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THE TRAINING OF MOTORCYCLISTS

(BILINGUAL)

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PREFACE

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1. This manual is published under the authority of the Chief of the Defence Staff.

2. It is effective on receipt.

3. All suggestions for changes may be sent through normal channels to FMCHQ, attention SSO Signals.

RECORD OF CHANGES

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INTRODUCTION

GENERAL

1. This publication is a guide for officers and NCOs concerned with the training of motorcyclists. It is based on use of a light type of motorcycle such as the Bombardier CAN-AM. If the machines provided are of the heavy type, ie, Harley Davidson, some minor departures from the text will be necessary. However, the principles will remain the same.

2. The motorcycle is a dangerous machine when ridden improperly. For this reason instructors must ensure that students meet the required standards before they are granted qualification.

3. During instruction on motorcycles any tendency by a candidate to become over-confident must be watched and suppressed. Overconfidence plus a desire to show off may tend to make students adopt bad habits.

INSTRUCTOR'S RESPONSIBILITIES

4. The motorcycle instructor has serious responsibilities which must be understood fully and discharged conscientiously. Briefly these responsibilities are:

a. To provide the most thorough instruction possible, making the utmost use of equipment and training facilities.

b. To make the training progressive as far as possible, gradually increasing the intensity of the training as the class progresses, following the syllabus as closely as conditions and equipment permit.

c. To take every precaution to ensure the students' safety and prevent training accidents.

d. To take a friendly, personal interest in each student, providing extra assistance to students who do not progress at normal speed.

e. To ensure that driver maintenance and inspections are properly carried out. The suggested policy for maintenance of motorcycles during training is to assign a number of motorcycles to each instructor who will either effect or supervise the necessary maintenance. Although riders in training will be responsible for effecting daily parades after they have received maintenance instruction, maintenance responsibility should be charged to the instructors who will carry it out themselves until the riders are qualified to do so, at which time the instructors will supervise the maintenance done by the riders.

f. To ensure strict discipline. The student's first approach to the machine is one of real interest and excitement, slightly tinged with fear, but with a surprising basis of confidence. This makes for rapid learning. The simplicity and novelty of the controls fascinates the student, who is at once eager to experiment with newly acquired skills. Once students have gained a little experience and confidence, there is a tendency toward recklessness, and a desire to imitate the skilled riders they have seen. At this point discipline is of primary importance. It is the instructor's responsibility to insist on the strictest discipline while riding, and to severely punish for even the smallest infraction of speed or safety laws.

UNIT RESPONSIBILITY

5. Motorcyclists must not be considered fully trained immediately after they have completed a course and qualified as motorcyclists. Experience and experience alone makes a motorcyclist. Therefore, units must try continually to raise the standard of their motorcyclists by giving them every opportunity to gain further experience.

INSTRUCTIONAL TECHNIQUES

6. It takes approximately four weeks to train a motorcyclist to the required standard.

7. During the early instruction, maintenance should be taught by topics, ie, lubrication, chain, electrical system, etc., but as students become adept, maintenance should be taught and practiced as it is laid down in the maintenance instructions. Theory should be kept to a minimum, but there should be instruction and practice on every part of the maintenance procedure no matter how simple.

ORGANIZATION OF COURSES

8. Students should be graded into sections of approximately the same ability before instruction begins. This need take only a few minutes and should consist of a friendly chat by one instructor. By asking a few pertinent questions on maintenance and riding, the instructor can make a fair estimate of a student's experience.

9. A section should NOT have more than six students. A section instructor should be appointed to the section and remain with it throughout the course. A healthy rivalry should be generated between sections with respect to riding ability and care of machines.

10. Each student should be issued a motorcycle and made responsible for it throughout the course. This will develop pride of ownership in the student, and at the same time give the instructor a way to judge each student's sense of responsibility. The motorcycle should be in first class condition before it is issued to give the student every opportunity to maintain the vehicle properly.

11. It is essential that students be issued crash helmets, goggles and protective clothing and that they wear them whenever necessary. It is important that the chin strap of the crash helmet be fastened; otherwise the helmet is useless.

TRAINING AREAS

12. It is difficult to acquire a training area that has all the desired features, but with careful organization, almost any area can provide a great variety of training possibilities. Areas should be adequate in size, graded as to difficulty from level areas such as a parade square to the most difficult rocky and wooded areas. If a small stream is available, an area should be laid out that involves the use of sandy banks, fords, narrow bridges, swampy areas and rocky paths. Hillsides are essential, and each slope should have a staked course that forces the student to climb, descend, turn, halt, jump and change gears in as may variations as possible. The most difficult hill of all should be left unstaked so that students are compelled to pick their own paths. In wooded areas a start point and destination should be set up, leaving students to choose their own routes and speed.

13. Road routes should be surveyed to provide maximum training; all types of surfaces, widths, slopes and turns, and varied traffic density should be used. If a short stretch of road can be isolated for training, administration becomes easier, and a variety of training should be introduced.

