Brake the Motorcycle – Don't Break the Fun of the Ride

Tips, Techniques and Practice Guidance
for getting the most out of your ABS/traction control equipped motorcycle

Disclaimer: *The information contained in this document is offered for the benefit of those who have an interest in riding motorcycles. Riding motorcycles is inherently dangerous and can result in serious injury or death. In addition to the experience of SMARTER, this curriculum material has been supplemented with information from publications and available research and has been reviewed by several nationally recognized motorcyclist safety experts. However, the developers disclaim any and all liability incurred in connection with the use of this material or the views expressed and for any actions by readers that might result in harm. Always ride within your personal limits. Always wear full gear when you ride.*

Introduction

This material was developed in early 2018 by the Skilled Motorcyclist Association - Responsible, Trained and Educated Riders, Inc. (SMARTER at www.smarter-usa.org). The project was undertaken following the 2017 National Association of State Motorcycle Safety Administrators (SMSA) conference, stimulated by a presentation by Brad Heiler, Manager, Two-Wheeler and Powersports, Robert Bosch LLC and Dane Pitarresi, Skidcar.

The reader and user of this material should be aware of the likelihood that some material may become outdated because of the rapidly expanding world of motorcycle technology. To complicate matters the various braking systems are used by and applied by the manufacturers in an ever expanding variety of ways. You must know the braking system on your motorcycle. Read your owner's manual and practice on the machine you ride.

History of ABS

The idea of Antilock Braking Systems (ABS) was being researched as early as the beginning of the 20th century, at a time when there were few cars and motorcycles. The first systems were developed for rail and airplane application. The literature provides conflicting information regarding the first production use of ABS. The 1971 Lincoln Continental Mark III had standard equipment antilock brakes called SureTrak and the first production rear wheel anti-lock brake system seems to have been the 1972 Oldsmobile Toronado and Cadillac Eldorado. The 1978 Mercedes-Benz W116 appears to be the first production car to use an electronic four-wheel multi-channel ABS as an option and the 1985 Lincoln the first American car to offer four-wheel ABS.

In 1988, BMW introduced the first motorcycle with an electronic-hydraulic ABS: the BMW K100. Yamaha introduced ABS in 1991 as an option on the FJ1200 model, Honda in 1992 with ABS on the ST1100 Pan European. Harley-Davidson began offering an ABS option on police bikes in 2005 and Suzuki in 2007 on the 1200 Bandit.

Why you should have a motorcycle with ABS

Motorcycles are less stable than four wheeled vehicles. Braking too hard or applying the brakes

too abruptly can possibly lead to the front or rear wheel locking, making the motorcycle very difficult to control and possibly result in a crash. However, not braking hard enough might result in crashing into something that could have been avoided with proficient braking. ABS on motorcycles directly addresses these two situations: maintaining control and stopping in the shortest possible distance. The available research shows that ABS makes riding safer (see http://smarter-usa.org/research/design-equipment/). Anecdotal evidence of fatal crashes, insurance claims and test track performance all confirm the effectiveness of ABS.

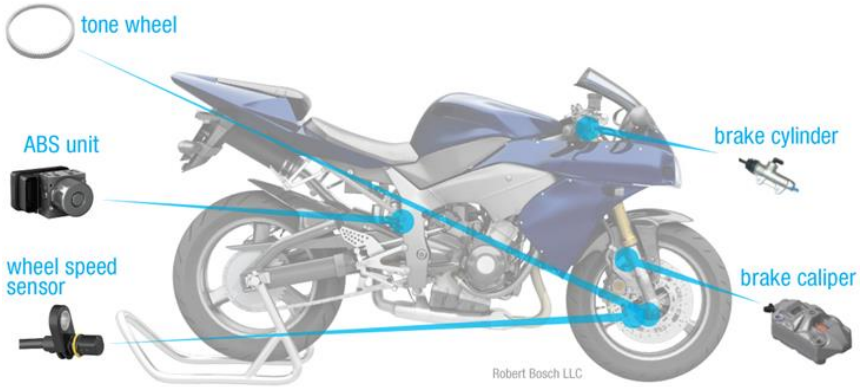
Stopping a motorcycle is much more complicated than stopping a car. Most motorcycles have separate controls for the front and rear wheel brakes. Braking too hard on either wheel can cause a skid which may result in a crash. Regardless of skill, a rider can't predict when another road user might violate their right-of-way forcing emergency braking. Road surfaces may be unexpectedly sandy or more slippery than they look. With ABS, riders can brake fully without fear of locking up. According to Bosch (a leading manufacturer of motorcycle ABS systems), the benefits for riders are:

- Around 1/4 of all relevant accidents could be prevented if every powered two-wheeler was equipped with ABS. (Bosch accident research study Germany and India based on GIDAS 2001-2004, RASSI 2009-2013).
- Optimal deceleration without the wheels locking.
- The risk of falling because of an unintentional lock-up is reduced.
- Stopping distance for many riders can be significantly reduced.
- Riding stability and comfort during hard braking is enhanced.

https://www.bosch-mobility-solutions.com/en/products-and-services/two-wheeler-and-powersports/riding-safety-systems/motorcycle-abs/

How motorcycle ABS works

ABS works to prevent a motorcycle's wheel, or wheels, from locking (or remaining locked) during hard braking. ABS works by constantly measuring front and rear wheel speed to determine whether the wheel is about to stop rotating. If it is, wheel speed information is used to adjust the pressure from the brake master cylinder to the brake calipers multiple times per second. The common way to do this is with a small grooved ring near the brake disc often called a tone wheel. The wheel speed sensor sends the tone wheel readings to the ABS unit which then adjusts the pressure.



Robert Bosch, LLC

SMARTER, June, 2018

How basic motorcycle traction control (MTC) works
Traction refers to the motorcycle tires grip to the road. Tires need to grip the road in order for the rider to perform all normal riding operations – accelerate, steer or brake. Motorcycle traction control helps riders maintain rear wheel grip when riding on slippery surfaces or when accelerating hard. Without traction (grip) the bike will slip and slide around making it hard to control.

Motorcycles have a very small patch of the tires in contact with the surface of the road. While riders like riding on smooth, dry and "grippy" asphalt the reality is the road surfaces are often wet, cracked, and otherwise a slippery mess. Traction control helps to diminish the loss of rear wheel traction from all of these surface problems in addition to rider-produced traction loss caused by excessive throttle roll-on.

Traction control systems use wheel-speed sensors to measure the speed at which the wheels are spinning. ABS equipped motorcycles already have wheel speed sensors so the information needed for traction control is already available. If the rear wheel is spinning more quickly than the front, the rider might lose control as the rear slides out to the side.

The wheel speed sensors transfer this information to the motorcycles Engine/Electronic Control Unit (ECU). In modern engines the ECU is the brain which monitors and controls the engine. In normal operation the ECU is programed to maintain the optimal running of the engine and notify the rider if something is not correct. The ECU controls and maintains an engine in its optimum state by manipulating the sensors and actuators which result in changes of the air-fuel mixture, ignition timing and idle speed. The ECU is to an engine what a CEO is to a company. It manages all the running aspects of the engine and lets the user know when something is wrong. The ECU "knows" the amount of power being applied at the rear wheel and with the additional wheel speed information can assess traction. If traction loss is determined (rear wheel spinning faster than front) the ECU can initiate an action to limit rear wheel spin. What action (or actions) the ECU is programmed to take to reduce power delivery varies depending make and model of the motorcycle. The owner's manual will tell what the manufacturer calls their traction control system, how riders adjust the settings if there are options, and may provide information about what actions the ECU takes to limit rear wheel spin.

A note regarding motorcycles used in this course.
This curriculum is written for riders using motorcycles equipped with ABS or ABS and traction control. Stability control (sometimes referred to as cornering ABS) is not addressed in this curriculum. Motorcycle stability control (MSC) is a system that supports the rider, during both braking and accelerating, and while either riding straight or cornering. In addition to braking and traction control assistance during straight line riding and cornering, motorcycles equipped with these systems may also have, for example, rear-wheel lift-up control, wheelie control, and hill hold control.

