

Motorcycle Mentorship Module 28

High Speed Emergency Stops



Acknowledgments

The authors of these modules wish to extend their gratitude to the organizations and the Service Men and Women who made them possible. The modules were developed collaboratively through the Defense Safety Oversight Council's Private Motor Vehicle Accident Reduction Task Force (PMV TF), Service Safety Centers, National Safety Council, and Motorcycle Safety Foundation. Some of the principal contributors to this effort include the following:

Mr. Joseph J. Angello, Jr., DSOC Executive Secretary
Mr. Jerry Aslinger, DSOC Program Manager

Major General Gregory Feest, USAF/SE
Major General Frederick Roggero, USAF, Retired

Colonel Donald "2 Dogs" White, USAF, Retired
Colonel John "Odie" Slocum, USAF/ANG
Captain Richard D. Jones, US Naval Safety Center
Captain Stephen E. Johnson, US Navy, Retired
Lieutenant Colonel Brian "Moose" Musselman, USAF/ANG
Major Alejandro Ramos, USAF, SAF/SEI
Major Dan "JD" Roberts, USAF, SAF/SEI
Mr. Walter Beckman, US Army Ground Driving Task Force
Mr. Peter Hill, HQMC SD, PMV-2 Working Group Chair
Mr. John Waltman, HQMC SD
Mr. Dave Kerrick, US Naval Safety Center
Mr. Don Borkoski, US Naval Safety Center
Mr. Bill Parsons, USAF Safety Center
Mr. Mark Erpelding, USAF Safety Center
Mr. William Walkowiak, USAF Safety Center
Mr. Arthur Albert, USAF Safety Center
Mr. Dale Wisnieski, USCG Traffic and Recreational Safety
Ms. Wendy Medley, US Joint Bases Subject Matter Expert
Ms. Karen Nelson, Concurrent Technologies Corp.
Mr. Robert A. Gardiner, Concurrent Technologies Corp.
Mr. Steve Kurtiak, Global Support Services
Mr. Zack Sionakides, Cape Fox Professional Services
The Traffic Safety Team, Cape Fox Professional Services
Ms. Debra Ann Ferris, National Safety Council
Dr. Ray Ochs, Motorcycle Safety Foundation



Preface

About: The Defense Safety Oversight Council (DSOC) Motorcycle Mentorship Modules are a set of thirty six (36) facilitation modules designed for the purpose of increasing rider knowledge on various aspects of riding and providing additional capability for self-policing within peer groups. The modules are intended as a mechanism to further decrease motorcycle related mishaps and fatalities within Department of Defense (DoD) by encouraging riders to talk, live, and think about the topic.

Using the Module: The module content enclosed is intended as a facilitation guide to assist you with discussing the topic. However, it is still critical to use your skills and talent to engage participants and develop “buy-in” on this subject from your group. To maximize this, motivate and moderate your participants, control the accuracy of participant feedback, and be mindful of their time.

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2	Facilitation Guide – A brief overview on conducting a facilitated discussion of a topic
3	Module Overview – This section provides the facilitator a synopsis of the topic, learning objectives, and the suggested environment, props, and handouts for conducting the module
4	Module Discussion Introduction – This section provides guidance to the facilitator in opening up the discussion and getting participants talking about the topic and their relevant experiences
5	Discussion Areas – This section provides various discussion topics, sample facilitation questions, and factual information for the facilitator to lead the discussion
9	Wrap-Up – This section provides guidance to the facilitator on wrapping up the topic discussion
10	Feedback Form – A feedback form to be given to all participants for their feedback on the module discussion
11	Resources – Additional resources and definitions to assist the facilitator in preparing for and conducting the topic facilitation
12	Handouts – Figures, pictures, diagrams, etc. to assist the facilitator to better demonstrate a topic idea

Warning: Incorrect or inaccurate information could lead to tragic results on the road. If a question arises that is not covered in the guide and you don’t know the answer from your own experience and training, simply state, “That is a great question, I’ll get back to you with the answer.” The Service Safety Centers will help with these types of questions when they arise. Their numbers are as follows:

US Army Driving Directorate: **334.255.3039**
USMC Safety Division: **703.604.4459**
US Navy Shore Safety: **757.444.3520 x7165**
US Air Force Safety Center: **505.846.0728**
USCG Safety Division: **202.475.5206**

Facilitation Guide for DSOC Mentorship Modules

It is recommended that this Mentorship Module be conducted in a facilitation style. Using the information provided in this Mentorship Module, you, as the facilitator, will lead a discussion on the subject. *You should not be conducting a lecture!* The facilitator's role is to help with how the discussion is proceeding. Participants will have much more "buy in" and connectivity with the information if they have input. One of your roles as the facilitator is to control the accuracy of the input and control the time. From the Mentorship Module, generate questions which will lead to group discussion. The more you let the group participate, the more success you will have.