14. It is important that areas be numbered according to their difficulty, so that the training routine for each area is thoroughly understood by all instructors. A test should set up for each area with a marking scheme for efficiency, control, smoothness, style, etc. For the sake of control, routes to and from training areas should be predetermined. Although the route is NOT a training area, it can provide experience in valuable convoy control for students.

15. Preparation of training areas gives a great deal of scope to the instructor's imagination and ingenuity From the most unpromising terrain the instructor may be able to provide thorough and interesting training.

CHAPTER 2

CHAPTER 2

RIDING

INTRODUCTION TO THE MOTORCYCLE

1. **Controls**. The position and type of controls vary with the make of the motorcycle. Therefore, the operator's manual will be used to teach the student know how to operate all controls and understand their effect.

2. **Adjustment of riding position**. The riding position and the controls are adjustable. Confidence is increased, firstly, by the controls being readily at hand, and secondly, by a comfortable riding position. Adjustable components will generally be described in the operator's manual.

3. **Starting the engine from cold**. The procedure for starting the engine may vary among makes of machines; therefore the operator's manual should be consulted.

   a. Ensure that the student's body is correctly placed. The student should have the machine leaning slightly out of the vertical against the left thigh and thus be able to give the starter a forceful swinging kick without losing balance.

   b. Students should practice starting the engine with the machine both on and off the stand until they are thoroughly proficient at it.

   c. If the engine fails to start after a few attempts the reason will be either a mechanical problem, in which case normal fault finding will locate the cause, or too rich a mixture in the cylinder. The remedy is to kick over the engine a few times with the throttle wide open, then proceed as for normal starting with a warm engine.

   d. Common fault. Mishandling of the throttle twist-grip by persistently opening and closing it while kick-starting. A learner who persists in this practice should be made to start up with the right hand holding the handle-bars near the middle.

ELEMENTARY RIDING

4. The student should begin by wheeling the machine about to feel its weight and natural balance.

5. If a gentle incline is available, the student should free-wheel down the fill, first operating the brakes individually, then together. If no slope is available, then one person must push the machine for a short distance while another rides it. The object of this exercise is to accustom the student to balancing the machine when in motion and operating the brakes without looking or groping for them.

6. **Starting and stopping in low gear**. The following sequence must be used, first with the machine on a stand, then on the road:

a. Start the engine and set the throttle for a slow idle; pull the clutch lever in towards the handlebars, as far as it will go; depress (or in some cases raise) the gear lever to its full extent with the toe, thus engaging low gear. (If first gear is not immediately obtainable the machine should be rocked gently backwards and forwards as the pedal is moved.) When low gear has been engaged and the pedal allowed to return to its normal position, the clutch lever should be gradually released, and the throttle slightly opened. As the clutch takes up the drive the machine will move forward and the throttle can be gently opened. Once the clutch is fully engaged, road speed is controlled by the throttle.

b. As soon as the machine is in motion, the feet should be placed on the foot-rests and should remain there. Insistence on riding feet-up will help the student automatically develop a natural balance, one of the essentials of motorcycling.

c. To stop, gently close the throttle and lightly apply both brakes together. As the machine comes to rest, the clutch should be disengaged. The free left foot is used to balance the machine at rest and the gear lever is pushed into the neutral position.

d. **Common faults**: Releasing the clutch too quickly when starting; racing the engine when moving off; rough handling of the throttle, ie, rapidly opening and closing the twist grip. All throttle movements should be gradual and gentle. Too severe an application of the front brake may result in loss of control.

7. **Use of Gears**. The student must understand the need for changing gears. Gear changes are accomplished by moving the pedal in the required direction to the limit of its travel; the pedal is then released, and will automatically return to its normal position. The following sequence must be used, first with the machine on the stand, then on the road:

a. To change to a higher hear, open the throttle to about one-third; disengage the clutch and simultaneously close the throttle, and move the pedal to select the next gear; release the clutch lever fairly slowly; re-open the throttle.

b. To change to a lower gear, disengage the clutch; open the throttle slightly; move the pedal to select the lower gear; release the clutch.

c. When changing to a lower gear while climbing hills it may not be necessary to open the throttle because the road speed will probably have dropped, which makes the existing throttle opening correct for a lower gear.

d. True neutral is between first and second gears, but a false neutral may often be found between the other gears, according to the type of machine. When the

machine is stationary with the engine running, the rider should always locate true neutral and release the clutch lever.

e. **Common faults**: Gear changing with the heel of the boot. Upward movements should be made with the toe, downward movements with the sole of the boot. Moreover, the pedal should be moved comparatively slowly, not kicked upwards or stamped down.

8. **Steering**. Students should begin to learn to steer at low speeds in a confined space.

a. On a figure-of-eight course students should ride steadily in low gear with the engine pulling evenly; the clutch should not be used.

b. On a narrow road, turning in a restricted space may be practised with the feet on rests. The danger of overtaking traffic must be emphasized (stop, look behind, and do not turn until the road is clear).

c. **Common faults**: Unnecessary use of the clutch. Learners frequently put the feet to the ground, turning sharply, instead of making an effort to acquire delicate balance.

