

d. Rear Brake Pedal

On the right side of the engine, just above the footboard. Applied by pressing down. Exerts pressure on rear brake only. Sufficient pressure will lock the rear wheel at any speed on any surface.

e. Front Brake Lever

On left handlebar, adjacent to spark. Pulling toward grip applies pressure to front brake only. The front brake is so designed that on normal surfaces the front wheel cannot be locked. It may be locked, however, where road is slippery or covered with loose material. This frequently results in a fall.

f. Choke Lever

Located under gas tank on left side of machine. Pushed down for "full choke" position.

C. Starting

1. Importance of Proper Starting Method

Rapid starting with the least effort must be learned. If the procedures taught here are followed, they will soon be mastered. If not followed, difficulty in starting will be experienced during your entire training period, and probably long afterward.

2. Procedure, Starting a Cold Engine

Machine should be on a jiffy stand, gear shift in neutral, and clutch engaged.

- a. Depress choke lever to "full choke."
- b. Turn engine over twice by two through kicks.
- c. Raise choke lever to the first notch, one-quarter choke.
- d. Turn on ignition switch.
- e. Retard spark slightly.
- f. Open throttle about one-half way.

- g. Turn engine over by a hard, fast, through kick, WITH KNEE IN LOCKED POSITION.
- h. When engine starts, rotate spark to full advance, raise choke lever to choke off.

3. Procedure, Starting a Warm Engine

A warm engine will need little or no choking to start. Simply turn on the switch, open the throttle one-half, slightly retard the spark and kick properly.

4. Procedure, Starting a Flooded Engine

An engine which has been flooded by overchoking must be cleared. Set the choke in the off position, set the throttle wide open and crank the engine over several times. Then turn the ignition on and start in the usual manner.

5. Warnings

- a. A motorcycle can backfire and injure a rider's leg by driving his knee violently against the right handlebar. This can be avoided by holding the knee in the locked position and putting the full weight of the body into the kick. A backfire will not have enough force to lift the entire body.
- b. Another danger in backfiring is that it may occur after a through kick has been completed and the starter is at the bottom, in the disengaged position. If the engine is spinning backwards, and the rider starts to release the kick starter, the pawl will be violently engaged, with results described above. This can be avoided by holding the kick starter pedal all the way down until the engine has either started or has ceased sound and motion after backfiring.

IV. PRE-RIDING DRILL

A. Proper Riding Position

Sit square and firmly in the saddle, right foot on the footboard, left foot on the clutch (except when operating on the open highway, the left foot may rest on the left footboard). Shoulders erect, stomach in. Hold grips naturally with elbows slightly bent. Lean slightly forward, knees in against the tanks, so that a sudden acceleration of the cycle will not throw you off balance.

It is well to remember that the proper position for riding a motorcycle is almost identical with the proper position for riding a horse. Every good horseman rides with his back straight, chest raised and stomach in.

An additional reason for this position is the reduction of strain on the kidneys. With the back bowed, the kidneys tend to swing forward, away from the inner wall of the back, and are unsupported. In this position, the bouncing and vibration of the motorcycle can more readily fatigue or injure them. Conversely, with the back straight, the kidneys are supported against the inner wall of the back, and less strain results. When riding, if a backache or abnormally frequent desire to urinate is experienced, your position is probably not correct.

B. Slipping the Clutch

1. Difference Between Auto and Motorcycle

In driving a car, it has been learned that a clutch may not be slipped for any length of time without damage. This is far less true of a motorcycle, the clutch of which is built to be slipped for considerable periods without damage.

2. Importance of Learning to Slip Clutch

It is impossible to ride well without slipping the clutch. A motorcycle has only two cylinders, and is consequently far less smooth than a car with six or eight cylinders. One result of this is that at low speeds, with the clutch fully engaged, the force of each individual power stroke of the engine will be felt. The cycle will progress by a series of jerks, usually accompanied by a clanking of the rear chain. This is known as "lugging", and in addition to being fatiguing and uncomfortable to the rider, is very hard on the engine and entire power train, particularly the rear chain. A cushion or buffer to absorb the strain and shock between the engine and the rear wheel is therefore necessary.

