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EMERGENCY

VEHICLE

OPERATIONS

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PREFACE

The law enforcement officer, although trained in the techniques of traffic enforcement and investigation, will all too frequently become involved in traffic mishaps. Contrary to popular belief, the high speed pursuit is not the principal factor in accidents involving police vehicles.

A survey conducted by the Highway Safety Division of the I.A.C.P. found that approximately 90% of the reported police accidents occurred when the vehicle was either parked or engaged in normal patrol. Also, one half of all injury producing accidents occurred at speeds under 40 mph. It appears that accidents are more likely to occur when the officer is on routine patrol and relaxes from a state of alertness which prevails during the high speed operation.

Safety in emergency vehicle operation must be constantly and conscientiously sought. It does not just happen. The law enforcement officer must consider three inter-related elements: the driver, the vehicle, and the external conditions. The defensive driver then, is a driver with a plan; a plan for his/her own safety and one that involves the vehicle, the driver, and the ever changing situations on the roadway.

Most of our "preventable accidents" are the result of drivers who fail to anticipate hazards and trouble in the making. Every little sign of what is developing must constantly be observed; <u>this is defensive driving</u>. Accordingly, this module has been prepared, in part, as an attempt to address some shortcomings relative to the valid application of proven techniques regarding emergency vehicle operations. To that end, this module will serve as a basis of understanding regarding vehicle dynamics and limitations.

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THE DEFENSIVE DRIVER

The police officer's level of exposure to potential auto accidents is far higher than the average driver. More than likely, an officer's shift is spent entirely on the road. The dangers of this increased exposure are compounded by the fact that officers are routinely required to drive in adverse weather conditions and to respond to calls which are located off of the main road. As a police officer, you spend approximately 60% of your duty time either on routine patrol or responding to calls for service. The bottom line is this:

POLICE OFFICERS MUST HAVE A HIGH LEVEL OF ENDURANCE BEHIND THE WHEEL, ALONG WITH DRIVING SKILLS THAT FEW OTHER OCCUPATIONS REQUIRE.

The skill required to operate a police vehicle is a learned commodity; one that can be enhanced by practicing the proper techniques of defensive driving. For this purpose, a driver training course can develope skills which can enhance proficiency in the basic techniques of professional driving. The intention is to give the police officer a strong foundation so that he/she can continue to improve driving skills while developing and maintaining a consistently high driving ability.

The practical application of these techniques is intended to provide the officer with the knowledge and skill necessary to secure the maximum efficient use of his/her patrol vehicle. This should not be construed however, to imply that the academics of defensive driving are not at least as important as the practical driving side. Proper vehicle dynamics can and should be learned in a classroom setting before being applied in the field. With this in mind, we can start with a discussion of your vehicle and the natural environmental forces at work.

Know Your Vehicle

Before we can proceed with a discussion of techniques and dynamics, you must first familiarize yourself with the vehicle in which you will spend approximately 60% of every working day. To that end, every officer should train with a vehicle currently being used in the field.

Understanding the Natural Environmental Forces at Work

Since the rear of the police vehicle contains only 40% of the total vehicle weight, and the rear wheels provide the acceleration drive, it is critical that the operator understand the natural forces at work on the vehicle so that control can be maintained. The following definitions are highlighted here to provide the reader with a basic understanding of critical elements over which we may have very little control.

a) Momentum - the quantity of weight of an object times the speed.

b) Inertia - a body in motion will tend to remain in motion unless acted upon by some outside force.

AS MOMENTUM INCREASES IT IS HARDER TO OVERCOME THE EFFECTS OF INERTIA.

c) Weight transfer - acceleration causes a vehicle's weight to go to the rear axle. Conversely, braking or deceleration causes the weight to go to the front axle.

d) Kinetic energy - the energy possessed or stored by a body in motion.
Depends on -

1. weight of vehicle
2. vehicle velocity
3. force of gravity

e) Centrifugal Force - Center fleeing - pulling away from the center.

f) Coefficient of Friction - The cohesion between two surfaces.

AT 60 MPH A CAR HAS ENOUGH KINETIC ENERGY TO LIFT 262 TONS, ONE FOOT OFF OF THE GROUND.

Just knowing the hazards, of course, does not automatically prevent us from having a collision. Understanding the natural forces, however, can assist us in controlling the vehicle in certain situations. For example, the majority of drivers would panic when approaching a fixed object and would most likely react by slamming the brake in an attempt to avoid contact. What we are suggesting is that you use what you know about momentum and inertia to transfer the weight of the vehicle from the rear to the front by utilizing the jab and stab method of braking, thereby allowing the weight of the vehicle to assist you (via the cohesion factor) in steering out of the emergency.

SLAMMING ON OR LOCKING UP THE BRAKES HAS NO REDEEMING QUALITIES AND ONLY SERVES TO HASTEN LOSS OF CONTROL.

The Two Second Rule

Some of the older officers on the department may remember a space/distance rule which stated that an operator of a vehicle should allow one car length between himself and the car in front for every ten miles an hour. The rule of thumb now states that you should allow yourself a two second cushion (given the length of vehicle you are operating and allowing for reaction time) between your vehicle and the vehicle in front and allow one second for every ten feet of additional vehicle.