CROSS-COUNTRY RIDING - PRELIMINARIES

9. Confidence is essential for cross-country riding. A sense of control is considerably assisted if riders learn to keep their feet on the foot-rest in order to retain their balance. As a general rule, footslogging should be discouraged. The rider's weight should be approximately over the foot-rests.

10. Rear tire pressure should be reduced for riding cross-country This allows an increased tire area to be in contact with the ground and increases stability and traction. Pressures must not be reduced to less than two-thirds of the road pressure unless lower pressure is authorized in regulations.

11. Students should be taught to ride standing in the foot-rests. The legs should be slightly bent at the knees and the weight of the body should be taken easily; the knees should be allowed to flex to absorb the bucketing of the machine over the bumps; the arms should be relaxed, yet holding the handlebars firmly. Discourage rigidness in the rider's pose, and see that riders are not holding themselves up by pulling on the handlebars. Do not allow them to place their weight too far back or to lean too far forward.

12. Solely to notice the effect, and not as a method of control to be used in practice, students should try gripping lightly the rear end of the tank with the knees; influencing the steering with the knees; moving the weight of the body about; riding very slowly standing on the foot-rests.

13. The purpose of having students stand on the rests is to allow them free body movement, and thus to use their weight to control skids and lunges. Moveover, riders minimizes fatigue by absorbing the machine's movements with their legs.

14. Students should be allowed to travel fairly fast standing on the foot-rests. This will show them that the machine can bucket about quite considerably beneath them and yet remain in control.

15. Students should practice steering the machine slowly between stones placed in a circle equal distances apart, while standing on the foot-rests, mainly by body movements from side to side. As the standard improves, the distance between the stones may be decreased.

16. **Common faults**: Rigidness in the rider's poise; holding the poised position by pulling on the handlebars; leaning too far forward or too far back; steering around the stones instead of manoeuvring the machine round by body movements.

ELEMENTARY CROSS-COUNTRY RIDING

17. **Falling on the hill**. It may be necessary to stop on a hill where a re-start is impossible; it will therefore be essential to descend and try again. Since a failure may occur inadvertently it is important that this procedure be taught before students are permitted to tackle steep banks or hills.

a. **Turning a machine on a steep gradient**. Close the throttle and as the machine comes to a standstill gently lay it down on one side, preferably the left, which is usually less vulnerable. The foot-rest acts as a stop to prevent the machine from sliding down the hill. If the machine is laid down on the left immediately before the stop, it can be turned slightly out of line to a position of about two o'clock. Similarly, if the machine is laid down on its right hand side it can be turned to the ten o'clock position. In addition to getting the machine in the most favorable position for subsequent turning operations, these "out of line" positions prevent the machine being laid over too far, thus minimizing fuel wastage and the change of the handlebars digging in. As the machine is laid down the rider steps off, walks around to the front, grasps the machine by the front fork blade with one hand and the end of the handlebars with the other to prevent the machine toppling over and jerks the machine round using the inside foot-rest as a pivot, until the front wheel is facing down the hill.

b. Having made sure that low gear is engaged, hold the machine by applying the front brake and turning the front wheel on full lock "into" the hill; get astride from above and place the outside foot on the foot-rest, raise the machine upright and with the throttle closed, turn straight down hill immediately the machine moves off. During the whole operation the clutch must not be touched. On some occasions it may be easier to jerk the front wheel only to the five o'clock or seven o'clock position instead of vertically down the hill before raising the machine up for the descent.

c. **Turning a machine on a normal gradient**. The machine is stopped and prevented from running back as in paragraph a. The rider applies the front brake and raises the machine slightly by the handlebars to clear the foot-rest; next the machine is swung at right-angles to the hill by turning the front wheel inwards and easing the machine round the body as the front brake is released. It is most important that the machine is leaned "into" the hill all the time. If the machine gets out of control, the inside foot-rest can be used to steady it.

d. When the machine is at right angles to the hill the rider should get astride; make sure that the low gear is engaged; apply the front brake; then, leaning the machine into the hill, work the handlebars backwards and forwards until the machine points down the hill; release the front brake and descend the hill with the throttle closed as before.

18. The first few descents of gradients should be made in the manner described above. When students are thoroughly proficient in this method and fully confident, they may be taught to make a controlled descent, using first the front brake alone and then both brakes. Unless the surface offers sufficient wheelgrip to prevent gentle brake application locking the wheels, the brakes are best left alone altogether; this point must be impressed on learners. Furthermore, 75 per cent of the braking is done on the front wheel, but this brake should be applied only when the front wheel is straight in line with the hill. If the handlebars are turned even slightly, the wheel is likely to lock and slip sideways.

19. When making a controlled descent it is important to start as slowly as possible. Stop on the brow of the hill and ease the machine gently over. Make full use of the brakes and thus prevent the machine gathering speed, but if there is a tendency for the wheels to lock, immediately release the brakes and rely solely on the retarding effect of the engine.