Stability control equipped motorcycles can be used in all the riding exercises described in this curriculum.

Section # 1

Tips and techniques for braking normal stops both ABS and non-ABS equipped motorcycles - straight-line stops

Performing normal stops with an ABS equipped motorcycle is no different than performing a normal stop on a non-ABS equipped motorcycle. On a normal stop, the ABS system will not activate.

The purpose in this section is simply to remind readers of braking fundamentals. This information and the section that follows on emergency stops with a non-ABS equipped motorcycle are included to provide the fundamentals of braking a non-ABS equipped motorcycle that also apply to an ABS equipped machine. Readers, who are new to motorcycling and have not yet taken a formal motorcycle rider course, are strongly advised to complete a course as soon as possible. Go online to do a search. Most states have a state sponsored rider training program and there are many privately sponsored courses as well.

Here are a few key points for performing a normal straight-line stop with either an ABS or non-ABS equipped motorcycle:

- The riders braking effort should result in 70 percent or more braking on the front wheel and 30 percent or less on the rear wheel.
- The front brake is operated by the right hand lever.
- The rear brake is operated by the right foot pedal.
- Apply both brakes at the same time – simultaneously.
- Progressively squeeze the front brake lever and lightly press the rear brake pedal.
- If coming to a complete stop, squeeze the clutch lever and keep it squeezed.
- If time allows, downshift to first gear during your stop.
- Weight transfer from slowing down will shift the bike's balance from the rear wheel to the front, which allows for progressively more pressure to be added to the front brake lever. Guiding language is "smoothly apply firm to firmer pressure on the front lever."
- As the weight shifts forward, it becomes much easier to lockup and slide the rear wheel. This means the pressure on the rear should be "light to lighter."
- Keep the handlebar straight or square with the front tire pointed straight ahead. Keep equal pressure on both grips.
- Keep head and eyes up, looking well ahead – not down at the anticipated stopping point.
- Maintain brake pressure until fully stopped. The left foot is placed to the ground and right foot remains on the rear brake. Once stopped, pressure on the front brake may be released.

Regardless of the type/style of the motorcycle, the best way to learn the fundamentals of braking is to take a formal training course and the best way to learn the characteristics of the motorcycle being ridden is through repeated practice on that motorcycle.

Section # 2

Tips and techniques for braking – stopping in the shortest possible distance non-ABS equipped motorcycles – straight-line stop

As in Section 1, the purpose in this section is simply to remind readers of the fundamentals for stopping in the shortest possible distance.

All the techniques noted above for normal stops apply. There are two additional actions for a rider to perform that result in shortening the stopping distance.

(1) Application of pressure on the front brake that results in the front wheel approaching near skid – what is often referred to as threshold braking.
(2) Getting to the threshold braking point as quickly as possible.

Threshold braking or braking at the limit of traction is the technique used to slow the motorcycle at the maximum possible rate. The technique involves the rider controlling the pressure on both the front brake lever and the rear brake pedal to the point just prior to the wheels beginning to skid. Traction is limited and the rider must learn to feel how much brake pressure can be applied without skidding and how to make brake pressure adjustments.

The key to stopping in the shortest possible distance is to manage available traction, predict the change in available traction between front and rear as the weight shifts forward and to progressively but quickly apply an increasing amount of front brake pressure and a decreasing amount of rear brake pressure. The goal is to reach the point of impending skid as quickly as possible and then maintaining that level until stopped. ABS makes this way easier.

The increased brake pressure required to stop in the shortest possible distance increases the likelihood of an unintended lock-up. Locking up a non-aligned front wheel or locking up the rear wheel, sliding sideways and then releasing rear wheel brake pressure are the leading rider caused barking actions that result in a crash. It is therefore critical that riders keep their head and eyes up to help maintain a straight path of travel and to keep the handlebar straight or square.

Practicing repeated stops under controlled conditions is the best way to learn to perform a threshold stop in real-life conditions. Remember, because available traction depends on many factors including tire condition, rubber compound, road conditions, weather conditions and temperature, threshold braking is difficult to achieve in real-world riding.

