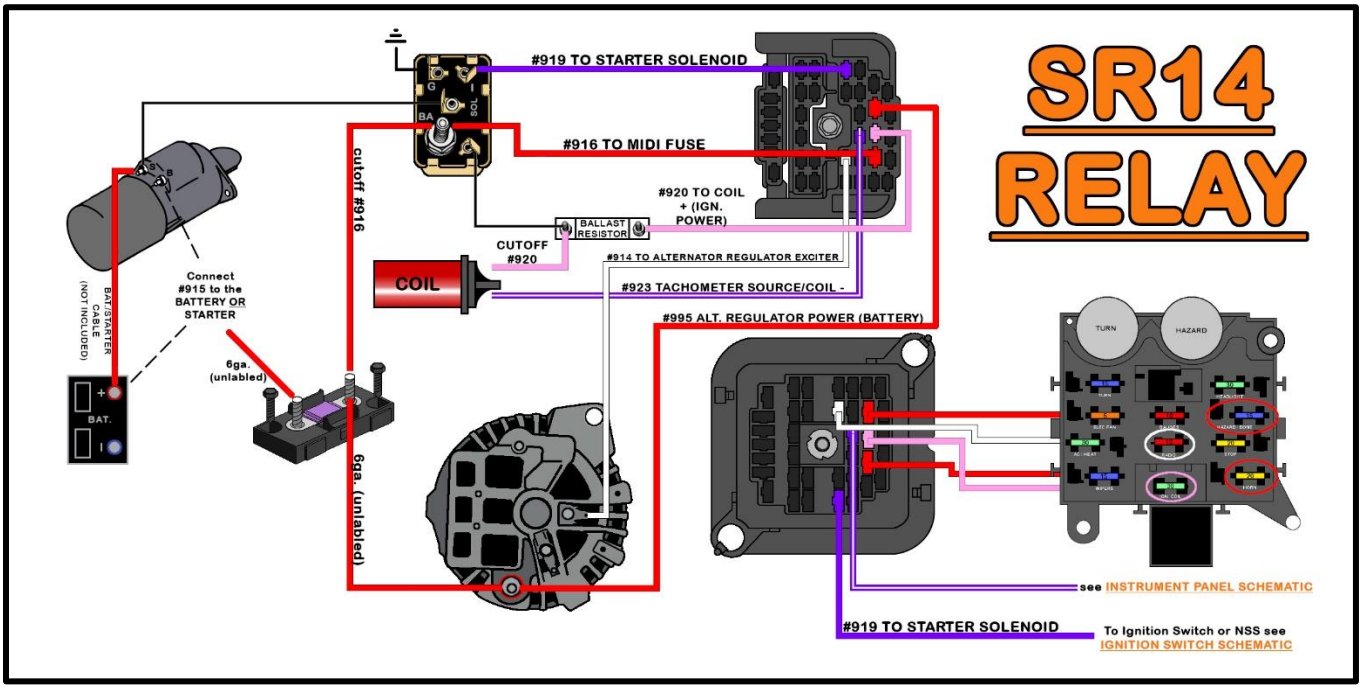
- Connect the **PUR #919** wire to the Starter Relay Ignition (I) terminal. This will activate the relay when 12v is applied when the key is in the "START" position.
- Connect a 14-gauge wire (not supplied) from the Starter Relay Ground (G) terminal to the center terminal of the transmission mounted Neutral Safety Switch.
    - Older Mopar neutral safety switches have only one terminal. On newer switches, the two outside terminals are for backup lights. Use existing wiring to connect these two terminals as shown in the diagram below.
- If using a harness with the GM column connectors, but using the Mopar Neutral Safety Switch, or neutral safety switch on a floor shifter, you will need to splice together the **PURPLE** wires at the steering column wiring.
- If the Neutral Safety Switch is mounted in the floor shifter, connect the Starter Relay Ground (G) terminal to chassis ground.
- Connect the "BAT" post on the relay to a battery power source. This is easily done by connecting this post to the output/harness side of the MIDI fuse, inline on the **#916** wire as shown in the diagrams on the following page. This post provides the power that is transferred through the relay, to the starter.
    - Those without a Mopar reverse switch/neutral safety switch, connect the "G" terminal to a clean chassis ground source using a cut off piece of 16- or 18-gauge wire from a previous connection, as shown in the *SR14 Relay* diagram on the next page.

- The terminal on the relay marked “SOL” will need to have a wire that runs from this terminal to the “S” post on the starter. This terminal on the relay provides power to the starter solenoid. The Painless harness does not have a wire dedicated for this connection, but a 12- or 14-gauge scrap wire cut from another connection of this harness will work.

- If you are using an SR14 Relay and a ballast resistor, connect the PINK **#920** wire to one end of the Ballast Resistor.

- Then, connect the other end of the ballast resistor to the ignition coil POSITIVE (+) terminal with 14-gauge wire (you may have enough PINK **#920** wire left over to accomplish this). Then run a 14-gauge wire (not supplied) to the “BAL” terminal on the Starter Relay





INTERIOR HARNESS

Now that the **Engine Sections** are wired, move to the interior of the vehicle.

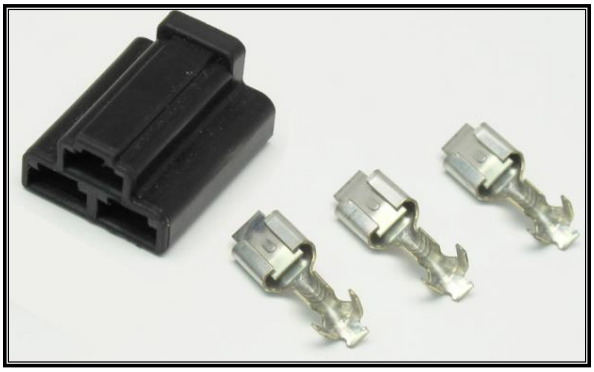
Before you make any connections on the inside of the vehicle, let us address the component switches: like the headlight switch, brake switch, turn signal switch, ignition switch, and headlight dimmer switch.

With older vehicles and hot rods in general, many times switches are replaced by what is available or what previous owners had lying around. In some cases, these switches are not marked and there is no idea what pins on the switch controls each function. If you are unsure about positions or functionality of the switches currently in your vehicle and are not up to the task of figuring out what each pin does, Painless offers several solutions. We have switch kits and sell switches individually.

A common switch kit that many people choose is **Painless part #80121**. This kit provides you with a new headlight switch, new dimmer switch, door jamb switches, and dash-mounted ignition switch, all marked with each terminal's function. Part numbers for individual switches are given in each individual section.

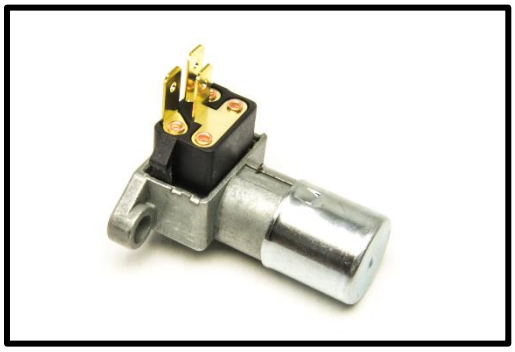
DIMMER SWITCH

The first connection is the group of three wires that belong to the **Dimmer Switch Section**. These three wires provide power to the headlights for low beam and high beam power. These wires can be seen in the *Headlight Dimmer Switch Schematics* on the next page, they are:



BLUE/YELLOW: 14-gauge wire, printed **TO DIMMER SWITCH << #907 >> TO HEADLIGHT SWITCH**, this wire provides power to the dimmer switch from the headlight switch. This wire has power whenever the headlight switch is in the "HEADLIGHT ON" position.

TAN: 14-gauge wire, printed **[DIMMER SWITCH] #909 LOW BEAM**, this wire provides power from the dimmer switch and into a splice with two other wires. The other two wires feed power to each low beam of the headlights, as seen in the *Headlight Section Schematic* on **page 36**. Once connected, this wire has power when the headlight switch is in the "HEADLIGHT ON" position and the dimmer switch is in the "LOW BEAM" position.



LT. GREEN: 14-gauge wire, printed **[DIMMER SWITCH] #908 HIGH BEAM**, this wire provides power from the dimmer switch to each high beam of the headlights and to the high beam indicator as seen in the *Headlight Section Schematic* on **page 36**. Once connected, this wire has power when the headlight switch is in the "HEADLIGHT ON" position and the dimmer switch is in the "HIGH BEAM" position.

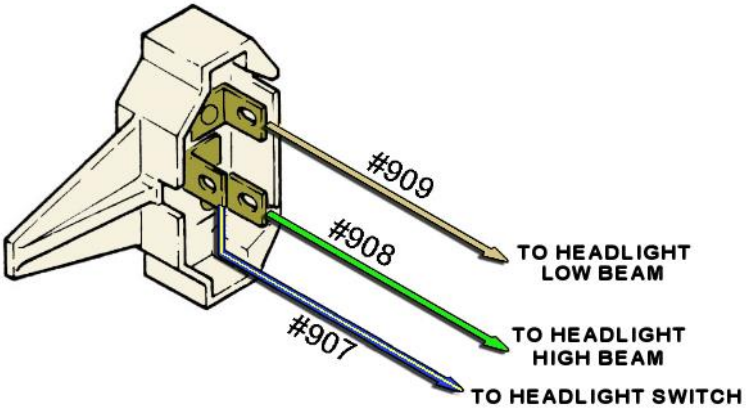
The connection point of these wires depends on the location of the dimmer switch. Most have a floor-mounted dimmer switch, although, those using a later model GM column may find the dimmer switch on the side of the column. Painless offers part **#80150** for those needing a new floor-mounted dimmer switch.

- Route all three wires to the dimmer switch and cut to length.

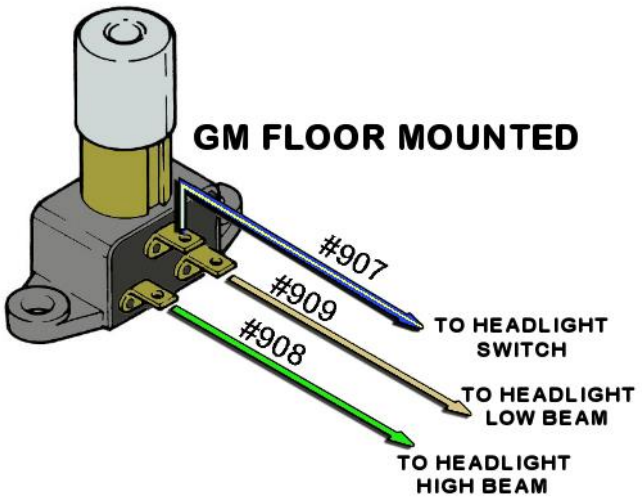
- Connect the three wires to the dimmer switch as shown in the diagram below. A connector and terminals have been provided in the parts kit for this connection. This connector fits both floor mounted and column-mounted switches.

HEADLIGHT DIMMER SWITCHES

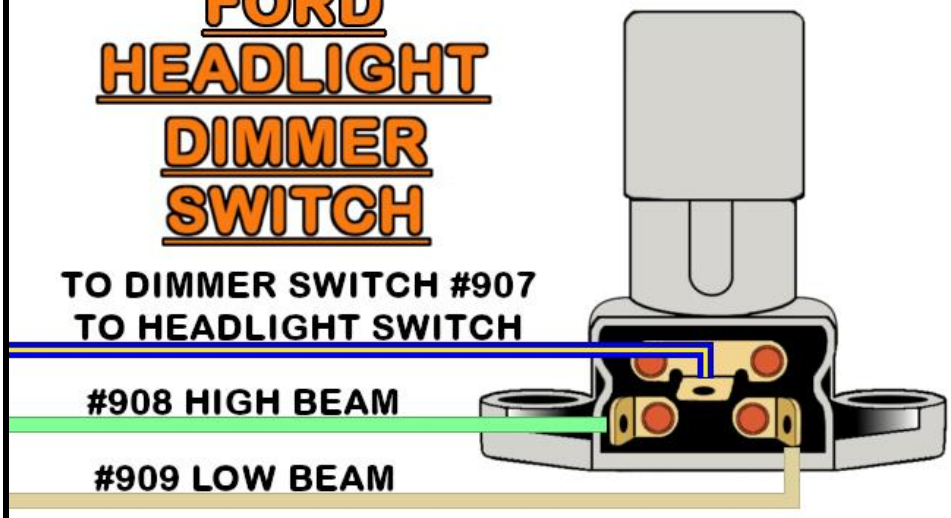
GM COLUMN MOUNTED



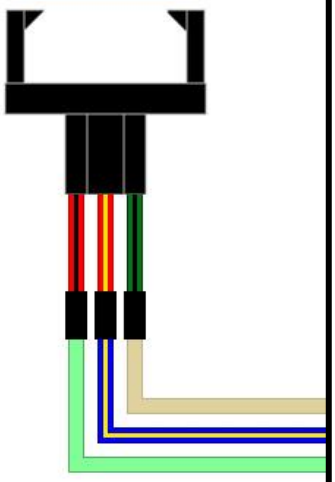
GM FLOOR MOUNTED



FORD HEADLIGHT DIMMER SWITCH

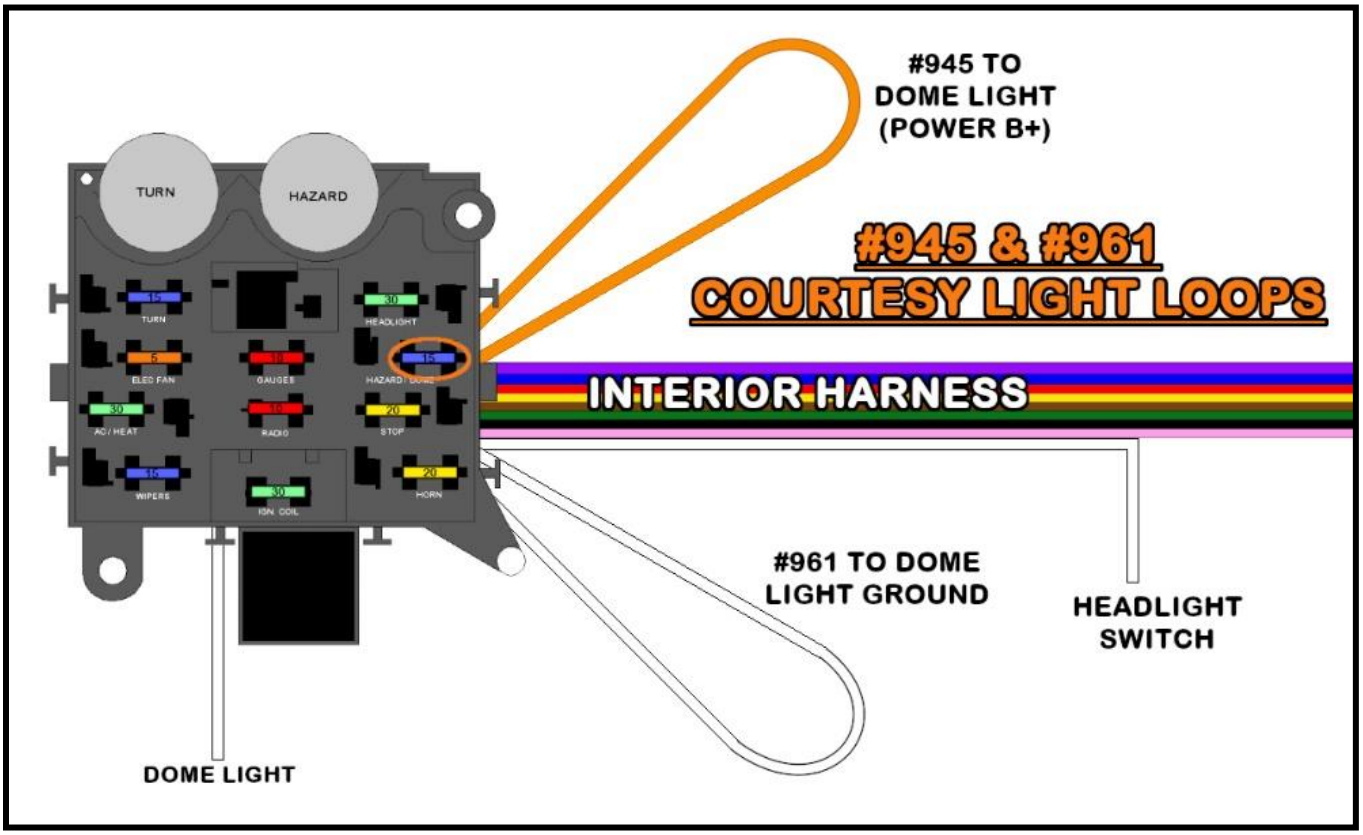


SPLICING TO FORD PIGTAIL



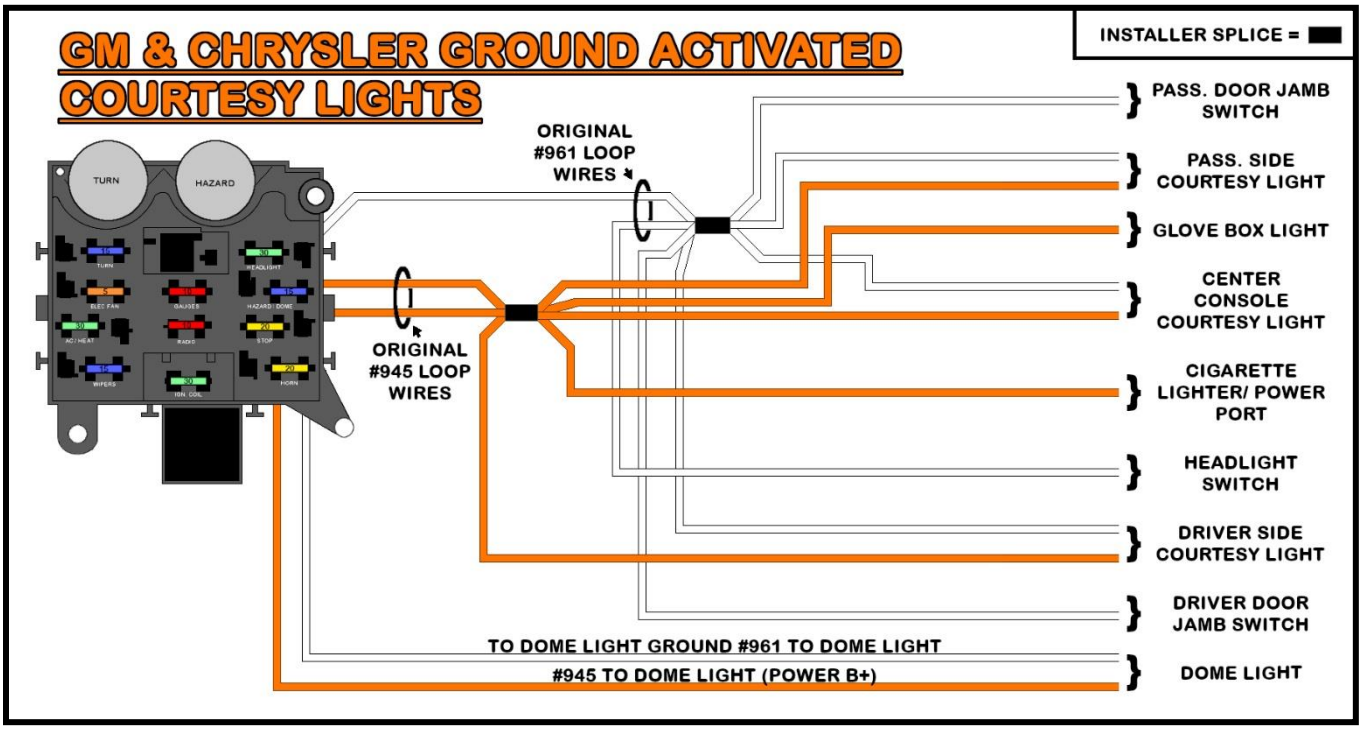
DRIVER COURTESY LIGHT SECTION

This Painless harness does not come with **Courtesy Light Sections**, but rather has two loops near the fuse block made from the **ORANGE #945** and **WHITE #961** dome light wires. These loops allow the installer the option of cutting them and creating splices to add courtesy lights, jamb switches, and other accessories typically found on these circuits. **If you are installing any of these things, you should have created the proper splices on pages 19 – 24 during the pre-installation guidelines.**

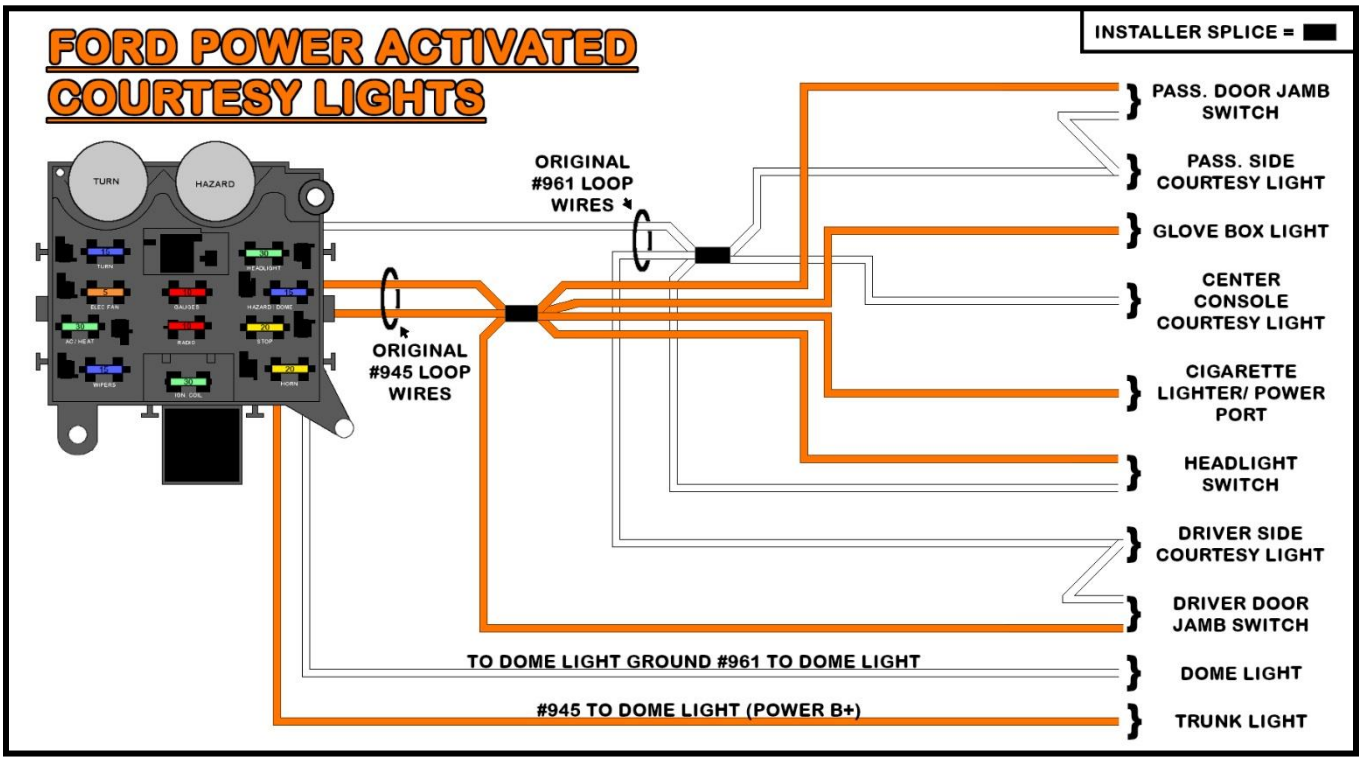


Connections in this section lead to both sides of the vehicle. Therefore, it is easiest to wire the passenger side after working your way across the dash. So, **Passenger Side Courtesy Lights** are covered on page 119.

As the harness comes from Painless, it is set up for GM and Chrysler style ground activation and the only way the dome light will operate is via the headlight switch. Your splices should look something like the schematics below.



<u>Those with Ford vehicles</u>, the loops also allow converting these circuits to power activation of the lighting like factory Ford vehicles used. **Proper setup was shown on page 22 creating the power activated courtesy/dome light circuit. Ford vehicles and others that have power activated courtesy/dome lights <u>MUST</u> make modifications for the dome light to work.** Your splices should look something like the schematics below.



DRIVER COURTESY LIGHT

This connection allows the driver side under the dash/floorboard of the vehicle to be illuminated any time a door is open or when the headlight switch is activating the dome light. Your original courtesy light sockets will need to be re-used.

- Locate the wires intended for the driver courtesy light socket. These wires should be coming from splices you created on **pages 19 – 24** with the **WHITE** **#961** and **ORANGE** **#945** loops.

- Route wires from the **WHITE** **#961** and **ORANGE** **#945** circuits to the driver's side courtesy light socket.

- Use insulated splices from the parts kit to connect the **WHITE** **#961** and **ORANGE** **#945** wires to the wires of the socket.

- If you are installing door jamb switches, the **WHITE** **#961** wire can be doubled up at the light and the excess routed to the door jamb switch. This will prevent you from having to create additional splices to the loop wires

- **Those with Ford vehicles** will only need to connect the **WHITE** **#961** to the courtesy light socket.

DRIVER DOOR JAMB SWITCH

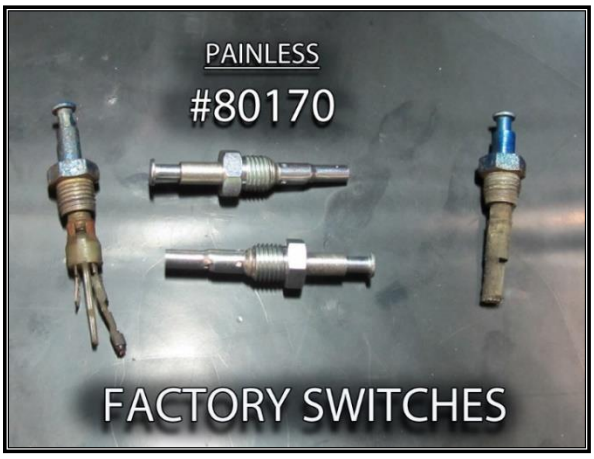
The door jamb switches provide a ground activation for the courtesy lights and dome light. When the door is opened, the plunger on the switch extends out as it is no longer being pushed in by the door. When the plunger extends, the contact point on the back of the switch contacts the body of the switch, which is grounded through the mounting into the metal door jamb. This grounding gives the wire attached to the switch a ground source which will then cause the interior lights to turn on.

- Locate the wire intended for the driver door jamb switch. This wire should be coming from a splice with the **WHITE** **#961** loop you created on **pages 19 – 24** or from the driver courtesy light socket if you doubled the **WHITE** **#961** wire in the previous step.

- Route the **WHITE** **#961** wire to the driver side door jamb switch and use an insulated terminal from the parts kit that fits your switch to connect it.

- If you find that your door jamb switch has 2 tabs, it does not matter which tab the **#961** wire connects to. The additional tab was for a key buzzer found on some vehicles. **Ford systems** will have 2-pin jamb switches, power in and power out. Connect a wire from the **ORANGE** **#945** circuit to the other tab.

If this is a new build/ restoration or your original switches are just in bad shape and new switches are needed, Painless offers factory style GM jamb switches as **part #80170**. Please note that **part #80170** is for one switch, and each door requires its own switch.



CENTER CONSOLE LIGHT

If you have a courtesy light on the back of the console, this connection allows the console light to illuminate any time a door is open, or the headlight switch is activating the dome light. Your original courtesy light sockets will need to be re-used.

- Locate the wires intended for the center console light socket. These wires should be coming from splices you created on **pages 19 – 24** with the **WHITE** **#961** and **ORANGE** **#945** loops.

- Route wires from the **WHITE** **#961** and **ORANGE** **#945** circuits to the center console light socket.

- Use insulated splices from the parts kit to connect the **WHITE** **#961** and **ORANGE** **#945** wires to the wires of the socket.

- **Those with Ford vehicles** will only need to connect the **WHITE** **#961** to the center console light socket.

CIGARETTE LIGHTER / POWER PORT

Splicing into the **ORANGE** **#945** wire can provide you with a constant power source for a universal Cigarette Lighter/Power Port connection. Typically, the cigarette lighter is more commonly used as a power port to charge and run electronic components requiring a 12vDC power source.

- Locate the wire intended for the cigarette lighter/power port. This wire should be coming from a splice you created on **pages 19 – 24** with the **ORANGE** **#945** loop.

- Route a wire from the **ORANGE** **#945** circuit to the cigarette lighter/power port.

- Cut the wire to length and connect according to one of the following options (see the clock notation below before doing any termination):

  - Ring terminals and bullet/socket/spade style terminals are provided in the parts kit to connect universal aftermarket lighters/power ports. Universal Lighter socket part **#56458**, seen in the photo above, can be found at most local parts stores. A ground wire is needed

  - For those with a factory socket, you can cut the connector from your factory harness. Leave 3” or 4” of wire to create a pigtail and splice it to the **ORANGE** **#945** wire on the Painless harness. Splices have been provided in the parts kit.