20. **Common faults**:

a. Allowing the stand to dig in when the machine is laid down, which makes pulling it round difficult.

b. Trying to pull the machine round when the end of the handlebars, any of the controls, or (if the machine is on its right side) the kickstarter is digging in.

c. Omitting to lean the machine "into" the hill when turning.

d. Forgetting to make absolutely certain that low gear is engaged before the descent, particularly if the machine has been laid down on the right side (it is not sufficient merely to look at the position of the gear-lever; before starting away test either by turning the rear wheel by hand when the machine is laid down and the wheel off the ground or by rocking to and fro when the machine is upright and across the hill).

e. "Throwing" the machine down on its side when stopping on a steep gradient.

f. Allowing the machine to topple over down the hill and when pulling the front round, or on top of the rider owing to the rider's mounting from the lower side.

g. Placing the "downhill" foot on the ground instead of on the foot-rest, thus losing balance.

h. Heavy use of the brakes during a controlled descent causing the wheels to lock.

j. Failure to release the brakes immediately when wheel-locking occurs.

21. **Throttle control**. Throttle control is required so that students can handle the conditions of everyday cross-country riding such as slippery grass, light mud, rutted tracks, descent of grass banks, humps, etc. To obtain the maximum wheelgrip and control over the machine, throttle control, ie, a steady and exact throttle opening at all times, is paramount. Students must understand that:

a. Wheel spin results from a sudden opening of the throttle and ceases as soon as the throttle is eased back sufficiently.

b. The tendency for the machine to slither about on light mud or any other slippery surface can be checked by body leaning (when poised on the foot-rests), and by throttle manipulation.

c. Ascending a step grass bank requires careful throttle control to prevent wheel-spin. Gradually easing back on the throttle as the top of the hill is approached will prevent the front wheel from leaving the ground. In straight hill climbing, momentum as opposed to engine power is most important, ie, speed should be obtained on the approach to the hill in the gear selected for the climb.

d. The engine should be used as a brake on the descent of a slippery grass bank. Often in such circumstances the brakes cannot be used to check the speed, since the wheels may lock and cause the machine to go out of control. The throttle should be kept closed for the whole of the descent. Never touch the clutch during a descent.

e. Skill in negotiating a series of high switch-back bumps lies in correct throttle control, in appreciation of the use of momentum before the gradient, and in the value of employing the engine as a brake for slowing down on the crest of each mound: approach fast enough to carry the machine to the top of the mound, close the throttle just as the machine reaches the top of the hill to prevent the front wheel leaving the ground, and descend the other side with the throttle closed bearing in mind the need for opening up again to obtain sufficient speed for climbing the next mound.

22. **Common faults**:

a. Taking the notes in paragraph 5a too literally when applied to paragraph 5c. If engine speed has to be very low to overcome wheel-spin and there is thus insufficient engine power for the climb, the only method to adopt is speed on the approach.

b. Nervousness about the apparently vertical drop down after each short climb on the switch-backs in paragraph 5e.

c. Closing the throttle too soon or too late when negotiating humps.

d. Failing to throttle down immediately when wheel-spin is apparent.

MANHANDLING

23. A good deal of effort can be saved if the correct method of manhandling the machine is used. Decide on a definite plan of action before tackling the job.

a. If the machine is stopped by wheel-spin with the crankcase grounded on a hump or with the foot-rests digging into the sides of a deep rut, set the engine running at a fast idle, leave low gear engaged and the clutch engaged (do not slip the clutch), dismount on the near side, grasp the handlebars with the left hand and the carrier (not the saddle) with the right hand, and heave forward. As the rear wheel grips, operate the clutch.

b. Most riders will at some time get a machine stuck in thick mud. The best method of extricating a machine is first to lift the rear wheel about a foot sideways onto firm ground, then lift the front wheel into line. Once on new ground the machine will not dig itself in as before unless the wheel spins excessively. Therefore, it is a good plan to start away while running beside the machine for the first few yards. Alternatively use the method described in paragraph a above. These instructions apply equally when a machine is jammed in a deep gutter with the foot-rests digging into the sides.

c. Various methods of turning on steep open hills have been discussed. Another method for lanes narrower than the length of the machine, with steep banks, is to steer into the bank and drive the front wheel up about one foot, withdraw the clutch and, as the machine rolls back, swing the handlebars on the other lock, steer into the bank and accelerate up again, change lock and roll back until the machine is facing down the hill.

24. **Common faults**:

a. Trying to extricate a grounded machine while still in the saddle.

b. Slipping the clutch while heaving the machine forward.

c. Attempting to get a machine out without the engine running and the drive fully engaged.

d. Stopping the engine when the wheel grips as a result of too small a throttle opening.

e. Dropping the machine as it frees itself because of too large a throttle setting or the failure to pull out the clutch quickly enough.

