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BASIC FIELD MANUAL

VOL. V

TRANSPORT

PREPARED UNDER THE DIRECTION OF
THE QUARTERMASTER
GENERAL

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INTRODUCTION

Pursuant to instructions from the War Department, Volume Transport, of the Basic Field Manuals (Tentative), prepared der the direction of the Quartermaster General, in collabora- n with the Chief of Cavalry, Chief of Field Artillery, and ief of Ordnance, is printed with a view to its use for refer- ce and for the purpose of securing constructive criticism as form, text, and data contained therein.

B. F. CHEATHAM,
Major General,
The Quartermaster General.

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CHAPTER I

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SECTION I

GENERAL PROVISIONS

1. Object.—The object of this chapter is to prescribe the means and methods whereby the mounted soldier is trained, in a minimum time, to ride sufficiently well for participation in field service. Due to limited time available, only rudimentary essentials can be covered.

2. Horses.—*a.* When quiet, well-trained horses are available such should be used for recruit instruction in equitation. The schedules appearing below are based on the availability of such horses. The assignment of old horses to recruits should be changed at least once each week.

b. When old horses are not available the recruits must be taught equitation and remount training concurrently. Generally the time required to train and condition the green horse is longer than the time necessary to train the recruit in riding. For this reason, when both man and horse must be trained together, the rate of training of the remount regulates the rate of training of the recruit. The training of the remount is pre-

scribed in chapter 2 and follows in general the sequence of the instruction prescribed in this chapter.

3. **Physical fitness of recruits.**—As a rule recruits are not in good physical condition. Furthermore, riding requires the use of many muscles not heretofore used by the recruit. Overwork of these muscles produces stiffness and soreness, causing muscular contraction, whereas progress in equitation is dependent upon the contrary condition—relaxation. For these reasons, it is essential not to overtax the physical strength of the recruit. In the beginning the work should be mainly at the walk, punctuated by frequent short rest periods. As the recruit develops in physical fitness the trot and gallop periods are gradually extended and the number of rest periods decreased.

4. **Confidence.**—The recruit who has never ridden a horse is often filled with apprehension due to the unaccustomed motion, and the difficulty of controlling his horse—especially at the faster gaits. This apprehension causes the recruit to become anxious and overstrained mentally, his muscles to become taut, and his body so rigid as to be incapable of doing its part easily and efficiently. It is necessary, therefore, that the instructor give his chief attention to combating this nervous tendency. The confidence of the recruit must be gained and held from beginning to end. To accomplish this, instruction should proceed gradually from that which has been mastered to that which is new and more advanced.

5. **The instructor.**—It is essential that the instructor be a skilled and experienced horseman, properly mounted. He should habitually supplement the original explanation of a movement by executing it himself. The instructor should be assisted by one or more noncommissioned officers, the number depending upon the number of recruits to be instructed at one time.

6. **Cautions to instructors.**—*a.* The instructor should first develop the confidence of the recruit, give him a proper seat, and make him supple on the horse. Progress should be regulated by the recruit's capacity so as to exempt him from avoidable accidents.

b. Each new movement is made the object of a particular lesson given to each recruit in turn.

c. The instructor passes frequently from one trooper to another, giving advice, and by constant repetition endeavoring to impress upon the troopers the fundamentals of equitation.

d. The instructor avoids general remarks and unfamiliar terms; in the correction of faults he addresses by name those committing them.

e. For the first lessons it is advantageous for the instructor to remain on foot so as to better explain movements and to correct faults.

f. In all exercises the instructor varies the gait so as not to weary the recruits or horses. The instruction is conducted without hurry. The daily work begins and ends at the walk.

7. Organization of recruits into groups.—The instructor organizes the recruits into squads. Not more than approximately 24 recruits should be trained at one time by one instructor. When the instructor must train more than 16 recruits at one time he should have the assistance of at least two noncommissioned officers.

8. Standard required of trooper.—Upon completion of the the training outlined hereafter each recruit should have attained a reasonably secure seat at all gaits, and, in addition, should be able—

a. To mount and dismount with ease on either side of the horse.

b. To apply correctly the aids whereby the horse is caused to move forward or increase his gait; to halt or decrease his gait; to turn to the right or left, or turn to the right or left about; and to back from the halt.

c. To cover long distances on horseback with the least possible fatigue to the horse and rider.

d. To ride across country.

9. Duration of course.—The length of the course is two weeks, divided into two periods of one week each. For use when more time is available, three supplementary courses of two weeks each are also included. In order to cover satisfactorily the work outlined for the first two weeks it will be necessary for the recruit to receive at least three hours' instruction each day (exclusive of time required for grooming the horse and caring for equipment). The daily work is best divided into morning and afternoon lessons of approximately one and one-half hours each.

SECTION II

FIRST PERIOD

10. Program of daily instruction.—*a.* During the first period the horses are equipped with stripped saddles and single snaffle single rein bridles. The men invariably ride with stirrups and without spurs.

b. The first 45 minutes of each lesson should be conducted in a riding hall. Any remaining time should be spent out of doors in quiet work on the road or in some appropriate phase of cross-country riding.

c. For the first three or four days the instructor should so conduct the work that not more than half the lesson period is devoted to actual riding, the remainder of the period being confined to explanations, saddling and briddling, mounting and dismounting, adjusting and handling reins, etc.

d. The term riding hall, as used herein, includes any inclosed or uninclosed course of corresponding size and shape.

e. Until they have become reasonably proficient in riding the men are required to lead their horses to and from the riding hall.

f. In preparing his daily schedule of work the instructor should be guided by the following:

(1) There is much to be explained to the recruit in detail.

(2) Explanations must be repeated with patience over a period of several days in order to insure that the mind of the recruit grasps and holds them.

(3) The exercises which follow constitute the subject matter for daily lessons; they should generally be used in the sequence in which listed.

(4) Exercises of preceding lessons which have not been mastered are repeated at the beginning of each lesson before proceeding with new exercises.

11. To fold saddle blanket, saddle and bridle, and to unsaddle.—Instruction in saddling, bridling, folding the saddle blanket, adjustment of the saddle and bridle, and unsaddling the horse will be in accordance with the provisions of chapter 3, The Use and Care of Animals.

12. To stand to horse.—*a.* At the command *STAND TO HORSE* each recruit places himself on the near side of the horse, facing to the front and opposite the horse's head. He

takes the position of attention, except that the right hand (nails down) grasps the reins about 6 inches from the bit, the forefinger separating the reins. The bight of the reins rests on the horse's neck near the withers.

b. Being at *STAND TO HORSE* if the command *AT EASE* be given each recruit stands at ease, holding the reins about 18 inches from the bit.

c. At the command *ATTENTION* each recruit resumes the position of *STAND TO HORSE.*

d. To stand to horse on the off side the instructor commands: *OFF SIDE, STAND TO HORSE.* At this command each recruit assumes a position on the off side of his horse corresponding to the position of *STAND TO HORSE*, as described above, substituting right for left, and vice versa.

13. To lead out.—The recruits being at *stand to horse*, to leave the stable or picket line, the instructor commands: *LEAD OUT.* Each recruit, holding his right hand well up and firm, leads his horse, without looking at him, to the place designated by the instructor.

14. To line up (in the riding hall).—As the recruits enter the riding hall the instructor indicates the point where he desires the right recruit to be located and the direction in which the line is to face and commands: *LINE UP.* The recruits form in line at intervals of 3 yards, dressing on the right man, each at *stand to horse*, and with horse correctly disposed perpendicular to the line.

15. To mount.—The recruit being at *stand to horse* the instructor commands: 1. *Prepare to mount*, 2. *MOUNT.*

a. At the command *prepare to mount* the recruit faces to the right, drops the right rein, takes a step to the right so as to be opposite the horse's left shoulder, and then half faces to the rear. He takes the reins in the left hand, with the little finger between them and the bight falling to the off side; adjusts them so that they give a gentle, even bearing on the horse's mouth, and places the left hand on the horse's crest near the withers. He then places the left foot in the stirrup, assisted by the right hand, if necessary, brings the left knee against the saddle, and places the right hand upon the cantle.

b. At the command *MOUNT* the recruit rises by an effort of the right leg aided by the arms. He keeps the left knee bent and firmly pressed against the saddle, the toe depressed, and the

upper part of the body inclined slightly forward in order to keep the saddle from turning. He brings the right foot by the side of the left, changes the right hand to the pommel, passes the right leg, knee bent, over the horse's croup without touching it, and sits down lightly in the saddle. Assisted by the right hand, if necessary, he then places the right foot in the stirrup and takes the reins in one or both hands as instructed.

16. **To hold the single reins in both hands.**—*a.* The recruit takes a rein in each hand in such manner that the rein comes into the hand under the little finger and passes out over the second joint of the forefinger. The thumb is closed on the rein and the bight of the reins falls forward and to the right. The fingers are closed until their tips lightly touch the palms of the hands. The back of each hand is vertical and in prolongation of the forearm. The elbows are low and close to the body. Each forearm, wrist, hand, and rein is in a straight line. The wrists are not contracted nor bent. The hands are about 9 inches apart and remain light, i. e., they maintain a light feel of the horse's mouth, following the vibration of the horse's head by means of an elastic play of the fingers and wrist. The reins are stretched sufficiently to maintain a light contact with the horse's mouth.

b. To shorten the length of the rein the recruit brings the hands together and grasps with the fingers of one hand, above and near the opposite thumb, the rein he desires to shorten. To lengthen a rein the recruit relaxes the grasp of his hand upon the rein, thus permitting the rein to slide through his hand until the desired length of rein is secured.

17. **To dismount.**—The recruits being at the halt, the instructor commands: 1. *Prepare to dismount*, 2. *DISMOUNT.*

a. At the command *prepare to dismount* the recruit passes the reins into his left hand and places that hand on the horse's crest near the withers. He then places the right hand upon the pommel and removes the right foot from the stirrup.

b. At the command *DISMOUNT* the recruit passes the right leg, knee bent, over the croup without touching it. He now changes the right hand to the cantle of the saddle and brings the right foot by the side of the left foot, the left knee being against the saddle and the upper part of the body inclined slightly forward. He next descends lightly on the right foot, which is followed by the left, and takes the position of *stand to horse.*

18. To hold the single reins in one hand.—*a.* The reins being held in both hands, to take the reins in the left hand, the recruit carries the left hand opposite the middle of the body, passes the right rein into the left hand so that it is separated from the left rein by the little finger. The two reins pass out of the left hand over the second joint of the forefinger, the thumb is closed on the reins, and the bight falls forward and to the right. The recruit's right arm falls naturally by his side. His left elbow is carried naturally by his side and his left wrist and hand are in line with his forearm. The recruit's fingers are closed lightly, his nails toward his body, and the back of his hand vertical.

b. To retake the reins in both hands the recruit grasps the right rein with the right hand as before and replaces the hands about 9 inches apart.

c. The recruit takes the reins in the right hand and again in both hands, in a similar manner.

19. To adjust and handle the single reins.—*a.* During the first lessons in riding, the instructor causes the recruits to hold the reins in both hands. After a few days, however, he commences to require them to hold the reins in the left hand and, similarly, in the right hand. He practices them in changing the reins from one hand to another, from both hands to one hand and back again, in lengthening and shortening the reins, in dropping and picking up the reins, and explains thoroughly the positions of the hands and the proper length at which to hold the reins.

b. It should not be forgotten by the instructor that riding with the reins in both hands is a temporary measure for the better control of the horse; that to hold the reins in the right hand is merely a restful change; and that to hold the reins in the left hand is the normal method for the military horseman, the right hand then being free for the use of weapons. Therefore, while the recruit should be made proficient in all methods of holding the reins, he should, as the course of instruction progresses, come to ride more and more with the reins in the left hand.

20. The position of the mounted soldier, or attention.—*a.* The position of the mounted soldier, or attention, should fulfill so far as practicable the following requirements:

(1) The buttocks should be well forward under the rider and bear an equal amount of his weight. The buttocks should never be permitted to bear against the cantle.

(2) The thighs should extend downward and slightly forward. They should rest without constraint upon their flat sides and clasp the horse evenly.

(3) The knees should be bent but without stiffness, and should clasp the horse snugly.

(4) The lower legs should extend downward and slightly backward; they should be in contact with the horse but without pressure.

(5) The ball of the foot should rest easily on the tread of the stirrup, the heel slightly lower than the toe, the ankle relaxed.

(6) If the rider is without stirrups the feet should hang naturally, ankles relaxed.

(7) The upper part of the body should be easy, free, and erect. The spinal column should be supple, especially in the small of the back.

(8) The shoulders should be carried back evenly, but without hollowing or stiffening the back.

(9) The arms should be free, the elbows falling naturally by the side.

(10) The reins should be held in one or both hands in the prescribed manner.

(11) The head should be erect, but without stiffness in the neck.

(12) The eyes should be alert and glancing well to the front.

b. A position fulfilling the above requirements is considered ideal for the military horseman. It is easy and comfortable to both man and horse—a consideration of the highest importance in the prevention of sore backs; it permits the efficient use of the aids in the control of the horse, and it affords a secure seat from which the rider is not easily thrown.

c. The position given is a model to which a well-formed man whose body is suitably proportioned for riding can approximately conform. Others whose legs are round and short or whose bodies are square and thickset can only be expected to adjust themselves as far as possible to the normal position without rendering themselves too uncomfortable or causing themselves undue fatigue or pain. Moreover, many men have

become excellent horsemen whose positions are not and could not be absolutely according to model. Often such men possess other and more compensating qualities as horsemen. All men, however, no matter what their natural aptitudes or degrees of proficiency, are greatly improved in their riding by conscientious efforts to conform to the model position described.

d. The instructor should not demand at once a correct position on horseback. To the recruit the new experiences and sensations are sometimes very fatiguing and discouraging. Even to an experienced rider a suddenly enforced change from old and confirmed habits and positions to new ones is especially trying upon strength, patience, and good temper. The instructor should, therefore, describe the correct seat, hold to it steadfastly as the goal the men are to strive for, but seek to attain it by minor and well-timed corrections and by gradual daily improvement. In this the instructor will be greatly assisted and his men will make rapid progress if he applies the mounted *supplying exercises* in a manner to eliminate individual faults and eventually to mold the men into one characteristic appearance and manner of riding.

21. The aids.—The horse is controlled by the effective use of the legs, the reins, the weight, and the voice. These means of controlling the horse are termed collectively *The aids.*

22. The use of the legs.—Increased pressure of the legs at the rear edge of the girth causes the horse to move forward, to increase his pace, or to change to a faster gait. Their action may also be such as to cause the horse to engage the hind quarters. One leg acting alone and in rear of the girth causes the horse to move his hind quarters to the opposite side. If the increased pressure of the legs is insufficient, the rider should resort promptly to calm but increasingly energetic, successive blows with the legs until the horse responds. The heels should be kept low; heels or spurs should not be used unless the horse fails to obey the legs.

23. The use of the reins.—Increased tension of the reins directly to the rear causes the horse to decrease the pace, to change to a slower gait, to halt, or to back. If the horse is standing still, an action of the reins and legs prepares him to move. A relaxing of the tension of the reins combined with a closing of the legs causes him to move forward, or, if already moving, to increase the speed of the gait. Relaxing the reins

does not mean loosening them so as to lose contact with the horse's mouth. The action of one or both reins toward one side causes the horse to change direction.

24. **The use of the weight.**—Movement of the rider's weight forward tends to cause the horse, if at the halt, to move forward, or, if already moving, to increase the pace or change to a faster gait. Movement of the rider's weight to one side inclines the horse to move in that direction.

25. **The use of the voice.**—The voice is the simplest and yet one of the most effective of all the aids. Its effect lies in the intonation rather than the words or phrases spoken. The low, gentle, soothing tones have a tendency to calm and quiet the horse, whereas the sharp, emphatic, higher-pitched tones have a tendency to excite and encourage him to greater activity. Clucking, a sound made by the combined use of the tongue, the teeth, and the cheek, though not, strictly speaking, a use of the voice, is a method commonly used to encourage the horse to move forward or to move faster. The use of the voice, like the application of any other aid, must be consistent with the effect desired. It must be used with discretion, as excessive or improper use soon renders it of little or no value in training or management.

26. **The use of the aids in combination.**—*a.* An aid is not usually employed singly, but in combination with one or both of the others. One aid does not need to act with as much force if assisted by another. For example, to move forward, or to increase the pace or change to a faster gaint, the legs and weight are used together; to halt, or to decrease the pace or change to a slower gait, the reins and weight are used together, while to change direction the reins, the weight, and the legs may all three be used in combination.

b. In using the aids in combination the rider must be careful that the effect of one aid is not opposed to that of another. If, for instance, the rider is using the reins to slow up or to stop his horse he should not at the same time use the legs in a manner to provoke a forward movement. Similarly, in slowing up or halting the horse, the weight of the body must not be allowed to contradict the action of the reins. For example, to lean the body suddenly forward while using the reins to slow up the horse would more than counterbalance the effect of the reins; the horse would in such case move faster instead of slowing up or halting.

27. Manner of applying the aids.—*a.* The action of the legs, the reins, or the weight should be intermittent and not continuous. If an action of the aids is prolonged and continuous, the horse becomes accustomed to the effect or has time to adjust himself so as to make resistance. Thus, if the reins are steadily pulled and the weight carried well back and is allowed to remain there the horse may shift his own weight forward to readjust his balance and move steadily onward without responding to such action of the reins and weight. If, on the contrary, the reins and the weight are used by quickly repeated applications the effect is very marked and the horse responds at once. A horse soon becomes very obedient if the aids are employed habitually in this manner.

b. In the same way the legs should not act by continuous pressure nor be released altogether but should preserve light contact in the intervals between the quickly repeated blows.

c. All actions of the aids should diminish in intensity when obedience begins and should cease entirely as soon as the desired result is obtained. The rider must not act with the reins when there is no reason therefor; to do so will eventually provoke the horse to pull, to fret, and to seek to increase his pace more and more, whether at the walk, trot, or gallop.

28. To keep the hand steady.—*a.* The hand should be kept low and free from involuntary movement; it should not bob up and down, nor pull, nor "give and take" without a real occasion, but should preserve an even tension on the rein.

b. To keep the hand or hands steady and yet to produce the desired effects of the bit upon the bars of the horse's mouth requires much practice. It is accomplished by a closing and gripping action of the fingers accompanied by an upward twist of the hand at the wrist, without movement of the elbows to the rear and thus "hauling away" on the reins. Drawing the elbows to the rear is pulling.

c. Horses usually go well with riders who keep their hands steady. Riders can acquire the knack of keeping their hands steady only by continuous effort. Steady hands are dependent upon a supple body and a secure seat. The hands will continue to bob up and down, to jerk and pull on the reins so long as the body is stiff, the muscles and nervous system not under control, and the seat unsteady in the saddle. Horses are always restless, ill at ease, and inclined to pull or to run away with such riders.

d. If the gait is the walk the reins should be adjusted long. If the trot be taken, the rider should promptly shorten the reins to suitable length for that gait. If the gallop be taken, the rider may again need to lengthen or shorten the reins to suit the positions of the horse's head and neck at that gait, and, in addition, according to the speed of the gallop. It is by reflection and practice on his own horse and by observation and study of the action of the horses of his comrades that the rider will learn how to do this. The point to be emphasized is that once having adjusted his reins to suit the speed of a given gait, the rider should thereafter refrain from continually shortening and lengthening them or letting the hands bob up and down.

29. The leading rein.—*a.* The leading effect of the rein (the right, for example) is produced when the rider opens the right rein by carrying the hand to the right and leads the horse's head and neck in that direction. This effect is accomplished without increasing the tension on the rein. To turn the horse to the right the rider employs the right leading rein, assisted by the effect of shifting his weight slightly to the right front, and the action of one or both legs.

b. In applying the leading rein (the right, for example) the rider with but little movement of the upper arm and elbow carries the forearm, wrist, and hand to the right. It is important that the rider produce no increased tension on the rein to the rear, that the joint at the wrist be not bent or cramped, that the back of the hand remain in easy prolongation of the forearm, and that the thumb incline outward so that the palm of the hand is slightly upward rather than vertical. Used in this manner the hand is without stiffness and harshness in its effects.

30. The rein of opposition.—*a.* The effect of the rein of opposition is produced when tension to the rear is placed on the reins. This effect of the reins of opposition in conjunction with the weight carried backward intermittently causes the horse to slow up or to stop.

b. In applying the reins of opposition the rider closes his fingers on the reins and repeatedly twists his hand inward and slightly upward without moving his elbows to the rear. This rearward action of the reins should always be accompanied by the simultaneous intermittent effect of the weight.

31. The bearing rein.—*a.* The bearing effect of the rein (the right, for example) is produced when the rider causes the

right rein, without increased tension to the rear, to act toward the left against the right side of the horse's neck. This effect of the right bearing rein in conjunction with the weight carried slightly forward and to the left, accompanied by the action of one or both legs, causes the horse to turn to the left.

b. In applying the bearing rein (the right, for example) the rider carries the hand upward and to the left and presses the stretched rein against the middle part of the horse's neck. It is important that the rider produce no increased tension on the rein to the rear, that the joint at the wrist be not bent nor cramped, that the back of the hand remain in easy prolongation of the forearm, and that the thumb incline forward so that the palm of the hand is slightly upward rather than vertical. Used in this manner the effect of the rein is powerful and causes a sharper turn than the leading rein.

32. Exercises in the use of the reins.—The instructor should introduce daily a few elementary but well-defined exercises in starting and stopping the horse and in turning to the right and left. In the beginning, to turn the horse, the recruit should be required to use the leading reins exclusively. In a few days he should be taught how to use the bearing reins in conjunction with the leading rein in turning the horse and, very soon, the bearing rein alone. Thereafter, even when riding with reins in both hands, the recruit should be required habitually to use the bearing rein for turning his horse.

33. The effect of the snaffle bit.—The effect of the snaffle bit is very mild, because it is received on the lips as well as on the bars of the mouth. Its action tends to raise the head and neck. It gives a comfortable support and is the most efficacious bit for relaxing the jaw by means of vibrations.

34. To gather the horse.—*a.* To gather the horse, having a light pressure of the bit against the horse's mouth and a light feel of the lower legs against his sides, increase the pressure of the lower legs and slightly increase the pressure of the bit against the bars by closing the fingers on the reins. Gathering the horse serves as a signal to attract his attention and to prepare him to respond promptly to the subsequent application of the aids.

b. The gather should always be employed at a preparatory command involving movement. It is, thus, a preparatory signal to the horse. It should always be employed whatever may be

the movement that is to be executed and whatever the gait at which the horse may be moving.

35. To move forward.—1. *Forward*, 2. *MARCH*. Being at the halt, at the command *Forward*, gather the horse. At the command *MARCH* incline the weight of the body forward, slightly relax the fingers of the hand, and use the legs with quickly repeated applications until the horse moves forward.

36. To halt.—*a.* 1. *Squad*, 2. *HALT.*—Being at the walk, at the command *Squad*, gather the horse. At the command *HALT* use the reins of opposition and the weight in combination and with repeated applications until the horse halts.

b. In using the weight the rider should keep the buttocks in the saddle, the legs in their proper place and snugly against the horse, and should carry the upper part of the body backward repeatedly. The head should be well up, the chest expanded, the shoulders free and well back.

c. The weight is not used effectively if the rider stands in the stirrups and lifts his seat out of the saddle, if he pivots on the crotch, if he carries his feet and legs to the front, or if he sinks the chest and advances the head and shoulders. The rider should, accordingly, have careful instruction and much practice in the exact use of the reins and weight in halting his horse.

37. To march to the right (or left) hand.—The rider is said to march to the *right hand* if, being on the track, the center of the riding hall is on his right; to the *left hand* if the center of the riding hall is on his left.

38. To take the track to the right (or left) hand without regard to distance between riders.—*a.* The instructor commands: *TAKE THE TRACK TO THE RIGHT HAND WITHOUT REGARD TO DISTANCE.* Each rider directs his horse toward the track, and upon arriving there enters the track to the right hand. The riders are distributed over the whole length of the track. Each rider should keep his horse at the gait ordered and must preserve a safe distance in rear of the next horse.

b. There should be much work on the track without regard to distance between riders. They are then absolutely independent of each other, the only obligation being to maintain the proper gait and rate and to march to the hand directed when on the track. To avoid crowding the individual riders should

turn out at will, move across the hall, and take the track at a convenient interval on the opposite side.

c. When riding on the track without regard to distance commands are not necessarily complied with at once; each rider, however, conforms to them as quickly as possible, considering his place on the track and the position and readiness of his horse for properly executing the movement. Each rider should choose his ground so as to avoid interfering with his neighbor. Under such conditions thoughtful deliberation in using his aids and exactness of execution of the movement by individuals are the results desired by the instructor, and not merely that all riders shall begin or end a movement at the same moment. Simultaneous execution of movements is a form of collective drill which should not be carried on except for occasional short periods for the purpose of checking results.

39. To take the track with fixed distances.—*a.* The instructor commands: 1. *At the walk (trot or gallop) take the track to the right hand with 4 feet (or so many yards) distance.* 2. *GUIDE ON (SUCH TROOPER).*

The designated rider takes the track, if not already there, at the gait ordered. The other riders move by the shortest line at the gait ordered, or increased gait if necessary, and place themselves, one behind another, with the indicated distance from head to croup. All then ride at the gait and at the distance ordered.

b. In the riding hall the distance from head to croup, when riding with fixed distances, is habitually 4 feet. Out of doors, however, greater distances should frequently be used, such as 10 yards between riders. Such out-of-doors exercises are very useful for training men to control the speed of their horses and to maintain fixed distances from riders or groups of men preceding.

40. To ride in.—*a.* Being in any formation in the riding hall or out of doors, the instructor may command: *RIDE IN.* The riders, moving at the gait at which they were riding, or at the designated gait, and by the shortest line, group themselves about the instructor. Such oral instruction, explanation, or orders as may be appropriate are then given.

b. To resume the ride, the instructor gives the command or direction for the exercise desired. The riders move at the designated gait and by the shortest line to their places.

41. Changes of gait.—*a.* Being at the halt, to gather the horse and to move forward have been described.

b. Being at the walk, to pass to the trot, or, being at the trot, to pass to the gallop, the rider uses the same means as for passing from the halt to the walk.

c. Being at the gallop to pass to the trot or being at the trot to pass to the walk, the rider uses the same means as for passing from the walk to the halt.

d. Changes of gait are habitually made progressively, the walk being taken from the halt, the trot from the walk, the gallop from the trot, and vice versa. For instruction purposes and when necessary in service an increase or decrease of gait may be made more abruptly.

e. A change of gait of *one degree* is an expression which in these regulations means a change from the halt to the walk, from the walk to the trot, from the trot to the gallop, or vice versa.

42. To rise to the trot.—*a.* The horse being at the trot, the rider, to rise to the trot, inclines the upper part of his body forward, supports himself by pressing the knees against the saddle, and then permits himself to be impelled upward by the thrust of the horse's hind leg (the left, for example). He remains up during the stride of the right hind leg and sits down just in time to be impelled upward again by the next thrust of the left hind leg. He continues in this way, avoiding the alternate strides of the trot. In order to catch the rhythm of the movement, the rider's attention should be directed toward the sensation of propulsion produced by the thrust of the hind leg rather than toward the merely supporting effect of the fore leg. It is upon the hind legs of the horse, so to speak, that the rider rises rather than upon the fore legs.

b. When learning to rise to the trot the beginner will make more rapid progress if he strokes his horse's neck at each effort to rise. Stroking the horse's neck assists the rider to catch the rhythm of the motion; it also causes him to incline his body forward at just about the proper angle.

c. In rising to the trot the seat should be raised moderately; contact with the saddle should be resumed gently and without shock; the knees should be pressed snugly against the saddle; the lower legs should be kept still, the ankle joint supple, and the heel slightly lower than the toe. The rider's head should

be up and his eyes glancing well out to the front; he must not lower the head and look down toward the horse's front feet.

