



TWO-WAY LCD REMOTE STARTER SYSTEM
WITH FULL ALARM SYSTEM FOR
MANUAL TRANSMISSION VEHICLES

CT-5460TW

Installation Guide

The Transmitter Battery:

Depending on the usage, the transmitter battery can last between 3 to 6 months. When the battery is low, the transmitter will emit two “beeps” in a repetitive cycle. ***At that point the battery should be replaced.*** We recommend keeping a spare battery somewhere handy such as inside the glove compartment.

Notice

The manufacturer will accept no responsibility for any electrical damage resulting from improper installation of the product, be that either damage to the vehicle itself or to the unit. This unit must be installed by a Prostart certified technician using all safety devices supplied. Please note that this guide has been written for properly trained Prostart technicians: a certain level of skills and knowledge is therefore assumed. Please review the Installation Guide carefully before beginning any work.

Warning

This unit is designed for vehicles with a **manual** transmission only. Before installing the unit, test that the OEM door switch contacts of the vehicle work well, and that the parking brake system operates properly.

Do not install on convertible vehicles.

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Introduction

This guide contains all the information relevant and necessary for the installation of the alarm and remote starter system. Most of the features of this product are explained in the **user guide**. Therefore, if you need detailed information about a feature of the product, we recommend that you refer to the user guide.

Installation Tools:

Here is a list of basic tools and supplies you will need to test and install safely.

- Digital Multi Meter (DMM), Computer-safe logic probe, fused jumper wire, neon 'trouble' light that is carpet safe, fender protector, carpet protector
- Soldering iron, solder, electrical tape, wire tie straps, split loom, diodes, resistors, relays
- Wire cutters, wire strippers, wire crimpers, needle nose pliers
- Sharp knife, panel poppers, various screw drivers
- Socket set, wrench set, drill with drill bits, coat hanger (for fishing wires through the fire wall),

Installation Points to Remember

- Make sure that vehicles equipped with an automatic transmission do not start while in any of the drive gears. **If the vehicle starts in gear, install a manual-transmission remote starter instead.**
- When installing a manual-transmission product on a vehicle with a manual transmission, always make sure that all doors will trigger the dome light when opened (indicating a functioning door pin).

- When installing a manual-transmission product on a vehicle with a manual transmission, make sure that the parking brake and door switch contacts work properly.
 - When working on a vehicle, always leave a window open.
 - **Never** leave the keys in the car. Leave them on a workbench with a window rolled down.
 - If possible, remove courtesy light fuse to prevent battery drain.
 - The **PROGRAMMING ASSISTANCE BUTTON (PAB)** The PAB is mounted on the side of the system unit and fulfils the same function as the hood-pin switch. The PAB will spare installers the effort of getting out of the vehicle to access the hood-pin switch. **The PAB works only when the hood is up and installed.**
 - Inspect vehicle for any body damage or electrical problems
 - **Always solder and tape all connections.**
 - Keep the antenna away from other types of antennas (GPS/OnStar).
 - Never install the control unit where it could interfere with normal operation or obstruct service technicians.
 - Always use a grommet when running wires into the engine compartment. Never run wires through bare or sharp metal.
 - Do not disconnect the battery on vehicles equipped with air bags and anti-theft radios.
 - Never ground the control unit to the vehicle's steering column.
 - Make sure that all the switches and controls operate properly.
 - Verify that the vehicle starts and idles properly.
 - Make sure that all safety equipment is installed: the valet button (if provided), the hood switch and the warning label.
 - When wiring in parallel, make sure you isolate each connection with a diode in order to avoid feedback and possible damage.
- Examples:**
- Wiring a clutch bypass and a transponder module to the GROUND OUT WHEN RUNNING wire:** At the junction point, where the **GROUND OUT WHEN RUNNING** wire "splits" and connects to each device, a diode is inserted on each of these lines.
- Multiple or separate door pin connections:**
- When joining all door pins together to the door pin input wire of the system unit, each wire must be isolated with a diode to prevent feedback.
- Note:** The above examples reflect common situations where diodes are use to isolate connections. Please note that there are numerous other cases where diode isolation is required.
- Always make sure that all external relays or modules added to the system unit are properly fused and diode-isolated.
 - Never test the shock sensor on glass with an open hand. Never hit glass hard enough as to break it. When testing on metal or plastic, make sure that the test will not damage the vehicle (e.g.: dents, broken glass, damaged trims, etc.).
 - On vehicles equipped with daytime running lights, the installer may be unable to see certain programming results since the daytime running lights never go out.
- Note:** The parking light output relay of the unit gives two clicking sounds for each flash of the lights: one click when the lights would go **ON** and one click when the lights would go **OFF**.)
- **Parking light flashes** to which the text refers throughout this manual refer to the parking light output of the **unit**, not of the **vehicle**.

Harness Description

When connecting a system, it is important to make sure that the connector with the ground wire is connected first, before making the 12 V connections. Should the unit be powered up before being grounded, there could be serious damage to internal components of the unit.

Be careful not to power up a system before it is properly grounded. To avoid any accident, it is recommended to pull out the fuses from their sockets before the installation, and to put them back during the very last steps.

6-Pin Main Ignition Harness

Wire	Colour	Function	Description
A	RED	(+) 12 V Battery	Connect to the largest 12 V supply wire at the Ignition Harness. Ensure that the OEM power wire is fused for more than 30 A.
B	PURPLE	(+) Starter output (30 A)	Connect to the Starter wire of the vehicle. The source wire should have +12 V with the Ignition Key in the CRANK position only.
C	RED	(+) 12 V Battery	Connect to the largest 12 V supply wire at the Ignition Harness. Ensure that the OEM power wire is fused for more than 30 A.
D	YELLOW	(+) Ignition output (30 A)	Connect to the Ignition wire of the vehicle. The source wire should have +12 V with the Ignition Key in the IGNITION ON (RUN) and CRANK positions.
E	ORANGE	(+) Accessories output (30 A)	Connect to the Accessories wire of the vehicle. The source wire must have power with the Ignition Key in the IGNITION ON (RUN) position only (no power in the CRANK position). This wire will power the Heater Fan.
F	GREEN	(+) Fifth Relay output (30 A)	This high-current output can be used to power a second Ignition, Accessories or Crank wire. See Jumper Setting , later in this Guide, for correct output.

5-pin Secondary Harness

Wire	Colour	Function	Description
1	BLACK	(-) Chassis ground input	This wire must be connected to bare, unpainted metal (the Chassis or the true Body ground). It is preferable to use a factory ground bolt rather than a self-tapping screw. Screws tend to get loose or rusted over time and can cause erratic problems.
2	PURPLE	(A.C.) Tachometer input	This wire must be connected to the negative side of the Ignition Coil in vehicles that use conventional coil systems. In Multi-coil systems, the Tach wire may be difficult to locate: the negative terminal of an injector may be used. Note: a Tach-programming procedure must be carried out after the installation is completed.
3	GREY	(-) Hood Switch input	Connect this wire to the installed Hood Pin switch supplied. This input will disable or shut down the Remote Starter when the Hood is up, and can also set off the Alarm.
4	ORANGE	(+) Brake Switch input	This wire must be connected to the Brake Light wire of the vehicle. This wire must have +12 V only when the Brake Pedal is down. This input will shut down the Remote Starter if the Brake Pedal is pressed.
5	YELLOW	(+) 12 V Parking Light output	This wire provides a +12 V output and must be connected on the vehicle to the Parking Lights wire that tests +12 V when the Light switch is in the ON position. Note: Ensure that the voltage does not decrease or increase when the dimmer control switch is turned. If the voltage goes up or down, find another Parking Light wire.

12-pin Accessories Harness

Wire	Colour	Function	Description
1	BLUE	(-) Trunk / AUX 3 output	500 mA negative output. This output can be used to control the Trunk release (1-sec. pulse), or it can be set to operate as a constant output as long as the TRUNK button is held pressed (for Sunroof or Window closure)
2	BROWN	(-) Lock output	Programmable 500 mA negative output: 1/10-sec., 7/10-sec. or 4-sec. pulse
3	GREEN	(-) Unlock output	Programmable 500 mA negative output: 1/10-sec., 7/10-sec., 4-sec. or double 1/4-sec. pulse (ON 250 ms, OFF 500 ms, ON 250 ms).
4	WHITE / BROWN	(-) Rearm output	500 mA ground signal when the Doors are locked by remote control. This wire will go to ground 1/2 sec. before the LOCK pulse, and go out 1/8 sec after LOCK . The wire must be connected to the OEM Arm wire (usually the Door Pin). Note: The System will also give a Rearm pulse on this wire when it shuts down the vehicle after a remote start.
5	WHITE / GREEN	(-) Disarm output	500 mA ground pulse when the Doors are unlocked by remote control. Connect to the OEM Disarm wire of the vehicle. Note: The system will also give a Disarm pulse on this wire before every remote start.
6	BLUE / WHITE	(+) Positive Door input	This input should be used in vehicles with positive-switching Door pins or Dome Light circuits. Connect to the Dome Light wire that tests +12 V when a Door is open. Caution! The installer should use either the positive or the negative Door input. Never use both of them simultaneously.
7	WHITE / ORANGE	(-) Starter Kill output (armed output)	This wire will provide a constant 500 mA output when the system is armed (locked by remote control). It can be connected to an external Starter Interrupt Relay. This wire should be connected to a Single Pole Double-Throw Relay: this wire will connect to Pin 85 on the Relay, and Pin 86 will be connected to the Ignition wire. The Starter Kill output becomes active during remote starts. One benefit of the Starter Kill is the Anti-Grind feature. Once the vehicle has been remote started, the Anti-Grind prevents the Starter Motor from re-engaging when the Ignition Key is inserted in the Ignition Switch and accidentally turned to the CRANK position.
8	ORANGE	(-) Parking Brake input	Connect to the negative Parking Brake Indicator Light wire of the vehicle. This wire is found at the parking brake lever itself. Note: The wire should test ground when the Parking Brake is engaged.