WATER HAZARDS

25. Any army machine will go through water up to 30 centimetres deep. Deeper water hazards raise the possibility of submerging the magneto and of water entering the engine. Always make sure of the depth and nature of the bottom of a ford by wading across and choosing the shallowest, but not necessarily the shortest, path before attempting a crossing.

26. Do not insist on feet-up crossings of water hazards where rocks are hidden under water. Such tactics demand too fast a passage, and introduce the risk of water being sucked into the engine through the carburetor of a fallen machine. (Never kick-start a stalled engine with the exhaust pipe under water because a backfire may cause the same result - water drawn inside the engine.)

27. Water hazards are crossed in the following manner:

a. Engage low gear before entering the water; ride as slowly as possible consistent with retaining balance; if necessary slip the clutch while the engine is running fairly fast to guard against a low wave from the front wheel that will flood the magneto or carburetor; as the front wheel emerges, accelerate.

b. When the exhaust outlet becomes submerged it will be obvious from the change in the exhaust note. Water causes back pressure, and higher engine speeds are required, necessitating clutch slipping. The speed of the machine, therefore, is controlled by the clutch and the brakes if necessary.

c. Once out of the water both brakes should be tried before they are required in normal riding. If necessary, eliminate water in the drums by lightly applying both brakes while riding at a steady speed. In cold weather, water inside the drums may freeze if the machine is stationary, causing temporarily locked wheels.

28. **Common faults**:

a. Failure to get prepared some distance before the water obstacle, therefore entering the water not in proper control of the machine.

b. Entering the water too fast.

c. Attempting a unfamiliar water hazard without first ascertaining the depth and nature of the bottom.

d. Dropping a machine in a rocky water hazard as a result of struggling to keep the feet up too long.

e. Rough handling of the throttle.

MUD HAZARDS

29. Thick mud offers considerable resistance to the path of a machine and little opportunity for wheel-grip. Speed is, therefore, essential and that speed must be attained before the deepest part of the mud is encountered. The only exception to this rule is when the mud is very liquid, like muddy water, when tactics similar to those laid down for crossing fords should be employed.

30. All riding demands quick observation, but it is even more important on rough going. The experienced rider gets into the habit of glancing at the path well ahead and weighing the situation very rapidly: This rider knows immediately which tactics should be adopted and decides whether the mud is thick or too liquid for speed.

31. Actual speed depends on circumstances, but full throttle in low gear usually is fast enough. Occasionally the slower engine speed of second gear with about half throttle will give better results where wheel-grip is difficult, but the characteristics of the engine must also be borne in mind. In general, a 500-cc side-valve engine has excellent low speed pulling capabilities and might show up well on half throttle in second gear, but a 350-cc ohv engine must be running fairly fast to develop enough power to utilize the wheel-grip available, so a wide throttle opening and low gear are preferable.

32. Forward momentum is not the only reason for speed: Speed also allows the machine to cleave a path and thus keep to a straight line. Keeping to a straight line, of course, makes getting through the mud hazard easier, and any slides or lunges are corrected by body-leaning methods when the rider is poised on the foot-rests. In fact, all machine control is maintained in this way rather than by steering.

33. If the mud section has a bend in its course, or follows immediately upon a sharp corner, then the speed might have to be lower than is desirable. In such an instance, work up speed as soon as wheel adhesion will permit after the bend. On the other hand, should the mud section be on a hill which has a bend bordered by steep banks, the speed can be maintained round the bend by using the outer edge as banking.

34. Throughout this manual of riding technique, it has been stressed that poising on the foot-rests is the best method of machine control on rough ground. There may be occasions, however, in very thick mud, when the machine would stop unless aided by footslogging. Only resort to this practice when sheer necessity compels. For instance, when in spite of a fast approach, speed and

careful throttle control have failed to conquer wheel-spin - when, in other words, the machine is about to stop - use the feet lustily to push the machine along while still keeping a throttle opening that gives the best wheel-grip and maintaining as much weight as possible on the saddle.

SAND HAZARDS

35. In wet weather, sand settles down and provides a good surface. But when sand is dry and loose, it may present a special problem.

36. As with mud, speed is absolutely essential in sand. While speed overcomes the resistance of the sand, and compensates by momentum for the lack of wheel-grip, speed combined with power at the back wheel is the only way to retain stability. The remarks in regard to choice of gear and throttle opening (paragraph 7) apply in this case. However, on first tackling deep, dry sand, the rider is sure to feel insecure - the machine seems to sway from side to side and tends to develop a front wheel wobble. After a few trial runs experience will show that the faster the speed, the greater the stability of the machine. Expert riders tackle open areas of sand that are free from high banks extremely fast. Their passage may be thrilling to watch but, in fact, they are adopting the safest tactics.

37. If a sand section is encountered where speed on the approach is impracticable, then it is essential to accelerate as much as possible. Similarly, if the machine sways too much or the front wheel starts to wobble, more throttle and a firm grip on the handlebars is the only sure remedy.

