SECTION 2

2004 Police Interceptor Modifier Guide

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General Guidelines

- Circuit protection (fuses) must be provided for all wiring. The fuse rating should not exceed either the rated wiring current capacity or the total current requirements for all the add-on components on the circuit. Fuses should be installed as close to the point of tapped power as possible.
- All revisions to the electrical system should be documented and placed with the vehicle owner guide. All revisions or additions to wiring should be color coded and/or labeled.
- Protective covering should be provided in all areas that could be damaged during normal equipment installations.
- Vehicles stored on site should have the negative battery cable disconnected to reduce the possibility of draining the battery by lights or other equipment.
- Control panels attached to the instrument panel should not protrude into the driver and passenger air bag deployment zones. For additional information, refer to Section 4: Installation Considerations in this guide.
- Switches and gauges should not be installed in the driver or passenger knee impact areas.
- All Ford gauges, lights, and switches must be inspected for correct operation after instrument panel work is performed.
- All wiring relocated or removed while working behind the instrument panel must be secured properly to prevent chafing, squeaks and rattles.
- Provide adequate retention for wiring harnesses so that they are clear of bolts, corners, edges, etc., which could abrade the wires during normal vehicle operation.
- Anticipate misrouted wiring situations and protect all wiring from penetration by screws and raw edges.
- Weather-seal all electrical connectors exposed to the elements.
- Do not use quick splice connectors or wire nuts.
- Install the fuse panel so fuses are readily accessible.
- Connections should be easily accessible for assembly and service.
- Make sure submersible connectors do not lose their seals under extreme assembly conditions, such as bending wires 90 degrees immediately after the connector.
- Whenever using connectors, use a socket (female) connector on the electrical source side and a plug (male) connector on the electrical load side to reduce the possibility of a short circuit when disconnected.
- Air bag restraint systems must remain intact as received from Ford Motor Company. Before modifications are done to the vehicle, the system must be disarmed by following the instructions provided in the current Crown Victoria Workshop Manual.
- Adherence to the above guidelines is not to be construed as approval by Ford Motor Company of any specific revisions or additions to the vehicle's original electrical system.

Isolate The Systems

When installing multiple police equipment components, it is advisable to use separate electrical systems. This will minimize confusion and ease troubleshooting. The front power distribution box and the optional rear power distribution box each have 3 relays and 10 fuses available for the addition of police equipment. Distribute loads among these circuits appropriately to help avoid an imbalanced system.

Keep-alive Power

The electronic engine and transmission control modules require battery power to be supplied at all times to maintain the keep-alive memory. Keep this in mind when installing load disconnect switches or solenoids.

Equipment Grounding Guidelines

- Do not ground the body to the transmission or transmission crossmember. Accessories must be grounded to the chassis or the vehicle battery.
- Splicing into circuitry relating to the electronic engine and/or transmission control systems is not acceptable because of the adverse effect on the electronic system operation.
- Electrical connections exposed to the elements should be appropriately protected.

Wire Insulation

- Polyvinyl Chloride (PVC) rated at 90°C (199°F) is the standard wire insulation that is acceptable for inside body use but is not acceptable for underhood/underbody wiring.
- Hypalon insulation should be used on links only (Ford Specification ESB-M1L54-A).
- Cross-linked Polyethylene (XPLPE or SXL) rated at 135°C (275°F) is the required insulation for underhood/underbody applications (Ford Specification ESB-M1L123-A).
- GXL can be used as an alternate wire (Ford Specification ESB-M7L85B) as long as the concentricity specifications are met. To provide a water-resistant seal in conjunction with crimp connectors, a Duraseal crimp connector is recommended since it is designed to account for outside wire diameter that is smaller than the present SXL wire.

Terminals and Connectors

Connector Types

- Submersible (Sealed) A connector that is capable of being immersed in water.
- Weather-resistant A connector that will retain its sealing and connection qualities while being exposed to adverse weather conditions.
- Duraseal crimp A supplier trade name for a sealed wiring repair or splice.

When a connection is not defined (typical situation - harness to harness connectors), the following suggestions should be implemented:

- Determine the connector type. If it will be located in a hostile environment, use a sealed connector; if not, use an open connector. A hostile environment is defined as being exposed to water and/or salt accumulation and/or high temperatures (i.e., underhood, exterior panels and footwells). Use in-line connectors with secondary locks to prevent the terminal from being pushed out.
 - Do not use single wires smaller than 14-gauge in a 2-way or larger weather resistant connector (the very-large style), since the wire may break during disengagement.
 - Use Hypalon, XLPE or Elexar insulation in submersible connectors to maintain sealing integrity. PVC is not acceptable because it cold flows and allows setting in a deformed pattern, therefore compromising the integrity of the seal.
- Determine the terminal type. Base your decision on wire gauge, current carrying capacity, connector type and insulation type.
 - Use non-detent low insertion force terminals whenever possible.
 - Do not use low insertion force female terminals in weather resistant connectors.
 - Analyze circuit requirements (signal levels, current, voltage, etc.) to determine the proper plating material (such as gold). Use of unplated terminals is not recommended.
 - Do not use plugs to seal holes in micropin connector grommets. It is very easy to forget to
 insert them during manufacturing and ruin the seal. Use a grommet with only the necessary
 number of holes or use dummy wires at least 600 mm (24 inches) long.
 - Fully align connectors prior to terminal connection -- terminal cavities should have minimum tolerance to prevent terminals from floating, bending or pin pushout during mating/engagement.
 - Make sure connectors of similar type and color are identifiable to the operator to eliminate crossed connections and minimize assembly time. Avoid using similar types and colors of connectors close together.
 - Be sure that connectors have positive locking devices that allow easy installation with a low insertion force and easy removal. The connector snap should be easily felt and heard.
 - Eliminate the use of edgeboard, tang-type, and molded-over connectors. The use of blade-type weather resistant connectors is restricted to high current applications which cannot be handled by submersible connectors.

Circuit Protection and Electrical Load

- Modification to existing vehicle wiring should be done only with caution and careful consideration of effects on the completed vehicle's electrical system. Anticipated circuitry should be studied to determine the required circuit protection and to avoid feedback loops.
- Added circuitry must be protected either by a base vehicle fuse or circuit breaker, or by a similar device supplied by the modifier.

- When adding loads to a base vehicle-protected circuit, make sure that the total electrical load through the base vehicle fuse or circuit breaker is less than the device's load rating.
- Use 80 percent of the fuse rating to determine maximum steady state load to reduce nuisance fuse failures.
- Use 135 percent of the fuse rating when sizing wiring to protect the circuit in the event of an overload. Fuses will last for one hour at 135 percent of their rating.
 - Total current draw is the sum of the base vehicle's circuit current requirement (measured with an ammeter) and the anticipated add-on component current requirements.
 - Never increase the rating of a factory installed fuse or circuit breaker.
 - If the total electrical load including additional electrical components, on any circuit, is less than the fuse protection rating or the capacity of some limiting component (switch, relay, etc.), the items to be added can be connected directly to that circuit. The headlamp switch circuits should never have additional lighting or electrical components directly connected.
 - Added devices that exceed the current capabilities of the factory-installed system are best controlled through the use of a relay or separate switch. The coil of the relay can be fed from the circuit in the factory harness (now acting as a signal circuit) with added wiring providing feeds to the added electrical device. The relay selection is important and depends on current requirements, number of cycles expected in the relay lifetime, whether the relay is to be operated intermittently or for long periods of time, and whether the relay is exposed to weather conditions or is installed in a protected area. When the current requirements of a circuit exceed the capacity of an available relay, the load should be reduced or divided through the use of additional relays.
 - Added wire feeds to the switch or relay power contacts should not be tapped into the basic vehicle wiring. Use the standard Auxiliary Power Distribution Box, or draw power as close to the battery as possible.

Grommets and Sealing Requirements

Any additional wiring routed through sheet metal must pass through a grommet that both seals the opening and locates the wire(s). Two-piece grommets (plastic inserts with rubber outers) are recommended to facilitate installation and retention.

- Locate grommets so they are accessible for proper seating (achieved by pulling) in sheet metal holes.
- Ramp grommets at the insertion end to facilitate installation and sealing.
- Be sure that the direction of the hole punch is in the direction of grommet seating and the hole is burr-free.
- Make sure the grommet molding compound will adhere to the harness to prevent slippage.
- Make sure the grommet will withstand the environment (temperature, splash, etc.).

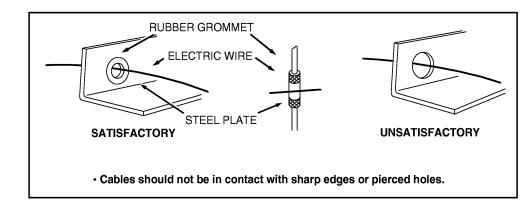
- Be sure that holes are large enough to allow the installation of the harness without causing circuit damage.
- Use adhesive tape on main trunks or branches with at least a 50 percent overlap to prevent wicking through grommets. Be certain to diaper-wrap the takeouts.

Wire Routing

VARNING: DO NOT PLACE ELECTRICAL COMPONENT ATTACHMENTS OR GROUND SCREWS ADJACENT TO VEHICLE FUEL TANKS, FUEL FILLER PIPES, FUEL LINES, FUEL VAPOR LINES OR CARBON CANISTERS. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

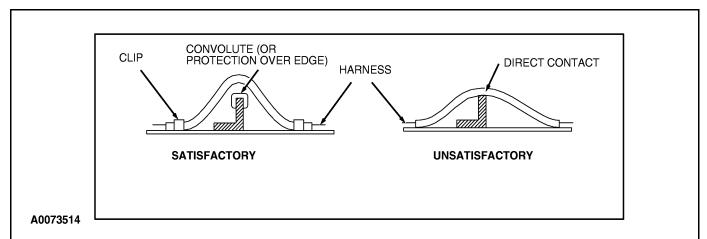
Wire harness routing should conform to the following:

 Wires routed through holes in sheet metal or castings must be protected by a grommet whether or not conduit is used (see figure below).