If this is a new build/restoration or your original sockets are just in bad shape and new sockets are needed, Painless offers a **Universal Courtesy Light Kit part #30710**.

HEADLIGHT SWITCH

The headlight switch's connections send power to the headlights, front park/marker lights, rear taillights, and component backlighting, such as gauges and the radio. These wires can be seen in the *Headlight Switch & Dimmer Switch Schematic* on **page 81**. These seven wires are:

ORANGE: 14-gauge wire, printed **[HEADLIGHT SWITCH SECTION] #959 TO HEADLIGHT SWITCH (POWER B+)**; this wire supplies constant battery power for the park/taillights as well as for the gauge backlighting. This wire comes from the 20-amp HORN fuse on the fuse block.

BROWN: 18-gauge wire, printed **[HEADLIGHT SWITCH SECTION] #927 TO FRONT PARK LIGHTS**, this wire supplies power to the park lights. This wire has constant battery power any time the headlight switch knob is pulled to Park Light ON and, depending on your switch, the Headlight ON position.

BROWN: 14-gauge wire, printed **[HEADLIGHT SWITCH SECTION] #929 TO TAILLIGHTS**, this wire supplies power to the taillights. This wire has constant battery power any time the headlight switch knob is pulled to both the park light ON and headlight ON positions.

BROWN: 18-gauge wire, printed **[HEADLIGHT SWITCH SECTION] << #930 INSTRUMENT PANEL LIGHTING >> [INSTRUMENT PANEL SECTION]**, this wire provides power to the gauge lights. This wire should have constant battery power any time the headlight switch knob is pulled to both the park light ON and headlight ON positions.

BLUE/YELLOW: 14-gauge wire, printed **TO DIMMER SWITCH << #907 >> TO HEADLIGHT SWITCH**, this wire supplies power to the dimmer switch for headlight operation. This wire has constant battery power any time the headlight switch knob is pulled to the headlight ON position.

RED/BLACK: 12-gauge wire, printed **[HEADLIGHT SWITCH SECTION] #928 TO HEADLIGHT SWITCH (POWER B+)**; this wire provides constant battery power to the headlight switch for headlight operation. This wire comes from the 30-amp HEADLIGHT fuse on the fuse block.

WHITE: 18-gauge wire, printed **[HEADLIGHT SWITCH SECTION] TO DOME LIGHT GROUND << #961 >> TO DOME LIGHT [TAIL SECTION]**, this wire provides a ground source for the interior dome/courtesy lights.

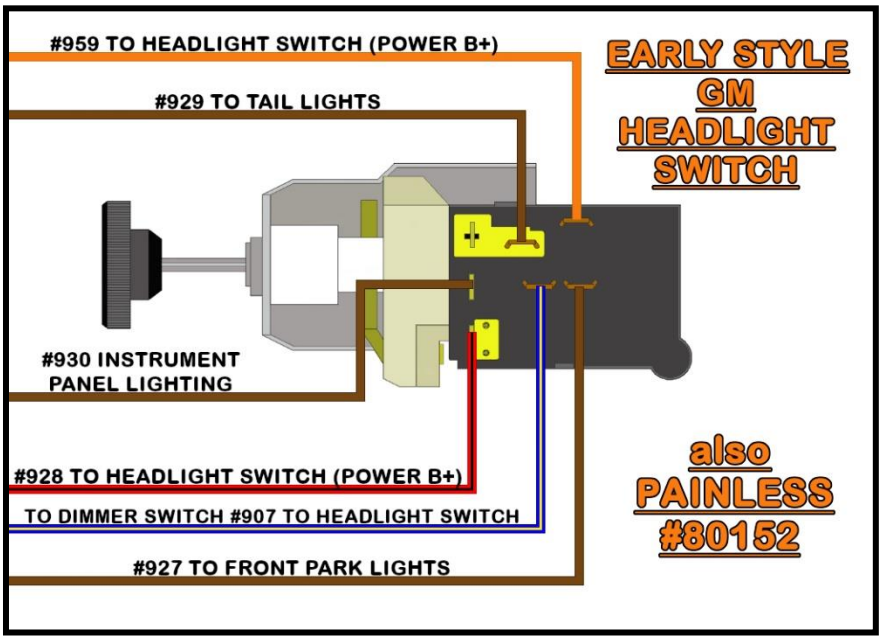
- Route the wires to the headlight switch and connect them. Diagrams have been provided for factory GM style switches and Universal switches offered by Painless. If you do not have a connector, use the light blue insulated terminals found in the parts kit to make these connections.

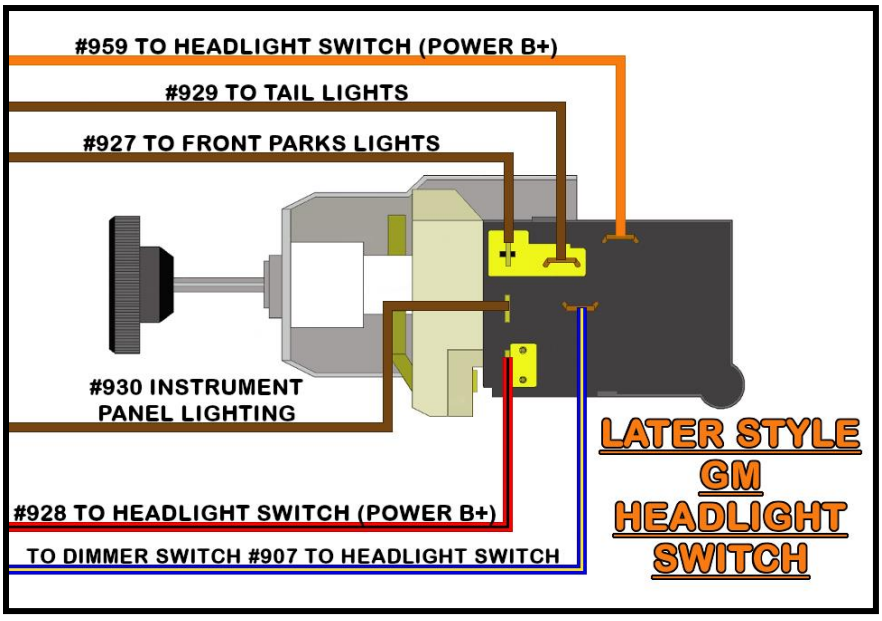
The use of some or all these wires will depend on the headlight switch you use. Factory style switches will use all wires, whereas most universal switches may not require all of them. Diagrams have been provided of the most common switches, along with universal switches that Painless also offers.

If your switch does not have a separate terminal for gauge backlighting, connect wire **#930** with the taillight wire **#929** at the switch. If your switch does not have separate tail and park terminals, **#927** and **#929** wires will connect at the switch. In the case you do not have a backlighting terminal and do not have separate tail/park terminals, all three wires **#930**, **#927**, and **#929** will all share the same terminal on the switch. Splicing these three wires to a single 16 gauge or larger wire that will connect to the switch is the easiest way to make the connection in that situation.

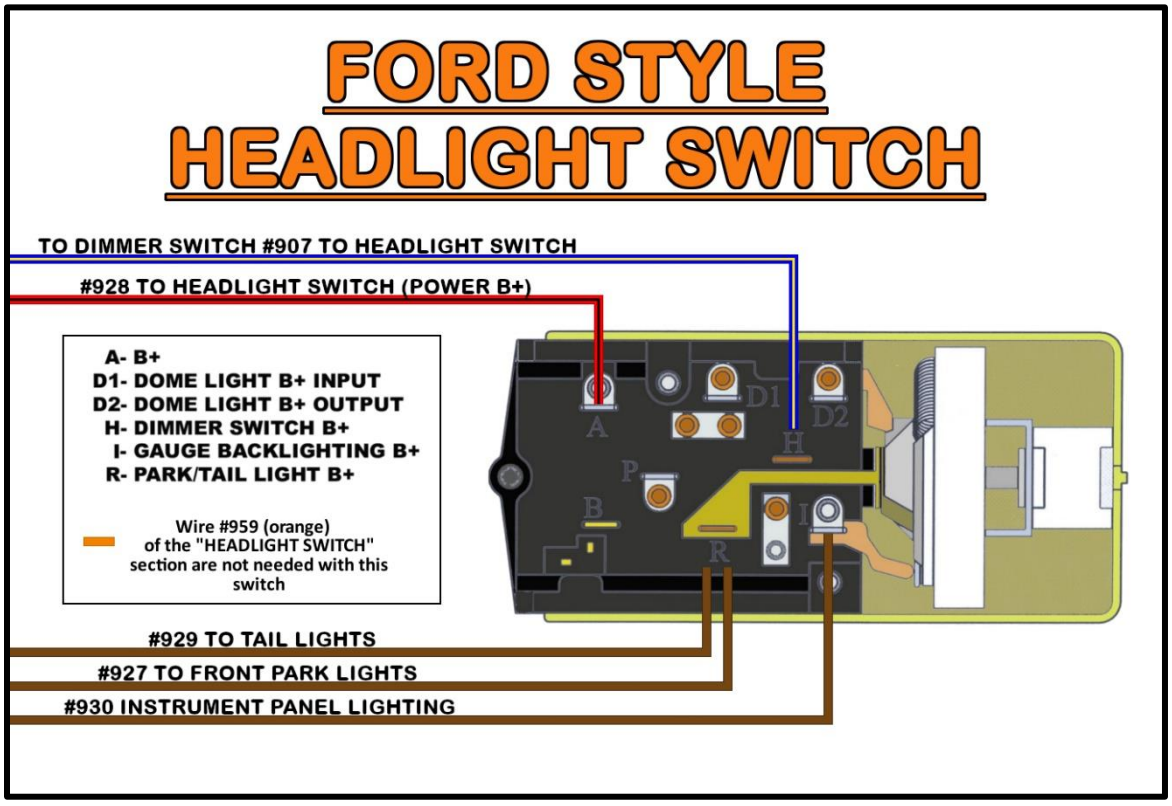
GM HEADLIGHT SWITCHES

Use the following diagrams to connect to a GM style headlight switch. GM used this style headlight switch from the 1960s up through the 1980s. There are 2 different types of these switches, commonly referred to as early and late styles. The only difference is the tab to which the park lights connect (see the diagrams below for an illustration of this difference). Painless offers the early style switch with a headlight pull, terminals, and a connector, **part #80152**, seen in the photo to the right.

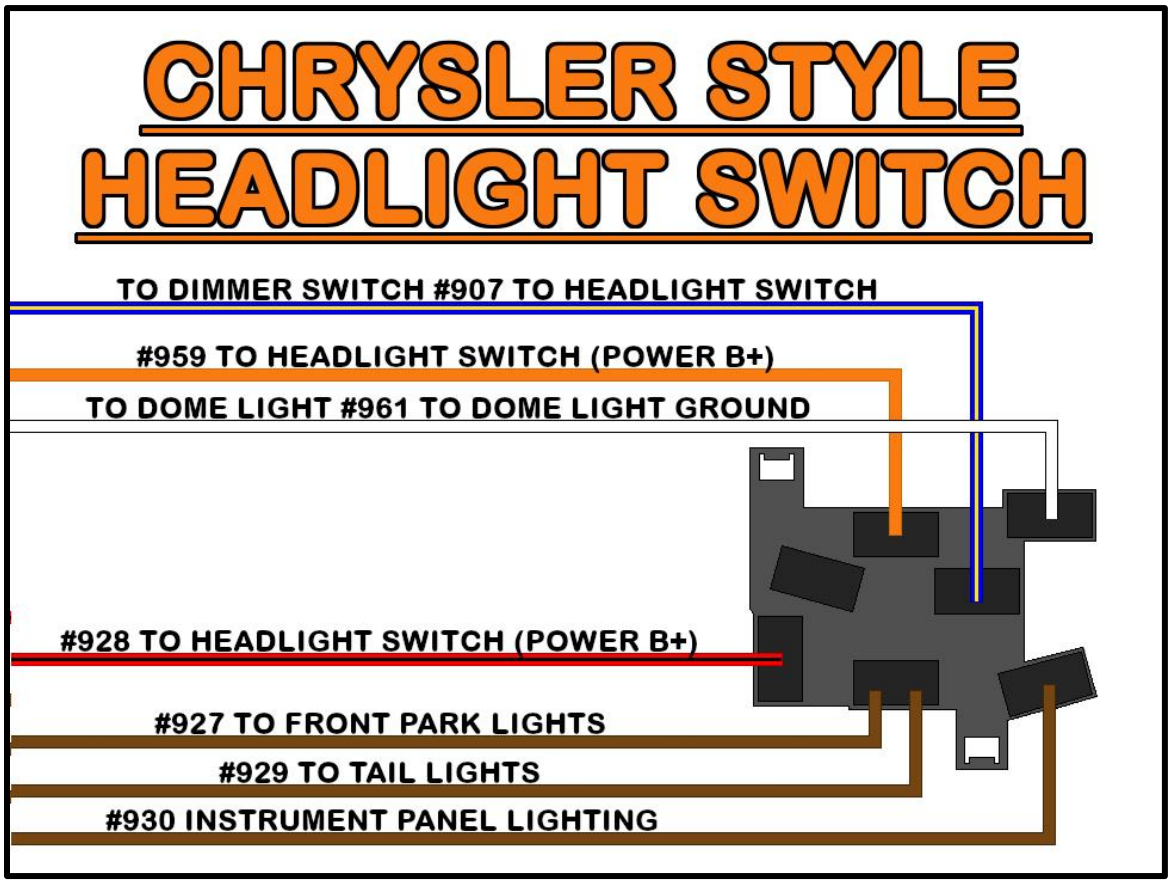




FORD HEADLIGHT SWITCH

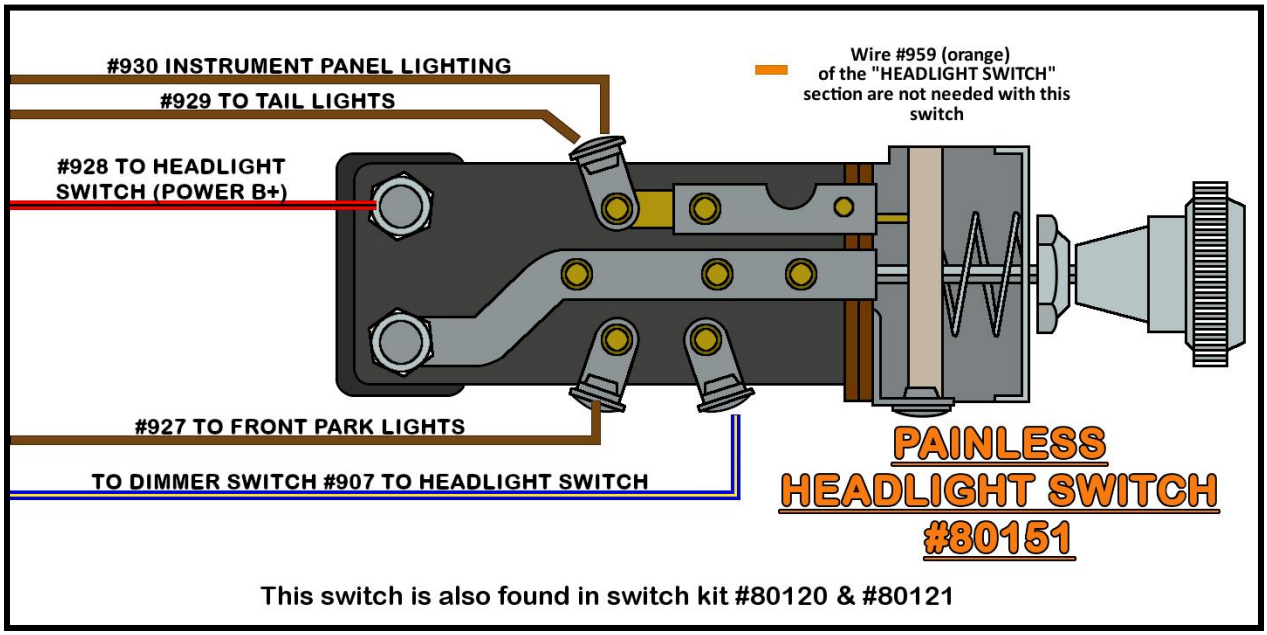


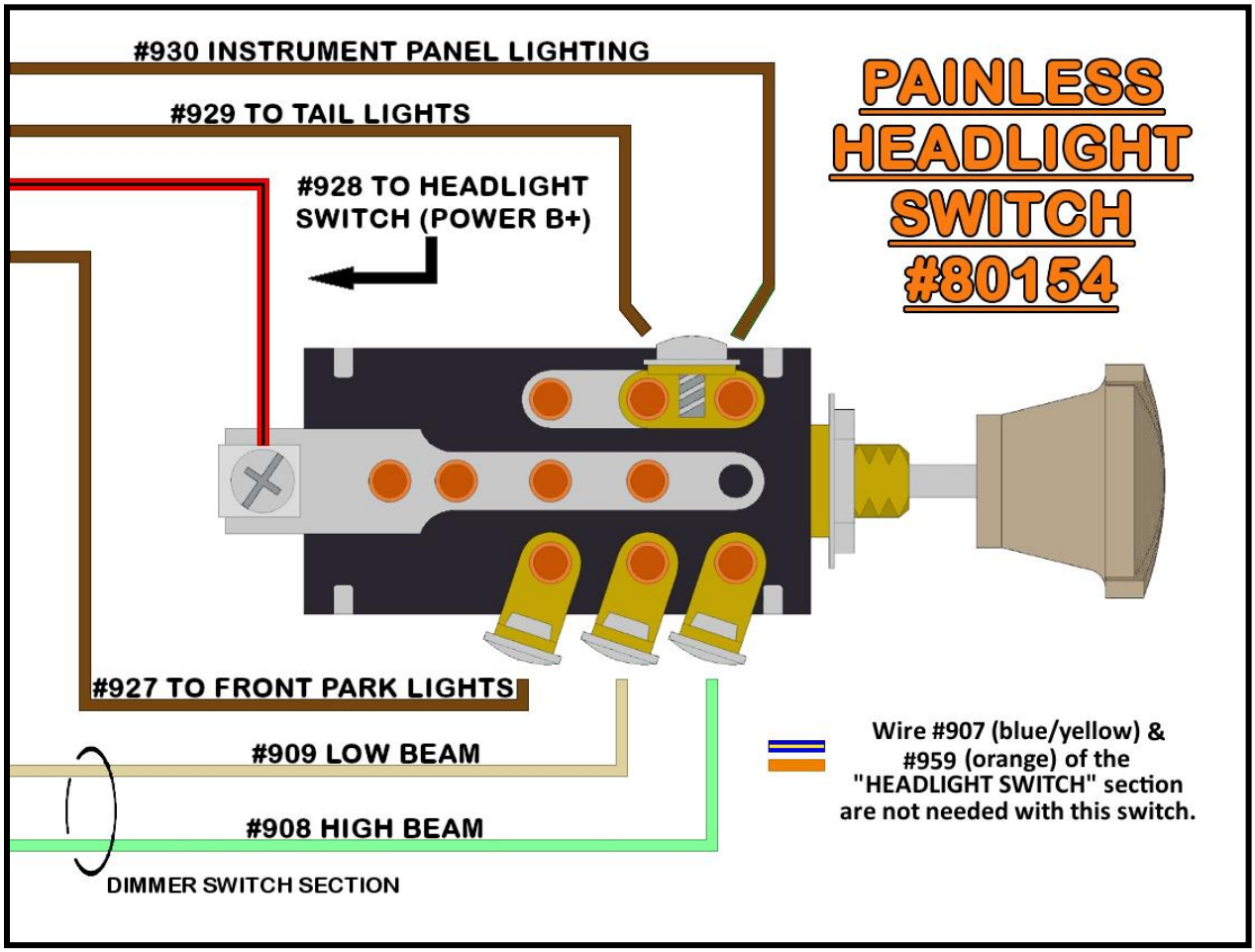
CHRYSLER HEADLIGHT SWITCH

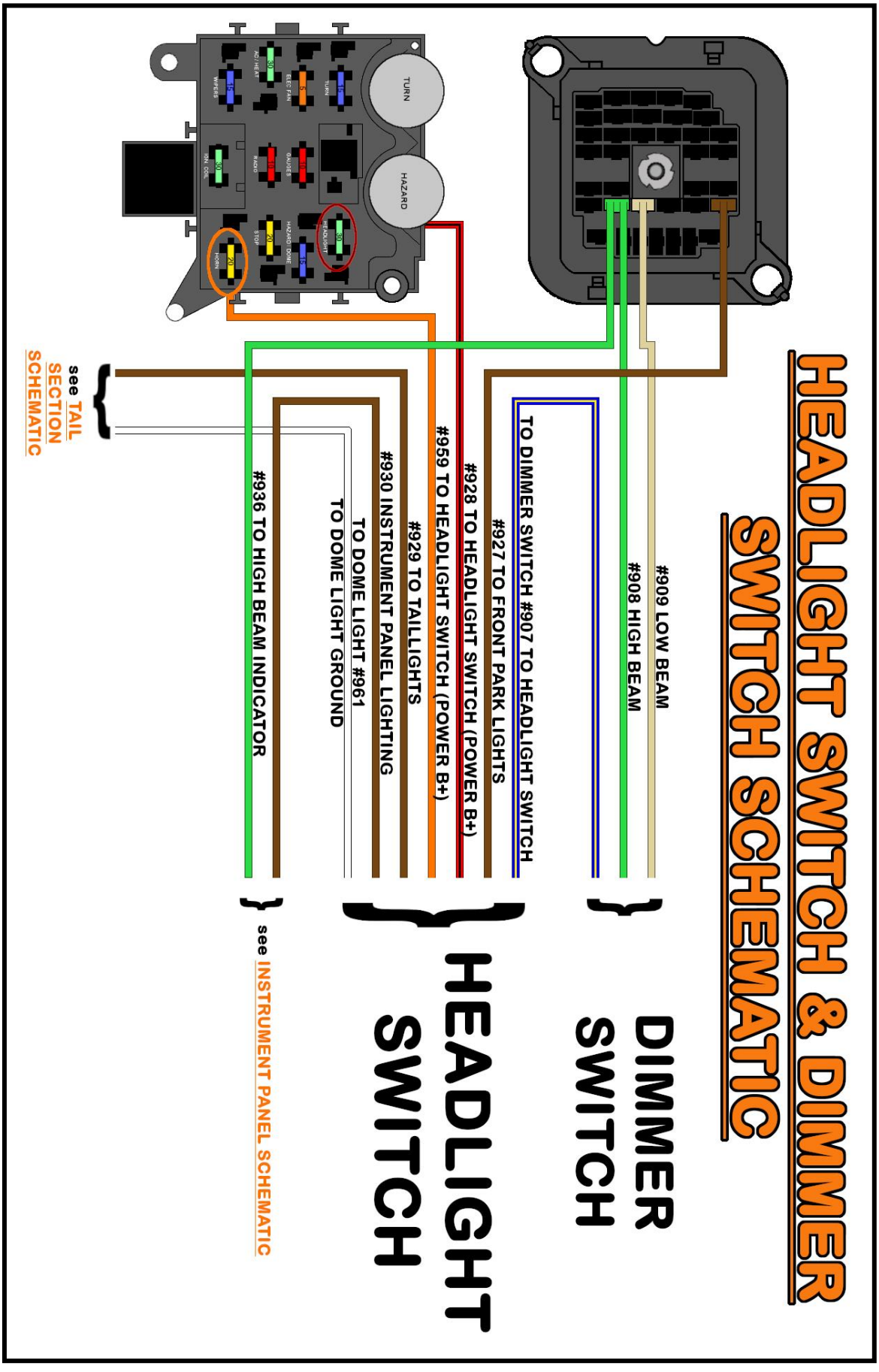


PAINLESS UNIVERSAL HEADLIGHT SWITCHES

Painless offers several universal switches as well, and even one with hi-low beam dimmer functions. Use the following diagrams to connect to either of the universal headlight switches offered by Painless. Use the blue insulated ring terminals found in the parts kit to make these connections.






HEADLIGHT SWITCH & DIMMER SWITCH SCHEMATIC
DIMMER SWITCH
HEADLIGHT SWITCH
#909 LOW BEAM
#908 HIGH BEAM
TO DIMMER SWITCH #907 TO HEADLIGHT SWITCH
#927 TO FRONT PARK LIGHTS
#928 TO HEADLIGHT SWITCH (POWER B+)
#959 TO HEADLIGHT SWITCH (POWER B+)
#929 TO TAILLIGHTS
#930 INSTRUMENT PANEL LIGHTING
TO DOME LIGHT #961
TO DOME LIGHT GROUND
#936 TO HIGH BEAM INDICATOR
see TAIL SECTION SCHEMATIC
see INSTRUMENT PANEL SCHEMATIC
TURN
HAZARD
HEADLIGHT
HORN

WIPER SWITCH

This harness comes set up for GM 2-speed wiper systems. **Those with GM 3-speed or delay/intermittent wipers, Ford, Chrysler, or any other system, will need to add additional wires from the switch to the motor for their set up**. Use your factory harness and/or a factory wire schematic to determine the number and color of additional wires needed.

All the wires in the wiper switch section can be seen in the *Wiper Schematic* on page 38, these wires are:

ORANGE/WHITE: 16-gauge wire, printed **[WIPER SWITCH] #905 TO WIPER SWITCH (POWER B+)**, this wire supplies switched ignition power to the wiper motor/switch from the 15-amp WIPERS fuse on the fuse block.

The following wires either provide power or ground to the wiper motor from the switch. This will depend on the connection of the **ORANGE/WHITE #905** wire. If your wiper motor requires an ignition switched, 12v source directly from the fuse block, like most firewall-mounted GM motors, the **#977**, **#979**, and **#984** will provide ground to the motor.

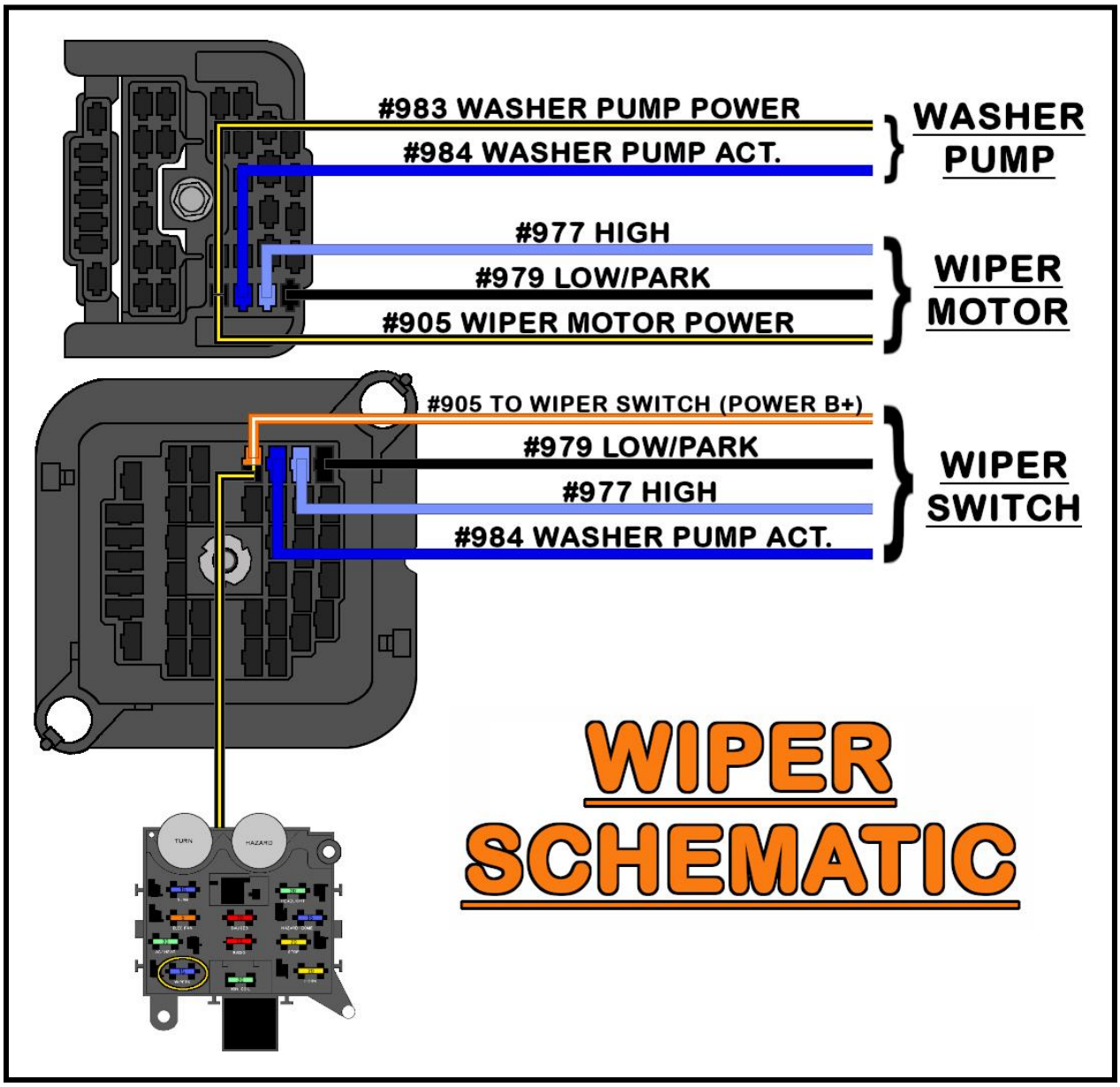
BLACK: 16-gauge wire, printed **[WIPER SWITCH] #979 LOW/PARK**, this is a signal to the low-speed tab on the wiper motor. On GM systems, this wire will provide a ground signal to the wiper motor when the wiper switch is in the “ON/LOW” position

LT. BLUE: 16-gauge wire, printed **[WIPER SWITCH] #977 HIGH**, this is a signal to the high-speed tab on the wiper motor. On GM systems, this wire will provide a ground signal to the wiper motor when the wiper switch is in the ON/LOW position, also when in the “ON/HIGH” position, and when the wiper switch “WASH” button is pushed

BLUE: 16-gauge wire, printed **[WIPER SWITCH] #984 WASHER PUMP ACTIVATION**, on GM systems this wire provides the washer pump with a ground source from the wiper switch when the switch is in the WASH position.