9	PURPLE	(+) Siren or Horn output	+12 V siren output. Connect to the positive side of the Siren.
10	WHITE	(-) Ground Out When Running	<p>This wire provides a constant 500 mA ground output while the System is running. This output becomes active at the same time as the Ignition and shuts off when the System shuts down, e.g.: when the Run Time has expired, when the STOP button has been pressed, etc. This output can be used to activate external relays, bypass kits, etc..</p> <p>Caution! If multiple relays or modules are connected to the GROUND OUT WHEN RUNNING wire, make sure they are diode-isolated from one another: feedback may otherwise occur, causing damage to the vehicle.</p>
11	GREY	(-) Negative Door input	<p>This input should be used in vehicles with negative-switching door pins or dome light circuits. Connect to the dome light wire that tests ground when a door is open.</p> <p>Caution! The installer should use either the positive or the negative door input. Never use both of them simultaneously.</p>
12	YELLOW	(+) Glow-Plug input	<p>In Diesel Mode, this positive input will monitor the Glow Plug Light: it will wait for up to 18 seconds until the Glow-plug Light goes out before allowing the System to proceed to cranking the Engine. Connect to the side of the Glow-plug Light which is positive when the Light is on.</p> <p>Note: the System will nevertheless proceed to cranking the Engine if the Glow-plug Light is still on after the 18-sec. delay (25 sec. when the Run Time is set to 30 min.).</p> <p>A Note on the Diesel Glow-plug Indicator Light: (Also known as the “wait-to-start light”). The purpose of the Glow-plug circuit on diesel vehicles is to pre-heat the Combustion Chamber before the vehicle is started. When a Remote Starter is installed on a diesel vehicle, the Glow-plug section of the Ignition circuit must be activated and allowed to operate before the vehicle is remote-started. For that purpose, the Glow-plug input wire of the System must be connected to the Glow-plug indicator light of the vehicle.</p> <p>Caution! The System will only accept positive Glow-plug input signals, therefore negative Glow Plugs should only be connected using relays to invert the polarity. A diode must be added between the negative Glow-plug trigger on the relay and the negative Glow-plug wire of the car. This is to prevent feedback effects on the Glow-plug indicator light on the instrument cluster: the light on the dash would come on because of the feedback, even though the circuit is off.</p> <p>When the user remote-starts the vehicle:</p> <ul style="list-style-type: none"> • The System will power up the Ignition circuit and wait to engage the Starter Motor while the Glow-plug indicator light is still on. • The System will engage the Starter Motor as soon as the Glow-plug light (+) goes out. <ul style="list-style-type: none"> ○ Minimum waiting time is 3 seconds. ○ Maximum waiting time is 18 seconds.

12	YELLOW	(+) Glow-Plug input	<p>If no Glow-plug wire is found on the vehicle, the Glow-plug input on the System may be “timed out”. The System will power up the Ignition and Glow-plug circuits and simply wait for the time-out before starting:</p> <ul style="list-style-type: none"> • Connecting the Glow-plug input wire of the System to Ignition will hold the ignition ON for the maximum waiting time (18 sec., recommended). • Keeping the Glow-plug input wire of the System unconnected will hold the ignition ON for the minimum waiting time (3 sec., not recommended in very cold environments). <p>Connect the Glow-plug wire to the Ignition wire only after the Tach programming has been completed: Connecting the Glow-plug wire is one of the very last steps in the installation process.</p>
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2-Pin Harness

Wire	Colour	Function	Description
1	BLUE/ WHITE	(-) AUX 2 output	<p>This 500 mA negative output can be programmed for one of the following Options:</p> <ol style="list-style-type: none"> 1. Constant while pressing the FUNCTION button followed by the LOCK button, + 1 sec. after the buttons are released. 2. Pressing the FUNCTION button followed by the LOCK button toggles the output ON and OFF with automatic toggle OFF after 30 seconds.
2	YELLOW	(-) Parking Light output	500 mA negative Parking Light output.

Flashing the Hood Pin Switch

Flashing the hood pin switch is a procedure that brings the system into programming mode. Once the system is in programming mode, the installer will have up to 20 seconds to select one of the sub-menus. If the installer fails to select a sub-menu before the 20-second delay, the system will exit programming mode and the installer will have to flash the hood pin switch once more.

Tip: As long as the hood is up, you may use the programming assistance button instead of the hood pin switch.

Here are the steps which the installer must follow in order to **flash the hood pin switch**:

The Installer ...	The Module ...
1. Press and hold the hood Pin switch for 4 seconds.	
2. Release the hood pin switch.	The parking lights will turn ON .
3. While the parking lights are ON , press down the hood pin switch once more.	
4. Release the hood pin switch again. Caution! If you press down and release the hood pin switch too many times, you will enter diagnostic mode rather than programming mode.	The parking lights will stay ON for 20 seconds
5. You now have 20 seconds to select one of the sub-menus.	

Table 1

Once the system has entered programming mode, you will have a selection of many different sub-menus, which will be described later in this guide:

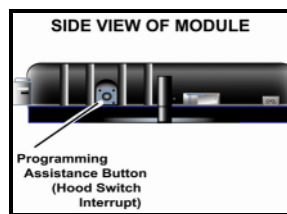
- a. Transmitter Programming
- b. Programming Options
- c. Honk/Horn Timing (if available)
- d. Tach Programming

Remember:

Once the parking lights are ON (solid), you have up to 20 seconds to select a sub-menu. If you do not select a sub-menu within 20 seconds, the system will exit programming mode and you will have to flash the hood pin switch once again.

The Programming Assistance Button (P.A.B.)

Mounted on the system, this button can be used from within the vehicle instead of the hood pin switch in the engine compartment. This will spare the installer the trouble of accessing the hood pin switch in the engine compartment.



Caution

The hood pin switch must be installed and connected in order for the programming assistance button to function. **The button will work only when the Hood is up.**

Programming a Transmitter

Before you Proceed

The transmitter of the system is not delivered pre-programmed: it must be programmed after the wiring of the system is completed. The system has the ability to retain up to 4 different transmitter codes; if a fifth transmitter is programmed, the code of the first transmitter will be lost from memory. **To erase all transmitter codes from memory, you must perform a reset of the system** (see **Resetting the System**, later in this guide, for more details).

A Word of Caution About the Alarm

The alarm is triggered when the unit is powered up because the default state of the alarm is **ARMED**. You will therefore need to shut off the alarm before you carry out the transmitter programming procedure.

One way to shut off the alarm is to (1) set the system to valet mode and then (2) immediately set the system **out of** valet mode. (See instructions below.)

Getting into Valet Mode

1. Turn the ignition key to the **IGNITION ON (RUN)** position.
2. Within 3 seconds, press and release the valet button (the L.E.D. will come on and stay lit).

The system must exit valet mode before a transmitter programming procedure can be carried out:

Getting out of Valet Mode

1. Turn the ignition key to the **IGNITION ON (RUN)** position.
2. Within 3 seconds, press and release the valet button (the L.E.D. will go out)

(See section **valet operation**, in the user guide, for more details on the use of valet mode.)

As the system exits valet mode, you will have 30 seconds to carry out the transmitter programming procedure before the alarm rearms.

The Transmitter Programming Procedure

1. **Flash the hood pin switch (see Table 1)**
 - The parking lights will stay **ON** for up to 20 seconds.
 - Before the lights go out, turn the ignition key to the **IGNITION ON (RUN)** position.
 - Immediately turn the ignition key back to the **OFF** position.
 - Press and hold the **LOCK** button and keep it down until the **parking lights flash 5 times** quickly and the siren will chirp twice.
 - The system has stored the code of the transmitter into memory.
2. To exit: close the hood.

Table 2

To program a transmitter on the second vehicle for multi-car operation, you must press the **TRUNK** button (instead of **LOCK** or **UNLOCK**) in transmitter programming procedure.

