

Getting
Smarter:

*Making Guns Safer for
Law Enforcement and
Consumers*

By Lauren R. Taylor



about the author

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There's a debate raging across the Nation about making guns safer and smarter.

Much of it tends to confuse "smart" technology with external locking devices. Technology for a true smart gun, such as one that operates via radio or ultrasonic waves, is still in the fledgling stage and is many years in the future.

This article clarifies some of the issues associated with safer, smarter guns as they are used by law enforcement and by the general consumer. The issues and concerns related to the two uses are quite different.

Smart Guns for Law Enforcement

Sixteen percent of law enforcement officers killed in the line of duty are shot with service weapons. According to the Uniform Crime Reports, 57 officers were killed with their own weapons in the 10 years between 1988 and 1998, and 113 officer weapons were stolen.¹ Many more officers were injured in such incidents. In addition, police weapons were stolen and later used in the commission of a crime.

Since the early 1990's, NIJ has been funding research and development for technology to give law enforcement officers safer and more reliable service weapons. By late 1999, NIJ had refined a system that used radio frequency to identify and approve a user before a gun could be fired.

NIJ's first task in the development process was to draw up a list of basic requirements. Under contract to NIJ, Sandia National Laboratories assessed the needs of law enforcement for "smart-gun" technology and came up with the basic requirements that guided the research. (See "Smart-Gun Features for Public Safety Officers.")

Sandia then evaluated commercial, off-the-shelf technologies—including biometrics (voice and fingerprint recognition), magnetics, and radio frequency—that might meet law enforcement's needs. It built models of each with air pistols inside portable boxes; lights signaled when an authorized user was recognized and when the weapon was fired. Sandia representatives

took the models to law enforcement conferences to get comments and suggestions.

By the mid-1990's, NIJ and Sandia had identified 14 technologies that might lead to smarter, safer service weapons but had settled on radio frequency as the most feasible.

"There is no one perfect technology, one that will meet all the officers' requirements," wrote Doug Weiss, project manager, in Sandia's final report in 1996. But the most promising technology is radio frequency.

According to Wendy Howe, the NIJ program manager, the next generation of gun has to "look something like the semiautomatic pistol law enforcement is now carrying. It cannot require too many changes to the gun, or to the way the gun is carried, or to the way the gun is holstered."

How a Radio Frequency Gun Works

With \$500,000 awarded in 1997, Colt's incorporated miniaturized motors and blocking mechanisms into the gun and reduced the size of the transponder chip. The resulting 40-caliber weapon looks like any other. To operate the gun, authorized users must wear a watch (which looks like a standard wrist watch) that has a chip inside it. As users pull the gun out of its holster, they press a switch on the grip. "It's a natural position where the fingers rest on the grip of the gun," says Howe. The grip switch sends a signal to the transponder in the watch, and the transponder responds. All of this happens in the time it takes to draw the gun. (See figure 1, page 18.)

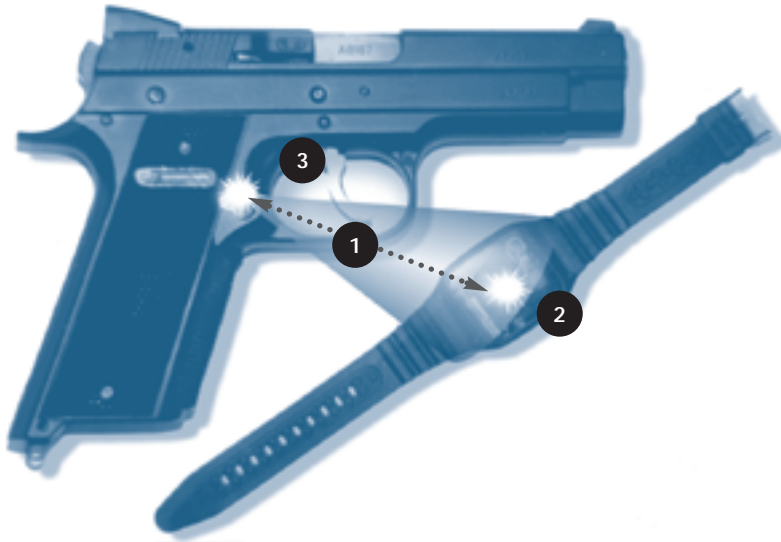
Smart-Gun Features for Public Safety Officers

Law enforcement officers who helped develop the specifications for a "smart" service weapon say the firearm should:

- Operate reliably in all environments.
- Have all the capabilities of a current firearm.
- Be able to be fired by other police officers.
- Be easy to operate and maintain.
- Verify and approve the user in the time it takes to draw and aim.
- Only work when the transponder is behind the gun.
- Include an indicator that tells the user if the system is enabled.
- Fire even if the electronics fail.

Figure 1: Building a Smarter Gun

U.S. gun manufacturers are developing technology designed to stop accidental shootings. The radio frequency gun being developed by Colt's Manufacturing Company, Inc., works like this:



1. The gun emits a radio signal from a chip inside its handle.
2. As the weapon is drawn from the holster, a watch-like device worn by the person holding the gun receives this signal and returns a coded radio signal.
3. The weapon is enabled when it receives the return signal. All this happens in the time it takes for the officer to draw the gun.

The transponder can communicate with the gun's locking mechanism only from behind the gun. Thus, a gun taken away and thrust toward an officer could not be fired.

Also key to law enforcement is the fact that if the smart technology fails—whether because of a problem with the technology or with the power source for the technology—the weapon can be fired.

