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RESEARCH AND DEVELOPMENT, INC.

OPERATING & INSTALLATION INSTRUCTIONS

Comfort Start

DELUXE KEYLESS ENTRY & REMOTE STARTER
FOR AUTOMATIC TRANSMISSION VEHICLES ONLY

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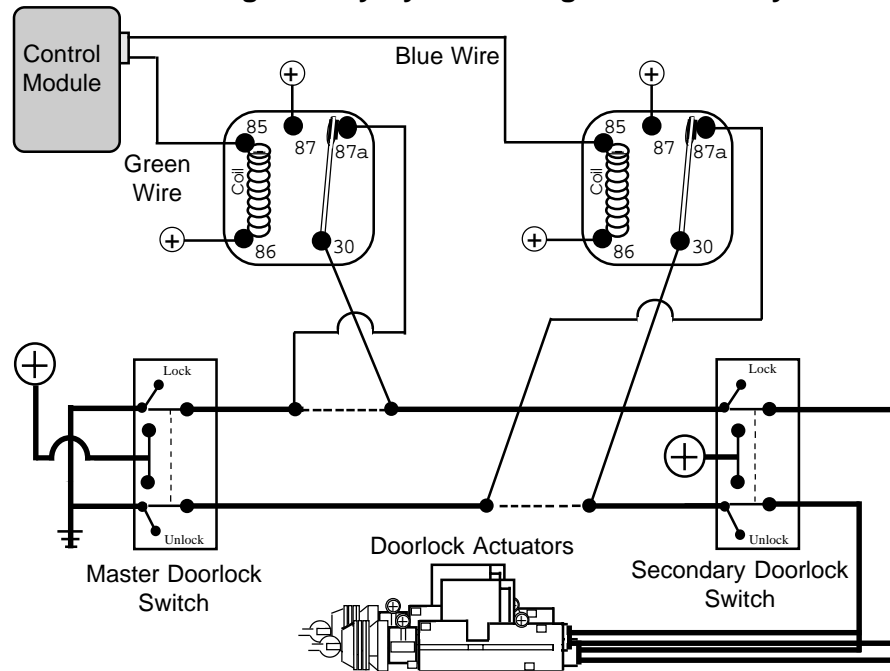
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Reversing Polarity System Using External Relays



5 Wire Reversing Polarity Systems

This power doorlock system differs from the negative and positive pulse systems in that there is no doorlock control unit or relays. In this type of system, the switches themselves supply the positive voltage directly to the doorlock actuators, and, more importantly, provide the return ground path. It is important to note that the lock and unlock wires in this system *actually rest at chassis ground*. This means that both the lock and unlock wires must be "opened", or cut, to make the proper connections.

Examine the wires on the back of the switch. (Normally 5 wires will be found)

- 1) One wire will show +12 Volts, regardless of the switch's position.
- 2) Two wires will be grounded regardless of the switch's position.
- 3) One wire will show +12 Volts only when the switch is pushed to "Lock".
- 4) One wire will show +12 Volts only when the switch is pushed to "Unlock".

- When the lock /unlock wires are found, they must be cut one at a time. If the correct wires are cut the door locking system should not operate from the primary switch.

- Notice that in the diagram the driver's switch is the primary or "Master" switch (in some vehicles, the primary switch is on the passenger's side). The half of the cut wires which come from this primary switch are referred to as the "Switch" side. The half of the cut wires which go to the secondary switch are referred to as the "Motor" side even though the cut is made between the switches.

Introduction & Safety Considerations

Congratulations on your purchase of the COMFORT START Keyless Entry and Remote Starter unit. The Comfort Start offers you the convenience of locking and unlocking your vehicle's doors with the press of a button, and the starting of your vehicle's engine from the comfort of your home or office, allowing your vehicle to warm up in winter and cool down in summer. The Comfort Start can also be optionally configured to remotely open your vehicle's trunk.

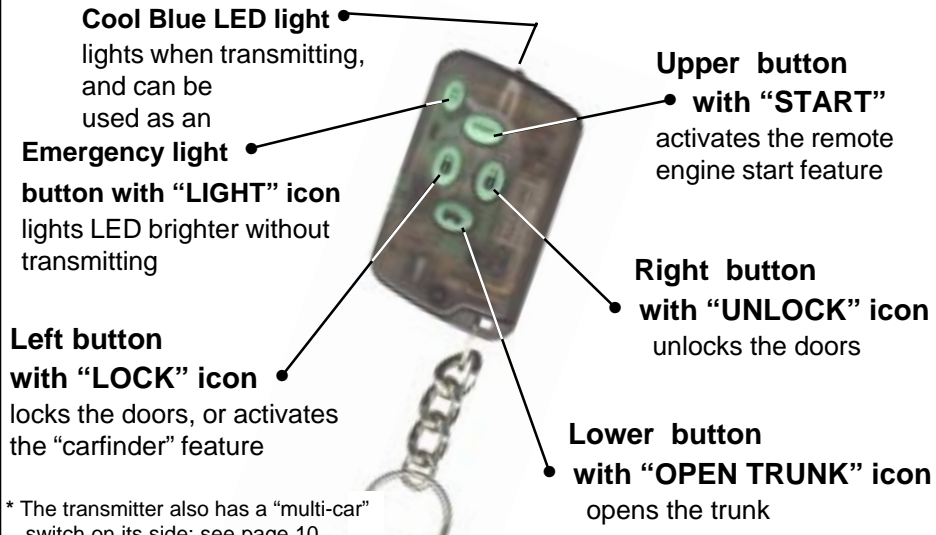
It is highly recommended that this system be professionally installed, as the complexity of the modern automobile and the nature of circuits to be accessed is often beyond the abilities of most do-it-yourselfers.