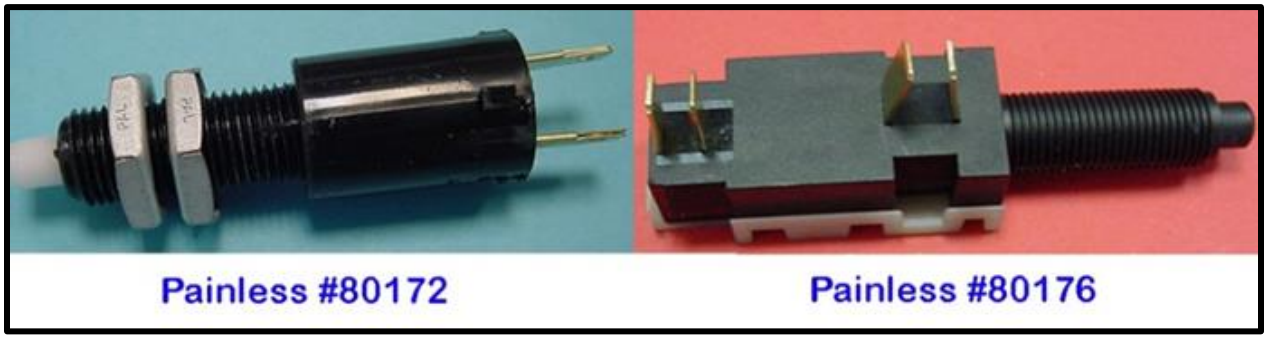
- Use your factory harness and/or a factory wire schematic to determine the correct wire pin out of your wiper switch.

On GM systems that switch ground to the wiper motor, without a proper clean ground source to your wiper switch, your wipers will NOT work. This ground can be from the mounting of the switch, in cases where the switch is mounted to a metal dash or a chassis ground source is supplied to one of the mounting screws. Also, some switches have a ground tab located on the switch itself for grounding purposes. Black is a common color for a ground wire in a GM vehicle. Please be aware, that GM switches of this era had a black wire for the low-speed function to the wiper motor. Do not mistake this black wire as a ground source to the switch when referencing a factory schematic.


#983 WASHER PUMP POWER
#984 WASHER PUMP ACT.
WASHER PUMP
#977 HIGH
#979 LOW/PARK
#905 WIPER MOTOR POWER
WIPER MOTOR
#905 TO WIPER SWITCH (POWER B+)
#979 LOW/PARK
#977 HIGH
#984 WASHER PUMP ACT.
WIPER SWITCH
WIPER SCHEMATIC

BRAKE SWITCH

A mechanical switch, like Painless part **#80172** (2-pin) or **#80176** (4-pin, also included in our torque converter lockup kits **#60109** & **#60110**), will be mounted on or near the pivot point of the brake pedal.



There are two wires found in the Painless chassis harness for proper brake switch connection, and they are:

ORANGE: 14-gauge wire, printed **[BRAKE SWITCH] #917 TO BRAKE SWITCH (POWER B+)**, which provides power from the 20-amp STOP fuse. This wire always has power.

WHITE: 16-gauge wire, printed **[BRAKE SWITCH] #918 BRAKE SWITCH OUTPUT**, this wire supplies power from the brake switch to the brake lights. The wire goes into a splice with two other wires, which can be seen in the *Turn Signal Switch & Brake Switch Schematic* on the next page.

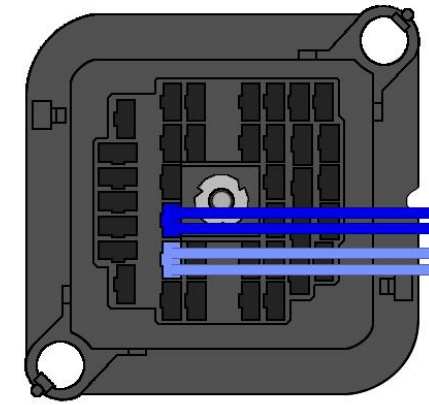
- Route the brake switch wires to the brake switch and connect them. Be sure to route the wires away from the moving parts of the brake pedal and/or clutch pedal. It does not matter which terminal the wires connect to.

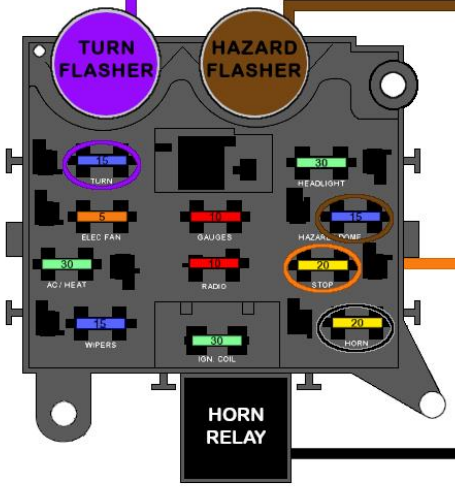
If your brake switch has four connection pins:

- Two pins will have contact or will be closed when the brakes are not applied. This is usually the pair of terminals closest together. These pins are for cruise control and/or torque converter lockup.

- Two pins will be separate, or open when the brakes are not applied. You will need these two posts that are normally open for brake light function. This is usually the pair of terminals further apart and usually the terminals closest to the threaded/plunger end of the switch. In the photo above of Painless part **#80176**, these will be the terminals in the center of the picture above.

TURN SIGNAL SWITCH & BRAKE SWITCH SCHEMATIC





#938 TO RIGHT TURN INDICATOR
#937 TO LEFT TURN INDICATOR
} INSTRUMENT PANEL

#925 TURN SWITCH (RIGHT FRONT)
#926 TURN SWITCH (LEFT FRONT)
#952 TO TURN SWITCH (TURN FLASHER)
#951 TO EMERGENCY FLASHER SW. B+
#953 TO HORN SWITCH
#949 TO LEFT TURN/BRAKE
#948 TO RIGHT TURN/BRAKE
#918 TO BRAKE SWITCH (INTEGRATED LIGHTS ONLY)
} TURN SIGNAL SWITCH

#917 TO BRAKE SWITCH (POWER B+)
#918 BRAKE SWITCH OUTPUT
} BRAKE SWITCH

#950 TO BRAKE LIGHTS (SEPARATE LIGHTS ONLY)
} see TAIL SECTION SCHEMATIC

= FACTORY SPLICE

TURN SIGNAL SWITCH

The turn signal switch provides power to each turn signal and turn signal indicator. For those using a later model or aftermarket GM style column, turn signal switch connectors are provided. As noted on **page 11**, if you use LED lights, a no-load flasher is required (Painless part **#80230**).

In this group of instructions, you will see the term “integrated turn/brake lights.” Most vehicles have integrated lights. This terminology refers to turn signals that also function as brake lights. You can easily tell if your vehicle has integrated turn/brake signals or separate turn/brake lights by looking at the lamp socket(s) on the rear of the vehicle. Only looking at the passenger or the driver side, how many sockets going into red lenses do you see?

Integrated turn brake signal vehicles will usually have one socket per side with a dual filament bulb (brighter filament for turn/brake, dimmer filament for taillights). You can also have vehicles that have integrated lights but also have multiple sockets and lenses.

Separate turn brake signal vehicles will usually have 2 or 3 sockets: 1 socket with dual filaments (brighter filament for brake, dimmer for tail) and 1 socket with a single filament for the turn signal. Remember to count the bulb filaments or the contacts on the bottom of the bulb, not the wires going to them, as your sockets may or may not have ground wires.

The wires provided in the Painless harness for turn signal connection can be identified by the wires reading **"**TURN SWITCH.**"** These wires can be seen in the *Turn Signal Switch & Brake Switch Schematic* on **page 85**, they are:

LT. BLUE: 18-gauge wire, printed **[TURN SIGNAL SECTION] #926 TURN SWITCH (LEFT FRONT)**, this wire provides power to the front left turn signal. This wire has power anytime the hazard switch is activated and when the turn signal lever is in the down/left turn position and the ignition switch is in the ON/RUN position.

BLUE: 18-gauge wire, printed **[TURN SIGNAL SECTION] #925 TURN SWITCH (RIGHT FRONT)**, this wire provides power to the front right turn signal. This wire has power anytime the hazard switch is activated and when the turn signal lever is in the up/right turn position and the ignition switch is in the ON/RUN position.

WHITE: 14-gauge wire, printed **[TURN SIGNAL SECTION] #918 TO BRAKE SWITCH (INTEGRATED LIGHTS ONLY)**, this wire feeds the brake light power into the turn signal switch for vehicles with integrated turn/brake signals. This wire has power anytime the brake pedal is pressed. Those with separate turn and brake lights will not need this **WHITE #918** wire.

YELLOW: 16-gauge wire, printed **[TURN SIGNAL SECTION] << #949 TO LEFT TURN/BRAKE >> [TAIL SECTION]**, this wire provides power to the left rear turn signal. This wire has power anytime the hazard switch is activated and when the turn signal lever is in the down/left turn position and the ignition switch is in the ON/RUN position. On vehicles with integrated turn/brake lights, this wire also carries the brake light power. In those cases, this wire will also have power anytime the brake pedal is pressed.

GREEN: 16-gauge wire, printed **[TURN SIGNAL SECTION] << #948 TO RIGHT TURN/BRAKE >> [TAIL SECTION]**, this wire provides power to the right rear turn signal. This wire has power anytime the hazard switch is activated and when the turn signal lever is in the up/right turn position and the ignition switch is in the ON/RUN position. On vehicles with integrated turn/brake lights, this wire also carries the brake light power. In those cases, this wire will also have power anytime the brake pedal is pressed.

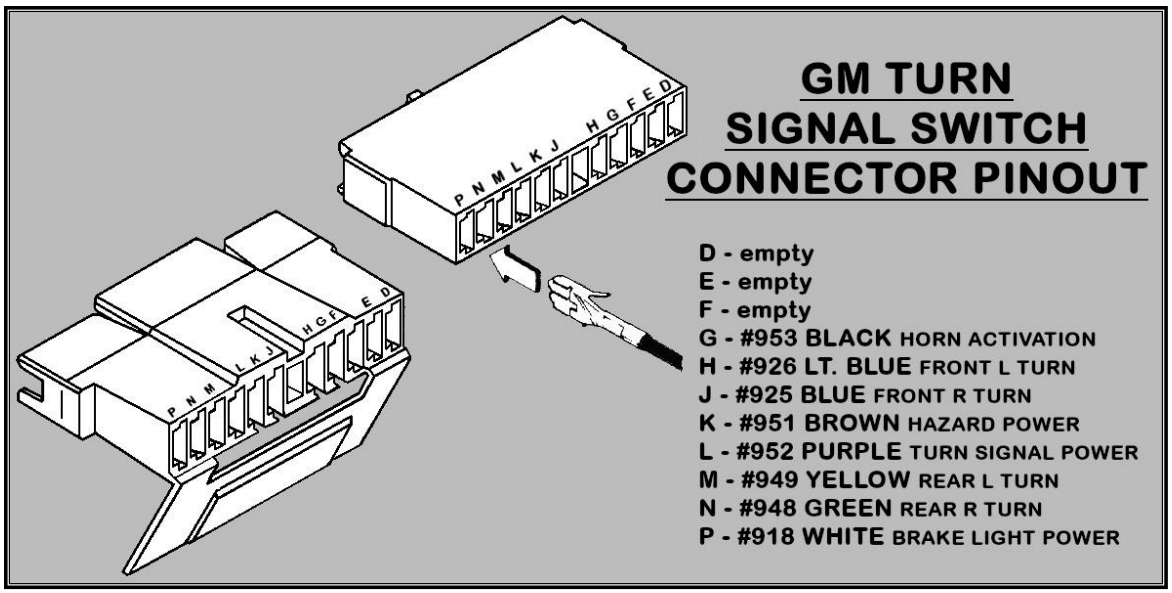
BROWN: 16-gauge wire, printed **[TURN SIGNAL SECTION] #951 TO EMERGENCY FLASHER SW. B+**, this wire provides power to the hazard switch. It comes from the hazard flasher found on the fuse block. It is a battery power wire, but it has power only when the hazard switch is activated which causes the flasher to send power through this wire. See **Flashers** on **page 11** for how this process works.

PURPLE: 16-gauge wire, printed **[TURN SIGNAL SECTION] #952 TO TURN SWITCH (TURN FLASHER)**, this wire provides power to the turn signal switch. It comes from the turn signal flasher found on the fuse block. It is an ignition power wire, but it has power only when the turn signal switch is activated, which causes the flasher to send power through this wire. See **Flashers** on **page 11** for how this process works.

BLACK: 18-gauge wire, printed **[TURN SIGNAL SECTION] #953 TO HORN SWITCH,** this wire is a ground activation signal to the horn relay. The only time this wire is grounded is when the horn button on the steering wheel makes contact to a ground source.

- Route the turn signal wires to the turn signal switch and cut to length.
- Use one of the following turn switch diagrams and connect each wire of the **Turn Signal Switch Section** to its correct connection.
- If a diagram is not provided, a factory schematic for your vehicle may be needed to figure out your connections.
- Locate the black connectors in the kit for GM columns. Terminals have also been provided in the parts kit for this connection, seen in the photo to the right

- Most columns will use the plug seen to the right, which is found on most aftermarket columns, as well as GM columns from the mid-1970s onward. These GM columns are a popular retrofit item because of their key on the column and tilt function.
- Using the diagram below, pin each wire into its correct location on the connector. Remember, **WHITE #918** will only be connected if you have integrated lights.
- If using the connector shown, once all wires have been installed, fold the locking tab down onto the connector. It will click/snap and lock the terminals in their place.
- Connect the now installed connector onto the connector on the steering column.



FORD COLUMNS

For those with Ford columns, the connector that plugs into the column from a factory harness will be needed. When it is cut from the factory harness leave 4-6" of wire to make it easy to splice/connect it to the wires on the new Painless harness. Those that do not have access to the connector that plugs into the column connector, cut the connector off the column, and splice/connect directly to the wires in the column.

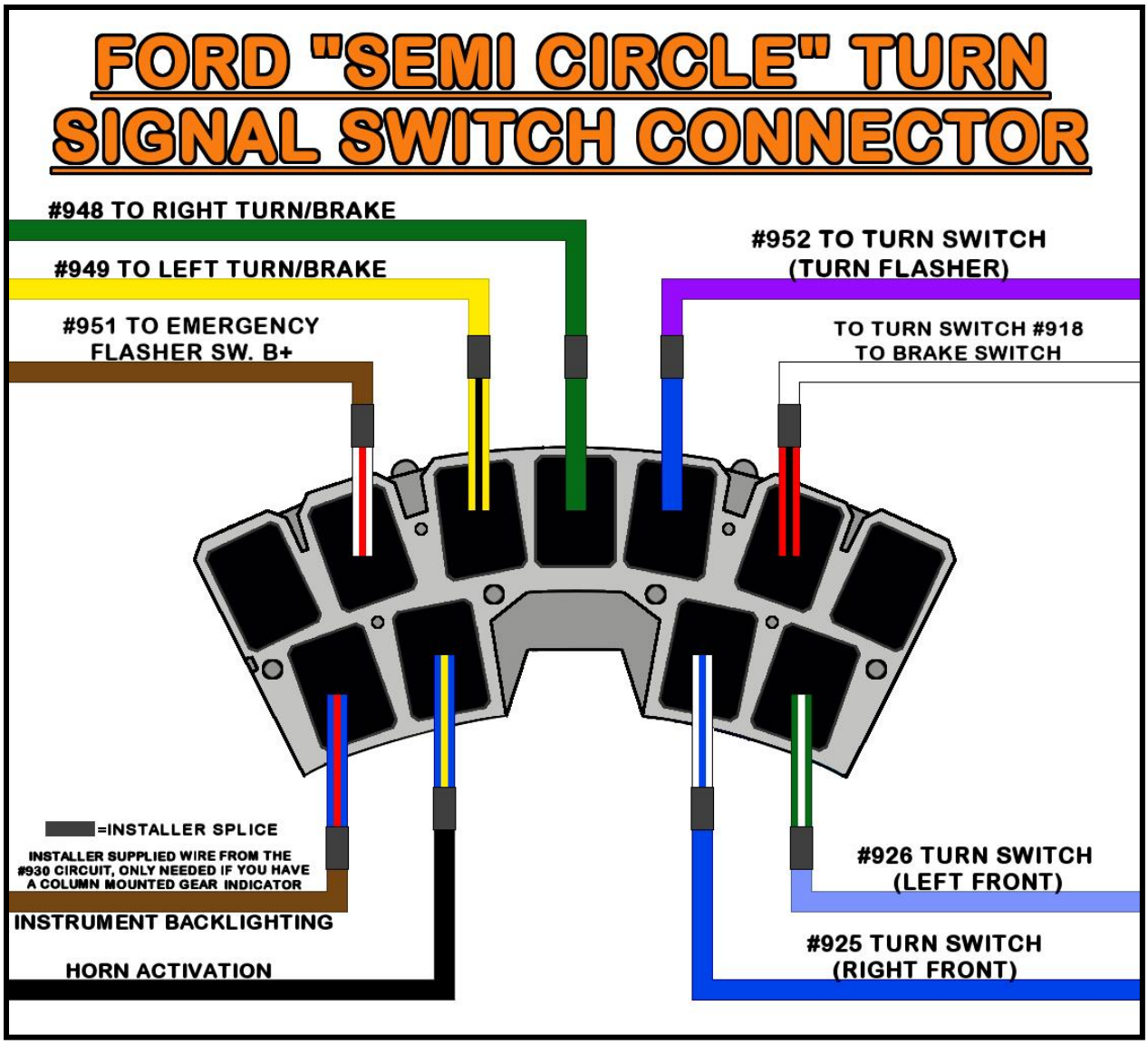
If a mate to your column connector is not available Painless recommends putting an in-line connection to make removal of the harness or column easy. Connector kits such as **#40010** and **#40011** would provide such a connection; allowing you to install a connector onto the new Painless harness as well as a mate to this connector onto the wires on your column.

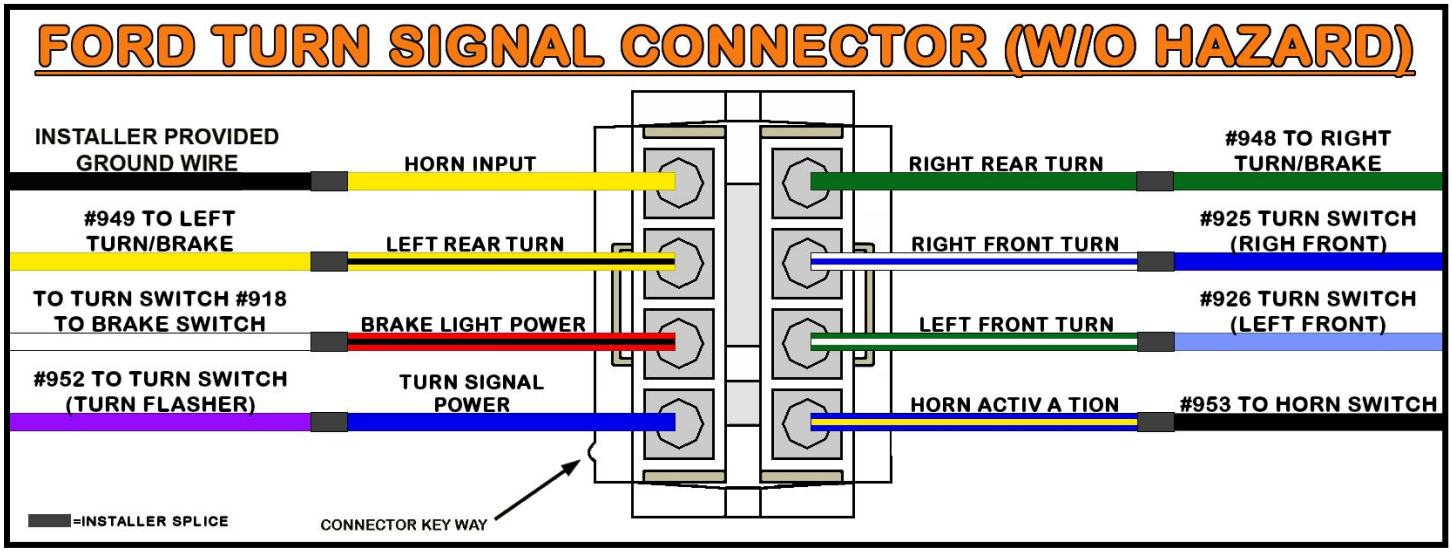
Diagrams, as well as a chart, have been provided to help identify the factory wires found on your column. Your column may differ from the information provided as there are numerous different columns.

- Using the splices provided in the parts kit, splice each wire of the "TURN SIGNAL SECTION" to your factory connector or directly to the wires coming from your column.

FORD COLOR	DESIGNATION	PAINLESS WIRE #	PAINLESS COLOR
GRN, RED/BLK	Brake Light Power	918	WHITE
WHT/BLU	Front Right Turn Signal	925	BLU
GRN/WHT	Front Left Turn Signal	926	LT. BLU
ORN/BLU, GRN	Rear Right Turn Signal	948	GRN
GRN/ORN, YLW/BLK	Rear Left Turn Signal	949	YLW
WHT/RED	Hazard Power	-	BRN
BLU, BLU/YLW	Horn	-	BLK
BLU	Turn Signal Power	-	PURP

If you are using a Painless connector kit, use the supplied terminals provided with that kit.





The diagrams above show splicing the wires from the Painless harness to an installer created pigtail from factory wiring.

MOPAR COLUMNS

For those with Mopar columns, the connector that plugs into the column from a factory harness will be needed. When it is cut from the factory harness leave 4-6" of wire to make it easy to splice/connect it to the wires on the new Painless harness. Those that do not have access to the connector that plugs into the column connector, cut the connector off the column and splice/connect directly to the wires in the column.

If a mate to your column connector is not available Painless recommends putting an in-line connection to make removal of the harness or column easy. Connector kits such as **#40010** and **#40011** would provide such a connection; allowing you to install a connector onto the new Painless harness as well as a mate to this connector onto the wires on your column.

Diagrams, as well as a chart, have been provided to help identify the factory wires found on your column. Your column may differ from the information provided as there are numerous different columns.

- Using the splices provided in the parts kit, splice each wire of the "TURN SIGNAL SECTION" to your factory connector or directly to the wires coming from your column.

If you are using a Painless connector kit, use the supplied terminals provided with that kit.

MOPAR COLOR	DESIGNATION	PAINLESS WIRE #	PAINLESS COLOR
WHT	Brake Light Power	**918**	**WHITE**
TAN, BLU	Front Right Turn Signal	**925**	**BLU**
GRN, LT. GRN	Front Left Turn Signal	**926**	**LT. BLU**
BRN, BRN/RED	Rear Right Turn Signal	**948**	**GRN**
GRN, GRN/RED	Rear Left Turn Signal	**949**	**YLW**
PNK, BLK	Hazard Power	**-**	**BRN**
RED	Horn	**-**	**BLK**
BLK, BLK/RED	Turn Signal Power	**-**	**PURP**

IGNITION SWITCH

The most important connection of a wiring harness, the ignition switch, controls power to the switched ignition fuses in the fuse block as well as sending power to the starter solenoid to crank the engine.

All wires going to the ignition switch can be seen in the *Ignition Switch Schematic* below. These wires are:

RED: (2) 12-gauge wires, printed **[IGNITION SWITCH SECTION] #934 TO IGNITION SWITCH (POWER B+)**, these wires come from a buss bar on the fuse block and feed battery power to the ignition switch. These wires always have power. One wire comes from the 30-amp HEADLIGHT fuse on the fuse block, and the other wire from the 20-amp STOP fuse.

ORANGE: 12-gauge wire, printed **[IGNITION SWITCH SECTION] #933 TO IGNITION SWITCH "IGN"**, this wire provides the switched power source to the fuse block. This wire powers all the switched power circuits to the harness except for the RADIO fuse. This wire only has power when the ignition switch is in the ON/RUN position.

PINK: 14-gauge wire, printed **[IGNITION SWITCH SECTION] #931 TO IGNITION SWITCH (COIL IGN)**, this wire provides power from the ignition switch to the 30-amp IGN COIL fuse on the fuse block. This wire has power when the ignition switch is in the ON/RUN position as well as the START position.

PURPLE: 12-gauge wire, printed **[IGNITION SWITCH] #919 TO STARTER SOLENOID**, this wire sends power to the neutral safety switch and only has power when the ignition switch is in the START position.

BROWN: 12-gauge wire, printed **[IGNITION SWITCH SECTION] #932 TO IGNITION SWITCH ACC**, this wire carries power to the RADIO fuse on the fuse block. This **BROWN** wire has power when the ignition is in the ACCESSORY position and when in the ON/RUN position.

- Route the wires to the ignition switch and cut to length. Be sure to allow enough length for the connectors. Strip ¼" of insulation from the wires.

- Factory style terminals have been provided to allow your factory ignition switch connector to be re-used. New connectors for GM column mounted switches have been provided.

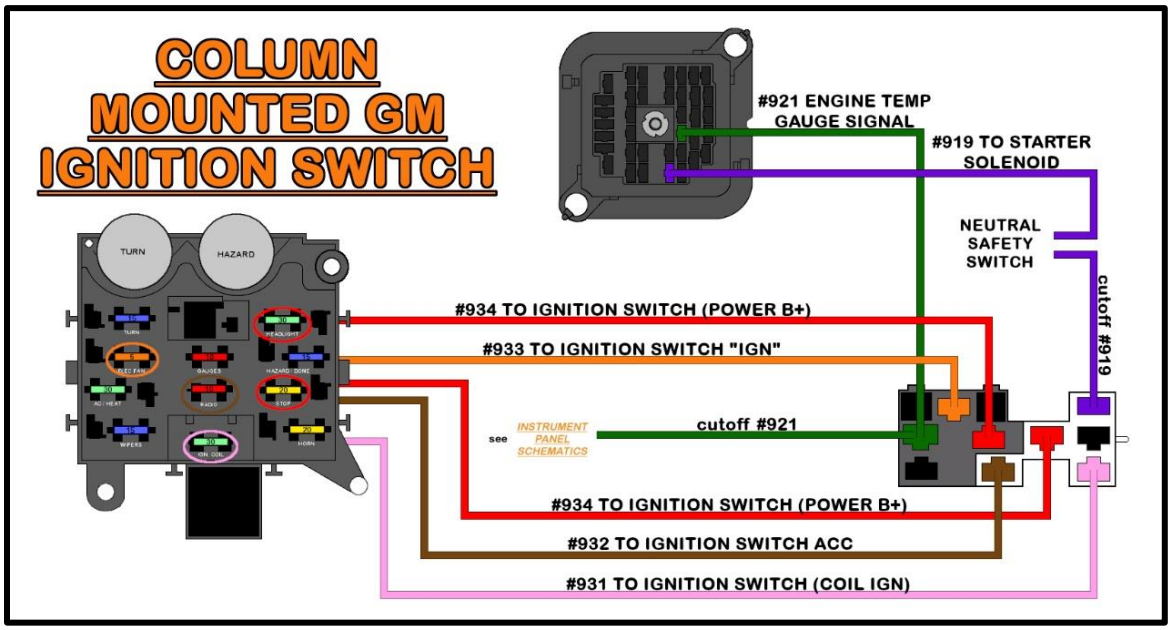
Since there are so many different types of ignition switches, chose from one of the following that best fits your application:

The **#921** wire shown in the following schematics can be found in the **Instrument Panel Section**. This wire will need to connect to the ignition switch if your gauge cluster has a temperature indicator light instead of an actual gauge. This will ground the light, causing it to illuminate when the ignition switch is in the "START" position, letting the operator of the vehicle know the light is functional. The **GREEN #921** will connect to the ignition switch and then from the ignition switch to the light.