Section # 3

Tips and techniques for braking with an ABS equipped motorcycle - stopping in the shortest distance - straight line stops

Prior to reading this section it is important to have a good understanding of the material in Sections 1 and 2. As readers have learned, there is no difference in performing a normal stop between an ABS and non-ABS equipped motorcycle. The huge advantage of braking with an ABS equipped motorcycle is connected to maintaining control when attempting to stop in the shortest possible distance. With practice and in a controlled situation, some riders can gain comfort and control with threshold braking a non-ABS equipped motorcycle. However, quickly reaching and then maintaining threshold braking while maintaining control is an enormously challenging task that is almost impossible for the average rider to be able to perform during an on-road traffic crisis situation.

That is where ABS becomes a life-saver. As readers learned earlier, ABS automatically reduces brake pressure when a lockup is about to occur and increases it again after traction is restored. It can do this multiple times *per second.* In other words, the ABS system works to maintain threshold braking. Achieving and maintaining threshold braking is action # 1 for stopping in the shortest possible distance. Action # 2 is getting to the threshold braking point as quickly as possible.

Without ABS a rider must carefully apply front brake pressure in a progressively increasing manner while at the same time lightening pressure on the rear brake pedal. Even with experience, practice and high level skill progressive application of both brakes takes time. As time goes by so does the distance the rider and motorcycle travel down the road before coming to a stop. Knowing the ABS system will activate and control the wheel lock up, a rider can much more quickly apply increasing brake pressure. Primarily we are referring to application of pressure on the front brake lever.

Without ABS riders must be exceedingly cautious about the possibility of exceeding the threshold and locking the front brake which dramatically increases the chance of loss of control and a crash. To address this, a rider must "sneak up on the threshold." With ABS and knowing the system will release pressure when the wheel locks (or nears lock) riders no longer need to "sneak up" on the threshold as the technology does that for them.

Practice guide

How to use this material

This material has been written for use by a small (3 - 7) group of riders or a small group of riders and a non-riding guide or facilitator. While it is possible to learn and strengthen ABS/traction control equipped motorcycle riding skills by individually using this material, it is not recommended for two reasons:

(1) For safety, having at least one other person present when practicing new skills is the responsible choice.

(2) Learning is enhanced when new ideas, concepts, knowledge and skills are discussed with others.

Practice area

It is important to find an off-street practice area which is free of traffic and has sufficient asphalt area for getting up to recommended practice speeds and then stopping with lots of additional room for runoff. All of the suggested practice exercises have a straight line design so the practice area does not have to be wide. Suggested length is 250-300 feet.

Gear and preparation

Riding a motorcycle is a dangerous activity. Practicing new skills and riding techniques add additional layers of risk to normal riding. Riders should begin each activity at a comfortable speed and work up to the speeds suggested. Start slow and cautious.

Wear full gear. Make good choices. Be a responsible and smart rider. Visit the GEAR section of the Skilled Motorcyclist Association – Responsible, Trained and Educated Riders, Inc. for more information on full protective gear: http://smarter-usa.org/gear/full-protective-outer-gear/

Pre-practice activities

As important as hands-on braking practice is, equally (if not more) important is mental preparation for the hands-on practice. Reviewing pertinent information and discussing it with others just prior to practicing prepares the brain for maximum learning. Follow-up discussion of practice sessions is also extremely beneficial to information processing and increased retention.

- Prior to gathering to practice, participants should individually read the section(s) in the motorcycle owner's manual pertaining to the brake system, use of the brakes and traction control system on the motorcycle that will be ridden.
- In pairs or trios, participants discuss and explain to each other their motorcycle brake and traction control systems (explain to someone what was learned by reading the owner's manual).
- If access to this "Brake the Motorcycle" curriculum is provided prior to gathering as a group to practice, be sure to read all of the material and be prepared to discuss with others.
- If access to this curriculum is not available prior to gathering to practice, be sure time

is allocated to read/review this material. Consider assigning individuals to read sections and report to the total group. It is especially important that each rider have a full understanding of the tips and techniques explained in Sections 1, 2, and 3.

- Before riding, participants should discuss as a group the various braking systems, tips and techniques and address any individual questions.