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• Wires should be routed to avoid metal edges, screws, trim fasteners and abrasive surfaces. When such routings are not possible, protective devices (shields, caps, etc.) must be used to protect the wires. Metal edges should be covered with a protective shield and the wiring fastened within three inches on each side of the edge (see figure below).

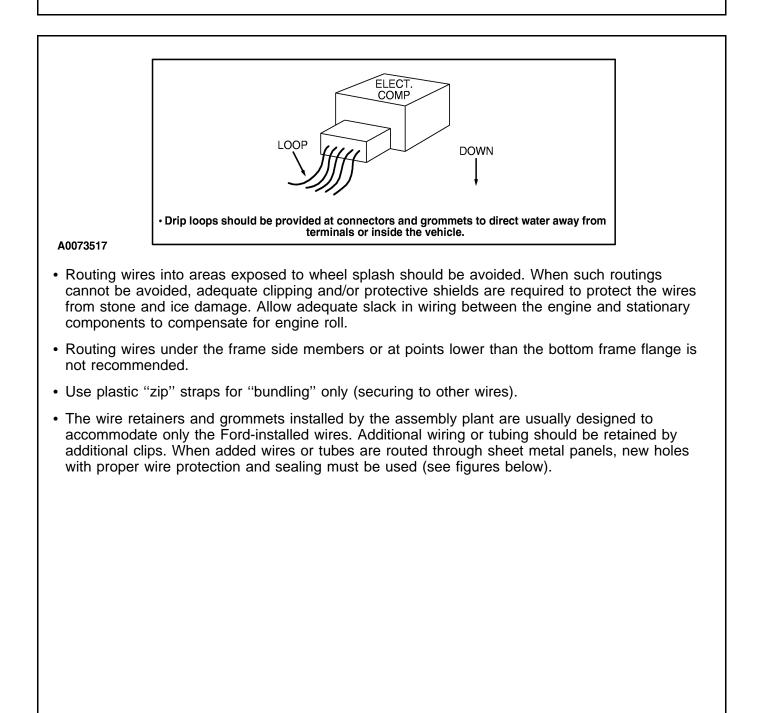


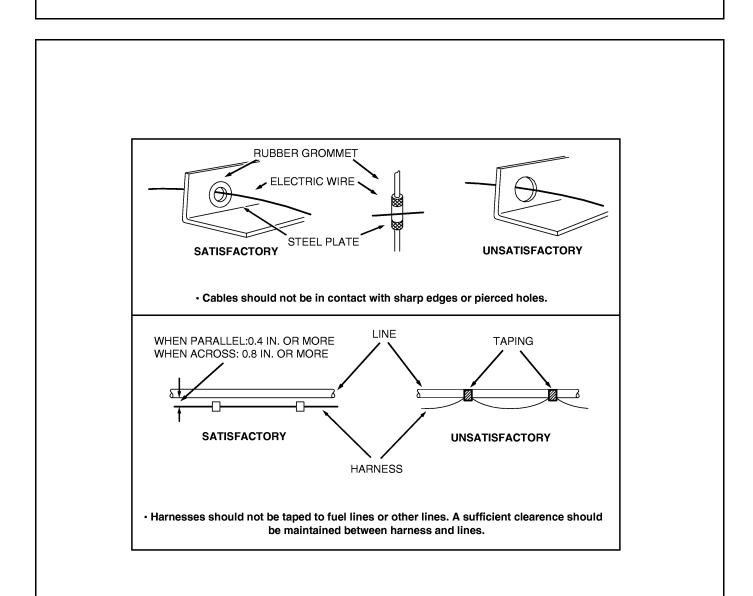
- Wires must be routed to provide at least three inches of clearance to moving parts in their extreme movement location, unless positively fastened and protected by a conduit.
- Wire routings without conduit should avoid areas where temperatures exceed 82°C (180°F). Minimum clearance of six inches should be maintained from exhaust system components. Heat insulation and heat shields should be used on the wires routed in high temperature areas.
- Make certain that all underhood or underbody wiring is cross-linked polyethylene high temperature insulation wire 135°C (275°F) (minimum rating) consistent with SAE specification J1128 Type SXL wire. Normal PVC wire must not be used in underhood or underbody applications.
- Make sure all ground locations are readily accessible for installation, service and verification.
- Do not place ground attachments in high-splash areas.
- Do not route underbody wiring over the exhaust system.
- Underhood/underbody wiring must be routed in conduit for protection. Minimum conduit rating is 177°C (350°F).