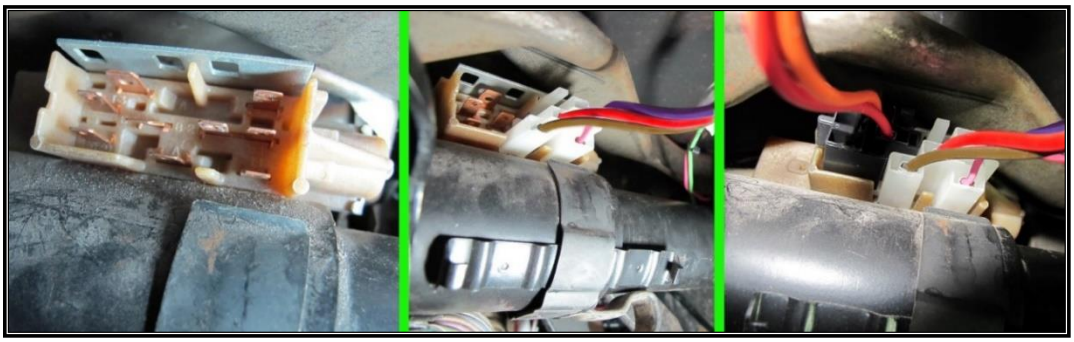
GM COLUMN MOUNTED

Many of the popular GM columns in vehicles have the ignition key on the column. The diagram and instructions below demonstrate how to properly connect to this type of ignition switch. The column will probably have to be lowered from the dash mounting bracket to make this connection, this is typically just **(2) 9⁄16" nuts** on either side of the column.

- Locate the ignition switch connectors and terminals from the parts kit. On GM column switches, the **ORANGE #933** wire requires a wider terminal than the other wires.
- Install a terminal using rollover crimpers. Again, the **ORANGE #933** wire requires a wider terminal than the other wires.
- Using the schematic below, install the wires into the connectors. It does not matter which red wire goes to each connector, both supply battery power to the switch.

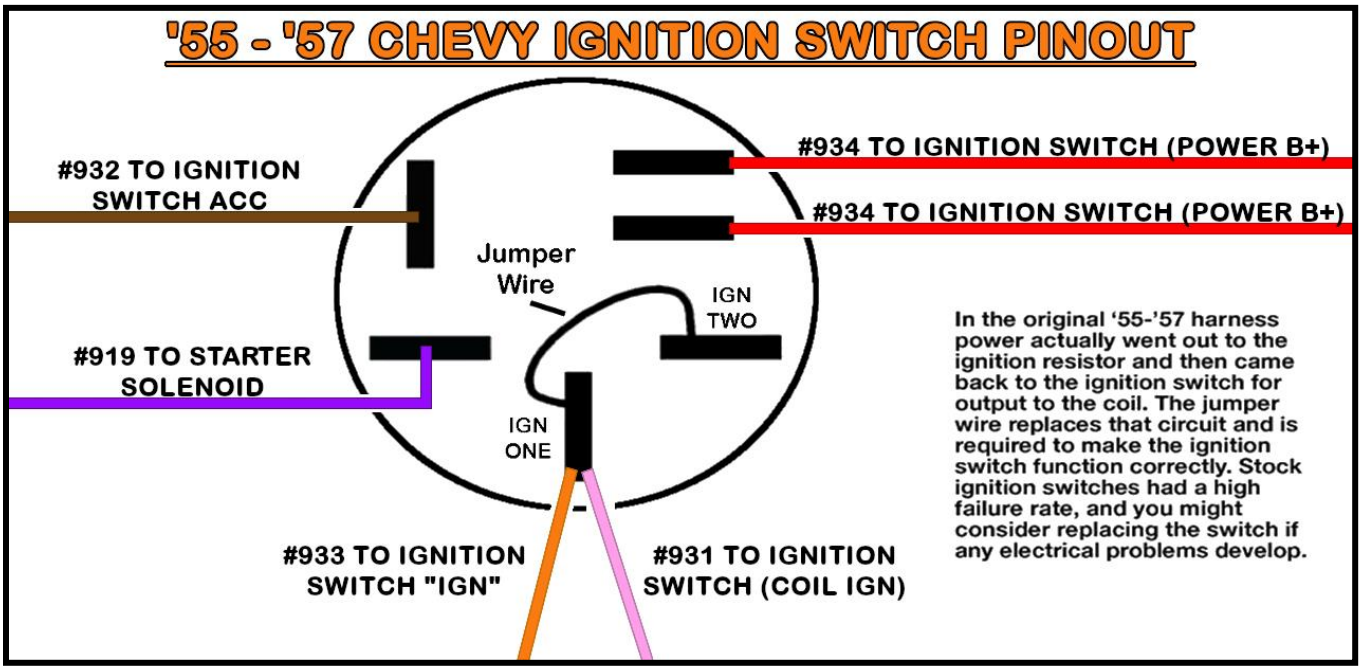


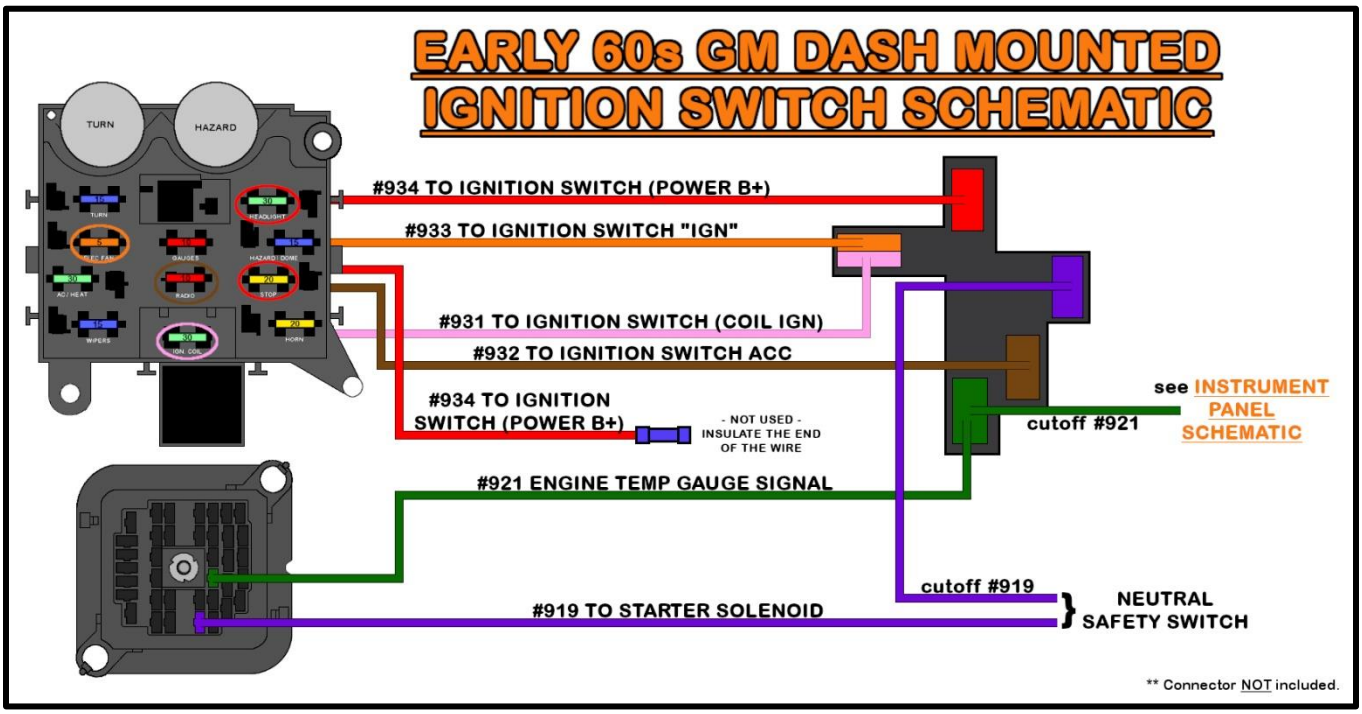
- With the connectors now installed, connect them to the ignition switch. The connectors must be installed in a specific order; the clear connector needs to be attached first, and then the black. Part of the black connector will overlap the clear connector. Also, your specific ignition switch may have these connectors flipped, with the white connector being closest to the steering wheel and the black towards the firewall.

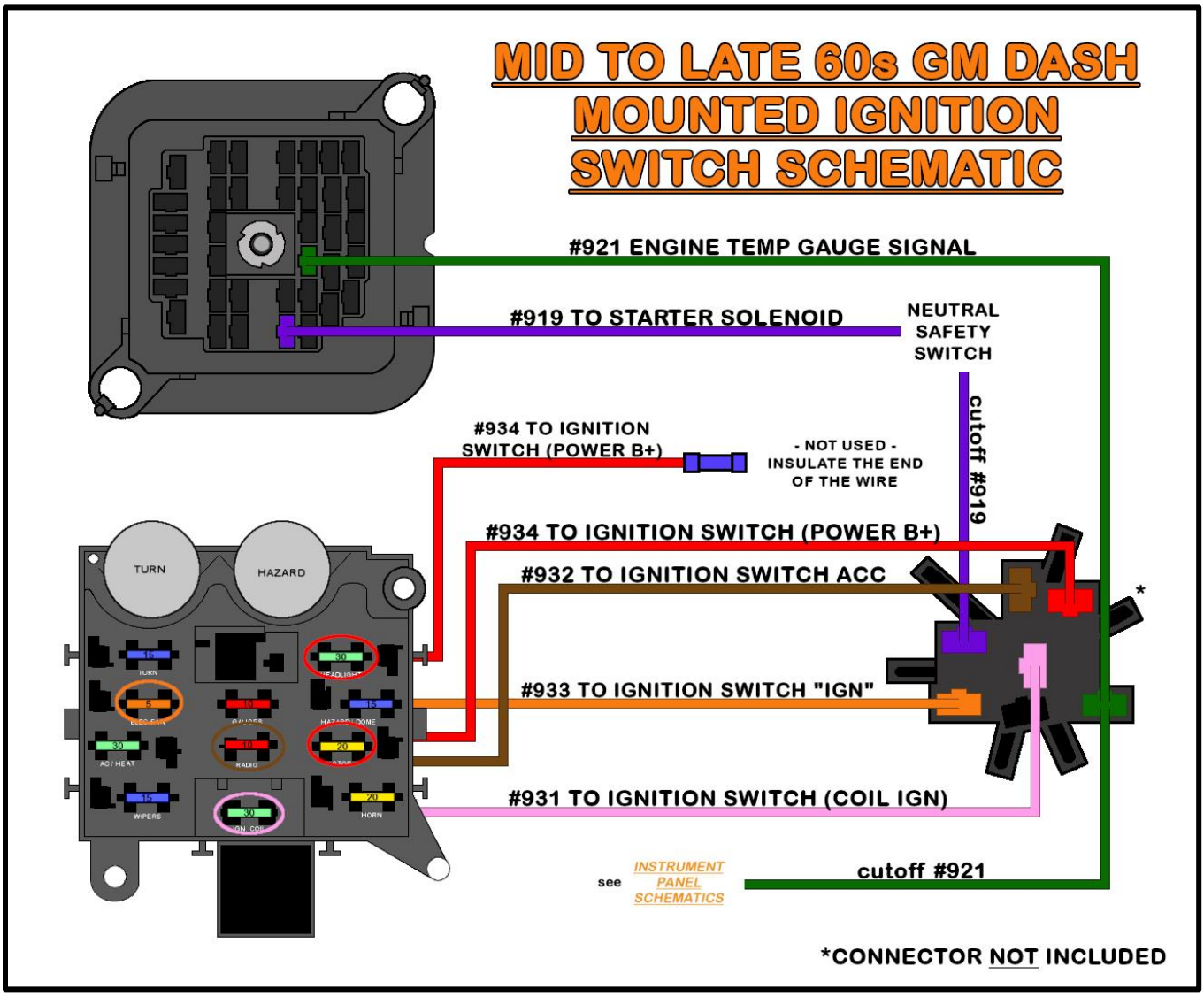


GM DASH MOUNTED

Your vehicle may have one of the many different dash-mounted ignition switches. Some have functions printed next to each pin on the switch; this allows for identification as to where each wire connects. Others will need a factory schematic to identify the functions of their switch. Below, there are diagrams showing the proper connection of a few of these popular switches.



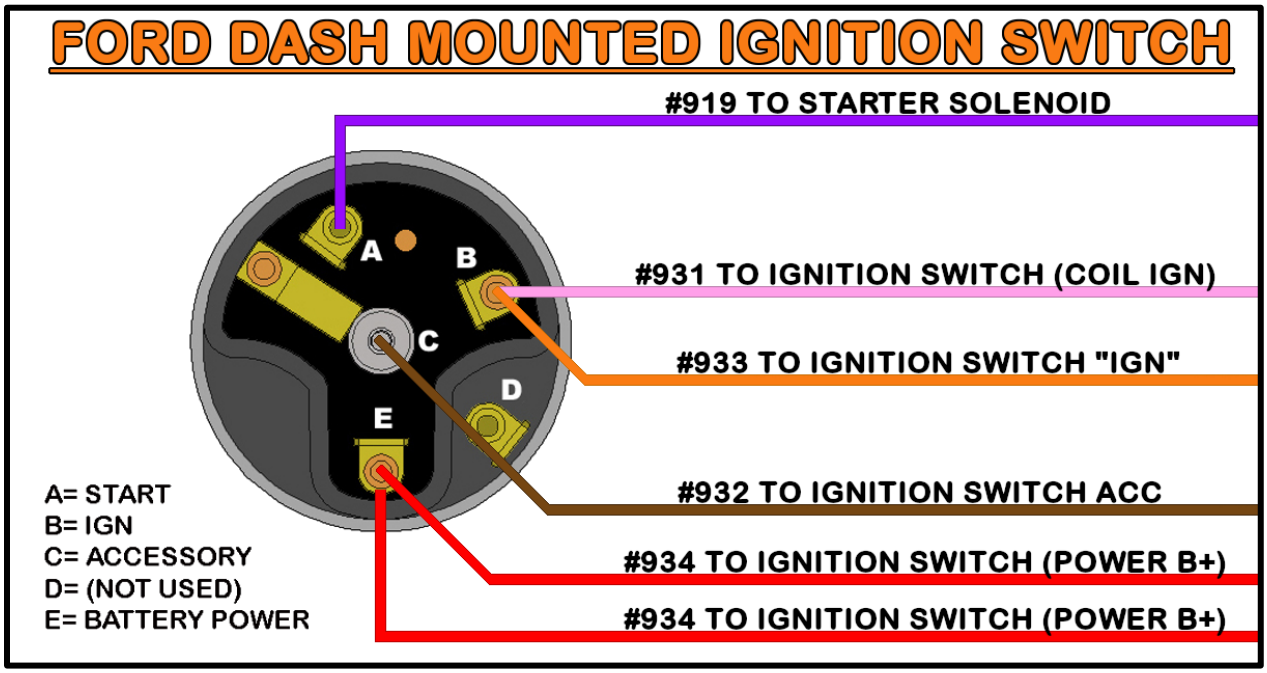



MID TO LATE 60s GM DASH MOUNTED IGNITION SWITCH SCHEMATIC
#921 ENGINE TEMP GAUGE SIGNAL
#919 TO STARTER SOLENOID
NEUTRAL SAFETY SWITCH
cutoff #919
#934 TO IGNITION SWITCH (POWER B+)
- NOT USED - INSULATE THE END OF THE WIRE
#934 TO IGNITION SWITCH (POWER B+)
#932 TO IGNITION SWITCH ACC
#933 TO IGNITION SWITCH "IGN"
#931 TO IGNITION SWITCH (COIL IGN)
TURN
HAZARD
see INSTRUMENT PANEL SCHEMATICS
cutoff #921
*CONNECTOR NOT INCLUDED

FORD KEY ON THE DASH

Below you will see a diagram to a common Ford dash-mounted ignition switch. This switch was used on many cars and trucks throughout the 1960s and 1970s. It is easily identified by a threaded post that comes out of the center, position C in the drawing below.

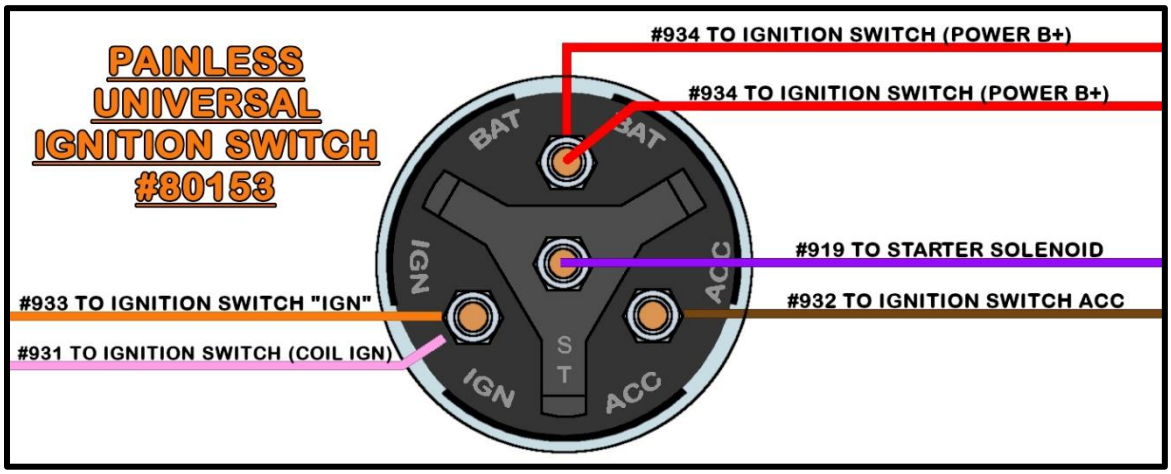
Pin D will provide a ground source to the warning lights when the ignition switch is in the ON position and the vehicle is not running. This will give the driver a visual indication that all warning lights have functioning bulbs. Connections for this pin are not supplied in this harness but can easily be added by the installer.



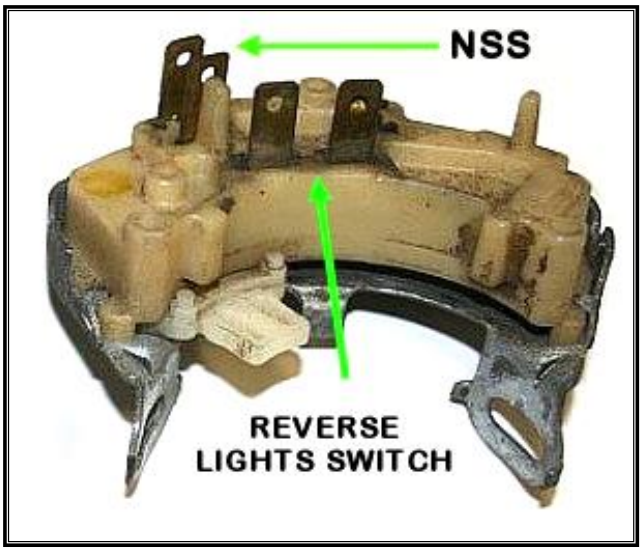
PAINLESS UNIVERSAL IGNITION SWITCH - #80153

Painless offers a universal, dash mount ignition switch as part **#80153**. This switch comes with the trim ring, which screws onto the switch to hold the switch in place, as well as 2 keys.

- Use insulated ring terminals, found in the parts kit, to make these connections.



REVERSE SWITCH



The reverse switch connection provides the backup lights the power they need to illuminate. This switch is a 2-pin, normally open switch that has power coming into one side and out the other to the backup lights. When the shifter is put into the reverse position, contact is made between these 2 pins, closing the switch. This allows power to flow from one pin to another, thus transferring power through the switch out to the backup lamps. The 2 wires provided for this option are:

LT. GREEN: 16-gauge wire, printed **[BACKUP LIGHT] #958 BACK-UP SWITCH B+**, this wire comes from the 10-amp GAUGES fuse on the fuse block. This wire is a switched ignition power wire meaning it will only have power when the ignition switch is in the ACCESSORY and ON/RUN positions.

If you do not have back up lights, **#958** can be used to power an accessory requiring a switched 12v power source.

LT. GREEN: 16-gauge wire, printed **[BACKUP LIGHT] #956 OUTPUT SIDE OF BACK-UP SWITCH,** this wire provides power from the reverse switch to the backup lights in the **Tail Section** of the Painless harness.

- Locate the reverse switch; the location varies depending on your vehicle.

  Many of those using a factory GM column will have a switch like the one shown above. This switch is mounted at the base of the steering column.

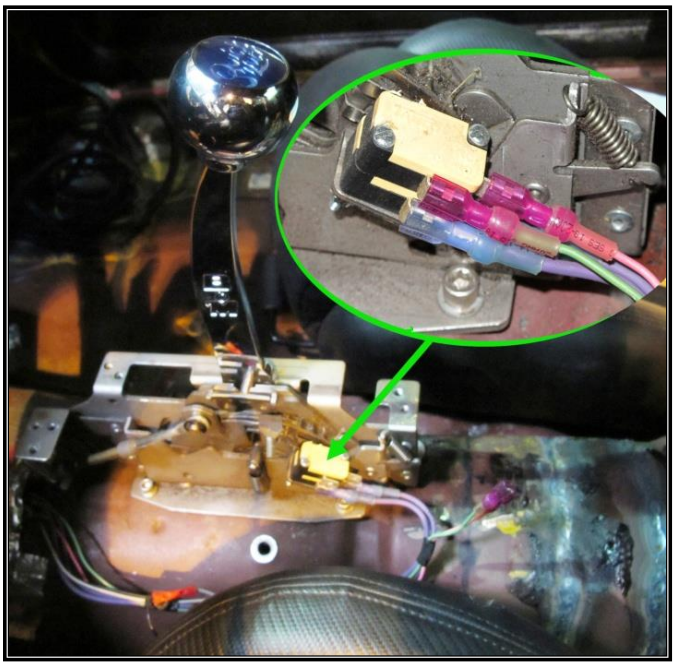
  This same switch can be found at the base of factory console shifters.

- Route the wires to the reverse switch, cut to length, and strip ¼" of insulation. Make sure to avoid moving parts like the brake and clutch pedal.

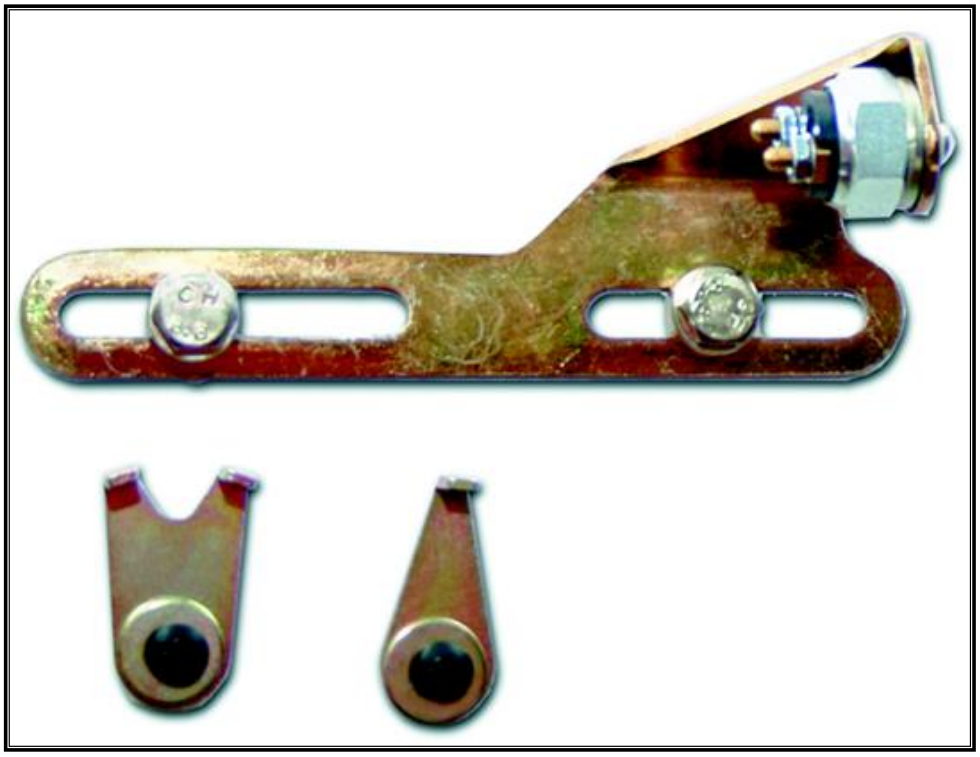
- The blue insulated terminals provided in the parts kit can be used to make this connection. It does not matter which terminal the wires connect to.

- If you are using an aftermarket floor-mounted shifter, the reverse switch may be found on the base of the shifter. There may also be a neutral safety switch found on the shifter as well. When testing the system, if you notice the reverse lights on when the transmission is in park or neutral, you have the reverse switch wires connected to the neutral safety switch.

  Small insulated terminals have been provided in the parts kit to accommodate aftermarket shifter switches.



- **Painless offers part #80175** for those using GM TH350, TH400, 700-R4, TH200, 200-4R, & 4L60e transmissions. This part can be used as either a reverse switch or a neutral safety switch.

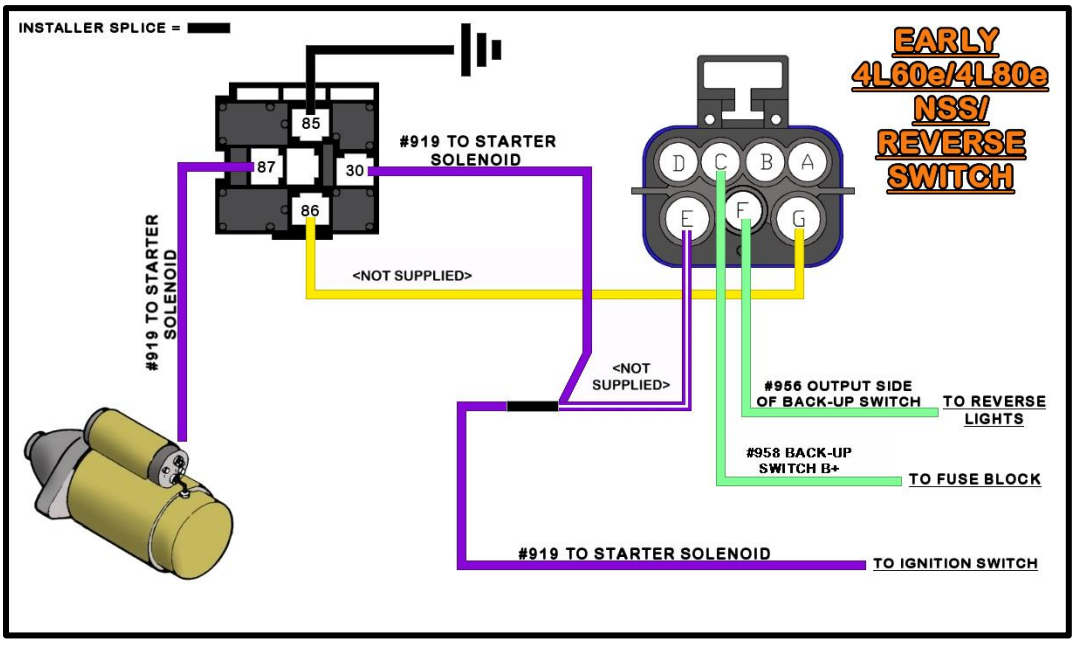


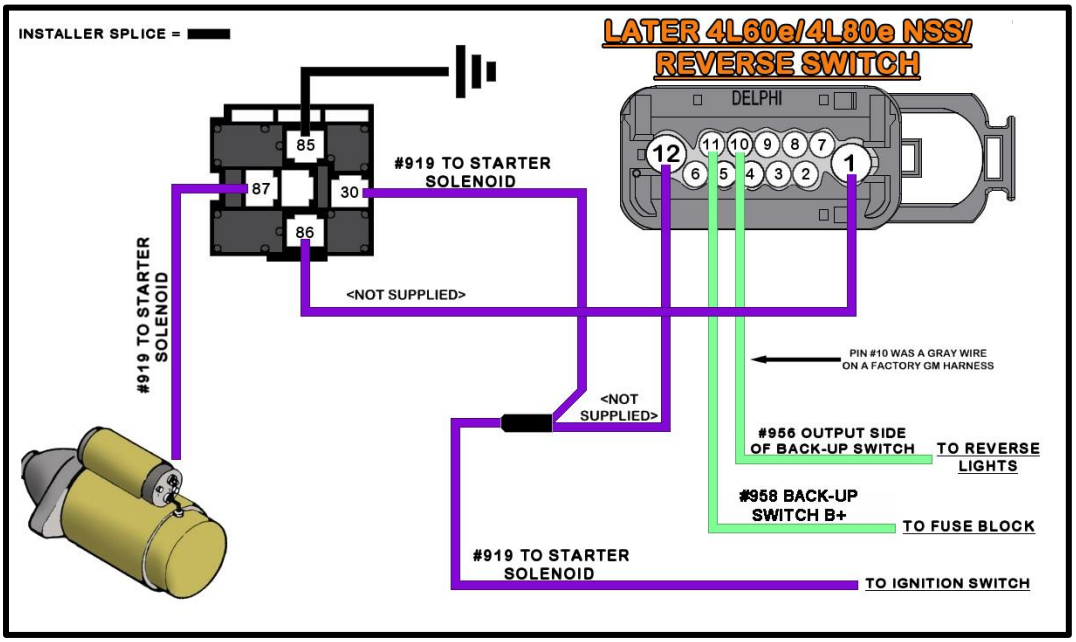
4L60E/4L80E SWITCH

The 4L60e/4L80e transmission, from trucks or SUVs, has a factory reverse switch on the shift detent rod on the driver's side of the transmission. This same switch also has a park/neutral switch incorporated. Use the diagrams below to connect the reverse wires of the Painless harness to this switch.