43. To change hands.—At the command *CHANGE HANDS* each rider, after having passed the corner of the riding hall and marched a horse length on the long side, directs himself toward the diagonally opposite corner so as to take the track to the opposite hand at about two horse lengths from the corner. Those going in an opposite direction are passed by keeping to the right.

44. By the right (or left) flank.—1. *By the right flank,* 2. *MARCH.* *a.* Being at the halt, at the command *By the right flank,* gather the horse. At the command *MARCH,* move the horse forward and at the same time use the leading rein (or the bearing rein) and the weight in such a manner as to turn the horse to the right. The turn is made on an arc of 90°. The radius of the arc when the horse is at the walk should be 2 yards; when at the trot, 4 yards; when at the gallop, 6 yards. During the movement the body of the horse should follow the arc on which he is turning. If, however, the horse prefers to carry his haunches somewhat to the inside of the curve, especially when at the faster gaits, the rider should not oppose it. But if, on the contrary, the horse carries his haunches to the outside of the curve his balance is adversely effected and the rider should oppose such action by using the left leg more strongly and slightly further back than the right leg.

In the first lesson in turning by the flank the rider uses the leading rein. Later he is taught to use the leading rein, assisted by the bearing rein; later the bearing rein alone, first with the reins in both hands, then in one hand.

b. By the left flank is executed by similar commands and means.

45. Right (or left) oblique.—This movement is executed in the same manner as *By the right or left flank,* except that each rider turns his horse through an arc of only 45°.

The command is: 1. *Right (or left) oblique,* 2. *MARCH.* To resume the original direction: 1. *Forward,* 2. *MARCH.*

46. The about.—At the command 1, *Right (or left) about,* 2. *MARCH,* each rider turns his horse until he finds himself facing in the opposite direction and then moves to his new front.

The turn should be made on the arc of a circle whose radius is 2 yards at the walk, 4 yards at the trot, and 6 yards at the gallop.

47. Cross-country riding.—That time of each lesson not used in the riding hall or in riding on the road is utilized in riding cross country. For this instruction the following details govern.

a. Terrain.—The unevenness of the ground selected should not be great. All fences, ditches, logs, and artificial obstacles are avoided.

b. Gaits.—The gait should be principally at the walk, varied by short trots on selected ground, leading, and short halts for the purpose of readjusting saddle equipment. The speed of the regulation gaits should be carefully maintained by the instructor. It is highly important that the walk be not so fast as to cause restlessness and jigging and that the trot be at the rate of 8 miles an hour. The attention of the recruits should be directed to these gaits and the importance of maintaining them strongly impressed upon their minds. Abrupt changes in gaits are carefully avoided.

c. Formations.—Starting out habitually in column of twos, the instructor should soon scatter the riders out in flock so as to cause each recruit to ride as an individual. If more than one squad is present, each may be formed in a flock guiding on its own leader, the leader of the base squad guiding on the instructor. The squads may thus be formed in line with 50 to 100 yard intervals between squads or in column of squads with extended distances between squads. Within the squads the formation may be in column of troopers, column of twos, column of fours, line, or as foragers.

48. To fall out.—*a.* The men being dismounted, in line, at the command 1. *By the right (left)*, 2. *FALL OUT*, the man on the right leads his horse directly to the stable or picket line. The other men, in successive order from the right, follow at 4 feet distance until near their places on the picket line or in the stable, when they leave the column and move directly to their respective places. Having secured their horses, the men unsaddle and unbridle, groom their horses, clean their equipment, and place the latter as prescribed.

b. To hasten the movement the instructor may command 1. *By the right and left*, 2. *FALL OUT*. The men on the right and left of the line lead their horses directly to their places

on the picket line or in the stable, followed in succession by the men on their right and left, successively.

c. If the men are in line facing their respective places on the picket line, the command *FALL OUT* may be given. Each man then moves directly forward to his place on the picket line.

d. If the men are dismounted, in column of troopers, or in any other similar formation, at the command *FALL OUT* the men tie their horses on the picket line or in the stable as directed and in an orderly manner.

49. To stand to heel.—The horses being tied on the picket line or in their respective stalls in the stable, at the command *STAND TO HEEL* each man stands at attention 1 yard in rear of and facing his horse. The horses are then inspected by the instructor.

50. To dismiss.—The instruction period being concluded, the men are ordered to *FALL IN*. They are then marched to the organization parade in front of their quarters and are there dismissed.

SECTION III

SECOND PERIOD

51. Program of daily instruction.—*a.* The horses are equipped with bit and bridoon and the recruits habitually wear spurs.

b. The recruits are given some instruction in riding without stirrups. Not to exceed 15 minutes of each lesson should be used for riding in this manner. The length of trot periods without stirrups should not exceed five minutes.

c. No restriction is placed upon the instructor as to the relative amount of time to be devoted to work in the riding hall and to instruction in cross-country riding.

d. The instructor is also freed from any restriction relative to the amount of actual riding given in each lesson. In this matter the instructor should be guided by the physical condition of the recruits and the fact that overwork is productive of more harm than underwork.

e. The amount of instruction in jumping given during the second period will be strictly limited so as not to materially interfere with the instruction of the recruit in the other work prescribed. The object of the instruction in jumping given

during this period is to enable the recruit when riding cross country to negotiate obstacles such as small ditches and logs.

f. The exercises prescribed for the first week's training in equitation are repeated during the second week. In addition the following exercises will be utilized for advancing the recruit's training.

52. Adjustment of bit and bridoon.—The recruit is instructed in the fitting and adjustment of the bit and bridoon as prescribed in chapter 3, The Use and Care of Animals.

53. To hold and handle the double reins.—*a. To hold the double reins in left hand.*—The rider hangs the bights of the reins on the thumb of his right hand in such manner that the bight of the snaffle reins rest upon the bight of the curb reins. He then carries his left hand in front of his body, back of the hand to the front, and inserts the little finger between the left snaffle and left curb reins (the snaffle passing underneath little finger), the third (ring), finger between the left curb and right curb reins, and the second finger between the right curb and the right snaffle reins. He closes his hand lightly and in such a manner that the reins come out of his hand between the thumb and forefinger. He slides the left hand to its proper position and, with the assistance of the right hand, adjusts the reins evenly and to proper length. With his left thumb he presses the reins forward and down upon the second joint of the forefinger and drops the bights of the reins to the right over the horse's shoulder. He drops his right arm to his side. The position of the bridle hand is now the same as that described for the single rein.

b. To hold the double reins in right hand.—The rider inserts the fingers of his right hand between the reins so that the reins are in inverse order to that prescribed for the left hand; the right snaffle rein now passes underneath the right little finger. The position of the hand is the same as that described for the single rein.

c. To hold the double reins in both hands.—The reins being held in one hand, the rider carries the other hand, back of the hand up, just in front of the bridle hand and so that the little finger is above the reins. He inserts the little finger between the snaffle and curb rein he wishes to grasp so that the snaffle rein will pass underneath. He adjusts all reins evenly and to proper length, then separates his hands until they are about 9

inches apart and in the position described for holding the single reins in both hands.

d. Practice in adjusting and handling the double reins.—The recruits are given much practice in changing the double reins from one hand to the other, taking them in both hands, taking a single rein in one hand while three are held in the other hand, and in taking the snaffle reins in the right hand and the curb reins in the left hand. When riding with all the reins in, for example, the left hand, the rider sometimes needs to assist temporarily with the right hand. To do this he reaches forward with the right hand and seizes the right snaffle or right curb rein and holds it in the usual manner. The left hand allows this rein to be drawn forward 3 or 4 inches but does not release it. When released by the right hand this rein is adjusted as before.

e. Manner of holding the reins during rests and at route order.—During rests and while riding at *route order* the recruits are required to frequently change the manner of holding the reins. The instructor explains to the men that the purpose of these changes is to rest their own arm and shoulder muscles and to give an equally restful change to the muscles of the horse's head and neck.

54. The effect of the curb bit.—The effect of the curb bit is much more severe than that of the snaffle, because its action occurs almost entirely on the bars of the horse's mouth; the horse's lips and tongue ameliorate its pressure but little. This pressure acts downward and tends to lower the horse's head and neck. If the pressure of the curb bit is maintained for a long time, it becomes painful to the horse; also the bars of the mouth become numb, the curb chain stops circulation, and the horse's mouth becomes deadened to any action of the bit. This bit should not, therefore, be used continuously for long periods. Generally best results are achieved when the curb and snaffle bits are used in conjunction.

55. The use and effect of the bit and bridoon.—The instructor explains and illustrates to the men the following three methods of using the bits of the double bridle.

a. The horse may be ridden with a light and equal pressure of both the curb and snaffle bits. This is the method used at drill, on the march, and in cross-country riding or jumping. It is the method most commonly used. Riding in this manner, the

rider may, on occasion, take the curb reins in the left hand and the snaffle reins in the right. This method is often found useful in the management of a hard-mouthed, stiff-necked horse. If the rider lightly alternates the tension of the curb and snaffle, the sensation thus produced on the bars of the mouth is very effective. When so used the bit and bridoon bring about the gradual relaxation of the muscles of the jaw and the poll and, as a result, the horse becomes light and obedient. The rider may also, on occasion, take three reins in the left hand and the right snaffle in the right hand. With the reins held in this manner the rider, by gentle vibrations of the right snaffle rein, causes the horse to relax the muscles of his jaw and poll, or by an upward effect of the right snaffle rein causes the horse to raise his head when carrying it too low, or by using the right snaffle rein as a bearing rein or leading rein renders sudden and powerful assistance to the left hand when riding with the reins in one hand. The last instance named finds valuable application when in the charge or the mêlée the trooper rides with the reins in the left hand and the saber or pistol in the right hand. The soldier can then reach forward with the right hand and grasp the snaffle rein for momentary use in maintaining or regaining control of his horse.

b. An exceptional method is to ride the horse on the snaffle alone, the curb reins swinging loose. This is the method used with horses that arch the neck unduly, that are behind the bit, that are nervous and restless and will not walk, or that have tender mouths.

c. The third method is to ride the horse on the curb bit alone, the snaffle reins swinging loose. This method may be used by the soldier in the mounted charge and on occasions of excitement and stress for the effective control of the horse.

56. The use of the spur.—The spur should not be used at all if the same result can be obtained by the use of the calf of the leg. For the majority of riders and horses the blunt spur is to be preferred to the one with rowel. The latter is often a severe instrument, which should only be worn by experienced riders. The spur should be used just in rear of the girth and with a series of successive touches rather than a constant pressure. These should cease as soon as the horse obeys. The shank of the spur is of such length that the horse can be touched by the rider simply rotating the ankle without depress-

ing the toe or raising the heel. The spur is properly adjusted when the straps hold it snugly in place and parallel to the ground at the height of the top of the boot or shoe counter.

57. To ride without stirrups.—*a.* Riding without stirrups when properly conducted is of great value in training recruits to ride. It develops his balance, confirms and strengthens his seat in the saddle, and increases the strength and pliancy of his muscles.

b. When riding without stirrups the gaits should be the walk, the slow trot, or the gallop. If the trot is faster than 6 miles an hour, it will, by its roughness, cause excessive weariness. soreness, and abrasions, thereby defeating the object in view.

c. The recruits should now be able to ride without stirrups for about 15 minutes of each instruction period. To avoid undue fatigue to the riders the instructor will frequently change the gait and exercise.

d. It is best not to cross stirrups. The upturned stirrups straps usually injure the muscles of the thigh. Stirrup straps should be unbuckled and the stirrups and straps entirely removed from the saddle.

e. In riding without stirrups the rider seeks, by sitting his horse correctly, by relaxing all unnecessary tension of muscles throughout the body, and by following pliantly the rhythm of the horse's motion, to relieve his body from constraint and shock. To do this the rider keeps his thighs in their correct position and does not extend them downward so as to ride on his crotch; he keeps his lower legs snugly in place behind the girth, without stiffening the knee or ankle joints; he sits deep in the middle of the saddle, with his buttocks well underneath his body; and he inclines the upper part of his body slightly backward in order to insure relaxation and pliancy in the region of the loins. The abdominal muscles should not be loose and flabby; they should be "tucked up" so as to draw in the waist at the abdomen and thus assist in retaining the outward curve of the spine. The muscles of the arms and shoulders should be without constraint but should not become so loose as to detract from an appearance of form in the upper body. The upper body should be held easily and gracefully erect, the shoulders square, the chest well out, the neck well postured, the head up, and the eyes glancing well to the front.

58. To pass from the front to the rear of the column.—*a.* Being on the track in column of troopers, at the walk, the

instructor commands: 1. *First trooper from front to rear,* 2. *MARCH, 2 NEXT.* At the first command the leading rider gathers his horse. At the command, *march,* he leaves the column by the right or left about, according to whether he is marching to the right or left hand, moves parallel to the column, and enters it again at the rear by another about. The riders in succession execute the same movement at the command *next,* which is repeated by the instructor until all the troopers have passed from front to rear.

b. The instructor may vary this exercise; for example, he may cause the first rider, at the command, *march,* to move straight forward at the increased gait and, passing entirely around the circuit of the track, rejoin the column at the rear.

59. Increasing and decreasing the pace.—*a.* Exercises in increasing and decreasing the pace are valuable for the following reasons:

(1) They afford excellent practice in the use of the aids.

(2) They teach the rider how to control the speed of his horse so that he can keep his horse in proper position with reference to other riders.

(3) They improve the balance and discipline of the horse, thus increasing the comfort of the rider.

b. In executing the following exercises the instructor emphasizes the importance of a secure seat, steadiness of legs, a sense of balance or accord between rider and horse, and tactful use of the aids. The riders will experience their greatest difficulty in attempting to slow up horses which seek continually to increase the pace. In such cases the timely employment of vibrations of the right snaffle rein or of divisions of support will forestall many resistances of the horse.

(1) Being at the walk, to cause the horse to walk faster, the rider increases the pressure of his legs and inclines his weight slightly forward. As the horse extends his neck and head the rider, without allowing the reins to become slack, increases the length of the reins. The hands are kept low and steady.

(2) Being at a fast walk, to cause the horse to walk slower, the rider increases the tension in the reins and inclines the weight slightly to the rear. The hands are kept low and steady. Care must be taken not to draw in the horse's head and neck too much, as such action usually causes the horse to fret, jig, and prance. With nervous horses the increased tension on the reins

must be applied very gently and no stronger than is absolutely necessary.

(3) Being at the regulation trot, to cause the horse to trot faster, the rider applies the same aids as in subparagraph (1) above.

(4) Being at the trot, to cause the horse to trot slower, the rider applies the same aids as in (2) above. In executing this movement, if for any reason the rider desires more collection in his horse, this collection is secured by increasing the pressure of the legs.

(5) Being at the regulation gallop, to cause the horse to gallop faster, the rider applies the same aids as in subparagraph (1) above.

(6) Being at the gallop, to cause the horse to gallop slower, the rider uses the same aids as prescribed in subparagraph (4) above. If the horse is galloping at or near full speed and it is desired to bring him down to the regulation gallop quickly, this can generally be accomplished most easily by suddenly depriving the horse of the steady support of the reins and using the reins and the weight thereafter intermittently and in combination.

60. To move backward.—*a.* The command is: 1. *Backward*, 2. *MARCH*, 3. *HALT*. At the command *Backward* the rider gathers his horse. At the command *March* the rider uses the direct reins of opposition and the weight in combination until the horse takes one or two steps backward, after which the rider ceases to use his weight and continues to use the reins of opposition to cause the horse to continue to back. If the horse backs too fast or lowers his croup too much the rider's weight is carried slightly forward to counteract this tendency. At the command *Halt* the action of the reins of opposition ceases, the weight is carried forward, and the legs are used sufficiently to stop the backward movement. In training, the halt should always be immediately followed by two or three steps forward.

b. Backing, like the turn on the forehand, may cause the horse to "get behind the bit"; it may also cause serious injuries to the hocks. Therefore, its use should be limited to strict necessity; that is, for the satisfactory instruction of the soldier and the horse. Thereafter the horse is backed only when necessary.

61. To ride at will.—*a.* The instructor commands: 1. At the walk (trot or gallop), 2. *RIDE AT WILL.* The riders scatter out in the interior of the riding hall, or over a designated area if out of doors, ride at the gait ordered, and execute on their own initiative such movements and exercises as the instructor specifies. When riders meet each keeps to the right.

b. Horses and men alike seek companionship; they prefer to move in a body and do not like to act alone. Although both require collective training, they need far more to be taught to go ahead as individuals. Riding without regard to distances should be the rule both indoors and outdoors during instruction in equitation, and riding with *fixed distances* should be the *exception.*

62. Suppling exercises.—*a.* The mounted suppling exercises, like all physical-culture exercises, depend for their good results upon the regularity and thoroughness with which they are practiced daily. Thus, long hours or intensity of application on one day do not compensate for the lack of practice on previous days. Furthermore, to produce the best results these exercises must be performed correctly, for, if performed incorrectly, they may serve only to confirm existing faults. Hence it is highly important that the instructor and the recruit alike have well in mind the object in view in each instance. Accordingly, in taking up a new exercise, the instructor gathers the class about him and briefly explains and illustrates the exercise. He then causes them, at the halt, to practice accurately the exercise just explained. When understood by the riders and systematically applied by the instructor the suppling exercises produce quick results. They may be executed either with or without stirrups.

b. The gaits employed during the suppling exercises should be the walk, the slow trot, and the gallop. The gallop should be employed very early in the instruction and used chiefly thereafter, because it is the most favorable gait for suppling the rider's loins. The gallop can be maintained for long periods without undue fatigue. The slow trot, on the contrary, is not only trying to inexperienced riders but, if prolonged, may cause such abrasions of the skin and soreness of the muscles as to retard rather than promote progress. There should, nevertheless, be much work at the slow trot, but for short periods only.

c. The instructor causes the riders to take the track without regard to distance; if they march to the right hand they hold

the reins in the left hand; if to the left hand they hold the reins in the right hand. Thereafter they take the reins in one or both hands, drop and retake them as necessary, without command.

d. Occasionally, as a temporary measure, the instructor may cause the riders to knot the reins and release them entirely. Habitually, however, the reins should be held while doing the suppling exercises; the rider is then cultivating a good hand in conjunction with a good seat. Moreover, the instructor is then able to point out instances illustrating the effect produced upon the bridle hand by the stiffness and bobbing of the body due to a poor seat.

e. While practicing an exercise the recruit should pay great attention to the position and steadiness of the bridle hand and the suppleness of the wrist, elbow, and shoulders. He should endeavor to coordinate and to separate his movements; thus, while moving or using one part of the body, he should neither unconsciously nor nervously contract the muscles in an unrelated part of the body nor move the bridle hand.

f. The recruits being suitably disposed on the track at the gait ordered, the instructor places himself near to and facing the track and gives the command for the desired suppling exercises. At the instructor's command, *AS YOU WERE*, each rider discontinues the exercise. The exercises are not performed in unison.

g. The instructor in his observations and criticisms confines his attention chiefly to the riders passing in front of him. Those riders who are beyond the view of the instructor are then enabled, with less self-consciousness, to recover their equilibrium and to adopt corrective measures.

h. The instructor should give his commands, observations, and criticisms in such a manner as to be easily heard and understood, but he should avoid shouting or scolding. When prolonged or special explanations are necessary the rider in question should be required to fall out of the column and report to the instructor. If several riders are involved, the instructor should assemble the whole column in order that all may profit from his instructions.

i. The suppling exercises have for their object the attainment of strength, pliancy, and easy control in the parts of the body most affected in riding. These are the neck, shoulders, loins, hip joints, knees, and ankles.

j. The following exercises are employed:

(1) *To supple the neck.—a.* The object of neck exercises is to combat rigidity of position due to the contraction of muscles in the region of the neck.

(*b*) The instructor commands: *ROTATE THE NECK.* Each rider slowly turns the head and eyes as far as possible—first, to the right; then, without pause, to the left. The exercise thus continues until the instructor commands: *AS YOU WERE,* whereupon each rider ceases the exercise and resumes the initial position.

(*c*) The instructor commands: *FLEX THE NECK.* Each rider slowly carries the head as far as possible upward and backwards and then, without pause, as far as possible forward and downward. The exercise is thus continued until the instructor commands: *AS YOU WERE.*

(2) *To supple the shoulders.*—(*a*) The object of the shoulder exercises is to combat rigidity of position due to contraction of the muscles in the region of the shoulders and to cultivate coordination of muscular effort.

(*b*) The instructor commands: *ROTATE THE RIGHT (LEFT) ARM VERTICALLY.* Each rider extends the arm straight upward, wrist and hand relaxed; without pause, he then carries the arm to the rear, downward, forward, and upward in such a manner as to describe, with uniform movement, a vertical circle. The exercise is thus continued until the instructor commands: *AS YOU WERE,* whereupon each rider ceases the exercises and resumes the initial position.

(3) *To supple the loins.—a.* The object of the following exercises is to give the rider practice in rotating and flexing the body in the region of the loins. The movements should be executed in such a manner as gradually to bring about the desired result—suppleness.

(*b*) The instructor commands: *SWING THE RIGHT (LEFT) ARM FROM FRONT TO REAR, HORIZONTALLY.* Each rider extends the arm straight to the front, fingers extended, palms upward. He then, without pause and by rotating the body in the region of the loins, swings the shoulders and arm to the right, the arm moving in a horizontal plane until the hand is over the horse's croup, the eyes following the hand. Each rider thus continues the exercise, swinging the shoulders and arm in horizontal plane, by rotating the body at the waist, until the instructor commands: *AS YOU WERE.*

(*c*) The instructor commands: *STROKE THE HORSE ON THE RIGHT (LEFT) SHOULDER WITH THE RIGHT (LEFT) HAND.* Each rider, by flexing the body at the waist, leans slightly forward and downward and gently strokes the horse on the shoulder until the instructor commands: *AS YOU WERE.*

(*d*) The instructor commands: *STROKE THE HORSE ON THE LEFT (RIGHT) SHOULDER—WITH THE RIGHT (LEFT) HAND.* Each rider, by rotating the body in the region of the loins, carries the hand over the reins and downward to a position opposite the designated shoulder of the horse. He then gently strokes that shoulder until the instructor commands: *AS YOU WERE.*

(*e*) The instructor commands: *STROKE THE HORSE ON THE LEFT (RIGHT) SHOULDER AND THE RIGHT (LEFT) HAUNCH WITH THE RIGHT HAND.* Each rider, in the same manner as in preceding exercises, strokes the horse on the designated shoulder with the designated hand and then, without pause, while rotating the body in the region of the loins, turns the shoulders and arm to the right (left) rear, the eyes following the hand, and strokes the horse on the designated haunch. He thus continues the exercise, alternately stroking the horse on the shoulder and haunch, until the instructor commands: *AS YOU WERE.*

(*f*) The instructor commands: *SWING LOW TO THE FRONT WITH THE RIGHT (LEFT) HAND.* Each rider extends the arm vertically upward, palm to the front, leans to the right (left) and downward by flexing the body at the waist, and makes a low sweeping stroke from the rear to the front; he then resumes the initial position of the body, the arm extended vertically upward. With a slight pause, he thus continues the exercise until the instructor commands: *AS YOU WERE.*

(*g*) The instructor commands: *RAISE THE THIGHS.* Each rider, inclining the upper part of the body slightly backward, raises the thighs only so much as is necessary to detach them and the lower legs from contact with the saddle. The rider thus balances on the buttocks, which should be pushed well underneath the body. This exercise requires the rider to flex the body at the loins in order to follow the motion of the horse and to minimize the effect of the shock. Riders should not be required to maintain this position continuously; they take and retake it, according to their ability to do so without falling.

The exercise ceases at the instructor's command: *AS YOU WERE.*

(4) *To supple the hip joints.*—(*a*) The object of the following exercises is to supple the muscles in the region of the hips and flatten the inner thigh surfaces of the rider's legs.

(*b*) The instructor commands: *ROTATE THE RIGHT (LEFT) THIGH.* Each rider removes the thigh from against the saddle, straightens the leg and carries it back until vertical. He then rotates the thigh at the hip joint by turning the knee inward, and, pressing the thigh hard against the saddle, draws it forward to its normal position. The friction of the thigh against the saddle presses backward the muscles underneath and back of the thigh, thus permitting the femur to rest solidly against the saddle. The lower leg is replaced in its normal position. The foot should hang naturally, without constraint. No attempt should be made to turn the foot either outward or inward. Its position in this respect is dependent upon, and a natural consequence of, the flatness of the inner surfaces of the thigh and the degree of its rotation inward.

(*c*) This exercise should habitually be given at the halt; if executed while the horse is in motion serious injury may occur in the region of the hip joint. The riders, being at the halt, the instructor directs them to rotate the right thigh and carefully fix it in position; next, similarly, the left thigh. He then causes he riders to take the walk, the slow trot, or the gallop, during which they should try to confirm the new position. After a few moments, however, the riders become shaken out of the exact positions assumed. The instructor then brings them to the halt, directs them to again rotate one thigh, then the other, and to fix their position, after which he causes them again to move forward.

(5) *To supple the knees.*—(*a*) The object of the following exercises is to render the knee joints supple, combat the involuntary contractions to which the knee joints are liable, and cultivate the coordination of muscular effort.

(*b*) The instructor commands: *FLEX THE RIGHT (LEFT) KNEE.* Each rider, removing the lower leg from against the horse, carries it backward and upward until horizontal and then, without pause, returns it to the normal position. The exercise is thus continued until the instructor commands: *AS YOU WERE.*

(6) *To supple the ankles.*—(*a*) The object of the following exercises is to assist the rider in overcoming involuntary contraction and stiffness in the ankle joints, in lowering the heels properly when riding with stirrups, in retaining the stirrups by the easy flexibility of the ankle joints, and in overcoming the tendency to stand stiffly in the stirrups.

(*b*) The instructor commands: *ROTATE THE RIGHT (LEFT) FOOT.* Each rider traces with the toe, by a slow and uniform movement, a circle in a vertical plane perpendicular to the horse. In tracing the circle the rider's toe first moves toward the horse. The exercise is thus continued until the instructor commands: *AS YOU WERE.*

(*c*) The instructor commands: *FLEX THE RIGHT (LEFT) ANKLE.* Each rider slowly flexes the ankle by raising the toes upward as far as possible and then, without pause, extending them downward as far as possible. The exercise is thus continued until the instructor commands: *AS YOU WERE.*

63. Jumping obstacles.—*a. General considerations.*—(1) The jumping of obstacles is the best exercise for developing a good seat. If the obstacles are low, so that they can be passed over while the rider is at the same time engaged in some phase of the suppling exercises, progress in the acquisition of a good, close seat is very rapid. Also, if the instructor conducts such exercises daily for even a few minutes the rider soon acquires good form in riding, his position on horseback becoming correct, easy, and graceful. As the rider's seat becomes more secure his hands become lighter and his use of the reins, the weight, and the legs more accurate and effective. Secure in his seat and confident of his ability to control his horse, the rider becomes more aggressive on horseback. He rides boldly up and down hills, over banks and bluffs, and jumps ditches and other small obstacles, whereas the inexperienced rider looking upon such obstacles as insuperable or too dangerous, hesitates, stops, and loses time in seeking a way around.

