



National Law Enforcement and Corrections Technology Center

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Jeremy Travis, Director

High-Speed Pursuit: New Technologies Around the Corner

Few effective options have existed for law enforcement to stop fleeing vehicles safely. Other than physical arrest, vehicle pursuit is the most common high-liability area of law enforcement. In the past the question has been whether to pursue or not to pursue. To improve the ability of law enforcement officers to halt fleeing vehicles and to enhance the safety of officers and the public, the National Institute of Justice (NIJ) is examining alternative approaches.

This National Law Enforcement and Corrections Technology Center (NLECTC) bulletin presents information on the risks associated with high-speed pursuit, findings from major studies on police pursuit, the need for departmental policies, and tactics and technologies that may provide alternatives.

Although this bulletin does not address training technologies, a number are designed to enhance pursuit driving capabilities. Two examples are driving simulators and the Skid Car. A simulator uses sights and sounds to provide the feeling of an actual situation—a capability that can be used to train people from many different disciplines, including law enforcement. Law enforcement agencies are using simulation technology to train personnel in the use of firearms and in emergency vehicle operations—training that allows officers to hone skills while reducing risk.

The Skid Car, which was designed in Sweden, provides actual skid control experience in real-time situations. The Skid Car is a frame and hydraulic dollie that attaches to the test vehicle. Instructors then have the ability to lift the car off the ground, thus inducing controlled skid conditions. These maneuvers are performed at speeds of less than 25 mph, thereby reducing the dangers of high-speed skids.

The Need for Safer Alternatives

Public concern over pursuit-related injuries and deaths and/or liability costs to agencies across the country has prompted a rethinking of pursuit policies. What is needed is an efficient, nonlethal method for law enforcement to stop fleeing vehicles that minimizes risk of death, injury, property damage, and liability to the agency, yet provides a high probability of making an arrest and recovering the vehicle.

The majority of research and professional literature has concluded that pursuit creates a far greater risk than benefit to the officer, the public, and the suspect. The question is, "Was it worth it?" Is public safety better served if

police officers pursue the subject or stop pursuing?

While no simple solution exists for this complex problem, an increasing awareness has evolved among both police officers and the public they serve of the need to address and manage police pursuit in a responsible manner.

Pursuit: What Does the Research Tell Us?

NIJ funded a research project recently concluded by Professor Geoffrey P. Alpert of the University of South Carolina to examine police pursuit driving and the use of excessive force. The study included an analysis of pursuits conducted by police agencies of various sizes at different geographic

locations. Police recruits, officers, and supervisors were interviewed concerning their attitudes and beliefs about pursuit driving. In addition, public opinion questionnaires and surveys of suspects who ran from the police were also conducted. The published report is available upon request from the National Criminal Justice Reference Service (NCJRS). NCJRS is NIJ's criminal information library that houses the largest and most comprehensive criminal justice information center in the world and serves an international community of policymakers and professionals in the field.

There has been an increase in research on the risks and benefits of high-speed pursuit since the 1983 California Highway Patrol study. Two important

Pursuit Management Task Force

NIJ's Office of Science and Technology is creating a Pursuit Management Task Force to conduct a multidisciplinary effort to define police practices and the role of technology in high-speed fleeing vehicle pursuits. The scope of the effort includes the entire gamut of pursuit issues, including preemption of pursuit, control of pursuits in progress, and termination of these pursuits.

Members of the Task Force will include senior law enforcement officers from local, State, regional, and Federal agencies, as well as experts from related fields. The effort will be directed by NLECTC—Western Region, located in El Segundo, California. In conjunction with a sister organization, the Border Research and Technology Center, located in San Diego, California, the centers will solicit membership for the Task Force from their respective Advisory Councils.

The Task Force will assess current techniques and technologies, make recommendations for new technologies, and assess the figures of merit for managing and evaluating these

technologies. Because of participation by law enforcement agencies, Task Force recommendations will be credible with other agencies in other regions of the country, and will have the acceptance of law enforcement professionals. The assessment will establish measures of effectiveness that developers and end users will use to produce and purchase vehicle topping equipment, develop practices and procedures, and train law enforcement personnel in pursuit "best practices."

NIJ and the U.S. Army Research Laboratory (ARL) are jointly funding a two-phased program to evaluate and select Electric/Electromagnetic Vehicle Stopper technologies and concepts (Phase I) for laboratory evaluations (Phase II). Plans will also be made during the first two phases for future engineering (Phase III) and operational (Phase IV) field evaluations. Testing will be held at the Army Research Laboratory in Adelphi, Maryland, with results and data used to make recommendations to support additional efforts that could include steps toward implementation of a proven technology.

findings of that study were that 77 percent of the suspects were apprehended, and 70 percent of the pursuits ended without an accident.