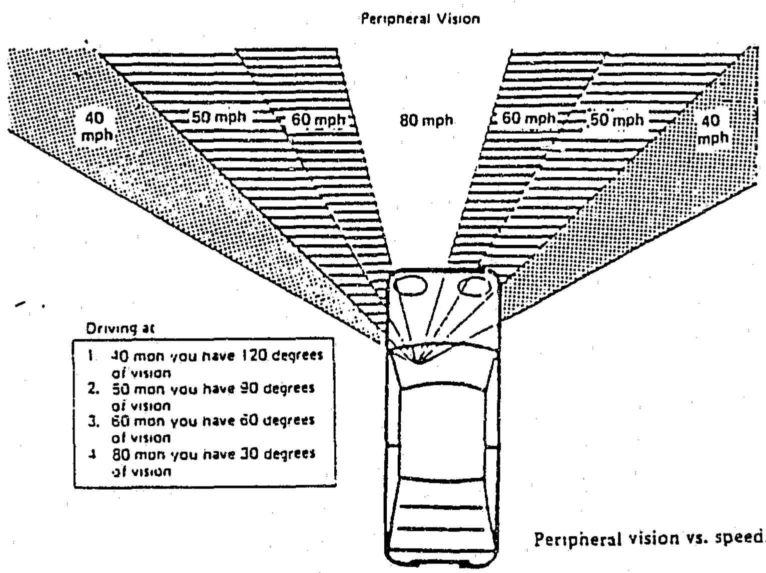
Night Driving

Some police officers spend their entire duty shift driving in d·rkness yet know very little about the fundamental differences between nighttime and daytime driving. The first startling difference between day and night driving is the accident rate. The night driving accident rate is truly appalling, roughly three times that of daytime driving. This high accident rate is the result of much more than simply driving when it's dark.

When viewed at night, most objects exhibit relatively low contrast which makes their detection, especially against certain backgrounds, extremely difficult. Colors fade at night. Peripheral vision is decreased. Contrary to common sense, most drivers do not slow down significantly at night, despite the reduced visibility and the added dangers of inclement weather.

If you drive at night using your low beam headlights, you are seeing approximately 200 feet in front of you. If your speed is 40 mph (approximately 60 feet per second) you have three seconds worth of vision ahead of you, assuming your headlights are clean and working to maximum efficiency. Your vision may also be impaired by the glare of an oncoming vehicle which can affect your vision for a distance of up to 3000 feet away. It is not impossible to be blinded for up to a second or two which can translate into between 60 and 120 feet at 40 mph.

If you wear glasses and want to drive at peak efficiency during dark hours, wear glasses with an anti-reflection (AR) coating on the lenses. The AR coating does much the same thing as similar coatings on binocular and camera lenses; it increases the lens' efficiency by allowing it to transmit more light. At least 8% of the light is absorbed within a clear glass lens, but the same lens with an AR coating transmits 99% of the light.



Peripheral vision vs. speed.

DYNAMICS

Anyone who spends time behind the wheel of a car, especially law enforcement officers, will need to understand what it takes for a car to go out of control. To do this, one must have a basic understanding of vehicle dynamics.

Don't let the term "vehicle dynamics" scare you off. It's nothing more than a description of the physical forces acting on the vehicle. When driving, a vehicle operator can do just two things: change speed and/or direction. Physical forces, however, are at work on the car and can affect the driver's ability to do this. If the driver takes an action via the car's controls, and these forces are exceeded, the driver will be unable to control the vehicle. Therefore, it is vital to have an understanding of the the forces that affect the car's ability to react to commands, and some of the techniques available to assist the driver in controlling the vehicle.

Rolling Friction

Maintaining control of the police vehicle depends entirely on your ability to foster rolling friction. Rolling friction is accomplished by allowing the tires to roll with the movement and momentum of the vehicle. The operator will find himself in serious trouble when he trades rolling friction for sliding friction; i.e., when he loses the rolling tire and substitutes the sliding, skidding, or locking tire.

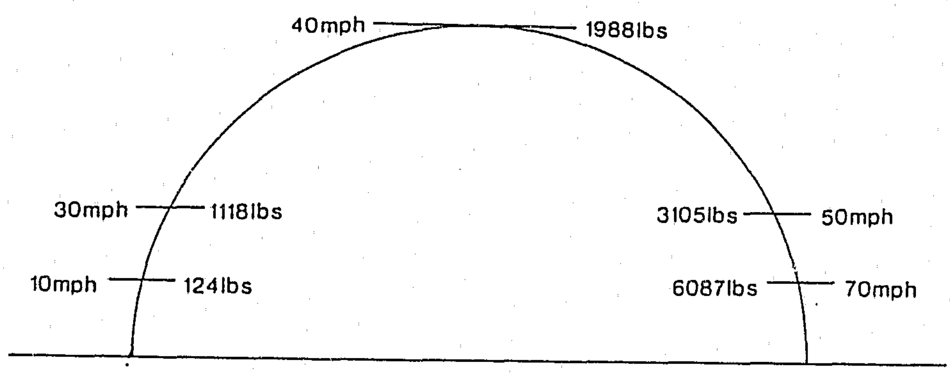
A simple experiment conducted in a controlled environment will highlight this phenomenon. A vehicle traveling 40 mph in a straight line is slowed by "locking up" the brakes. The operator can turn the steering wheel left to right and back again, however, the vehicle will not respond and will continue in a straight line. This occurs because of the natural forces acting on the vehicle (momentum) and because a sliding, skidding tire will not respond to steering due to the lack of cohesion between the tire and the roadway. Therefore, NEVER lock the brakes - always attempt to steer out of the situation using the brakes only to transfer the weight of the vehicle for the purpose of gaining traction.