Entering Programming Options Mode

The system is equipped with four custom programming modes that allow the installer to custom-fit the system outputs according to installation requirements. The programming options are designed to facilitate interfacing with all vehicle types. (See section **Table of programming options** later in this guide.)

1. **Flash the hood pin switch (see Table 1)**
 - The parking lights will stay **ON** for up to 20 seconds.
 - Before the lights go out:
2. Press and hold the brake pedal,
 - And press one of the following buttons on the transmitter:
 - LOCK**to access Mode 1;
 - UNLOCK**to access Mode 2;
 - TRUNK**to access Mode 3;
 - START**to access mode 4.

The **parking lights** will **flash** and the **siren** will **chirp** once, twice or three times to confirm entry into a mode.
3. Release the brake pedal.

Table 3

Note
 The unit will stay in the selected programming mode until the hood pin-switch or the brake pedal is pressed again. **Therefore take your time to make the proper selection.** Pressing the brake pedal will take you back to the programming centre, where you can select a different mode.

Once you access a particular programming mode, you will automatically start at function 1. Once you select one of the options of function 1, you will automatically be taken to the next function.

To select one of the five options of any given function, press the buttons(s) on the transmitter:

- LOCK** buttonto access Option 1
- UNLOCK** buttonto access Option 2
- TRUNK** buttonto access Option 3
- START/STOP** buttonto access Option 4
- FUNCTION** then **LOCK** buttonsto access Option 5

Table 4

In each function, once an option has been selected the parking lights will flash 1, 2, 3 or 4 times (depending on the selected option). **Please note** that the different functions within any particular mode can only be accessed sequentially: the programming centre will move from function 1 to function 2, then to function 3, and so on. Therefore, whenever you access a particular mode, be prepared to re-configure all the functions of that mode in ascending order.

Multi-Level Features *(default state)*

Basic Features *(press the FUNCTION button 1X)*

FUNCTION > LOCK:..... AUX 2

FUNCTION > START/STOP..... cold weather

Multi-Car Operation *(press the FUNCTION button 2X)*

FUNCTION > FUNCTION > LOCK:..... 2nd car lock

FUNCTION > FUNCTION > UNLOCK:..... 2nd car unlock

FUNCTION > FUNCTION > START/STOP: 2nd car start/stop

Customized Features *(press the FUNCTION button 3X)*

(May not be applicable for certain vehicles)

Your installer can add customized features such as turning on the radio, opening sliding doors, etc.

FUNCTION > FUNCTION > FUNCTION > LOCK: customized feature 1

FUNCTION > FUNCTION > FUNCTION > UNLOCK: customized feature 2

FUNCTION > FUNCTION > FUNCTION > START/STOP: customized feature 4

By default, the multi-level features are programmed as follows:

- Level 1 (Basic Features)
 - Level 2 (Multi-car operation)
 - Level 3 (Customized Features)
- To access a feature that is programmed as level 1, press the **FUNCTION** button once followed by the desired function.
 - To access a feature that is programmed as level 2, press the **FUNCTION** button twice followed by the desired function.
 - To access a feature that is programmed as level 3, press the **FUNCTION** button three times followed by the desired function.

Your installer can customize the system as to personalize these multi-level features in an order that best suits you. Your options are:

Option 1:		
Level 1 (requires pressing the FUNCTION button 1X)	→	Multi-car operation
Level 2 (requires pressing the FUNCTION button 2X)	→	Basic features
Level 3 (requires pressing the FUNCTION button 3X)	→	Customized features
Option 2:		
Level 1 (requires pressing the FUNCTION button 1X)	→	Basic features
Level 2 (requires pressing the FUNCTION button 2X)	→	Multi-car operation
Level 3 (requires pressing the FUNCTION button 3X)	→	Customized features
Option 3:		
Level 1 (requires pressing the FUNCTION button 1X)	→	Customized features
Level 2 (requires pressing the FUNCTION button 2X)	→	Multi-car operation
Level 3 (requires pressing the FUNCTION button 3X)	→	Basic features
Option 4:		
Level 1 (requires pressing the FUNCTION button 1X)	→	Basic features
Level 2 (requires pressing the FUNCTION button 2X)	→	Customized features
Level 3 (requires pressing the FUNCTION button 3X)	→	Multi-car operation

Example: If the multi-level features were set to option 3, the setup would be as follows:

- Level 1 → Customized feature
- Level 2 → Multi-car operation
- Level 3 → Basic features

The “**Basic features**” are now programmed as level 3 and therefore:

- To access the aux. 2 feature, the user needs to press on the **FUNCTION** button three (3) times followed by the **LOCK** button.
- To access cold weather mode, the user needs to press on the **FUNCTION** button three (3) times followed by the **START/STOP** button.

Tach Programming

About Tach Programming

If you press the **START/STOP** button before carrying out a tach programming procedure, the system will make no attempt to start the engine and the parking lights will give 5 flashes. In order to carry out tach programming, follow the automatic tach programming procedure. The system stores tach settings regardless of the procedure used at the time of tach programming. All tach settings are cleared when the system is reset. A new tach programming procedure has to be carried out **only** if the system is reset.

Multi-speed Tach Programming

Tach signals may vary from vehicle to vehicle. The system is designed to read a wide range of tach signals produced by recent ignition systems. There is no necessary manual adjustment. Nevertheless, a tach-programming procedure **must** be carried out **every time a new system unit is installed**. This is because the tach signals of certain ignition systems are sometimes too low or too high for the system, causing failed start-ups at various temperatures.

1. **Flash the hood pin switch (see Table 1)**
 - The parking lights will stay **ON** for up to 20 seconds.
 - Before the lights go out:
 2. Press and hold the **brake pedal**,
 - And simultaneously press the **LOCK** and **UNLOCK** buttons on the transmitter:
 - The parking lights will flash 4 times.
 - Release the brake pedal.
 3. **Start up the engine** and allow the vehicle to reach regular engine idle speed.
 4. Once the engine is running idle, press the **brake pedal** and hold it down until you hear the parking lights output flash 5 times.
 - Release the brake pedal: Tach programming is now complete.
- The siren will chirp 1, 2, 3 times to indicate which tach mode has been detected.**

Table 5

Note

The L.E.D. follows the parking lights during the transmitter programming procedure. At any time, close the hood to end the tach-programming procedure.

Automatic Tach Programming

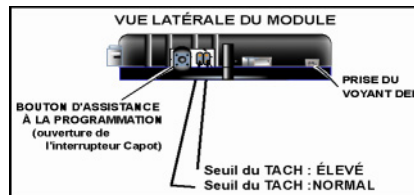
This simple procedure can replace the multi-speed tach programming procedure:

1. Make sure that all the connections are properly made and that the system is powered up.
2. With the hood up (ground on the hood pin switch line), start the vehicle using the key.
3. Allow the vehicle to reach regular engine idle speed.
The parking light output from the system will activate when the vehicle starts and shut off once a tach signal is detected.
4. Press the **brake pedal** and keep it down until you hear the parking lights output flash 5 times and the siren chirp twice.
5. Shut down the engine. Tach programming is now complete.

Table 6

Prise pour configuration tachymétrique

Certains nouveaux véhicules ont un seuil de voltage Tachymétrique plus élevé, ce qui excèderait la capacité de déclenchement normal du circuit de lecture du démarreur à distance. Le changement de la prise au seuil de tachymètre ÉLEVÉ permettra au module de bien détecter le signal du Tachymètre.



Siren or Horn Chirp Timing

Follow these steps to program siren or horn confirmation:

1. Ensure that the hood is up and that the ignition is OFF.
 1. Hold the hood pin-switch down for 4 seconds.
 2. Release the pin-switch. The parking lights will come on.
 3. While the parking lights are on, immediately push and release the pin-switch again. **The parking lights will stay on for up to 20 seconds.**
2. Press and hold the brake pedal, then simultaneously press the UNLOCK and START/STOP buttons on the transmitter – **the siren or horn will chirp 5 times.**
3. Release the brake pedal.
4. To change the timing:
 1. To increase the siren or horn pulse by 3 ms, press the LOCK button.
 2. To decrease the pulse by 3 ms, press the UNLOCK button.
 3. To increase the pulse by 10 ms, press the START/STOP button.
 4. To decrease the pulse by 10 ms, press the TRUNK button.
5. To save the new settings: press LOCK and UNLOCK. If 3 chirps are returned the new settings have been saved.

Table 7

Otherwise close the hood to cancel the changes.

Note

Select siren or horn in the programming options.

The siren and the horn each have their own settings. Changing the settings of one of them will not affect the settings of the other.

For each timing change, the siren or horn will chirp with the new settings, except in the following cases:

1. When the lower limit of 5 ms is reached, there will be a 1/4-sec. chirp.

2. When the upper limit of 200 ms is reached, there will be a 3/4-sec. chirp. A system reset will set the system back to the default values: 30 ms for the horn and 120 ms for the siren.