Competencies of a Facilitator:

- Prepare prior to the event
- Make sure everyone gets a chance to participate and help members to express themselves
- Ask rather than tell
- Honor the group, display respect for the members, and acknowledge participant contributions
- Ask for others' opinions
- Listen without interrupting
- Demonstrate professionalism and integrity

The key characteristic distinguishing facilitation from other types of leadership, like scripted training, is that the outcomes are never predetermined in a facilitative setting. Although the background information provided with this Module remains the same, the result will depend on the participants, the knowledge and experience they bring, and the information that they feel they need to take away. The group uses the activities provided by the facilitator to unlock expertise, ensure thorough discussion, stay focused and reach decisions that are better than those any individual could come up with alone.

At the beginning of each Mentorship Event, discuss why the participants are there and what they will receive as a result of participating. Adults have limited time and they want to know "What's in it for me?" A facilitator should make training fun. Encourage humor and laughter in your Mentorship Event.

Principles of Adult Learning:

- ➔ Adult Learners want material that is relevant to them. "What's in it for me?" "What will I get out of this that will make a difference to me?"
- ➔ Adult Learners come to training events with varying amounts of experience. They like to share their experiences. If you have minimal or no motorcycle experience, you can still draw from your group.
- ➔ Even if you have motorcycle experience, you should draw from your group because people tend to remember what "they" said longer than what you said. Information that they "own" is more valuable to them.
- ➔ Facilitators are not always subject matter experts; nor do they need to be. Facilitators may draw on the existing knowledge of the participants and the information provided in these Modules.

Section I: Module Overview

Time Frame: One 30-45 minute facilitator-led discussion

Level of Prior Knowledge: Participants should have basic competency in operating a motorcycle and be familiar with motorcycle operations.

Synopsis: The purpose of the discussion is to disseminate information on proper braking techniques, especially high speed emergency stops.

Learning Objectives:

- ➔ Introduce basic knowledge and participant recognition of good emergency stopping technique
- ➔ Discuss the general physics of straight line stopping
- ➔ Discuss the proper technique of straight line emergency stopping
- ➔ Discuss the general physics of stopping in a curve
- ➔ Discuss the proper technique of stopping in a curve
- ➔ Discuss how to avoid the necessity of making emergency stops

Suggested Environment/Props/Handouts:

- ➔ Comfortable environment such as classroom or conference room.
- ➔ Module Handouts/illustrations (Attached)
 - **Figure 1:** Weight Distribution Before Braking
 - **Figure 2:** Weight Distribution During Braking
 - **Figure 3:** Stopping Effectiveness using Both Brakes
 - **Figure 4:** Stopping Distance vs. Speed

Section II: Module Discussion

Introduction: Facilitate discussion: Open discussions with participant-centered activities. Have attendees introduce themselves (or each other) and share their current motorcycle make and model.

All activities should encourage participant interaction and develop camaraderie and a willingness to participate in discussions. Ask for and encourage participant sharing of experiences related to the module topic.

Sample questions may include:

- Have you ever had to perform an emergency stop on your motorcycle?
- Would you tell us about it?
- Was the stop successful?

What factors affect your total stopping distance?

- Speed
- Weather
- Road Surfaces and Conditions
- Reaction Time
- Your motorcycle type and condition
- Carrying a passenger
- Your skill level

Suggested Discussion Areas:

Discussion Area 1: Emergency Stopping in a Straight Line

Facilitation Questions:

- Who can explain what makes a motorcycle stop?
- What are the physics involved in stopping?
 - ➔ Is there a weight shift on the motorcycle?
 - ➔ What is it?
 - ➔ How does this affect braking?