Practice riding activities

Each riding activity should be practiced by following the series of steps outlined for that activity. The objective of each activity is identified and the practice steps are outlined. The objective should be read and discussed. Remember; begin all riding in a slow and cautious manner and work up to higher speeds and quicker responses. Maintain smooth operation of controls at all times. After all riders have obtained the riding objective, time should be allotted for discussion and processing of the new learning.

A formal break should be scheduled after Riding Activity 1 (B), 2 (B), 3 (B).

Motorcycle ABS availability by make and model

A website maintained by the Insurance Institute for Highway Safety (IIHS) has a listing of motorcycle ABS availability by make and model. IIHS is an independent, nonprofit scientific and educational organization dedicated to reducing the losses - deaths, injuries and property damage - from motor vehicle crashes. The website has a video and additional information describing ABS. http://www.iihs.org/iihs/ratings/motorcycle-abs

Riding Activity # 1 (A)
Planned gradual straight-line stops from 15-25 MPH

Objective: To stop smoothly in a straight line.

1. **Prior to riding all riders should review the Section # 1 tips and techniques**
2. **Path of travel**

   Riders begin in a single file line, ride individually, perform a normal stop and return to the end of the line.
3. **Instructions**
   - One rider at a time, begin in first gear and ride toward the designated stopping area.
   - Up-shift to second gear. Maintain a steady speed of 15 - 25 MPH.
   - Maintain speed as you approach the stopping area.
   - Keep your eyes focused on the horizon. Do not look down at the stopping area.
   - At or just before the stopping area, squeeze the clutch lever, apply both brakes, downshift to first and come to a smooth stop, placing your left foot to the ground and keeping your right foot on the rear brake. Do not release the brakes until you are completely stopped. Keep the handlebar square – front tire pointed straight.
   - When stopped, check your posture (head and eyes up, back straight, slight bend at elbows, feet properly placed) and check to ensure the bars are square.
   - Return to the end of the line. Review your trial for correct procedure and smooth operation and plan for your next trial.
   - Begin at slower end of the speed range and increase speed slightly with each trial
   - 2-4 trials should be sufficient to reach the objective. Final speeds prior to stops should be at or near 25 MPH.
   - This is not a quick stop and ABS should not be activated. Motorcyclists riding machines that can switch off ABS should NOT do so. The ABS should remain on to provide a safety feature and to provide rider feedback regarding brake pressure.
   - Keep the motorcycles in line.
4. **Processing and discussion**
   - When all riders have completed part A, the group should gather to report insights, discuss the experience and ask and answer questions.

Riding Activity # 1 (B)
Planned gradual straight-line stops from 25 - 35 MPH

1. Objective: To stop smoothly in a straight line from higher speeds. This activity is a continuation of the previous. Use the same format as in Riding Activity 1A except the speeds are increased to between 25 and 35 MPH.

2. Path of travel

Same as previous.

3. Instructions

Same as previous except approach the stopping area at speeds between 25 and 35 MPH. Begin at the slower end of the speed and increase speed slightly with each trial.

4. Processing and discussion

When all riders have completed part B, the group should gather to report insights, discuss the experience and ask and answer questions. Take a break before proceeding to Riding Activity # 2 (A).

Riding Activity # 2 (A)
Stopping in shorter distance – non-skidding and non-ABS activation