38. Should it be necessary to take a bend or corner, pick the outside of the track which is certain not to be as loose as the main path; make use of any plant growth for obtaining wheel-grip. As in mud sections, use the outside bank if there is one.

39. In the event of a machine sliding to the ground there is a chance of sand entering the carburetor intake. Remember, therefore, always to clean the carburetor if necessary before starting up after a fall.

ROCK HAZARDS

40. Rock outcrops or rock ledges should be avoided if possible, but where these hazards must be surmounted they should be taken slowly. Speed will not only sent the front wheel in the air and make control difficult, but may buckle the wheel or cause a concussion burst of the tire. Fortunately rock sections are usually free from thick mud and there is no question of speed being necessary to prevent the machine digging in.

41. Each rock outcrop or step should be tackled individually The approach must be slow, with the engine pulling steadily in low gear, and the rider standing on the foot-rests. The machine must meet the rock head-on, to minimize the risk, of the front wheel sliding sideways, and in such a way that, once over, the machine will continue in a straight line.

42. Just before the rock or step is reached the throttle should be opened up and then eased back as the wheel strikes the obstruction; in effect, momentum carries the machine over.

Immediately the obstacle has been surmounted the throttle is again opened slightly to straighten the machine.

43. If a rock step is so high there is danger of the crankcase grounding and being damaged, use similar tactics, but open up slightly harder and for a longer period, and at the same time give an upward pull on the handlebars. The object is to lift the front wheel high enough and long enough for the crankcase to clear the rock. Throttle control is essential; too much power will start wheel-spin, while if the throttle is held open too long the machine will get out of control.

44. If the rocks are wet or slimy use special care both in handling the throttle and in approaching the obstacle, with the machine square and vertical.

45. The majority of rock outcrops can be missed by skillful choice of a path. Even where rock steps appear to go right across the track it is often possible to miss the worst by accelerating sharply up the bank, round, and down to the path again.

46. The secret of tackling sections composed of loose stones or rubble is initial speed. Do not hesitate to open up well in first or second gear, balance on the foot-rests, and hold on firmly to the steering. If such a section is taken slowly the rear wheel will slide from side to side and the machine will probably fall.

HOW TO FALL

47. Knowing how to fall without injury to rider or machine is one of the first essentials of the successful rider. This method of falling is called riding the machine to the ground. It is possible to carry out the procedure at a speed of 80 to 95 km/h without injury.

48. The method of riding to the ground satisfactorily is as follows:

a. When the rider feels that the machine is getting out of control he or she should lock the front wheel to one side, preferably to the left, and brake hard with the rear wheel.

b. This causes the machine to fall gently forward, while the rider is automatically separated from the machine and falls unhurt.

c. As riders hit the ground they should attempt to roll over and over, and should avoid at all costs attempting to control themselves by putting out their hands or feet. This method should not be practiced by the students, but they must know it in case of an emergency.

49. The method of failing described in the preceding paragraph is intended primarily for use when the machine is out of control. It is also an excellent means of avoiding a collision. In such an instance, the main object is to prevent injury to the rider. The rider should brake violently up to the last moment, by which time the machine is going slowly and the rider can step off it. But in such a case the machine will probably be damaged severely. When faced with an imminent

collision, the rider can avoid injury and damage to the machine by "riding to the ground" the instant it becomes clear an accident will occur.

ROAD RIDING

50. Taking the students for a fairly long ride on varied roads gives them an opportunity to get accustomed to their machines and allows for observation of their riding styles. Gear changing, road signals, and the students' general confidence should be watched.

51. **Restarting on an incline**. To get away from a standing start on a fairly steep hill on a main road, the following procedures should be used:

a. The machine is held stationary entirely on the front brake, which can be operated by four fingers of the right hand while the throttle twist-grip is controlled by the crook of the thumb. Start the engine; engage low gear; apply the rear brake; release the front brake to leave the right hand free for throttle control. Move off, bearing in mid the need for higher engine speed and more gentle engagement of the clutch than would be necessary on a level road. As the clutch begins to take up the drive, the rear brake must be gradually released. Students often forget this point.

b. Should the gradient be very steep or the front brake temporarily out of action, the machine can be held by backing it at an angle of about 800 mils (45?) to the incline, with the result that the rear wheel rolls into the gutter and rests lightly against the curb or bank. Start as before, but there is no need to use the rear brake. This method of starting is useful when the gradient is particularly steep or when there is need to lighten the load on the clutch, eg, a slipping clutch.

c. **Common faults**: Failing to ease off the brake as the clutch takes up the drive; engaging the clutch too quickly.

