

Triple RFID Protection for Cars

A new car immobilizer system uses three RFID readers to make it tougher for thieves to drive off with your automobile.

By Claire Swedberg

Jan. 3, 2005—To decrease the chances of automotive theft, a new automobile immobilizer system uses three radio frequency identification (RFID) readers to make it three-times harder for prospective thieves to start a car's engine. Released in December by [Northland Auto Enterprises](#), Burnsville, Minn., the new system, named TheftStopper1, is being sold as an aftermarket device installed by car dealerships or independent auto mechanics.

RFID security systems installed in new vehicles by car manufacturers have succeeded in reducing car thefts, according to statistics gathered by immobilizer manufacturers. These RFID security systems work by fitting a car's ignition key with a passive RFID transponder containing a unique ID code. Whenever the key is inserted into the ignition switch, it activates an RFID reader connected to a control module in the engine's central computer (which controls such things as the car's ignition and fuel systems) and is wired to an antenna built into the vehicle's steering column. The RFID reader generates a random number, which is transmitted to the key. The key's transponder combines the random number with its own unique serial number, encrypts the new number and transmits it back to the car's RFID reader. If the numbers don't match, the car won't start. Thieves, however, have found several ways around those systems, according to Dan Beach, director of new product development for [C-Chip Technologies](#), a Montreal security systems provider that developed TheftStopper1. Some experienced thieves can locate the RFID unit, override it and drive away with the vehicle in a matter of minutes. Thieves can use a simple resistor to bypass some RFID security systems, while most factory-installed RFID immobilizers require the use of a module, in order to "talk" to the onboard computer, Beach says.

Instead of using a passive RFID tag embedded in the ignition key, the TheftStopper1 system uses a key fob containing an active RFID transponder that transmits a signal containing a unique ID code over a distance of up to 20 feet. The key fob is comprised of a miniature OEM transmitter module powered by a small lithium button battery.

TheftStopper1's three RFID readers each have a nanowatt microcontroller and relay. One of the RFID readers serves as the starter cutoff, or "mother," unit. The mother unit controls the power to the two other control units installed elsewhere in the car. Each of the other two units functions as a power switch to a different part of the car, such as the fuel pump, ignition circuit, computer or transmission relay.

When equipped with TheftStopper1, a car won't start unless all three control units receive a signal from a key fob containing the correct ID code. Because the key fob's active transponder can transmit its signal over a distance of 20 feet, the mother unit communicates with the key fob, well before the driver even starts the vehicle, and verifies that the key fob's ID code matches the one programmed in the mother unit. When the driver turns the ignition switch, a second connection is made between the mother unit and the two other units and the engine starts. Without the key fob's transponder, none of the three cut-off switches will allow electric

current to flow to their respective devices (the car's fuel pump, ignition circuit, computer or transmission relay).

For that reason, a thief who manages to hotwire one cut-off switch and thereby override it, will still not be able to start the car. That's because the two other units will still lock down the engine without a signal from the proper key fob or the mother unit. The additional time necessary to locate and bypass all three units will be enough to discourage most thieves, says Allen Lentsch, CEO and president of Northland Dealers. Lentsch admits, however, that a thief who succeeded in overriding all three control units could start the car.

The three cut-off scenario was created at the request of insurance companies, according to C-Chip Technologies' Beach. "They have had a major role in deciding just what features should be incorporated into our antitheft products...since they will be the ones with the most to gain from our products, and will be passing along their savings to their customers," he says.

When stealing cars with factory-installed RFID-immobilizers, thieves have taken advantage of a small box-type device originally made available by carmakers for use by drivers who have lost their RFID-tagged keys. These devices can be bought from third parties on the Internet and used to start an RFID-protected vehicle. By mimicking the code transmitted by key's RFID tag, the devices convince the system's onboard computer that a valid tag has been detected. One site that sells these devices is the BypassKit.com. To work with certain vehicle models, the bypass device needs to be programmed using the vehicles original RFID-tagged keys; for some cars, however, the original RFID-tagged keys are not needed.

The TheftStopper1 system is manufactured by C-Chip Technologies. The system's RFID tags and readers are based on C-Chip's proprietary standards.

"The antitheft industry built their systems on standardization," Lentsch says. "The systems are installed in the same place with the same configuration." That uniformity is the weakness of the systems, Lentsch argues. With TheftStopper1, each car's antitheft system can be installed differently. No matter where the three control units—which amount to 1-inch black cubes and three wires—are installed, they will shut off the car's starting capabilities until the correct RFID-enabled key fob is used.

If they lose their key fob, car owners can always start their car as long as they know the code for the TheftStopper1 system installed in their vehicle. Each TheftStopper1 system comes with a "bypass card" printed with the system code. The driver can enter the code by turning the ignition switch from the "off" position to the "accessory" position and back to "off," in response to beeps coming from the mother reader module. Once the code is properly entered, the driver has the option to allow up to 10 authorized starts for servicing purposes.

Car dealers throughout the United States have already deployed Theftstopper1, according to Lentsch, who hopes to sell the system also to automotive stores. The system retails at \$279 and installation will cost between \$35 and \$75, Lentsch estimates. Most car owners would not be able to install it themselves.

[RFID Journal Home](#)

Copyright ©2005 RFID Journal, Inc. All Rights Reserved