There are several important safety considerations with using and installing the Comfort Start keyless entry and remote starter. Among them are:

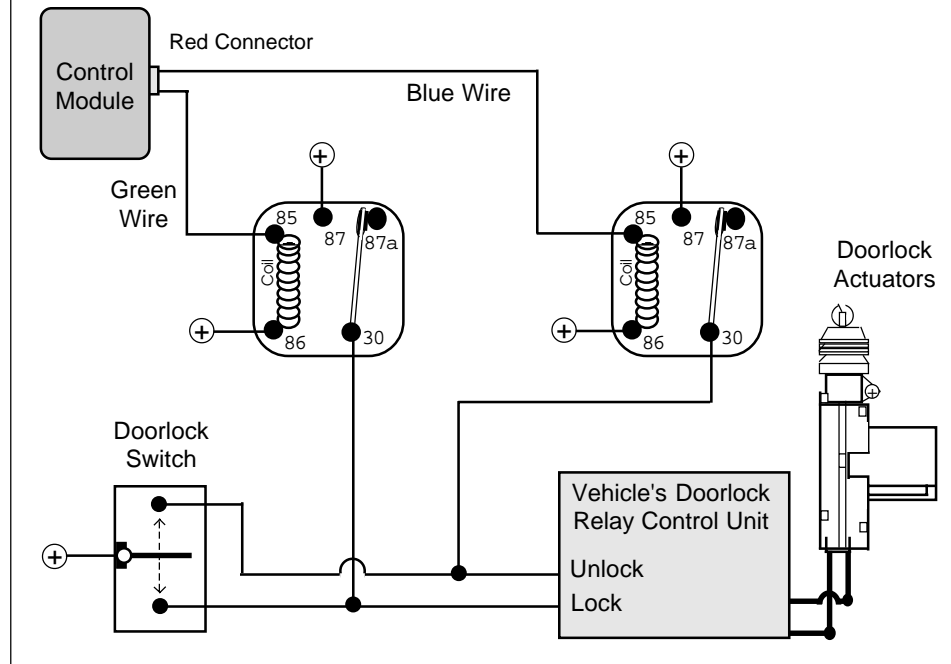
- This unit is for vehicles with an automatic transmission only. Installation in a vehicle equipped with a manual transmission can result in property damage or personal injury.
- This unit is for fuel injected gasoline or diesel engines.
- Children should not be left unattended in, or be allowed to play with the activating transmitters of any remote starter equipped vehicle.
- Do not use the remote starter feature in an enclosed garage or other structure.

Basic Transmitter Functions

The Comfort Start includes with two 5-button remote transmitters.* Please familiarize yourself with the control buttons, as shown here, and operations of the transmitters and Comfort Start system which are explained in the following pages.



Positive Pulse System Using External Relays



3 Wire Positive Pulse Systems

This doorlock system is similar to the 3 wire negative pulse system except the doorlock switches send +12 Volt pulses to operate the doorlock relays/control unit.

Examine the wires on the back of the doorlock switch:

- 1) One wire will show +12 Volts, regardless of the switch's position.
- 2) One wire will show +12 Volts only when the switch is pushed to "lock".
- 3) One wire will show +12 Volts only when the switch is pushed to "unlock".

Warning: The Positive pulse system can be confused with the 5-wire Reversing Polarity system. This is because both systems show +12 Volt pulses on the "Lock" and "Unlock" wires when the vehicle's switch is pressed respectively. It is critical to identify which system is present, since if +12 Volts is pulsed into a Reversing Polarity system, which rests at ground, a direct short circuit will occur.

3 main differences between a Positive pulse and a Reversing Polarity system:

- 1) In a Reversing system the Lock/Unlock wires *rest at ground*, while in a Positive system the wires *show partial ground* through the relay's coils.
- 2) The doorlock switch in a Reversing system will have 5 wires, while a Positive pulse system the switch will have 3 wires.
- 3) A *Positive pulse system uses factory relays or a control unit, a Reversing system does not.*

Locking & Unlocking the Doors

To Lock the Vehicle's Doors: Press & Release the left transmitter LOCK button



THE PARKING LIGHTS WILL FLASH ONCE



- The parking lights and Status Light will flash once to confirm and the doors will lock (optionally, the horn will chirp once).

To Unlock the Vehicle's Doors: Press & Release the right transmitter UNLOCK button



THE PARKING LIGHTS WILL FLASH TWICE



- The parking lights and Status Light will flash twice to confirm and the doors will unlock (optionally, the horn will chirp twice), then the parking lights stay on for 30 seconds.

Remote Starting

To Activate Remote Start: Press & Release the upper transmitter START button



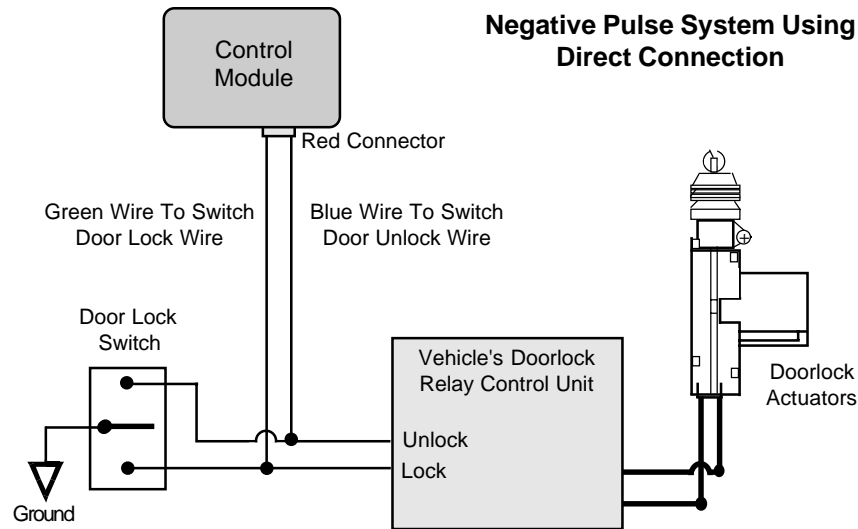
THE PARKING LIGHTS
WILL TURN ON, OFF, THE
ENGINE STARTS, THEN
THE PARKING LIGHTS
RESUME ILLUMINATION



- The parking lights will turn on and the status light will flash to confirm the starting process, and the horn will also chirp 3 times.
- The ignition circuit will turn on.
- Within a few seconds the parking lights will turn off and the starter will engage.
- The engine will start, run, and the starter will be disengaged.
- The parking lights will turn back on and remain on while the Comfort Start is controlling the engine. The status light will continue to flash slowly.
- If the engine stalls, the Comfort Start will make two attempts to restart it.

When you leave your vehicle, simply set the climate controls for what you desire to be operating upon remote start - heater, defroster or air conditioning.

operate the vehicle's on-board doorlocking relays. If the vehicle's Negative pulse doorlocking system requires more than 500mA Negative output, optional relays must be used.