52. **Cornering**. No corner is correctly taken unless the machine is kept to the near side of the middle of the road throughout the cornering process. Never overtake on a blind corner. The two lessens to be brought out on cornering are deceleration and line.

a. Use engine, brakes etc. Brakes should be applied well before the corner is reached, while the machine is still travelling in a straight line and on an even keel, thus minimizing the risk of a skid.

b. Use both brakes together; there is no danger in applying the front bake hard providing that the front wheel is straight and not locked-over.

c. Similarly, a change should be made to a lower gear on the approach to the corner. The use of an indirect gear affords increased stopping power and allows the machine to be "driven" (ie, mildly accelerated) on the corner - a motorcycle is inherently more stable cornering under power. This does not mean that a change

of gear is to be made on the corners. If the bend is slight there is no need to gear down. The student must not be encouraged to change down unnecessarily. If for some reason a corner is misjudged and taken too fast, the rear brake and the gears alone should be used for slowing down (on no account touch the front brake on the corner itself). The success of negotiating the curve or corner is in the action of gearing down and reducing speed (using brakes if necessary) before entering into the curve.

d. Path or line - right-hand corner. The corner is approached in a straight line about one foot from the centre of the road. The machine is then brought round forward to the apex of the corner to a point, say 60 centimetres from the gutter. Full advantage can therefore be taken of the road camber. If a bend is continuous or more than a right angle, it is extremely important not to bring the machine across to the right gutter until the sharpest part has to be rounded. The line the rider takes out of the corner depends on the speed of the machine in relation to the corner. The machine should be held as close to the right of the road as the speed permits. In no case should the speed be so great that the machine cannot be held within the right-hand half of the road.

e. Path or line - left-hand corner. The corner should be approached in the right-hand gutter. The machine should be brought round in an arc keeping always within the right-hand half of the road. If the machine is brought round too soon it will get on the wrong wide of the road at the apex of the corner.

f. Path or line - "S" bends. An initial left-hand bend should be approached and negotiated with the object of emerging in a favourable position to take the right bend, ie, approximately 30 centimetres from the centre line of the road.

g. If the right hand comes first, then the procedure does not alter. Since the machine is coming out of the bend it will already be in the best position for the approach to the following left-hand bend.

h. **Common faults**: decelerating and gear changing on the corner instead of during the approach; misjudging the apex on the left-hand bends and thus crossing the middle line of the road.

53. Varying road surfaces and gradients should be used for practicing cornering. Students should take turns at following next behind the instructor through a series of bends, noting the instructor's line and attempting to follow it as closely as possible.

54. Repetition is essential at this stage. Students should stay on these routes until they have become proficient in handling their machines.

55. The instructor should sometimes ride behind the course to observe faults which may conveniently be dealt with at brief halts.

56. Such faults as over-revving in the lower gears, rough use of the gearbox, excessive rough handling of the throttle or clumsy cornering, harsh braking too near a corner and inconsiderate riding in traffic should be checked immediately.

57. A good rider's movements in controlling the machine should be imperceptible and passage along the highway unobtrusive.

ADVANCED ROAD RIDING

58. Students should ride on main roads and in traffic-congested towns to gain practice in riding and handling the machine under distracting conditions. The road riding technique used on busy hard surface thoroughfares differs some what from the technique discussed previously. The main hazards on such roads are the inherent traffic congestion and the accumulation of an oily slick stream in the centre of the lane of travel. This area of the road should never be used for travel. The rider must select a position either to the right of left of this often invisible hazard. Experience has shown that a rider can develop safe and effective cornering techniques by travelling to the left of this area or in the left-hand wheel tracks of other vehicular traffic.

CHAPTER 3

CHAPTER 3

MAINTENANCE AND ADMINISTRATION

CARE AND USE OF MOTORCYCLE TOOL KIT

1. Every motorcycle is provided with a set of tools with which to carry out rider's maintenance. The rider must learn how to use these tools correctly.

2. It must be impressed on the rider that the good condition and cleanliness of the tools is essential to good servicing. If tools are carefully stowed, clean and well serviced, it indicates that the rider is trustworthy, and takes a pride in the machine and the work.

VEHICLE COMPONENTS

3. The most common components are described fully in the operator's manual.

DAILY MAINTENANCE

4. Daily maintenance parades are to be conducted by the rider to ensure that the machine is completely operational. For specific information about the Bombardier CAN-AM 250cc Motorcycle or the Honda CT 90 Motorcycle, refer to the operator's manuals or CFTO C-30-902-000/NP-000.

MOTORCYCLE ADMINISTRATION

5. Vehicle required for a motorcycle are the same as the records for any other military vehicle. The rider must be familiar with all regulations regarding the operation of military vehicles.

6. Students must know the proper use of Transportation Work Tickets, the Vehicle History Book, the Preventive Maintenance Recorder, and the Driver's Report of Vehicle Accident.

CHAPTER 4

CHAPTER 4

ACCIDENT PREVENTION

GENERAL

1. Students must be made aware of the causes of vehicle accidents and the ways they can be prevented. Accident prevention must be emphasized. Throughout the entire training period, the instructor must check every instance of bad driver attitude and every unsafe act. All instructor's must demonstrate that they are safe and competent driver's, students will be adversely influenced by bad habits.

2. The increase in the number of pieces of mechanical equipment used by the Armed Forces during and since World War II has been accompanied by an even greater increase in the number of accidents. The increased accident rate has been responsible for considerable damage to service vehicles, injuries to military personnel, and damage to civilian vehicles and property, and consequently numerous deaths and claims against the Crown.