Charles-Augustin de Coulomb was a French physicist in the 1700's. According to Coulomb's law of friction, the friction of a sliding object increases with the force applied. When a greater force is applied to a tire, the suppleness of the rubber allows the surface in contact with the ground to conform better to the irregularities of the pavement and the area in contact with the ground to increase through deformation of the tread.

As the brakes on a motorcycle are applied, there is a weight shift forward and downward on the front tire, increasing the friction between it and the road surface. If the front brake lever is squeezed with progressively increasing pressure, this increased weight will help prevent the front wheel from locking and causing a front wheel skid. This weight shift forward is the reason the front brake provides a minimum of 70% of your total stopping power.

Refer to Figures 1 and 2. Notice the subtle differences in the motorcycle suspension just prior to braking and during the braking process.

If the front brake lever is grabbed, the front wheel may lock up before the forward weight shift occurs. Therefore, the front brake lever must always be squeezed, and then progressively squeezed harder as the front forks compress.

Facilitation Questions:

- What is the proper technique for braking?
 - ➔ Do you always use the front brake?
 - ➔ Do you always use the rear brake?

Even though the front brake supplies 70% of stopping power, would you not want the other 30% available in an emergency situation?

Both brakes should be applied at the same time during stopping. You should develop the habit of always using both brakes to stop, so that when an emergency situation arises, you will automatically use both brakes with proper technique. (See Figure 3)

Facilitation Question: What should you do if you accidentally lock up the front wheel?

If the front brake lever is grabbed before the forward weight transfer is available, the wheel can lock and a front tire skid can occur. If the front tire skids, immediately release the brake lever and re-apply the brake properly.

Facilitation Question: What should you do if you accidentally lock up the rear wheel?

While the forward weight transfer increases the traction available to the front wheel, it reduces the traction on the rear wheel. The amount of brake pressure needed to lock the rear wheel is lessened as well. If the rear wheel does lock, you should intentionally keep the rear brake locked and skid to a stop.

Facilitation Question: How many people believe that they should squeeze the clutch while stopping?

As emergency stopping does not always result in coming to a complete stop, the answer to this question is going to be dependent upon how much slowing you plan on doing. If you believe the speed of the motorcycle will be reduced enough to require a downshift, then the clutch should be squeezed and the gears lowered to match your decreasing road speed. If your motorcycle is going to be coming to a complete stop, then of course the clutch should be squeezed and held in for the duration of your stop.

In most cases, an emergency stop will likely require a downshift. To ensure that you remember this vital step, you should practice the simultaneous application of the front and rear brakes, combined with a squeeze of the clutch and a press down on the gear shift lever.

Facilitation Question: Why is it a good idea to shift down to 1st gear whenever you stop?

This is another case of developing good motor skills. If you get into the habit of always downshifting into first gear, you will be ready to take evasive action in case the vehicle behind you fails to stop.

Facilitation Question: How does carrying a passenger affect emergency stopping?

With a passenger there is an increase in mass to manage and the center of gravity shifts rearward and higher. Braking can be strongly affected. A passenger tends to move forward in quick stops and may “bump” your helmet with theirs and in hard braking may even slide forward enough to intrude on the operator’s seat area. Riding on a downhill grade will also cause braking distance to increase as compared to a flat surface.

With a passenger, all braking will be affected, rider should be prepared to brake sooner, and greater brake lever and pedal pressures may be required. A possible benefit of a passenger is that more weight over the rear tire may increase the usefulness and stopping power of the rear brake.

Facilitation Question: Should you “lay it down” to avoid a crash?

Many have heard of stories where someone states that he had to lay the bike down to avoid a serious crash. These stories are probably a misinterpretation of what really happened – the rider panicked and used improper braking techniques to try to stop, resulting in a slide out, or skid. Motorcycle Safety Instructors do not teach riders how to lay down a bike.

When faced with an obstacle in your path, it’s generally best to remain on your bike and use proper stopping techniques. The rubber tires offer an enormous amount of traction; much more than the bike’s other materials, (plastic, metal, etc.), which offer almost no traction. You have a much better chance of stopping by keeping the bike upright to avoid an obstacle, or at least minimizing the impact. You lose only about 8-10 mph every second you spend sliding on the ground. If you do a good job using both brakes, you can lose 15-20 mph every second you are braking.

Quick stop skills should be practiced in an empty parking lot or a clear road. Every bike has unique braking characteristics, and many crashes occur within the first five months of purchasing a new motorcycle.