NEVER SUBSTITUTE SLIDING FRICTION
FOR ROLLING FRICTION.

Apexing

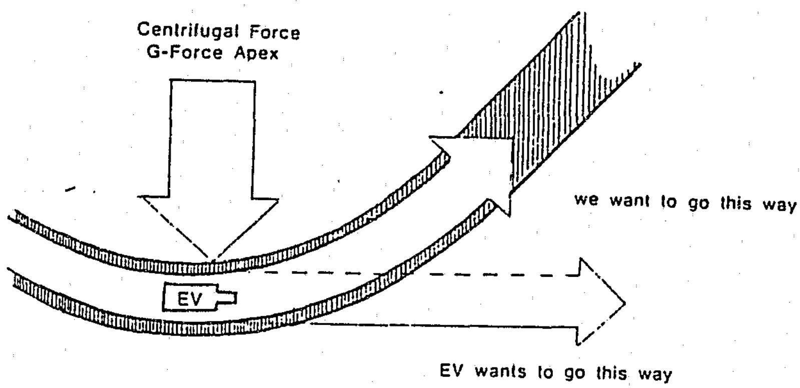
The apex concept can be accomplished when several basic facts regarding your vehicle, your "G" factor, and the curve you're about to maneuver through are understood. First, the police operator must be able to locate the line through each curve that will apply the least amount of force (centrifugal) against the police vehicle. This "force" is also known as the "G" factor and is computed by taking the weight of your vehicle (approximately 4000 lbs.) and allowing that figure to represent one "G". Thus, one "G" = 4000 lbs. For each vehicle there is a maximum number of "G's" that it will withstand before the limits of adhesion are exceeded.

Most full size police vehicles have a rating of 0.7 "G's"; that is to say that they can withstand approximately 2800 lbs. of force before the operator will lose control of the vehicle. (4000 x 0.7 = 2800)



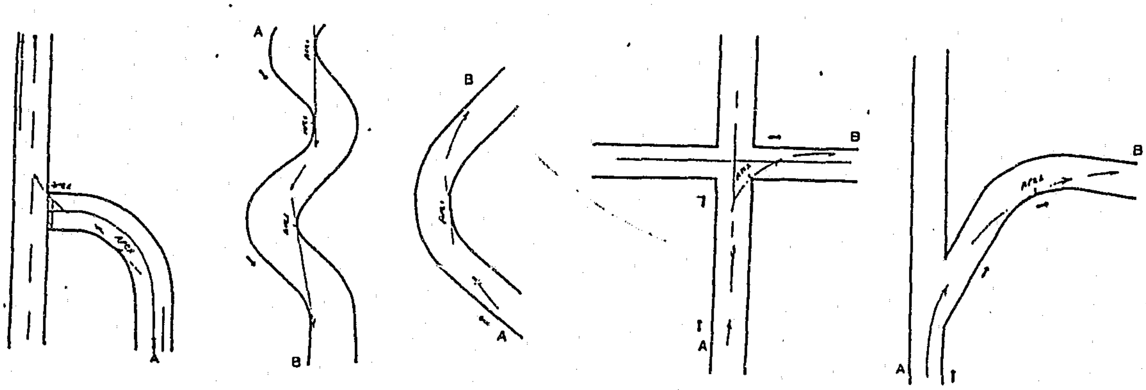
* Fig. #1 - Relationship of speed + "G" force to lateral acceleration.

Each curve will have very definite points of apex. (those points where the curves can be accomplished safely and without loosing cohesion) They are normally located at the lowest portion of the vehicle's path through the curve. For example, the curve below can be successfully maneuvered as follows:



By quickly locating and utilizing the apex system, the police officer will have a greater chance of completing the curve without loosing control of the vehicle. Conversely, the vehicle being chased in a pursuit situation - having no such knowledge - will likely follow the path that the momentum and centrifugal force has determined for the vehicle; a path that will cause the violator to end up off the roadway and out of the chase. This concept is also known as "Outside - Inside - Outside" and it should be integrated with a speed reduction upon entering the curve and a speed increase upon leaving the curve.

The following diagrams also depict proper apexing techniques.



Hydroplaning

This condition is caused by a combination of water on the roadway and speed. Grooves on the tire displace water to the rear and sides of the vehicle when the road surface is wet. However, when the water volume is such that the tire is unable to displace it, the vehicle is actually lifted from the roadway and rides on a thin layer of water. As in a slide or skid, the vehicle will not respond to steering and once again we have traded rolling friction for sliding friction.