This harness, which plugs into the White 3-pin port on the control module, is the power doorlock outputs which allow the Comfort Start system to operate the vehicle's existing power doorlock system. The vehicle must have existing power doorlocks; or, if it does not, power doorlocks may be added to the vehicle in the form of installing an Omega actuator to each of the doors, along with a doorlock interface. The doorlock interface needed to allow the system to operate the doorlocks will depend upon the type of power doorlocking system the vehicle is equipped with.

The following sections describe typical power doorlocking systems, which are categorized as "3 Wire Negative Pulse"; "3 Wire Positive Pulse", and "5 Wire Reversing Polarity" systems

3 Wire Negative Pulse Systems

This power doorlock system is simplest of all doorlocking systems. A Negative pulse system will have only three wires at the doorlock switch.

Examine the wires on the back of the doorlock switch:

- 1) One wire will show Ground, regardless of the switch's position.
- 2) One wire will show Ground only when the switch is pushed to "Lock".
- 3) One wire will show Ground only when the switch is pushed to "Unlock".

The lock & unlock wires coming out of the switch operate the vehicle's doorlock relays or a control unit with on-board relays, therefore the lock & unlock wires will read Positive voltage, up to +12 Volts, when the switch is at rest. The correct connection point is between the switches and the relays. The Red connector's Green and Blue wires can be connected directly to the vehicle's Negative pulse system since only a Negative pulse is required to

Upon entering the vehicle place the ignition key in the switch and turn it to the "On" position. **Do not turn the key to the "Start" position.**

Deactivation

- After the preset programmable time the Comfort Start will turn the engine off.
- To stop the engine by remote control, simply press the upper button again.
- Stepping on the brake pedal will turn the engine off.
- Opening the hood will turn the engine off. If the hood is open when an activation attempt is made, the Comfort Start will only flash the parking lights once, chirp the horn 3 times, but will not start the engine.
- Pressing the Valet Switch will also stop the engine.

Valet Mode

The Comfort Start may be placed into a "valet mode" which prevents the remote start feature from being activated. Valet Mode should always be used when you do not wish for remote starting to be operated, such as when you leave your vehicle with someone else. The Valet Switch, within the clear Receiver Unit, is used to engage the Valet Mode:

- At any time simply press the Valet Switch for 5 seconds; the Status Light within the Receiver Unit will light steady, to indicate Valet Mode, and stay illuminated continuously while the system is in Valet Mode.

Once the Comfort Start is in Valet Mode, an attempt to remote start will instead be acknowledged by 1 long and 3 short parking light flashes, but no starting attempt. If the horn is connected, it will sound and then chirp 3 times.

- To turn off Valet Mode, simply press the Valet Switch.

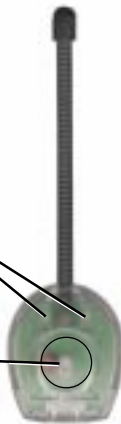
The Receiver Unit

An important part of the Comfort Start system is its Receiver Unit. As its name implies, the Receiver Unit contains the radio receiver needed for the system to operate from the hand-held transmitter. The Receiver Unit also contains the Valet Switch and Status Light; the operations of which are explained throughout this guide.

The Receiver Unit is designed for mounting directly on the vehicles' window glass, which also gives the system its best operating range. Should this not be possible or desired, the Receiver Unit may be mounted in a hidden location, and provisions are made for optional separately-mountable Valet Switch and Status Light.

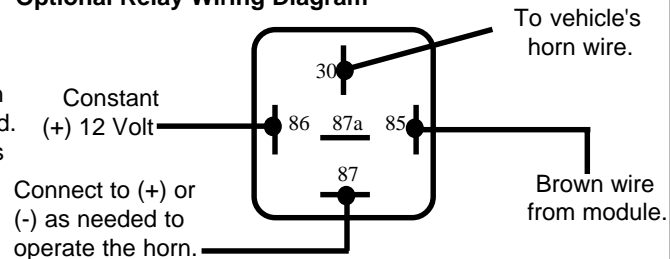
Blue Status Light is inside the clear case, and shows certain operations

Valet Switch used for Valet Mode and in programming



switch wire, provided the circuit operates with 1/2 Amp of current or less. The horn wire is typically found around the steering column; the correct wire will show Positive 12 Volts normally, and no voltage when the horn is being sounded. If the horn circuit requires more than 500mA, use this diagram to configure an optional relay.

Optional Relay Wiring Diagram



Wiring - 2 Wire (3 Cavity) Connector

22 Gauge Green Wire:
Connection If Desired

500mA (-) Lock Output

The Green wire supplies a negative pulse for locking the vehicle's doors.

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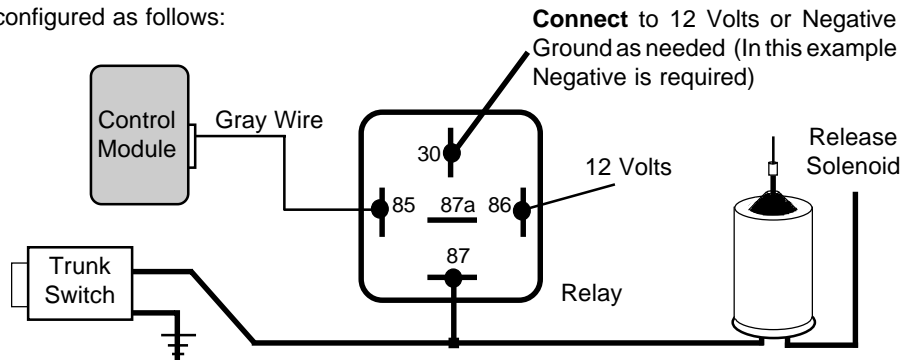
22 Gauge Blue Wire:
Connection If Desired

500mA (-) Unlock Output

The Blue wire supplies a negative pulse for locking the vehicle's doors. Programmable feature #3 changes the single unlock pulse to be a double unlock pulse.

The Blue wire supplies a negative pulse for locking the vehicle's doors. Programmable feature #3 changes the single unlock pulse to be a double unlock pulse.

configured as follows:



In some applications the solenoid wire will rest at ground. In these cases:

- Cut the solenoid wire:
- Connect the switch side to pin #87a of the external relay.
- Connect the solenoid side to pin #30 of the external relay.
- Connect 12 Volts to pin #87 of the external relay (Fused).