Testing

Before putting the vehicle back together, it is recommended to check that the system operates properly. The following testing procedures should be used to verify proper installation and operation of the system. Before testing, make sure that all connections are soldered and that the unit is plugged in.

1. **Make sure the system properly enters and exits ready mode:**

Setting the system to ready mode

1. Ensure that all the doors are closed and that the gear shift lever is in the **NEUTRAL** position.
2. With the engine already running, apply the parking brake and release the brake pedal.

Make sure to release the brake pedal.

3. Within 20 sec. push **LOCK**, or **UNLOCK**.

The parking lights will flash 3 times quickly and remain lit.

4. Remove the key: the engine will continue running.
5. Exit the vehicle and close the doors.
6. Press either:
 - a. **LOCK** to lock the doors arm the alarm and shut down the engine or enter turbo mode ;
 - b. **UNLOCK** to unlock the doors and shut down the engine or enter turbo mode ;
 - c. **START/STOP** to shut down the engine without affecting the doors.

Table 8

Remaining in ready mode

Once the vehicle is in ready mode, you can start and stop the vehicle as needed; however, should any one of the following occur, the vehicle will exit ready mode, thus disabling remote start capabilities until ready mode is restored:

- Door opened,
- Hood opened,
- Brake pedal pressed,
- Parking brake disengaged,
- Ignition key turned to the **IGNITION ON (IGNITION ON / RUN)** position.

Should any of the above occur, ready mode will be cancelled.

Table 9

2. **Remote-start the engine and listen for Starter drag.** If the starter cranks for too long, carry out another tach learning procedure.
3. **Test hood switch shutdown:** with the vehicle running under the remote starter, open the hood; the vehicle should shut down. If it does not shut down, check the hood pin-switch and its connector.
4. **Parking brake shutdown circuit.** With the vehicle running under the system, disengage the parking brake. The engine should shut down immediately. If the engine continues to run, check the parking brake switch connection.
5. **Test the brake shutdown circuit:** With the vehicle running under the remote starter, press and release the brake pedal. The engine should shut down immediately. If the engine continues to run, check the brake switch connection.

6. **Door pin shutdown circuit.** Make sure the system **exits ready mode** when each door is opened while the vehicle is running under a remote start (Test each door).
7. **OEM alarm control:** Make sure the module is able to arm and disarm the OEM alarm (if applicable).
8. **Alarm testing:** Arm the vehicle and test the hood pin and each door to make sure that each one of these points triggers the alarm.
9. **Door locks, auxiliary outputs and trunk testing:** Make sure each of these options respond to the transmitter (if they were installed).
10. **Shock sensors:**

Mounting shock sensor:

Mount the sensor in the most central location on the vehicle as to allow the sensor to detect vibration equally from each side of the vehicle. Two common places to mount the sensor are wire harnesses or metal braces located under the dashboard/center console.

Setting:

Turning the dial clockwise increases the sensor's sensitivity and turning the dial counter-clockwise decreases the sensor's sensitivity.

Testing:

Make sure the hood and the doors are closed. Arm the alarm and wait approximately 10 seconds to let the vehicle "settle". A **light "tap"** on the vehicle should **NOT** trigger either the alarm or the warn away. A **medium "tap"** should trigger the warn away. A **hard "tap"** should trigger the alarm.

All vehicles are different and therefore transmit shock level differently, if you are unable to set both zones to your satisfaction, referer to **Function 4 – Shock Sense / Warn Away** (programming options) to disable the appropriate zone(s).

When the engine is running after remote start **the shock sensor will not trigger an alarm condition**, although it will still produce warning chirps if warn-away is enabled.

11. **Two-stage disarm:** When the vehicle is in an alarm condition, pressing the **UNLOCK** button mutes the siren, pressing the **UNLOCK** button a second time disarms the module.
12. **Starter kill option:** Sit inside the vehicle with all the doors closed. Arm the vehicle and then try to start the vehicle with the key —it should not start. If the vehicle starts, rewire the starter kill so it functions properly.
13. **Valet mode:** Make sure the module is able to enter and exit valet mode properly. When setting the module into valet mode, the starter kill function is disabled, when pressing **LOCK** the doors will lock but the starter kill will not be activated. (Refer to user guide for more information on valet mode).
14. **Idle mode:** Make sure the vehicle properly goes into idle mode.

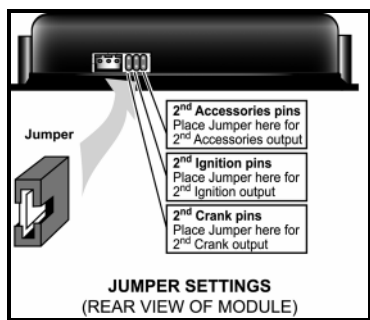
Closing Up

Use tie-wraps or screws to properly secure the system and keep the wiring away from any moving parts such as the parking brake or the steering column shaft. Mount all switches in good and accessible locations where they do not risk getting kicked or hit accidentally. Most product returns are the result of misunderstandings about how a product works or performs. Take the time to properly explain all functions and features to the customers before they leave the premises. Doing this will save time and money. Always make all your connections before plugging in the system,

and be sure to test all functions properly before closing up the installation. Make sure the warning label is applied on a visible place under the hood.

Supplementary Information

Fifth Relay Output (2nd IGN, ACC or CRANK)



Systems of this series are equipped with an on-board high-current programmable 5th relay that can be used to power a second ignition, accessory or crank wire.

The unit uses 3 sets of pins; each set corresponds to a specific function of the output. In order to activate one of the three possible functions, you must place the jumper (supplied) on one of the three sets of pins and connect the 14 AWG wire to the second **IGN.** / **ACC.** / **CRANK** wire of the vehicle.

Caution!

Only one set of pins can be used at one time. Using more than one jumper may result in serious damage to the vehicle.

The relay output rating on this unit is 25 A at most. Defective OEM solenoid switches can sometimes draw up to 50 or 60 A, causing the 30 A fuse to blow. Always verify your circuit with an appropriate measuring device.

Clutch Bypass

In order to remote start a manual transmission vehicle, the clutch switch must be bypassed. Clutch safety switch circuits can take many forms. Listed below are the most common ones. When testing to determine the type of clutch circuit, it is recommended that you use a computer safe logic probe. Some vehicles may also have a separate or combined switch on the clutch pedal for cruise control. Usually a cruise control switch reacts the moment you touch the pedal, where as a clutch switch reacts only when the pedal is near the floor. Once the circuit type has been determined, you must recreate what happens electrically at the switch with the remote start module, to bypass the clutch during remote starts. Relays are often used to accomplish this. Always use the Ground Out when Running (G.O.) as the negative trigger on your clutch bypass relays, as it is only active during remote starts. **NEVER** permanently bypass a clutch switch. Do not attempt this if you are unfamiliar with the use of relays, and diode isolation.

Before any hot wiring attempts:

Test and record the way each wire tests in the following positions:

Without the pedal pressed:

- ◆ test the wire with the ignition OFF
- ◆ test the wire with the ignition ON
- ◆ test the wire with the key in the start position

With the pedal pressed:

- ◆ test the wire with the ignition OFF
- ◆ test the wire with the ignition ON
- ◆ test the wire with the key in the start position

With this information for every wire at the switch, determining what type of clutch switching system you have will be easy.

Direct Feed:

The simplest type of system to test and bypass is the "direct feed" system. This circuit simply interrupts the +12 V signal starter wire from the ignition switch to the starter solenoid. There are 2 wires in this circuit, the "key side" wire which goes from the clutch pedal to the Ignition switch, and the "solenoid side" which goes from the clutch switch to the starter motor. When the key is turned to the start position without pressing the pedal, you will test 12 V only on one of the wires at the clutch switch, this is the key side. When the pedal is pressed down, and the key is in the crank position, the other wire will also read 12 V; this is the solenoid side wire. To confirm you have a direct feed clutch switch, hotwire the "solenoid side" wire with a fused +12 V and the starter motor will crank. Connect the starter output from the remote starter to solenoid side wire.

Note: In the next two systems a relay in the vehicle interrupts the start wire between the ignition switch and the starter motor. With the key in the start position, and the clutch pedal pressed, the relay energizes and allows the start signal to reach the starter motor. In these systems a wires from the clutch triggers the relay, when the pedal is pressed. There will be another wire at the clutch switch that supplies the signal to the trigger wire (either positive or negative, depending on the system).

Negative:

In a negative system, when the clutch is pressed; a negative signal is sent to the relay, the relay energizes, when the key is turned to the start position the 12 V from the start wire is allowed to pass through the relay and to starter motor. One of the wires at the clutch will test as negative, this is the supply wire. The relay's negative trigger wire will only show negative when the pedal is pressed (some vehicle's also require the Ignition system to be powered). To confirm you have a negative system, hot wire the negative trigger wire by jumping it to a ground source with your fused test jumper. You should now be able to turn the key to the start position and engage the start motor without pressing in the clutch pedal. If there is nothing else connected to the G.O. wire from the remote start module, the G.O. wire should be strong enough to trigger the vehicle's clutch relay. If there are other devices or modules connected to the G.O. wire, a relay (and diodes) may have to be added to strengthen the negative current going to the clutch bypass.