Because agencies maintain different reporting procedures and levels of information, comparative analyses can be made only at the most general level. Five comprehensive studies applying scientific controls have been conducted, addressing causation factors and outcomes of police pursuits: the California Highway Patrol study, using mostly freeway data; the Miami and Metro-Dade studies (1990), using data from a large county police department; the Baltimore County study (1994), another large county agency; and the Minnesota (1988) and Illinois (1992; funded

through a grant from the AAA Foundation for Traffic Safety) studies, using data from large-, small-, and medium-sized agencies from urban, rural, and suburban areas.

Notwithstanding dissimilar data collection procedures and levels of data, the data are presented as representative of the current knowledge base of pursuit driving. When the data are combined and the results analyzed, the above studies show striking similarities.

- A collision of some type can be expected to occur in 32 percent of pursuits.
- When the severity of these collisions is analyzed, 20 percent will result in

property damage, and 13 percent will result in personal injury.

- A fatality will occur in 1.2 percent of police pursuits.
- Approximately 70 percent of all pursuit-related injuries and fatalities will involve the occupants of the pursued vehicle, while 14 percent will involve law enforcement and 15 percent, innocent, uninvolved parties.
- Police were successful in apprehending the suspects in more than 72.2 percent of the pursuits.
- Suspects were able to outrun police in 12 percent of escape categories.

Data from the AAA Foundation for Traffic Safety's Summary Report dated April 1992 reveal that more than 80 percent of respondents to a public opinion survey approved pursuing a violent felon under high-risk conditions (those situations that would pose a greater threat to innocent third parties), but only 20 percent approved pursuing a traffic offender in those situations. In low-risk conditions (those situations posing a lesser threat to innocent third parties), these percentages change to 94 and 58, respectively, in favor of pursuit. However, only 12 percent of respondents believed that most suspects flee police because they have committed serious crimes.

According to the report, the recommendations and conclusions of today's researchers and practitioners generally focus on establishing comprehensive pursuit policies, implementing enhanced training efforts, and providing effective supervision.

The Need for Departmental Policies

Because of the inherent risks, there is no "good" pursuit. The merit of a pursuit must be based on interpreting the risks presented. In its model policy (1995), the International Association of Chiefs of Police (IACP) restricts pursuits to those

actions for which an officer would make a custodial arrest. Subsequently, within States having adopted the more restrictive policies, researchers have noted marked decreases in pursuits.

Departmental policies regarding high-speed pursuit are important for several reasons:

- To reduce the number of injuries and deaths.
- To guide officers in knowing when and how to pursue.
- To maintain the basic law enforcement mission to enforce the laws and to protect life and property.
- To minimize agency liability.

The AAA study, conducted in the State of Illinois from January through December 1991, was designed to provide a data base helpful to government officials, police administrators, and police personnel. With this information, perhaps more informed decisions can be made by responsible government officials regarding police pursuit legislation, policies, and procedures. Based on that study, which was exploratory in nature, AAA recommended:

- Police agencies have well-developed, highly restrictive police pursuit policies, as well as clear and simple procedures for regulating pursuits.
- Proper training for police officers who are given authority to participate in vehicle pursuits, and close supervision by administrative staff to ensure compliance with pursuit policies.
- Police agencies be required to collect and maintain relevant and reliable data on police pursuits conducted by their officers so that pursuit policies and officer actions during pursuits may be more effectively evaluated.
- Departments develop an internal critical incident review board to review all police vehicle pursuits

engaged in by their officers, and States review their police vehicle pursuit statutes to encourage safety and require alternatives to police pursuits for less serious offenses.

Alternatives to High-Speed Pursuit

Police vehicle pursuits are dangerous, and officers have traditionally had few options in stopping a fleeing suspect. However, technological development may help to facilitate major changes in law enforcement services by the year 2000. Joint ventures now occurring between law enforcement and industry are indicative of future markets for advanced technology. The six prototype technologies described below offer seven potential alternatives to high-speed pursuits.

Retractable Spiked Barrier Strip

Current maneuvers for stopping a fleeing suspect—e.g., bumping, crowding, a three-cruiser rolling roadblock, and tire spikes—can often result in significant damage to involved officers, suspects, or vehicles, and to innocent bystanders as well. Safer methods are desired. Unlike commercially available barrier strips, this prototype technology can be deployed on a roadway with the spikes retracted. Then, from a safe and strategic location, the spikes can be activated to extend and retract to target specific fleeing vehicles. Also, this unobtrusive strip can be placed across the road far in advance of the fleeing vehicle, with passing vehicles incurring no damage. Once the fleeing vehicle approaches and the hollow spikes are extended, puncturing and becoming embedded in the tires, the escape of air is rapid but uniform, so that the vehicle can come to a controlled stop. The barrier strip, which is designed to be comparably priced with current nonretractable spiked barrier strips, can be placed safely across several potential pathways of a fleeing vehicle.