(2) Instruction and practice in jumping obstacles is divided into two phases. The first phase, called the *gymnastics of jump,* has for its object the cultivation in the rider of suppleness of body, security of seat, ease and grace of position, and freedom from nervous contractions of the muscles due to apprehension. The object of the second phase, called *conducting the horse to the obstacle, over it, and beyond it,* is to teach the rider the cor-

rect use of the aids in the management of the horse. From the beginning the instructor should, in general, devote equal attention to each of these phases. He should be careful to graduate the difficulties involved according to the proficiency and progress of the riders.

b. The gymnastics of the jump.—(1) This is an exercise which should be conducted in the same general manner as are the *suppling exercises*, except that now, as an additional feature, low obstacles are placed across the track. At first the instructor causes one bar to be placed on the track; later he places another bar 10 feet from the first; still later he raises the second bar about 18 inches from the ground. If all goes well, in due time he raises the first bar; then he puts down a third bar, and finally a fourth. He does not do all this the first day. Instead, he graduates the difficulties thus created according to the progress of the riders, always remembering not to make demands too suddenly, and to avoid, if possible, falls and accidents. Eventually, he adds variety to the work by putting the obstacles at unusual places, as, for instance, near a corner, or at irregular intervals along the track. The obstacles having been placed on the track in the manner above indicated, the riders are required to take the track without regard to distance; first, at the walk, later at the slow trot, and eventually at the gallop. To maintain the speed of a slow gait without shortening the reins, lifting the hands, or pulling on the reins as the horse approaches the obstacle is in itself a most valuable exercise. The riders, during their continuous circuit of the track, execute such suppling exercises as are indicated from time to time by the instructor. They hold the reins, which should be long, in the hand next to the wall of the riding ring. Each rider should endeavor to maintain the speed of the gait ordered without exciting his horse to resistance. If a rider is unable to maintain the speed of the gait without crowding unduly upon the rider in front of him he should turn out and, by proceeding straight across the hall, take a vacant place in the column.

(2) The extent to which a rider is able to display indifference to the presence of obstacles is an indication of the extent to which he is able to control his nervous reactions and apprehensions, and to the extent to which he is able to carry on with the suppling exercises without flinching, pausing in his movements, or contracting his muscles as his horse approaches and takes

an obstacle, is a measure of the extent to which he is able to coordinate and regulate his movements. For example, when the riders are executing such an exercise as rotating the arm vertically one may suddenly discontinue the exercise as he approaches a jump; another may grip the fingers of the hand; a third may become rigid in the elbow or the shoulders; while still a fourth may stop rotating the arm altogether and hold the hand high in the air as his horse takes the jump, and then, without realizing it, rotate his arm very swiftly to make up for lost time. All riders may thus display some form of nervous contraction of the muscles and each in a different part of the body for a different reason and to a varying degree. If both the effect and the remedy for it are pointed out to the riders they will become greatly interested, and if the instructor conducts the exercises with regularity and system each rider soon solves and conquers his own personal difficulty.

(3) Prior to executing the above-described exercise the horses should be "warmed up" by brisk work.

(4) Provided the horse is in good hard condition, it is no undue hardship for him to keep up the gallop for a period of 15 or 20 minutes and to continue jumping in succession three or four low obstacles placed at intervals around the track of the riding hall. The horses under these circumstances soon overcome any tendency to rush the jumps, and gradually acquire the habit of jumping while taking the obstacles in his galloping stride. Having great freedom of action, he acquires handiness. By the long periods at the gallop his general condition is improved, and by the mild gymnastics involved in thus leaping low obstacles his so-called jumping muscles are developed and strengthened. The rider, meanwhile, having only to guide or restrain his horse so as to retain his place in the column, can abandon himself completely to the motion of the horse and thus acquire ease and flexibility.

c. Conducting the horse to the obstacle, over it, and beyond it.—(1) Just prior to starting work in this phase of jumping both horses and riders are "warmed up." While calling out individuals to jump the instructor makes it a point to keep the others moving and practicing suppling exercises.

(2) For the purpose of teaching the beginner the correct manner of conducting the horse to the obstacle, over it, and beyond it, the instructor should erect in the center of the riding

hall a long obstacle of moderate height. In the beginning this obstacle should be merely a bar laid on the ground, its height being gradually increased until it has reached toward the end of the course a height of 3 feet.

(3) High jumps are as a rule taken at a gallop of moderate speed and broad jumps at an extended gallop. For broad jumps *it is important that the speed be increased as the obstacle is approached.*

(4) Throughout the instruction in jumping the instructor should impress upon the riders the following points:

(*a*) Preparatory to approaching a jump, the rider should sit deep in the saddle, adjust the reins, and gather the horse. Being well seated at the outset, if the horse bounds suddenly forward, the rider will not lose his balance and have to lurch forward to regain it. Moreover, he will be more at his ease, more secure in the saddle, and more efficient in his use of the aids. The reins being correctly adjusted, there should, ordinarily, be no occasion thereafter to shorten or lengthen them or to let them slide. By means of the forward inclination of the body and the opening of the angles formed by his shoulders, elbows, and wrists, the rider can usually give the horse any additional rein that he may require. The horse being properly gathered, he will be more readily set in motion and the more easily controlled. The fingers should never be clamped on the reins; they should be closed, but without contraction.

(*b*) In approaching the obstacle it is essential that the rider proceed steadily toward a previously selected point of it, that he ride at the gait prescribed, and that he keep his shoulders leading the points of his hips. He should ride easily, using the legs with just sufficient energy to insure the vigorous forward movement of the horse, and keeping the hands low and steady.

(*c*) Should it become necessary in guiding the horse to use either the leading or bearing rein, the action of the rein should be without traction to the rear. This last point is very important. To produce an effect of traction to the rear is restraint; this is likely to cause the horse to move faster and to pull.

(*d*) If the horse needs to be restrained in order to preserve the speed of the gait prescribed the rider should discreetly apply the reins of opposition and the weight in combination. In this case he must avoid "getting behind" his horse. This

condition occurs when the rider allows his weight to be displaced so far to the rear that the thrust of the horse in making the jump pulls rather than pushes the rider's weight over the obstacle. The rider should exert the exact measure of restraint necessary to slow up the horse and no more; to use his strength excessively and roughly merely excites the horse and provokes resistance. As a rule the only resistance the horse makes is to fight the bit and increase the speed, both of which may be avoided if the rider has a firm seat in the saddle and exercises tact in the use of the aids.

(*e*) Should the horse hesitate as he approaches the obstacle, the rider should use the legs with just sufficient force to preserve the proper gait. If the horse stops in front of the obstacle or runs out and avoids it the rider should gather him sharply and then quiet him, but without seeming to reward him. He should ride back to a point about 10 yards from the obstacle and again approach it, exercising great care to prevent the horse from making the same or still another resistance.

(*f*) If upon approaching the obstacle the horse gets out of hand, goes too fast, or bolts, the rider in his use of the aids must be sure to give the horse his head before he actually jumps. Such a horse should be turned back to jumping very low obstacles or bars laid on the ground until he becomes calm and manageable.

(*g*) A horse should give his attention exclusively to the obstacle and to the ground over which he approaches it. His head and neck should be free and his ears pointing forward. No action or movement of the rider should disconcert the horse, cause him to lose confidence, or direct his attention backward. A horse is quick to detect a spirit of hesitancy and indecision upon the part of the rider and is likely to take advantage of this condition by either running out or refusing. The rider, therefore, should cultivate and display a spirit that is quiet, easy, confident, and bold; this greatly calms the horse, steadies his gait, and assures his best performance in jumping.

(*h*) On arriving near the obstacle the rider should slightly increase the pressure of the lower legs, knees, and thighs; relaxing at the waist, he should settle down into the middle of the saddle. He should keep the upper part of the body slightly forward and the hands low and steady.

(*i*) If the rider's body is inclined forward with waist relaxed the upward bound of the horse with the resulting upward move-

ment of the rider's seat causes the body to bend more at the waist and to appear to dip toward the horse's neck. As the horse descends on the far side of the obstacle the rider's seat descends also, with the result that the rider's body is again nearly upright. This should be accomplished without the rider's seat hitting the seat with a bump. The descent of the rider's seat, as the horse alights, is controlled by the rider *slowly decreasing* the angle formed by his thigh with his lower leg, this angle having previously been increased as his body went forward and his seat upward. The gradual decrease of this angle and the continued forward inclination of the upper part of the body avoids the shock of the rider's weight being received in the saddle as the horse alights. Thus, the actions and postures of the rider's upper body during the jump are automatic rather than premeditated and deliberate. As a result the tightness of the seat, the flexibility of the waist, and the freedom and ease with which the shoulders and arms are carried cause the rider unconsciously to adjust himself not only to the normal motion of the horse but also to any sudden and unexpected reactions due to an exceptional effort or accident.

(*j*) After the first stride on the far side of the obstacle the rider's body should again assume the normal position. He should be deep in the saddle, his legs correctly placed, and his hands low and steady. The degree of forward inclination of the rider's body is now dependent on the pace at which he is riding. The shoulders should be square, the chest out, the head erect, and the eyes glancing forward. In a word, the rider should be ready for the next obstacle or the next thing that may happen; he should in no way be at a disadvantage as regards his position or his ability to make effective use of his aids. If the reins are long enough and taut at the outset they will be long enough during the jump to give ample freedom to the horse for using his neck as a balance without in any way hurting his mouth; after the jump, too, they will be still at the proper length for controlling the horse and will at the same time afford him liberty to use his strength in the next effort.

(*k*) The rider should let the reins slide through the fingers whenever necessary to avoid injuring the horse's mouth or interfering with his action in jumping. This is necessary when the rider gets "behind his horse." Also, when a horse makes a bad fault it is advisable to give him his head and let him take care of himself.

(*l*) The horse having jumped the obstacle, the rider should neither hesitate, slow up, nor turn and look back. He should, instead, ride steadily onward at the gait at which he approached the obstacle.

(*m*) It is very important to impress upon riders that if several are jumping at the same obstacle each should jump that section directly in his own front and thereafter continue in his original direction. It is both disconcerting and dangerous for one rider to change direction at the last moment and jump a section selected by another. Nor should one rider jump directly in the trace of another unless at a considerable distance in rear.

d. Common errors to be guarded against in jumping.—The following is a list of the common errors of riders when jumping and the causes thereof:

ERROR	CAUSES
Getting behind the horse on the approach, or at the take-off, or both.	Rider not ready to go with his horse, or rider's weight is too far to the rear.
Falling on the horse's neck on landing, and occasionally when the horse places himself for the take-off.	Rider's legs too loose.
Hitting the horse in the mouth with the bit.	Rider behind his horse, and fails at the take-off to relax hands to permit reins to slide through fingers as needed. Rider's hands not relaxed when horse jumps.
Toes down and heels up	Improperly adjusted stirrups, or improper manner of closing legs on horse, usually the latter.
Looking down over shoulder on either side.	Mental and physical tenseness.
Looking back at jump	Mental and physical tenseness.
Losing stirrup	Rider behind horse, loss of balance forward or to one side, or improper method of supporting the weight of the body or of closing legs on the horse.
Repeated refusals	Failure or inability to use legs properly, or improper presentation of horse to the jump.
Unsteady hands	Insecure seat, mental and physical tenseness, or lack of muscular coordination.
Repeated run-outs	Failure or inability to use the aids properly, or improper presentation of horse to jump.
Floating reins on approach or take-off	Unsteady position of body.

64. Marching under field conditions.—At the end of the second period the instructor will take the recruits on a short practice march of approximately 5 miles length. For this march the recruits will be fully armed and equipped and the saddle packed as for field service. During this march the recruits will be carefully instructed in the following:

a. March discipline.

b. Proper rate of speed at the walk and the trot.

c. The use and value of leading.

d. The correct adjustment of saddle and equipment prior to the start of the march and during regular halt periods.

e. Watering.

SECTION IV

THIRD PERIOD (THIRD AND FOURTH WEEKS)

65. Program of daily instruction.—*a.* During the third period the horses are equipped with bit and bridoon and the men habitually wear spurs.

b. When time is available two lessons per day are advisable, each lesson being of approximately one and one-half hours duration. When time for two daily lessons is not available the work may be covered by one lesson per day of *not less* than two hours duration, exclusive of the time required to care for animals and equipment.

c. The men ride without stirrups during the first 15 minues of each day's instruction, using the snaffle bit alone. The curb reins are knotted and dropped on the horse's neck. This first half hour is devoted entirely to those exercises which tend to improve and confirm the seat, namely, the suppling exercises and the gymnastics of the jump. During the remainder of each day's instruction the men habitually ride with stirrups.

d. While the men are riding with stirrups the instructor gives close attention to the difficulties encountered by them. For example, many men are unable to retain their stirrups; others stand in their stirrups; others ride with their stirrups too long, thus cultivating a "forked seat"; others ride with their stirrups too short, thus lifting themselves out of the saddle, tiring their leg muscles, and riding in the rear part of the saddle seat. The stirrups should be of such length as to cause the lower leg to extend downward and backward and to rest comfortably and snugly against the side of the horse, leaving the knee and ankle flexible and the heel lower than the toe.

e. During this period of instruction the instructor will continue to use the exercises prescribed for the preceding two periods. In addition he will use the following exercises for advancing the training of the men in equitation.

66. The mechanism of the various gaits.—*a.* The instructor will briefly explain and illustrate by use of a horse the mechanism of the following gaits:

(1) The *walk* is marked by four beats. The feet are raised successively and planted in the order in which raised; for example, right fore, left hind, left fore, right hind.

(2) The *trot* is marked by two beats and a period of suspension. The horse springs from one diagonally disposed pair of feet to the other; between the beats all the feet are in the air. The right fore and the left hind are together called the right diagonal pair; the left fore and right hind, the left diagonal pair.

(3) The *gallop* is marked by three beats and a period of suspension. Thus, for example, if the horse is galloping with the right lead, the first beat is marked by the left hind foot, the second by the nearly simultaneous placing of the right hind and the left fore, and the third beat by the placing of the right fore. If the horse be galloping with the left lead, the beats are right hind, left hind and right fore, left fore.

(*a*) A horse is said to gallop with the *right lead* when the right fore is planted in front of the left fore and the right hind in front of the left hind. When the feet are planted in the inverse order the horse is said to gallop with the *left lead*.

(*b*) A horse gallops *true* when he gallops with the right lead in turning to the right and with the left lead in turning to the left. He gallops *false* when he gallops with the left lead in turning to the right, or conversely.

(*c*) A horse is *disunited* when he gallops with the right lead with his fore feet and with the left lead with his hind feet, or conversely.

b. The recruits, when at the gallop, need not concern themselves as to whether their mounts are galloping true or false; they should not, however, permit their horses to gallop disunited.

c. When a horse becomes disunited in his gallop the rider should bring him to the trot and then put him back into the gallop.

d. During riding-hall work the instructor should not insist that all the horses gallop true. Thus, when galloping on the track, if a few horses are seen to gallop false it is of no consequence. The instructor should bear in mind that the false gallop, occasionally used, is a beneficial exercise for the horse, causing him to acquire a handiness and sense of balance in making changes of direction that is most useful in drill, combat exercises, and cross-country riding.

e. The gallop departs are not taken up until the last period (fifth). Prior to teaching the gallop departs, should the instructor desire that the recruit take the gallop with a certain lead, the right, for example, he directs the recruit to ride his horse at the trot from the inside of the riding-hall ring, perpendicularly towards the track. Upon arrival at the track the recruit turns his horse sharply to the right, applies both legs with vigor, and forces the horse into the gallop. Another method of accomplishing the same result is for the recruit to take the trot on a circle to the right hand and then urge his horse into the gallop.

f. Occasionally, when the riders are at the gallop, the instructor will question them as to whether their own and other designated horses have the right or left lead.

67. The speed of the various gaits.—*a.* In the military service it is essential for the rider to maintain certain rates of speed when at the walk, trot, and gallop.

b. The rate of the walk is 4 miles per hour, or 117 yards per minute. At the command 1. *Forward*, 2. *MARCH*, the regulation walk of 4 miles per hour is taken and scrupulously maintained unless otherwise specially directed.

c. The rate of the trot is 8 miles per hour, or 235 yards per minute. At the command 1. *Trot*, 2. *MARCH*, the regulation trot of 8 miles per hour is taken and scrupulously maintained unless otherwise specially directed. For the purpose of individual instruction in equitation the rate of trot may, at command, be reduced to 6 miles per hour. The command is: 1. *Slow trot*, 2. *MARCH*. When at the *slow trot* the rider should sit down in the saddle; when at the *Trot*, he should rise to the trot.

d. The *maneuvering gallop* is at the rate of 12 miles per hour, or 352 yards per minute. It is called the regulation gallop. At the command 1. *Gallop*, 2. *MARCH*, the maneuvering gallop is taken and held unless otherwise specially directed.

e. The *extended gallop* is at the rate of 16 miles per hour, or 469 yards per minute. It is taken at the command 1. *Extended gallop*, 2. *MARCH*.

f. The *canter* is at the rate of 8 miles per hour. It is used on occasion in connection with the instruction of recruits in riding and in the training of horses. It is taken at the command 1. *Canter*, 2. *MARCH*.

68. Gaiting.—*a.* Throughout instruction in equitation the instructor will avail himself of every favorable opportunity to impress upon the men the importance of knowing and maintaining the proper rates of speed at the various gaits. In this connection the example set by the instructor, especially when leading the men across country, will have a strong influence in the right direction. Of all the gaits it is of special importance that the men know the 8-mile-per-hour trot.

b. The instructor will have a gaiting course of 1 mile length marked off and frequently practice the men individually over this course at the regulation walk, trot, and gallop. Occasionally selected individuals may be required to lead the squads to which they belong through the gaiting course at a prescribed gait, the instructor and his assistants keeping time and noting errors.

69. To leave ranks.—*a.* The instructor causes the recruits to form line and then calls upon them individually to ride their horses out of ranks. As each man's name is called he rides his horse out of ranks to a point or locality designated by the instructor.

b. In case a rider's horse resists leaving ranks the rider takes the reins in both hands, gathers his horse, inclines his weight slightly forward, applies the right leading rein and the right leg so as to cause the horse to move forward and to the right oblique. When the horse has taken two or three steps forward and to the right oblique the rider changes the aids to the left leading rein and left leg so as to cause the horse to move to the left front. Continuing the above-described process, the rider causes the horse to move on a zigzag course towards the designated point or locality.

c. In riding a difficult horse out of ranks it is essential that the rider not permit the reins to become slack when inclining his body forward. Also, when using the leading rein on one side the rider must not permit the opposite rein to become slack. The reins are kept taut and the horse up on the bit.

70. Practicing, individually, the charge at full speed.—*a.* In the case of recruits assigned to the Cavalry the instructor prepares the troopers to participate in the charge in line. This is accomplished by practicing the troopers in galloping, individually and at full speed, over a distance of 60 to 75 yards.

b. In charging, the trooper bends his body forward and pushes his feet home in the stirrups. He gives his horse his head, if necessary, a touch of the spur, and holds him in the direction indicated.

c. Having charged the distance prescribed by the instructor, the trooper reduces the speed progressively that is, he brings his horse to the regulation gallop, then to the trot, then to the walk. To reduce the speed abruptly is unnecessary and inadvisable during instruction. It may be practiced later on when the trooper is sufficiently proficient in the use of the aids to stop suddenly without injuring the mouth or spoiling the temper of his horse.

d. In order not to fatigue the horses by repeated charges, the individual charge should be practiced only a few times during any one instruction period. It should always be executed on a track or piece of ground especially adapted to this work; that is, open, level ground where the footing is neither too hard nor too soft.

71. Object of riding-hall exercises.—The object of the purely riding-hall exercises prescribed in this period and succeeding periods is to afford the rider frequent opportunity to apply the principles previously stated. It is evident, therefore, that these riding-hall exercises are merely the means to an end. The end to be obtained is that the rider shall be able to control his horse out of doors, alone or in ranks, and under both favorable and unfavorable conditions.

72. To march on a circle.—The riders being on the track, at the command *ON A CIRCLE*, the designated leader, followed by the other riders, rides on a circle between the two tracks. At the command *TAKE THE TRACK* the leader takes the track to the hand toward which he is marching and is followed by the other riders.

73. Work by threes.—*a.* The riders being on the track with 4 feet distance from head to croup, as the head of the column passes across an end of the riding hall the instructor commands: 1. *By threes by the right (or left) flank*, 2. *MARCH.* At the command *March* the first three riders at the head of column execute by the *right flank* and proceed straight down the length of the hall. They are followed by each successive three in the column, who turn to the flank on the same ground. In each three the center rider is the guide. The center rider of the leading three is also the guide of the squad, the guides in rear

regulating upon him. Upon arrival at the opposite end of the hall the leading three take the track to the hand to which they were marching before the movement began.

b. The movement is continuous until the instructor commands: *TAKE THE TRACK.*

c. When the riders are disposed by threes in the riding hall the instructor should cause them to halt, to move forward, to change gaits, to turn to the right flank, and to execute the right or left about. Each rider, in addition to executing all movements correctly, should be required to preserve his place, checkerboard fashion, with reference to his comrades. Thus the conditions of the exercise demand of the trooper increased alertness combined with an effective use of the aids.

74. Cross-country riding.—The instruction in cross-country riding prescribed in section 2 for the first and second periods is continued during the third period. However, the trot and gallop will be used more frequently during the third period and the route selected may be over ground affording steeper slopes. Natural obstacles such as heavy brush, woods, small ditches, and streams may be crossed, but fences, hurdles, and all other artificial obstacles are avoided.

75. Marching under field conditions.—At the end of the third period the instructor takes the recruits on a practice march similar to that prescribed for the second period, except that the distance is increased to approximately 15 miles.

SECTION V

FOURTH PERIOD (FIFTH AND SIXTH WEEKS)

76. Program of daily instruction.—*a.* During the fourth period the horses are equipped with bit and bridoon and the men habitually wear spurs.

b. When time is available two lessons per day are advisable, each lesson being of approximately one and one-half hours duration. When time for two daily lessons is not available the work may be covered by one lesson per day of *not less* than two hours duration, exclusive of the time required to care for animals and equipment.

c. The men ride without stirrups during the first 15 minutes of each day's instruction, using the snaffle bit alone, the curb bit hanging loose. The first half hour is devoted entirely to

those exercises which tend to improve and confirm the seat, namely, the suppling exercises and the gymnastics of the jump. During the remainder of each day's instruction the men habitually ride with stirrups.

d. The primary objective of the instruction during the fourth period is to constantly improve the seat of the rider and his use of the aids. To accomplish this task the instructor utilizes all the exercises of preceding periods in addition to the following exercises.

77. Broken lines.—*a.* The broken-line exercise consists of departures from and returns to the long side of the hall by successive obliques. The riders being on the track without regard to distance, at the walk, trot, or gallop, the command is: *BROKEN LINES, ONCE (TWICE, OR THREE TIMES) IN THE LENGTH OF THE RIDING HALL.* As each trooper enters the long side he leaves the track by an oblique and, having marched the proper distance, returns to the track by another oblique. This is repeated the number of times specified; at the other end of the long side he retakes the track.

b. This exercise in the riding hall has for its object to teach the rider how to make rapid changes of direction when out of doors.

78. Serpentines.—*a.* The serpentine consists of successive abouts executed by the rider directing his horse on a sinuous course. The command is: *SERPENTINE.* Being on the track without regard to distance, at the walk or slow trot, as each rider reaches the middle of the short side designated by the instructor he leaves the track and follows by a continuous succession of abouts, a serpentine course to the far end of the riding hall. Upon reaching the opposite end of the riding hall each rider takes the track to the same hand as that on which he marched before the movement began.

b. Riders should execute broken lines and serpentines as individuals; they should not follow closely in the trace of the man in front. The riders being thus disposed *without regard to distance,* each turn is made by the horse in exact obedience to the aids as applied by the rider.

79. Circling individually.—*a.* The riders being on the track without regard to distance, at the walk, slow trot, or canter, at the command *Individual circle to the right (or left),* each rider gathers his horse. At the command *March,* each rider describes a complete circle tangent to the track and retakes the

track at the point where he left it. The radius of the circle should be 2 yards at the walk, 4 yards at the slow trot, and 6 yards at the canter.

b. Each rider, without reference to any other rider, rides his horse with great exactness on the circle. He should endeavor to use the aids correctly in maintaining the speed and in controlling the direction of his horse.

80. The half turn.—*a.* The half turn consists of an about followed by an oblique.

b. Being on the track to the right (or left) hand, at the walk, slow trot, or canter, at the command *Half turn* each rider gathers his horse. At the command *March* each rider executes a right about and then by the right oblique regains the track. The about should be made on the arc of a circle whose radius is 2 yards at the walk, 4 yards at the slow trot, and 6 yards at the canter. At the moment the horse starts the right about the rider increases the action of the left leg and left bearing rein, thus causing the horse to turn slightly on the haunches.

c. This movement being a turn slightly on the haunches, should be much practiced, first at the walk and slow trot and later at the canter. This exercise is of especial value when executed at a collected canter because it teaches the rider how to turn quickly to the right (or left) about at the gallop out of doors.

81. The figure of 8.—*a.* The riders being on the track without regard to distance, at the walk, trot, or gallop, at the command *Individual figures of 8* each rider gathers his horse. At the command *March* each rider directs his horse on such a course as to describe a figure of 8, the figure being perpendicular to the track and its lower loop tangent to the track.

b. In the beginning the figure of 8 described by each rider should be of large dimensions. Later, as the riders become more skillful in the use of the aids, the dimensions of the figure are gradually reduced until finally all arcs are described on a radius of 2 yards at the walk, 4 yards at the trot, and 6 yards at the gallop.

82. Dimensions of artificial obstacles.—*a.* Obstacles for jumping are of two classes:

(1) *Broad jumps* are those which require a leap of breadth only, such as ditches, water jumps, etc.

(2) *High jumps* are those which require a leap in height, such as hedges, fences, walls, etc.

b. The dimensions of obstacles are increased in proportion to the progress of the riders; very moderate at first, they should be limited eventually to 8 feet for broad jumps and 3 feet for high jumps. Artificial obstacles should have sufficient width of front to prevent the horses from avoiding them easily.

83. Cross-country riding.—*a.* The instruction in cross-country riding is continued in the same spirit throughout the remainder of the course. New routes across country should be sought of a nature to add to the rider's difficulties, thus presenting to him tests gradually increasing in interest and severity. Artificial obstacles from 3 to 5 feet in width or from 1½ to 2½ feet in height should be provided so as to be encountered conveniently enroute.

b. Horses should not be tempted to sudden refusals, thereby bringing about unnecessary falls and accidents among the riders. Accordingly, all artificial obstacles should be quite long—the longer the better. Moreover, to horses and men alike, a long obstacle seems low, a short obstacle high.

c. Obstacles encountered should be approached calmly; that is, there should be entire freedom from undue spurts of speed, rushing, or pulling. The riding is not good if the horses are excited and if the riders have to resort to harsh and undue feats of strength in order to hold them down to the gait prescribed. Such exhibitions show poor management upon the part of the instructor, indicating that he has neglected to practice the men sufficiently at the slower gaits or has increased too quickly the height of the obstacles.

d. A new feature—that of moving across country by bounds from cover to cover—is introduced at this time. Each squad is organized as a patrol and directed to proceed at a certain rate over a specified route across country. While so moving the squads are directed to take advantage of all available cover from assumed hostile aerial and ground observation.

84. Marching and field conditions.—Toward the end of the fourth period the recruits are taken on a practice march similar to that prescribed for the second period, except that the distance marched will be approximately 20 miles. This march and all subsequent marches should be conducted under an assumed war situation, requiring the recruits to be organized as a large

patrol, as the support of an advance guard, a rear guard, flank guard, etc.