Further, a motorcycle throttle is far more sensitive than a car. Only a very experienced rider can hold a constant low speed using the throttle alone, such as in following a car closely in slow traffic, or in holding to a closely fixed position in parade or formation riding.

C. Stopping the Motorcycle

1. Difference Between Car and Motorcycle

Most people can stop a car precisely at low speeds. One reason is long experience. A more fundamental reason is that a car will not fall over when stopped, and both feet are free to operate the brake and clutch before, during, and after stopping. In riding a motorcycle, the foot brake can be used only until the speed is reduced to the point where the right foot must be put down to hold the motorcycle upright. When the right foot is taken off the brake and put down, the hand brake must be used or the machine will roll forward some distance. This results in the novice rider hopping along with his right foot holding the cycle upright and hoping that it will coast to a stop.

2. How to Stop at Low Speeds

- a. Back the throttle either all the way off, or at the minimum idle speed which will keep the engine running.
- b. Simultaneously release the clutch all the way.
- c. Apply the foot brake so as to slow the machine evenly, without skidding the rear wheel.
- d. When the cycle has almost stopped, release the foot brake and put the right foot out, ready to touch the ground for balance.
- e. Simultaneously apply the hand brake, at the same time leaning the machine slightly to the right, so that its weight can be caught by the right foot.
- f. When the cycle has almost stopped, put out your right foot and exert maximum pressure on the hand brake. Your foot should stay in the place where you put it, and should not drag at all. In other words, your foot should not touch the ground until the machine has only about a foot to go before it can be brought to a dead stop by the hand brake alone.

- g. Put gear shift in neutral. This must always be done to avoid the motorcycle starting out inadvertently.
- h. Engage clutch. Whenever the machine is not moving, the gearshift must be in neutral and the clutch engaged.

D. Emergency Procedure, Novices

1. Causes of Accidents, Early Training

The two most common causes of accidents in early training are:

- a. Injuries caused by improper engine starting.
- b. Injuries and equipment damage resulting when the novice rider loses control of the machine and it runs away with him.

2. Improper Starting Accidents

These can be controlled by closely following the instructions given during training on how to start a motorcycle, and subsequent practice. THE FIRST TIME YOU BECOME CARELESS AND ARE CAUGHT BY A BACKFIRE, YOU WILL RECEIVE A LESSON WHICH YOU WILL REMEMBER, AND WHICH WILL PROBABLY BE OF VALUE BY PREVENTING YOU FROM MAKING THE SAME MISTAKE AGAIN.

3. Loss of Control

An emergency procedure has been developed which, if followed, will prevent injuries if a rider temporarily forgets how to control his machine. It can be summed up in the following phrase:

"DIG IN YOUR HEELS"

Briefly, this means that if you become rattled, excited, lose your balance, or in any other way lost control of the machine, you can stop the cycle promptly in the following manner. Dig in your right heel (and foot) on the brake. Dig in your left heel on the clutch, (which will rock the clutch back to the disengaged position). Doing these two things will stop the cycle quickly, and the worst that will happen will be that the motorcycle will fall over on its side. As the crash bars will hold the weight up off you, there is little possibility of injury. DON'T TRY TO STOP BY DIGGING YOUR HEELS INTO THE GROUND.

The engine develops 53 horsepower, and can pull far harder than you can push. DO DIG YOUR HEELS INTO THE BRAKE AND CLUTCH.

V. BEGIN RIDING

A. Straight Line Riding

The Trooper will learn to ride by riding in a straight line. When he has gone as far as is permissible, he will stop the machine and push it around, if necessary. He should not try to turn around by himself until he has gained more experience. When he has the machine aimed in a straight direction again, he will ride it back to the starting point.

B. Turning

At higher speeds, motorcycles are turned by merely leaning in the desired direction. At very low speeds, it is necessary to turn the handlebars, as well as lean, for a tight turn.

It will be found that it is easier to turn to the right than the left. This is due to the fact that should the rider lose his balance and have to put his foot down to steady the machine, when turning to the right, the left foot will remain on the clutch. Should the rider lose his balance while turning to the left, the left foot must be removed from the clutch and control of the machine is partially lost. Beginners will therefore make their first turns to the right, but as soon as possible, must practice left turns as well.