1. **Objective**
   The objective of this riding activity is to stop smoothly in the shorter distance from speeds between 15 and 25 MPH – non-skidding and non-ABS activation.
2. **Prior to riding all riders should review the written material in Section # 2**
3. **Path of travel**
   Riders begin in a single file line, ride individually, perform a stop in the shortest distance they safety and smoothly can, then return to the end of the line.
4. **Instructions**
   - One rider at a time, begin in first gear and ride toward the designated stopping area.
   - Up-shift to second gear. Maintain a steady speed of 15 – 25 MPH.
   - Maintain speed as you approach the designated stopping area.
   - Keep your eyes focused on the horizon. Do not look down at the stopping area.
   - At or just before the stopping area, squeeze the clutch lever, apply both brakes, downshift to first and come to a smooth rapid non-skidding and non-ABS activation stop, placing your left foot to the ground and keeping your right foot on the rear brake. Do not release the brakes until you are completely stopped. Keep the handlebar square with the front tire pointed straight ahead.
   - When stopped, check your posture (head and eyes up, back straight, slight bend at elbows, feet properly placed) and check to ensure the bars are square.
   - Return to the end of the line. Review your trial for correct procedure and smooth operation and plan for your next trial.
   - Begin at slower end of the speed range and increase speed slightly with each trial
   - 2-4 trials should be sufficient to reach the objective. Final speeds prior to stops should be at or near 25 MPH.
   - This is a rapid threshold braking stop but without activating the ABS. Motorcyclists riding machines that can switch off ABS should NOT do so. The ABS should remain on to provide a safety feature and to provide rider feedback regarding brake pressure.
   - Keep the motorcycles in line
5. **Processing and discussion**
   - When all riders have completed part A, the group should gather to report insights, discuss the experience and ask and answer questions.

Riding Activity # 2 (B)
Stopping in a short distance with ABS

1. Prior to riding all riders should review the written material in Section # 2

2. Objective

The objective of this riding activity is to stop in a short distance with ABS engagement near the end of the stopping distance - speeds between 15 and 25 MPH.

3. Path of travel

Riders begin in a single file line, ride individually, perform a stop in the shortest distance they safety and smoothly can, then return to the end of the line.

4. Instructions

- One rider at a time, begin in first gear and ride toward the stopping area.
- Up-shift to second gear. Maintain a steady speed of 15 – 25 MPH.
- Maintain speed as you approach the stopping area.
- Keep your eyes focused on the horizon. Do not look down at the stopping area.
- At or just before the stopping area, squeeze the clutch lever, apply both brakes, downshift to first and come to a smooth rapid stop, with the goal of engaging the ABS near the end of the stopping distance. The riders goal is to feel the ABS (or get an ABS activation signal from the motorcycle) during the final 5-10 feet prior to stopping. At the stop, place the left foot to the ground and keep the right foot on the rear brake pedal. Do not release the brakes until completely stopped. Keep the handlebar square with the front tire pointed straight ahead.
- When stopped, check posture (head and eyes up, back straight, slight bend at elbows, feet properly placed) and check to ensure the bars are square. Did the ABS activate? If not, plan for using more front brake pressure at the end of the next trial.
- Return to the end of the line. Review your trial for correct procedure and smooth operation and plan for your next trial.
- 2-4 trials should be sufficient to reach the objective. Final speeds prior to stops should be at or near 25 MPH.
- This is a rapid stop with the goal of activating the ABS near the end of the stopping distance.
- Keep the motorcycles in line.
- Begin at slower end of the speed range and increase speed slightly with each trial.

5. Processing and discussion

- When all riders have completed part B, the group should gather to report insights, discuss the experience and ask and answer questions. Take a break before proceeding to Riding Activity # 3 (A).

Riding Activity # 3 (A)
Stopping in the shortest distance with quick engagement of ABS

1. Prior to riding all riders should review the written material in Section # 3

2. Objective

The objective of this riding activity is to stop in a short distance with ABS engagement as quickly and safety as the rider feels comfortable - speeds between 15 and 25 MPH

3. Path of travel

Riders begin in a single file line, ride individually, perform a stop in the shortest distance they safely and smoothly can, with ABS engagement as early in the stopping as the rider feels comfortable, then return to the end of the line.