Positive:

Very similar to the negative system, except that the vehicle's clutch relay is trigger by 12 V, instead of a negative signal. In a positive system, when the clutch is pressed; a positive (12 V) signal is sent to the relay, the relay energizes, when the key is turned to the start position the 12 V from the start wire is allowed to pass through the relay and to starter motor. One of the wires at the clutch will test as 12 V, this is the supply wire. The relay's positive trigger wire will only show positive when the pedal is pressed (some vehicle's also require the ignition system to be powered). To confirm you have positive system, hot-wire the positive trigger wire by jumping it to a 12 V source with your fused test jumper. You should now be able to turn the key to the start position and engage the start motor, without pressing in the clutch pedal. A relay is needed to send 12 V to the trigger wire from the start module during start attempts.

Normally Closed (N/C):

Note: There are different types of this system used by various vehicle manufacturers; the following is used to illustrate how these systems work in general.

A relay is also used in these types of systems to interrupt the starter wire. In the previous two examples, the clutch was bypassed by engaging the clutch relay; with this system you bypass the clutch by preventing the clutch relay from engaging. When the ignition key is turned to the start position the relay energizes and interrupts the start wire, when the pedal is not pressed. When the ignition key is turned to the start position, and the pedal is pressed, the relay does not energize, and the start signal reaches the starter motor.

In a N/C system the supply wire is connected to the relay's trigger wire at rest (pedal not pressed). When the pedal is pressed, the connection is broken between the supply wire and the relay's trigger wire (this disengages the relay). To verify that you have a N/C system, disconnect the clutch switch and the vehicle should start without the clutch pedal being pressed. When you test the trigger wire with your logic probe, the trigger wire will test as 12 V or negative when the pedal is not pressed, it should read as an open circuit (or float) when the pedal is pressed. **Note:** your probe may also show feed back from the other end of the circuit. The polarity of the trigger wire does not matter in this system, since all you need to do in order to bypass it is to use a relay to interrupt it during remote starts.

Ignition-controlled Door Locks

This feature will lock all the doors of the vehicle when the brake pedal is pressed while the ignition key is in the **IGNITION ON (RUN)** position. The unit will unlock all doors when the ignition key is turned back to the **OFF** position.

If ignition lock only is selected, the system will only lock all doors when the brake pedal is pressed while the ignition key is in the **IGNITION ON (RUN)** position.

If the ignition unlock only option is selected, the system will unlock all doors when the key is turned to the **OFF** position (provided that the ignition key was in the **IGNITION ON (RUN)** position and that the brake pedal was pressed at least once).

Ignition Re-lock

This feature is automatically available whenever ignition lock is available. When ignition is **ON** (but not under remote start) and a door is opened and closed, the system will re-lock all doors next time the brake pedal is pressed.

Secure Lock

This feature allows the system to control certain OEM factory alarm systems without requiring the use of other wires for disarming the OEM alarm. (Namely, this feature is designed for OEM systems which use the factory lock wire to arm the alarm and the unlock wire to disarm it.)

Standard Secure Lock

If this Option is selected, upon receiving a remote start signal, secure lock will unlock the doors (disarming the factory alarm); ½ second after remote start secure lock will re-lock the doors. 4 seconds after shutdown, secure lock will re-lock all doors (arming the system once again). **Note** that most OEM systems will **not** rearm the alarm while the engine is running, but will still lock the doors.

Smart Secure Lock

If the vehicle is initially locked, upon remote start the system will trigger an unlock pulse and a disarm pulse before the engine is started. The system will lock again when the engine is running, and lock once again 4 seconds after shutdown.

If the vehicle is initially unlocked, upon remote start the system will start the engine and arm the starter kill and alarm, but the doors will not be locked or unlocked at any time during the sequence.

Lock Pulse Duration

The duration of the lock and unlock pulses can be configured as follows:

- (Default) 7/10 of one second lock and 7/10 of one second unlock pulses
- 4-second lock/unlock pulses to control vacuum door lock systems
- A single 7/10 of one second lock pulse and two ¼ of one second unlock pulses for double-pulse disarm/unlock systems.

- 1/10 of one second lock and 1/10 of one second unlock pulses

Engine Run Time

Use this function to configure the length of time the engine will be left running under remote control. The system will allow the engine to run for **4, 15 or 25** min. in gasoline mode and **9, 20 or 30** min. in diesel mode. Standard default run time is 15 minutes in gas mode and 20 minutes in diesel mode.

Open Zone Notification

This feature will warn the user when a door is left open: upon the arming of the system, a 10-second notification delay will take place, after which the siren will chirp 3 times if an open door is detected.

Starter Kill (Installation)

The system is equipped with a selectable passive or active-arming starter kill circuit that will prevent the vehicle from being started with the ignition key when the system is armed. The starter kill wire will provide a constant 500-mA. negative output when the system is armed (locked by remote control) and can be connected to an external starter or ignition interrupt relay.

The starter kill circuit follows the arming function of the alarm and therefore can be set to arm in either passive mode or active mode.

Passive or Active Arming

- **Active Arming:** the alarm and the starter kill will not arm automatically. Press the **LOCK** button to arm and the **UNLOCK** button to disarm it.
- **Passive Arming:** the alarm and the starter kill will arm automatically if it is not armed by remote within a 30 second delay. Press **UNLOCK** to disarm.
- **Passive Arming** without siren mute. Press **UNLOCK** to disarm.

Disarmed Notification: See description below.

Relock after Passive Arming

If you unlock the doors with the remote transmitter, but do not open any of the doors within 30 seconds, the doors automatically relock and rearm the system.

Disarmed Notification

This feature will notify the user when the vehicle is left disarmed: (1) after Ignition is turned off and the ignition key is removed from the ignition switch, or (2) when the system is disarmed after being previously armed, the opening or closing of a door will start a 10 second. timer, after which the Horn or Siren will chirp once, if the vehicle was left unprotected, to warn the user. Pressing **LOCK** or **UNLOCK** before the 10 second delay elapses will cancel this warning.

Siren Mute

When the siren is sounding, pressing the **UNLOCK** button will stop the siren. Note that this will not unlock or disarm the vehicle.

Horn / Siren Mode

The System can be configured to use either the siren or the horn for sound signals and alarms.

Siren or Horn Chirps

The siren can be configured to give the following signals:

Warning Chirps:

Arming and disarming the car (**LOCK** or **UNLOCK**) will not cause the siren to chirp. While the vehicle is being armed, the siren will chirp 3 times if a zone is active. After the alarm is set off, disarming the vehicle will cause the siren to chirp **4 times**.

Full Chirps:

Pressing the **LOCK** button will lock all doors, arm the system and:

- (1) cause the siren to **chirp 1 time** if all zones are inactive.
- (2) cause the siren to **chirp 3 times** if a zone is active.

Pressing the **UNLOCK** button will unlock and disarm the vehicle and:

- (1) if no intrusion was detected, the siren will chirp 2 times.
- (2) if an intrusion was detected, the siren will chirp 4 times.

Open Zone Notification (see below):

If a door is detected as open 10 second after arming, the siren will chirp 3 times.

Chirps disabled: the siren will not chirp under any circumstance.

Shock Sense and Warn-away Sense

Your system can react to a full shock by triggering the alarm; it can also respond to a lighter shock (30 % of the strength of a full shock) by giving a warn-away: The siren will chirp but no alarm condition will be triggered. However, when the engine is running after a remote start, the shock sensor will not trigger an alarm condition, although it will still produce warning chirps if warn-away sense is enabled.

Note

Although the shock sensor may not trigger an alarm condition after remote starts, the door zones and the hood pin-switch may generate one: the door zones and the hood pin-switch are not disabled in any way after remote starts.

Resetting the System

The system is equipped with a reset function that allows the installer to erase all transmitter codes from memory and return all the programming options to the factory default values. Resetting the system is not a required process. Most of the time, you can avoid resetting by fixing the issue directly at the root of the cause.

1. Flash the hood pin switch (see Table 1)
Once inside programming mode, you have 10 seconds to complete the next step.
2. Press and release the break pedal 6 times.
The parking lights will flash **8 times** to confirm resetting.

Table 10

On some vehicles (such as BMW and certain Volkswagen vehicles), resetting will not work if the brake pedal is pressed while the ignition key is **not** in the **IGNITION ON (RUN)** position: Therefore you will need to hot-wire the brake pedal by manually jumping 12 V with a fused test lead at the brake pedal switch.

1. Flash the hood pin switch (see Table 1)
– Once inside programming mode, you have 10 seconds to complete the next step.
2. Press and release the valet button 6 times or more until the parking lights start to flash.
3. The parking lights will flash **8 times** to confirm resetting.