SECTION VI

FIFTH PERIOD (SEVENTH AND EIGHTH WEEKS)

85. Program of daily instruction.—*a.* During this period the men and horses are equipped the same as for the preceding instruction period.

b. When time is available, two lessons per day are advisable, each lesson being of approximately one and one-half hours duration. When time for two daily lessons is not available, the work may be covered by one lesson per day of *not less* than two hours duration, exclusive of the time required to care for animals and equipment.

c. During this period the instructor will utilize the exercises employed in the four preceding periods and, in addition, will use the following exercises:

86. To passage to the right or left when at the halt.—*a.* The purpose of this exercise is to teach the recruit how to close his horse to the right or left when in ranks at the halt.

b. The instructor causes the recruits to form line, with approximately 2 yards interval between horses. He then commands: 1. *Passage to right* (*left*), 2. *MARCH.* At the preparatory command each man gathers his horse. At the command of execution each man causes his horse to move to the right (left) without gaining distance to the front. To effect this movement the soldier employs the left (right) bearing rein and the left (right) leg. Any tendency of the horse to move forward is checked by increasing the tension on the reins. The rider demands only a few steps by the horse in the desired direction before relaxing the aids and stroking the horse on the neck. The exercise is repeated until the instructor commands *HALT.*

c. The instructor gives only so much practice in this exercise as is necessary to enable the recruits to align their horses when in ranks at the halt.

87. The gallop departs.—*a.* The recruit should, by the end of his course in equitation, know how to make his horse take the gallop *from the trot* with either lead desired.

b. The horse being at a slow trot on a circle or *at the end* of a turn, to cause the horse to take the gallop with the right

lead the rider employs the right bearing rein just in front of the withers and the left rein of opposition. At the same time the rider inclines his weight slightly to the left rear, applies the left leg vigorously at the rear edge of the girth, the right leg vigorously on the girth, and pushes the horse into the gallop. At the moment the horse springs into the gallop the rider inclines his weight forward in order to assist the horse.

c. The effect of the right bearing rein is to weight the horse's left foreleg and induce him to extend or advance the right foreleg. When applied lightly this rein also causes the horse to bend his head at the poll slightly to the right, thus enabling him to see the ground on which he is to move.

d. The effect of the left rein of opposition is to support the action of the right bearing rein, restrain the left foreleg, and prevent the horse's neck from bending to the right.

e. The effect of shifting the rider's weight to the left rear is to weight and thereby restrain the forward movement of the left hind leg and at the same time free the right foreleg for movement to the front.

f. The effect of the rider's left leg, due to its position, is more powerful than the effect of his right leg, causing the haunches of the horse to be moved slightly to the right. The action of the rider's right leg prevents the horse from shifting his haunches too far to the right. The vigorous action of both of the rider's legs provides the necessary impulse to cause the horse to take the gallop.

g. The gallop with the left lead is secured in a similar manner by converse application of the aids.

h. The change of lead while *at the gallop* is a very difficult exercise and is, furthermore, of no practical utility to the mounted soldier in ranks. For the two reasons just stated, this exercise will *not* be practiced.

88. The about on the haunches.—*a.* The about on the haunches *at the halt* is of no utility and should not be practiced. In executing this movement it should be borne in mind that the faster the horse is moving the more be engages his haunches under him in order to slow up and make the turn.

b. By utilizing the about, circling individually, the half turn, and the figure of eight exercises at the walk, the trot, and the canter the rider is progressively prepared for executing the about on the haunches. In executing the above-mentioned pre-

paratory exercises the rider is given much practice in making the turns involved, now with the horse held straight on the curve, now with his haunches held slightly to the inside of the curve. In addition to these preparatory exercises the rider is practiced in coming to a halt from the walk, the trot, and the canter.

c. The rider is next practiced in combining the halt and turn into one exercise—the about on the haunches. This exercise is practiced first at the walk, next at the trot, and finally at the gallop. In executing this exercise the rider moves on a straight course, at the gait indicated, until he arrives at a point previously designated by the instructor. Here he executes a right (or left) about on an arc the radius of which is as short as he can make it. The rider uses his legs well back and low in order to secure his seat solidly in the saddle. He applies the reins of opposition and the weight in combination in order to slow up his horse and then uses the left bearing rein, the weight, and the left leg in order to whirl his horse to the right-about on the haunches. Having completed the about, the rider returns to the starting point at the indicated gait. The left-about on the haunches is executed in a similar manner, employing the right bearing rein, the weight, and the right leg in making the turn. In practicing this exercise the rider turns to the right-about if his horse is leading right and to the left-about if his horse is leading left.

d. In executing the about on the haunches the instructor emphasizes the importance of calmness and obedience on the part of the horse. Exactness of step or posture are not so important as swiftness and brilliancy of action. When properly executed this movement finds ready and useful application at drill and in individual mounted combat.

89. Swimming horses.—*a.* The men who can not swim are first taught how to swim. When this has been accomplished the men are given individual instruction and practice in swimming their horses. In case time is not available for teaching those men who can not swim how to swim, only those men who can swim are given instruction and practice in swimming with their horses.

b. Prior to swimming his horse the soldier removes all the equipment from his mount except the halter, the bridle headstall, the snaffle bit, and the snaffle reins. He then ties a knot

in the reins so that when the knot rests in front of the withers the reins will not sag down and become entangled in the horse's front feet. As a further precaution the throatlatch is unbuckled, brought around underneath the reins and again loosely secured.

c. The rider now mounts his horse and, preceded by an experienced soldier, if available, rides his horse into the stream. When the horse gets into deep water the rider slips off his back on the *downstream* side and holds on to the horse by grasping his neck just in front of the withers with the nearest hand. The rider lies flat in the water near the surface and guides his horse by splashing water against his head or by pulling *very gently* on the bridle rein with the hand farthest away from the horse. In so using the rein the rider grasps it near the bit and uses it entirely as a leading rein, being careful not to exert any rearward pressure. Any backward pull on the rein is liable to cause the horse to throw up his head and turn over backward. The rider releases the rein the moment it has served its purpose.

d. If the current is strong the rider heads his horse at an angle of about 45° against it to avoid being carried too far downstream.

e. In case of difficulty the soldier releases his hold on the horse's neck and grasps hold of the tail. Under no circumstances must the soldier grab his horse about the head or attempt to sustain himself by the reins.

90. Marching under field conditions.—Toward the end of this period the recruits are taken on a practice march smilar to that prescribed for the fourth period, except that the distance covered should be approximately 25 miles.

91. Supplementary references.—T. R. 50—45, Instruction, Mounted, Without Arms.

CHAPTER 2

TRAINING REMOUNTS

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SECTION I

GENERAL PROVISIONS

92. Object.—*a.* The object is to develop, in a minimum time, the condition and training of the remounts to the degree necessary to fit them for field service in the ranks of the troop.

b. A good troop horse is one that is sound and of good conformation, in good condition for hard work, tranquil, pleasant to ride and easy to manage, a moderately good jumper, unafraid of water and a good swimmer, and accustomed to the use of arms and the sound of firing.

93. The physical fitness of remounts.—At the beginning of their training remounts are not in good physical condition. They are not accustomed to hard work and their muscles, tendons, joints, and vital organs (heart and lungs) are weak. Accordingly, the remounts' bodies are susceptible to painful injuries if the work demanded of them is beyond their reasonable physical powers. Therefore, the daily work imposed upon remounts should tend to be long in point of time but very mild in character. It is out of doors, in the open air and sunshine, that the young horse is conditioned. Long periods at the walk, very short periods at the trot, and shorter and less frequent periods at the gallop expand the lungs, strengthen the heart, and build up the muscles of the young horse.

94. Qualities of an officer in charge of remounts.—It is essential that the officer in charge of the training of remounts be a skilled and experienced horseman.

95. Cautions to officers in charge of training remounts.—*a.* Progress should be suited to the age, quality, and condition of the remounts. The officer in charge of training should be constantly on the alert to make sure that the training in each step of the course is thorough before proceeding to a more advanced step.

b. The training of the remounts should be conducted without hurry. Intensity and nervousness upon the part of the officer in charge is promptly transmitted through the riders to the remounts and reacts most unfavorably upon their dispositions.

c. There should be frequent rests. As training progresses the distinction between standing and moving *at ease* or *route order* and standing or moving when at *attention* should be sharply drawn. Horses should be kept moving during rests if they are very hot or the weather is unfavorable. During rests the men should habitually be required to look their horses over carefully, examine their feet, and readjust the saddles.

d. Throughout the course of training for remounts the officer in charge should bear in mind the following precepts:

(1) *Be systematic.*—Prepare a program for each day's work. Make sure that the exercises included in the program are in proper relation to the work of previous days.

(2) *Be patient.*—Do not demand too much. Ask a little, but ask it often.

(3) *Be tactful.*—Take advantage of the most favorable conditions for teaching the horses a new lesson. Undertake nothing new when the horse is "high," excited, or frightened.

(4) *Be moderate.*—Begin with the simplest movements and when these are understood proceed to those movements or exercises which are slightly more difficult.

(5) *Be observant.*—The resistance of the horse is frequently due to ill-fitting bits or saddlery, to a poor rider, to lack of condition, or approaching unsoundness.

(6) *Be exacting.*—Do not be content with the perfunctory execution of riding-hall exercises. Make certain that the riders understand the purpose of each exercise and then require them to be precise in their use of the aids on the remounts. Before taking the first step of an exercise require that the horse be placed in a position to facilitate the easy and natural execution of the exercise.

(7) *Be logical.*—Do not confuse the means by which an end is obtained with the end itself. Thus, do not use riding-hall ex-

ercises as a proof of training nor drill movements as a means of training.

(8) *Be liberal.*—Permit the riders to ride part of the time at will. In general, work conducted on the track should be without fixed distances between riders.

(9) *Be tenacious.*—Never provoke a struggle that can properly be avoided. If, however, a serious resistance is encountered the rider must persist until resistance is overcome.

(10) *Be practical.*—Throughout the course of training keep in mind the fundamental requirements of ordinary marches, maneuvers, and field service. Exclude from the training program any exercises as do not contribute directly toward the preparation of the remounts for such duty.

96. The organization of remounts into suitable groups.—Not less than 8 nor more than 32 remounts should be trained by one instructor at one time. The remounts are organized into squads and are thus accustomed to simple military formations and evolutions while being trained.

97. The selection of riders.—*a.* For the training of remounts those men should be selected who have a liking and an aptitude for the management of animals and who, in addition, have received a thorough course of instruction in riding.

b. In case inexperienced riders are used in the training of remounts the officer in charge will have to carry on the instruction of the men in conjunction with the training of the horses. Under such conditions the remounts will not be so well trained at the end of the course as would be the case were they ridden by experienced riders. Nevertheless, if the officer in charge makes a judicious combination of the subject matter of this chapter and that of chapter 1, Equitation, the training of both the men and the horses may be brought to a very satisfactory conclusion.

c. In the assignment of riders to horses some adjustment will be necessary during the first few days in order to place certain types of horses in the charge of men who appear best able to manage them. As soon as practicable, however, all assignments should be made permanent.

98. Care of the horses.—*a.* The officer in charge of the training of remounts should pay scrupulous attention to the cleanliness of the stables, stalls, and mangers, and to the general sanitation of the immediate surroundings. Remounts are very sus-

ceptible to colds, fevers, and other ailments which if not guarded against will seriously interrupt if not wholly interfere with the training. He should, in addition, by daily inspections, keep himself thoroughly informed as to the kind and supply of forage, its preparation, the amount fed, and the frequency of feeding. (See ch. 3, Use and Care of Animals.)

b. During work the officer in charge must be watchful of the speed and duration of the various gaits, lest an overtaxing of the strength of young horses results in a loss of condition. In the early lessons, especially when out of doors, the officer in charge should designate as group leaders those men who are riding the oldest and gentlest remounts. No great attempt should be made to conform to the regulation speed at the walk, the trot, or the gallop until all the remounts have attained a fair degree of condition. Thereafter the regulation speed of the various gaits should be maintained.

c. As rapidly as possible the remounts should be shod, beginning with the quietest ones first. The officer in charge should exercise close supervision of the shoeing to make sure it is properly done and that this work is accomplished in a quiet, gentle manner.

99. Attention to the fitting of bits and saddles.—*a.* There is nothing more injurious to the temper of a horse or that more interferes with the achievement of satisfactory results in his training than ill-fitting and uncomfortable bitting and saddlery. Accordingly, from the beginning to the end of the course of training the proper fitting of bits and saddles should receive systematic attention. (See ch. 3, Use and Care of Animals.)

b. In fitting the snaffle bit in the remount's mouth it is very important to prevent the horse's tongue from getting over the bit. Therefore the cheek pieces of the bridle should be carefully adjusted in length so that the snaffle bit lightly wrinkles the corners of the horse's mouth.

100. Duration of a course of training for remounts.—*a.* The training given remounts may be classified under three headings, viz, conditioning or physical upbuilding, training proper or "schooling," and the preservation of the tranquility or good disposition of the horse. The time required to accomplish the training of remounts under each of the above headings is subject to wide variations, due to such factors as the season of the year; the age, quality, and condition of the remounts; the facilities available; such as riding halls, terrain for cross-country

riding, jumping pens, etc., the quality of the riders; and the amount of time available each day for the work. Except in an emergency three or four months can be profitably employed in the training of an average lot of remounts before assigning them to troop duty. For horses under 5 years of age a longer training period is desirable.

b. The *conditioning* of the remount *requires more time than does the other training.* No matter how great the rider's skill, the physical development of the horse is mainly subject to the laws of nature. *Increased work* is not a substitute for *time* in building up the horse physically.

c. Due to a sudden war emergency, it may be necessary to prepare remounts for field service in a shorter period of time than three or four months. The training outlined in this chapter is based upon the existence of such an emergency, and it must be clearly understood that the condition of the remounts at the conclusion of such brief training will not attain the standard desirable for field service. Horses so trained must necessarily receive a large share of their conditioning after assignment to troop units. In particular the weight-carrying muscles of such horses must be carefully strengthened and hardened. This may be accomplished by requiring a large amount of leading in the early stages of campaign, and a very gradual increase, from day to day, in the time the rider's weight is allowed to be on the horse's back. Unless the necessity for gradual building up the strength of the horse's back is clearly understood and suitable care exercised a large per cent of the new horses will be quickly incapacitated for further service.

d. In conducting the training of remounts under the conditions specified in the preceding subparagraph the officer in charge may find it advisable and even necessary to segregate the animals of poorer quality and substance and have their training proceed with greater deliberation.

101. Division of training into periods.—The course of training herein prescribed covers two weeks in time, divided into two periods of a week each. A supplementary period of two weeks is also provided for use when more time is available.

102. Weekly inspection of the horses.—In addition to his attention to the appearance of the horses while at work and at "stables" the officer in charge of the training of remounts should inspect each horse in a formal manner once a week. He should have each rider lead out his mount, the latter equipped

with the snaffle bridle and without saddle. He should then question the rider and discuss with him the condition of the horse. The two together should minutely inspect the teeth, the eyes, nostrils, feet, legs, coats, and should note the state of health of the horse as exhibited by his appearance generally. They should glance at blemishes and closely observe for any indication of approaching diseases or lameness.

103. Periodic inspection by the commanding officer.—At the end of the second period the commanding officer should inspect the remounts and should test the results accomplished as to their conditioning and training. In his tests he should confine himself strictly to the subject matter of the approved program of instruction.

SECTION II

FIRST PERIOD (FIRST WEEK)

104. Conditioning.—*a.* Too much time should not be spent in work in the riding hall because such work dulls the sensibilities of the remounts and they lose that alertness of manner and vigor in action which it is the aim of conditioning to cultivate. It is desirable that the steady upbuilding of their strength by exercise out of doors keep pace with or a little ahead of the exercises and movements required in the riding hall. Generally not more than 45 minutes should be given to riding-hall work at one time.

b. Condition of remounts is based upon a great amount of walking in proportion to the time spent at the trot or gallop. During the first three days' work the walk only should be used while riding the remounts. Thereafter short periods at the trot and gallop may be interposed with long periods at the walk.

c. It is highly important that the rate of the walk be regulated on the speed of the slowest horses, so as to avoid causing the slower horses to fret and fidget. In returning to the stables it is desirable to follow a different route from that used in going away from the stables. The remounts should be brought back to the stables dry and cool.

105. Objective of each day's work.—In general terms, the object of each day's training should be as follows:

First day.—To saddle each remount; to teach each remount to be led about by the rider on foot.

Second day.—To mount each remount; to teach each remount to move forward at the walk with the rider on his back.

Third day.—To improve and confirm the training given on the first two days; to teach the remounts to move forward freely at the walk and to halt and again move forward; to teach the remounts to turn to the right and left.

Fourth day.—To improve and confirm the training given during the first three days; to teach the remounts to take the trot from the walk and to return to the walk.

Fifth day.—To improve and confirm the training given during the first four days; to teach the remounts to turn about to the right and to the left.

Sixth day.—To improve and confirm the training given during the preceding five days; to teach the remounts to take the gallop from the trot and to return to the trot; to teach the remounts to individually leave the group of horses and rejoin; to accustom the remounts to carrying the saber and having it drawn and returned and handled by the rider when mounted.

106. Program of daily training.—*a.* When local conditions permit, the gentling and conditioning of the remounts should be started while they are still in quarantine and before starting on their training as herein prescribed. During quarantine all healthy remounts should be exercised by herding them around an oval-shaped track inside one of the corrals. An hour of this exercise in the morning and another in the afternoon will materially improve the condition of the remounts and do much toward making them gentle. In addition each horse should be thoroughly groomed once each day, preferably at a feeding time.

b. After release from quarantine the remounts should receive two training lessons per day, one in the morning and the other in the afternoon, each lesson of about two hours' duration.

c. After each lesson the remounts are thoroughly groomed. During grooming the feet are picked up and the bottom of the feet tapped with the currycomb or a stone in order to prepare the remounts for their first shoeing ordeal.

d. The first 30 minutes of each lesson should generally be used for exercising the remounts by herding them around on the exercise track. The next 45 minutes of each lesson should generally be conducted in a riding hall. Any time remaining should be used in riding the remounts across country or on the

roads. The term *riding hall* refers to any inclosed or uninclosed rectangle out of doors similar in arrangement to a riding hall.

e. In riding across country or on the roads the remounts are frequently practiced in close and extended order drill formations.

f. The men ride without spurs and carry a riding whip or switch. The remounts are equipped with snaffle bridles.

g. The exercises which follow, in the order in which listed, constitute the subject matter from which the officer in charge should make up his program of daily training.

107. To exercise the remounts.—*a.* The remounts are exercised by herding them around an oval-shaped track which has been fenced on both sides. To construct this track any available corral or riding pen of suitable size may be used for the outer fence. Only an inner fence about 4 feet high need then be built. The width of the track should be about 10 feet. A gate should be provided in both fences. A mounted soldier, or two dismounted soldiers, equipped with driving whips, are employed to keep the remounts on the move while being exercised.

b. To accustom the remounts to the sight of pistol targets and saber heads several of each are placed along the track fence where they can be plainly seen by the horses.

c. To accustom the remounts to the sound of firing one soldier is detailed to fire the service pistol in the immediate vicinity of the exercise pen while the remounts are being exercised. The firing point is gradually moved nearer to the track on each succeeding day of the training.

d. As soon as the remounts can be saddled they are required to carry the saddle during all exercise work on the herding track. Each day added equipment is placed on the saddle until by the end of the first week's training all the remounts are carrying full-pack field equipment. Articles of equipment are added in the following order: Saddlebags, saber scabbard, rifle boot, shelter half roll, slicker, grain bag, and canteen.

e. Beginning with the first day's work on the exercise track, two or three logs (about 1 foot in diameter) are placed on the ground across the track and at convenient intervals apart. After the remounts have passed over these logs a dozen times, first at the walk and later at the trot, the logs are removed. Thereafter, on each succeeding day, the height of the logs is gradually increased until by the end of the first week the remounts have been practiced in jumping over obstacles 2 feet high.

108. To put on the saddle.—For the first lesson in saddling and thereafter, until the remount submits quietly to saddling, the following procedure is observed:

a. Starting with the first day, all remounts that can be quietly handled are saddled.

b. Before being saddled the remounts are thoroughly exercised by herding on the exercise track.

c. In saddling, the riders work in pairs and the remount to be saddled is led off the track to the inside of the pen. Here the snaffle bridle is put on, care being taken to have the length of the cheek pieces such that the snaffle bit *just wrinkles* the corners of the horse's mouth.

d. The assistant stands squarely in front of the remount, grasping the bridle reins about 6 inches from the bit with the right hand. With his free hand the assistant strokes the remount's head and neck and uses assuring tones of voice to keep him calm. The rider now approaches the remount from the left front, with the saddle blanket folded and resting on his right arm; he runs his left hand along the horse's crest and withers, strokes him on the shoulder and back, and places the blanket quietly in place. The rider next places the saddle on the horse's back in the same manner as described for the blanket. If necessary, the assistant holds the blanket in place until the saddle is placed on it. The girth is adjusted comfortably; it is not drawn tight. If the remount is quite nervous the stirrups are removed from the saddle before attempting to saddle him.

e. The remount is then led about for a few minutes and the saddle pressed and handled. As soon as the horse is quiet the bridle is removed and the remount turned loose on the exercise track. The pair of riders now saddle another remount, following the same procedure as outlined above.

109. To stand to horse, lead out, and line up (in the riding hall).—*a.* The remounts having become accustomed to the weight of the saddle, the pressure of the girth, and the movement of the swinging stirrups, they are now ready for further training in being handled by the rider on foot. For this purpose each rider takes the position of *Stand to horse* and leads his remount up and down at the walk. The riders are next required, while leading their remounts, to *Line up* (*in the riding hall*), each rider at *Stand to horse* with his horse properly disposed. The first lesson should cease at this point and the men directed to *fall out* and lead their remounts to the stable.

b. The second lesson of the first day should be a repetition of the first lesson, except that saddlebags and saber scabbard are attached to the saddle after the remount has been saddled. The second lesson of the first day should terminate in the same manner as the first lesson, i. e., with the riders leading the remounts about dismounted.

c. In order to avoid accidents due to kicking, the instructor should caution the riders to be very careful while leading the remounts about.

110. To mount and dismount.—*a.* On the second day the remounts are ready to be mounted. They are first exercised on the herding track, then saddled, and again returned to the herding track for more exercise, carrying the saddle, saddlebags, saber scabbard, and rifle boot. After a thorough workout on the herding track the officer in charge designates three or four remounts at a time to be brought off the track to the inside of the pen. In designating which remounts should be brought out for mounting the officer in charge selects the quietest remounts first.

b. The remounts selected for mounting are first bridled with snaffle-bit bridles, which are carefully adjusted and examined prior to proceeding with the mounting lessons. The saddles are also stripped of all equipment. Each man should now be able to mount his horse without great difficulty, provided patience and gentleness are exercised.

c. The officer in charge designates four or five of the most experienced men on his training detail to assist the riders in mounting their remounts for the first time. An assistant stands in front of the remount, grasping the bridle reins with the right hand about 6 inches from the bit. By his firm, gentle manner and soothing tones of voice the assistant attracts the attention of the remount and keeps him quiet. The rider, meantime, approaches the horse from the left front, runs his left hand along the horse's crest and withers, and with his right hand strokes the horse's shoulders, back, and haunches. He places his left hand on the horse's neck just in front of the withers, extends his right arm across the middle of the saddle, and presses down upon the saddle. He next lowers and raises the near stirrup and twists the strap face outward. He then takes the reins in the left hand and places this hand on the horse's neck just in front of the withers, puts the left foot in the stirrup

without touching the horse's side with his toe, places his right hand upon the cantle of the saddle, and raises slightly on the stirrup by an effort of the right leg, the left knee bent and pressed against the saddle. If the remount does not move the rider mounts without hurry, but without hesitation, and sits down lightly in the saddle.

d. If the horse moves when the rider starts to mount the assistant takes hold of the cheek pieces of the bridle and, by caressing the horse, induces him to stand still. The assistant must not pull on the reins; to do so may cause the horse to rear and fall over backward. The rider should not mount the horse until he stands still again; he should, instead, remove the foot from the stirrup and his right hand from the cantle and, staying near the horse's left shoulder, follow his movements forward, backward, or sideward until he eventually stands still. The rider then renews his efforts to mount.

e. After sitting down lightly in the saddle the rider puts his right foot in the stirrup, assisted habitually by the right hand. He then holds the reins lightly in the left hand and strokes the horse on the crest and shoulders with the object of causing him to relax and stand still.

f. As soon as the horse is relaxed and reasonably calm the assistant takes the position of *Stand to horse*, but with his right hand holding the cheek piece, and causes the horse to move forward and change direction to the left. The horse is more easily moved forward if he is swung to the left at the same time. After thus moving a few steps the horse should be halted and petted; then the forward movement and turn to the left is repeated. The assistant then leads the horse for a considerable distance in a straight line before halting and petting him. When the horse leads freely and is relaxed and quiet the rider dismounts.

g. In dismounting it is very important that the horse be not frightened. Accordingly, assisted by the dismounted rider, the rider dismounts quietly and carefully, endeavoring always to cause the horse to stand perfectly still.

h. If a horse is very difficulty to mount the rider should not be permitted to resort to violent methods; such a horse should be returned to the exercise track and also given more dismounted leading and gentling before he is mounted.

i. (1) The first lesson of the second day's work should now be terminated by requiring the remounts to be led about dis-

mounted for a few minutes and then lined up preparatory to falling out and returning to the stables.

(2) The second lesson of the second day's work should be a repetition of the above lesson, except that the riders, after mounting, remain a little longer in the saddle and cause the remount to move farther *forward on straight lines* than was required during the first lesson. The assistant still remains near the head of the remount and renders the rider any necessary assistance. The remount is not allowed to move out of the walk while being led about.

111. The use of the aids during the first period.—*a.* During the first period the use of the aids should be confined to three well-defined actions, which, in turn, should produce three simple effects. These actions and effects are:

(1) Action of the legs to cause the horse to move forward, to increase the pace, or to change to a faster gait.

(2) Action of the reins to cause the horse to change to a slower gait, to decrease the pace, or to halt.

(3) Action of the leading rein to cause the horse to change direction or to turn to the right or left about.

b. Once the remount is in motion, the reins should be used solely to maintain the direction and to regulate the speed of the gait; no attempt should be made to set the horse's head and neck in position or to relax the jaw or poll.

c. The remount should not be halted abruptly; to slow up or halt, the rider should use the reins of opposition intermittently until the horse obeys. In slowing up or halting the remount the rider's legs should not be used.

d. All changes of direction should be made on the arc of a large circle without insisting on exact correctness or accuracy of movement. In turning, the leading rein should be used exclusively; the opposite rein should be used as a light bearing rein to support the leading rein.

112. To teach the remount to submit to guidance and control.—*a.* Prior to requiring the following movements from the remount while being ridden outside the riding hall the movements listed below should be first taught the remount in the riding hall:

(1) To move forward; to halt.

(2) To turn to the right flank and to the left flank.

(3) To pass from the walk to the trot and from the trot to the walk.

(4) To turn to the right-about and to the left-about.

(5) To pass from the trot to the gallop and from the gallop to the trot.

b. To teach the remounts the above movements the officer in charge should, in general, be guided by the following procedure:

(1) The riders take the track at the walk, in rear of the man riding the most manageable remount, and without regard to distances. By appropriate commands the riders are required to halt, move forward again at the walk, halt, and so on repeatedly.