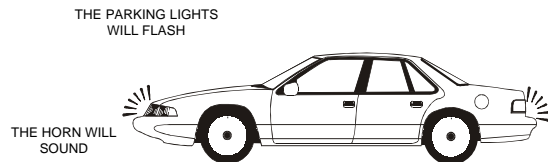
20-Gauge Brown Wire: Connection If Desired.

The Brown wire is a 500mA Negative output designed to sound the vehicle's horn for audible operation confirmations and the remote "panic" feature. The Brown wire may be connected directly to the vehicle's horn

(-) Horn Output

Remote Panic & Emergency Flashlight

To Activate Panic*: Press & Hold the left transmitter LOCK button for 3 seconds



- The horn will sound and the parking lights will flash. To deactivate Panic, press either the LOCK or UNLOCK button.

* Connection of the horn may require additional parts, and may not be included in a standard installation.

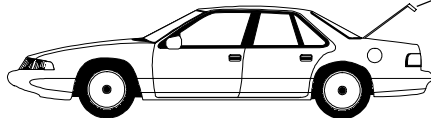
To Operate the Emergency Flashlight: Press the transmitter LIGHT button



- Pressing this button lights the transmitter's Cool Blue LED light brightly without sending a radio transmission. This should be used sparingly, to prolong the transmitter battery life.

Remote Trunk Release

To Activate the Trunk Release*: Press & Hold the lower transmitter **TRUNK** button for 2 seconds

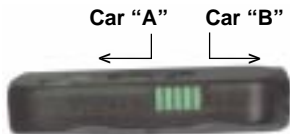


OPERATE OPTIONAL TRUNK RELEASE

- The trunk will be released after 2 seconds. The parking lights and Status Light will flash twice to confirm and the doors will unlock. Then the parking lights will stay on for 30 seconds. Optionally, the horn will also chirp 2 times.

* Connection of the trunk release may require additional parts, and may not be included in a standard installation.

Multiple Vehicle Operation

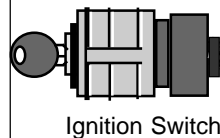


The "multi-car" switch on the side of the transmitter

The Comfort Start transmitter can operate two different vehicles equipped with Comfort Start systems. The slide switch on the side of the transmitter is utilized for this- one car can be operated in switch position "A" and the second car in switch position "B".

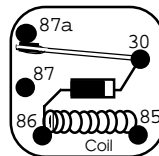
Typical Anti-Grind Relay Configuration

Connect "Switch" side of cut wire to terminal #30 of the relay.



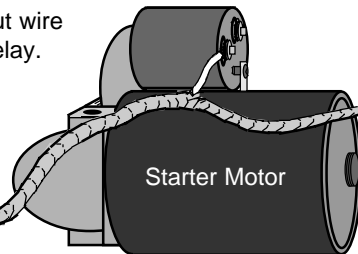
Ignition Switch

Relay Schematic:

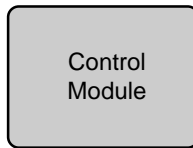


Connect "Motor" side of cut wire to terminal #87a of the relay.

Note: Connect 12-gauge Green starter wire to the motor side of the cut wire



Starter Motor



Control Module

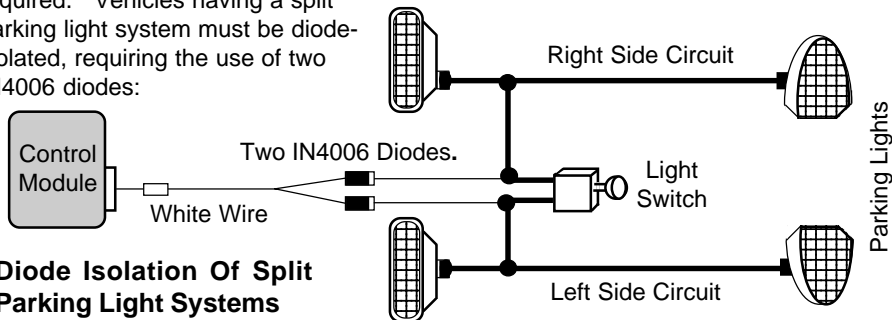
Orange Wire

20-Gauge Gray Wire:
Connection If Desired.

(-) Trunk Release Output

The Gray wire has a 500mA Negative output which is operated by the transmitter button with the "open trunk" icon, and this output is designed for trunk release. In most cases, an optional external relay will be needed,

Caution: When such a wire is located, be sure to also test that it is non-rheostated: While metering the wire, operate the dash light dimmer control. The correct wire will show no change in voltage when the dimmer is operated. Some vehicles have a parking-light relay which is triggered by a Negative signal from the headlight switch. In these vehicles, the White wire must be connected after the relay, usually at the Fuse/Junction Block. Do NOT connect the White wire directly to the vehicle's headlights. An external relay is required. Vehicles having a split parking light system must be diode-isolated, requiring the use of two IN4006 diodes:



Diode Isolation Of Split Parking Light Systems

20-Gauge Orange Wire: Connection If Desired.

The function of the Orange wire is to provide a 500mA Negative auxiliary output which may be used to operate a starter motor "Anti-Grind" relay, which prevents accidental starter grind should the key be turned while the remote starter is in operation.

(-) Anti-Grind Output

Programmable Features

The Comfort Start has 11 programmable features, some of which are "operations" features and others are installation-related. These features can be changed by using the transmitter when the unit is in Features Programming Mode. To access Features Programming Mode:

- 1) Turn the ignition key "On", then "Off".
- 2) Within 7 seconds press the Valet Switch 5 times. The parking lights will flash twice, the Status Light illuminates and the horn chirps twice.
- 3) Select the feature to be changed by pressing the Valet Switch the same number of times as the feature number; the unit's response is an equal number of horn chirps.
- 4) Once the feature has been confirmed by the horn chirps, press either the transmitter's left "LOCK" button (1 chirp & parking light flash) or the right "UNLOCK" button (2 chirps & parking light flashes) for the "option" setting.
 - Some of the features offer multiple choices, so further transmitter buttons may be pressed. See the following descriptions of each feature.
- 5) Select another feature by repeating step "3)" and "4)", or allow the unit to exit Features Programming Mode by turning the ignition "On" or by simply not performing any programming actions- after 15 seconds the system chirps once and flashes then turns off the Status Light to indicate its exit from Features Programming Mode.