Wire Retention and Routing

Use the following criteria to determine the location of retainers:

- Size and weight of wire bundle.
- · Holes with poor accessibility that prevent installation of locators.
- Movement of wires that can result in abrasion, squeaks and rattles.
- When wiring is routed between two members where relative motion can occur, the wiring should be secured to each member with enough wire slack to allow flexing without damaging the wire.
- Wiring exposed to weather must provide a drip loop to prevent moisture from being conducted into the device through the wire connection (see figure below).





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For retainer screws, the following guidelines apply:

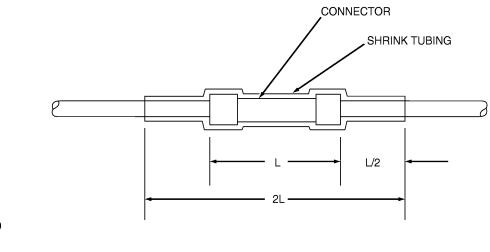
- Avoid using fasteners that are too long for the application or are in an area which might damage vehicle components, including wiring, brake lines, fuel tank and lines, powertrain components, exhaust system, and suspension.
- Do not use pointed screws for attachments. Also check that screws used in the vicinity of the wiring are blunt-ended.
- To minimize the potential for wiring shorts do not use drill point screws. Trim components (including wiring shields) should use pin-type attachments instead of screws.

- Always check areas that screws protrude into for verification that an interference condition to other components does not exist.
- Make sure that retainers used are capable of withstanding the environment over the vehicle's life expectancy.

Splices and Repairs

For quality splicing and to reduce potential problems, the following guidelines are recommended:

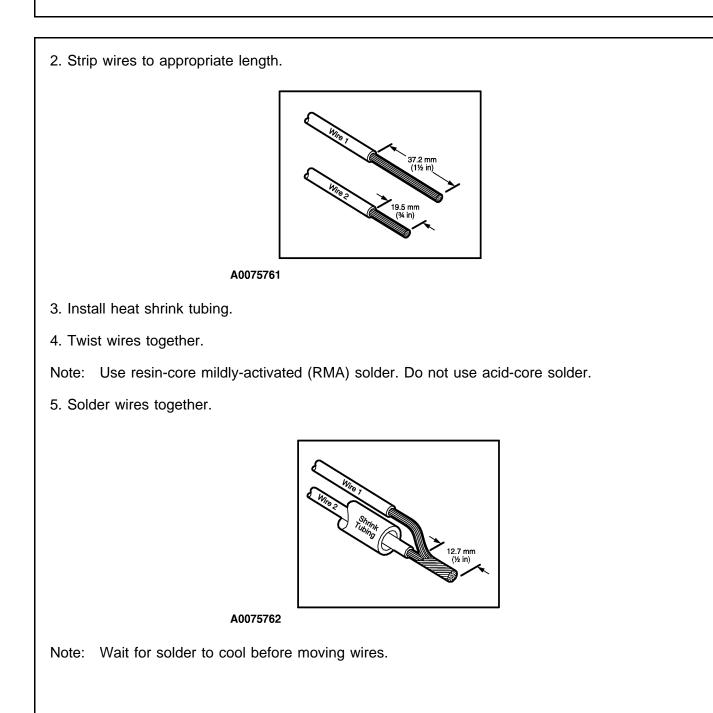
- Stagger the splices within a harness to reduce increased harness diameter. Splice only on straight areas as installed, not on bends.
- Strip wire ends making sure that individual conductor strands are not damaged.
- When soldering, make sure an adequate mechanical joint exists before applying solder. Use only resin-core solder. Acid-core solder should not be used since it may result in corrosion.
- For crimp joints, use butt-type metal barrel fasteners and the proper tool at the appropriate setting for the wire size (such as Motorcraft crimp tool S-9796) specifically designed for this type of work.
- Make sure splice joints are adequately sealed and insulated. In an outside environment, use Duraseal butt connectors or equivalent. A durable substitute splice joint can be achieved by using a bare metal barrel, crimping, flow-soldering and covering with shrink tubing (see figure). Quality electrical tape can be used inside the vehicle but is not recommended for an outside environment.
- Be sure that the new wire is not a lesser gauge than its original mating wire.



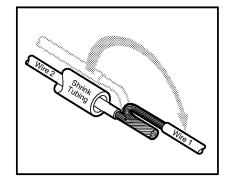
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Recommended splicing method

1. Disconnect the battery.

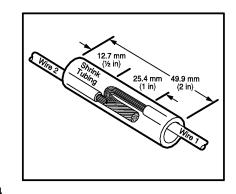


6. Bend Wire 1 back in a straight line.



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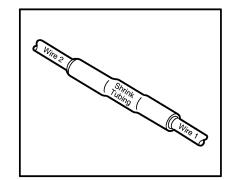
- Note: Overlap tubing on both wires.
- 7. Evenly position heat shrink tubing over wire repair.