Skid Control

Most skids occur as a result of:

a) Excessive Speed
b) Improper Braking
c) Improper Throttle Control
d) Improper Steering
e) Excessive Weight Transfer
f) Poor Road Conditions

In all instances the skid can be controlled by "getting off" the brake and the throttle and allowing the vehicle to regain rolling friction while steering the vehicle out of danger. The following tips regarding skids should also be considered:

a) When loss of control is due to braking, you must release the brakes to regain control through rolling friction.

b) When loss of control is due to front wheel skid, you must decelerate and transfer the weight to the front wheels to increase traction.

c) When loss of control is due to rear wheel skid you must turn the vehicle in the direction of the slide, coordinating steering and throttle to maintain vehicle control.

Acceleration

Acceleration should always be smooth and steady. The left half of the shoe sole should contact the pedal with the right side resting against the interior of the vehicle. An alternative method would be to position the shoe in a location where the brake and the accelerator can be actuated without lifting the foot off of the interior floor. (Pivot the foot). The pressure applied to the accelerator should be eased slightly prior to turns so that rolling friction can be maintained. The left foot should be placed against the floorboard in such a manner as to stabilize the operator's body behind the wheel of the vehicle.

Steering

Steering is best accomplished by utilizing the three and nine o'clock position. Although uncomfortable at first, this position will permit the operator to be able to turn the wheel 180 degrees and handle turns up to a 45 degree angle without removing the hands from the wheel.

Light pressure should be applied to the wheel with the fingers and firm pressure with the thumb. When driving aggressively, for instance while in a high speed pursuit, the operator may want to introduce hand over hand steering or shuffle steering. (hands should be separated, with one hand in contact with the wheel at all times)

Backing will require the utilization of the twelve o'clock steering position. The left hand will be placed at the top of the wheel with the right arm and shoulder over the back of the seat. The operator will look over the right shoulder and out the back window.

If visibility is not suitable, the operator can adjust the seating by applying pressure to the right arm and shoulder, thereby lifting the body slightly out of the seat.

Counter Steering

Counter steering is most beneficial when applied in a high speed chase, emergency avoidance situation, or any other aggressive maneuver. Abrupt steering transfers the weight of the vehicle laterally and if the weight is not transferred back to center, the propensity for the vehicle to exceed the limits of adhesion and slide out of control is very real.

The steering procedure is a three point exercise utilizing the three and nine o'clock position. The steering wheel is turned to avoid an object and the weight shifts to one side. The wheel is turned in the opposite direction (counter-steer) which shifts the weight back to the other side at which time the wheel is then centered and the weight is returned to the center of the vehicle.

Reaction Time

Many factors other than age and physical condition affect reaction time. Reaction times, for instance, can vary according to the time of day, sometimes as much as four-tenths of a second in the morning to a full second when fatigued at day's end. Four-tenths of a second may not sound like very much, but at 60 mph, a driver can travel 35 feet. The standard reaction time for a healthy person is 0.66 seconds.

Other natural factors such as adverse weather conditions can also play a significant role in determining stopping distances. Stopping on wet pavement takes approximately twice the distance as stopping on dry pavement and stopping on ice can take more than five times the normal distance to bring your vehicle to a halt. Therefore, an increase in stopping distances in proportion to weather conditions is an absolute necessity.

A 4/10THS OF ONE PERCENT DELAY IN REACTION TIME WILL ALLOW YOUR VEHICLE TO TRAVEL 35 FEET.

HOW LONG DOES IT TAKE TO STOP A CAR?

MPH	DRY (ft.)	WET (ft.)	SNOW (ft.)	ICE (ft.)
20	25	70	105	160
30	55	110	170	275
40	105	170	275	
50	188	250	410	
60	300	350		
70	455			

Backing

First of all, you should understand why it is difficult to control your vehicle when backing. Automobile suspensions possess a quality known as "caster." Caster is the force that helps to straighten out the front wheels after turning a corner and also gives the car stability while traveling forward. Unfortunately, this stabilizing forward force destabilizes the car while backing. In other words, while driving in reverse, the steering wheel will not center automatically as it will when you are in forward motion. Another little quirk of caster is that the car becomes unstable while traveling backwards and small changes in the steering wheel can cause big changes in the way the car reacts to your input.

Weight Transfer

Weight transfer problems develop when a driver applies too much steering and braking force, or too much steering and power. The result in both cases is excessive weight transfer. Since your vehicle normally rides on four tire "patches" about the size of your hand, too much weight or pressure on the tire patch could cause the driver to lose control.

As the steering wheel is turned, a force pushes on the car's center of gravity. If this force is greater than the force that the car can accept, the vehicle could once again go out of control. Also, this transfer of weight could cause the vehicle to slide when the limits of adhesion (the amount of friction between the tire and the roadway) are reached or exceeded.