(2) The riders, still moving at the walk are next required to turn out of the column individually (when called by name) and halt on the median line of the riding hall; then move forward and regain a place in the column.

(3) The riders are next required to pass from the walk to the trot and from the trot to the walk repeatedly.

(4) Next the riders are required to execute the about by tracing in column the course of a wide serpentine, first at the walk, then at the trot.

(5) The riders are next required to pass from the trot to the gallop and from the gallop to the trot repeatedly.

(6) Lastly, the riders being on the track at the walk, they are required, individually, to pass from the front to the rear of the column; first, turning out of the column; and next, taking the trot and moving on the track to the tail of the column, where they again take the walk.

c. During the work outlined above there should be frequent short rests during which the rider dismounts and gentles his remount by petting, rubbing his legs, picking up his feet, etc. The remount is habitually required to stand still while the rider mounts and dismounts.

SECTION III

SECOND PERIOD (SECOND WEEK)

113. Conditioning.—*a.* Conditioning is continued along the same general lines as during the first week. (See par. *104*, Sec. II.) The object is to fit the remount for field service. This service imposes two major requirements upon the horse: First, that he be able to march long distances, day after day, at a rate of 4 or 5 miles per hour; second, that he be able to carry,

while marching, the weight of the rider and his equipment, totaling approximately 250 pounds.

b. (1) To be fit for marching the horse must have three essentials: First, he must have good feet; second, he must have good legs; and, finally, he must be in good flesh, i. e., he must have plenty of flesh and this flesh must be fairly solid.

(2) Good feet result from close attention to the shoeing and trimming of the feet, their frequent inspection each day, and the maintenance of clean, level standings. (See ch. 3, Use and Care of Animals.)

(3) Good legs are secured by avoiding fast work, particularly on hard or uneven ground. Many remounts are prone to interfere, especially while becoming accustomed to carrying weight. During this period it is quite important to watch for signs of interference on the horse's legs and protect the injured places by proper bandaging.

(4) For the remounts good flesh is secured and retained by long, daily periods of slow work. During this work *the walk* is the gait principally used. In addition to long periods of slow work it is important to give close attention to the feeding, watering, grooming, and bedding. Some remounts will stay fat while being worked on 6 pounds of grain per day. Others under the same work will lose flesh while being fed the full ration. Every effort should be made to build up the flesh of the thin remounts by increasing their grain and hay ration, by providing them with plenty of good drinking water, and by increasing the number of grain feeds per day.

c. To fit the remount for carrying his heavy load in the field it is necessary that the flesh and skin of his back be seasoned and toughened to withstand heavy pressure, heat, and sweat. In addition the back muscles must be developed and strengthened for their weight-carrying job. To accomplish the above results it is essential that the remount receive the major portion of his training while carrying rider and full field equipment.

114. Objective of each day's work.—*a.* In general terms, the object of each day's training during the second period should be as follows:

First day.—To accustom the remount to the curb bit; to accustom the remount to the pistol and saber being drawn, returned, and handled by the rider while moving at the walk; to improve the handiness of the remount while changing gaits

and executing turns when moving at the walk and trot; to teach the remount to respond to the bearing rein; to teach the remount to obey the combined aids; to accustom the remount to carrying the rider over obstacles 1 foot high at the walk and trot.

Second day.—To improve and confirm the training given on the first day.

Third day.—To accustom the remount to the pistol and saber being drawn, returned, and handled (including pointing of the pistol and thrusts of the saber) while moving at the trot; to improve the handiness of the remount while changing gaits and executing turns at the trot and the gallop; to accustom the remount to carrying the rider over obstacles 1½ feet high at the trot; to teach the remount to eat from the feed bag; to teach the remount to lead when linked in column of fours.

Fourth day.—To improve the training of the remount in having the pistol and saber handled when moving at the trot; to improve the handiness of the remount while changing gaits and executing turns at the trot and the gallop; to accustom the remount to carrying the rider over obstacles 2 feet high at the trot; to improve the training of the remount in leading linked in column of fours.

Fifth day.—To accustom the remount to the pistol and saber being handled and used while moving at the gallop on the prescribed pistol and saber courses; to improve the handiness of the remount in executing all movements at the walk, trot, and gallop; to accustom the remount to carrying the rider at the gallop over obstacles 2 feet high.

Sixth day.—Review of all previous training.

115. Program of daily training.—*a.* During the second week the use of the herding track is discontinued except for practicing the remounts in jumping.

b. The remounts should receive two training lessons per day, one in the morning and the other in the afternoon. The length of each lesson period should be about two hours. In general, the first 45 minutes of each lesson should be used for riding-hall instruction. Any remaining time should be spent in riding on the road, cross-country riding, or drill.

c. After each lesson the remounts are thoroughly groomed and their feet handled.

d. While riding across country or on the road the remounts are frequently practiced in close and extended order drill for-

mations. While riding across country the formations assumed should generally be such that each remount is well separated from the others. Thus the remounts are accustomed to going freely in any direction when alone.

e. While engaged in riding-hall work the men should generally be required to ride without fixed distances.

f. The men ride with spurs except when jumping. The remounts are equipped with bit and bridoon bridles and carry full pack field equipment.

g. Each day's training should generally include a thorough review of all previous training prior to taking up any new exercises.

h. The exercises which follow constitute the subject matter from which the officer in charge should make up his program of daily training.

116. To accustom the remount to the packsaddle and to submit to conditions of field service.—*a.* During the first week of training the remounts are gradually accustomed to the presence on their backs of the various items of full-pack field equipment. During the second week of training the remounts should be required to carry this equipment during all their work in order that the weight-carrying muscles of their backs may become stronger and the skin and flesh of their backs may become somewhat seasoned to the pressure, friction, heat, and sweat caused by the full packsaddle.

b. During marches across country and on the road the riders should be frequently required to dismount and lead. The horses should be trained to lead forward at a brisk walk at the rate of approximately 4 miles per hour. Those remounts that are inclined to lag back should be urged to walk faster by means of light touches on the hind quarters from a switch carried in the rider's left hand. Some practice should also be given over low obstacles and ditches.

c. In order that the remounts may become accustomed to eating their grain from the feed bag, they should be fed once a day for two or three days in this manner. Care and patience must be used in first putting on the bags so as to avoid frightening the horses.

d. While marching in any formation the remounts should be accustomed to leaving ranks. This training may be accomplished by directing individual riders to leave the formation, ride to a designated place, and then rejoin.

117. To accustom the remounts to arms.—*a.* During the second week the pistol and saber should be drawn by the rider while mounted and these weapons handled at the various gaits.

b. To accustom the remounts to the pistol being handled, the men first practice drawing, pointing, and returning the pistol while riding at the various gaits; next the remounts are ridden quietly on the mounted pistol course while the riders simulate fire on the targets; finally the horses are ridden on the mounted pistol course while the riders fire a few shots to the right and left.

c. To accustom the remounts to the saber being handled, the men ride the horses at a walk past the dummies on the saber course, executing slow, quiet thrusts. When the remounts become accustomed to this exercise similar practice is given at the trot and the gallop.

118. To train the remount to submit more willingly and easily to guidance and control.—*a.* During the second period the training prescribed for the first period (paragraph 112, To teach the remount to submit to guidance) should be continued so as to increase the handiness and willingness of the remount while executing forward movements, halts, changes of gait, and changes of direction. Through much practice of these exercises the horse gradually learns to engage his haunches properly, develops and strengthens his muscles, and acquires a correct carriage of his head and neck. In this manner the horse slowly acquires a true balance free from bad habits and unnatural posture.

b. All training in starting, stopping, and turning should follow a gradual and well-ordered progression; carried to excess, such training may injure the horse's joints or tendons and destroy his tranquillity.

c. The basis of all training outlined in this paragraph is *freedom* in the *forward* movement.

119. Accustoming the remount to the effect of the bit and bridoon.—During the first few days' work with the curb bit and snaffle it is better to go chiefly out of doors. Any work indoors should be mild in character, nothing of an exacting nature being demanded of the horse until he has fully accepted and goes well into the bit and bridoon. There is now great danger that the young horse may "get behind the bit." This must be most carefully guarded against by the officer in charge

and by each rider. In all exercises and work the reins should be held lightly taut and quite long, a lighter pressure on the curb than on the snaffle. The horse should be encouraged, by tactful use of the legs, to extend his head and neck to the front and to maintain against the bit a steady pressure. During periods of rest, whether standing still or while moving, the reins should not be held taut; they should be allowed to swing loose, thus according the horse full liberty to relax.

120. Manner of applying the aids.—*a.* During the second period the rider should begin to use the aids in combination on the remount.

b. To start the horse, to change to a faster gait, or to increase the speed of a gait the legs and weight should be used in combination. Conversely, to stop the horse, to change to a slower gait, or to decrease the speed of a gait the reins and weight should be used in combination. In turning the horse the effect of the leading rein should be more and more reinforced by the effect of the bearing rein; in addition the weight and legs should be used in combination to effect the change of direction.

121. To train the remount to jump obstacles.—*a.* The dimensions of the obstacles should be increased in proportion to the progress of the horse. The eventual limit for high jumps is 3 feet and for broad jumps 8 feet. Obstacles without wings should have ample width of front so as not to tempt the remount to avoid jumping by passing around the obstacle.

b. The training of remounts to jump should be conducted in the same general manner as prescribed in Chapter I for teaching the recruits to jump.

c. In teaching the green horse to jump he should first be practiced over small obstacles at the walk and trot without the rider on his back. After considerable practice in this method of jumping the same training is repeated with the rider on his back. While receiving this training the remount should not be sent careening over the obstacles. He should, on the other hand, be allowed to approach the obstacle calmly and learn to jump by exertion rather than by a flying leap. When trained in this manner the remount develops the muscles of his hind quarters, loins, back, and shoulders; learns how to use his head and neck as a balance; and acquires sureness in handling his feet. Having completed the above training, the remount is ready for training in taking the jumps at the gallop.

d. In conformity with the training scheme outlined above the remounts should continue, during the second week, to receive daily training in jumping low obstacles on the herding track without the riders on their backs. The height of the jumps should be increased 2 or 3 inches each day until they are 3 feet high near the end of the week. In order to provide practice over a ditch jump, such an obstacle should be constructed across the herding track. The ditch should be approximately 3 feet deep and 5 feet wide to start with. Each day this jump should be increased in width about 6 inches until, by the end of the week, it is approximately 8 feet wide.

e. In addition to the training in jumping without the riders on their backs the remounts are given a little training each day in jumping low obstacles with the riders up. For this training the jumps are kept at least 6 inches lower than the jumps without the riders on their backs.

f. In approaching an obstacle at the walk or trot the horse should be permitted to hurry his last few steps in order to acquire a little spring and momentum. In jumping small obstacles at the gallop the speed of the gait should be moderate and the horse should jump in his galloping stride without increasing the speed before or after taking the jump.

SECTION IV

THIRD PERIOD (THIRD AND FOURTH WEEKS)

122. Program of daily training.—*a.* When time is available it is desirable that the remounts receive two training lessons per day, one in the morning and the other in the afternoon. The length of each lesson period should be about two hours. The first 45 minutes or each lesson period should be utilized in riding-hall training. The remaining time of each lesson period should be spent in work out of doors, such as drill, cross-country riding, mounted pistol and saber work, and short practice marches.

b. The major portion of all instruction should be given without requiring the riders to maintain fixed distances and intervals.

c. The men ride with spurs. The remounts are equipped with bit and bridoon bridles and carry full field equipment.

d. The herding track is used each day to give the remounts added practice in jumping low obstacles not over 3 feet high or 8 feet wide.

123. Objective of each day's work.—In general the objective of each day's work should be threefold: First, to improve the physical condition of the remount; second, to improve his handiness and balance; and, third, to improve his training for mounted saber and pistol work.

124. To improve the physical condition of the remount.—The remount's physical condition is improved by continued slow work and unremitting attention to his feeding, watering, bedding, grooming, shoeing, and clipping. In addition the remounts should be taken on short practice marches every second or third day, starting with a march of 5 miles and gradually increasing the distance to approximately 15 miles.

125. To improve the handiness and balance of the remount.—*a.* In order to improve the handiness and balance of the remount, more marked obedience to the aids should be demanded by the riders in executing the movements prescribed for the first and second periods. To increase the scope of this training the following additional exercises should be used: Abouts, broken lines, figures of 8, individual circles, and the half turn. For a description of these movements see Chapter I, Equitation.

b. In executing the above exercises the remount should be frequently ridden with the reins in one hand.

c. For the specific purposes indicated below these exercises may be classified as follows:

(1) *To obtain engagement of the hind quarters.*—Increasing and decreasing the pace; passing from the walk to the trot, the trot to the gallop, and vice versa; broken lines, serpentines, circles, and half turns, with the haunches following the track of the forehand at times and again with the hind quarters a little inside the track of the forehand. The false gallop should also be practiced, but always with the haunches tracking the forehand.

(2) *To obtain mobility of the haunches.*—Half turns in reverse executed slightly on the forehand; individual circles executed with the haunches disposed slightly to the outside.

(3) *To obtain suppleness of the spinal column.*—Laterally by galloping on a large circle the radius of which is reduced as

training progresses; vertically, by increasing and decreasing the pace, changing gaits, and half halts.

(4) *To obtain mobility of the shoulders and lightness of the forehand.*—Abouts, broken lines, and serpentines, causing the forehand to swing around the haunches as a movable pivot; the circle and figure of 8 with haunches inside; half turns executed on a shorter and shorter radius as training progresses.

126. To improve the training of the remount for pistol and saber work.—The training of remounts to accustom them to the use of the pistol and saber should be continued during the third period by daily work on the mounted pistol and saber courses. Generally from 15 to 20 minutes of this work each day will be ample. Horses which are nervous should be given this instruction at slow gaits until they become quiet; then the gallop may be used.

127. Repetition and review of previous work.—All work given during the third period is directed toward the improvement of the training imparted during the first two periods. For this reason all the training given during the first two periods should be repeated during the third period.

CHAPTER 3

USE AND CARE OF ANIMALS

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SECTION I

FEEDING AND WATERING

128. Feeds and feeding—General considerations.—The health and condition of animals depend largely upon the kind of food received and the hours of feeding. To feed so as to obtain the best or even good results requires a knowledge of the digestive system of animals, the food elements or constituents required for their sustenance, the correct proportions of these elements, the proper methods of preparation, and the best hours of feeding.

129. The digestive system.—*a.* The organs of the digestive system form what is called the alimentary canal and consist of the mouth, pharynx, esophagus, abdomen, small and large intestines, and the anus.

b. The stomach is the principal organ of digestion. It is very small as compared with the size of the horse and the amount of food he consumes. Its capacity is from 3 to 4 gallons. The intestines are also organs of digestion but have a much greater capacity than the stomach.

c. Food is taken into the mouth and masticated. It passes through the pharynx and esophagus into the stomach, where it is partially digested and prepared for complete digestion in the

intestines. In the intestines digestion is completed and the nutriment and moisture extracted. The residue is discharged through the anus as dung.

d. The time required for stomach digestion varies with the class of food. Grain being a concentrated diet requires approximately twice as long as hay, and as they do not mix during the process they should not be in the stomach at the same time, except when fed together as chop. For this reason, hay, being the more quickly digested, should precede the grain ration or else follow it by an hour or two. The latter is best when a large hay feed is given, as in the evening. A small feed of loose hay shortly before the grain is advisable, since it greatly stimulates the saliva and stomach secretions and is an aid to digestion in furnishing the bulk necessary for the best action of the stomach.

e. Water remains in the stomach for only a short time. It is passed quickly into the intestines, where it is collected in a part of the large intestines called the cæcum. If given soon after feeding, it flushes a considerable portion of the food from the stomach and into the intestine before it is digested and may cause indigestion. Watering should, therefore, be done before feeding or not until an hour or two afterward.

f. Every precaution should be exercised in the manner of feeding and watering so as to insure the proper action of stomach digestion.

130. Food constituents.—*a. Classification.*—Food constituents are classified according to the function they perform in the animal system, as follows:

(1) Flesh making, such as linseed meal, oats, peas, beans, bran, etc.

(2) Fat, heat, and energy producing, such as corn, wheat, rye, oats, etc.

(3) Bone making, such as grass, hay, bran, bone meal, milk, etc.

(4) Bulk supplying, necessary to digestion (fibrous and woody material), such as hay, grass, bran, oats, etc.

(5) Watery, such as carrots, potatoes, green grass, etc.

b. There is no one food containing all of the required constituents, hence two or more must be combined to obtain the desired ration. Natural grasses come nearer to serving this purpose than any other food when animals are on pasture.

131. The proportions of various food components in a ration.—The components of any ration depend upon the class and condition of the animals and the work required of them, the variety of available foods, the kind of shelter afforded, the climate, the season, etc. The food must be selected in such proportions as to form a balanced ration and fed in such quantities at such hours as to enable the animal to obtain the greatest possible amount of nutrition from them. The forage ration, with its permissible substitutes, as given in paragraph 144, furnishes a ration which is sufficiently balanced for service use.

132. Oats.—*a.* Oats are the safest of all grains for animals. Accordingly they are standard for issue in the Army, and all other grains are regarded as substitutes.

b. Oats may be safely fed in quantities up to 16 pounds per day, provided the animal is performing heavy work. Under ordinary conditions the amounts given in paragraph 144 are sufficient. Horses and mules, when rested for a length of time, should be given not more than 6 pounds daily.

133. Corn.—*a.* Corn is less desirable than oats by reason of its tendency to produce heat and fat. It is, therefore, most useful in cold climates when more than the usual amount of animal heat is required. Combined with oats and hay, as indicated in paragraph 144, it forms a well-balanced ration.

b. Corn may be fed whole, either shelled or on the cob. It should, when practicable, be fed on the cob rather than shelled. When necessary to feed shelled corn, mix with dry bran, coats, or both to prevent bolting of the feed. When feeding corn on the cob one feed consists of from 6 to 12 ears, depending on the size of the ears, the amount of work performed, and the individual animal.

c. Change from oats to corn should be made gradually, substituting about 2 pounds of corn for 2 pounds of oats each successive week. Later, as the animals become accustomed to corn, the oats may be discontinued and the corn correspondingly increased.

134. Barley.—*a.* Barley is a very good food for horses and mules and may be safely substituted for oats.

b. Barley may be fed whole, but, due to its excessive hardness, it is usually crushed or soaked in water for two or three hours before feeding. The nutritive value of barley is slightly less than that of oats. The allowance should accordingly be slightly

greater. The change from oats to barley should be gradual and extend over a period of at least two weeks.

135. Rye.—Rye is not regarded as good forage. Should its use become necessary, it should be fed in small amounts, never alone, but mixed with any other grain available. In emergency 10 pounds a day can be fed if mixed with bran.

136. Wheat.—Wheat is an unsafe food for animals. If used, only 1 or 2 pounds may be given at first, the amount being gradually increased thereafter. The allowance of wheat should never exceed 6 pounds a day.

137. Rice.—Rice is a useful grain as forage. Ten to fourteen pounds may be fed daily. Only unhusked or unthreshed rice should be used.

138. Linseed meal.—Linseed meal is an excellent food for animals that have become run down in condition. Its effect is slightly laxative and it produces an oily skin and a sleek glossy coat. The allowance is from one-half to 1 pound daily, mixed with other food. The best amount is a heaping tablespoonful three times a day on the grain.

139. Bran.—*a.* Bran is an excellent food for animals. As an adjunct of a ration consisting largely of grain, it is most useful on account of its mild laxative effect. It helps in building bone and muscle without tending to fatten and adds to the general tone and condition of animals.

b. If dry bran is fed daily, mixed with grain, about 2 pounds may be given. The amount should be varied from time to time, according to the need. The object in feeding bran is to produce more complete mastication of food, to increase the bulk of the ration in the stomach and intestines, and to counteract the heating effect of the grain.

c. Animals are greatly benefited by the substitution once each week of a bran mash for the grain ration. Plenty of hay during the night furnishes the necessary bulk. This routine will tend to prevent constipation. Bran should be discontinued when either alfalfa or clover hay is fed or animals are on pasture.

d. A bran mash is made by placing 2 or 3 pounds of bran in a bucket, sprinkling a little salt over the top, and then pouring in enough hot water to soak it thoroughly, making the mixture mushy.

140. Salt.—Salt is a bodily requirement and as such is necessary for the well-being of the animal. It should be regularly

supplied in the form of rock or caked salt placed in or conveniently near the manger, so that the animal may have free and continuous access to it, or the grain feed should be dampened with salt dissolved in water. The feed box should not be used as a container for salt.

141. **Hay.**—*a.* Hay can not be wholly dispensed with for any considerable time as a component of the ration unless it is replaced by a similar article, such as straw, as bulk is necessary for the proper performance of digestion and must be furnished for that purpose even though the component possesses little nutritive value. Animals will suffer more on a grain ration alone than on one of hay alone. Oat straw is best as a substitute for hay. Wheat straw is satisfactory, especially if chopped. The use of barley or rye straw is not recommended.

b. The following classes of hay are of practically equal feeding value: Timothy, mixtures of timothy with clover and other grasses, prairie, Johnson grass, Johnson grass mixtures, alfalfa, and alfalfa mixtures.

c. Clover hay, when of excellent quality and properly cured, makes good forage for draft animals. It has a very laxative effect and if fed alone continuously may make animals "washy." When clover hay is used it should, if practicable, be fed mixed half and half with timothy or prairie hay.

d. Alfalfa hay is very laxative in its effect upon animals that are not accustomed to it. The change to a ration containing alfalfa should be made gradually. If alfalfa is mixed with other hay much waste will result, as animals relish the alfalfa and will paw the hay around to get to it. If practicable, alfalfa should be fed at the noon feed, omitting the grain. Alfalfa is not a good feed during hot weather.

e. Grain hay is made from oats, wheat, and barley, cut before maturing. The grains are retained in the head. When feeding 14 pounds of this hay the regular ration of grain should be reduced by about 3 pounds.

f. Chaff, or "chop," is hay cut in 1-inch lengths. It is economical and insures thorough mastication of the grain with which mixed. Alfalfa, prairie, and clover mixed hays chop best. In order to lay the dust, chaff should be well dampened before feeding.

g. Sprinkling of hay before feeding is very beneficial to animals. It should be done about one-half hour before the hay is fed.

142. Grazing.—*a.* Grazing is very beneficial to the animal.

b. In turning animals out for the first time to graze care must be taken that they do not overeat. Flatulent colic is almost sure to result if they are allowed to graze on *wet* or *frosted* alfalfa or clover. When grazing is sufficient and regular the feeding of bran should be discontinued.

c. In order to augment the possible scanty ration, the grazing of animals in the field should always be taken advantage of. Men must be trained to allow their animals to graze at every opportunity.

143. Compressed forage ration.—The compressed forage ration is primarily for field service. This feed is made up of 87 per cent No. 2 white oats, cleaned, crushed, and dried, and 13 per cent pure cane molasses carefully processed. This mixture is pressed into cakes 12 by 6 by 1½ inches, weighing about 3 pounds. Three pounds of this feed is issued in lieu of 4 pounds of oats and is to serve as one grain feed. It must be thoroughly understood that this compressed forage does not in any way take the place of the necessary hay ration. On the contrary, when such a concentrate is fed it is most essential that sufficient roughage be supplied if the animals are to be kept in a satisfactory condition. Before feeding the compressed ration should be well broken up.

144. The forage ration.—*a. Classes.*—Forage rations for Army horses and mules are divided into two classes as follows:

(1) *Garrison ration.*—The garrison ration will be issued at permanent posts or stations or in semipermanent camps.

(2) *Field ration.*—The field ration will be used when animals are actually in the field, on march or maneuver, and where stabling facilities can not be furnished.

(*b*) *Division of horses for rationing purposes.*—For rationing purposes there are three distinct divisions of horses, depending upon their weight, as follows:

(1) Small horses, issued to foreign stations.

(2) Light horses, 1,150 pounds in weight and less.

(3) Heavy horses, more than 1,150 pounds in weight.

c. Allowances; components.—The following tabulation shows the allowances prescribed in each class of ration for each division of horses mentioned in *b* above and for mules:

(1) *Garrison ration*

	Small horses	Light horses	Heavy horses	Mules
	Pounds	*Pounds*	*Pounds*	*Pounds*
Grain	7	10	12½	8
Hay	14	14	15	14
Straw	5	5	5	5

(2) *Field ration*

	Small horses	Light horses	Heavy horses	Mules
	Pounds	*Pounds*	*Pounds*	*Pounds*
Grain	9	12	14	10
Hay	14	14	16	14

d. Substitutes and equivalents.—(1) Not to exceed 3 pounds of bran may be substituted for a like quantity of grain or one-half pound of linseed meal for 1 pound of grain.

(2) In foreign possessions the substitution of palay, copra meal, or any native products for the grain ration and native grasses for hay is authorized where a saving can be effected.

(3) In the issue of forage 10 pounds of hay will be considered the equivalent of 15 pounds of corn fodder or grain sorghums.

e. Variations.—(1) The variations permissible in the garrison ration and which can be furnished in a practical manner are as follows:

LIGHT HORSES

Variation 1:
- 8 pounds oats.
- 5 pounds alfalfa.
- 9 pounds hay other than alfalfa.

Variation 2:
- 6 pounds oats.
- 2 pounds corn.
- 5 pounds alfalfa.
- 9 pounds hay other than alfalfa.

HEAVY HORSES

Variation 1:
- 10 pounds oats.
- 5 pounds alfalfa.
- 10 pounds hay other than alfalfa.

Variation 2:
- 6 pounds oats.
- 3 pounds corn.
- 6 pounds alfalfa.
- 9 pounds hay other than alfalfa.

Variation 1:	Variation 2:
5 pounds oats.	3 pounds oats.
5 pounds alfalfa.	2 pounds corn.
9 pounds hay other than alfalfa.	6 pounds alfalfa.
	8 pounds hay other than alfalfa.

(2) Whenever alfalfa is mentioned the alfalfa hay mixtures in which alfalfa predominates will be regarded as alfalfa and used as such in the above variations.

145. Food requirements.—*a.* When animals begin to gnaw the woodwork and eat dirt and dung the cause may be looked for in the lack of mineral matter in the food or in the insufficiency of hay in the ration. In the field, when hay can not be obtained, grazing should be resorted to at every opportunity. The quality of the grass is not relatively of great importance. It is highly necessary, however, that as "roughage" it should be sufficient in bulk to properly distend the intestines. Failing grass, the animal should be permitted to consume any form of roughage, such as straw, bark, leaves, etc., with which his appetite can be tempted.

b. For idle animals that amount of food is sufficient which maintains the weight of the body satisfactorily. The average maintenance ration should be about 18 pounds of forage for each 1,000 pounds of body weight. It may consist of hay only or of about 4 pounds of oats and 14 pounds of hay. Mules and horses absolutely idle in corrals will retain their weight on a daily allowance of 18 pounds of good hay.

c. When animals are put to work an increased amount of forage is necessary. As work becomes more severe the tendency should be to increase the oats without a corresponding increase of hay. During very severe work a further increase of oats is appropriate.

146. Feeding in garrison or camp.—*a.* Grain is fed about first call for reveille. This early morning feed should be small; 2 or 3 pounds per animal is ample. Just before saddling, harnessing, or packing the animals can be watered. While this is contrary to the general principle of watering after feeding, nevertheless, the animals have been fed for over an hour and in the early morning they usually will not drink a great deal.