Facilitation Question: Who knows what the Hurt Report is?

The **Hurt Report** was a motorcycle safety study conducted in the United States, initiated in 1976 and published in 1981. The report is named after its primary author, Professor Harry Hurt.

The study was initiated by the Department of Transportation's National Highway Traffic Safety Administration, which contracted with the University of Southern California Traffic Safety Center — the work was ultimately conducted by USC professor Harry Hurt.

The study found that in single vehicle accidents, motorcycle rider error was present as the accident precipitating factor in about two-thirds of the cases, with the typical error being a slide out and fall due to over braking.

You should practice quick stops whenever you ride a new or different motorcycle, and practice often. The motorcycle training classes are another excellent opportunity to practice quick emergency stops.

Discussion Area 2: Emergency Stops in a Curve

Facilitation Questions:

- Has anyone had to make an emergency stop in a curve?
 - ➔ Would you tell us about it?
 - ➔ Was the stop successful?
- What are the physics involved in stopping in a curve?
 - ➔ At what lean angle does a motorcycle have best available braking traction?

Facilitator Facts:

A motorcycle has the most braking traction when the bike is standing straight up. As the lean angle increases, the amount of available traction is consumed by the turn.

If a hard emergency stop was executed while the motorcycle was leaning in a curve, the maximum available traction would be exceeded, and the motorcycle would skid.

If it is necessary to make an emergency stop in a curve, you should first straighten the motorcycle, square up the handlebars, and then make a quick stop using the techniques discussed previously.

Like quick stops, stopping in a curve may be practiced in an empty parking lot or closed road. Once in a curve, practice straightening the bike, squaring the handlebars and performing a quick stop.

Discussion Area 3: Avoiding the Necessity of Making Emergency Stops

Facilitation Questions:

- What are some examples of situations where an emergency stop might be necessary?
- What steps can you take to reduce the likelihood of having to make an emergency stop?

Example Situations:

- Vehicle pulling out in front of motorcycle
- Deer or other animal running in your path of travel
- Traffic ahead comes to a stop
- Pedestrians and bicyclists
- Obstacle blocking the road in a blind curve
- Obstacle falling from another vehicle

Steps to Avoid Making an Emergency Stop:

1. Maintaining an adequate following distance is probably the best measure you can take to avoid having to make emergency stops. According to the Hurt Study, the typical motorcycle accident allows the motorcyclist just less than 2 seconds to complete all collision avoidance action. Knowing this, it would make sense to maintain a following distance of greater than 2 seconds – at least double – for a 4 second following distance. This gives the rider more time to react to emergency situations.
2. Maintain space to the sides and rear of the motorcycle as well as to the front. This will give the rider an escape route, and may give the rider another choice besides an emergency stop.
3. Pay attention to traffic and road conditions as far down the road ahead as you can see. Looking ahead may allow you to make a minor speed or position adjustment, eliminating the need for an emergency stop or swerve.
4. Always be thinking about what you would do to respond to ever changing traffic conditions. If the car at the next intersection should pull out in front of you, what would you do?
5. Position yourself where you can both see and be seen by others.
6. Wear bright colored clothing, with reflective materials at night. Make certain all lights are on and working.
7. When entering curves, always look through the curve for potential hazards. You should be able to stop in the distance that you can see ahead, so adjust your entry speed accordingly.
8. Be aware of and avoid driving while distracted. Adjusting the radio or GPS, your passenger, signs, road construction and accident scenes are all examples of driving distractions. Can you think of others?
9. Avoid riding while you are drowsy, fatigued, or under emotional stress.
10. Maintain a zero tolerance alcohol policy. Riding with even one drink in your system can greatly impair your ability to operate a motorcycle, let alone react to an emergency situation.

Wrap-Up:

Wrap up the discussion by asking the participants how they would apply the knowledge they gained from the discussion to their lives.

Distribute copies of the DSOC Motorcycle Mentorship Module Evaluation form to all participants and request that they deliver or mail the completed form to the Command or Command Safety Office for processing.

Remind everyone to ride safe and see you at the next Mentorship Meeting.