4. Instructions

- One rider at a time, begin in first gear and ride toward the stopping area.
- Up-shift to second gear. Maintain a steady speed of 15 – 25 MPH.
- Maintain speed as you approach the designated stopping area.
- Keep your eyes focused on the horizon. Do not look down at the stopping area.
- At or just before the stopping area, squeeze the clutch, apply both brakes, downshift to first and come to a smooth rapid stop, with the goal of engaging the ABS as quickly as the rider feels comfortable – in the early part of the stopping distance. Rider goal is to feel the ABS (or get an ABS activation signal from the motorcycle) as soon as the rider is comfortable at or near the beginning of the stopping area.
- At the stop, place left foot to the ground and keep right foot on the rear brake pedal. Do not release the brakes until completely stopped. Keep the handlebar square.
- When stopped, check posture (head and eyes up, back straight, slight bend at elbows, feet properly placed) and check to ensure the handlebars are square. Did the ABS activate early in the stopping distance? If not, plan for using more front brake pressure early in the stopping procedure.
- Return to the end of the line. Review your trial for correct procedure and smooth operation and plan for your next trial.
- Begin at slower end of the speed range and increase speed slightly with each trial.
- 2-4 trials should be sufficient to reach the objective. Final speeds prior to stops should be at or near 25 MPH.
- This is rapid stop with the target of activating the ABS near the beginning of the stopping area.
- Keep the motorcycles in line.

5. Processing and discussion

- When all riders have completed part A, address any rider question or concerns before proceeding to Riding Activity # 3 (B).

Riding Activity # 3 (B)
Stopping in the shortest distance with quick engagement of ABS at higher speeds

Objective

The objective of this riding activity is to stop in a short distance with ABS engagement as quickly and safety as the rider feels comfortable - speeds between 25 and 35 MPH.

- This riding activity is conducted in the same manner as # 3A, with the exception that approach speed is increased. Only riders who feel comfortable should proceed. However as median pre-crash speeds as reported in the literature are in the 30 – 35 MPH range, practice at this speed should help riders feel comfortable with the handling and control aspects of engaging the motorcycle ABS as quickly and as safety as they can at these speeds.

- Take a break after completing Riding Activity # 3 (B). This completes the ABS riding activities. The next riding activity focuses on gaining comfort and understanding of traction control.

Riding Activity # 4 - Experience Traction Control

Riding Activity # 4 requirements
A sand, dirt or gravel area over asphalt or hard packed sand, dirt or gravel area is required for this practice. This is NOT designed to simulate a terrain for dirt bike riding but rather an area that a road rider might encounter during normal street riding. An area of 6 x 10 feet or larger spread over an asphalt area near where the braking practice has been conducted is recommended.

Pre-riding
- Review *How Basic Traction Control Works.* Each participant should review the appropriate sections of their owner's manual.
- Participants discuss what they have read.
- If the participants' motorcycles have traction control that is adjustable (has various riding modes) the riders are to select the mode for the most slippery conditions. This is the mode that the traction control will intervene the earliest/soonest.

1. Objective
The objective of this riding activity is to provide participants with experience with how the traction control on their bike works to keep the rear tire from exceeding the available traction under acceleration.

2. Path of Travel
Riders begin in a single file line with the motorcycle placed with rear tire at the beginning of the sand/gravel surface – the front tire is about one bike length onto the surface. One at a time execute a quick start and return to the end of the line. Riders should stay upright when moving the motorcycle so neither foot slips on the loose surface. Head and eyes should be up and looking well ahead. Be sure riders waiting in line are well back from the starting point.

3. Instructions
- One at a time riders move their motorcycle into the starting position by straddle walking (pushing) without engine power or power walking slowly under power.
- Riders should begin with both feet down.
- Riders are to perform a rapid start using a quick release of the clutch with enough throttle application to spin the rear tire.
- Riders experience the traction control intervention which prevents the tire from continuing to spin, prevents sideways slide out and propels the motorcycle forward.
- Return to the end of the line.
- Repeat - three trials to gain comfort.

4. Processing and discussion
- When all riders have completed, the group should gather to report insights, discuss the experience and ask and answer questions.

5. Optional - Riders with mode adjustments may perform additional trials with different modes selected.

Closing course activity and/or discussion

Time should be allocated for a "course closing" discussion. The discussion should focus on what riders have learned and how they plan to apply what they have learned to their riding. Questions like the following should be addressed:

- What is the meaning of the term "threshold braking?"
- How does a rider know when they have achieved threshold braking?
- How does a rider know what threshold braking feels like without actually exceeding the threshold and locking up the brakes?
- Describe the purpose of ABS.
- How does ABS and threshold braking of a non-ABS motorcycle compare?

Consideration could be given to re-riding activity # 2 (A).