For those with a 4L60e/4L80e transmission, a starter relay must be used (not supplied) unless you use a factory switch on a GM Keyed column. The switch is not capable of handling the amperage the solenoid requires.

The following section of this manual, **Neutral Safety/Clutch Switch**, contains information on the starter relay shown in the diagrams. Wires of the Painless harness will need to splice to the existing wires coming from your switch connector.





NEUTRAL SAFETY / CLUTCH SWITCH

This switch is a safety device that prevents the vehicle from being started while in gear and causing an unfortunate accident. The purpose of this switch is to only allow the engine to be started when the vehicle is in park or neutral (automatic transmissions) or if the clutch pedal is depressed (manual transmissions). When the transmission is put into park/neutral or the clutch pedal is depressed, contact is made between these 2 pins, closing the switch. This allows power to flow from one pin to another, transferring power through the switch to the starter solenoid.

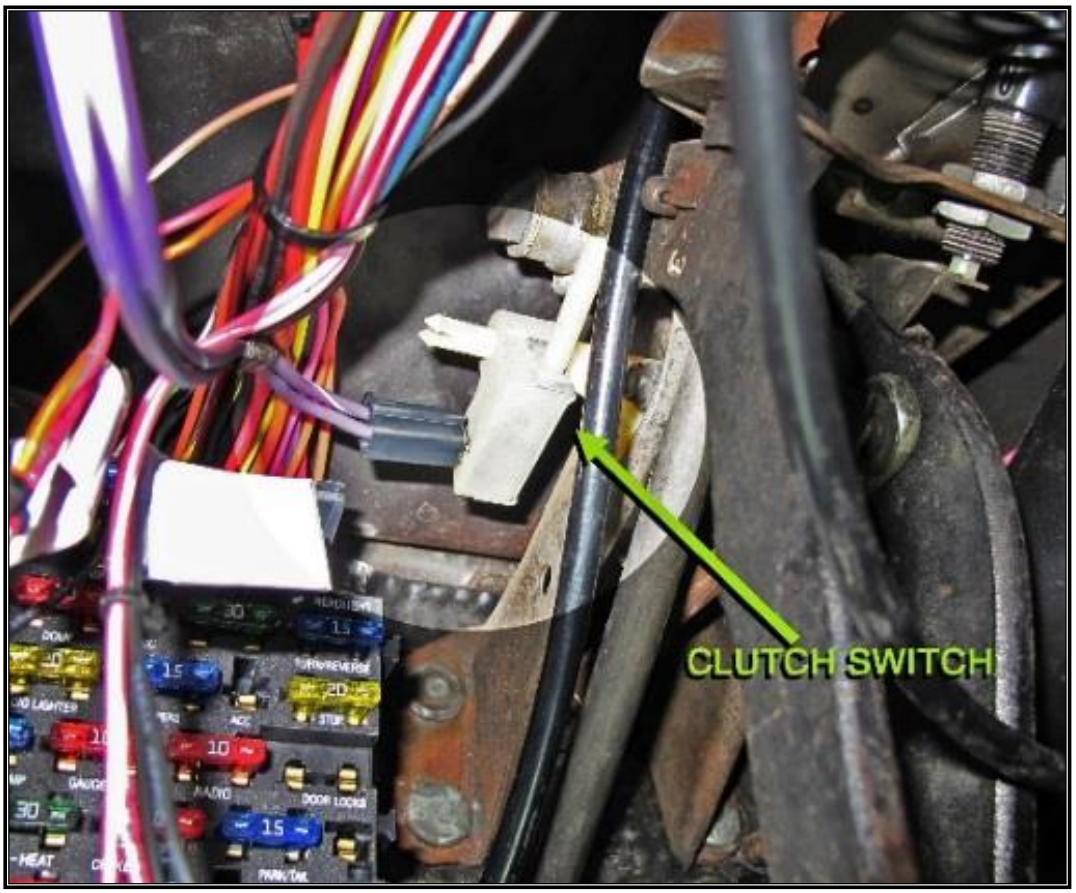
The neutral safety/clutch switch connection will involve one wire from the ignition switch section, it is:

PURPLE: 12-gauge wire, printed **[IGNITION SWITCH] #919 TO STARTER SOLENOID**, this wire comes from the ignition switch and only has power when the switch is in the START position. This wire will provide power to the starter from the neutral safety switch (NSS).

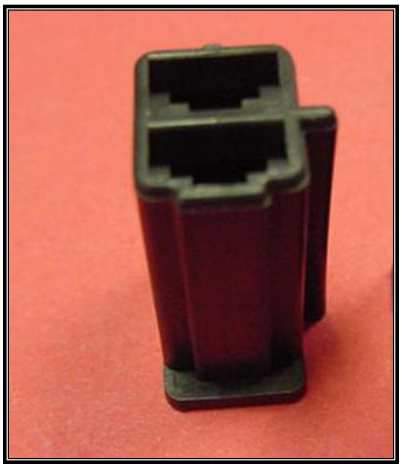
- When this wire is routed to the NSS or Clutch switch and cut to length, the cut-off piece of wire will then be connected to the other side of the switch and will route to the ignition switch.

  This cut off wire will then provide power to the neutral safety switch (NSS) from the ignition switch.

- If you have an automatic transmission with a column shift, the NSS is usually located at the base of the steering column, as seen in the photo with the reverse switch on page 97. This same switch can be found at the base of factory console shifters.



IF YOU ARE USING AN AFTERMARKET FLOOR SHIFTER



- If you have a manual, the clutch switch is located at the top of the clutch pedal, much like the brake switch on the brake pedal.

- Route the wires to the NSS, cut to length, and strip ¼" of insulation. Also, strip ¼" of insulation from the cutoff piece of **PURPLE #919** wire as previously stated, it will connect to the switch as well.

Re-use the connector from the factory harness, seen to the right, or use the small insulated terminals that have been provided in the parts kit. It does not matter which tab each wire connects to.

- Those with a 4L60e/4L80e transmission, a starter relay must be used (not supplied) if using a factory switch; as shown on page 99. The switch is not capable of handling the amperage the solenoid requires.

- **Like with the 4L60e/4L80e transmission, if you do not have a neutral safety/clutch switch and do not plan on getting one, or if you have a transmission mounted NNS that you are accessing in the engine compartment, that NSS connection should have been made on page 67. The PURPLE #919 will only connect to the ignition switch on the inside of the vehicle.**

Painless does not recommend operating your vehicle without a neutral safety/clutch switch.

INSTRUMENT PANEL

The instrument panel connections of the Painless harness vary according to the gauge cluster or aftermarket gauges you are using. The wires for this connection are:

BROWN: 18-gauge wire, printed **[HEADLIGHT SWITCH SECTION] << #930 INSTRUMENT PANEL LIGHTING >> [INSTRUMENT PANEL SECTION]**, this wire provides a power source for gauge backlighting. The **BROWN #930** wire comes directly from the headlight switch and has power anytime the headlight switch is in the Park/Taillights ON or Headlights ON position. This wire can also be seen in the *Headlight Switch & Dimmer Switch Schematic* on **page 81**.

TAN: 18-gauge wire, printed **[INSTRUMENT PANEL SECTION] TO FUEL GAUGE << #939 >> TO FUEL SENDER [TAIL SECTION]**, this wire is a ground signal from the fuel level sending unit in the fuel tank. The resistance to ground will vary on this wire according to the amount of fuel in the tank. This wire can also be seen in the *Tail Section Schematics* on **pages 127 & 128**.

PINK: 18-gauge wire, printed **[INSTRUMENT PANEL SECTION] #935 TO VOLTMETER SOURCE (IGN POWER)**, this wire provides a switched ignition power source to the cluster. This wire comes from the 10-amp GAUGES fuse on the fuse block. This wire has power anytime the key is in the ON/RUN position.

GREEN: 18-gauge wire, printed **[INSTRUMENT PANEL SECTION] #921 ENGINE TEMP GAUGE SIGNAL**, this wire is a ground signal from the engine coolant temperature sending unit. The sending unit will create resistance to ground according to engine temperature. This resistance is transferred through this wire to the gauge.

PURPLE/WHITE: 18-gauge wire, printed **[INSTRUMENT PANEL SECTION] #923 TACHOMETER SIGNAL,** this wire is a ground signal from the negative side of the ignition coil. This wire can also be seen in the coil connection diagrams on **pages 46 – 49**.

LT. BLUE/BLACK: 18-gauge wire, printed **[INSTRUMENT PANEL SECTION] #922 OIL PRESSURE SIGNAL**, this wire is a ground signal from the oil pressure sending unit. The sending unit will create resistance to ground according to oil pressure. This resistance is transferred through this wire to the gauge.

LT. GREEN: 18-gauge wire, printed **[INSTRUMENT PANEL SECTION] #936 TO HIGH BEAM INDICATOR**, this wire provides power to the high beam indicator when the headlight switch is in the “ON” position and the dimmer switch is in the “HIGH” position.

LT. BLUE: 18-gauge wire, printed **[INSTRUMENT PANEL SECTION] #937 TO LEFT TURN INDICATOR**, this wire provides power to the left turn indicator when the turn signal switch is in the left turn position.

BLUE: 18-gauge wire, printed **[INSTRUMENT PANEL SECTION] #938 TO RIGHT TURN INDICATOR**, this wire provides power to the right turn indicator when the turn signal switch is in the right turn position.

ORANGE/BLACK: 16-gauge wire, printed **[INSTRUMENT PANEL SECTION] #955 TO ACCESSORY (IGN POWER)**, this wire provides a switched ignition power source to any accessories you may have. This wire comes from the 15-amp TURN fuse on the fuse block. This wire will have power anytime the key is in the ON/RUN position.

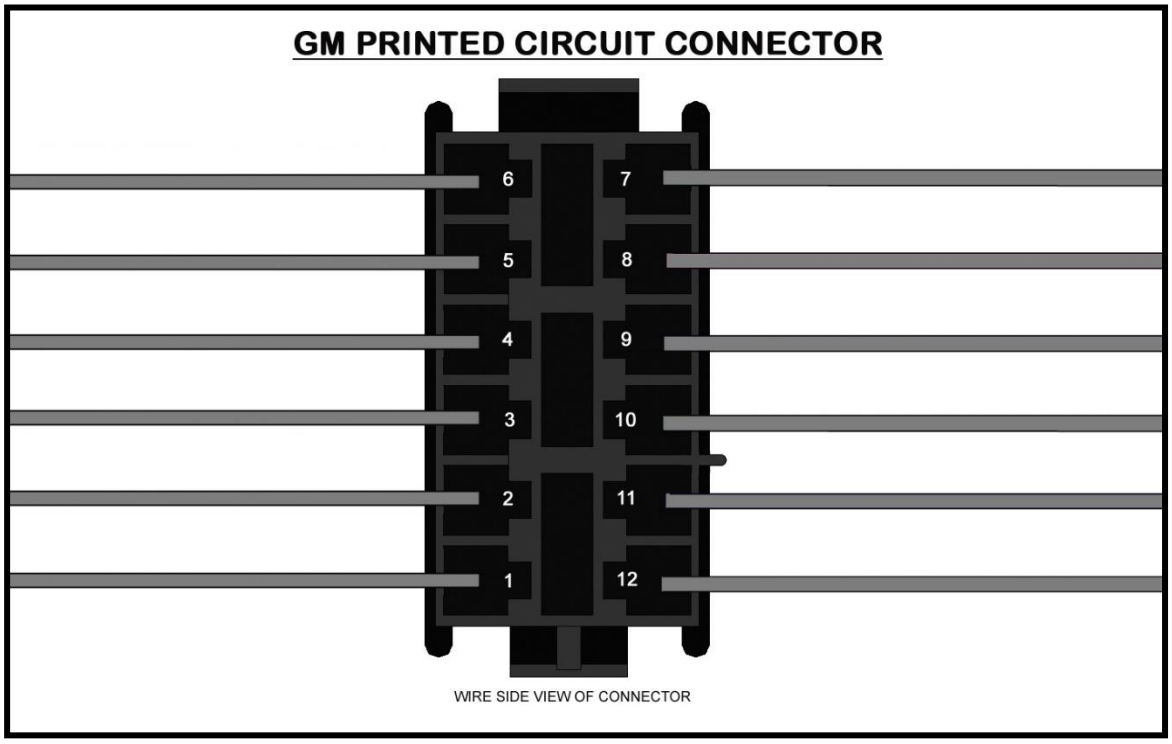
FACTORY PRINTED CIRCUIT GAUGES

A factory schematic and/or tracing your factory harness is necessary to identify the connector pinout needed for your gauges. The factory connector will need to be removed from your original harness and spliced onto the wires of the Painless harness

- Most factory, GM printed circuit gauge clusters used a 12-pin connector like the one in the diagram below. It is recommended to use a factory schematic or your factory harness to fill in the blanks on the image with the function and/or Painless wire color and circuit number for each connector pin location.

If you have a charge/alternator light, the **WHITE** **#914** wire that provides ignition power to the alternator needs to be routed to the gauge cluster, cut to length, and the cut off portion then routed from the gauge cluster out to the alternator.

If you have a brake warning light, a wire (not supplied) needs to be run from the gauge cluster to the emergency brake switch and then to the brake warning switch if equipped. This was most commonly an 18 ga **TAN** wire on factory harnesses.



Any ground wires required will need to be installer supplied

AFTERMARKET GAUGES

The following instructions will be universal due to all the different manufacturers of aftermarket gauges. Use the following instructions along with the gauge manufacturer's instructions.

Most electric aftermarket gauges require four or five wire connections:

- Gauge Power - a Switched 12-volt power source
- Gauge Ground (some gauges do not require this)
- A signal from a sensor or sending unit
- Gauge Light Power - 12-volt power source from the Gauge Lighting circuit
- Gauge Light Ground

Most mechanical aftermarket gauges only require two wires to be connected:

- Gauge Light Power- 12-volt power source from the Gauge Lighting circuit
- Gauge Light Ground

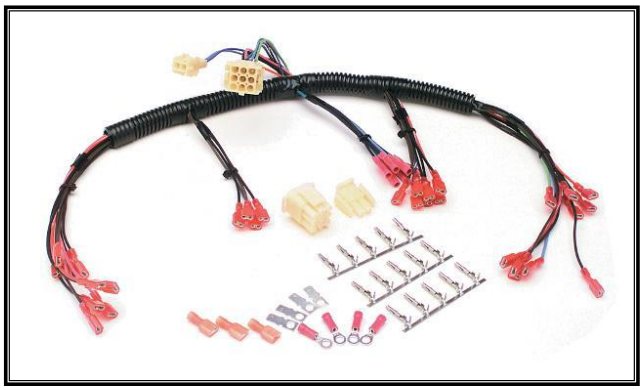
All these connections are present in the wiring Painless harness. However, it will be up to the installer to distribute the power for the gauge and the gauge lights as well as the grounds. This additional splicing will be dependent on the method the gauge wires are connected to the gauges.

There are two methods of connecting aftermarket gauges:

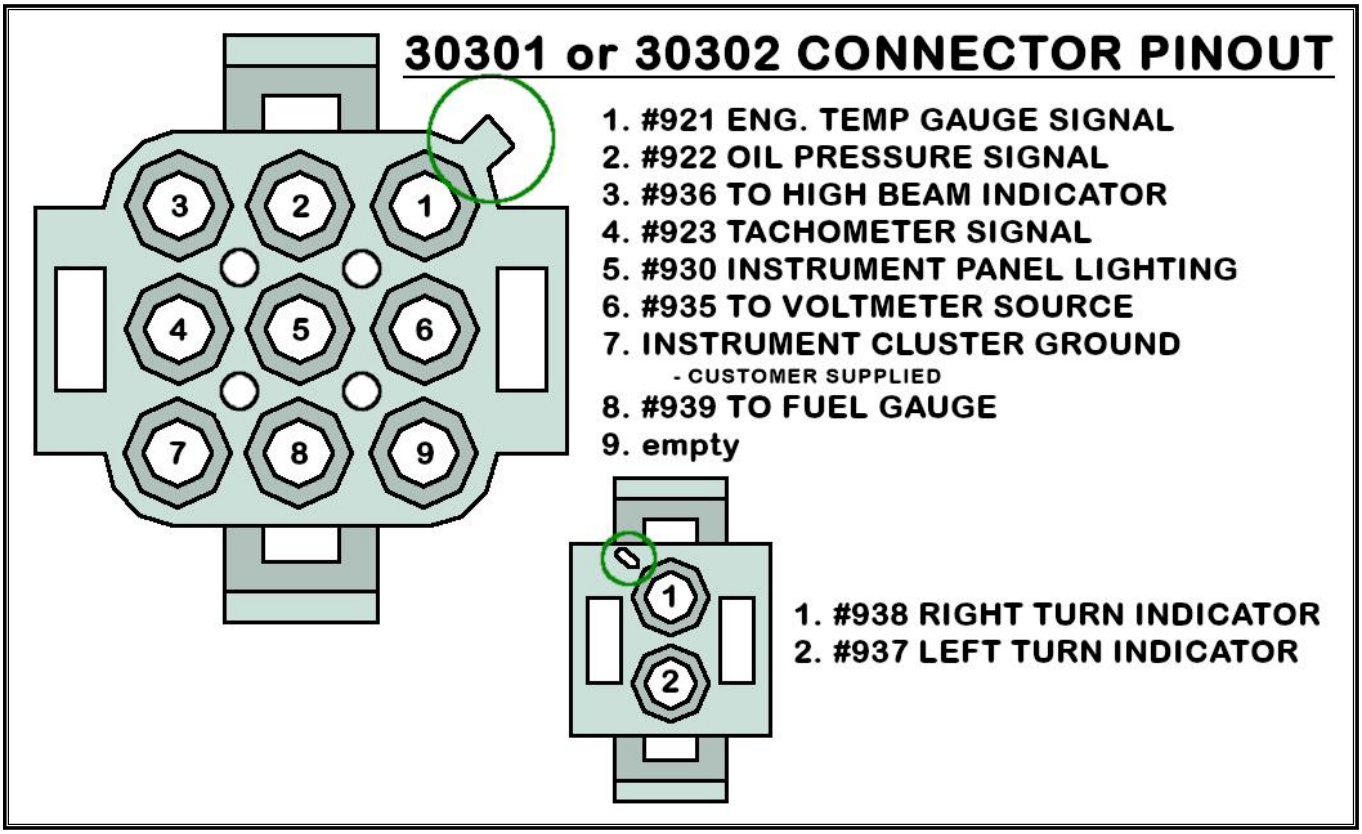
- Separate harness
- Hardwiring

SEPARATE HARNESS – PAINLESS #30301 & 30302

To facilitate wiring individual aftermarket gauges Painless offers, and recommends, the use of **Painless part #30301 (#30302** if using an electric speedometer). This is a universal gauge cluster harness that has all the splicing and termination pre-installed for these types of applications. This harness also offers you the benefit of having an inline connector instead of hardwiring the chassis harness directly to the gauges.



- Using the terminals and connector found in the **#30301** or **#30302** kits, install the wires of the Painless chassis harness according to the diagram below. Use the circled keyways as a reference point in the diagram for the proper wire cavity location.

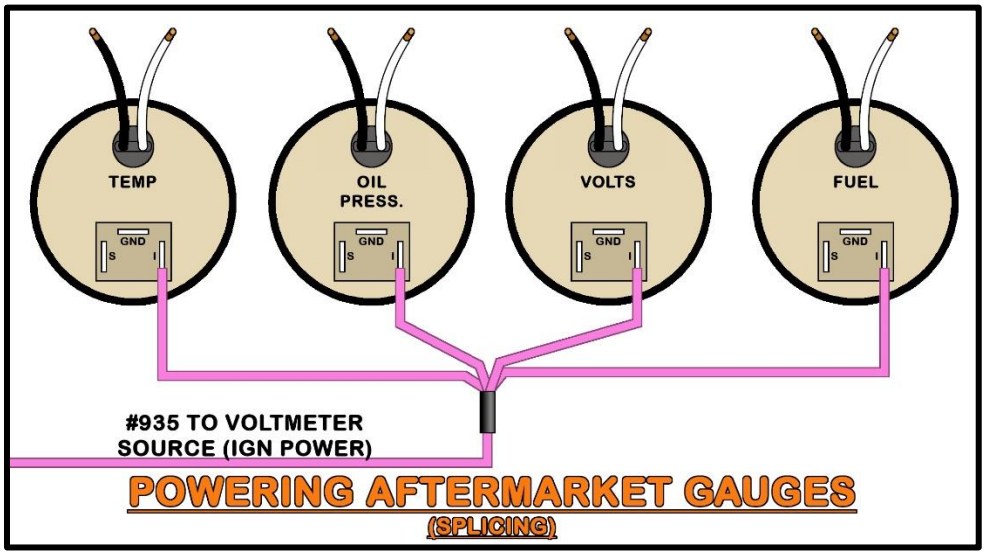


HARDWIRING:

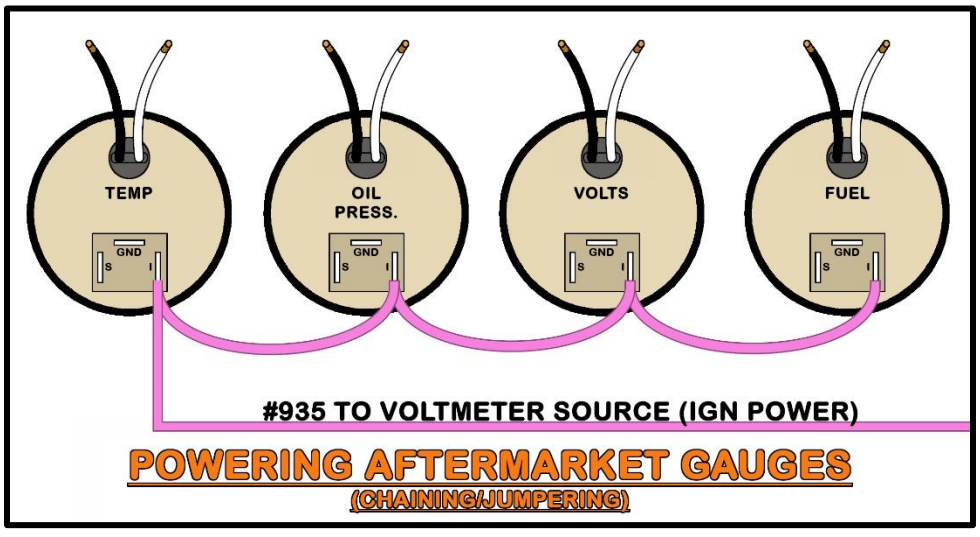
For those who choose to wire aftermarket gauges with just the wires found in the Painless chassis harness, and not purchase an additional gauge harness, the following steps will walk you through the process of distributing power and ground as well as connecting the sender wires. The following diagrams only show temp, oil pressure, volt, and fuel level gauges. Power, ground, and sender wires connect in the same manner to speedometers and tachometers.

Power to the gauges comes from the PINK **#935** wire, and it needs to be connected to the "I" or "12v" post on each gauge. The power wire can be connected in one of two ways:

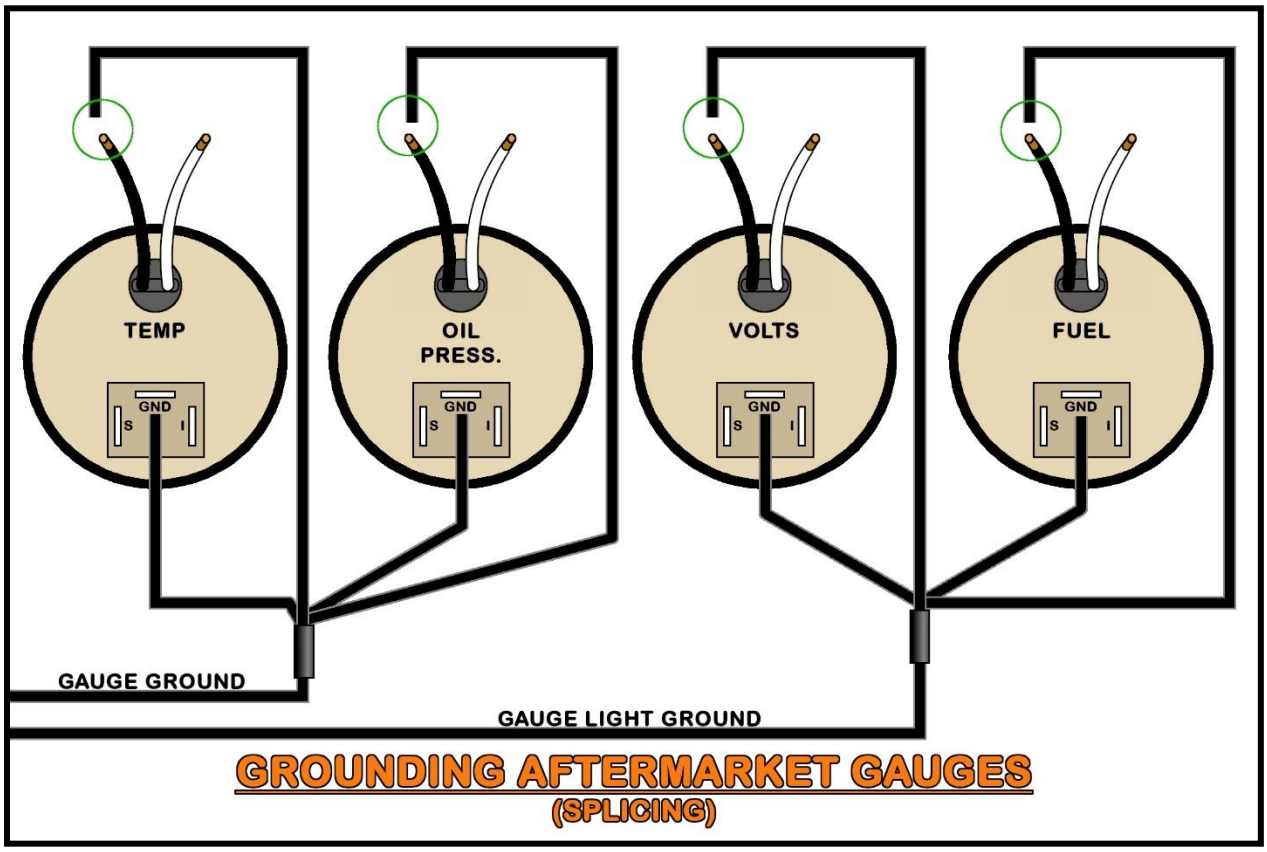
#1) Splicing- This is when you connect multiple wires to a single wire to distribute power/ground to multiple components. In this case, splices on the PINK **#935** wire are running wires to several gauges to provide power to each gauge.

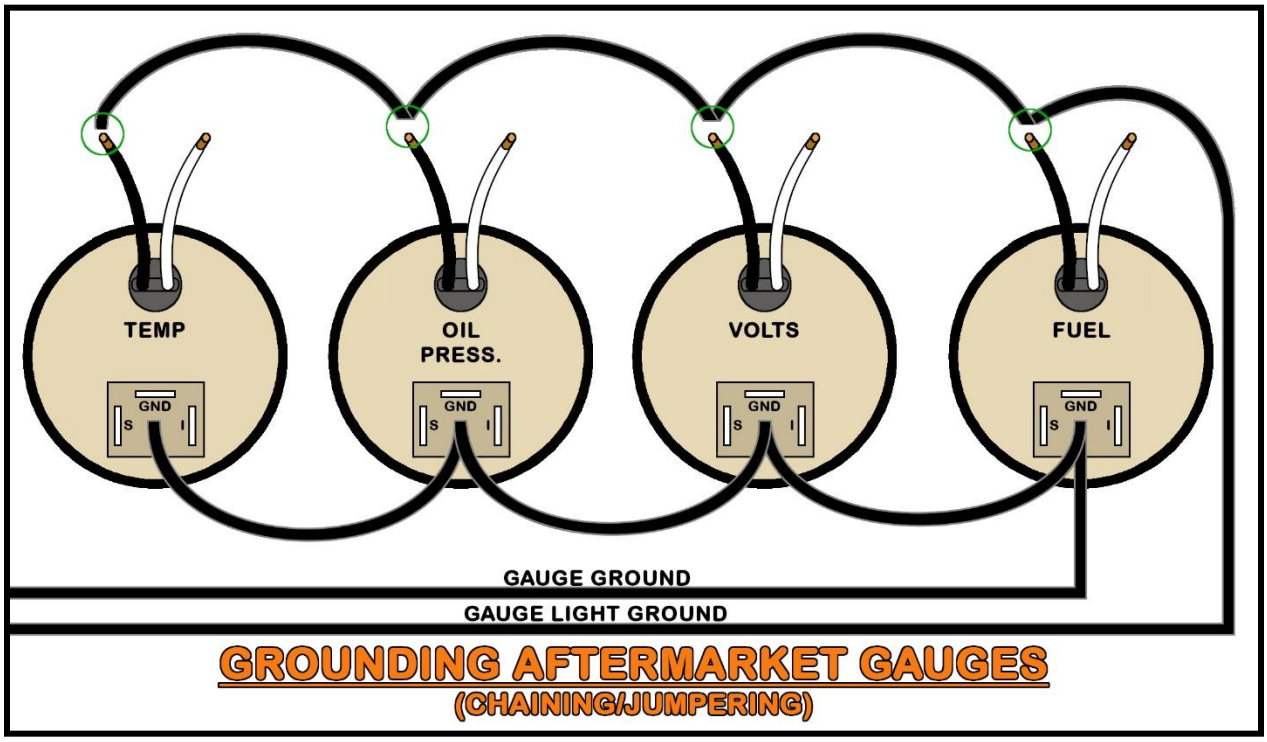


#2) Chaining or Jumpering- Run the PINK **#935** wire to a power post. Before terminating the wire with the proper terminal, insert another wire into the terminal and crimp. You now have 2 wires in 1 terminal. This additional wire then routes to the next gauge's power post. Before terminating that wire with the proper terminal, insert another wire into the terminal; and so on.