Table 11

Events Logging

With this feature, the system will play back the last 4 start failure events codes and the last Intrusion code via the parking lights or L.E.D.

Events playback

Ensure that the hood is up, that the vehicle is not in valet mode and that the ignition is **OFF**.
Hold down the hood pin-switch for 4 seconds.
Release the pin-switch. The parking lights will come on.
While the parking lights are on, immediately push the pin-switch 3 more times
The parking lights and L.E.D. will flash the five events stored in memory.

Table 12

The first four playback codes are start-failure events, while the last playback code is an intrusion code. There is a pause after each event code is played back. The system will play back the most recent event first, then the second one, and so on. If there is no event at all to report, the parking lights will give one long flash. To jump directly the intrusion code, press the brake pedal. Close the hood to end playback.

Start Failure Codes through the Parking Lights

1 x = No Start	6 x = Hood
3 x = Hardware reset	7 x = Engine running, no ignition detected, or tach before start
4 x = Brakes	10x = Alarm condition
5 x = No tach cut-off	

Note: "x" stands for one flash of the parking lights

Intrusion Codes

1 x = Power-up reset: battery disconnected / reconnected or dead...	3 x = Shock sense
2 x = Doors intrusion	4 x = Hood
	5 x = Panic
	6 x = Ignition

Intrusion Codes through the LED Light

If there has been an intrusion in the vehicle while it was locked and armed, the LED will provide an intrusion code matching the type of the intrusion which took place. The LED intrusion codes are flashed in continuous loops, using the same codes as those provided during events playback:

1 x = Power-up Reset: Battery disconnected / reconnected or dead...	3 x = Shock Sense
2 x = Doors intrusion	4 x = Hood
	5 x = Panic
	6 x = Ignition

Installation Order

The following is a suggested order for the Installation procedure. It is intended as a guide for novices, to help make the process of installing a remote start module easier. Time is wasted by rewiring the module when mistakes are made, also the neatness of the install decreases every time the module is taken down and the wiring is "corrected". A messy install is harder to trouble shoot if there are problems later on. The actual "how to install" is not covered by this list, the order of the installation processes is the focus.

- Before you get started, make sure the vehicle starts and idles properly with the ignition key, and that the electrical system is not compromised in any way.
- After deciding what options are to be added to the basic install, you can start by looking for the wires that will be needed.
- Remember to take care when removing the panels that are covering the wires for which you are searching.
- Once all of the wires have been located, they should be hot-wired to verify that they are the correct wires you will need for the installation.
- When all the wire pass the hot-wire test, they can be stripped to expose the wire (over one inch of plastic should be removed).
- It is always better to strip more than you need than not enough. A common way cold solder joints happen is when not enough plastic is stripped off the vehicle's wire, so during the soldering process the plastic from the wire melts and flows in to the connection instead of the solder.

- Decide where the module is going to be mounted. It is ALWAYS mounted inside the passenger compartment, and never in the engine bay. Under the driver's side of the dash there is usually enough room for the module to fit. Once the location has been decided on, proceed to the next step.
- Mount the antenna and run the cable to the where the module is going to be mounted. The antenna will get the best range when it is high up in the vehicle, and not obstructed by metal. The most common choice is the center of the windshield at the top, behind the rear view mirror, and at least one inch below the tint strip. Another location should be used, if there is another antenna, compass, or other device in this location that may interfere with the range of the start module.
- Mount the Valet switch, and L.E.D. (If applicable). Make sure they are close enough to the selected module mounting location so they will plug in when the module is mounted. If the wires are too short, they will have to be extended.
- In the engine compartment, mount the hood pin in a suitable location. Search along the fire wall for an OEM grommet to run the wires through. If you cannot find an OEM grommet to use, you will have to drill a hole. The hole must be big enough for all of your wires to fit through. To be safe drill the hole out a little bigger so the wires will not get squished. We recommend using an aftermarket grommet whenever you drill a hole through the fire wall. This will protect the wires from rubbing against the bare metal and possibly shorting out. If you are installing an Alarm / starter combo module, mount the siren in the engine compartment at this time.
- The next step is to pre-wire the module. This is done on your work bench, and not in the vehicle. Connect any external modules and relays that may be needed for you install. Tape or tie- strap wires that are going to be routed to the same areas of the vehicle. This will keep things neat when the module is in the vehicle. The fuses on the power wires should be removed during the pre-wire stage. The fuses will not be put back in until the powering stage of the install.
- With the pre-wire finished the module can be mounted in the vehicle. Before the module is mounted, connect the antenna, the valet switch, shock sensor (if applicable) and L.E.D. to the module. With everything connected to the module, it can now be mounted in the vehicle. Use tie-straps to secure it to the vehicle. Make sure the module and harnessing do not interfere with any moving parts, and do not obstruct access to diagnostic ports, or fuse boxes. It should be up in the dash high enough so that it won't get kicked by accident.
- With module secured, route the wires to the previously stripped wires to which they correspond to (leave the engine compartment wires for last). Tie strap them up as you go, so they do not interfere with any thing else.
- When all of the passenger compartment wires run to their locations, you can now route the engine compartment wires through the fire wall.
- With the engine compartment wires out the way, you can begin making the connections in the passenger compartment. Strip about an inch of wire past where the connection is going to be made. This extra bit wire is wrapped around the exposed OEM wire to secure in place while you are soldering.

- When all of the wires have been connected, solder the connections. When the solder has cooled, the connections are then individually taped up, to isolate them.
- Return to the engine bay and route the start module wires to their corresponding connections.
- Solder the engine compartment wire once the connections are made. When the solder has cooled, the connections are then individually taped up, to isolate them.
- Use your DMM to verify your ground location is good, before Grounding the module.
- The last step before programming is to power the module up. Replace the power fuses on the power wire fuse holders. The module will flash the Park lights twice confirming the powering up.
- If you are installing an Alarm / Starter combo module: The siren will be sounding at this point. Place the module into Valet mode to silence the siren. Take the module out of valet mode to continue the programming. (Note: the module default programming is passive arming, after exiting valet mode, the alarm will start the count down for passive arming. You have 30 sec. to begin the Remote control programming procedure, before the module re-arms)
 - Program the Remote control
 - Program the Tach Signal
 - Change the programming of the options, if necessary
 - Test the module's operations
 - If all of the testing is successful the install is complete, and the vehicle can be put back together.

▲ basic introduction to the Relay:

What is a relay?

A device that responds to a small current or voltage change by activating switches or other devices in an electric circuit. An electromagnetic switch, remote controlled switch, a switching device.

Why are Relays used?

Relays can have several purposes in remote car starter installations. They are used mainly for isolation, inversion, interruption, strengthening current, and for **powering multiple wires from one source SAFELY**.

How does it work?

The basic relay consists of a coil and a set of contacts. The most common relay mechanism is electromagnetic. When voltage is applied to the coil, current passes through the wire and creates a magnetic field. This magnetic field pulls the contacts together and holds them there until the current flow in the coil has stopped.

Relays come in all varieties and types, but for the applications that concern us, we will concentrate on the **Single Pole Double Throw (SPDT) 12 Volts relay**.

Naming Convention:

Usually the relay's manufacturer will include an electrical diagram on the relay displaying the role of each terminal and how they interact with each other.

These terminal numbers are standard, and can be used with any SPDT relay.

85 & 86: The Coil. These inputs energize the coil when one is +12 Volts, and the other is Negative. They are usually non-polarized, so it does not matter which one is positive (+) or negative (-).

87: Normally Open (N/O). When the coil is energized, 87 is connected to 30.

87A: Normally Closed (N/C). When the coil is at rest, 87A is connected to 30.

30: Common. When the relay is at rest, 30 is connected to 87A, when the coil is energized, it is then moved and makes contact with 87. (Note: in a SPDT relay, 30 can never be connected to 87 and 87A at the same time, 30 is connected to **either** 87 OR 87A)

What happens:

When there is no voltage across the COIL (terminals 85 and 86), the relay's movable contact ARM (connected to terminal 30) is held, by SPRING tension, against terminal 87a (normally closed circuit).

When 12 V is applied to the COIL (terminals 85 and 86), the ARM (connected to terminal 30) is pulled in by the electromagnet (COIL) so that it physically connects to terminal 87 (normally open circuit)

When 12 V is applied to the COIL (terminals 85 and 86), the ARM (connected to terminal 30) is pulled in by the electromagnet (COIL) so that it physically connects to terminal 87 (normally open circuit)

Remember, there is no polarity on a relay's coil. This means that you may apply positive from the battery to either terminal 85 **OR** 86, and then Ground the OTHER terminal to activate the relay. In other words, you may use either a positive or negative trigger to energize the relay.

Keep in mind, when the relay is energized, if the positive OR the ground connection on the coil is broken, the arm switches the connection between 30 back from 87 to 87a.