C. Motorcycles Inherent Stability

1. Given a chance to do so, a motorcycle will stay upright at any reasonable speed. In fact, the higher the speed, the more difficult it is to force it down. There are two reasons for this:
 - a. Inertia - Any mass in motion will continue in motion in the same straight line, unless acted upon by some external force.
 - b. Gyroscopic Action - The heavy wheels and tires, the chains, clutch, flywheel and crankshaft of a cycle all rotate in the plane of its travel and at right angles to the ground. The more rapidly it travels, the greater the force necessary to change the machine from an upright position.

VI. RIDING CURVES

A. Purpose

To teach how to ride curves at both low riding speeds and higher speeds.

B. Characteristics of Motorcycle Turning Movements

1. Why Motorcycles Turn When Leaned

At very low speeds, it has been found that it was necessary to turn the handlebars in order to change direction or to turn. This was because the speed was not sufficient to hold the machine upright if it was leaned to any degree. At higher speeds, direction is changed by the rider leaning the cycle in the direction he wants to go.

A motorcycle turns when it is leaned because the act of leaning changes the direction of motion of the machine. The more it is leaned, the greater the change of direction of the mass, and the shorter the curve. Thus, the proper amount of leaning for any curve is determined partially by the radius of the curve to be ridden.

Secondly, the amount of leaning possible without gravity pulling the machine over on its side, is determined by the centrifugal force developed by turning, which tends to throw the rider away from the direction he is leaning. Leaning into the curve counteracts the centrifugal force developed. The higher the speed, and the shorter the radius of the curve, the more centrifugal force is developed and the more it is necessary to lean.

2. Adjusting Leaning to Speed and Radius of Curve

a. Correct leaning for speed and curve

If a curve has a constant radius, and the amount of leaning for that radius and speed of travel is correct to begin with, the angle of leaning will remain constant all the way around the curve.

b. Insufficient angle of leaning

If a rider does not lean enough when he goes into a curve, he can:

- (1) Run off the road on the outside of the curve, due to not turning sharply enough.
- (2) Decrease speed, if he has time.
- (3) Increase the amount of leaning

c. Leaning too much

If the rider leans too much when he goes into a curve he can:

- (1) Cross the roadway and run off the road on the inside of the curve, due to turning too sharply.
- (2) Partially straighten up the machine so that it is leaning at the correct angle.
- (3) Increase the speed until it becomes correct for the angle at which he is leaning.

3. Tires

Motorcycle tires are built so that the tread extends well up on the sidewall of the tires. This is done so that there will be tread in contact with the roadway even though the machine is leaned far over to either side. To a novice rider it may seem that the wheels will slip out from under him if the cycle is leaned over very far. This is not true, provided the surface of the roadway has reasonably good traction, i.e., it is not loose or slippery.

4. Dragging the Underside of the Machine

When a motorcycle has been leaned over a certain degree, the underside of the footrest will touch or scrape the roadway. On a hard surface, this scraping will produce a loud and startling noise, and at night a visible shower of sparks, but is not injurious to the machine. Care should be taken when leaning on rough or broken pavement as the undercarriage might strike a raised portion of the road and cause the machine to go down.

5. Continuation of Training, Curves

During training, Troopers will be riding curves. They must perfect two abilities, which can only be gained by experience.

- a. How to lean properly; how to control the machine on a curve.
- b. How to look ahead at a curve and instantly estimate the maximum safe speed at which that particular curve can be negotiated.

- (1) Remember, every curve has a maximum speed at which it can be traveled on a motorcycle. When this speed is exceeded, the best rider in the world cannot successfully ride the curve. The rider and machine will run or slide off the roadway.
- (2) Beginners must learn to estimate this critical speed, and learn to stay below it. Play safe, ride well below the speed at which you know you can do it.

A SERIOUS ACCIDENT OCCURRED AT OUR SCHOOL BECAUSE A NOVICE RIDER OVER-ESTIMATED HIS ABILITY TO RIDE A CURVE.