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8. Use heat gun to heat the repaired area until adhesive flows out of both ends of heat shrink tubing.

9. Reconnect the battery.



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Sealed Connectors

Ford Part Number	Part Name	Class
E6FZ-14488-A	Butt Connector Gauge: 18-22, Color: Red	С
E6FZ-14488-B	Butt Connector Gauge: 14-16, Color: Blue	С
E6FZ-14488-C	Butt Connector Gauge: 10-12, Color: Yellow	C

Heat Shrinkable Tubing (Heat Shrink) (Ford Specification ESB-M99D56-A2)

Heat shrinkable tubing is available in various diameters for different splice sizes and configurations. When shrunk, it forms a small, flexible hermetic seal.

Other methods (tape, PVC mold, etc.) do not provide a hermetic seal and are not recommended. Splice balancing is critical with heat shrink insulation. If the splice is extremely unbalanced (more circuits on one side than the other), heat shrink insulation will not provide a proper seal. Evaluate the use of double terminals instead of splices where practical in these situations.

Wire Protection Requirements

General Notes:

- Anticipate problems and design accordingly. Try to anticipate what could go wrong and modify your designs to address any adverse impact.
- Review all connector applications and electrical systems to determine the need for solder, grease, weather-resistant or sealed connectors. Make sure components and wire insulation are compatible with greased connectors (important for long term durability).
- Make sure that drip loops or other means are provided to prevent water leakage into the vehicle through wiring assemblies that pass through the dash panel.

- Use greased or sealed connectors in floor pan troughs which are subject to moisture coming through the carpeting.
- Use XLPE insulation for uncovered runs that exceed 305 mm (12 inches).

Electrical Protection

- Properly route wires away from noise-generating wires or components. However, if routing near noisy wires or plugging into noisy components is unavoidable, additional protection must be designed into the harness.
- Shielding Electro Magnetic Interference (EMI) Consider shielding if you must route close to high-current or noisy circuits. Use shielded wire and ground one side. Seal all splices in wire assemblies that use bare coaxial shielding (braid or tape) for EMI suppression, and insulate or tape over all shielding ends that terminate near any open connectors. This prevents splice and terminal shorts to the shielding. Minimize the length of conductors which extend beyond the shield. Failure to do this reduces the effectiveness of the shield.
- Spike suppression, in general, is accomplished by connecting a diode or resistor-diode combination across the terminals of the noisy component. The diode should be sufficiently close to the component (both electrically and physically) so that inductive spikes are clamped off. Make sure the diode is connected with the proper polarity.

Proper routing and retention will reduce the likelihood of chafing, pinching, etc. When this ideal routing is unattainable, the following additional protection is needed:

Mechanical/Environmental Protection

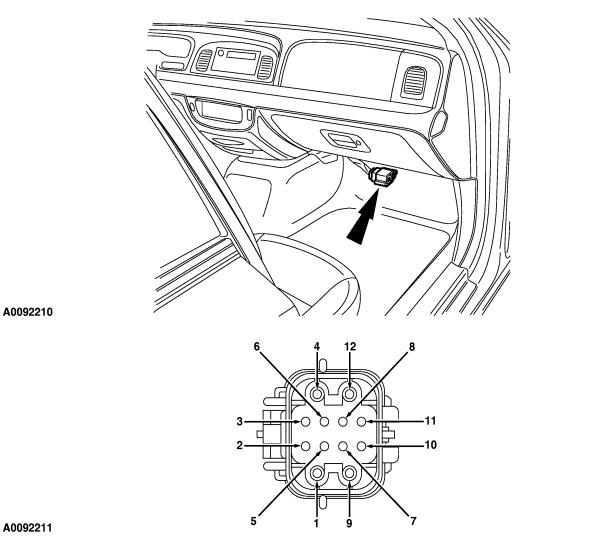
- Tape Tape is the most basic means of protection. It contains the wires in a loose bundle and provides limited environmental protection. It does not protect against chafing and pinching.
 - Kendall Polyken Fiberglass Base Tape (Ford Specification ESB-M3G38-A) is used for engine compartment applications. This durable tape provides against cut-through and abrasion commonly found in underhood applications.
 - Polyken 267 is a substitute tape that may be used in lower temperature areas of the engine compartment (apron area).
- Convolute Use convolute for all underhood/underbody applications or when increased temperature, abrasion or pinch resistance is required. Convoluted tubing comes in different diameters and materials to accommodate different temperature ranges and harness sizes.
 - Use polyethylene convolute when abrasion is the only consideration; this convolute is adequate up to 96°C (205°F) maximum. Use nylon convolute when underhood/underbody or abrasion and temperature are considerations; nylon convolute is adequate up to 177°C (350°F) maximum.
 - On all engine-mounted wiring or bend points. Use vinyl tape on the outside of the convolute to prevent wiring from looping out. This tape must be able to withstand high temperatures 135°C (275°F) or over.
 - Tape convolute junctions with a brasion-resistant tape (Polyken 267, fiberglass, etc.).