The Comfort Start's 11 programmable features are:

#	FEATURE	DEFAULT	OPTION
#1	Smart Start or Tach Wire Sensing	Smart Start	Tach Wire
#2	Starter Cranking Time (in seconds)	.5 Second	.75, 1.25, 1.5 Sec.
#3	Gasoline or Diesel Engine	Gasoline	Diesel
#4	Engine Running Time	10 Minutes	20, 30, 40 Min.
#5	Single or Double Unlock Pulse	Single	Double
#6	1 Or 2 Pulse Remote Start Activation	1 Pulse	2 Pulses
#7	Unlock Doors With Trunk Release	ON	OFF
#8	Doors Lock/Unlock Upon Ignition On/Off	ON	OFF
#9	Horn Confirmation With Doorlocking	ON	OFF
#10	Horn Confirmation With Engine Start	ON	OFF
#11	Reset All Features To Default	See Description	

Explanation of the programmable features:

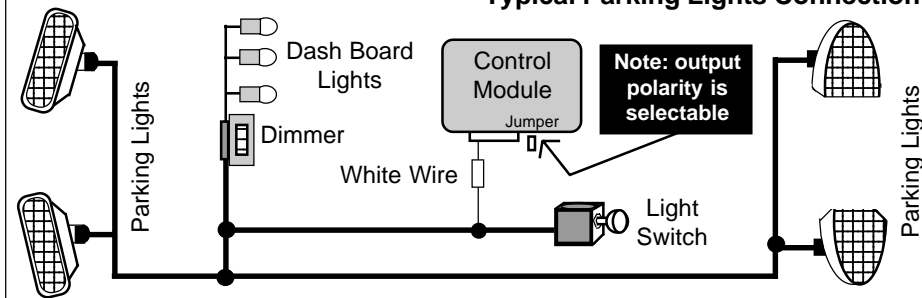
- Features #1, #2, #3, #5, #6 and #11 are all installation-related features for the installer's use. The remaining features have "daily use" benefits, and may be programmed by the user to suite their preference or needs.

When feature #6 is selected for "two pulse" operation, once the Comfort Start unit has started the engine, the Pink/Black wire must receive two more Negative pulses within 10 seconds to stop the engine. See pages 11-13 for programmable features instructions.

18-Gauge White Wire: (+/-) Parking Light Output Connection Recommended.

The White wire is a programmable output to the vehicle's exterior parking lights to visually confirm system operations; +12 Volt or - Negative output may be selected by the Black jumper next to the doorlock port. Connect the White wire to the vehicle's 12 Volt parking light circuit as shown in the accompanying diagrams. The correct wire will show 12 Volts only when the headlight switch is in the "Parking Light" and "Head Light" positions. This wire can usually be found at the headlight switch, and various other locations within the vehicle, such as the rear body harness or firewall connector.

Typical Parking Lights Connection



To use this wire to turn off Retained Accessory Power, locate a vehicle wire within the door or doorjamb which shows Negative when the door is open. Should such a wire be found which is positive, a relay is needed to reverse the Yellow/Red wire's Negative output to Positive.

The Yellow/Red wire produces a Negative pulse output whenever the system turns off the engine after it has been remotely started.

20-Gauge Pink/Black Wire: (-) Start Activation Input Connection If Needed.

The Pink/Black wire allows for alternative devices such as an existing keyless entry or alarm system to activate the remote start operation. If the Pink/Black wire receives a Negative pulse, the Comfort Start unit will start the vehicle's engine, provided that all safety circuits are in the proper status. After the engine has been started by remote control, another Negative pulse on the Pink wire will turn the unit off, stopping the engine.

The Pink/Black wire can be connected to an available auxiliary output of an existing Remote Security System, and the unit's remote control may also be used to activate the remote start operation.

Should it be desired to activate the unit's remote start operation from an existing keyless entry system, programmable feature #6 will configure the Pink/Black wire to activate the remote start feature only if it receives two Negative pulses within 10 seconds. This allows configuring the unit to remote start when the OEM transmitter's "LOCK" button is pressed twice. In most cases the existing keyless entry system will have Negative switching door lock circuits to which the Pink/Black wire may be connected directly. In the other cases, an optional relay is needed to reverse Positive polarity to Negative.

- "Engine Running Time" (feature #4) is adjustable so that remote starting the engine will allow it to run for 10, 20, 30 or 40 minutes before it automatically stops. When programming as described on page 11, at step "4)" set the time as follows: press "LOCK" for 10 minutes; press "UNLOCK" for 20 minutes; press "START" for 30 minutes; or press "TRUNK" for 40 minutes.
- "Unlock Doors With Trunk Release" (feature #7) can be changed, so that operating trunk release will not also automatically unlock the doors.
- "Doors Lock/Unlock Upon Ignition On/Off" (feature #8), being factory-set "on", automatically locks the doors when the ignition key is turned on, and unlocks them when the key is turned off. If desired, this feature can be turned "off".
- "Horn Confirmation With Doorlocking" (feature #9) actually has three options. The factory setting (press "LOCK" when programming) has automatic confirmation chips with doorlocking operation. One option (press "UNLOCK" when programming) has the chirp when doorlocking "upon demand" via pressing the transmitter again a second time. The second option (press "START" when programming) completely turns off the chirp confirmation.
- "Horn Confirmation With Engine Start" (feature #10) can be changed, so that the 3 horn chirps upon remote starting are turned off.

Programming Transmitters

The Comfort Start includes with two pre-programmed transmitters, and up to four transmitters total may be programmed to operate it. Transmitters, other than the originals, must be programmed to operate the Comfort Start. When an additional or replacement transmitter is added to operate the unit, all of the transmitters must be programmed as any existing transmitter code is erased from the system.

- 1) Turn the ignition switch "On" (and leave it "on").
- 2) Within 7 seconds press the Valet Switch 5 times. The parking lights and Status Light will illuminate, and the horn chirps once to indicate that the unit is ready to receive the first transmitter code.
- 3) Press the transmitter's upper "START" button. The system will acknowledge the transmission by momentarily turning off the Status Light.
- 4) Repeat the previous step for each remaining transmitter.