The natural transfer of weight, however, is from front to back (acceleration) and from back to front (braking). As was stated earlier, this natural transfer of weight is not always a negative factor and could assist the trained operator in maintaining rolling friction through curves and turns if the proper techniques of apexing are followed. (See also "Braking")

Tires

The rule of thumb is that a single pound of under-inflation takes 600 miles off of a tire's life. Most tires only last 70% of their design life thanks to inflation problems. If the tires on your vehicle are not properly inflated, you're not only wasting tires but hundreds of miles worth of gasoline. This is because a properly inflated tire offers less rolling resistance than one that's under-inflated; thus, it requires more energy to roll an under-inflated tire than one with the proper amount of air in it. On the average, cars lose mileage at the rate of about a half mile per gallon for every 6 lbs. below a recommended inflation of 32 lbs. per square inch. (PSI) Under-inflated tires not only wear out quickly and are a drain on gasoline, but they also exhibit less overall durability and can be more easily damaged.

As a vehicle is driven, the rear wheels press down on the pavement. At 30 mph, the rear tires exert a 5 horsepower (hp) push against the pavement. At 50 mph, 16 HP is exerted, and by 70 mph, this number has risen to 38 HP. What this means is that the faster you drive, the faster you'll wear out your tires. Temperature also has an extreme effect on tires. High temperatures, or changes in temperature, wear out tires faster. Tests have shown that a change from a winter temperature to a summer temperature can increase tire wear as much as 400 percent.

Worn tires are also trouble. If you're driving on worn tires, you're driving without the tread depth that controls stopping, accelerating, and cornering. When driving on worn tires, you've thrown away some of the control you should have over your vehicle. Worn tires are also prone to hydroplaning. When the ground is covered with water, a good tire design swallows that water into the tread pattern and pushes it out the sides of the tire. Some tires do this better than others and are called all-weather tires.

The more rubber in contact with the roadway, the more traction we have - up to a point. If we could guarantee that no rain or snow would ever fall, we could ride on racing slicks, however, since this is not possible, the theory of more rubber - more traction, doesn't hold water!

BRAKING

BRAKING

The proper braking technique to be used in most emergency braking situations is called "stab or jab" braking. This technique can be used in slippery conditions, such as rain or snow, when steering control is vital. The brake pedal is hit hard enough to cause the weight of the car to move to the front wheels and then the brake is released. This sequence should be continued until you are back in control. This technique should not be used when the car is skidding or being driven through a curve, but only when the car is travelling in a straight line. By employing this technique at higher speeds, it helps reduce the over-heating of the brakes and allows a heat-cool effect on the brake shoes. Most importantly, control can be maintained. But remember, never brake so hard that you lock up the brakes.

When didtances permit,threshold braking can also be used, to decelerate your vehicle. The brake should be applied to a point just before lock-up. This is where maximum braking will occur without loss of control.

Methods of Braking

Many drivers have acquired the habit of "left-foot braking" when driving a car equipped with an automatic transmission. Some driving school instructors even recommend this practice. It is true that the use of the left foot could, if positioned on the brake pedal at all times, slightly decrease the normal reaction time. Unless the left foot is poised over or upon the brake pedal, however, it takes no longer to brake with the right foot. A driver that spends the majority of his time in a car equipped with an automatic transmission can become quite adept at left-foot braking. However, in an emergency situation, with a standard transmission, he will probably find himself depressing the clutch pedal when he needs immediate, severe braking. A driver is best braced when his left foot is placed against the left floorboard of the car and his right foot is positioned over the accelerator pedal. This technique tends to stabilize the driver's position behind the steering wheel and helps the operator retain control during sudden vehicle movements that occur during an evasive action, mechanical failure, or actual impact with another object.

In an emergency stop, the "left foot braker" can find himself with both the accelerator and brake pedals depressed. Not only is the engine trying to keep the car moving, but vacuum boost is reduced and more pedal pressure is required to operate the brakes.

IN AN EMERGENCY SITUATION, STAY OFF OF THE BRAKES AND STEER.

Rolling friction allows the driver to maintain directional control over his vehicle. For most drivers, braking just short of a locked wheel skid (threshold braking) is best achieved with the right foot. A "left foot braker" has a tendency to allow his left foot to rest on the brake pedal, actually pushing it down. It is, of course , unlikely that the foot will be poised over the pedal without touching it for any length of time. (even a slight pressure can cause brakes to rub and become heated) The constant rubbing of brake shoes and pads will result in their rapid destruction, and may also damage disc brake rotors and brake drums. As a result, the operator may find himself with inadequate brakes when he needs them most.

The brake systems on most currently produced automobiles equipped with front wheel disc brakes are basically the same. During braking tests, it has been noted that from 30 to 60 ounces of foot pressure and less than a 1/8 inch pedal movement can initiate braking action. A well-worn size 10 left shoe may weigh as much as 24 ounces, requiring very little additional pressure to activate the brakes.

Emergency Braking

Using the parking brake is an option, but the parking brake only stops the rear wheels. If you do decide to use the parking brake, apply it slowly, keeping the front wheels pointed straight ahead. Caution: any movement of the wheel while applying the parking brake will spin the car around 180 degrees.