During the time the animals are out and during stables the feed boxes and hay racks should be thoroughly cleaned and about 2 pounds of fresh hay put in the latter. After morning stables the animals should be watered and then tied in their stalls. From then until noon they have a chance to eat the hay which has been put in their mangers. At noon their second grain can be given. This should be regulated according to the animal. Assuming that 9 pounds is to be fed an animal, the division of about 2 for morning, 3 for noon, and 4 for evening would be correct. With 12 pounds, 3 for morning, 4 for noon, and 5 for evening is correct. When the grain is more than 12 pounds it is better to feed four or five times than three.

Upon completion of the noon feed the animals are tied outside, except in very hot or inclement weather. After evening water call they are again tied in and should find the remainder of their hay ration in their hayracks. Then, about supper call, the evening feed of grain should be given.

b. The advantages of feeding in this way are that a small feed of grain is given in the morning, which the animal will thoroughly digest before going to work, and feeding of the hay before the other grain feeds keeps them from being greedy and bolting their grain without masticating it.

c. In camps where feed boxes are not available nose bags should be used for feeding grain. (See par. 179 relative to adjustment of nose bags.) Grain is fed by issuing the proper amount to each man who feeds his horse individually. Any grain left in the nose bags should be spread on a paulin to dry and used for the next feed. Under no circumstances should such grain be scattered on the ground in front of animals. To do so invites serious dirt or sand colic. Any grain spilled out of a nose bag by an animal should be swept up for similar reasons.

d. (1) In cases where hayracks are not available hay nets should be used for feeding hay. The mesh should be of such size that a small quantity only can be pulled out at a time.

(2) If hay nets are not to be had, hay should be fed by breaking up the bales and distributing it along the picket line. It should be fed in small quantities and frequently renewed. A detail of men should be kept with the animals to prevent the hay from working back underneath the feet and being trod upon and wasted. To avoid undue waste, bales of hay should be

broken only as actually required and should be carried to the animals before this is done.

147. Feeding on the march.—*a.* On the march the principle of feeding little and often should be adopted. At every halt of sufficient duration the nose bag should be put on.

b. On long marches there should be a midday halt of an hour or more and animals given a feed of grain.

148. Feeding special cases.—*a. Animals that bolt their food.*—To overcome this habit a considerable amount of bran should form a part of each feed. If this does not produce the desired results nail slats across the manger so as to divide it into compartments or place a few large stones in the feed box.

b. Windsuckers and cribbers.—If possible, feed windsuckers and cribbers apart from other animals and in such a way as to prevent their practicing these habits. (See also par. 175.)

c. Animals that "stock."—(1) This is a condition in which the legs swell in the fetlock region.

(2) The rations of animals predisposed to this condition must be carefully regulated. If allowed to rest for even a few days the ration must be reduced proportionately. Exercise must be given to keep the circulation of the limbs active and no more food than suffices for actual daily requirements.

d. Thin animals.—In such cases a little food should be given several times a day. As the animal gains in strength the quantity of each feed may also be increased. Water should be supplied in unlimited quantities. Steamed or boiled grain is an excellent conditioner. Such a feed should be thoroughly cooked and fed lukewarm with a little salt added. A cooker can be easily improvised.

149. Care of forage.—Dampness is responsible for the early decay of forage in storerooms, even though this forage was of standard grade and condition when it was received. Hay and grain rooms must be kept ventilated at all times. Forage should not be piled on the floors nor should it be so piled that it is in contact with the walls. Boards properly spaced so that the air may circulate under the pile should be used as a foundation for each pile. Spaces should be left between piles and between each pile and the walls and the ceiling in order that air may circulate freely around them.

150. Feeding maxims.—*a.* Water before feeding or not until at least one hour afterwards.

b. Never feed grain to heated animals; hay will not harm them.

c. If expecting hard work immediately after feeding, give only a half feed.

d. Do not work the animal immediately after a full feed.

e. Use nose bags when feed boxes are not available.

f. Use hay nets when no mangers are available.

g. When practicable, give a small feed of hay before each grain feed.

h. Never feed a large hay feed immediately before grain.

i. Give a bran mash at least once a week, preferably before a day of rest.

j. Feed salt. (See Par. 140.)

k. Never feed hay on the ground if it can be avoided.

l. When feeding in feed bags remove them as each animal finishes.

m. Keep feeding utensils clean.

n. Feed clean food.

o. Watch your horses feeding and know which are the slow and the shy feeders.

p. Watch their condition and fix the ration for each horse according to his needs.

q. Graze whenever the opportunity occurs.

r. Encourage men to bring handfuls of grass or other food to their horses.

s. Be economical in feeding, waste nothing, let the horse get the full value of his ration.

151. Watering—General.—*a.* Under average conditions animals require about 8 gallons of water per day. Excessive heat and heavy work will double ordinary requirements.

b. Animals suffering from communicable diseases should always have a separate watering place. When practicable, such animals should be watered from individual buckets. Neglect of these precautions may cause a spread of disease throughout the command.

c. During watering there must be no shouting or confusion of any kind.

d. Restless and kicking animals should be watered separately.

e. Never allow an exhausted animal to drink his fill at once, especially if he has gone long without water. Give him a little at a time at 5 or 10 minute intervals until he is satisfied.

152. Watering in camp or garrison.—*a.* In camp or garrison animals should be watered three times daily under average conditions. At work, especially when the weather is warm, four times daily should be the rule. Water should be given previous to feeding.

b. Animals should not be watered for at least an hour after feeding, but they may be allowed to drink freely while at work, even though sweating. If brought in hot, they may be given a few swallows at intervals, but should be kept moving until they have cooled down.

c. Care should be taken not to allow too many animals to water at once, only such number as there is plenty of room for being taken to the trough. They should be allowed ample time to drink their fill and not be led away the first time they raise their heads from the water. This must be carefully explained to the untrained man. Animals should be led to and from water at a walk and, if possible, not more than two animals per man.

d. If a stream is the source, care must be exercised not to foul the water for succeeding units. (See subpar. *c*, below.)

153. Watering on the march.—*a.* Animals should be watered within reason whenever opportunity occurs, especially on hot days. There is little risk attached to their being allowed to drink frequently. The usual method of watering before feeding will be adhered to, but if a stream is crossed an hour after feeding they may be allowed to drink if circumstances permit the delay. Bits, especially the curb, should be removed when it is intended to give a full watering.

b. When water is scarce its issue must be carefully regulated to avoid waste. Animals can drink from a very shallow vessel if their bits are removed. Small quantities may be poured into a shallow receptacle, the supply being regulated by the animal's rate of swallowing. A very small quantity will revive overtaxed animals; this should be given in small rations rather than one long draft. When the amount is very scanty, say, a pint or less per animal, it is best to offer the exact quantity to each animal in turn rather than to risk a large bucketful.

c. While watering, overcrowding of the animals should be prevented (allow at least 5 yards of water space per animal) and plenty of time allowed for each animal to drink his fill. Groups of animals should come up together and leave together.

After they have finished drinking animals are inclined to paw the water and even lie down. This must be prevented, else the water will be rendered unfit for commands which follow. Unless absolutely necessary, animals should not be led into water to drink, particularly into ponds and muddy-bottomed streams.

d. If practicable, the place for the noon halt should be 2 or 3 miles beyond a convenient watering place. The animals should be watered and then moved forward to the designated resting place. At the day's destination, however, it is best to relieve the animals of the weight of their equipment before watering. They will in the meantime have become cooled and rested, after which they should be watered before feeding.

SECTION II

STABLE MANAGEMENT

154. General provisions.—*a.* In mounted organizations the organization commander is responsible for the proper performance of stable duty in his organization. He should see that the men on duty at the stables are properly instructed and that the stable routine prescribed by him is faithfully carried out. An officer should habitually be present when horses are groomed. ("Stables.")

b. The animals are assigned to stalls and to places on the picket line by platoons or sections. When not being used or fed they should stand during the day, except in very cold, very hot, or stormy weather, at the picket line or be at liberty in the corral.

155. Stable floors.—*a. Cleanliness.*—The floors of stables and aisles should be thoroughly cleaned daily. During warm weather brick, cement, and stone floors are best cleaned by scrubbing with water, using the hose and stable brooms. Earthen floors at all times and hard-surfaced floors in cold weather are cleaned by scraping with a shovel or hoe and sweeping with a stable broom.

b. Slippery floors.—If the stables wear smooth and become slippery, the surface should be roughened by chipping with a cold chisel and a mallet. If slippery from ice the surface should be sprinkled with sand or sifted ashes before the bedding is put down. Likewise, when necessary, the aisles are covered tempo-

rarily with bedding and the approaches with sand and cinders to prevent the animals from slipping.

c. Maintenance of earthen floors.—Earthen floors require continual work to keep them clean and smooth. As soon as wet depressions occur they should be dug out and filled with fresh clay bound with cinders or crushed rock. The floor at the front of the stall for a distance of about 2 feet from the rear edge of the manger should be level in order that the animal's front feet may rest on a level surface. Back of this space the floor should slope gently to the rear to provide drainage. A drop of about 2 inches is sufficient.

156. Mangers.—*a. Cleanliness.*—Feed boxes and mangers should be brushed out daily, care being taken to see that all particles of food are removed and that the woodwork surrounding them is also kept free of particles of food. This is especially important in warm weather, when fermentation is most likely to occur. Advantage should be taken of exposure to sunlight and fresh air to keep feed boxes clean. In addition to the daily police, which should be thoroughly efficient, a monthly (or oftener, if necessary) cleaning of feed boxes and the woodwork immediately surrounding them should be made. This should be done by scraping and scrubbing with soda ash and hot water.

b. Cleaning solution.—A 5 per cent soda ash solution (5 pounds of soda ash to 12 gallons of water) will be used. To clean feed boxes this mixture should be placed in a kettle such as is used for cooking feeds, a galvanized can or other suitable receptacle large enough for the purpose, and brought to the boiling point. The feed boxes should be collected and, after being cleansed and all food particles removed, placed in the boiling solution for a period of from three to five minutes. They should be removed with an iron rod with a hook at one end and thoroughly rinsed. This is best done by the use of a hose when a water system is available. None of the soda-ash solution should be allowed to remain upon a feed box, as it will irritate the mucous membranes of the mouth and lips of the animals. Care should be exercised by those handling the solution to prevent its coming into contact with the skin or mucous membranes (particularly of the eye), since the solution is irritating to such tissues.

157. Woodwork.—*a.* There should be no sharp or rough projections in the woodwork of the stables on which animals might injure themselves. All fittings should be flush with the surface

to which they are attached. Some form of quick release should be provided for the rear end of the kicking bar. All woodwork within reach of the animals should be protected with sheet metal or painted with a thin coat of gas tar. Other woodwork and brick should be painted a light shade and then kept clean and free from dust. Whitewash should not be used on the woodwork of the manger, as it may be rubbed off and cause severe irritation of the eye. If used elsewhere about the stalls it may be a great nuisance through rubbing off on the animals.

b. Three tablespoonfuls of lye in a bucket of warm water makes a good solution for cleaning the coating of dirt from the mangers and woodwork of the stalls and improves the appearance of the stables. Care should be exercised when using this solution that none of it gets on forage or bedding.

158. Water troughs.—Water troughs should be emptied and thoroughly cleaned each morning. A water trough placed in a corral should be kept plentifully supplied with water at all times when the animals are in the corral. Under no circumstances should strange animals be permitted to drink at the water troughs or be fed in the stables. One animal with a contagious disease may affect all the animals of the organization.

159. The corral.—*a.* The corral should be cleaned at least once a day. Thorough drainage should be provided and all depressions kept filled so that pools of water will not form after rains.

b. The corral fences should be of sufficient height and stoutness to restrain all animals turned into the corral. They should be able to withstand considerable shocks and should be kept in a thorough state of repair at all times. They should be entirely free of all rough or sharp projections. The gates to corrals from the stable and from the outside should be particularly stout and should be kept in a thorough state of repair. They should be kept securely fastened, should be free from all rough or sharp projections, and all fittings should be flush with the materials of which the gate is made.

c. The picket line and corral should be sprinkled to keep down the dust. Crude oil may be used to advantage. If there is no shade, shelter from the sun should be extemporized from any available material. This is very important, as animals lose condition rapidly if forced to stand in the hot sun for long periods of time.

160. The picket line.—*a.* In garrison or permanent camp the picket line should be elevated about 5 feet above the ground on heavy posts. The picket line may be made of 1½-inch rope or small wire cable. It must be kept taut at all times. The length of line must be such as to provide 4 feet of space for each animal.

b. A second line below the first, breast high, is excellent for keeping the animals all on one side. It prevents fighting across the line and the tangling of animals.

c. The standings along the picket line should receive the same attention and care as stable floors. A foundation of stone should be provided with a covering of gravel or cinders. In wet climates the standings should be raised above the ground level.

d. The picket line should be placed on firm, sloping ground. If there is insufficient slope, it must be constructed, preferably sloping from line to heels, and drained by a ditch running parallel to the line and about 10 or 12 feet from it. If necessary to locate the line on a considerable slope, the line should be run up and down the slope instead of on a contour around it.

161. Securing animals.—*a.* For tying an animal in a stall the proper length of rope is such as will permit him to lie down and get up with ease. This length is slightly less than the height above the ground of the tie ring in the manger.

b. For tying an animal on a picket line the length of rope should be no more than enough to permit him to reach the ground comfortably.

c. Any knot which is perfectly secure and capable of being untied rapidly may be used for securing animals. A satisfactory knot is tied as follows: Pass the free end of the tie rope over the top of the picket line, then over the fixed end (attached to the halter), and form a half-bow; next pass the loop of the half-bow over the picket line and under itself. To free the knot disengage the loop from under itself and pull the loose end.

162. Fire prevention.—*a.* All stables must be provided with the necessary fire equipment, including knives for cutting halter tie ropes. Periodic fire drills should be held in which each man is assigned his proper duties. Smoking in stables should be strictly prohibited.

b. In a fire animals become panicky and attempt to return to their stalls or to stampede. It may be necessary to blindfold an animal to get him out of the stable. Animals must be securely tied or held outside the stable as soon as removed.

163. Ventilation.—Ventilation must be thorough and continuous without draft. In closed stables ventilation is effected by means of ventilators, louver boards, windows, and doors. Animals rarely suffer from cold air, provided there is no draft. They do, however, suffer greatly from foul air; hence, the importance of an abundant supply of fresh air. Ventilators and louver boards are constructed in the stable roof to carry off the warm, tainted air. The principal supply of fresh air is obtained through windows and doors. Windows should be built to hinge at the bottom and open inward, thus forcing the incoming fresh air up and over the animals instead of directly on them. Doors are apt to cause drafts. They should be closed on the windward side in stormy weather. Any unpleasant odor on entering a stable is an indication of insufficient ventilation and should be corrected immediately.

164. Bedding.—*a.* The provision of a good bed is an important detail in the economical management of animals. A good bed has a marked effect in inducing animals to lie down frequently and for long periods during both day and night, and it also prevents injuries to elbows and other parts in contact with the stable floor. The bed should be level, dry, warm, and elastic and have a clean surface for the animal to lie upon.

b. Good bright, clean, coarse straw, either wheat, oat, or rye, is the best article for bedding. Numerous other articles may be used, such as leaves, shavings, sawdust, and even sand. When sand is used the animals must be watched, as sand colic may develop.

c. Hay of poor quality is occasionally used as bedding. Care must be exercised not to use it when mouldy or very musty, as animals will eat it, usually with ill effects afterwards.

d. In the morning the bedding should be taken up and carefully shaken out and sorted. That part which can be used again should be spread out where it can aerate and dry out. A good way is to place it in bedding racks and in good weather carry it out to air and sun. When bedding at the top of the racks dries it is turned over so as to expose all of it to the sun. In bad weather racks are hoisted out of the way inside the stables. Great care must be exercised to salvage all bedding which can be used again; otherwise the allowance is insufficient.

e. Bedding racks should be about 8 feet long and 4 feet wide, with the bottom raised 1 foot from the floor. The framework

should be light and strong and covered on the bottom and sides with light wire screening. If not available they should be improvised.

f. In the afternoon the dried bedding is mixed with such fresh bedding as may be necessary and laid down. This should be done as late as practicable in order to provide a clean, dry bed. The bed must be soft and even and somewhat thicker toward the head. It is best to lay successive layers of bedding crosswise to each other, thus forming a more elastic and durable bed. In bedding down, bedding should not be spread up to the manger, as animals will eat it, soiled or fresh.

165. Grooming.—*a. General.*—Grooming is essential to the general health, condition, and appearance of animals. Men should be taught that upon grooming mainly depends immunity from lice and mange. In the field as well as in garrison officers should permit no service demands or trying weather conditions to prevent utilizing the necessary time and labor involved in one good daily grooming for their animals. The value of grooming depends upon the thoroughness and speed with which it is done. Men should be encouraged to work hard and rapidly and to do a thorough job in a minimum time. Each man's grooming should be inspected as soon as practicable after completion, and if not satisfactory, the man dismissed. Grooming by squad is an efficient method and develops leadership in squad leaders.

b. Time for grooming.—(1) Every animal in the stable should be groomed thoroughly at least once each day. Before leaving the stable for work or exercise horses are brushed off; mane, if any, neatly arranged; tail brushed out; eyes cleaned; nostrils and dock wiped out; and feet cleaned.

(2) On return from work or exercise grooming should be proceeded with immediately, except for such delay as is necessary incident to wiping off and putting away equipment. Heated, wet, or sweating animals should be cooled out before being groomed. In the case of such horses the equipment should be removed and quickly put aside, then the horse given a brisk rubbing with the wisp or drying cloth, blanketed, and walked until cool. A couple of swallows of water every few minutes assists the cooling out and is beneficial to the animal.

c. Grooming tools.—Each mounted man should have the following grooming kit: Currycomb, horse brush, dandy brush (if procurable), hoof hook, grooming cloth, and wisp.

d. The currycomb.—(1) This tool may be used to groom animals that have long, thick coats, to remove caked mud, and to loosen matted scurf and dirt in the hair.

(2) The currycomb produces the best effect when applied gently in small circles rather than with pressure and in long strokes, like the brush. It should never be used on the legs from the knees and hocks down nor about the head. The use of the currycomb should be prohibited in grooming animals recently clipped or that have a fine, thin coat of hair. In most cases the hair may be loosened and ruffled sufficiently by a wisp.

e. The horse brush.—This implement is the principal tool used for grooming. When properly used it reaches the skin, the bristles or fibers penetrating through the hair of the coat.

f. The dandy brush.—This tool is not an article of regular issue, but its use is strongly recommended wherever it can be procured. When used it takes the place of the currycomb and cleans the horse more quickly than the horse brush alone. When used it should be followed by the horse brush.

g. The hoof hook.—This implement is used to clean out the feet. It can be easily made by the horseshoer. Three-eighths-inch iron wire or a horseshoe drawn out to that dimension make excellent ones. The wire should be about 8 inches long to begin with. The end is sharpened slightly and given a rounded point, then bent at right angles about 1¼ inches from the point. The other end can be turned into a small ring for a handle. The point should not be sharp.

h. The grooming cloth.—The grooming cloth is used to remove dirt and dust from the coat, to wipe off the head, to clean the dock, and to polish the coat. It is also used to dry horses. It is usually made from old toweling or condemned blankets, cut in a 2-foot square or even larger.

i. The wisp.—(1) The wisp is used in regular grooming and in drying out wet animals. Wisping is really a form of massage and is a most valuable means of improving the condition of the skin and coat and for making muscle. It should not be omitted from grooming unless prevented by shortage of straw or the necessity for great haste.

(2) A wisp is made from straw or hay in the following manner: Twist the material into a rope about 8 or 10 feet long. Make two loops at one end, one loop being slightly larger than the other. The remainder of the rope is now twisted alternately around each loop until the end is reached, when it is

passed through the extremity of each loop and tucked under one of the twists. The completed wisp should be no wider than can be conveniently grasped by the hand, about a foot long and 2 or 3 inches thick.

(3) In wisping wet horses the wisp should be worked forward and backward well into the coat. After drying in this manner the coat should be laid flat. In regular grooming the wisp should be dampened slightly to make the straw less brittle.

j. Washing and disinfecting of grooming tools.—The washing and disinfecting of grooming tools, either to clean them or as a precaution against the spread of disease, may be necessary. Clean thoroughly by dipping them in a strong soda solution, followed by dipping in a strong salt solution to stiffen the bristles. Then immerse in a 1 per cent solution of cresol for 15 minutes, shake out, and stand with bristles down to dry. Grooming cloths can be treated similarly.

k. Normal method of grooming (for the average thick-coated animal.—(1) Clean out the feet with the hoof hook, working from the heel toward the toe, being careful not to exert too much pressure. At this time the feet should be inspected by each man for nails, thrush, or other disease. Any horse in need of shoeing or of attention for other cause must be reported to the stable sergeant.

(2) Take the currycomb in the right hand, fingers over the back of the comb, and the brush in the left hand; first use the currycomb on the near side of the animal, beginning on the neck, then breast, withers, shoulders, fore leg down to the knee; then back, side, belly, croup, and hind leg to the hock. Change the currycomb to the left hand and brush to the right and proceed in a similar manner on the off side. Strike the currycomb against the heel frequently to free it from dirt. The currycomb should never be used about the head nor on the legs from the knees and hocks downward. When it is necessary to loosen mud or matted hair on the fleshy parts of the body, apply the currycomb gently. (See also subpar. *d* above.)

(3) Take the brush in the left hand and currycomb in the right; brush entire near side of the animal in the same order as when the currycomb was used, except that in brushing the legs brush down to the hoof. Change brush to the right hand, currycomb to the left, and proceed in a similar manner on the off side. After every few strokes clean dust and hair from the

brush with the currycomb. In using the brush the man should stand well away from the animal, keep his arm stiff, and throw the weight of the body against the brush. In grooming the belly apply the brush the way of the hair, the brush in the left hand on the near side and in the right hand on the off side. The skin under the flanks and between the fore and hind legs must be soft and clean.

(4) Next brush head, mane, and tail. In cleaning mane and tail begin brushing at the ends of the hair and gradually work up to the roots, separating the locks with the fingers so as to get out scurf and dirt. Tails require frequent washing with warm water and soap.

(5) Having finished with currycomb and brush, go over the animal with the wisp. The wisp should be held about the middle in the full grasp of the hand and brought down with a bang on the coat in the direction of the hair. The pressure should be continued throughout the stroke. Should service conditions render wisping impractical it may be omitted.

(6) Finally with grooming cloth wipe about the face, eyes, nostrils, and dock, and give a final polish to the coat.

1. *Special method of grooming (for fine-coated and clipped animals).*—Use the normal method, omitting the use of the currycomb, except occasionally to remove caked mud. In place of the currycomb the dandy brush (see subpar. *f* above) should be used.

166. Hand rubbing.—*a.* Hand rubbing is beneficial, being soothing, restful to tired muscles, and stimulating to the circulation. It also removes loose hair and helps to produce a glossy coat. The hands are slapped down briskly on the coat, one after the other, with the weight of the body behind them, then moved over the skin with firm pressure.

b. On unsaddling after a march rub the back with a circular motion to restore circulation.

c. After very hard work the horse's legs should be hand rubbed briskly up and down with the fingers and palms and then bandaged loosely.

167. Cleaning the sheath.—Occasionally the sheath becomes very foul from accumulated secretions and dirt and requires cleaning. Cleaning should be accomplished by first removing very carefully the accumulated material and then washing with warm water and castile soap.

168. Pulling manes and tails.—*a.* Manes and tails should be pulled thin and even. This is done by grasping a few hairs at a time and sliding the hand up close to the roots, then giving a quick jerk so as to pull the hairs out by the roots. Always work on the longest hairs and on the underside of the mane and tail.

b. Tails should be shortened to about 4 inches below the hocks. The dock and upper part of the tail should be kept free from coarse hairs.

169. Trimming manes and fetlocks.—*a.* Fetlocks should be neatly trimmed, and that part of the mane on which the crown piece rests should be closely clipped.

b. Clipping manes is optional with regimental commanders. It is, however, strongly recommended, especially for field service. When manes are clipped the clipping should be done close all the way up.

170. Clipping.—*a.* The clipping of heavy coats is strongly recommended. It should be done in the fall before the winter sets in and as often thereafter as may be necessary. During severe weather in cold climates it should be done over the neck and body only, leaving the hair on the legs. Special care must be taken to blanket clipped animals during sudden changes of weather and when it is extremely cold or damp. The least inclement days should be selected for clipping animals.

b. Power clippers are best for clipping animals, though hand clippers will serve the purpose. Clipper heads and blades must be used with care, as they are easily dulled and broken. They can be resharpened and should be as often as may be necessary. Clipping should follow grooming, as many blades are broken by sand and dirt in a dirty animal's coat. While using power clippers a small pan of kerosene oil should be at hand and the clipper head immersed frequently with the machine running.

171. Washing animals.—The washing of animals as a general practice is to be strongly condemned. Cleaning legs by washing should not be permitted, as scratches and grease heel result. Whenevr an animal is washed he should be treated. as prescribed in paragraph 165 for cooling out animals.

172. Blanketing.—*a.* Blankets are used for the following purposes:

(1) As a protection against cold and storm.

(2) To cool out wet or heated animals.

(3) To conserve the ration by conservation of heat energy during severe weather.

(4) To improve the coat.

(5) To protect thin-skinned and clipped animals from flies.

(6) As a protection against chill in the case of sick animals.

b. Both lined and unlined blankets are issued. A serviceable fly sheet can be made from grain sacks. Horse blankets should be worn while at rest only.

c. Blankets must be properly adjusted and secured; otherwise they are apt to slip off and become torn. All straps and fastenings must be kept in good repair. Blankets must be kept clean. Those used on animals suffering from communicable diseases must be thoroughly disinfected before being used on other animals.

173. Exercise and conditioning.—*a.* These subjects are very closely related, as conditioning is largely dependent upon the exercise and feed given. Animals are considered to be in fit condition when the body and muscular organs are in condition to perform without injury the work required. Fit condition is accomplished by systematic exercise and feeding, which must be continued even after the condition has been attained.

b. The exercise must be regular and graduated and always within the limits of the animal's strength. Working tired animals when unfit is very likely to cause accidents or disease. This is the time when they are most likely to sustain bad falls and sprains. But once animals are put in fit condition any work within reason not only is performed without great effort but adds to the quality of the condition already attained.

c. If animals are not worked for any considerable time the process of conditioning has to be repeated. The minimum amount of systematic exercise necessary to maintain animals in working condition is two hours daily. Ordinarily animals regularly exercised do not suffer by resting on Sunday, but the ration must be reduced accordingly.

d. The kind and amount of exercise given to animals depends upon the work they are to perform, the condition of the animals, and the number of men available to give the exercise. When there is one man available to exercise one or two animals, as in a troop of cavalry, the most satisfactory exercise can be had by organization under the supervision of the troop officers. But when there are many animals and few men as at remount depots and veterinary hospitals special means must be adopted.

e. Exercise tracks or rings are probably the most economical means of exercise, considering man power, but there is more danger of accidents than when riding one animal and leading another. A circular or oval track about 15 feet wide and inclosed between fences 5 or more feet in height is all that is necessary. The track surface should be springy and well drained. Animals should be admitted to the track in groups of not more than 24 at a time. There must be a rider to lead and one to follow each group. By this means the gait can be regulated and stampeding or crowding eliminated. Turning animals loose in corrals and driving them around is not recommended, as too many accidents usually occur.

f. Any form of exercise should begin with a period of 10 or 15 minutes at a walk so that good circulation may be established. It should end at a walk in order that animals may be returned to the stables dry and breathing normally. No exercise should be given on hard roads. When one man is exercising two horses he should ordinarily ride one out and the other in, and he should lead each horse alternately on his right and left. Playful or vicious animals should be led with a very short rein to prevent accidents.

g. Ordinarily the greatest part of the exercise should be at a walk. A fair proportion for the average riding animal in normal condition would be for a 2-hour period—walk 7, trot 2, gallop 1. This schedule varies of course with conditions.

h. The routes selected for exercise should be varied from day to day to avoid monotony. It is best to return by a different route from the one taken going out so that animals do not fret when they are headed toward stables.

i. Draft and pack animals should do a considerable part of their exercise drawing loads and carrying packs so that their muscles may be hardened to the work.

j. The quality and quantity of sweat is generally taken as an indication of condition. Profuse lathery sweat is a general indication of poor condition. Thirst and sweat, however, are to be expected in animals under exercise. The weather must also be taken into consideration. Warm or damp muggy days cause abnormal sweating, while on cool days it is often difficult to get up a sweat.