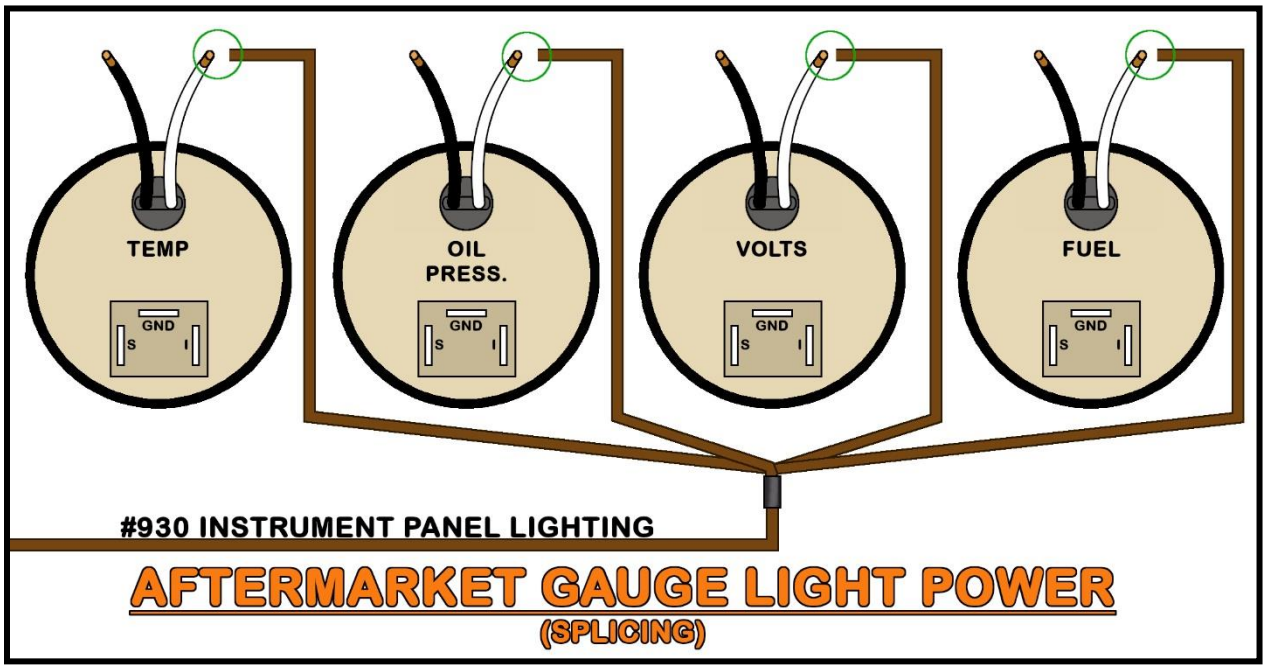


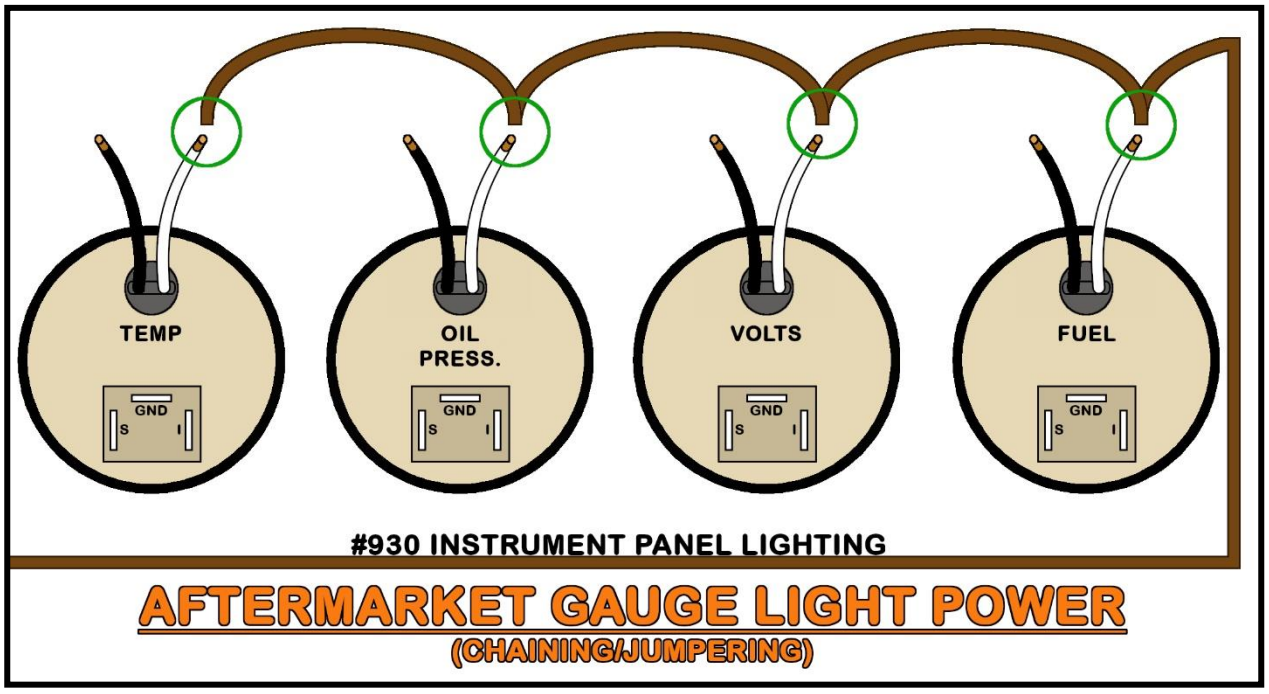
Grounds need to be supplied to the gauge lights and any ground tab on the gauges. The installer needs to run their own ground circuit for gauge connections. To make these ground connections you can splice from the installer provided ground wires to all the gauges or chain/jumper it all together. Both methods can be seen in the following two drawings:



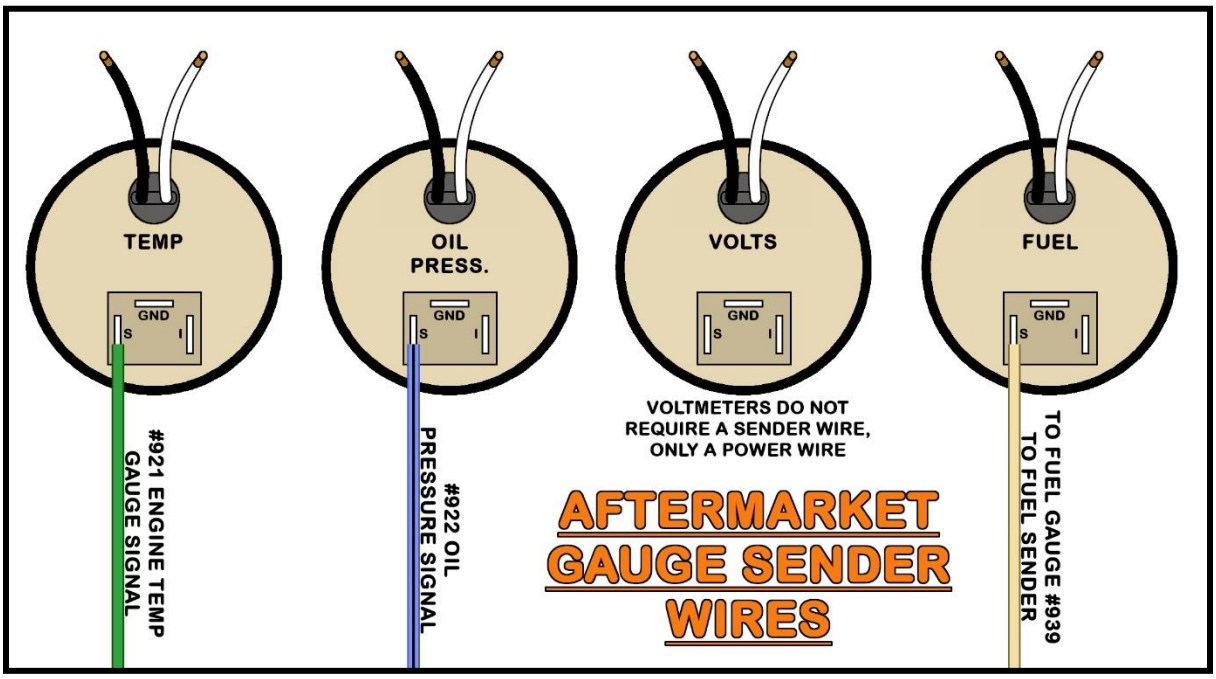


Gauge light power is supported by the **BROWN #930** wire. This wire connects to one of the leads for the gauge light or the gauge light tab found on gauges with LED backlighting. To make these connections you can splice from this **BROWN #930** wire to all the gauges or chain/jumper it all together.

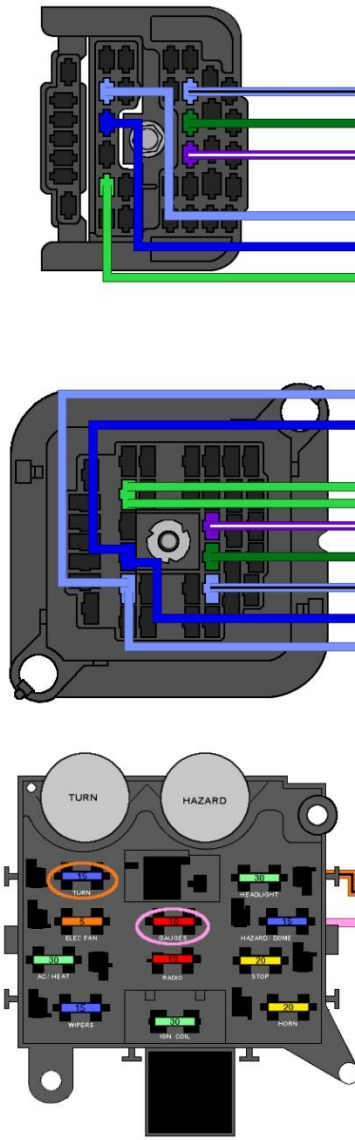




The last connections that need to be made are the sending unit wires or signal wires. These are the wires which come from the temperature sending unit, oil pressure sending unit, and fuel level sending unit. Not shown in the diagram, but also provided in the Painless chassis harness is the **PURPLE/WHITE #923 TACHOMETER SIGNAL** wire.



INSTRUMENT PANEL SCHEMATIC



#922 TO OIL PRESSURE SENDER
#921 TO TEMP SENDER
#923 TACHOMETER SOURCE/COIL -

see ENGINE SCHEMATIC

#926 TO LEFT FRONT TURN SIGNAL
#925 TO RIGHT FRONT TURN SIGNAL

see HEADLIGHT SECTION SCHEMATICS

#926 TURN SWITCH - (LEFT FRONT)
#925 TURN SWITCH - (RIGHT FRONT)

see TURN SIGNAL SWITCH & BRAKE SWITCH SCHEMATIC

#908 HIGH BEAM

see HEADLIGHT SWITCH & DIMMER SWITCH SCHEMATIC

#930 INSTRUMENT PANEL LIGHTING
#936 TO HIGH BEAM INDICATOR
#923 TACHOMETER SIGNAL
#921 ENGINE TEMP GAUGE SIGNAL
#922 OIL PRESSURE SIGNAL
#938 TO RIGHT TURN INDICATOR
#937 TO LEFT TURN INDICATOR
#955 TO ACCESSORY (IGN POWER)
#935 TO VOLTMETER SOURCE (IGN POWER)

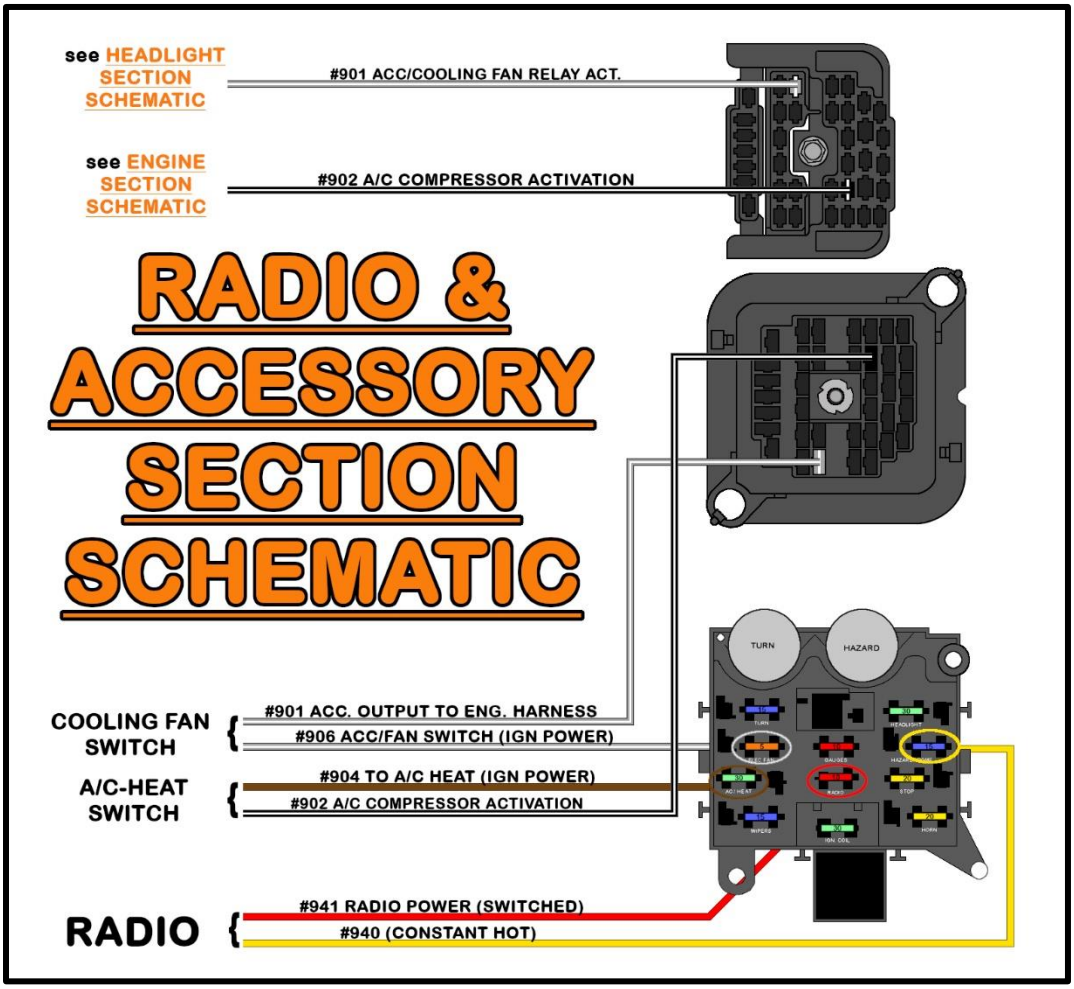
INSTRUMENT PANEL

TO FUEL GAUGE #939 TO FUEL SENDER

see TAIL SECTION SCHEMATICS

RADIO & ACCESSORIES

This Painless harness includes provisions for several accessory components that may or may not be used on your install. These accessory wires include wiper power, which should have already been connected. Below, you will find information about each of these accessories and the wires provided in this harness to connect them.



RADIO

The radio connection on the Painless harness is not GM color-coded. This means the two power wire colors used by Painless reflect the colors most aftermarket companies use on radios/head units manufactured today. The Painless harness includes two wires dedicated to a connection to the radio. They are:

YELLOW: 18-gauge wire, printed **[RADIO SECTION] #940 (CONSTANT HOT)**, this wire provides the radio a battery power source that allows the time and radio presets to remain every time the ignition is turned off. This wire comes from the 15-amp HAZARD/DOME fuse and can be seen in the *Radio & Accessory Schematic* above.

RED: 18-gauge wire, printed **[RADIO SECTION] #941 RADIO POWER (SWITCHED),** this wire provides the radio with ignition-switched power for operation. This wire has power when the ignition switch is in the ACCESSORY and ON/RUN positions. This wire comes from the 10-amp RADIO fuse of the fuse block and can be seen in the *Radio & Accessory Schematic* above.

If you are wanting to wire in a radio dim/backlight, then you will need to splice into the **BROWN #930 INSTRUMENT PANEL LIGHTING** wire. This wire will provide a power signal to the radio to dim the backlighting/display during low light conditions. On older radios, this power source will illuminate the backlighting. This wire will have power anytime the headlight switch is in the Park/Taillights ON or Headlights ON position. This wire/splice can be seen in the *Headlight Switch & Dimmer Switch Schematic* on **page 81**.

- If you are using an aftermarket radio, refer to the manufacturer's installation guide for proper connection. Splices and quick-disconnect terminals have been provided in the parts kit.

- If you are using a factory radio, a factory schematic for the vehicle it came out of will be needed to identify the connections to the radio.

Many older radios require one power source, Painless recommends connecting the **RED #941** to the radio in these circumstances so that the radio will only operate when the ignition switch is in the ACCESSORY or ON/RUN position. This will prevent the radio from draining the battery if it is accidentally left on.

- You must supply a ground for the radio.

ACCESSORY SECTION

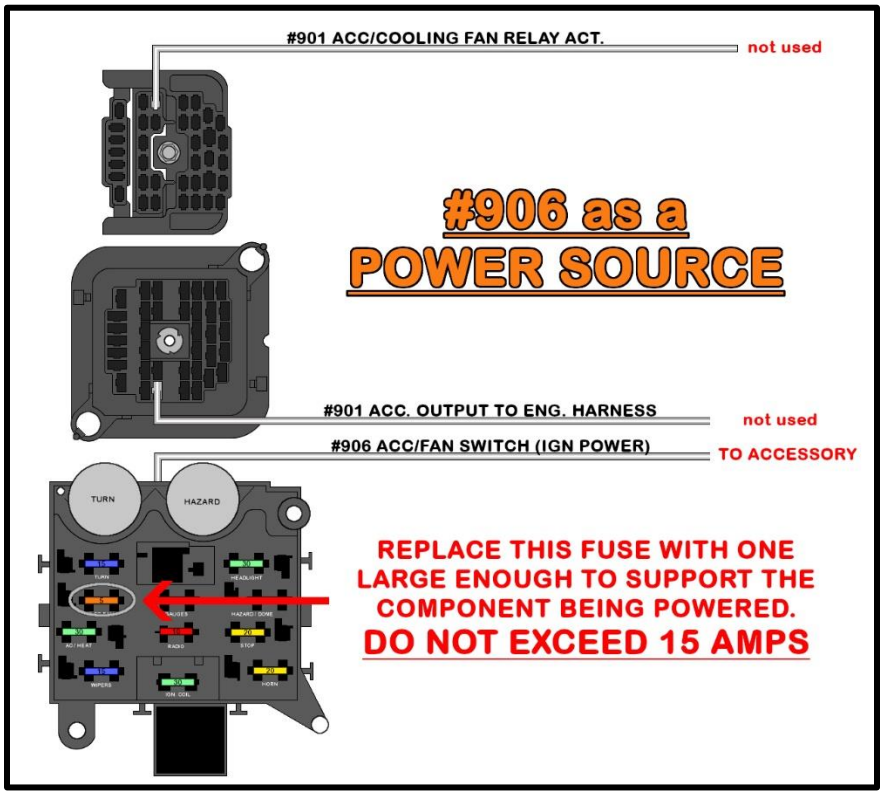
The **Accessory Section** of the Painless harness consists of 4 wires for various accessory applications. Locations of all these components vary from vehicle to vehicle, so no specific routing instructions can be given.

Accessory Power (Ign.)

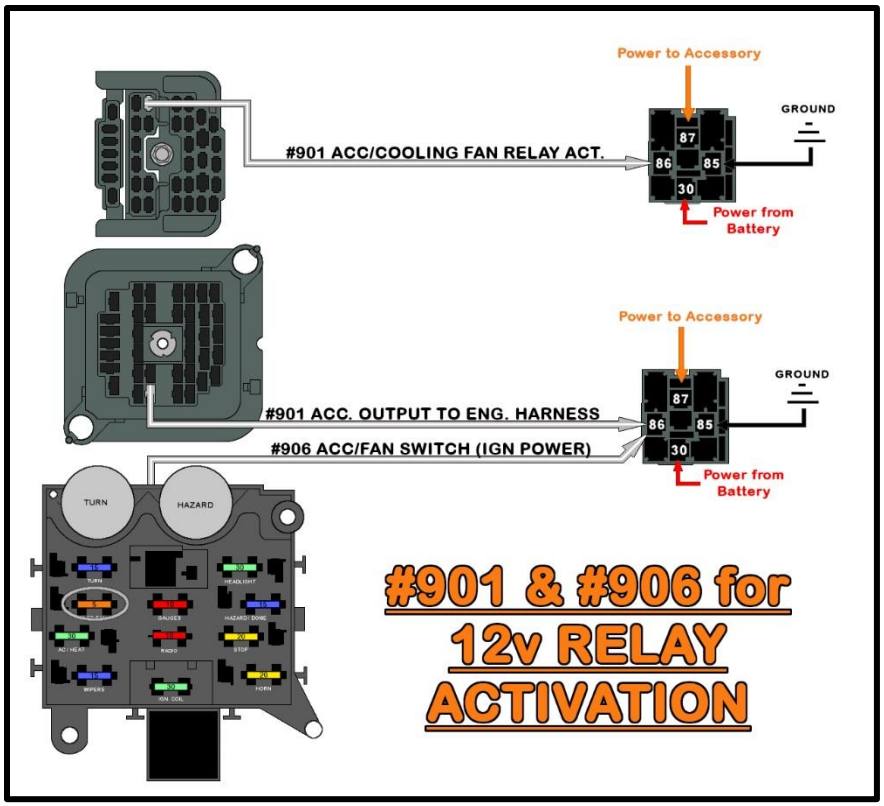
GREY/WHITE: 18-gauge wire, printed **[ACC. SECTION] #906 ACC/FAN SWITCH (IGN POWER)**, this wire provides a switched, ignition power source for an accessory not exceeding 15 amps. This wire is fused with a 5-amp fuse from Painless and must be replaced if powering an accessory with this wire. In most cases, this wire is used to provide a cooling fan relay a switched 12v source activation. **DO NOT POWER A COOLING FAN DIRECTLY WITH THIS WIRE.** If the **#906** wire will be used to power some other accessory, re-route the **#906** in the harness to wherever the accessory is located.

GREY/WHITE: 18-gauge wire, printed **[ACC. SECTION] #901 ACC. OUTPUT TO ENG. HARNESS**; this wire will only have power if it is connected to the **GREY/WHITE #906** wire. This wire can be used for the activation of the relay only and **MUST NOT** be used to directly power a cooling fan.

The following pages will show and describe the multiple ways these two wires can be utilized with your install. Pay attention to notes and instances that will require the fuse in the fuse block to be changed.

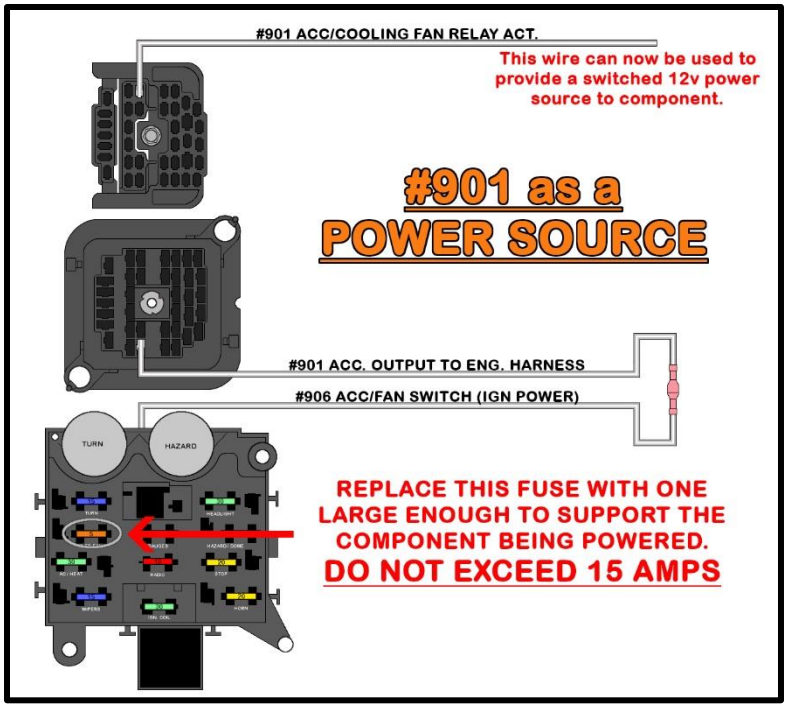


Wire #**906** can be used to power an accessory inside the vehicle. This could be anything from additional gauges, a USB port, a wideband O2 controller, rear-mounted fuel pump relay, etc. If powering an accessory, make sure to replace the 5-amp fuse in the fuse block on the circuit labeled “ELECTRIC FAN”.

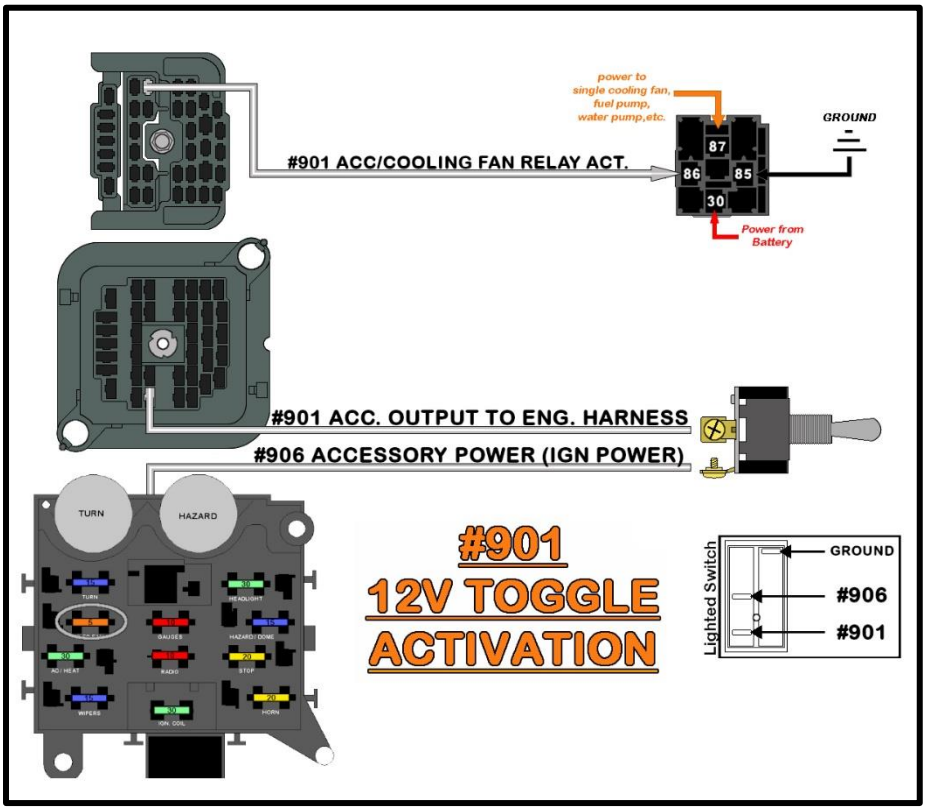


If you need to power an accessory in the car, but also need relay activation in the engine compartment, simply double the #**901** and #**906** wire together as shown here.