The system will automatically exit the transmitter programming mode by turning the ignition key "off", or 15 seconds after the last transmission.

Any time that transmitters are programmed to operate the Comfort Start, for 48 hours afterward every time that the ignition key is turned "on" the horn will briefly chirp and the status Light will flash the number of operating transmitters. This is "Unauthorized Transmitter Alert", protecting against unauthorized transmitters.

"Wait To Start" light in the vehicle has a Negative switching circuit, change the position of the White "Glow Plug +/- Select" Jumper on the control module to reverse the Green/Red wire's polarity operation.

20-Gauge Yellow/Green Wire: (-) OEM Disarm Output Connection If Needed.

If needed, the Yellow/Green wire allows the Comfort Start to disarm a factory alarm system. Connect the Yellow/Green wire to the wire in the vehicle which is connected to one of the doorlock key cylinders. The typical OEM alarm has an electrical switch in the key cylinders which switches -Ground when the key unlocks the door. This wire can usually be located in the vehicle in either kick panel area, in the wiring harness which is routed into the cab from the door. The Yellow/Green wire has a -Ground pulse whenever the Comfort Start unit has an unlock output or its remote start operation is activated.

20-Gauge Yellow/Red Wire: (-) OEM Arm Output Connection If Needed.

This output may be used to arm a factory-installed alarm, or, if the vehicle is equipped with a Retained Accessory Power circuit, this output can be used to "spike" the door pin switch wire, which will turn off the Retained Accessory Power circuit.

To arm a factory alarm after remote start engine run stops, connect the Yellow/Red wire to the vehicle's factory arm wire. This wire will show Negative polarity when a key is held in the "lock" position in the door key cylinder. This wire can usually be located in either kick panel, in the wiring harness from the door, as it is routed between the door key cylinder and the factory alarm.

directly from a wire in the vehicle. The Black/Yellow wire connects to the vehicle's tach wire, which is found in the engine compartment, although in many cases it may also be located inside the vehicle. To use a multimeter to verify the correct tach wire, set it for AC Volts scale. The correct wire will read 1 to 6 volts AC with the engine idling, and will increase with engine speed.

Learning the Tach Wire Sensing must be performed after all wiring connections are made, and the Comfort Start unit has been programmed for Tach Wire Sensing operation (the unit must be programmed- see pages 11-13). To perform the learning:

- 1- Turn the key on and off, then step the brake pedal 5 times.
- 2- Within 5 seconds, start the engine with key. The unit will chirp the horn once, if connected, to indicate tach learning mode.
- 3- The Status Light will light to indicate that the tach signal is learned.
- 4- The unit will exit tach learning mode automatically 7 seconds later, or by stepping on the brake pedal, upon which the unit will chirp the horn once and the Status Light will go out.

20-Gauge Green/Red Wire: (+/-) Glow Plug Input Connection If Needed.

The Green/Red wire allows the Comfort Start to be used with diesel engines, operates only if programmed (feature #3) and is also polarity-programmable. Connect the Green/Red wire to the wire in the vehicle which powers the glow plugs, or the wire which illuminates the "Wait To Start" light on the instrument panel. When connected, the unit will not engage the starter if the Green/Red wire has +12 Volts; in other words, using this wire simply delays the unit's engagement of the starter. If the

Installation Instructions

IMPORTANT!

After reading this manual, start the installation by affixing the WARNING DECAL to a visible area in the engine compartment!

Installation Considerations: This entire booklet should be read before starting the installation. An understanding of which control module wires are to be used and their functions is essential. Installations will vary from car to car, as some control module wires are required, while others are optional. Before starting the installation, it should be determined which control module wires will be used. Most installers will list these wires, then "map out" the installation by locating and noting the target wires in the vehicle. This will also determine the best location for the Comfort Start control module, which is mounted upon completion of the installation.

The Comfort Start remote starting unit duplicates the actions that occur within the ignition switch when you use your key to start the engine. Because of this, most of the main wiring harness connections will be made at the ignition switch harness. The ignition switch wires usually are high amperage circuits, which means that high reliability connections must be made- soldering of all connections is recommended.

Caution! Avoid the Airbag circuit! Especially avoid any harness or wires encased in Yellow or Red tubing or sleeves. Do not use a standard test light, as it can deploy an airbag or damage on-board computers and sensors.

Installation Cautions and Warnings

Do not attempt to install this Remote Car Starter into a manual transmission vehicle! Doing so could cause serious property damage, personal injury, and will void all warranties!

Be aware of, and avoid, any airbag circuitry! Due to the fact that an installer will not be in a normal, upright seated position, severe injury may occur in an accidental airbag deployment!

The use of a Digital Multimeter (DMM) or Volt-Ohm Meter (VOM) instead of a standard testlight is required. This can greatly reduce the risk of an accidental airbag deployment or on-board computer damage.

Battery gases are explosive! Avoid sparks and do not smoke while working near the vehicle's battery!

Always protect wires routed through the firewall from sharp metal edges and hot parts of the engine! Always fuse positive wires at their source!

Instead of using a pin switch to monitor the hood's open or shut status, an Omega AU-46 Mercury Tilt Switch may be used. Connect one of the AU-46's wires to Negative Chassis Ground and connect the remaining wire to the Blue wire.

20-Gauge Black/Yellow Wire:

Engine Detect Input

Connection If Desired.

The Black/Yellow wire is the engine detect wire. The Comfort Start unit utilizes two different methods of monitoring the vehicle during the remote starting process. Consider both methods before selecting one to use:

Smart Start is more commonly used, for its ease of installation and especially for applications such as diesel engine in which the vehicle has no true tach signal available or an unsatisfactory tach signal. The unit as received has Smart Start selected, and when it is used the Black/Yellow wire is not connected to anything. Smart Start "reads" the vehicle's voltage level to determine engine running status.

An adjustment control for Smart Tach is on the side of the unit's case. Complete all wiring connections; then start the engine by pressing the transmitter's START button. If the engine can't be started, turn the adjustment clockwise. If the engine is over cranking, turn the adjustment counter-clockwise.

Tach Wire Sensing is preferable in cases where the engine normally starts inconsistently, or is hard to start. To use this method, Tach Wire must be programmed to operate (see pages 11-13), the Black/Yellow wire must be connected, and then the Tach Wire signal must be learned by the Comfort Start unit.