- Scroll Similar to convolute, but without the ridges. Scroll is used where harness rigidity is required, especially for maintaining critical locator dimensions. Use scroll for short lengths only, as it is quite inflexible.
- Note: This is not meant to be an all-inclusive list of methods for physically protecting the wires. There are other means of protection available that are not listed.

Available Power Sources

Front Power Access Point (C275)

The front power access point is a connector (C275) located below the glove box. This connector contains various power feeds and inputs available for the addition of police accessories. See the following illustrations and table for connector and circuit details. A mating connector with blunt cut wire leads is available from an authorized Ford Dealer with a base service part number of 14A411.

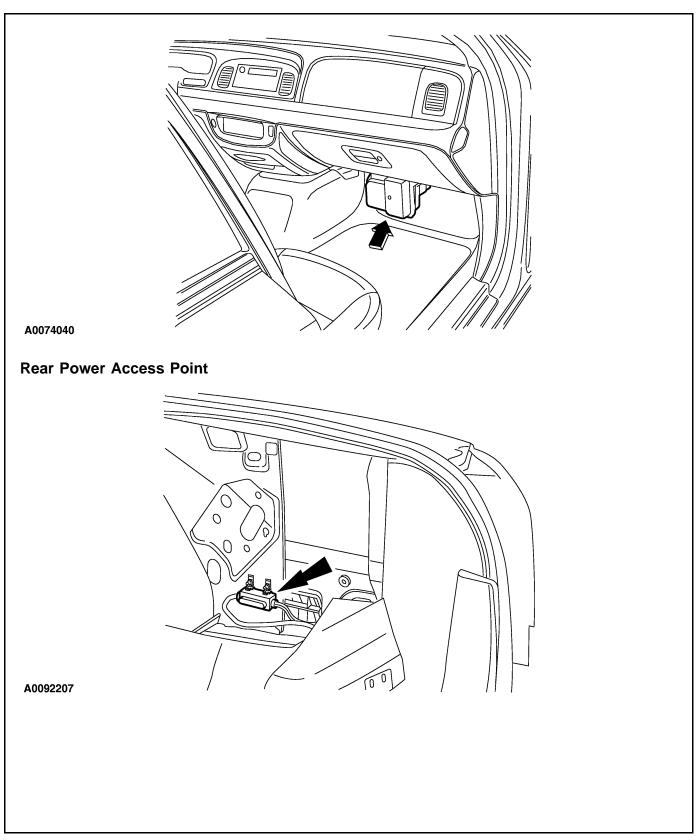


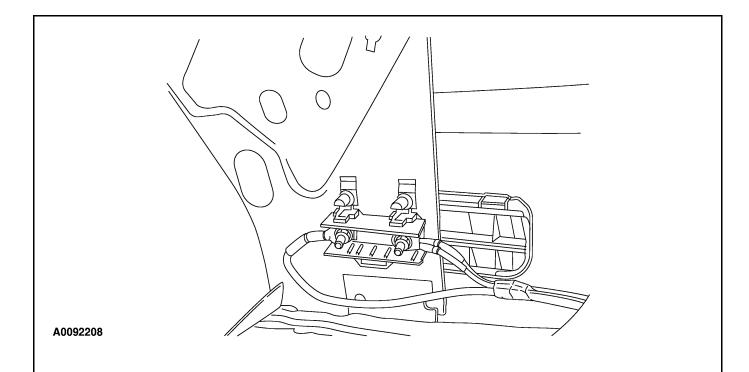
Cavitity #	Circuit #	Gauge	Color	Function
1	792	10	TN/YE	Battery feed from battery junction box fuse #110 (50A)
2	385	16	WH/RD	Hazard in signal
3	175	18	BK/YE	Blunt cut to engine compartment
4	401	10	PK	Run/Accuracy feed from battery junction box fuse #111 (30A)
5	Empty	-	-	Empty
6	Empty	-	-	Empty
7	679	18	GY/BK	Vehicle speed signal
8	705	16	LG/OG	Battery save signal
9	3010	10	TN	Battery feed from battery junction box fuse #117 (50A)
10	689	18	DB	Start signal
11	44	16	LB	Hazard out signal
12	57	10	BK	Ground

Front (Optional) Auxiliary Power Distribution Box

The Auxiliary Power Distribution Box contains the following:

- 30A supply circuit that operates when the vehicle is in the RUN or ACCESSORY position (Battery Junction Box fuse 111)
- 50A supply circuit connected directly to the battery (Battery Junction Box fuse 117)
- Ten (10) fuses of various amperages
 - Five (5) direct to the battery (total 50-amp maximum)
 - Five (5) through the ignition switch (total 30-amp maximum)
- Three (3) relays protected by 20A fuses
- Four (4) ground circuits



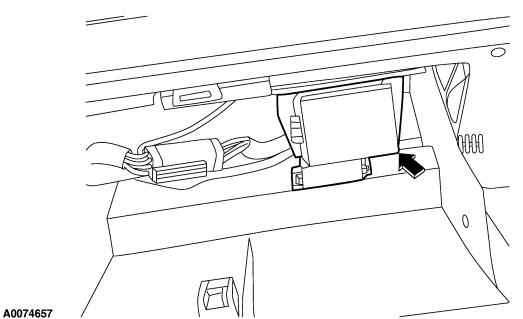


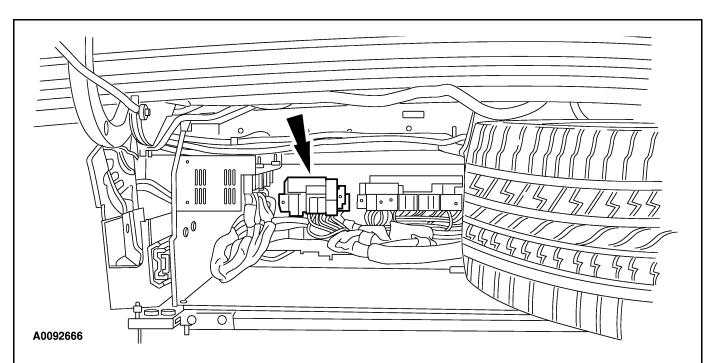
WARNING: UNDER NO CIRCUMSTANCE SHOULD THE REAR POWER ACCESS POINT COVER BE REMOVED WITHOUT FIRST REMOVING THE BATTERY JUNCTION BOX (BJB) FUSE #110 AND FUSE #117. REMOVING THE COVER WITHOUT REMOVING THE FUSES COULD RESULT IN AN ELECTRICAL HAZARD. TURN OFF LOAD DEVICES BEFORE INSERTING THE FUSES. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

The Rear Power Point is a battery access port for Police auxiliary equipment mounted in the trunk. It is capable of supplying 80 amps of battery power. The BJB contains two 50 amp fuses (#110 and #117) which protect the Rear Power Access Point. Battery access is provided by two studs contained in an enclosure, mounted in the trunk behind the carpet, on the right side fender support. The terminal with the red wire is the battery positive, and the terminal with the black wire is the ground. Remove both fuses in the BJB before removing the cover to the rear power point. Insure load devices can be turned off, and are switched off when reinserting the fuses.

Police Prep Packages (Optional)

Vehicles equipped with one of the optional Police Prep or Visibility Packages (options 65A, 68P and 65W) include a different Auxiliary Power Distribution Box that is located in the glove box or trunk. By checking the area of the glove box or trunk, it can be easily determined if a vehicle is equipped with a Police Prep and Visibility Package. The standard Front Auxiliary Power Distribution Box normally mounted below the glove box is deleted and the Police Prep and Visibility Package Power Distribution Box is installed inside the glove box or trunk. For additional information, refer to the Ford Police Interceptor Preparation Packages Owner's Manual that is included with the vehicle.

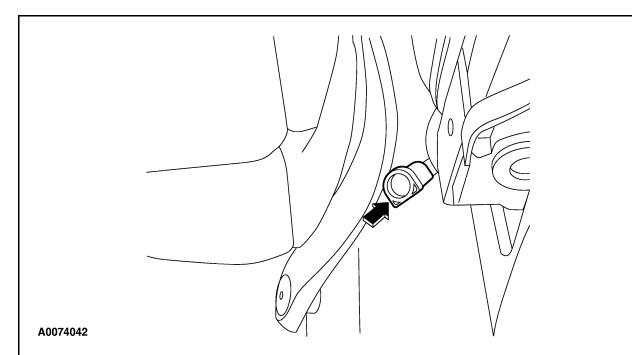




B-Pillar Light Bar Connector

In the lower right hand B-pillar (behind the B-pillar trim), there is an available power source (light bar connector C300). This is a 4-pin connector with three (3) circuits. One fused circuit (50 amp) from the BJB fuse 109 and two (2) ground circuits. See the following chart for connector information:

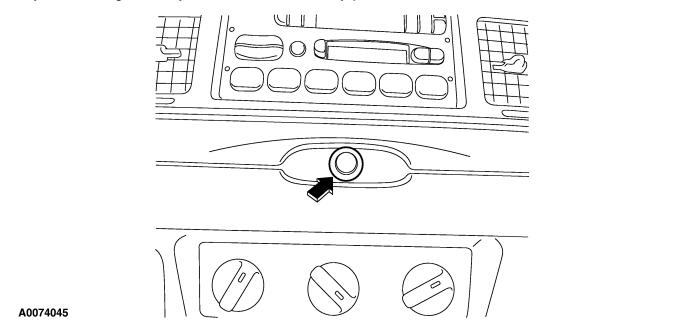
Pin	Wire Color	Description
2	RD/YE	Hot at all times
3	BK	Ground
4	BK	Ground



How To Change Option Content

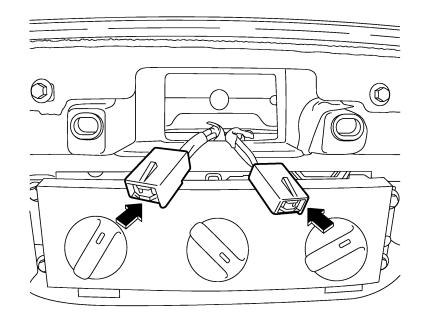
Decklid Release Switch

The decklid release system may be configured to operate either when the ignition key is in the Run/Accessory position or at all times (without requiring a key). Configuration of the decklid release switch is accomplished by connecting one of the two available connectors located behind the dash trim panel. One of them is wired for power at all times and the other is wired for power only when the ignition key is in the Run/Accessory position.



Use the following steps to change this option:

- Remove the dash trim panel by gently pulling to release the nine (9) push-type retainers.
- Disconnect decklid release switch electrical connector.
- Locate and connect the alternate decklid release switch electrical connector.



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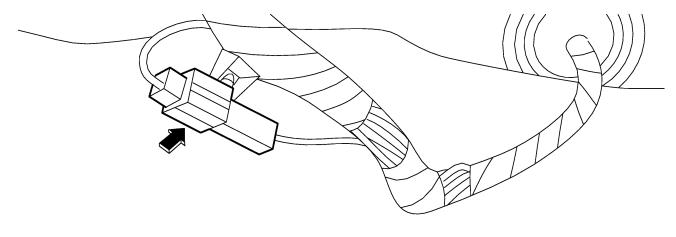
- Note: The connectors can be identified by the wire colors. The connector with the (VT/YE) and (BK/WH) wires has power at all times. The connector with the (VT/YE) and (YE/GN) wires has power in the run position.
- Reinstall dash trim panel.

Courtesy Lamp Disable (Dark Mode)

This option offers deletion of the illuminated entry function. Upon vehicle power-up, the Lighting Control Module (LCM) will monitor the dark car input signal for a ground condition of longer than two seconds. If the ground is present, no interior lighting will be provided during entry or exit of the vehicle. The interior lighting will, however, still operate on demand whenever the dome lamp switch is active. A ground will be provided to the LCM by an in-line connector within the unique police 14401 instrument panel harness. The male terminal side connector will be retained on a portable clip and the female terminal connector will be tear-taped to a bundle. If the dark car feature is necessary, the connection will be made on the assembly line. If no connection is made the default state of the LCM will be to provide illuminated entry. The vehicle can be reconfigured by removing the power to the module, changing the dark car input from (or to) a ground or an open circuit, and then reapplying power to the module. The vehicle can also be reconfigured by changing the dark car input signal from (or to) a ground or an open circuit, entering diagnostics, and then exiting diagnostics.

Use the following steps to disable the courtesy lamps:

- Disconnect the battery.
- Connect C263 located under the glove box.

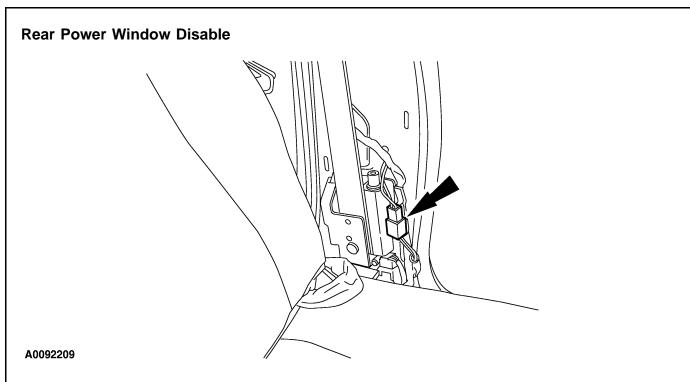


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• Connect the battery.

Use the following steps to enable the courtesy lamps:

- Disconnect the battery.
- Disconnect C263 located under glove box.
- Connect the battery.



The rear window control switches of the Crown Victoria Police Interceptor can be disabled by disconnecting the rear window power supply connector (C340). This connector is located behind the LH B-pillar trim panel, adjacent to the seat belt retractor. Disconnect the connector to disable the rear window control switches. While they are disabled, the master window control switch can still control the rear windows. Refer to Crown Victoria Wiring Diagram Manual for additional power window wiring information.