174. Care of the feet.—*a.* Every officer in charge of animals must continually watch the condition of the animal's feet and see that they receive proper care. Every man who rides or

drives an animal must do the same, reporting promptly to his squad leader or the stable sergeant any need for attention, no matter how slight. (See also Sec. V, Shoeing animals.)

175. Stable vices and their prevention.—*a. General.*—(1) Stable vices are objectionable habits of animals, practiced while idle, as in the stable or on the picket line, and caused usually by nervousness and restlessness, but not infrequently by poor stable management. As a general preventative to their contraction, animals should be kept out of the stables as much as possible during the day, either at work, on the picket line, or loose in the corral. During very cold, very hot, or stormy weather horses should not stand on the picket line or be at liberty in the corral.

(2) Most stable vices when once acquired are incurable, but they may be wholly or partially prevented, temporarily at least.

b. Weaving.—A nervous habit in which the animal rocks to and fro, similar to a bear kept in confinement. Such animals should be kept tied short and out of sight of other animals.

c. Windsucking and cribbing.—Nervous habits closely related. In windsucking an animal swallows air by arching the neck, drawing the head toward the chest, and giving a gulp. The cribber accomplishes the same end by catching hold of the manger with his teeth to obtain a pull and, as he gulps, emits a grunt. Both of these vices are incurable and are likely to be acquired by other animals stabled near by. They may be prevented by the use of a broad strap fitted tightly around the neck with a small wooden or leaden gullet plate stitched on so that it projects on each side and sticks into the throat when the neck is bent. Another method is to buckle a narrow leather strap around the neck rather tightly. Indigestion and colic frequently result from these vices.

d. Biting.—Usually the result of animals being teased by men in a playful way, but, once acquired, is a dangerous vice. As a preventative, teasing must be stopped, and if the animal is dangerous only one man should handle him. The danger may be lessened by use of a muzzle, a thick wooden bit, or a side stick. (See par. 176.)

e. Kicking against the stall.—This habit is usually acquired through lack of work. It may be cured by using a short chain, one end of which is fastened to a hobble around one rear postern, the other end attached to a small wooden ball.

f. Gnawing the woodwork.—A restless habit acquired by animals kept tied up without work or when deprived of hay. The cure is work and plenty of hay. The prevention is to wrap the woodwork with wire or cover it with tin.

g. Eating dung.—With some animals this habit may be classed as a vice. It is a morbid appetite resulting from poor condition, caused by chronic indigestion. Animals in fit condition seldom form the habit. The only prevention is to keep the animal in good condition, well fed and exercised, and tied so that he can not reach his own or other animals' droppings.

i. Greedy feeding.—A greedy feeder eats as fast as he can, grasping huge mouthfuls at a time and throwing his feed with his muzzle out of the box on the ground, and later eating the dropped grain. This results in indigestion, the bolting of feed, eating dirt and trash, and is wasteful on account of the amount of forage lost. To prevent this vice place several large stones in the feed box, feed the grain as chop, place a wire screen with half-inch mesh inside of the box and resting on the grain, or feed in a wide-bottomed feed box.

j. Tearing blankets.—The only prevention is the use of a leather muzzle.

k. Halter pulling.—This is an expensive and troublesome habit. The vice is usually contracted by the use of weak halters or ropes which permit the animal to break away when frightened. Tying with the reins has the same effect. As a prevention use a very heavy neck strap and tie rope. The vice is sometimes cured by tying a piece of rope around the animal's band just in rear of the forelegs, from which the tie rope is run between the legs through the halter ring and to the manger or picket line. After a few attempts to pull away the animal will probably give up. This should be applied for several days and then just a light cord tied around the band as a reminder.

176. Restraint and control of animals.—*a. General.*—In the management of animals restraint is sometimes necessary. The methods are varied and the one to be used depends largely upon the individual animal and the object of the restraint. Always select the mildest and least dangerous method that will accomplish the end sought.

b. The twitch.—(1) The twitch is the simplest, handiest, and most common method of restraint. It is effective in the ma-

jority of cases as a simple measure, but should be used always with caution and only when necessary. As it shuts off circulation in the lip, it should never be used continuously for an extended period of time and never with greater force than is actually necessary.

(2) A twitch is made by running a small piece of rope or rawhide through a hole in the end of a rounded piece of wood 2 to 5 feet long, such as an ax handle, and tying it into a short loop.

(3) The loop of the twitch is passed over the upper lip, which is seized by the hand and drawn forward, care being taken to turn the edges of the lips in so as to prevent injury to the mucous membranes. The cord is then twisted by turning the stick until sufficient pressure is obtained.

c. The side stick.—This method of restraint is used for vicious animals to prevent them from biting men while grooming or to prevent an animal from doing injury to a wound. The side stick is made from a stout wooden rod from 3½ to 4 feet in length, with a small cord or strap at each end, one for attaching to the noseband of the halter, the other to the surcingle.

d. The muzzle.—This means of restraint is useful to prevent an animal from eating bedding or chewing or tearing the dressing from a wound. Muzzles are best made of leather. They should be provided with attachments for fastening to the halter rings or with straps which are sewed to the muzzle and fastened over the pole.

e. The crosstie.—This consists of tying the head in an elevated position with two tie ropes. The ropes extend from the tie ring in the halter to opposite sides of the stall. The crosstie is useful to prevent an animal from chewing a wound or dressing and from lying down when it is desired to keep him standing.

f. The blind.—Blinds are used as a means of restraint for nervous or vicious animals. The desired docility is attained by depriving the animal of sight. A blind may be made in the form of a hood or of a piece of leather broad enough to cover the eyes and provided with strings for fastening to the halter.

g. Neck cradle.—The neck cradle is of value to prevent an animal from chewing or tearing a wound. It consists of from 8 to 12 pieces of hardwood about 1⅓ inches in diameter and about 18 inches long, pierced at each end by a hole through which is passed a cord or small rope. The rods are kept 3 or

4 inches apart by knots in the rope. The ends of the rope are tied at the upper border of the neck and so adjusted that the upper ends of the rods are just back of the lower jaw, the lower ends resting on the shoulders.

h. Knee strap.—In shoeing an animal or when operating on him it may be necessary to fix a foreleg. A strap or rope is used to fasten the postern to the foreleg. The leg is first well bent at the knee. A rope or strap is then attached to the postern by means of a loop and the free end passed over the forearm and back to the postern, drawn tight, and tied or buckled.

i. The side line.—For securing a hind leg the side line is used. It is made of ¾-inch rope about 20 feet long and a leather hobble provided with a ring. The hobble is placed around the postern of the leg to be raised and buckled snug. One end of the rope is secured around the animal's neck by a nonslip tie and the free end passed through the hobble ring and back through the loop. The leg is then brought forward by pulling on the free end of the rope and held in the desired position by an attendant. If desired, the leg may be drawn backward by tying a rope to the hobble and having an attendant draw the leg to the rear.

j. The casting rope.—(1) The casting rope is made of ¾-inch rope about 50 feet long. This is doubled and from 3 to 4 feet of the doubled end tied in a nonslip loop which is passed over the animal's head and adjusted about the neck. The free ends are passed backward between the forelegs and around the rear posterns or through hobbles, if used, thence upward and back through the loop at the neck. A strong man should hold the animal by the head and two assistants grasp the free ends of the rope and by a quick pull to the rear take the animal off his feet.

(2) When the animal is down the man at the head should grasp and hold the head firmly against the ground. At the same time the attendant handling the ropes on the side not against the ground should quickly draw the legs up against the side and secure them by a double half hitch made of the free ends of the rope. When one side is thus secured the animal may be rolled over and the other legs tied in a similar manner. Keeping the animal down is facilitated by the man at the head placing one knee on the neck and raising the animal's head from the ground.

(3) Casting can be done with least effort if one foreleg is secured by means of a knee strap. (See par. *h* above.) If it is desired to cast on a particular side it can be done by one attendant pulling in a forward direction on that side and the other pulling to the rear. When necessary to pass ropes around the rear posterns (case of hobbles not being available), always bandage the posterns to prevent rope burning.

(4) The casting rope may be necessary to secure an animal for an operation or, in rare cases, for shoeing.

k. The war bridle.—(1) This method of restraint produces effects that are lasting and beneficial, making the animal quieter, more tractable, and more amenable to discipline. Its use is especially adapted to the training of young animals to be shod and in handling the heads of unbroken or nervous animals.

(2) The war bridle is made and applied in the following manner: Take about 20 feet of $\frac{5}{8}$-inch, 3-strand hemp rope and make a 4-inch loop at one end. To apply, stand on the near side of the animal; place the loop in the mouth, inclosing the tongue and lower jaw; carry the rope up on the off side, over the poll, and down the near cheek to about opposite the eye; then double back over the poll, leaving a bight hanging; pass the running end of the rope along the off cheek and through the mouth between the upper lip and the gum and up through the bight on the near cheek, then down through the lower part of the loop; draw the free end snug without changing the position of the bight. A moderate pull on the rope tightens the bridle, producing pressure on the poll and to a lesser extent on the mouth. This has a strong moral effect, inducing the animal to stand quietly. The rope should not be pulled unduly tight, but always with only moderate tension and with a slight twitching to attract the animal's attention.

177. Records.—*a.* The following records are kept at each stable by the stable sergeant:

(1) Descriptive card of public animals (or horse record card).

(2) Record of stable property.

(3) Forage record.

(4) Shoeing record.

(5) Morning report of horses.

(6) Sick report of horses.

b. Descriptive cards of public animals are made out, one for each animal, on the prescribed form. The forms give the name and number of the animal, age, sex, color, and markings. They should contain a complete record of the service of the animal from the time of purchase until finally disposed of. Such data as training, by whom trained, qualification as to jumping, pistol and saber work, cross-country work, and sick-report record should be fully and accurately recorded on the descriptive list. Where spaces on the prescribed form are not adequate, additional sheets should be added so that all data of interest may be recorded.

All stable property and equipment are listed in the property record book, which has been ruled for the purpose. Any convenient form will suffice. The record should be kept accurately and should show each class of tool or equipment separately.

An accurate record is kept of all forage received, on hand, and consumed. It should be kept posted accurately from day to day. The form shown below will be used for the purpose:

FORAGE RECORD

---------- (Organization)

(Month) ---------- ------ (Year)

Date	Number of animals	Grain on hand	Grain received	Grain consumed	Grain balance	Hay on hand	Hay received	Hay consumed	Hay balance	Remarks

An accurate record of the shoeing of all animals of the organization is kept on the form which appears below and in the manner shown.

SHOEING RECORD

---------- (Organization)

---------- (Year)

Animal's No.	Animal's name	January	February	March	April	May	June	July	August	September	October	November	December	Remarks
T-10	Murat	5 / 10	9	11	10 / 30	15	----	----	25	20 / 29	18	20	16	Hind shoes removed and not replaced March 11. All shoes removed May 15, sick in stables May 15 to August 25.

EXPLANATION.—The circle appearing in the rectangle for any month represents the body of the horse. The lines outward from the circumference represent the legs of the animal. The number in the circle represents the day of the month. Thus, in the case of T-10, "Murat," this horse lost the shoe from his right fore on January 5 and the record shows that it was replaced that date. On January 10 his other three feet were shod. On February 9 he was shod all around. On March 11 he was shod in front and the remark shows that his hind shoes were pulled and left off. On April 10 he was shod in front. On April 30 he was shod behind. On May 15 all shoes were removed and not replaced. On August 25 he was again shod all around, etc.

A record is kept of all animals in the stables, showing the changes that occur from day to day. The form shown below, painted upon the bulletin board at the stable, will be used for this purpose:

MORNING REPORT OF ANIMALS

---------- (Organization)

	Duty	Hospital	Sick in stable	Being shod
Public horses				
Private horses				
Mules				

CHANGES

----------,
Stable Sergeant.

An animal sick report is kept at each stable. The following form in a book is recommended.

ANIMAL SICK REPORT

---------- (Organization)
From: ---------- (Date)
To: ---------- (Date)

Date	Brand	Name	Diagnosis	Status	Remarks

The first three columns are filled in before the animals are presented to the veterinarian, the organization commander signing on the line below the last entry. The sick report is presented to the veterinarian at sick call, who fills in the last three columns and signs his name on the line below the last entry. The fifth column is filled in by the letters H (hospital), S (stables), or D (duty). Animals marked H are admitted to the veterinary hospital, those marked S are returned to the stable and presented at sick call the next day, and those marked D are returned to the stable and not presented at sick call again unless further sickness develops.

Any advice of the veterinarian as to feeding and exercise of the individual animal should be entered under "Remarks."

SECTION III

FIELD MANAGEMENT

178. Condition.—It is most important that all animals be in fit condition before going into the field. If they are not it is impossible for them to undergo the fatigue and exposure incidental to it. Constant close supervision by officers is necessary in the field if condition is to be maintained.

179. Care of animals on the march.—*a. Rate and length of march.*—(1) Taking the rate when leading at 3 miles per hour, the walk at 4 miles per hour, and the trot at 8, cavalry, unaccompanied by other arms, can maintain a rate of 5 miles per hour, including halts, over any ordinary distance. This rate is capable of being kept up for long journeys where animals are in good condition and men are properly trained. Horse artillery can travel at the same rate as cavalry, horse-drawn artillery at 4 miles per hour, and wagon transportation at 3 miles per hour under favorable conditions. Single horsemen who are well trained and whose mounts are properly conditioned are capable of traveling 40 to 50 miles at a rate of 10 to 12 miles per hour. Such a rate can not be maintained by a mounted force of any size. As a rule the rate of march varies inversely with the size of the command. Forty to fifty miles a day, if continued for several days, will test thoroughly the condition of both men and animals.

(2) Except in emergencies, unseasoned cavalry and horse artillery should not march more than 12 to 15 miles per day. The distance is progressively increased 2 or 3 miles a day up to the normal daily march of seasoned troops. Unseasoned draft and pack animals should not exceed 6 to 10 miles per day. Seasoned cavalry and horse artillery average 25 miles per day; horse-drawn artillery, 15 miles; trains, 15 miles, and under favorable conditions 25 miles per day; pack transportation, 20 to 25 miles per day.

(3) In general, a march should be completed as quickly as possible, provided an average rate is maintained.

b. The start.—When practicable, daylight marches begin at as early an hour as is consistent with allowing ample time for the men to breakfast, animals to feed, and transportation to be

loaded. Unless military reasons demand or climatic conditions require, a march should not begin before daylight. In the dark, feeding arrangements are not satisfactory; saddles, packs, and harness may not be accurately adjusted.

c. Gaits.—The first 15 minutes after leaving camp or stables should be at a walk. The trot should be used on level ground where the going is good, and the walk and leading on hills or over bad or heavy stretches. When horses are out of condition for any reason the periods of leading must be lengthened and the rate of march decreased. The gait for single horsemen should be varied as much as possible, the walk, trot, and canter all being utilized. No gait should be maintained so long without a change as to weary either animal or man. After 10 to 12 minutes at the trot a short walk should follow. Depending on conditions, mounted men should lead from 10 to 20 minutes of each hour spent on the march.

d. Formation.—(1) On muddy, sandy, or very dusty roads mounted troops usually march on both sides of the road with a view to permitting men and animals to pick their way. On hard-surfaced roads riding animals should be kept off the road if the going at the sides is soft and suitable. Vehicles should always keep to the firmest and smoothest routes.

(2) If the military situation permits, troops should travel in small bodies with a sufficient distance between them to allow dust to settle or blow away. The position of units in column from head to rear should be rotated each day.

e. Halts.—(1) A halt of 15 minutes is usually made at the end of the first 45 minutes of marching for the purpose of permitting troops to relieve themselves, adjust equipment, inspect shoeing, inspect loading, etc. Subsequently a short halt of 5 or 10 minutes should be made hourly.

(2) It is generally desirable to finish the day's march as soon as practicable; long halts in the course of a daily march are not made unless special conditions require it. This applies to marches of less than 25 miles. For marches of over 25 miles, or under conditions of excessive heat, a halt of from 1 to 4 hours should be made toward the middle of the day.

(3) At halts the command should be disposed to facilitate grazing. During long halts saddles, packs, or harness should be removed, if practicable. In any case cinches of riding animals should be loosened and part or all of the packs removed. Sad-

dles should be raised just off the backs to relieve pressure and allow blood circulation to be restored. During short halts saddles and packs should be adjusted, men working in pairs. Each man should look over his animal and lift each foot to see that stones have not been picked up and that shoes are tight. Officers and noncommissioned officers should inspect the animals of their units.

f. Watering.—See paragraph 153.

g. Feeding.—On the march the principle of feeding little and often should be adopted. At every halt of sufficient duration the nose bag should be put on. Nose bags must be adjusted so that the horse can reach his grain easily; otherwise tossing of the head and loss of grain will result. Half way through the feed it will be necessary to adjust the nose bag for this reason. Animals must be allowed to graze at every opportunity. See also Section I, Feeding and watering.

180. Crossing streams.—*a. Fords.*—(1) When crossing a stream at an unfamiliar ford or where there is no ford the crossing should invariably be examined before committing the command to it. The sound sand footing of some safe fords begins to wash away after several animals in columns have passed and the ford rapidly deepens. In such cases the crossing should be made on a wide front.

(2) Deep streams should be crossed on a relatively wide front to prevent damming; streams with treacherous bottoms, on a narrow front, and with limits of the ford marked.

(3) Animals should be allowed to drink before getting well into a dangerous ford, but having been committed to the crossing must be pushed vigorously ahead and not allowed to stop. It is well for riders to take their feet out of the stirrups if the current is swift. Eyes must be fixed on the point of the opposite bank toward which one is riding and not on the water.

(4) Quicksand is dangerous and frequently shifts. Crossings on this kind of bottom should be avoided.

b. Ice.—See Basic Field Manual, Volume I.

c. Swimming animals.—(1) For swimming streams of moderate width the following method is practicable and safe: A good swimmer crosses and carries with him sufficient rope or joined lariats to reach across the stream. A man on the near bank attaches the near end of the rope to the animal's halter and an equal length of rope to his tail or saddle and pushes him into the stream. The soldier on the far bank can easily guide the

animal across and the latter tows the tail rope. When the animal has reached the far bank both ropes are taken off and tied together, the knot pulled back to the near side, and another animal crossed. Each man who can not swim catches hold of an animal's tail and is towed across in safety. This method is not slow and it takes little time to get an organization across.

(2) The following method is the best for crossing wide, swift rivers:

(*a*) Procure boats or rafts. They usually can be found, or rafts can be constructed. If there are no boats and rafts must be used, then, by the use of a number of lariats fastened together and doubled, a cable can be improvised so as to make a good ferry. This cable is gotten across to the far side by one or two good swimmers, swimming alone or with exceptionally good animals. The cable is fastened on both banks of the stream, and the raft, which should be light but capable of holding six or eight men, is pulled across by hand, aided by poles if the stream is not too deep.

(*b*) The animals are stripped, except halters, and the equipment is ferried across. Several animals are crossed either by swimming or by being led from the raft. These animals, after crossing, are stood on the opposite bank in plain sight of the others. Those not yet across are held in column of twos, with the natural leaders of the organization herd in front. Halter shanks are fastened close around the necks, using knots that do not slip. A few men who are excellent swimmers attempt now to swim with the leading animals across the stream. Usually, after some delay and difficulty, the leading animals of the column see those on the opposite bank and show signs of wanting to join them. The men holding the animals in the column then turn them loose and the whole column follows the leading animals across. This method is particularly applicable after the animals have had a few such experiences in crossing streams. It may be necessary to swim or lead across from the boat or raft quite a number of animals before the desire of the remaining animals to join them is shown. This method keeps the equipment dry and gets the timid or poor swimmers across safely.

(3) (*a*) Animals are towed from boats or rafts by means of the halter shank. The boat or raft should move at the same rate that the animal swims. Three or four quiet animals can

be taken across at a time; difficult ones should be taken separately.

(*b*) An animal towed from a small boat should be to the rear and downstream.

(4) Streams not over 30 yards wide may be swum in column of twos without unsaddling, men retaining their seats in the saddle. Men's knees should be held well up to lessen resistance to the water; steadiness in the saddle should be maintained by grasping the pommel. This method is risky for organizations not well trained in swimming and crossing streams with animals. Unless time is important, it is better to cross by one of the methods prescribed above. Men must be cautioned not to pull on the reins.

(5) Swimming animals must have absolute freedom of the head and neck. Absolute calmness, determination, and quiet must prevail. The least excitement on the part of the men is sure to confuse and frighten the animals.

181. Care of animals in camp.—*a. The camp site.*—The camp site should be on well-drained high ground, and due consideration should be given to shelter from cold winds or, in summer, to shelter from the sun. Exposure to cooling winds is of great importance during hot weather. Convenience to watering places and grass must be considered. Level standings, but with sufficient fall to carry off storm water, are essential.

b. Water supply.—(1) When water is gotten from a stream the watering place for animals should be located below that designated for drinking water for men and above the place prescribed for washing clothes and bathing.

(2) The principles of watering are given in paragraph 152.

c. Restraint.—(1) By whatever method the animals are secured, it should be carried out in such a manner that they are not likely to injure themselves or their neighbors. The comfort of the animals should be studied as far as possible, but the prevention of injury is of the first importance. It is at the commencement of operations that this matter calls for most attention.

(2) A field picket line may consist of a single long rope or of platoon picket lines stretched in prolongation of each other when the single line is to be used by the organization. The ends should be securely pegged down or tied to wagon wheels or trees. In any case the line must be kept taut to prevent

animals getting their feet over the rope and producing burns. If the line is on the ground, animals must be tied short. Horses usually harm themselves on their own tie ropes or on the tie rope with which another animal is tied. When ground lines are used, men must be kept on duty constantly to prevent injury to the animals. If the necessary materials are at hand, picket lines should be raised 3 or 4 feet from the ground. A ground line should never be used when an elevated line is practicable. In permanent or semipermanent camps a double set of lines should be provided. This permits a change of standing and will be found a great convenience. Where aerial attacks are probable several lines separated by appreciable intervals will be necessary. Adequate camouflage must be provided if lines are in the open. (See Basic Field Manual, Vol. I, Field Service Pocketbook.)

d. Feeding.—(1) *General.*—The general principles of feeding should be adhered to as far as circumstances allow.

(2) *Hay.*—The use of hay nets should be considered. Without them, hay, always wasteful, becomes doubly so in wet and windy weather. The mesh should be of such size that a small quantity only can be pulled out at once. The nets should be secured to the picket line. If nets are not to be had hay should be fed by breaking up the bales and distributing it along the picket line. It should be fed in small quantities and frequently renewed. This is very necessary in prolonged wet weather, and if the rain is not continuous it is better to withhold hay altogether till the shower is over. To avoid waste, bales of hay should only be broken as they are actually required and should be carried to the animals before this is done. The cover of a wagon may be used for mixing feeds and for covering forage when not in use. Grazing should be afforded at every opportunity.

(3) Grain is fed by issuing the proper amount to each man who feeds his animal individually. Nose bags require frequent cleaning. They should be removed and turned inside out to dry as soon as the animal has finished feeding. Any grain left in the nose bag should be spread on a paulin to dry and used for the next feed. Under no circumstances should such grain be scattered on the ground in front of the animals. To do so invites serious dirt or sand colic, due to the fact that a certain quantity of these materials is picked up with the grain by the

animals, and this is apt to cause indigestion and kindred diseases. Any grain spilled out of the nose bag by an animal should be swept up for similar reasons.

e. Protection of forage.—In semipermanent camps more or less large accumulations of forage are liable to occur at organization picket lines. If conditions are such as to permit the building of temporary shelters over these accumulations large quantities will be saved. If the construction of such shelters is impracticable all forage should be piled on timbers to keey the surface water from the bottom layers and to permit the air to circulate freely underneath. Paulins, if obtainable, should be used to cover the piles. In one-night camps or when the supply of forage is consumed about as rapidly as it is received the protection of forage against dampness is not so important. But even here it will be profitable to take such simple precautions as are possible with the materials at hand. Day and night guards are usually placed over all forage piles and the guard over animals is made responsible for the safety of all piles at the picket line. In the absence of such guards the stable sergeant is responsible to the organization commander for the protection of such forage as pertains to his organization.

f. Stable tools.—Stable tools are at a minimum in the field. At most they consist of a few shovels and forks. Brooms may be improvised by tying brush into bundles of convenient size.

g. Horse blankets.—(See par. 172.)

h. Protection from weather.—Windbreaks may be easily constructed and should be placed to the windward of the picket line. Roofed shelters of a temporary nature may be erected, but they should be solidly constructed so as to be safe in any storm.

i. Protection from the sun is desirable in hot countries. Any improvised structure may be employed as a shelter during the day.

j. Stampedes.—To prevent stampeding in camp it will in most cases be sufficient for the men to go quietly among the animals and speak to them. If animals are stampeded, men should mount the fastest animals within reach, place themselves in front of the herd, and conduct it back to camp.

k. The picket lines demand constant attention. The natural lay of the ground should be taken advantage of to get rid of storm water and small clean-cut drains constructed in suitable directions to assist in its rapid removal. All rubbish should

be cleared from the picket lines and the standings kept level in order that the animals may take a proper amount of rest, which they will not do if the ground is very uneven. For this purpose the free use of sand will be found of advantage. It fills in the hollows which are inevitable when the camp is occupied for any time, soaks up urine, and keeps the picket lines dry. Dung and other refuse should be removed regularly to a considerable distance from the picket lines, as it attracts flies. Manure pits or heaps should be downstream from the camp to avoid any chance of contaminating the water supply. During hot weather, and particularly when flies are numerous, semi-permanent camp picket lines standings must be burned off twice each week. This is done by covering the standings with a small quantity of straw. This in turn is soaked with crude oil and the whole is burned.

1. *Care on arrival in camp.*—(1) On arrival in camp cinchas should be loosened immediately, then packs removed. Saddles should be left on for about 10 minutes, after which they should be removed and the blanket, with dry side in, placed on the back. The blanket is secured by the surcingle, adjusted snugly. Blankets may be removed in about 30 minutes, though if backs are wet and the sun hot the blankets should be kept on until the backs are dry. A good hand massage of the back at this time is excellent. These precautions are necessary to prevent too rapid resumption of circulation, which will cause bunches and finally sore backs. After the blanket is removed the back should be massaged before grooming.

(2) Saddle and cinch sores must be carefully treated. To prevent repetition, packs and saddles may require readjustment before the next day's march. Swellings should be hand massaged, bathed with a salt solution or even plain cold water, and in bad cases a cold pack applied. If treated thus they frequently disappear by morning.