REASONS FOR THE INCREASE IN ACCIDENTS

3. The principal reasons for the increase in the number of accidents are:

   a. the greatly increased number of vehicles on the road;

   b. the increased average speed of vehicles; and

   c. lack of driver education.

4. Little can be done to eliminate the first two causes. However, much can be done to train and educate the drivers of military vehicles.

CAUSES OF VEHICLE ACCIDENTS

5. Causes of vehicle accidents may be divided into four main groups:

   a. acts of God;

   b. mechanical failure;

   c. physical hazards; and

   d. unsafe acts.

6. Acts of God account for approximately one percent of the total number of accidents. Mechanical failure and physical hazard together account for less than five percent, and the

greater number of these are the result of poor maintenance. The remaining accidents - nearly 95 percent - are caused by drivers' unsafe acts.

EXPLANATION OF CAUSES

7. Accidents caused by an **act of God** are rare. An example of this kind of accident is a tree or building being blown over by a strong wind and failing on a vehicle.

8. The term **mechanical failure** implies that there is a defect in the mechanical structure of a vehicle due either to defective manufacture or poor maintenance. Accidents resulting from manufacturing defects are rare. Vehicles are thoroughly tested before being shipped from the assembly plants and are considered perfect in all respects by specialists in their trade. Most vehicle accidents caused by mechanical failure are the result of poor maintenance.

9. The term **physical hazard** implies that because of the physical condition of the street, highway, garage, vehicle compound, etc., accidents cannot be prevented by observing normal safe driving practices (eg, an unsigned bridge washout on the highway).

10. **Drivers' unsafe acts** are listed below in order of the frequency of accidents resulting from them:

a. speed too fast for road or traffic conditions;

b. inattention;

c. following too closely;

d. unsafe passing;

e. assuming the right of way;

f. unsafe mechanical conditions;

g. intoxication;

h. cutting in;

j. driving on the wrong side of the road;

k. improper parking; and

m. failure to signal.

DRIVERS' RESPONSIBILITY FOR PREVENTING ACCIDENTS

11. The driver is the critical factor in maintaining a vehicle in first class condition. The best designed and constructed vehicle and the best mechanics cannot compensate for bad driving. Bad driving is not recognized as a source of maintenance trouble because its effects (save for accidents) are cumulative rather than immediate. The excellence of the vehicle and the work of the mechanic may keep the vehicle running for a time in spite of bad driving but bad driving practices will reduce the normal life expectancy of the vehicle and increase the maintenance required.

WHY DO DRIVERS PERFORM UNSAFE ACTS?

12. Briefly, the reasons for unsafe acts by drivers may be placed under four general headings:

a. physical defect (vision, hearing, etc);

b. mental preoccupation;

c. lack of knowledge or skill (ignorance of safe driving practices and rules of the road, inadequate training); and

d. improper attitude (not observing the spirit of traffic rules and regulations).

DRIVER TRAINING

13. No matter how much instruction drivers receive or how good their instructors are, it is not possible for them to be practiced in all of the circumstances they will encounter during a driving career. During training, drivers are acquainted with most of the hazards and circumstances they may meet, but it is only by continued practice over a period of years that they reach the stage where they can be classified as safe drivers.

DRIVER ATTITUDE

14. Driver attitude is the driver's interpretation of the rules of the road and application of them to his or her own conduct while driving. Some of the prime requisites for good driver attitude are:

a. A complete understanding of the fact that all regulations that govern road users are made to protect lives and property, not to hinder drivers.

b. A consideration for other road users and pedestrians under all circumstances.

c. The ability to drive with care, even though other drivers do not.

15. Improper attitude is the chief cause of most accidents. Ninety-five percent of accidents are the result of unsafe acts by drivers. The reason behind these unsafe acts is usually poor driver attitude, which causes the driver to:

a. follow another vehicle too closely;

b. assume the right-of-way;

c. drive at an unsafe speed;

d. park on a hill or curve;

e. cut in; and

f. fail to stop at a stop street.

PUBLIC RELATIONS

16. All drivers can foster good public relations by operating their vehicles safely and courteously. Drivers are representatives of their units. The way they drive means much to their own units' reputation.

THE PROFESSIONAL DRIVER

17. Professional drivers must observe the laws and regulations in the highway traffic act. They must realize that disregard for the rights of others is dangerous. They must understand the need for traffic police and the impartial enforcement of traffic laws. They must understand that enforcement of traffic regulations is aimed at saving human life and eliminating property damage through accident prevention. As professional drivers they must be willing at all times to give the right-of-way to other vehicles in the interest of safety. It is small comfort, if you have an accident, to know that you had the right-of-way. A driver's mind must not be preoccupied, because the job presents many hazards and emergencies. Professional drivers must concentrate fully on their driving. In short, they must be defensive drivers ready to adjust their driving to meet changing conditions and allow for the mistakes of others.