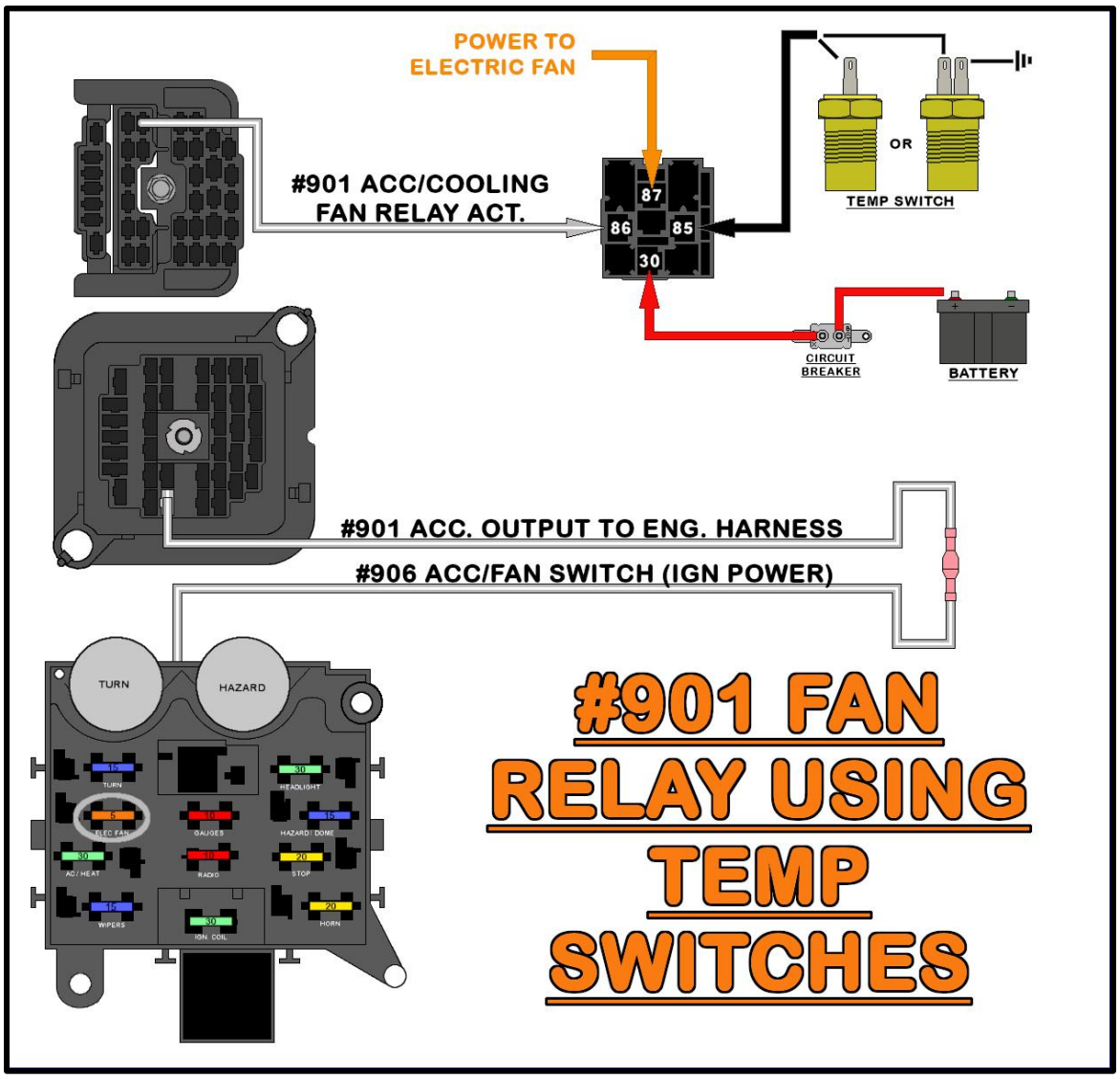
To provide power to an accessory in the engine compartment, connect the #**901** and #**906** wires. This can be accomplished by splicing the two wires together, using male and female insulated terminals, or double up at a connection as shown on the previous page. If powering an accessory, make sure to replace the 5-amp fuse in the fuse block on the circuit labeled “ELECTRIC FAN”. The diagram to the right shows wiring a relay that will activate any time the ignition switch is in the “ON/RUN” position.



If a rocker or toggle switch is desired to control an accessory or accessory relay, #**906** and #**901** will need to be wired to the switch. A ground wire will be to be added for those using a switch with backlighting



The diagram below depicts the most common way **#906** and **#901** will be used; **#906** and **#901** connected, with **#901** in the engine compartment providing 12v to a fan relay. The relay is then ground activated using a temperature switch installed on the engine. **Painless offers numerous Fan Relay Kits, part #30100 thru #30130**.



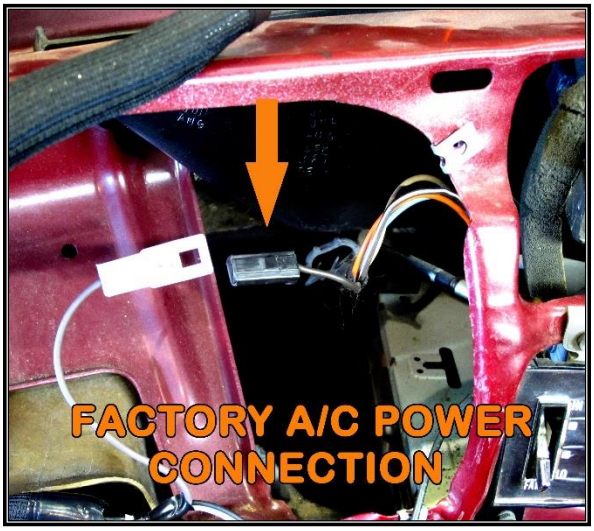
A/C – Heat System

BROWN: 14-gauge wire, printed, **[ACC. SECTION] #904 TO A/C HEAT (IGN POWER)**, this wire provides a switched ignition power source for a factory or aftermarket A/C system and comes from the 30-amp AC/HEAT fuse.

BLACK/WHITE: 14-gauge wire, printed **[ACC. SECTION] #902 A/C COMPRESSOR ACTIVATION**, this wire runs from the A/C Thermostatic switch to the binary or trinary safety switch and then on to provide power to the A/C compressor clutch.

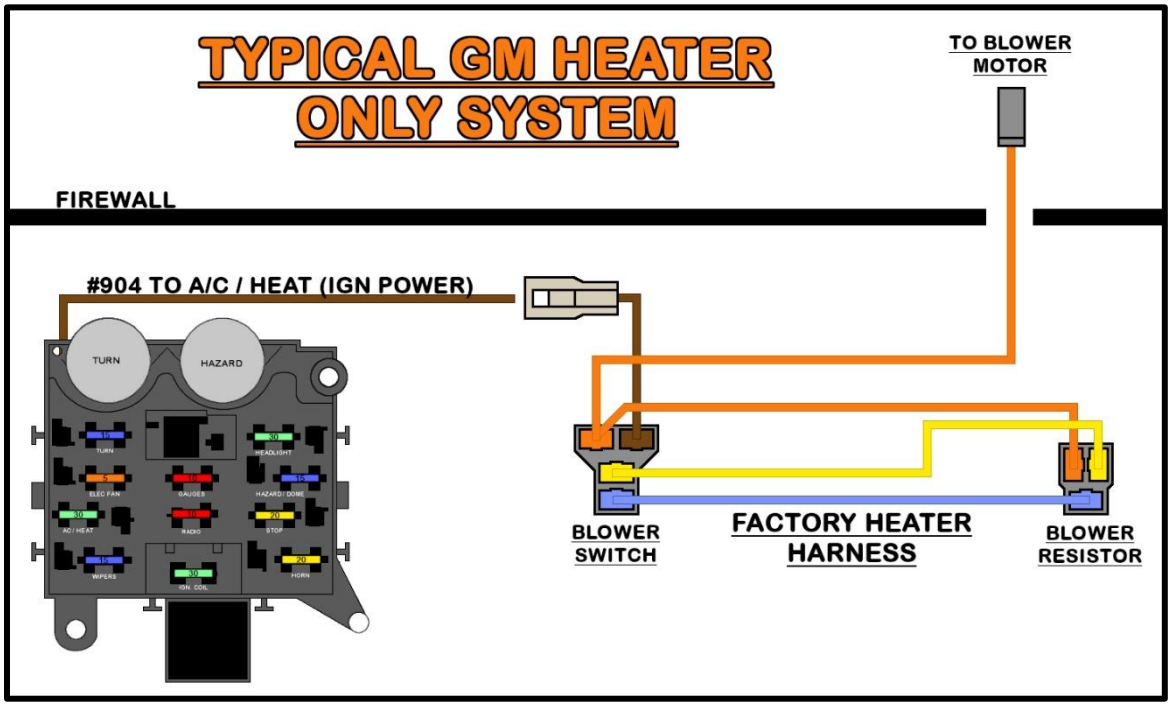
Factory Heater or A/C Harness

This harness does not include any wiring for the factory heat or air conditioning or wiring to the blower motor and blower motor resistor; your original harness or a reproduction of the original harness must be used. The Painless harness plugs directly into a factory/reproduction harness without any modifications.

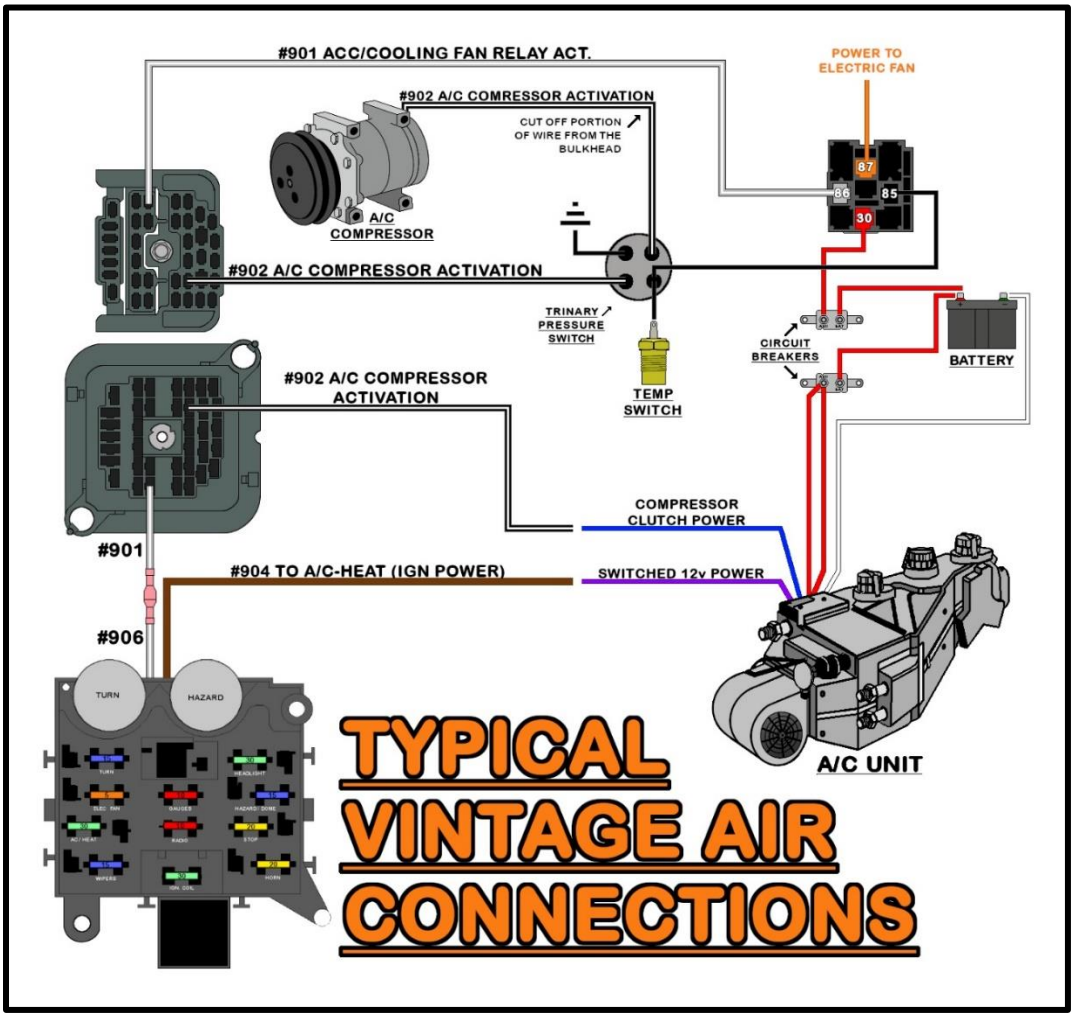


- Locate the inline connector on the factory heat or A/C harness, it will be a single-pin connector on a wire several inches away from the blower switch connection. This connector is the power feed to the factory harness. Connect the **BROWN #904** power wire to this wire on the air conditioning harness.

- Your factory A/C panel may have a backlight socket. To power this light, it will be necessary for the installer to splice into the **BROWN #930 INSTRUMENT PANEL LIGHTING** wire in the instrument panel section to provide this power source



Aftermarket A/C System



Your aftermarket system should come with all the wiring needed for proper operation. This wiring will need to be connected to power sources provided by the battery and the Painless harness. The following diagrams are labeled as “Vintage Air” and the wire colors are those used by Vintage Air. These same connections hold true for any aftermarket system, regardless of the manufacturer or the wire colors they use.

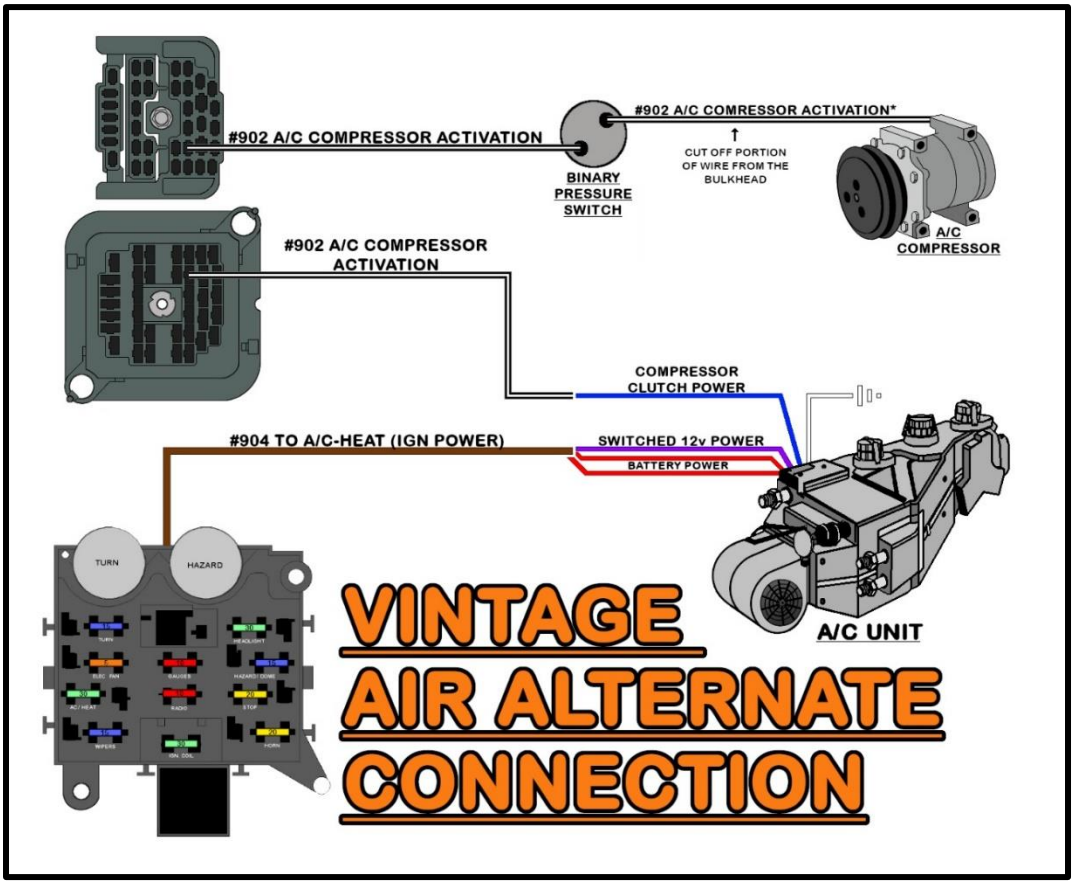
- **BROWN #904** will provide your system the switched 12v source it will need to function. Connect this wire to the wire coming from your A/C unit requiring a switched ignition power source.

- Find the wire of the A/C – heater system that provides power to the A/C compressor clutch. Connect the **BLACK/WHITE #902** wire to this wire under the dash, or the output of the A/C thermostatic switch. The **#902** wire was already routed in the engine compartment; thus, eliminating the need to pass an additional wire through the firewall.

- Your A/C panel may have a backlight socket or there may be a wire to the control board of your A/C unit that requires power when the park lights are on to control the illumination of the panel. To power this light, it will be necessary for the installer to splice into the **BROWN #930 INSTRUMENT PANEL LIGHTING** wire in the instrument panel section to provide this power source.

Aftermarket A/C System-Alternate Connections

Most aftermarket A/C systems provide the installer with an inline circuit breaker between the battery 12v power source and the A/C unit. Many units do not require a battery source but connect to the battery simply due to the amperage demands of the unit and to not have installers overload an existing circuit on the chassis harness. To avoid running these wires to the battery, adding additional connections to the battery terminals, and having to mount a circuit breaker, use the following instructions and diagram.



- Locate the wire(s) from your A/C unit that are intended to be connected to the battery and remove the circuit breaker. These wires can connect to **BROWN #904**. Since the **#904** wire is coming from the 30-amp AC/HEAT fuse, the circuit breaker is no longer necessary.

  BROWN #904 can also provide the power source for the switched 12v source your unit needs. Meaning the battery power and switched power from your A/C unit can connect to one source.

- The ground wire from your A/C unit can connect to a clean chassis ground source under the dash. Take the time to thoroughly clean the grounding point as the A/C unit and blower motor will require a good clean ground.

PASSENGER COURTESY LIGHT SECTION

If you are using courtesy lights or door jamb switches, you should have made splices to the **Courtesy Light loops** on **pages 19 – 24**. This section covers how to connect the remaining wires of the splices you made earlier. The left/driver's side was installed on **pages 73 – 76**.

PASSENGER COURTESY LIGHT

- Locate the wires intended for the passenger courtesy light socket. Again, these wires should be coming from splices you created on **pages 19 – 24** with the **WHITE** **#961** and **ORANGE** **#945** loops.

- Route wires from the **WHITE** **#961** and **ORANGE** **#945** circuits to the passenger side courtesy light socket.

- Use insulated splices from the parts kit to connect the **WHITE** **#961** and **ORANGE** **#945** wires to the wires of the socket.

- If you are installing door jamb switches, the **WHITE** **#961** wire can be doubled up at the light and the excess routed to the door jamb switch. This will prevent you from having to create additional splices to the loop wires. See the *Courtesy Light Schematics* on **page 74** for reference.

- **Those with Ford vehicles** will only need to connect the **WHITE** **#961** to the courtesy light socket.

GLOVEBOX SWITCH

The glove box switch is a simple, plunger activated light that illuminates the inside of the glove box when the glove box door is opened. The glove box switch requires a single power wire to function correctly, as it grounds through its mounting.

Factory Switch: The factory wire for the switch has a single terminal installed into the side of the switch. This wire can be difficult to remove, and, chances are, you will break the switch trying to remove it. Painless recommends cutting the wire going to the switch and installing an insulated splice or reusing the factory connector, as seen in the photo to the right.

- Locate the wire intended for glove box light. This wire should be coming from a splice you created on **pages 19 – 24** with the **ORANGE** **#945** loop.

- Route the **ORANGE** **#945** wire to the glove box switch and connect using one of the methods mentioned above.

- You can use the holes found in the edge of the glove box opening and small zip-ties, included with the kit, to help secure the wire.

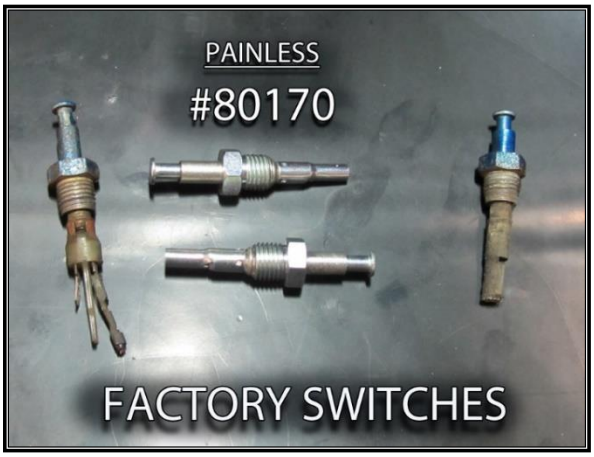
PASSENGER SIDE DOOR JAMB SWITCH

The passenger side door jamb switch is the last connection on the passenger side of the vehicle's interior.

The door jamb switches provide a ground activation for the courtesy lights and dome light. When the door is opened, the plunger on the switch extends out as it is no longer being pushed in by the door. When the plunger extends, the contact point on the back of the switch contacts the body of the switch, which is grounded through the mounting into the metal door jamb. This grounding gives the wire attached to the switch a ground source which will then cause the interior lights to turn on.

- Locate the wire intended for the passenger door jamb switch. This wire should be coming from a splice with the **WHITE #961** loop you created on **pages 19 – 24** or from the passenger courtesy light socket if you doubled the **WHITE #961** wire in the previous step.
- Route the **WHITE #961** wire to the passenger side door jamb switch and use an insulated terminal from the parts kit that fits your switch to connect it.
- If you find that your door jamb switch has 2 tabs, it does not matter which tab the **#961** connects to. The additional tab was for a key buzzer found on some vehicles. **Ford systems** will have 2-pin jamb switches, power in and power out. Connect a wire from the **ORANGE #945** circuit to the other tab.

If this is a new build/ restoration or your original switches are just in bad shape and new switches are needed, Painless offers factory style GM jamb switches as **part #80170**. Please note that **part #80170** is for one switch, and each door requires its own switch.



TAIL SECTION

The **Tail Section** wires are the last group to be connected. This group of wires connect to things like the right & left turn signals, taillights, reverse lights, license plate light, and fuel level sending unit. All the wires found in the **Tail Section** can be seen in the schematics found on **pages 127 & 128.**

- Route the wires with the print reading "TAIL SECTION" to the rear of the vehicle. Make sure to avoid pinch points around door/trunk hinges and moving parts like window regulators.

DOME LIGHT

The dome light has constant battery power applied to it. This light is ground activated by turning the headlight switch to the DOME LIGHT ON position. If you added the wires to the harness as instructed on **pages 19 – 24**, the door jamb switches will also ground activate the light. These wires can be seen in the *Tail Section Schematics* on **pages 127 & 128**, they are:

ORANGE: 18-gauge wire, printed **[TAIL SECTION] #945 TO DOME LIGHT (POWER B+)**, this power wire comes from the 15-amp HAZARD/DOME fuse on the fuse block; this fuse has battery power and is "hot" at all times.

WHITE: 18-gauge wire, printed **[HEADLIGHT SWITCH SECTION] TO DOME LIGHT GROUND << #961 >> TO DOME LIGHT [TAIL SECTION]**, this wire is the ground wire that activates the dome light. When this wire is grounded it completes the voltage path causing the light to illuminate. This ground will come from either door jamb switch and/or the headlight switch.

In most cases, these wires will attach to the factory dome light wires. The factory wires coming from the dome light can usually be seen in the trunk, on the driver's side, near the trunk hinge. Connect the Painless harness to the factory pigtail coming from the dome light.

- If you do not have a factory pigtail, there has been ample length supplied to allow routing of the **WHITE #961** and the **ORANGE #945** to the dome light fixture. In most cases, this will require the headliner of the vehicle to be removed. You will need new terminals, though, to connect to your existing dome light fixture.

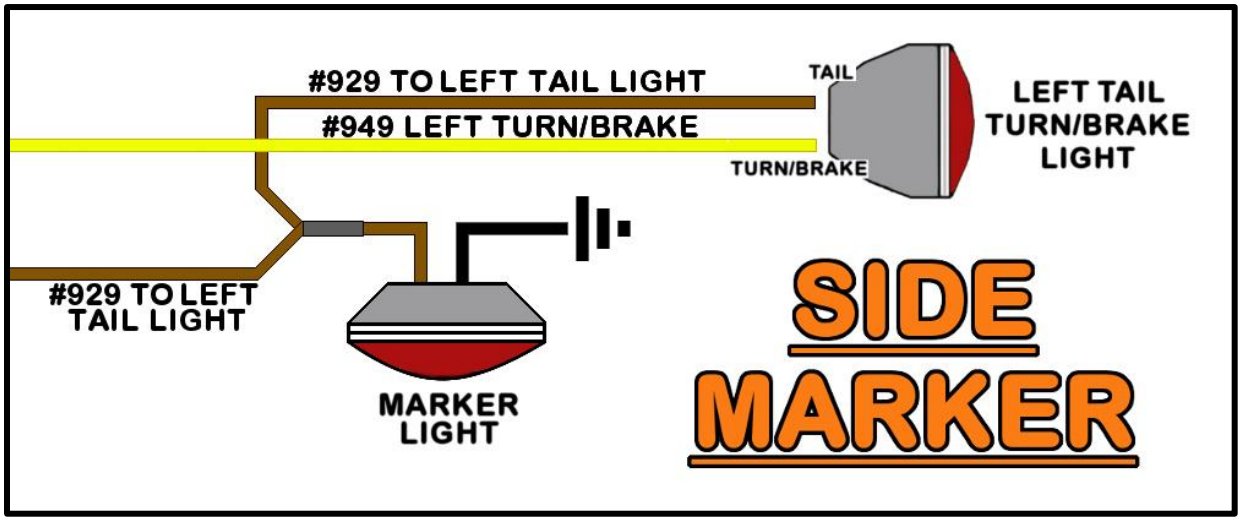
- **Those with Ford vehicles**: If you modified your courtesy/dome light circuits to be power activated on **page 22**, then your dome light connection will not require the **ORANGE #945** wire. As this wire is no longer being used for the dome light, it can power a trunk light, or you can pull it from the tail section and use the excess length to create your splices for the courtesy light sections.

LEFT SIDE MARKER LIGHT

The left side marker light is the next connection. The marker light is activated by a power source coming from the headlight switch. This light illuminates any time the headlight switch is in the *PARK* or *ON* position.

A single power wire is provided, it is:

BROWN: 16-gauge wire, printed **[TAIL SECTION] #929 TO LEFT TAILLIGHT**, this is a power wire for the park or marker light function. This wire has power anytime the headlight switch is in the Park/Taillights ON or Headlights ON position. This wire, along with all the other wires and splices it is associated with, can be seen in the *Tail Section Schematics* on **pages 127 & 128**.



- This wire also provides power to the left taillight. The marker light and the taillight will need to be wired together, as shown above.

- Route the taillight wire to the marker light and cut to length. Strip ¼" of wire from the **#929** wire and the piece of excess wire you just cut off. Your factory socket will need to be re-used, there are generally white molded ¼ turn sockets. Splice the **#929** wires to one the wires on the socket. It does not matter which wire goes where.

- The other wire on the socket will need to connect to a ground source. This can either be to the threaded stud used to mount the side marker light or an installer supplied ground wire.

LEFT TURN / BRAKE LIGHTS

Connection to the turn signal/brake lights depends on if your vehicle has integrated or separate turn/brake signals; both are explained on **page 86**.

To begin making connections to the turn/brake lights, locate the wires in the tail section dedicated to these functions, they are:

YELLOW: 16-gauge wire, printed **[TURN SIGNAL SECTION] << #949 TO LEFT TURN/BRAKE >> [TAIL SECTION]**, this wire provides power to the left turn signal. This wire has power anytime the turn signal is in the down/left position and the ignition switch is in the *ON/RUN* position. For vehicles with integrated turn/brake signals, this wire is also the brake light power. The wire has power anytime the brake pedal is pressed or anytime the hazard switch is activated. This wire can be seen in *Tail Section Schematics* on **pages 127 & 128**.

ORANGE: 18-gauge wire, printed **[TAIL SECTION] #950 TO BRAKE LIGHTS (SEPARATE LIGHTS ONLY)**, this wire provides power to the brake lights on vehicles with separate turn/brake lights, or a third brake light, and has power anytime the brake pedal is pressed or the hazard switch is activated. This wire can be seen in the *Tail Section Schematics* on **pages 127 & 128**.

Notice there is only one separate brake light wire going to the **Tail Section**. Since Painless has no idea if this wire will be needed in your particular application, and since it is not used in most applications, we only provide one wire to prevent additional unused power wires to be taped up in the harness. If separate turn brake sockets are used, it will be up to you to splice or link this brake light power to both brake lights.

If you have integrated turn/brake lights and no 3rd brake light, install an insulated terminal on this **ORANGE #950** wire and tape it up into the harness, this wire will not be used.