Quenching Diodes:

It was said earlier that you energize a relay by applying positive from the battery to either 85 OR 86 and grounding the other terminal. This is not absolutely true, some relays are "polarized" if they have a quenching/ suppression diode (A diode installed between the coil terminals 85 and 86, could be internal or external). To activate the coil on this type of relay, make sure that the +12 Volts trigger is on the same terminal of the relay as the Anode (+ or non striped side) side of the quenching/suppression diode, and that the Negative trigger is on the same terminal of the relay as the cathode (- or striped side) of the quenching/ suppression diode. When a relay's coil is energized, a magnetic field is created and energy is stored in the coil. When power is removed from the coil, the magnetic field collapses. This causes a Reverse Voltage to be generated and can sometimes reach 200 V. A quenching diode absorbs this reverse voltage spike.

A closer look at a relay:

Now that you know what the main inscriptions are on the relay, take a look on the side, and you will see another inscriptions: i.e. **(12 V DV, 40/ 30 A)**

12 V DC: This indicates the coil voltage rating. For an Automotive relay, it's usually 12 V DC.

40/ 30 A: This indicates the current carrying capability of the contacts 30, 87, & 87A.

40: Indicates that the normally closed circuit (30 and 87a) can safely handle a maximum of 40 amps of current.

30: indicates that the normally open circuit (30 and 87) can safely handle a maximum of 30 amps of current.

Examples: The following examples demonstrate some of the most common uses for relays. Isolation, inversion, interruption, strengthening current, and for powering multiple wires from one source SAFELY.

Powering multiple wires from one source safely:

Example: Powering a second Ignition

Problem: You need to power Multiple Ignition wires to remote start the vehicle, but your module only has one Ignition output available.

Solution: You will need to add a second ignition relay to power the second ignition wire.

(Jumping Ignition 1 to Ignition 2 is NEVER recommended. Always use a relay. The vehicle circuits are Isolated for a reason, the wiring of the remote star module should reflect this.)

The relay connections:

- 85:** Connects in parallel to the Ignition 1 output from the remote start module. This becomes the positive side of the coil.
- 86:** Connects to the Ground Out when Running wire from the remote start module. This becomes the negative side of the coil.
- 87:** Connected to a Fused +12 V source, that is capable of supplying power for the vehicle's second ignition wire. This becomes the source of power for the 2nd ignition wire.
- 87A:** No connection. This terminal is not used in this application.
- 30:** Connects to the vehicle's second ignition wire. This becomes the output of the 2nd ignition relay.

Comments: The relay is only energized when the vehicle is running by remote start. When started with the Key, the relay is not energized and the integrity of the stock system has been preserved.

Isolation:

Example: Isolating a park light output

Problem: Some vehicle circuits need to be isolated from feedback. In some cases, when a vehicle is remote started, feed back occurs on a circuit, and powers another device or switch, that was not intended to be powered during the remote starts. The following example will be a Positive (+) Park Light circuit that feeds back and activates the windshield wipers during remote starts.

Solution: When power is applied to the OEM Park light wire it back feeds through the park light switch, and activates the wipers. Where the connection was made from the start modules' park light output, and the vehicle's park light circuit, the OEM park light wire is cut to isolate the park light switch and the actual parking lights. A relay is added to the park light circuit so that power from the remote start module is only sent to the parking lights and not the parking light switch.

The relay connections:

- 85:** Connects to the +12 V Park light output from the remote start module. This becomes the positive side of the coil.
- 86:** Connects to a Negative source. i.e. The spot where the remote start module is grounded. This becomes the negative side of the coil.
- 87:** Connects to the +12 V Park light output from the remote start module. This becomes the power supply for the vehicle's park lights. The OEM park light wire is cut. The side that is still connected to the switch becomes the "Switch Side". The side that is still connected to the Parking lights becomes "Parking Lights Side".
- 87A:** Connects to the "Switch Side" of the cut OEM park light wire.
- 30:** Connects to the "Park Light Side" of the cut OEM park light wire.

Comments: When the relay is at rest, the OEM Park light wire is connected (through 87A & 30) and allowed to operate normally. When the remote start module powers the Park lights, the OEM park light wire is opened, and power from the remote start module is sent only to the actual Parking Lights (from 87 through 30).

Inversion:

Example: Activating a Positive trunk release switch

Problem: The vehicle's power trunk release switch is activated by a positive (+) pulse, and the remote start module's trunk output is negative (-).

Solution: A relay is used to invert the negative signal from the start module to a positive signal before it is sent to the OEM switch.

The relay connections:

- 85:** Connects to the start module's Trunk release output wire. This becomes the negative side of the coil.
- 86:** Connects to a fused +12 V. This becomes the positive side of the coil.
- 87:** Connects to a fused +12 V. This becomes the supply for the positive trunk release.
- 87A:** No connection. This terminal is not used in this application.
- 30:** Connects to the OEM trunk wire in the vehicle.
- Comments:** At rest, the trunk switch is allowed to operate normally. When the Trunk button on the remote is pressed, the negative Trunk output from the remote start module triggers the relay. When the relay is activated, +12 V from 87 is sent through 30, and the OEM trunk switch is activated, by the positive pulse.

Interruption:

- Example:** Creating a Starter Kill relay to prevent unauthorized starting of the vehicle.
- Problem:** The OEM starter circuit needs to be disabled only when theft is attempted.
- Solution:** A relay is used to interrupt the OEM starter wire. There is an output on the remote start module especially for this purpose (Starter Kill output).

The relay connections:

- 85:** Connects to the Starter Kill output wire from the remote start module. This becomes the negative trigger for the coil.
- 86:** Connects to the vehicle's Ignition wire. This becomes the positive trigger for the coil.
- 87:** No connection. This terminal is not used in this application.

The vehicle's OEM start wire is cut. The side of the wire that is still connected to the Ignition switch becomes the "Key Side" of the starter wire. The side of the wire that is still connected to the starter motor becomes the "Starter Side" of the of the starter wire.

- 87A:** Connects to the "Key Side" of the cut OEM starter wire.
- 30:** Connects to the "Starter Side" of the cut OEM start wire.
- Comments:** At rest the relay is not active, and +12 V on the starter wire passes through the relay (through 87A & 30) normally. The Starter Kill output wire on the remote start module is activated when the LOCK button is pressed on the remote control. When a theft attempt happens, and the thief powers the Ignition circuit (to hot wire the vehicle), and the Starter Kill was ARMED (by the LOCK button on the remote) the starter kill relay activates. The OEM start wire is now open, (does not make connection) because 30 is no longer connected to 87A, and the vehicle is unable to start.

Strengthening current:

- Example:** Strengthening an output
- Problem:** A vehicle has a negative (-) trigger trunk release wire. The module has a negative trunk release output wire. The remote start module is unable to supply the necessary current to activate the vehicle's trunk release wire.
- Solution:** A Relay is used to provide the necessary negative current to active the vehicle's Trunk release wire.

The relay connections:

- 85:** Connects to the start module's Trunk release wire output. This becomes the Negative trigger for the coil.
- 86:** Connects to a fused +12 V source.
- 87:** Connects to a Negative source. i.e. The spot where the remote start module is grounded. This becomes the supply for activating the vehicle's Trunk release wire.
- 87A:** No connection. This terminal is not used in this application.
- 30:** Connects to the vehicle's Trunk release wire.
- Comments:** At rest the relay is not active and the vehicle's Trunk release switch is allowed to operate normally. When the Trunk release button is pressed on the remote control, the

start module's Trunk release output activates the relay. The ground signal is sent from 87 through 30 to the vehicle's Trunk release wire activating the switch and opening the trunk.

Troubleshooting Poor Transmitting Range

In order to ensure optimal range, the antenna should be installed at least 7.5 cm (3 in.) from the roof – 2.5 cm (one inch) below the tint strip is generally the best location. Install the antenna as far as possible from radio antennas, GPS, On-board communication systems or factory compasses.

Many factors may affect the operating range of the transmitter. Some of these are:

- The condition of the battery in the transmitter.
- The operating environment (for example: downtown radio-frequency noise, airports, cellular phone towers...)
- Metal: any type of metal will affect operating range. This includes the metal in the car.
- The shape of the vehicle can affect range as well; vans in general have an especially poor range.
- The shape of the roof and A-pillars brings about considerable radio-frequency deflection (in this case the signal from the remote control). As a result, the direction in which the vehicle is facing in relation to the remote control can affect the range. Straight on – standing in front of the vehicle – generally gives you the greatest range; the second best performance is from the back. Using the remote control from either side of the vehicle will usually give the lowest range.
- The range will be significantly lower in a crowded parking lot than in open space.
- Always hold the transmitter high, approximately at shoulder height. Holding the transmitter against your chin will also increase your range: your head acts as an antenna.
- The operating range will be somewhat lower on vehicles equipped with an aftermarket or factory alarm.
- Windows and windshields tinted with lead or metallic tints will decrease the operating range.
- The antenna cable may have been cut and/or is grounded out on the chassis. Try using another cable.
- The receiver may be faulty. Try replacing it with another.