Antilock Braking Systems

Although antilock braking systems were first developed in the forties by the aircraft industry, the technology was not applied to automobiles until the early eighties. An antilock braking system, as the name implies, does not allow the wheel to lock and is able to maximize the available friction. Additionally, a decelerating tire that is not locked up will have friction available for steering. This is beneficial as it will allow a decelerating vehicle to execute a turn or evasive maneuver. The full potential of ABS is revealed during emergency braking. The system is designed to maximize vehicle decereration and retain control regardless of the driver's ability. By not permitting the wheels to lock, the vehicle should stop quicker and remain under the control of the driver.

PURSUIT DRIVING

THE PURSUIT SITUATION

Statistical Background

The use of deadly force by law enforcement has been well researched during the past decade. As a result, every professional police agency is alert to the importance of the incorporation of this topic in its administration. High speed pursuits, however, have not received this level of attention despite the fact that they result in a greater toll of injuries and deaths than the traditional deadly force incidents. Notably absent is any scientific research prior to 1983.

Since that time, however, two scientifically constructed studies on police pursuit have been released. The California Highway Patrol collected data in 1982 and released a report in 1983 and the Michigan State University's School of Criminal Justice also published a study based on the original information identified by the CHP.

Of 424 pursuits studied, it was found that 77% occurred between 4:00 p.m. and 4:00 a.m. Eighty-three percent (83%) of the pursuits lasted ten miles or less and almost as many lasted ten minutes or less. A full 71% of the pursuits were reported to have been conducted on state and local roadways with an apprehension rate of 86%. Ninety-six percent (96%) of the pursuits occurred in dry weather at an average speed of between 41 and 80 mph.

Several interesting facts relative to officer injuries and officer seniority should also be examined. It is hard from the research to identify a particular speed which appears more dangerous than any other, however, more injuries and deaths occurred at speeds above 81 mph than any other grouping of speed. According to the study, officers having seniority between 1 and 5 years will have the highest number of accidents followed closely by the 6 to 10 year bracket. Locally, training and education seems to be the key to reducing the accident rate as well as practical applications in a controlled environment. The Departmental Accident Review Board has also played a key role in the identification of specific problem areas and has been the catalyst for changes in policy and procedure.

Clearly, we have a duty to apprehend violators of the law and the public has a duty to obey. Nevertheless, the law has restricted the means available to the police in the apprehension of offenders. The use of deadly force is now limited to certain circumstances involving fleeing dangerous felons, and the general public may not be endangered by such use of deadly force. Similarly, the Transportation Code provides for certain exemptions for emergency vehicles but has language preventing emergency vehicle drivers from driving without due regard for the safety of the public.

The challenge lies in striking the appropriate balance between the need for apprehension of the fleeing motorist and the inherent hazards which endanger the users of the highway, including the officer, suspect, and other motorists.

THERE IS A 1 IN 3 CHANCE OF BEING INVOLVED IN AN ACCIDENT WHILE ENGAGED IN A PURSUIT; A 10% CHANCE THAT SOMEONE WILL BE INJURED AND A 1% CHANCE THAT SOMEONE WILL BE KILLED.

Limitations of Blue Lights & Sirens

Warning systems have been used for many years by a large number of departments and as a result considerable operational information and experience has been accumulated. Although there have been inter-departmental exchanges of information relative to this subject, no single system has evolved as the "best" warning system. In fact, it seems that each department has reached its own solution independently based on the following facts.

Our sense of sight is highly directive and selective. A warning light may not always be in the driver's line of sight, since vision in the outer portions of the visual field (the periphery) have characteristics different from those in our direct central vision. Overall, people pay less attention to things seen in the peripheral vision than to what is being viewed directly.

The best colors to be used in warning lights, according to the U.S. Department of Commerce, are either red or blue. Blue has some definite advantages. There are relatively few blue lights in the nighttime environment, so blue is a more distinctive color. Blue is also currently the standard police light color in many other countries, and international standardization may be desirable. The level of intensity, however, renders it nearly useless in the daytime and not visible from great distances at night.

Similarly, for a sound to be audible, it must transmit an adequate amount of acoustic energy. To determine the intensity of a siren, and the amount of audibility necessary, we must look at how the siren is used. In a quiet environment, for example, a siren can be heard for a very long distance. The same siren employed in the daytime on a downtown city street, however, may not be heard for more than a block or two, due in part to background noises. Engineers use the term "signal to noise ratio" in explaining this concept. When the intensity of the background noise approaches that of the signal, it is very difficult and sometimes impossible to detect the signal. For this reason, both warning lights and sirens should be used simultaneously. The other critical factor in detection is the degree of similarity between the signal and the background noise. The more alike they are, the more difficult it is to detect the signal. For this reason, a change in pitch is recommended during an emergency response. Further, the operator should not depend on, nor should he have an over-reliance on, the warning devices used in an emergency response.

BECAUSE OF NATURAL ENVIRONMENTAL FACTORS, AN EMERGENCY RESPONSE OVER 50 MPH WILL RENDER THE SIREN VIRTUALLY USELESS.