Issues Remain

Although some technical problems have been resolved, many obstacles remain. "It's not even ready for lab testing," says Howe, who explains that one of the most valuable results of the research is a better understanding of the difficulties of making a reliable gun when introducing off-the-shelf technology into a volatile, real world environment.

Developers are tackling a number of issues associated with reliability, including ensuring that the technology is not vulnerable to interference from outside frequencies (such as

those from radio antennas or those underground in a subway system) and that it will work in a variety of environmental conditions. "This weapon must be as reliable as the conventional weapon that law enforcement is now carrying," says Howe.

The next steps already are underway. On May 12, President Clinton announced NIJ's award of two grants to continue refining and improving the technology. One award, to Smith and Wesson, will explore a fully electronic weapon using a pin code and, in the future, a biometric identification system. The other, to FN Manufacturing, will explore the inclusion of micro-electronic and ultrasonic wave technology that is less sensitive to interference than radio waves.

Smart Guns at Home

Ultimately, experts agree, the high-tech approaches to gun safety now being developed for law enforcement use will make their way into

consumer firearms. In the meantime, gun manufacturers are working hard to ensure that guns cannot be used by children or other unauthorized users. Although these technologies are often called "smart," they are not; they are mechanical.

Many gun manufacturers have been including locking systems in their products—either integral or optional—for years. The most common, says Ken Green, technical affairs director for the Sporting Arms and Ammunition Manufacturers' Institute, uses a cable that goes through the trigger so that the gun cannot be fired without a key or combination. His association and its more than 20 manufacturer members are working on voluntary standards for locking devices designed to keep firearms out of the hands of children age 7 and under.

"If the device is properly applied and it prohibits the gun from being activated, it's child-resistant to some degree," Green says. But

how child-resistant? That's what the new standards, which are voluntary, will determine. Green points out that no system is foolproof: "If you put a cable lock through the gun, that's pretty childproof because the child doesn't have the key. If the child has the key and knows how to use it, the child may be able to open the lock. If that child doesn't have the key, it's not going to come apart easily, but that's not to say that if the kid grabs a 20-pound sledgehammer and beats on the thing, it won't come off.... It's not going to stop everybody from doing everything."

Eventually, when smart technology trickles down to consumer-owned guns, it still will differ from that used in law enforcement. For example, if a police officer's smart gun fails, it should still fire. "It needs to fail 'live,'" says Howe. "But for general consumers, you want the technology to fail 'dead,' meaning not fire when kids have tampered with it and are showing off to friends, when teens are trying to commit suicide, or when people are getting the gun and using it in the commission of a crime."

Debate Rages

Gun-control advocates and gun-rights promoters have taken positions for and against the development of smart guns and gun-safety technology for consumer use.

Some gun-control supporters fear that safety technology will lead people to see guns as safe and cause sales to grow. Supporters also fear that consumers may think, "My gun has a lock on it, so it's okay to leave it loaded and lying about." Under this scenario, guns will become more of a "coffee-table item," and the danger will increase, not decrease. Some gun manufacturers have expressed that concern as well.

For More Information

- Contact Wendy Howe, Smart-Gun Technology Program Manager, 202-616-9794, howew@ojp.usdoj.gov.
- D.R. Weiss, *Smart-Gun Technology Project, Final Report*, prepared by Sandia National Laboratories under contract IAA-94-IJ-R-021, February 1996 (SAND96-1131). Available at <http://www.prod.sandia.gov/cgi-bin/techlib/access-control.pl/1996/961131.pdf>. An abstract is available from NCJRS under NCJ 162841.

Gun manufacturers and owners' groups generally oppose the new technologies, saying that they will boost the prices of guns, making them unaffordable; that they are unreliable; and that the marketplace, not the legislatures or the courts, should decide whether such technologies are needed. Some gun-rights advocates also oppose the safety measures because they see them as encroaching on gun owners' rights.

Sandia's Weiss compares safety measures on consumer guns to speed bumps. In parking lots, he says, everyone knows they need to be careful: there are cars backing up, pedestrians walking, people carrying packages, and people pushing shopping carts. But society puts speed bumps in parking lots to remind drivers of what they know they should do. In Weiss' view, locking mechanisms on guns are the same: They shouldn't allow owners to be careless with firearms, but instead remind them of the responsibility they already have.

Looking Forward

Howe is philosophical about the controversy. "This is one stage in the evolution in firearms technology," she says.

Each transition—from black powder and ball to revolvers with six-shot capability to semiautomatic pistols—has been difficult. People felt uncomfortable with the new technology, but once they got used

to it, says Howe, "it was great." In her view, smart guns are the same: "This is an evolution in technology. That's all it is. We are trying to take what we currently have and make it better, so that if a weapon is taken away from you, it can't be used against you."

The technology, however, can't be rushed. Gun-safety mandates are coming fast and hard, but as Howe and others point out, the technology is not mature. "We have researched the technology; manufacturers are working diligently on the technology, and they still haven't been able to overcome the reliability issue using over-the-counter concepts," says Howe.

"Developing and incorporating components that operate reliably under extreme conditions is difficult, expensive, and time-consuming. Ultimately," she says, "we'll have a solid smart-gun concept for law enforcement. And I'm sure it will have spinoffs that can be used to support commercial smart guns." It's one more stage in the technological evolution.

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Notes

1. *Law Enforcement Officers Killed and Assaulted 1998: Uniform Crime Reports*, Washington, D.C.: U.S. Department of Justice, Federal Bureau of Investigation, 1998 (NCJ 181118).