DSOC Motorcycle Mentorship Feedback Form

Presenter Name:

Date:

Topic/Title:

Unit Number:

Please review each statement below and check the response that closely matches your experience in the Mentorship Module today:

1. Please rate the presenter's performance:

☐ Prepared ☐ Not Prepared ☐ Engaging ☐ Not Engaging ☐ Led Discussion ☐ Lectured

Comments:

2. I was given opportunities to participate in the module's discussion

☐ Never ☐ Only Once ☐ 2-4 Times ☐ Many Times Throughout Discussion

Comments:

3. With regard to my personal riding experiences, this discussion was:

☐ Relevant ☐ Not Relevant ☐ Interesting ☐ Not Interesting

Comments:

4. This discussion topic has provided me with specific learning points that I can use to be a safer, better informed rider

☐ None ☐ One Idea or Fact ☐ 2-4 Learning Points ☐ 5 or More

Comments:

5. I would be interested in participating in other Motorcycle Mentorship Module discussion topics

☐ Never Again ☐ Willing to Try Another Module ☐ Would Like to Do Modules Regularly

Comments:

Thank you for your participation. Please make note of any other suggestions or comments below (continue on the back if needed):

Deliver or mail this completed form to the Command or Command Safety Office for processing. Please do not return this form directly to the Module Presenter.

Resources

Continued Reading:

Ienatsch, Nick (2003). *Sport Riding Techniques: How To Develop Real World Skills for Speed, Safety, and Confidence on the Street and Track*. Phoenix, AZ: David Bull Publishing

Motorcycle Safety Foundation, (2005). *The Motorcycle Safety Foundation's Guide to Motorcycling Excellence*, 2nd Edition. Irvine CA: Whitehorse Press

Parks, Lee (2003) *Total Control – High Performance Street Riding Techniques*. St. Paul, MN: Motorbooks International

Internet:

Sport Rider Magazine:
<http://sportrider.com>

Hurt Report: Department of Transportation Highway Traffic Safety Administration:
http://commons.wikimedia.org/wiki/File:MOTORCYCLE_ACCIDENT_CAUSE_FACTORS_AND_IDENTIFICATION_OF_COUNTERMEASURES_VOLUME_I-TECHNICAL_REPORT.pdf

Definitions: *(As defined for purposes of this module.)*

Friction: Friction is the force resisting the relative motion of solid surfaces, fluid layers, and material elements sliding against each other.

Traction: Traction refers to the maximum frictional force that can be produced between surfaces without slipping.

Motor Skill: A motor skill is a learned sequence of movements that combine to produce a smooth, efficient action in order to master a particular task. The development of motor skill occurs in the motor cortex the region of the cerebral cortex that controls voluntary muscle groups.



Handout: Figures 1-5

Figure 1: Weight Distribution Before Braking



Figure 2: Weight Distribution During Braking



Source: <http://sportrider.com>

Figure 3: Stopping Effectiveness using Both Brakes

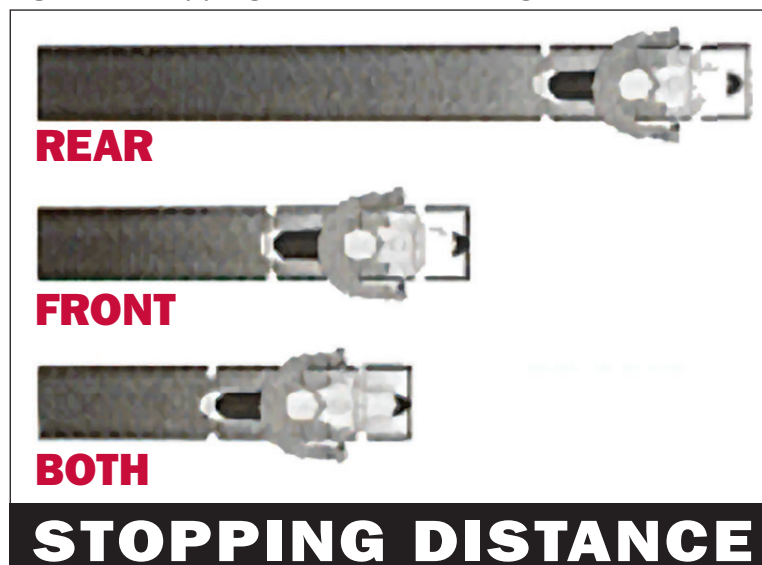


Figure 4: Stopping Distance vs. Speed