The High Speed Chase

Given what we know about the limitations of emergency equipment, no police officer should ever respond through an intersection or against a red light without displaying due regard for traffic patterns and pedestrians. Passing on the right during an emergency response can also be disastrous since there is an excellent chance that the operator will not hear the siren until the vehicles are almost side by side. (especially at speeds over 50 mph) Since, according to Maryland law, an operator must pull to the right upon the approach of an emergency vehicle, the probability is that a collision will result.

The officer's overall attitude during a pursuit situation is also very important. An officer must not let emotions override good common sense since the decision to pursue will involve other innocent people. Thus, you must coolly and calmly evaluate the situation and then make your decision. If you decide to go for it, you must be able to control both your vehicle and yourself.

IF YOU MAKE A MISTAKE AND HURT SOMEONE,
OR DESTROY SOMETHING, YOU AND THE DEPARTMENT
MAY BE CIVILLY LIABLE. ON THE OTHER HAND,
IF YOU DO SUCCESSFULLY PURSUE AND APPREHEND,
YOU'RE JUST DOING YOUR JOB!

LIABILITY ISSUES

High speed pursuit driving often poses a greater risk to innocent citizens than the police use of a deadly weapon. The hazards inherent in a vehicular pursuit must be balanced against the need for immediate apprehension.

The basis for most pursuit related liability is negligence. Police officers operating a pursuit vehicle are under a legal duty to drive with <u>due regard</u> for the safety of others and may be liable for the consequences of their negligent or reckless conduct. In Smith v. The City of West Point, the court stated that the police "... are under no duty to allow motorized suspects a leisurely escape." However, police officers do have a duty of care with respect to the manner in which they conduct a pursuit.

POLICE OFFICERS OPERATING A PURSUIT VEHICLE ARE UNDER A LEGAL DUTY TO DRIVE WITH DUE REGARD FOR THE SAFETY OF OTHERS.

Statutes exempting emergency vehicles from ordinary traffic regulations generally make the privilege dependent upon: (1) the existence of an actual emergency, (2) the use of adequate warning devices, i.e., lights and siren, and (3) the continued exercise of due regard for the safety of others.

Most courts have translated the reasonable care standard into a duty to drive with the care a reasonable and prudent officer would exercise in the discharge of official duties of a like nature. Reasonable care is a relative term, the definition of which depends on the exigencies (pressing or urgent nature) of the situation and the degree of care and vigilance which the circumstances reasonably dictate. For example, if the police pursue without activating their lights and siren and an innocent citizen enters an intersection without being warned of the pursuit and a collision results, the police may be liable because the accident was the proximate and <u>foreseeable</u> result of their failure to adequately warn other drivers of the pursuit.

LIABILITY ISSUES

POLICE OFFICERS MAY BE LIABLE FOR A FORESEEABLE CONSEQUENCE REGARDING THEIR PURSUIT TACTICS.

The various factors that determine liability are nothing more than common sense considerations of whether and how to pursue. Each pursuit situation is different and requires a particularized assessment. One factor is the need for the pursuit. Does the purpose of the pursuit warrant the risks involved? Is there a need for immediate apprehension or has the suspect been identified so that he could be apprehended at a later time?

Another factor involves a general assessment of equipment, weather, roadway and traffic conditions, and the experience and personal ability of the driver. Considering the performance characteristics and general state of repair of the police vehicle involved, is it capable of traveling safely at a high rate of speed and has it been inspected on a regular basis to insure that it does not have dangerously worn shocks, tires, or brakes? Is the roadway wet and conducive to hydroplaning or otherwise slippery due to ice or possibly a combination of hot weather and oil?

Of course, the personal abilities of the individual driver depend in large measure on prior experience, training and familiarity with the area and road involved.

The use of adequate visual and audible warning devices, such as flashing lights and siren, are not only required by the Transportation Code, but also assures to the greatest extent possible that other vehicles and pedestrians are alerted to the approaching emergency vehicle and to the need to yield the right of way The over reliance on warning devices to clear the way for pursuit vehicles is problematic, because many drivers are visually distracted or drive with their windows up or radio playing and are not aware of approaching emergency vehicles.

THE GENERAL PUBLIC MUST BE ADEQUATELY WARNED THAT A PURSUIT IS IN PROGRESS. TO THIS END, POLICE OFFICERS MUST USE ALL AVAILABLE WARNING DEVICES WHILE RESPONDING TO AN EMERGENCY CALL OR WHILE ENGAGED IN A PURSUIT.

Whether a particular speed is excessive depends on the purpose of the pursuit, driving conditions, and the personal ability of a police officer to control and effectively maneuver his/her vehicle. For instance, liability may be based on the failure to sufficiently decrease speed when approaching an intersection so that an accident can be avoided.

Of course the decision to continue a pursuit in a reckless manner can create liability. A pursuit should be terminated when the hazards of continuing the pursuit outweigh the benefits and purpose for the pursuit. Because some officers may be reluctant to terminate a pursuit out of fear that fellow officers will view the voluntary termination as an act of cowardice or timidity, it is advisable that a supervisor be placed in charge of the activity. The supervisor should track the location of the pursuit, designate the primary and secondary pursuit vehicles, and maintain tight control on the desire of other officers to get involved or parallel the action.