With this method the Black/Yellow wire reads the engine speed (tach) information.

Wiring Connections - 12 Wire Harness

18-Gauge Black Wire: *System Ground*

Connection Required. Connect the Black wire to a very good, clean chassis ground. A recommended connection is to an existing machine-thread bolt, either in the driver's kick panel, steering column area or a major structural member behind the dash. Small dash braces are not adequate, and the area must be clean, bright metal.

20-Gauge Red/Black Wire: *(+) Brake Input*

Connection Required- **The Red/Black wire must be connected.** It is part a critical safety feature which disables the unit whenever the brake pedal is pressed. Connect the Red/Black wire to the brake switch wire which shows +12 Volts when the brake pedal is pressed. The brake switch is typically located above the brake pedal, and usually mounted to the brake pedal support bracket. Make this connection securely for long-term reliability, and thoroughly test the operation of this circuit.

20-Gauge Blue Wire: *(-) Hood Input*

Connection Required- **The Hood Safety Switch must be installed and the Blue wire must be connected.** This prevents operation of the unit if the hood is open. Carefully install the included pin switch so that it is open (pin down) when the hood is shut and closed (pin up) when the hood is open. Connect the Blue wire to the pin switch and carefully route this wire through the firewall, using an added or existing grommet, avoiding any hot or moving parts. If there is an existing hood pin switch for an alarm system, you may use it for this purpose, but the two systems must be diode-isolated.

Main & Receiver Modules:

Main Module:

The Comfort Start **Main Module** should be mounted in a location close to the ignition switch (where many of the wiring connections are made); typically, hidden behind the driver's side dash.

Receiver Module:

An essential part of the Comfort Start is the plug-in window mount **Receiver Module**, which also contains the **Valet Switch** and **Status Light**. The unit will not operate unless this Receiver Module is plugged-in. Select a desired mounting location for the Receiver Module; optimum performance is obtained by mounting this module high and unobstructed on the vehicle's glass, such as the windshield behind the rearview mirror. Make sure the glass surface is clean and free of dust, grease, or debris. Peel the backing off of the adhesive tape and affix the Receiver Module. Carefully route the module's 5-wire ribbon cable to the Comfort Start control module; plug the cable into the Black 3-pin port on the rear of the module, and plug the remaining two connectors into their respective 2-pin ports on the front of the module.

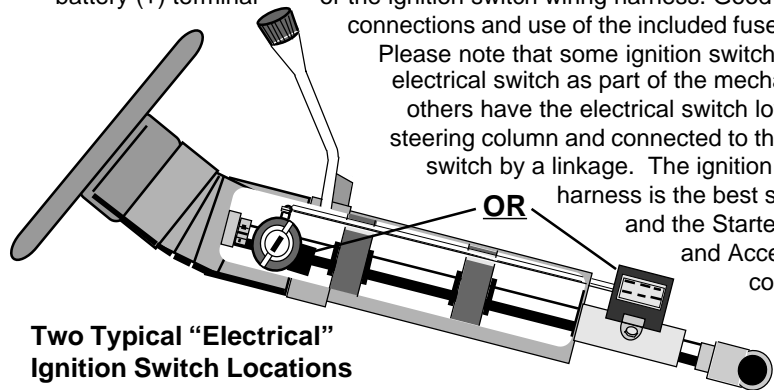
Optional: Should it be desired, an optional separately-mountable Valet Switch and Status Light are available. The Receiver Module must still be used for its receiver section, but the Valet Switch and/or Status Light may be placed as desired.

Wiring Connections - 6 Wire Main Harness

(Two 12-Gauge) Red Wires: *Constant +12 Volts Input Connection Required.*

Connect both Red wires to constant 12 Volts. The source used must supply adequate amperage. The most common sources are the battery (+) terminal or the ignition switch wiring harness. Good reliable connections and use of the included fuses are a must.

Please note that some ignition switches have the electrical switch as part of the mechanical switch; others have the electrical switch lower on the steering column and connected to the mechanical switch by a linkage. The ignition switch wiring harness is the best source for this and the Starter, Ignition #1 and Accessory wiring connections.



Two Typical "Electrical" Ignition Switch Locations

12-Gauge Green Wire: *Starter Output Connection Required.*

Connect the Green wire to the vehicle's Starter wire. This wire will show +12 Volts only when the ignition key is in the "Start" position. This

more Primary Ignition wires are present in the vehicle an optional relay is needed, connected to this wire as shown in the diagram.

22 Gauge Red Wire: *(+) Output For Optional Relay Coil Connection If Needed.*

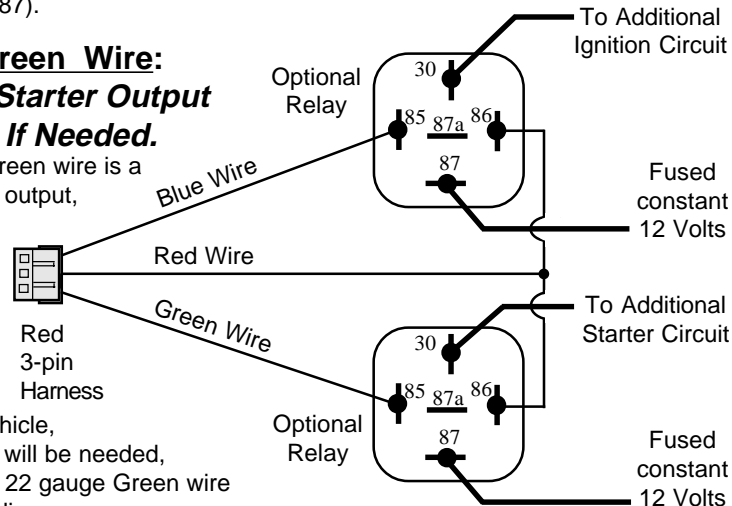
The Red wire supplies constant 12 Volts that can be used to power the relay's coil only- DO NOT use this Red wire for the optional relay(s) power input (pin 87).