Initiating and Terminating Pursuits: IACP Policy Highlights

- Pursuit may be justified if:
 - in the officer's conclusion the immediate danger to the officer and the public posed by pursuit is less than the danger created by the suspect remaining at large.
 - the suspect exhibits the intention to avoid arrest by using a vehicle to flee apprehension for an alleged felony or misdemeanor that would normally require a full-custody arrest.
 - the officer reasonably believes that the suspect, if allowed to flee, would present a danger to human life or cause serious injury.
- Pursuit should be terminated if:
 - it is the most rational means of preserving the lives and property of the public, the officer, or the suspect.
 - commanded by the pursuing officer's field supervisor or chief executive officer of the department.
 - weather or traffic conditions warrant; the distance between pursuing and fleeing vehicles render it futile; or the danger posed to public, officer, or suspect is greater than the value of apprehending the suspect.

Excerpted from IACP's 1995 Vehicular Pursuit Model Policy

The Idaho National Engineering Laboratory (INEL) delivered its prototype of this technology, which was funded by NIJ through an interagency agreement, to NIJ in March 1995. Collaborating with NIJ's Office of Law Enforcement Technology Commercialization (OLETC), the Laboratory has identified and is pursuing a potential industry

partnership for commercialization of this technology. For more information, contact OLETC at 316 Washington Avenue, Wheeling, WV 26003 (800-678-6882), or Larry W. Hops at the Idaho National Engineering Laboratory, Lockheed Martin Idaho Technologies, P.O. Box 1625, Idaho Falls, ID 83415-3805 (208-526-6870).

Auto Arrestor System

This technology employs a short pulse of electric current to burn out or disrupt critical electronic components in the ignition systems of modern automobiles. Once a targeted automobile has driven over the activated system and the car's ignition system is damaged, the affected vehicle can coast to a safe stop, allowing the driver to maintain control, similar to the car having run out of gas. According to the developer, the damaged part can normally be replaced at minimal cost, rendering the vehicle fully operational.

Developed inhouse by JAYCOR, building on previous U.S. Department of Defense research, a prototype of this technology has been demonstrated in several settings. For more information, contact Blair Stewart at JAYCOR, 25 North Cascade, Suite 300, Colorado Springs, CO 80903 (719-577-9700).

Road Patriot™/Road Sentry™

The Road Patriot is an automatically guided rocket-powered unit that is designed to stop a target vehicle by emitting an electromagnetic energy pulse that disrupts the vehicle's engine controls and associated sensors. The unit mounts underneath the bumper of a pursuit vehicle and is activated by a triggering mechanism that lowers the unit within 1 second to ground level, where it is then launched. Propelled by the rocket at a speed of 20 miles per hour faster than the pursuit vehicle, the device can be launched at up to seven car lengths behind the vehicle in pursuit. Once disabled, the vehicle is drivable only in a "limper mode" before coming to a safe, rolling stop.

A similar device to the Road Patriot is the Road Sentry. Also designed to disable a target vehicle's electrical components, the Road Sentry, which resembles a pancake-shaped bump in the road, can be armed and activated by either remote control or unmanned automatic control, allowing for advance placement of the device. Custom units can be obtained that allow for permanent placement into the road surface at critical high-traffic areas or in high-risk security areas.

The Road Sentry is commercially available. The Road Patriot is in the latter stages of development. For more information, contact Non-Lethal Technologies, Inc., 1815 Higgins Road, Sleepy Hollow, IL 60118 (847-428-5676).

Checkpoint Barrier Strip

This technology is a lightweight tire deflator that, when deployed and activated remotely at a checkpoint prior to being driven over, will rapidly deflate a vehicle's tires, rendering an offender's vehicle incapable of high speed as the offender begins to accelerate away from the checkpoint. This technology would be particularly useful in rendering large trucks incapable of attaining high speed in order to evade border patrol checkpoints. The deflator consists of an array of 1/2-inch hardened, hollow steel spikes and support blocks magnetically retained in a 6-foot deflator bar. When run over, the spikes separate from the bar and are retained in the tire, providing an unobstructed air passage for deflation. The deflators are lightweight, quickly deployable, reusable, and leave no roadway debris after use.

The Eagle Research Group, Inc., developed this tire deflator concept inhouse and has a patent pending on the design. Prototype units fabricated of aluminum and steel were demonstrated to the U.S. Customs Service and to the U.S. Immigration and Naturalization Service (INS). Subsequent to the demonstrations, Customs procured 20

deflator bars for test and evaluation, and INS funded the development of a portable tire deflating system for use at border patrol checkpoints. For more information, contact Bert Soleau at Eagle Research Group, Inc., 1110 North Glebe Road, Suite 1090, Arlington, VA 22201-4795 (703-243-9400).