SUPERVISORS MUST TAKE CHARGE OF A PURSUIT SITUATION BY TRACKING IT, DESIGNATING PRIMARY AND SECONDARY UNITS, AND MAINTAINING TIGHT CONTROLS OVER ALL PARTICIPANTS.

Because of the natural tendency for many police officers to lose some perspective during a pursuit, and because of the emotional and psychological stresses that are inherent in this type of activity, all pursuits, including those that are successfully terminated, should be routinely critiqued to determine whether departmental policy was followed and the extent to which any policy modification, training enhancement, and/or other remedial action is warranted.

Vehicular pursuits are an inherently dangerous but necessary part of law enforcement's obligation to promote law and order in our society. Unfortunately, some accidents are unavoidable, and some pursuit related liability is probably an inevitable consequence of law enforcement responsibilities. The law, however, places a duty on all police officers to operate their vehicles with due regard for the safety of others.

SUMMARY

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National statistics indicate that accident rates for emergency vehicles are approximately 2.5 times higher per vehicle mile than accident rates for other professional drivers. In fact, far more law enforcement officers are killed in traffic accidents than by gunshot wounds or other violent means. Since most law enforcement officers spend approximately two-thirds of every working day behind the wheel of a police vehicle, it is critical that they receive as much information as possible regarding vehicle dynamics, limitations, and liability.

Environmental forces acting on a vehicle, for example, can influence the amount of control an emergency vehicle operator will possess at any given time. If the limits of adhesion are not exceeded by the vehicle (G-force), the operator can control both the velocity and the direction of the corners, accelerates or decelerates, the weight of the vehicle will shift from one side of the car to the other or from back to front or vice versa. This transfer of weight, if not handled properly, can be the catalyst for disaster. Negotiating a curve at high speed, for example, is tricky at best, but it can be accomplished safely by understanding vehicle dynamics and the apexing concept.

It is also important to remember that the use of emergency equipment does not guarantee the officer's safety. Emergency vehicle operators should expect that some people will not hear or see the signal or will react improperly. The two-second rule should be applied by leaving an adequate space cushion between your vehicle and the one in front. Also, don't wait to activate your audible signal: do it early and vary the pitch.

While a law enforcement officer is permitted under Maryland law to violate sections of the Transportation Code, "due regard" still remains a primary consideration. Proper use of emergency equipment does not relieve the officer of the duty to otherwise exercise caution. Pursuit of traffic violators, for example, should never extend to the point that the officer abandons due regard for the safety of others. The pursuit of non-hazardous violators or violators that can be identified and captured at a later date, frequently do not merit an excessive speed chase. A well trained and well disciplined police officer is aware that the decision to abandon the pursuit is, under certain circumstances, the most intelligent course of action.

As an emergency vehicle operator, you have a tough and demanding job. But it is a job that can be performed safely if you remain in control of yourself and don't take unnecessary risks. REMEMBER - you can only do your job if you get there - so drive with a PLAN, a plan for being in control.

GLOSSARY

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1. Apex - the lowest portion of the vehicle's path through a curve.

2. Balanced hand positioning - three and nine position.

3. Brake fade - the loss of braking efficiency, normally due to heat build up resulting from excessive use.

4. Centrifugal force - center fleeing; pulling away from the center.

5. Centripetal force - center seeking; pulling towards the center.

6. Coefficient of friction - the cohesion between two surfaces.

7. Cohesion - the sticking power between two surfaces.

8. Counter steer - turning the steering wheel in the direction that the rear of the vehicle is sliding.

9. Hydroplaning - the tire rides upon water rather than the road surface.

10. Impending skid - a preliminary skid caused by maximum pedal pressure short of locking the brakes.

11. Kinetic energy - the energy possessed by a body in motion.

    a.) Depends on:

        1.) weight of the car
        2.) car's velocity
        3.) force of gravity

12. Momentum - the quantity of weight of an object times the speed.

13. Oversteer - the characteristic of a vehicle when the driver attempts to tighten the turning radius and rear slips towards the outside of the curve.

14. Powerslide - the lateral skidding of a vehicle when the limits of cohesion are exceeded.

15. Rolling friction - the motor vehicle must be rolling in order to steer the vehicle.

16. Understeer - the tendency of a vehicle to continue in a straight line and resist turning from a direct course of travel.

17. Visual horizon - the distance that the driver can see ahead.

18. Weight transfer - (Longitudinal & Lateral) - acceleration causes a vehicle's weight to go to the rear axle. Braking or deceleration causes the weight to go to the front axle.

19. Inertia - a body in motion will tend to remain in motion unless acted upon by some outside force. (As momentum increases, it is harder to overcome the effects of inertia).

20. "G" force = the force of gravity acting on a vehicle in a curve or turn. 1 "G" = the weight of the vehicle.

21. Jab & Stab Braking - quick repeated jabs to the brake pedal.

22. Shuffle steering - feeding the wheel through the hands.

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