22 Gauge Green Wire: *500mA (-) Starter Output Connection If Needed.*

This 22 gauge Green wire is a 500mA Negative output,

which has the same operation as the 12 gauge Green Starter output. If a second Starter wire is

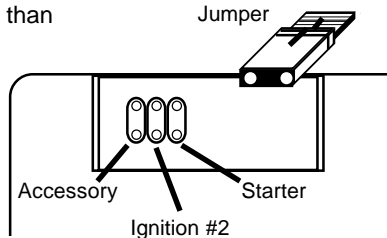
present in the vehicle, an optional relay will be needed, connected to the 22 gauge Green wire as shown in the diagram.



12-Gauge Yellow/Green Wire: Programmable Output

Connection If Needed. The Yellow/Green wire is an additional output which can be programmed to operate as an Ignition output, Accessory output or Starter output. As received, it is programmed as an Ignition #2 output. This wire may be used in cases where the vehicle has more than one of any of these three circuits.

Programming: Locate and open the small access panel on the top of the control module case. Place the Jumper as shown on the pins below the removable panel on the control module. The factory setting is the center "Ignition #2" position.



Wiring - 3 Wire Connector

This harness, which plugs into the Red 3-pin port on the control module, can be used, if needed, to configure optional relays to energize additional Ignition or Starter circuits. Omega OEM security bypass interfaces also use this Red port.

22 Gauge Blue Wire: 500mA (-) Ignition Output

Connection If Needed. This 22 gauge Blue wire is a 500mA Negative output having basically the same operation as the 12 gauge Blue Ignition output. If two or

wire is also found in the ignition switch wiring harness (see diagram on previous page). Some vehicles have a second Starter wire known as a "Cold Start" wire. When this is encountered, two options are available: program the Yellow/Green wire as a second starter output, or use an optional relay configured to the 3-pin Red port, to energize the second Starter wire (see pages 22-23).

Note: If a security system is present which utilizes a starter interrupt circuit, the Green wire must be connected to the Starter Motor side of the interrupt.

12-Gauge Yellow Wire: Ignition Output

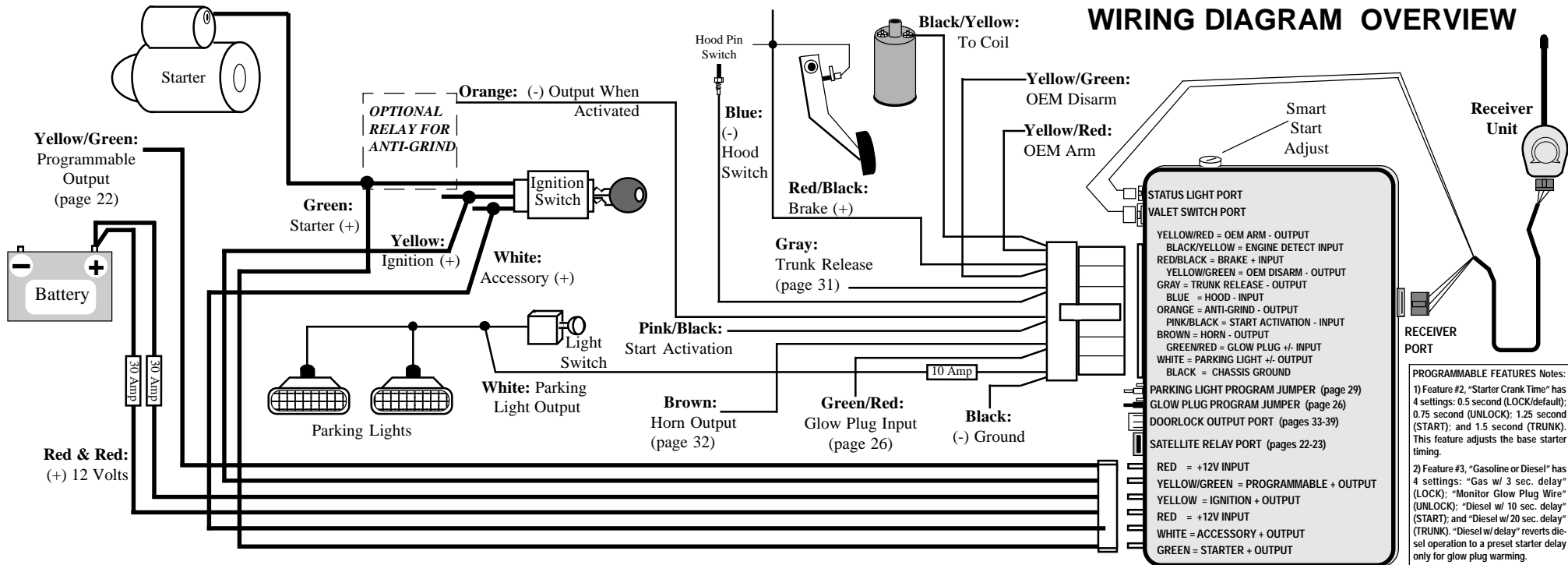
Connection Required. Connect the Yellow wire to the vehicle's Ignition wire (also known as "Primary Ignition"). This wire will show +12 Volts when the ignition key is in the "Run" and "Start" positions and no voltage in the "Off" and "Accessory" positions. This wire is found in the ignition switch wiring harness (see diagram on previous page).

Note: If two Primary Ignition wires are present, use the Yellow/Green wire for the second, or configure an optional relay to the 3-pin Red port (see pages 22-23).

12-Gauge White Wire: Accessory Output

Connection Required. Connect the White wire to the vehicle's Accessory wire. This circuit supplies power to the Heat, Ventilation and Air Conditioning (HVAC) system. This wire will show 12 Volts when the ignition key is in the "Run" and "Accessory" positions and No voltage in the "Start" and "Off" positions. The connection point for this wire is also found in the ignition switch wiring harness.

WIRING DIAGRAM OVERVIEW



PROGRAMMABLE FEATURES Notes:

1) Feature #2, "Starter Crank Time" has 4 settings: 0.5 second (LOCK/default); 0.75 second (UNLOCK); 1.25 second (START); and 1.5 second (TRUNK). This feature adjusts the base starter timing.

2) Feature #3, "Gasoline or Diesel" has 4 settings: "Gas w/ 3 sec. delay" (LOCK); "Monitor Glow Plug Wire" (UNLOCK); "Diesel w/ 10 sec. delay" (START); and "Diesel w/ 20 sec. delay" (TRUNK). "Diesel w/ delay" reverts diesel operation to a preset starter delay only for glow plug warming.