Your factory turn signal sockets must be re-used. Splice the Painless harness wires to the factory wires coming from your sockets.

- Loosely route the **YELLOW #949** turn signal wire to the turn signal. On integrated brake/ turn housings/assemblies with a dual filament bulb, this will be the brighter filament. If you have separate turn/brake lights this will connect to the socket with the yellow lens.

- If you have separate turn/brake lights, route the **ORANGE #950** brake light wire to the closest brake light as well. On housings/assemblies with a dual filament bulb, this will be the brighter filament.

- If your housing requires a ground source, installer supplied ground wires need to be connected at this time.

Cut the wires to length and connect to the appropriate contact/wire in the housings/assemblies. Consult the manufacturer's instructions if you are using aftermarket assemblies

LEFT TAILLIGHT

In most cases, your rear exterior lights have at least one housing/assembly with a dual filament bulb. The taillight connections attach to the dimmest filament(s) of this type of housing/assembly. 1 wire is provided in the tail section for these connections, it is:

BROWN: 16-gauge wires, printed **[TAIL SECTION] #929 TO LEFT TAILLIGHT**, this wire provides the taillight power. This wire receives power from the headlight switch and has power anytime the headlight switch is pulled into the PARK/TAILLIGHT ON and HEADLIGHT ON positions. This wire can be seen in the *Tail Section Schematics* on **pages 127 & 128**.

- Your factory taillight sockets must be re-used. You will need to splice the Painless harness wires to the factory wires coming from your sockets.

- Loosely route the **BROWN #929** taillight wire to the taillight. On housings/assemblies with a dual filament bulb, this will be the dimmer filament.

- Cut the wires to length and connect to the appropriate contact in the housings/assemblies. Consult the manufacturer's instructions if you are using aftermarket assemblies.

- . Splices are provided to make these connections.

REVERSE LIGHT

Two wires are provided in the **Tail Section** for reverse light connections, it is:

LT. GREEN: 16-gauge wires, printed **[TAIL SECTION] #956 TO LEFT REVERSE LIGHT**, this wire provides power to the left reverse or back up light. Power for this wire comes from the reverse switch and will have power anytime the shifter is in the "REVERSE" position with the ignition switch in the "ON/RUN" position.

- Your factory, reverse-light sockets must be re-used. You will need to splice the Painless harness wires to the factory wires coming from your sockets.

- Loosely route the **#956** reverse light wire to the reverse light.

- Cut the wires to length and connect them to the appropriate contact on the housings/assemblies. Consult the manufacturer's instructions if you are using aftermarket assemblies.

- If your vehicle does not have reverse lights, these wires will not be used. The wires only have power if they are connected to a reverse switch so there is no need to insulate the ends. The wires can also be removed from the harness if it is not being used.

FUEL SENDING UNIT

The fuel level sending unit sends a ground signal to the fuel level gauge. The float inside the tank moves up and down with the level of fuel in the tank. This raising and lowering of the fuel level moves an arm/contact across a resistor of the sending unit. This sends a resisted signal to the fuel level gauge. The amount of resistance the gauge sees is evident based on the reading of the gauge. For the fuel gauge to work properly, the fuel level sending unit operating range must match the gauges operating range. See the table below for the most common fuel level sender resistance.

MAKE	YEARS	Ohms Empty	Ohms Full
GMC	UP TO '64	0	30
GMC	'65 - '97	0	90
GMC	98 AND LATER	40	250
FORD	UP TO '87	73	10
FORD	'87 AND LATER	16	158
MOPAR	UP TO '86	73	10
TOYOTA/NISSAN	'85 AND LATER	90	0
VDO	-	10	180
STEWART-WARNER, CLASSIC INSTRUMENTS, & AUTOMETER	-	240	33

TAN: 18-gauge wire, printed **[INSTRUMENT PANEL SECTION] TO FUEL GAUGE << #939 >> TO FUEL SENDER [TAIL SECTION]**, this wire sends the ground signal from the fuel level sending unit to the fuel level gauge.

- Route the **TAN #939** wire to the fuel level sending unit.

*Note: **If a hole must be drilled in the trunk pan, be sure to not puncture the fuel tank**. Also, before a hole is drilled, make sure there is no other way to get the **#939** wire to the fuel sender.

- The parts kit provides insulated terminals to make this connection.

- The sending unit must be grounded to work properly; Painless does not offer a wire specifically for this. Some sending units have a tab for a ground connection while others may rely on the sending unit mounting. If your sending unit has a ground tab, run a wire from a clean chassis ground source to this tab.

If you do not have a ground tab, and the sending unit is bolted into the tank, run a ground wire from a clean chassis ground source to one of the mounting bolts of the sending unit.

For vehicles with sending units that mount with a lock ring, ensure the contact area of the ring and the tank are free of paint, dirt, and road grime. This is especially true with those doing an install on vehicles with new gas tanks as the tank may have paint or powder coat buildup.

LICENSE PLATE LIGHT

The plate light is the next connection that needs to be made. This light is tied to the rear marker lights and taillights and will illuminate the license plate when the headlight switch is in the park light “ON” or headlight “ON” positions.

BROWN: 18-gauge wires, printed **[TAIL SECTION] #929 TO PLATE LIGHT**, this is a power wire for the license plate light function. This wire has power anytime the headlight switch is in the park light ON or headlight ON positions. This wire, along with all the other wires and splice it is associated with, can be seen in the *Tail Section Schematics* on **pages 127 & 128**.

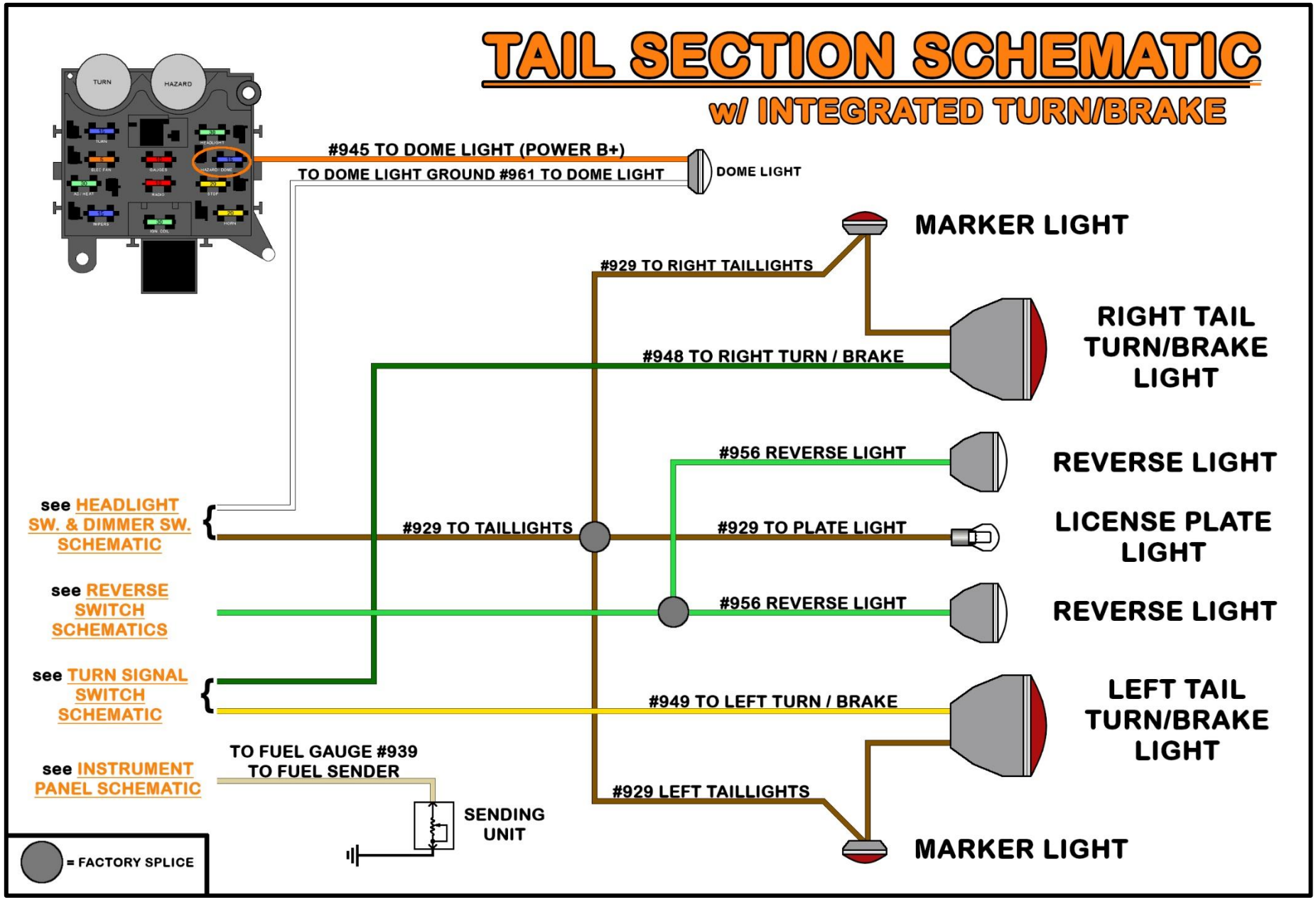
- In most cases, your license plate light will have a socket/bullet terminal connection. Insulated terminals have been provided in the parts kit to connect to these types of plate lights. You can cover the insulated terminal with heat shrink once connected to clean up the look of this connection since colored insulated terminals can often look out of place.

- Your factory light socket must be re-used. Splice the Painless harness wires to the factory wires coming from your socket.

RIGHT TAIL/ TURN/ BRAKE/ REVERSE/ MARKER LIGHTS

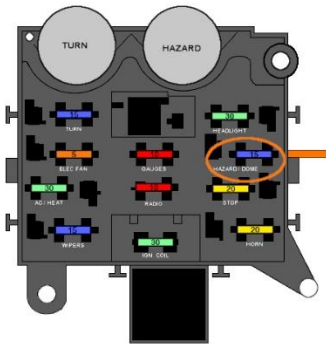
The connections mentioned above all connect in the same manner as those on the left/driver side. The only difference you will find is the turn signal wire for the right turn signal is a different color than the one used for the left turn signal. The right turn signal will be:

GREEN: 16-gauge wire, printed **[TURN SIGNAL SECTION] << #948 TO RIGHT TURN/BRAKE >> [TAIL SECTION],** this wire provides power to the right turn signal. This wire has power anytime the turn signal is in the up/right position and the ignition switch is in the *ON/RUN* position. For vehicles with integrated turn/brake signals, this wire is also the brake light power and has power anytime the brake pedal is pressed, or the hazard switch is activated. This wire can be seen in the *Tail Section Schematics* on **pages 127 & 128**.


TAIL SECTION SCHEMATIC
w/ INTEGRATED TURN/BRAKE
TURN
HAZARD
#945 TO DOME LIGHT (POWER B+)
TO DOME LIGHT GROUND #961 TO DOME LIGHT
DOME LIGHT
MARKER LIGHT
#929 TO RIGHT TAILLIGHTS
RIGHT TAIL TURN/BRAKE LIGHT
#948 TO RIGHT TURN / BRAKE
#956 REVERSE LIGHT
REVERSE LIGHT
see HEADLIGHT SW. & DIMMER SW. SCHEMATIC
#929 TO TAILLIGHTS
#929 TO PLATE LIGHT
LICENSE PLATE LIGHT
see REVERSE SWITCH SCHEMATICS
#956 REVERSE LIGHT
REVERSE LIGHT
see TURN SIGNAL SWITCH SCHEMATIC
#949 TO LEFT TURN / BRAKE
LEFT TAIL TURN/BRAKE LIGHT
see INSTRUMENT PANEL SCHEMATIC
TO FUEL GAUGE #939
TO FUEL SENDER
SENDING UNIT
#929 LEFT TAILLIGHTS
MARKER LIGHT
= FACTORY SPLICE

TAIL SECTION SCHEMATIC

w/ SEPERATE TURN/BRAKE



#945 TO DOME LIGHT (POWER B+)

TO DOME LIGHT GROUND #961 TO DOME LIGHT

DOME LIGHT

SENDING UNIT

TO FUEL GAUGE #939
TO FUEL SENDER

see INSTRUMENT PANEL SCHEMATIC

see HEADLIGHT SW. & DIMMER SW. SCHEMATIC

see REVERSE SWITCH SCHEMATICS

see TURN SIGNAL SWITCH SCHEMATIC

TO TURN SWITCH #918 TO BRAKE SWITCH

not used

#918 TO BRAKE SWITCH
(INTEGRATED LIGHTS ONLY)

= FACTORY SPLICE

MARKER LIGHT

#929 TO RIGHT TAILLIGHTS

TAIL/BRAKE LIGHT

#948 TO RIGHT TURN / BRAKE

RIGHT TURN SIGNAL

#956 REVERSE LIGHT

REVERSE LIGHT

#929 TO TAILLIGHTS

#929 TO PLATE LIGHT

LICENSE PLATE LIGHT

#956 REVERSE LIGHT

REVERSE LIGHT

#949 TO LEFT TURN / BRAKE

LEFT TURN SIGNAL

cutoff #950

#950 TO BRAKE LIGHTS

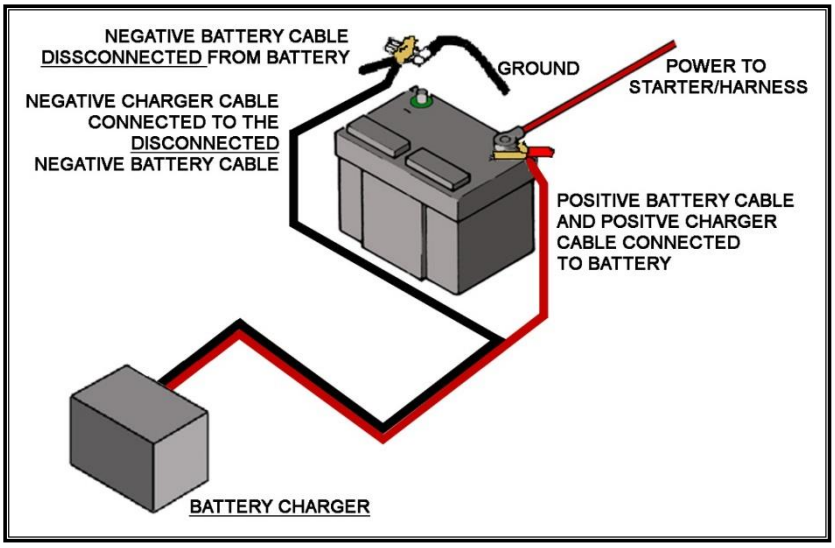
TAIL/BRAKE LIGHT

#929 LEFT TAILLIGHTS

MARKER LIGHT

TESTING THE SYSTEM

Use a small (10 amp or less) battery charger to power up the vehicle for the first time to test the circuits. If there is a problem anywhere, the battery charger's low amperage and internal circuit breaker will provide circuit protection.



- Make sure the negative (-) battery cable is connected to the frame or engine block, and make sure there is a ground between the engine and frame. **The negative battery cable should still be disconnected from the Battery**

- Connect the positive (+) battery cable to the positive side of the battery and make sure the other end of this cable is connected to the B+ side of the starter solenoid.

- At this point connect the **RED** **#915** from the MIDI fuse to the positive side of the battery, either through the starter lug or the battery lug.

- Connect the Battery Charger's NEGATIVE cable to the automobile chassis, engine block, or the disconnected Negative Battery cable. **Do NOT connect the Battery Charger's NEGATIVE cable to the Battery.**

- Connect the Battery Charger's POSITIVE cable to the automobile's positive battery terminal lug.

- INDIVIDUALLY turn on each light, ignition, wiper circuit, etc. and check for proper operation. Turn off each component before testing another.

Note: If you try to test more than one circuit at a time, the charger will not provide enough amperage for each circuit to work correctly.

- After all circuits have been checked, disconnect the battery charger and attach the vehicle's negative (ground) battery cable to the battery.

- Once testing is complete, re-install any panels, lens, or other parts that were removed during the harness installation. You are now finished installing this Painless Harness, congratulations!

WIRE INDEX

- The index is listed in the same order in which the manual instructed components to be connected.
- The **BLUE** descriptions indicate sections found throughout the harness.
- **ORIGIN** indicates where the opposite end of this wire is.

HEADLIGHT SECTION

Color	Gauge	Wire Print	Origin
Blue	18	#925 TO RIGHT FRONT TURN SIGNAL	Turn Switch
Light Blue	18	#926 TO LEFT FRONT TURN SIGNAL	Turn Switch
Tan	16	#909 TO HEADLIGHT LOW BEAM	Dimmer Switch
Tan	16	#909 TO HEADLIGHT LOW BEAM	Dimmer Switch
Brown	18	#927 TO FRONT PARK LIGHTS	Headlight Switch
Brown	18	#927 TO FRONT PARK LIGHTS	Headlight Switch
Light Green	16	#908 TO HEADLIGHT HIGH BEAM	Dimmer Switch
Light Green	16	#908 TO HEADLIGHT HIGH BEAM	Dimmer Switch
Green	14	#924 TO HORN	Horn Relay
Grey/White	18	#901 ACC/COOLING FAN RELAY ACT.	Acc. Switches

ENGINE SECTION

Color	Gauge	Wire Print	Origin
Pink	14	#920 TO COIL + (IGN. POWER)	Fuse Block
Green	18	#921 TO TEMP SENDER	Instrument Panel
Lt.Blue/Black	18	#922 TO OIL PRESSURE SENDER	Instrument Panel
Purple/White	18	#923 TACHOMETER SOURCE/COIL (-)	Instrument Panel
Red	18	#954 TO ELECTRIC CHOKE	Fuse Block
Black/White	14	#902 A/C COMPRESSOR ACTIVATION	A/C Heat Switch
Purple	12	#919 TO STARTER SOLENOID	NSS

WIPER MOTOR

Color	Gauge	Wire Print	Origin
Black	16	#979 LOW/PARK	Wiper Switch
Light Blue	16	#977 HIGH	Wiper Switch
Black/Yellow	16	#905 WIPER MOTOR POWER	Fuse Block
Black/Yellow	16	#983 WASHER PUMP POWER	Fuse Block
Blue	16	#984 WASHER PUMP ACTIVATION	Wiper Switch

START/CHARGE SECTION

Color	Gauge	Wire Print	Origin
White	14	#914 TO ALTERNATOR REGULATOR EXCITER	Fuse Block
Red	14	#995 ALT. REGULATOR POWER (BATTERY)	Fuse Block
Red	10	#916 TO MIDI FUSE	Fuse Block

DIMMER SWITCH SECTION

Color	Gauge	Wire Print	Origin
Light Green	14	#908 HIGH BEAM	Headlight Section
Tan	14	#909 LOW BEAM	Headlight Section
Blue/Yellow	14	TO DIMMER SWITCH #907 TO HEADLIGHT SWITCH	Headlight Switch

HEADLIGHT SWITCH SECTION

Color	Gauge	Wire Print	Origin
Red/Black	12	#928 TO HEADLIGHT SWITCH (POWER B+)	Fuse Block
Orange	14	#959 TO HEADLIGHT SWITCH (POWER B+)	Fuse Block
Blue/Yellow	14	TO DIMMER SWITCH #907 TO HEADLIGHT SWITCH	Dimmer Switch
Brown	18	#927 TO FRONT PARK LIGHTS	Headlight Section
Brown	18	#930 INSTRUMENT PANEL LIGHTING	Instrument Panel
Brown	14	#929 TO TAIL LIGHTS	Tail Section
White	18	TO DOME LIGHT GROUND #961 TO DOME LIGHT	Dome Light

WIPER SWITCH

Color	Gauge	Wire Print	Origin
Black	16	#979 LOW/PARK	Wiper Motor
Light Blue	16	#977 HIGH	Wiper Motor
Blue	16	#984 WASHER PUMP ACTIVATION	Wiper Motor
Orange/White	16	#905 TO WIPER SWITCH (POWER B+)	Wiper Motor

TURN SIGNAL SWITCH SECTION

Color	Gauge	Wire Print	Origin
White	14	#918 TO BRAKE SWITCH (INTEGRATED LIGHTS ONLY)	Brake Switch
Blue	18	#925 TURN SWITCH (RIGHT FRONT)	Headlight Section
Light Blue	18	#926 TURN SWITCH (LEFT FRONT)	Headlight Section
Green	16	#948 TO RIGHT TURN/BRAKE	Tail Section
Yellow	16	#949 TO LEFT TURN/BRAKE	Tail Section
Brown	16	#951 TO EMERGENCY FLASHER SW. B+	Fuse Block
Purple	16	#952 TO TURN SWITCH (TURN FLASHER)	Fuse Block
Black	18	#953 TO HORN SWITCH	Fuse Block

IGNITION SWITCH

Color	Gauge	Wire Print	Origin
Red	12	#934 TO IGNITION SWITCH (POWER B+)	Fuse Block
Red	12	#934 TO IGNITION SWITCH (POWER B+)	Fuse Block
Orange	12	#933 TO IGNITION SWITCH "IGN"	Fuse Block
Brown	12	#932 TO IGNITION SWITCH ACC	Fuse Block
Pink	14	#931 TO IGNITION SWITCH (COIL IGN)	Fuse Block
Purple	12	#919 TO STARTER SOLENOID	Starter/NSS

REVERSE SWITCH

Color	Gauge	Wire Print	Origin
Light Green	16	#958 BACK-UP SWITCH B+	Fuse Block
Light Green	16	#956 OUTPUT SIDE OF BACK-UP SWITCH	Tail Section

BRAKE SWITCH

Color	Gauge	Wire Print	Origin
Orange	14	#917 TO BRAKE SWITCH (POWER B+)	Fuse Block
White	16	#918 BRAKE SWITCH OUTPUT	Tail Section

INSTRUMENT PANEL SECTION

Color	Gauge	Wire Print	Origin
Blue	18	#938 TO RIGHT TURN INDICATOR	Turn Switch
Light Blue	18	#937 TO LEFT TURN INDICATOR	Turn Switch
Pink	18	#935 TO VOLTMETER SOURCE (IGN POWER)	Fuse Block
Green	18	#921 ENGINE TEMP GAUGE SIGNAL	Engine Section
Lt.Blue/Black	18	#922 OIL PRESSURE SIGNAL	Engine Section
Purple/White	18	#923 TACHOMETER SIGNAL	Engine Section
Tan	18	TO FUEL GAUGE #939 TO FUEL SENDER	Tail Section
Brown	18	#930 INSTRUMENT PANEL LIGHTING	Headlight Switch
Lt. Green	18	#936 TO HIGH BEAM INDICATOR	Dimmer Switch
Orange/Black	16	#955 TO ACCESSORY (IGN POWER)	Fuse Block

RADIO SECTION

Color	Gauge	Wire Print	Origin
Yellow	18	#940 (CONSTANT HOT)	Fuse Block
Red	18	#941 RADIO POWER (SWITCHED)	Fuse Block

ACCESSORY SECTION

Color	Gauge	Wire Print	Origin
Grey/White	18	#906 ACC/FAN SWITCH (IGN POWER)	Fuse Block
Brown	14	#904 TO A/C / HEAT (IGN POWER)	Fuse Block
Grey/White	18	#901 ACC. OUTPUT TO ENG. HARNESS	Engine Harness
Black/White	14	#902 A/C COMPRESSOR ACTIVATION	A/C Compressor

TAIL SECTION

Color	Gauge	Wire Print	Origin
Yellow	16	#949 TO LEFT TURN/BRAKE	Turn Switch
Green	16	#948 TO RIGHT TURN/BRAKE	Turn Switch
Brown	16	#929 TO LEFT TAIL LIGHTS	Headlight Switch
Brown	16	#929 TO RIGHT TAIL LIGHTS	Headlight Switch
Brown	16	#929 TO PLATE LIGHT	Headlight Switch
Orange	18	#950 TO BRAKE LIGHTS (SEPARATE LIGHTS ONLY)	Brake Switch
Light Green	18	#956 REVERSE LIGHT	Reverse Switch
Light Green	18	#956 REVERSE LIGHT	Reverse Switch
Tan	18	TO FUEL GAUGE << #939 >> TO FUEL SENDER	Instrument Panel
Orange	18	#945 TO DOME LIGHT (POWER B+)	Fuse Block
White	18	TO DOME LIGHT GROUND #961 TO DOME LIGHT	Headlight Switch

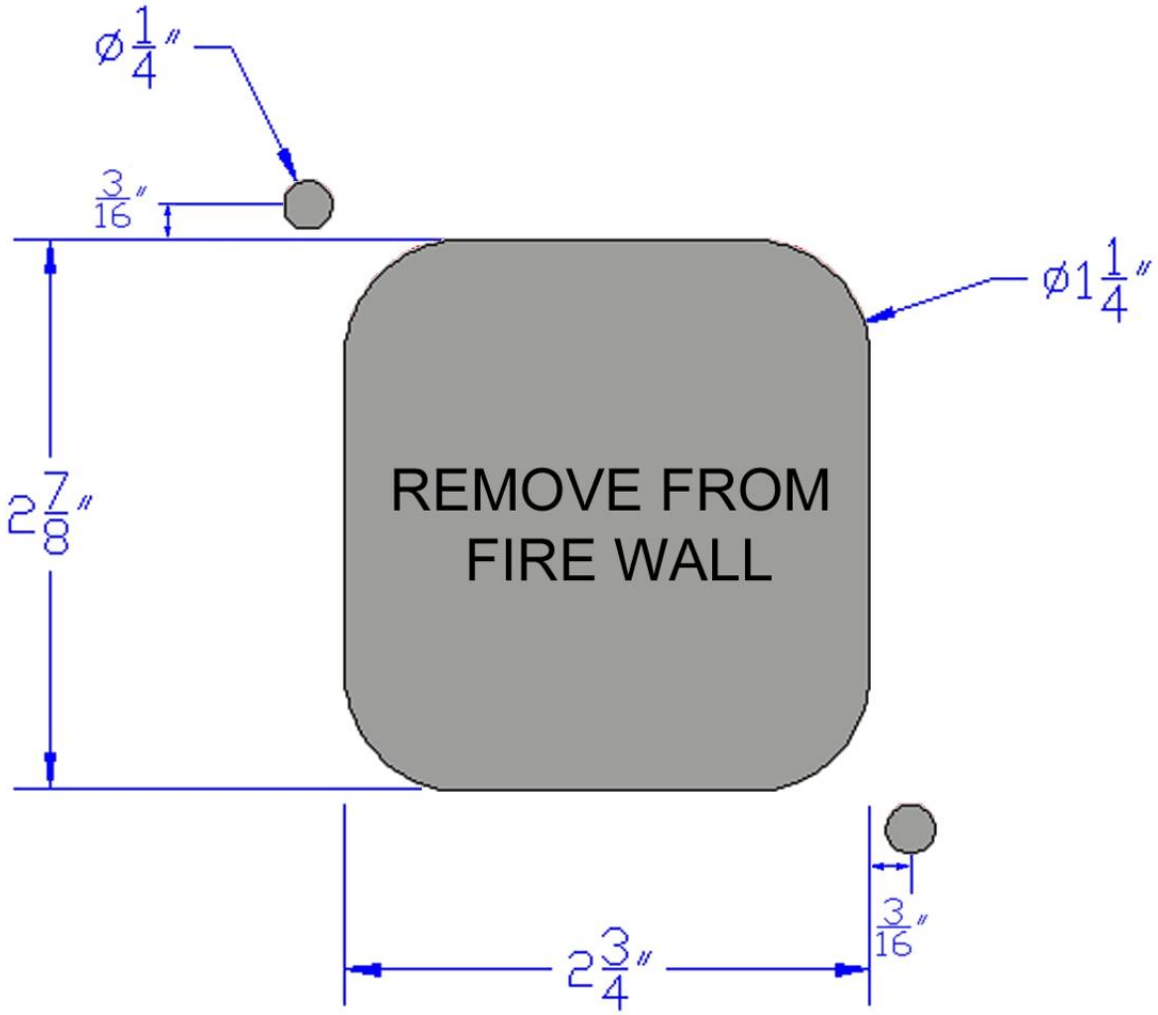
Painless Performance Products, LLC
Limited Warranty and Return Policy

Chassis harnesses, fuel injection harnesses, and Trail Rocker units are covered under a lifetime warranty.

All other products manufactured and/or sold by Painless Performance are warranted to the original purchaser to be free from defects in material and workmanship under normal use. Painless Performance will repair or replace defective products without charge during the first 12 months from the purchase date. No products will be considered for warranty without a copy of the purchase receipt showing the seller's name, address, and date of purchase. You must return the product to the dealer you purchased it from to initiate the warranty procedure.

Bulkhead Template for Vehicles with No Bulkhead Hole

The dimension photo below shows how you can cut the bulkhead hole clean and precise using a 1 ¼" hole saw to cut 4 holes, using a jigsaw or cut off wheel to connect the outsides of the 1 ¼" holes and using a ¼" drill bit for the fuse block mounting holes. Mark the centers of all 6 holes (the 1 ¼" holes as well as the ¼") holes before any cutting is done.



NOTE: This drawing MAY NOT be to scale, please double check your measurements with those on the drawing before any cutting or drilling.

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