Fleeing Vehicle Tagging System

Offering an intermediate option between no pursuit and pursuit, this proposed technology could be operated by a single law enforcement officer from a pursuit vehicle. The fleeing vehicle tagging system concept would consist of a launcher; a projectile that is less than lethal to bystanders if it should miss its intended target; a radio frequency transmitter tag embedded in the projectile; a polymer adhesive within the projectile to secure the tag to the fleeing vehicle; and a receiver-tracker.

INEL conducted a feasibility study of this system. The report is available from NCJRS. For further information, contact Glenn Shell at the Idaho National Engineering Laboratory, Lockheed Martin Idaho Technologies, P.O. Box 1625, Idaho Falls, ID 83415-2805 (208-526-4078).

Other potential technologies under consideration by NIJ for tagging and/or tracking vehicles are:

- Sensors installed along the highway for identifying stolen cars as they drive by.
- Paint darts for marking vehicles for later interception.
- Radio transmitters attached to cars that would allow for predeploying of cruisers.

Precision Immobilization Technique

Known initially as "tactical ramming" or "legal intervention," this maneuver was more fully developed and popularized more than a decade ago by BSR Inc., the

Summit Point, West Virginia, advanced driver training center, as tactical vehicle interception (TVI), a formal training technique for law enforcement. The first large law enforcement agency to teach TVI as a technique to halt fleeing vehicles was the Fairfax County (Virginia) Police Department, which modified the program for police use and named it “precision immobilization technique” or PIT. The technique involves easing up to and making contact with a fleeing suspect’s car in such a way as to cause the target car to snap sideways and come to a halt. While this technique is not applicable in every situation, the key to its effective use is to carefully choose a favorable spot before attempting PIT and to first consider the possible effects on other traffic and pedestrians.

For more information, contact Terry Pearson at the Fairfax County Public Safety Academy, 3725 Willard Road, Chantilly, VA 22021 (703-818-1924).

Questions To Ask Before Pursuing

Until options become available that will render obsolete the need to engage in dangerous high-speed pursuit, ask the following questions:

- What is the nature of the crime under investigation?
- What is the probability of being able to identify the defendant at some subsequent time?
- What is the potential liability to the jurisdiction and the danger to others?

The bottom line is a balance between the need to apprehend a law violator immediately and risks created by the pursuit.

NLECTC: Your “One-Stop” Shop

NLECTC is your *one-stop shop* for equipment and technology information. The Center can answer your questions about what is currently available, what may be on the horizon, results of NIJ testing initiatives, and referrals to agencies using the products. NLECTC’s sole mission is to be the most comprehensive source of product and technology information in the country for law enforcement, corrections, and other criminal justice practitioners.

NLECTC bulletins offer a fast and effective way of disseminating current information on technologies and NLECTC testing activities. Bulletins may review the advantages and limitations of existing off-the-shelf technologies or discuss technologies currently under development. They also provide preliminary findings from NLECTC-supported testing activities such as the annual police vehicle testing program. We welcome your comments or recommendations for future bulletins.

For online access via the Internet and World Wide Web (WWW) to NLECTC, users may access JUSTNET (Justice Technology Information Network). By accessing the JUSTNET home page on the WWW, users can take advantage of three primary service options—News and Information, Interactive Services, and Data and Publications. JUSTNET’s address is: <http://www.nlectc.org>.

Your contributions to the Center’s information network are important. If you would like to learn more about what NLECTC can do for you, or you want to share information on tech-

nologies or techniques with colleagues, please call 800-248-2742; write P.O. Box 1160, Rockville, MD 20849; or contact one of our Regional Centers or Offices:

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- Office of Law Enforcement Standards, National Institute of Standards and Technology
301-975-2757
301-948-0978 (fax)

For Further Information

Readers interested in further information on the studies cited in this bulletin may contact the following:

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The technologies described in this bulletin are not endorsed by nor have they been evaluated by the National Institute of Justice.

Major portions of this bulletin are drawn from a paper presented by Geoffrey P. Alpert, Professor, College of Criminal Justice, University of South Carolina at Columbia, based on his research, funded by NIJ, in the area of police pursuits (1995). Other portions of the bulletin are drawn from a Summary Report, Police Pursuit in Pursuit of Policy: The Pursuit Issue, Legal and Literature Review, and an Empirical Study, prepared at Illinois State University's Department of Criminal Justice Sciences at Normal and sponsored by the AAA Foundation for Traffic Safety (1992), and from an article entitled "Police Pursuits" by Chief Tim Grimmond, El Segundo (California) Police Department, which appeared in the July 1993 issue of The Police Chief magazine.

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