VII. EMERGENCY BRAKING

A. Purpose

1. To teach how to stop a motorcycle as quickly as possible, in an upright position, in order to avoid an accident.
2. We are not going to teach you how to "lay a cycle down" at this time. That is an emergency procedure used only as a last resort, and is dangerous. It will be covered next.

B. Characteristics of Motorcycle Stopping

1. Front Wheel Brakes

As previously discussed, the front wheel brake of a motorcycle is so designed that, on any road surface with reasonably good traction, the wheel cannot be locked. When the brake is applied, there is friction between the brake lining and the brake drum, which slows the motorcycle down.

This friction is less than the friction between the tire and pavement. Therefore, on a good surface, the wheel will still turn while being acted upon by the brake. However, on a poor surface, (such as gravel, wet or slippery roads, sand, etc.), there is more friction between the brake lining and the brake drum than between the tire and the pavement. This means that the wheel will be locked if the front brake is applied firmly on such a surface. With the front wheel locked, control of the machine is lost, and the cycle will frequently go down, throwing the rider. Therefore, don't apply front wheel brakes on loose or slippery surfaces.

2. Rear Wheel Brakes

As previously discussed, the rear wheel brake of a motorcycle is so designed that the wheel can be locked on any surface. Locking the rear wheel will result in only partial loss of control. In some cases, the machine will skid in a straight line, but this is the exception rather than the rule. Usually the cycle will broadslide (or fishtail) with the rear wheel skidding to one side or the other.

3. Broadsliding

Factors which produce broadsliding include: rider's weight not squarely in saddle, slope on roadway (crown), uneven tire wear, or a change in the motorcycle's direction of travel when brakes are applied, as when the rider attempts to evade an obstacle and applies brakes simultaneously.

Broadsliding is not dangerous if properly executed. A rider can ride a machine to a complete stop, skidding at an angle to his direction of travel, if he holds the front wheel in the direction of travel.

At any time the rider wishes to straighten the machine out while skidding, he can do so by releasing the brake. The machine will align itself with the direction of travel, after which he may again apply the brakes. Don't be alarmed if the machine whips from side to side a few times in so doing. It is natural and the inherent stability of the motorcycle will cause it to correct itself.

WARNING - At high speeds, this recovery will be rapid and violent. It can be controlled by releasing the brake gradually, instead of abruptly.

VIII. EMERGENCY PROCEDURE, "LAYING CYCLE DOWN"

A. Purpose of Instruction

1. To inform the Trooper of the technique of an emergency procedure which will frequently reduce rider injury when an accident is inevitable.
2. To explain when the procedure should be used.

B. Purpose of Maneuver

1. It sometimes happens that an accident between a motorcycle and another vehicle or fixed object is inevitable. In such a case, the injury to the rider can be reduced if the machine can be kept between him and the object to be struck.
2. If the impact occurs with the machine upright, the rider is injured by being thrown with considerable force against the object, or to the pavement. Further, in some cases, he may be thrown between the motorcycle and the object struck, or the machine will fall on him. This can be avoided if the rider can put the machine on its side, keep it between himself and the hazard ahead, and stay in the saddle.
3. This maneuver is dangerous, and should not be done so long as there is a chance to avoid the hazard. THIS MANEUVER WILL NOT BE PRACTICED, as the incidence of fractures would be too high, as well as unnecessary damage to equipment.

C. Procedure

1. If an impact ahead is inevitable, apply brakes as hard as possible. THE REAR WHEEL MUST BE LOCKED.
2. Make the cycle broadslide by shifting your weight hard against the saddle in the direction you want to go, at the same time turning the front wheel slightly in that direction.
3. With both hands, seize the handlebar on the side away from the side that you want to do down. KEEP THE REAR BRAKE LOCKED.
4. Pull as hard as you can on the handlebar, at the same time throwing your weight to the side you want to go down on.
5. Clamp your knees and legs tight around the tanks. If you stay on the saddle, the crash bars will hold the weight of the machine off your legs.
6. WARNING - If the rear brake is released before you go completely down, the machine will probably come back up so rapidly you will be thrown between the motorcycle and the hazard ahead. This could be dangerous.