Troubleshooting Q & A

The following are some common install related issues.

A problem or symptom is given and then possible solutions and/or suggestions as to areas to verify are outlined.

1. **I cannot program the remote control.**
 - Do the parking lights come on when you open the hood? (Does the hood pin work?)
 - Is the antenna plugged in?
 - Does the light on the remote control turn on when you press the button?
 - Is the Ignition wire connected properly?
 - Are you waiting too long between programming steps?
 - After flashing the hood pin turn the key to ON, WAIT for 2 seconds.
 - Turn the key Off, On, Off then keep pressing the LOCK button repeatedly until you get 5 light flashes from the module.

The entire process should take less than 20 seconds.
2. **The car won't start by remote.**
 - Does the light on the remote light up when you press the button?
 - Is the starter in valet mode?

- Does the vehicle have passive antitheft security (PATS, VATS, PASSLOCK, TRANSPONDER)?
3. **The starter motor cranks for 8 seconds but the car won't start.**
 - Are you on the correct ignition wire?
 - Does the car have more than 1 ignition?
 4. **The car cranks briefly then quits.**
 - Have you bypassed the passive security? (PASSLOCK, PASSKEY III, PATS...)
 - Have you adjusted tach?
 - Is the vehicle's battery weak?
 5. **The park lights come on for 8 seconds but the starter motor will not crank.**
 - Does the car have an after market starter kill?
 - Have you bypassed the VATS or Passlock II?
 - Is the start wire hooked up correctly?
 - Has the clutch been bypassed properly (for standard transmissions)?
 6. **The car starts but starter stays engaged.**
 - Make sure ignition and crank are not common with the key out (connected at rest). May have to add relay (i.e. Tercel, Altima)
 - Did you make an Auto Tach Adjustment?
 - Weak Tach signal?
 - Bad ground?
 7. **The car starts by remote but then the starter re-engages.**
 - Check ground wire
 - Is Tach programmed?
 8. **The car starts on its own.**
 - Is the module in cold weather mode?
 - Program remote 4 times. (another remote may be programmed to your module)
 - Is external trigger shorting out to ground?
 9. **I get one long flash when I press the button trying to go into ready mode.**
 - Check tach circuit.
 10. **The factory alarm goes off when I start by remote.**
 - Did you hook the disarm wire?
 - Do you have the correct OEM disarm wire?
 - Did you program the disarm wire? (CT-3100/3160 only)
 11. **The ABS and the CHECK ENGINE light come on in the dash.**
 - Are you missing a second ignition or accessory?
 12. **The car starts and runs but the heater blower motor doesn't work.**
 - Incorrect Accessory wire
 - Does it have more than one accessory?
 13. **The car starts, the heater works but not the air conditioning system.**
 - Missing second accessory (common on some Fords)
 14. **The CHECK ENGINE light comes on and the vehicle doesn't shift, it feels sluggish.**
 - Missing second ignition. (common on some GMs)
 15. **On cold mornings the park lights come on, go out, and then flash 2 times slowly.**
 - Check for a weak car battery. (Try using the cold weather mode option)
 16. **The car doesn't start and the park lights flash 4 times.**
 - Check brake circuit.
 - Check for blown rear park light (feedback).

17. **The vehicle runs for 8 seconds then shuts down. I have 12 V on starter wire the whole time but no over crank.**
 - Did you make an Auto Tach adjustment? (New GM trucks, cars and mini vans)
18. **The car runs for about 5 seconds, shuts down and restarts; it does this 3 times.**
 - Check voltage on tach wire.
 - Try an alternate tach source.
19. **The car starts by remote but the range is poor.**
 - Is the car tinted?
 - Does it have an after market alarm?
 - Is the antenna mounted below the tint strip?
 - Using the correct remote?
 - Change remote battery.
 - Heated front windshield? (Taurus, Crown Vic)
 - Metal film in windshield? (GM Mini vans)
20. **I get excellent range when the vehicle is not running but almost none when it is running.**
 - Check for loose spark plug boot or faulty ignition wires, cracked cap.
 - Try disconnecting blower motor.
21. **After about a half hour almost no range at all until the vehicle is started with the key again.**
 - Does the vehicle have factory alarm/ keyless entry? You might have to switch to a 433MHZ module. (Some GM Trucks, Cavalier/Sunfire, Breeze/Stratus/Cirrus)
22. **Sometimes I have to press button I twice to lock my doors.**
 - Normal on 3100/3160 if you wait past the starter kill arm cycle (approx. 35 seconds)
 - Program toggle mode. (3100/3160 only)
23. **The radio stays on after the vehicle shuts down.**
 - Retained Accessory Power will keep power to radio for approx. 10 - 15 minutes or until it senses a door open. (Fords, GM's R.A.P.)
24. **The headlights stay on after car shuts down by remote.**
 - Switch headlight switch from Auto to normal. (Toyotas)
 - On some vehicles, opening a door will shut the head lights off. Pulse the drivers door pin with the Rearm wire.
25. **I get no 12v reading at all at the brake pedal, depressed or not.**
 - Some vehicles require ignition be on. (BMW)
26. **The park lights flash on their own.**
 - Check hood pin adjustment.
 - Check ground wire.
27. **I blow fuses every time I try the remote door locks and I have already installed a relay.**
 - Door locks are reverse polarity, and not positive trigger.
28. **I blow fuses every time I try the remote trunk release and I have already installed a relay.**
 - Trunk release is reverse polarity, and not positive trigger.

Diagnostics – Chirps Table

Chirps	Description
1	Doors locked, Alarm and Starter Kill armed. LOCK confirmation. Entering Mode 1 in the Programming Centre. Disarmed Notification
2	Doors unlocked, Alarm and Starter Kill disarmed. Transmitter programmed. Entering Mode 2 in the Programming Centre.
3	LOCK and arm while a zone is left unprotected. Entering Mode 3 in the Programming Centre. Door Zone left unprotected.
4	UNLOCK and disarm: an intrusion was detected (in Warning Chirps Mode or Full Chirps Mode). Entering Tach-programming Mode.
5	Siren or Horn Chirp Timing adjustment
Constant up to 30 seconds	In Horn Mode: alarm condition generated by an intrusion, by Panic Mode or when the System is powered up. The Horn will sound for 30 sec.
Constant up to 60 seconds	In Siren Mode: alarm condition generated by an intrusion, by Panic Mode or when the System is powered up. The Siren will sound for 60 sec.

Diagnosics – Parking Light Flash Table

Flashes	Description
1	Doors locked, Alarm and Starter Kill armed. End of Run Time. TRUNK button pressed Start signal received by the System. Cold Weather Mode cancelled.
2	Doors unlocked, Alarm and Starter Kill disarmed. Run Time cancelled. Exit Remote Valet. Exit ignition valet Remote start attempt cancelled by remote.
3	Entering Cold Weather Mode . Entering Remote Valet. Entering ignition valet Entering and exiting Ready Mode Entering Extended run time.
4	+12 V where detected on the brake line and cranking was cancelled. Entering Tach-programming Mode
5	New Transmitter programmed. Tach programmed.
6	A remote start was attempted while a Tach or a vacuum signal was detected before cranking.
8	Unit reset: occurs when the Unit is reset to the factory defaults.
10	The Hood Switch line went to ground during cranking or Run Time.
1 – pause – 2	There was an attempt to start the vehicle while the System was in Valet Mode.
2 – pause – 2	There was an attempt to start the vehicle while the System was in Home Valet Mode.
4 – pause – 3	<ul style="list-style-type: none"> When the vehicle is running: +12 V detected on the Brake Line.
10 – pause – 3	<ul style="list-style-type: none"> When the vehicle is running: the Hood Pin-switch went to ground.
ON solid	Cold Weather Mode: the Brake Pedal is being held down.
ON 2 sec.	The Hood is up and the Hood Switch line went to ground. This is step one of the Programming Centre procedure.
ON 3 sec.	First press of the START/STOP button under Safe Start.
ON 4 sec.	Locking or unlocking a Door (with Door pulses configured to 4 sec.)
ON 25 sec.	The Hood Pin-switch has been pressed twice: the Unit went into step 1 of the Programming Centre procedure, and no Transmitter activity was detected for 20 seconds. Or the Unit went into step 1 of the Transmitter Programming procedure and no activity was detected for a few seconds. The Unit has exited the Transmitter Programming procedure.
Irregular	If the unit gives irregular signals (1 to 10 flashes followed by a pause, followed by further flashes), the system is playing back Start Failure Codes. This occurs when the Hood Pin-switch is pressed three times.
Constant flashes up to 30 sec.	<ul style="list-style-type: none"> Panic mode triggered with LOCK button, if programmed in passive arming.
Constant flashes up to 60 sec.	<ul style="list-style-type: none"> Panic mode triggered with LOCK button, if in passive mode. Panic mode triggered with LOCK and UNLOCK button, in active mode. ON solid when alarm is triggered. Alarm condition generated by an intrusion, by panic mode.