SECTION IV

PREVENTION AND FIRST-AID TREATMENT OF DISEASES AND INJURIES

182. Appearances of health.—In health the animal stands with the front feet square and firm on the ground. One hind foot may or may not be resting on the toe. A fore leg is never rested unless there is something wrong with it. The head is

held erect, the eyes are wide open, and there is a lively play of the ears.

a. The skin is loose, supple, and easily moved about over the structure beneath. The coat is smooth, sleek, and glossy. In cold weather, unless blankets are used, the hair stands upright and the coat becomes heavy and coarse and loses its gloss.

b. The pulse is strong, full, and regular. It beats from 36 to 40 times per minute. The number of beats is increased by exercise or excitement. The pulse is taken by placing the fore or middle finger crosswise on the artery at the edge of the lower jaw, counting the pulsations for half a minute and then multiplying the result by two.

c. Respiration is free, soft, and noiseless. The number of respirations per minute are approximately as follows:

At rest	9 to 12
After walking 200 yards	28
After trotting 5 minutes	52
After galloping 5 minutes	52

After a cessation of exercise the breathing should subside quickly to normal. At rest the ratio of respiration to heart beat is about 1 to 4. The respirations are counted by watching the rise and fall of the flank, the movements of the nostrils, or on a cold day the steamy expiration of breath.

d. The temperature varies from 99° to 100° F. It is increased by exercise or excitement. Age has a slight influence, the temperature being higher in young animals and lower in old ones. In the Tropics it may average as high as 100.5° F. The temperature is taken with a clinical thermometer in the rectum. The thermometer is moistened or oiled, the mercury is shaken down to 96° or below, the bulb of the thermometer is inserted in the anus and allowed to remain three minutes, when it is withdrawn and the temperature noted.

e. Defecation occurs 8 to 10 times in 24 hours, the droppings being fairly well formed, free from offensive odor, and varying in color from yellow to green, according to the nature of the food. The amount of droppings passed in 24 hours varies from 36 to 40 pounds, depending upon the size of the animal and the amount of food given.

f. Urine is passed several times daily in quantities of a quart or more. It is a thick, yellowish fluid. The quantity passed in 24 hours varies from 3 to 6 quarts. During the act of urination

the animal straddles, grunts, and assumes a very awkward position, which must not be mistaken for pain.

183. Indications of disease.—*a. Common indications.*—The most common preliminary indications of disease are partial or total loss of appetite, elevation of temperature, accelerated breathing, listlessness, dejected countenance, stiffness, profuse sweating, nasal discharge, cough, diarrhea, pawing, rolling, lameness, inflamed mucous membranes, reluctance to move, "stary" coat (that is, standing on end), and loss of hair or intense itching.

b. Inspection of sick animals.—The best time to inspect animals with a view to detecting the sick is when they are being fed. This is because one of the first and most constant symptoms is impaired appetite. Take the temperature of any animal not eating. Sick animals in a corral are inclined to stand by themselves. Listen to coughs and make each animal move around a little. On the march animals should be inspected at halts, also after unsaddling in camp.

184. Administration of drugs.—The following methods of administering drugs internally by other than Veterinary Corps personnel are prescribed:

a. Orally—by way of the mouth.—(1) *Drenching.*—This method is used when large doses of liquids are to be given. The animal is confined in a single stall or by other means; the head elevated by means of a strap passed over the upper jaw in the interdental space and then over a timber above. The free end of the strap is held by an assistant and is not fastened. The medicinal agent should be administered from a long-necked bottle made of glass or hard rubber, preferably the latter, and inserted into the mouth through the interdental space. Only small amounts are given at a time and the animal is allowed to swallow before more is given. The possibility of some of the medicine entering the lungs renders this method hazardous. Its use is not recommended unless the attendant is thoroughly acquainted with the procedure.

(2) *Syringing.*—This method is safe and should be used ordinarily. The rubber syringe is utilized to introduce the liquid into the back part of the mouth.

(3) *Bolling.*—It is extremely difficult to administer a pill by hand. Ordinarily a twitch is employed and the tongue of the animal is held to one side with the hand. The pill is then thrown well back into the mouth and the tongue released.

Swallowing is aided by rubbing the wind pipe. If practicable, a bolling gun should be used for administering a pill.

b. By way of the rectum (enema).—Nonirritating drugs. water, or food may be administered by injection into the rectum with a long-nozzled syringe or a rubber tube. Oil or grease the end of the nozzle or tube inserted in the rectum. Care must be exercised not to injure the lining of the rectum nor to puncture its wall. Enemas must be copious to be effective.

185. Nursing.—Good nursing is indispensable in the treatment of sick and injured animals. The chief points to consider in nursing are:

a. Ventilation.—Allow plenty of fresh air but protect from draughts. Avoid extremes of temperature, and in the field provide shelter from wind and rain. Utilize grass lots and corrals whenever possible.

b. Clothing.—The amount of clothing must be regulated by the climate. In winter woolen bandages on the legs are useful, and as many as three or four covers may be used. In summer fly sheets are extremely comforting.

c. Bedding.—A good clean bed induces an animal to rest more and produces a soft springing surface for foot cases. It should be shaken up several times daily and be kept free of urine-soaked straw.

d. Stalls.—A roomy box stall, well bedded, should be used whenever possible. Keep a bucket of water in the stall and change the water frequently.

e. Shoes.—The shoes may be removed and the feet leveled if the animal is to remain in a stall for more than a few days.

f. Convalescent patients should receive just as much exercise as each individual case permits. It must be borne in mind, however, that absolute rest is one of the very best treatments.

g. Grooming.—Animals that are weak and depressed should not be worried with unnecessary grooming. Such animals should be carefully hand rubbed or wisped at least once a day, and their eyes, nostrils, and docks should be wiped out with a sponge or soft cloth. The feet should also be cleaned.

Animals that are only slightly indisposed should be groomed in the usual way.

Animals with tetanus should not be cleaned at all.

h. Food.—Some sick animals retain a good appetite. The principal things to observe in their cases are that they are not overfed, that droppings are kept soft, and that they have plenty

of water. Sick animals with impaired appetites require special attention. They often relish a change of diet, a bran mash, steamed oats, chopped alfalfa, grass, roots, and apples. Feed small amounts often, do not allow uneaten portions to remain in front of them, keep mangers and feed boxes clean, induce eating by hand feeding, sprinkle a little sweetened water over the hay and grain. The forced feeding of liquid foods by means of drenches or enema may be used as a last resort.

186. General measures for dealing with contagious diseases.—*a. Segregation.*—Animals should be divided into three groups—affected, suspected, and healthy. The suspected should include all those which have been in contact with the diseased. Attendants, watering, feeding arrangements, and all equipment should be included in this separation and should be kept separate until the outbreak it over. The distance between different groups should, if possible, be sufficiently far to prevent any chance communication between them, or, when military considerations restrict the available space, fencing of some sort should inclose each group. If there is a prevailing wind the healthy should be placed to the windward and the suspected and affected to the leeward in the order named. Once an animal is placed in the affected group it should remain there until all danger is over and on no account be replaced among the healthy, although it may perhaps have been moved in error in the first instance.

b. Disinfection.—Strict cleanliness of picket lines, equipment, water troughs, feed boxes, and feed bags, and personal cleanliness of attendants is in itself a good safeguard against the spread of disease.

c. Inspections of all suspected and healthy animals should be carried out daily. In cases where it may be a guide the temperature of suspected animals should be recorded.

d. Destruction of animals.—To shoot an animal use preferably a pistol. Stand close, with the pistol almost touching the forehead and held at right angles to the head. The head can be brought into a convenient position by offering a handful of grain. Aim at the center of the forehead, well above the level of the eyes, just below the place where the lowest hairs of the forelock grow. The animal will not fall forward, but collapse exactly where it stands.

e. Disposal of dead.—This is a consideration of importance. All carcasses of animals dying as a result of communicable

disease should be burned, if practicable; otherwise buried and covered with quicklime, if available. When buried they should be burried at depth. These are the safest methods of disposal and when practicable should be adopted, as the practice of leaving carcasses about the line of march is a great danger to all troops following. Litter should be burned over ground where discharges from the dead have fallen.

187. Communicable diseases.—Glanders-farcy is a communicable disease peculiar to the horse and mule. It is occasionally communicated to man. It is very slow in development in many cases and may lie dormant in the system for a long time. It is communicated from one animal to another by the discharges from the disease, and consequently calls for very strict measures of precaution when dealing with an outbreak.

(1) *Symptoms.*—The visible symptoms are a slight, sticky discharge from the nose, usually from one nostril, a hard lump under the jaw on the same side as the discharge, the lump feeling as if it was stuck onto the jaw and not freely movable. Small sores, called farcy buds, may appear in the nostril or in certain places on the skin. These have the same sticky discharge as seen from the nose and show no inclination to heal. When these sores are found on the legs the disease is popularly known as "farcy," but it is the same disease as glanders. The glanders-farcy ulcer is a small, ragged-edged, angry sore, covered after it bursts with a glutinous, not very copious, discharge. They occur in lines, one below the other. The common situations for them are in the nose, down the inner sides of the legs, and occasionally on the neck and face. In their neighborhood the lymphatic vessels may be seen standing out under the skin like knotted cords, and it is along the course of the cords that the sores occur. Cases of this disease may linger on for a considerable period after these symptoms are observed. Every case should be destroyed when the disease has been confirmed.

(2) *Measures for dealing with an outbreak.*—The obviously diseased are slaughtered and those that have been in contact with them segregated. Carry out strict disinfection of standings and equipment. A daily inspection of all animals is made, especially of the nose, beneath the jaw, and along the insides of the legs. This disease almost invariably appears in campaign, and all cases with nasal discharge, especially if on one

side only, should be regarded with suspicion and placed under observation.

Remedial measures are of no use, and, once a case has been decided to have glanders, it is destroyed and the carcass and equipment burned or buried. The use of the diagnostic agent "mallein" now enables the Veterinary Corps to deal with glanders in a much more satisfactory manner than previously. As a precaution all remounts on joining the service are tested with it to ascertain their freedom from the disease.

b. Epizootic lymphangitis.—This is a contagious disease which affects horses and mules. It is highly contagious and may lie dormant in the system for a considerable time. The symptoms are the development of small abscesses along the course of the lymphatic vessels and generally down the legs, though they may appear in other parts of the body, which become swollen and are very similar in appearance to the condition described under glanders-farcy. There are certain distinctions, however, among which are the readiness with which the sores heal, the fact that the inflamed condition of the lymphatics and resulting abscesses always have their original starting point from a wound, and, generally, the absence of fever symptoms. Nevertheless, the symptoms and appearance of both diseases are so similar that very great care should be taken to isolate all cases in the most rigid manner.

c. Contagious stomatitis.—This disease is a mild contagious inflammation of the mucous membrane of the mouth, involving sometimes the mucous membrane of the nose and the skin of the lips.

(1) *Cause.*—The cause is unknown. The disease is spread by the saliva of the sick, which contaminates the food and water of other animals. It is also spread by the hands of attendants, grooming kits, etc.

(2) *Symptoms.*—The animal takes its food slowly and chews with great care. There is always more or less slobbering, the saliva hanging from the mouth in long threads. The animal holds the mouth shut. If opened a quantity of saliva spills out. The mucous membrane of the mouth is reddened. The lips and cheeks are often swollen and tender. On the mucous membrane of the lips, gums, tongue, roof of the mouth, and beneath the tongue appear hard, red elevations about the size of a pea, from which in a few days little blisters are formed.

Sometimes small abscesses are formed, which break and leave behind small round ulcers. These ulcers and blisters usually heal in five or six days, leaving a white scar. The lump is usually slightly elevated. The disease usually ends in recovery in about two weeks.

(3) *Treatment.*—Feed soft food and allow plenty of fresh drinking water. Wash out the mouth three times a day with creolin, 1 per cent solution.

d. Coughs and colds.—(1) Coughs and colds are usually caused by sudden changes of temperature and exposure to drafts when heated or in stables. A cold (catarrh) is inflammation of the lining of the nostrils. A cough is produced by inflammation of the lining of the throat (sore throat). The two very frequently accompany each other. The symptoms are discharges from the nostrils and the presence of a cough. The discharge is at first watery, but in the course of a few days it becomes grayish and thicker and then alters to a yellowish color. It runs freely from both nostrils and does not smell. The cough varies somewhat, according to the state of the throat. If the lining is dry and hot, it will be a short, painful one, but when there is much phlegm it is hoarse and longer. In severe colds fever may accompany them, and in such cases additional care should be taken to prevent the chance of the lungs becoming inflamed. What appears to be colds and sore throats may be the beginning of strangles and pneumonia.

(2) *Treatment.*—General attention to comfort. Steam the head to promote free discharge. Rub the throat with a liniment consisting of solution of ammonia 1 part, oil of turpentine 1 part, and olive oil 2 parts. If the cough is very painful only such food as is easily swallowed should be given and the state of the bowels should be carefully attended to.

e. Inflammation of the lungs.—Pneumonia may occur from the extension of a cold into the lungs, or may, especially among horses, arise without any visible cause, when it should be treated as a contagious disease and the case segregated. In outbreaks of influenza among animals it is a somewhat common form for the disease to take.

(1) *General symptoms.*—The animal will probably be noticed dull and off feed; there may be a history of a cold or cough for a day or two previously and the animal stands still with the fore legs probably a little wide apart, the breathing hurried, the

pulse fast, and the temperature high. The lining of the eye will be generally found a brighter red than normal and the bowels are usually constipated. From day to day the changes observed are slight, the pulse remains fast but gets gradually weaker, the breathing remains hurried but may become more shallow, the temperature keeps high, and the appetite is gone or capricious. After a few days the animal begins to get visibly thinner. A slight rusty-colored discharge may be sometimes observed from the nostrils and a painful cough is ofen a constant accompaniment. When the ribs over the lungs are struck with the tips of the fingers the sound produced is duller than is natural.

(2) *Treatment.*—In this disease, above all others, good nursing is necessary. The great thing is to get the case to eat sufficient food to keep up the strength. Every variety of food may be tried to tempt the animal and small quantities of different sorts should be left in the stable at night. Water should be kept within easy reach and changed whenever fouled. Warm enemas and green food should be frequently administered if the bowels are constipated, but aloes balls should not be given. If the case is weak a daily stimulant is beneficial. After recovery a long rest is essential to allow the lungs to get back their elasticity.

f. Strangles is a fever of young horses and mules, the prominent feature of which is an abscess which develops between the branches of the lower jaw. There is also fever and in many cases the animals may be off their feed and get thin. It is contagious, but large outbreaks are chiefly confined to remount depots. The disease is a serious one and occasions severe animal losses. It is closely associated with one form of pneumonia.

(1) *Symptoms.*—Fever and swelling beneath the jaw. This swelling is at first hard and diffused, but within a few days it becomes prominent in the center between the jaws and gets soft at the point. It then bursts and generally heals rapidly.

(2) *Treatment.*—Feed the animal well and pay attention to the droppings, keeping them soft. When the abscess has burst or been opened the discharges must be destroyed, as the disease is contagious and its prevention is important. The general rules for dealing with contagious diseases and wounds apply.

g. Influenza is a contagious fever which attacks horses and mules. It is chiefly to be feared when large bodies of animals

are suddenly collected together, especially if the sanitary surroundings are not good.

(1) *Symptoms.*—Fever and great lassitude, with generally a highly colored lining to the eye (pink eye), which may also be considerably swollen. When the disease attacks the chest and air passages there will be discharge from the eyes and nose, resembling that described under catarrh, and in severe cases inflammation of the lungs may follow. In another form there may be rapid swelling of the legs. Occasionally the bowels are affected and there is diarrhea. It is easily communicated from one animal to another and the usual precautions for dealing with contagious diseases should be observed.

(2) *Treatment.*—In this disease the weakness of the patient is great and the wasting rapid, while the appetite is often wanting, or at any rate capricious. Nursing is of great importance and every endeavor should be made to get the patient to eat in order to keep up the strength. The body should be clothed and the legs bandaged warmly, while, if stabled, drafts should be avoided. After recovery ample rest should be given to recover the strength before being put to work again.

h. Surra is a fever produced by a parasite in the blood, affecting chiefly horses and mules. It usually appears in swampy districts or countries and is most prevalent during the rainy season. The parasite is conveyed from one animal to another by means of flies. It is not found in the United States, but occurs in the Philippine Islands and other tropical countries.

(1) *Symptoms.*—The symptoms are fever, which appears and disappears or gets less every few days; dark red spots on the lining of the eye and nose, which are often yellowish; the appearance of nettle rash over the body; and, later on, swelling of the legs and lower surfaces of the body. The animal gets thin and weak and usually dies in about six weeks from the time it was noticed to be ill.

(2) *Measure for dealing with an outbreak.*—The disease is incurable. Immediately after the diagnosis of surra is established the animal should be removed from others and destroyed. Suspicious cases must be isolated and so handled as to be inaccessible to flies.

i. Anthrax is a rapidly fatal disease, produced by the growth of a germ in the blood. It attacks all animals and may be conveyed from one to another, but is most generally caused by the germ being consumed in the food or water.

(1) *Symptoms.*—The general symptoms are high fever, want of appetite, rapidly increasing swellings in various parts of the body, spotting and purple coloring of the lining of the eye and nose, bloody discharges from the nose and sometimes the bowels, and rapid death. The patient may be found in many cases with swelling of the throat, which rapidly increases. This swelling, which is common in all cases of the disease, is rather soft and doughy to the feel. The finger pressed into it will leave a dent. It may occur in the chest or belly—when chest, symptoms of colicky pains will be shown. Later a rusty or bloody discharge may be seen to run from the nostrils. Death occurs in about 24 to 48 hours.

(2) *Prevention.*—As the disease is usually introduced by the food, this should be changed when possible. There is little danger of animals getting it from one another if strict precautions are observed. These are as follows: Separation as soon as found ill and burning of all equipment, droppings, feed, etc. In stables, walls should be scorched with a flame as high up as the animal can reach its nose, scraped, and washed with a strong disinfectant. The top layer of earth should be removed from earthen standings and burned. Carcasses should be burned whole.

(3) Curative measures are usually of no avail. Upon discovery of the first case in a command the rest should be immunized.

j. Mange is produced by small parasites which live in or on the skin. It is found in all animals and each class of animal has its own particular variety of itch insects. In the field this disease is a constant source of trouble and loss and deserves particular attention, as it is very easily spread and often cured with difficulty. In the horse and mule there are two troublesome forms:

The dry, produced by insects which live beneath the skin.

The moist, in which they are found on the surface of the skin.

(1) *Symptoms.*—In both cases the common situations for the disease to be first noticed are on the head, withers, and back, and sometimes but less frequently the quarters. In the dry form small pimples may be felt about as big as a pin's head and from these the hair falls, leaving a small pea-sized bald spot. In the wet form a moist, rapidly increasing patch will be seen, from which the hair falls, and in both cases there is severe

itching. If the place be gently scratched the animal will smack or nibble with his lips and lean and rub against the hand. When being groomed they will lean heavily against the brush and when loose they will scrub against anything rough with such violence as to make the skin bleed.

(2) *Treatment.*—Segregation and strict disinfection. Clip off the hair and burn it. Dress the case thoroughly, if possible, all over with a parasiticide. Keep the dressing on for several days and rub it in lightly daily with the hand. Then wash well with soap and water and keep under observation for at least three weeks. Keep the animal well fed, but clothing should be withdrawn from any unit in which the disease exists until the outbreak is over, as it is one of the main sources of contagion. All equipment, blankets, etc., should be soaked in a disinfectant before being used again. Daily inspections of all animals of a unit which has many cases of mange are imperative and all long coats should be clipped to allow of easier examination.

k. Tetanus (*lockjaw*) —(1) *Cause.*—Tetanus is caused by a germ which gains entrance to the body through wounds. The germ is found in the ground. It most usually, therefore, enters such wounds as pricks of the feet and broken knees which come in contact with the soil. The symptoms are stiffness and constant spasms of the muscles of the jaws (lockjaw), neck, and back. The other muscles of the body may be affected, but it is most noticeable in those mentioned. The jaws are fixed, the tail is drawn to one side, and quivers. If the head is lifted up the haw or third eyelid appears and the animal is very easily startled. The mouth is often seen covered with food from the patient's effort to eat, and this may be the first thing to draw attention to the case.

(2) *Treatment.*—Keep the animal as quiet as possible, separated from others, and away from all noise; give a noiseless bed which is easy to walk about on, such as sand or old short bedding. Feed on plenty of boiled, sloppy food which the animal can suck down. Give at the outset a dose of physic and, having plenty of food and water within easy reach, do not allow anyone near the animal for 12 hours at a time. Absolute quiet is the best treatment. In all cases look for wounds and thoroughly cleanse and treat them with antiseptics. Cases which live over 10 days generally recover if carefully nursed.

l. Tinea (*ringworm*).—Round bald patches covered with grayish scales, usually about the size of a quarter, caused by a

fungus growth at the root of the hairs. It is contagious but not always serious. Clip off the hair around the patch and dress with iodine (tincture or ointment), both over and around the spot.

188. **Noncommunicable conditions.**—*a. General.*—There are many noncommunicable diseases from which animals suffer. Only the more common ailments, with which the personnel of mounted commands should be familiar, will be mentioned in this manual. In many cases Veterinary Corps personnel will not be available and minor ills may be cured by a little knowledge of their symptoms, causes, and principles of treatment.

b. Spasmodic colic.—Gripes.—(1) *Symptoms.*—The suffering is very violent but of short duration; the spasms appear suddenly and disappear with the same rapidity. While the spasm lasts the animal paws, stamps, looks around at his flanks, lies down and rolls, and if the pain is very severe sweats profusely. During the attack a few pellets of dung may be passed and attempts to urinate are frequently made.

(2) *Causes.*—Usually caused by indigestible food, change of food, working hard after a full feed, watering immediately after feeding, feeding or watering exhausted animals, overfeeding, eating too much green feed.

(3) *Treatment.*—Place the animal in a well-bedded box stall. If such a stall is not available bed down a section of the picket line and tie with just enough rope to allow the animal to lie down comfortably. In ordinary cases give one aloes ball or the following drench: Raw linseed oil, 1 pint; turpentine, 1 ounce; if relief is not obtained repeat the drench in one hour. In case of fecal obstruction or constipation give 1 pint of raw linseed oil daily until the animal purges. Induce the animal to drink but withhold food until the acute symptoms subside.

c. Flatulent colic.—(1) *Symptoms.*—The rapid swelling of the belly constitutes the characteristic symptom. The abdomen is distended, the pain is not as severe as in spasmodic colic, but more constant. The animal paws, looks at his sides, and appears to be in great pain.

(2) *Causes.*—Much the same as spasmodic colic. Windsuckers are very likely to have this trouble.

(3) *Treatment.*—Act quickly. Prevent the animal from rolling Give the drench prescribed for spasmodic colic. If not relieved after the second dose administer one aloes ball. Cold-water enemas are sometimes effective. Rub the belly.

d. Diarrhea.—(1) *Symptoms.*—Purging, the fecal matter being semifluid, of a dirty brown color, without offensive odor, or clay-colored and fetid. If the condition continues long the animal loses flesh and appetite is wanting.

(2) *Causes.*—Irregular feeding, bad food, change of diet, worms, chill, nervousness.

(3) *Treatment.*—When the purging arises from the presence of some offending matter in the intestinal canal (sand, worms, undigested food), give 1½ pints of linseed oil. If the purging arises from no apparent cause, or if the bowels do not regain their normal function after the action of the oil has subsided give astringents, such as tannic acid, 1 to 2 drams. Do not stop diarrhea too suddenly.

e. Staggers.—(1) *Symptoms.*—The animal may stop very suddenly and shake his head or stand quietly braced on his legs then stagger, make a plunge, and fall. The eyes are staring, breathing snoring and hurried, nostrils widely dilated; there may be convulsions.

(2) *Causes.*—The usual causes are pressure of the collar or breast harness on the large vessels of the neck, which causes a congestion of the brain, or the effect of sun combined with work.

(3) *Treatment.*—Prompt removal of all mechanical obstruction to the circulation. Shade from the sun; apply cold water to the head and spine; keep the animal quiet. When recovered give a purgative (1 pint of raw linseed oil or one aloes ball) and feed on a soft diet.

f. Sunstroke and heat stroke.—(1) *Symptoms.*—(*a*) *Sunstroke.*—Sunstroke is manifested suddenly; the animal stops, drops his head, begins to stagger, the breathing is marked by great snoring, the pulse is slow and irregular, cold sweats break out in patches on the surface of the body, and the animal often dies without recovering consciousness.

(*b*) *Heat stroke.*—In heat stroke the animal usually requires urging for some time previous to the appearance of any other symptom. Generally perspiration is checked; he becomes weak in his gait, the breathing becomes hurried, the eyes watery and bloodshot, nostrils dilated and highly reddened to a dark-purple color, the heart is rapid and weak; frequently the animal becomes unconscious.

(2) *Causes.*—Sunstroke is produced by the rays of the sun falling directly on the head. Heat stroke is caused by the overheating of the whole body or by excessive exertion.

(3) *Prevention.*—On extremely hot days, especially when the humidity is great, careful watch should be made for symptoms of sun stroke and heat stroke. On appearance of the first signs the animal should be moved to the shade without delay. If, while still working, an animal that has been perspiring freely stops perspiring and starts to dry, stop work immediately.

(4) *Treatment.*—If possible, the animal should be placed in a cool, shady spot or in water and cold water poured over the body, the head, and the neck. Give enemas of cold water and rub the body vigorously and often. When the animal is able to swallow, 2 ounces of aromatic spirits of ammonia should be given and repeated in an hour. In the cool of the evening or during the night the animal may be moved, if necessary. It should, however, be kept in a cool place during the heat of the day until recovery is apparent.

g. Exhaustion.—(1) *Symptoms.*—On reaching the journey's end the animal may lie down and refuse to feed, though it may drink unusual quantities of water. Sometimes there is considerable sweating, but the body will be found cold and the pulse feeble.

(2) *Causes.*—Excessive or prolonged heavy work.

(3) *Treatment.*—Clothe warmly and give 2 ounces of aromatic spirits of ammonia. If possible, give a warm bran mash instead of the usual feed.

h. Spasms of the diaphragm (thumps).—(1) *Symptoms.*—Exhaustion with spasmodic jerking exhibited in the flanks.

(2) *Causes.*—Overwork or fast work during hot weather.

(3) *Treatment.*—Absolute rest and fresh air without drafts. Give the following: Aromatic spirits of ammonia, 2 ounces; water, 1 pint.

i. Azoturia.—(1) *Symptoms.*—The attack usually comes suddenly and within 20 minutes after leaving the stable. The animal becomes dull, goes slowly, and stiffens over the hind quarters. The muscles of the croup and loins become very tense, greatly swollen, and sensitive to touch. The animal frequently refuses to move the hind legs or drags them. Breathing accelerated, profuse sweat, great nervousness, urine red to coffee color. If the animal is continued to exercise or an attempt is made to return him to the stable, he invariably goes down and his chances of recovery are remote.

(2) *Causes.*—(*a*) *Predisposing cause.*—Enforced idleness on full feed for animals accustomed to regular work.

(*b*) *Exciting cause.*—Work following enforced idleness for animals in excellent condition when no change in the diet has taken place during the rest period.

(3) *Prevention.*—When animals in excellent state of flesh and accustomed to regular daily work are rested for one or more days they must not be fed the full ration; in lieu of one feed, it is desirable that they be given a bran mash as a laxative.

(4) *Treatment.*—Stop the animal immediately when the first symptoms are observed. Remove the saddle or harness at once and cover with three or four blankets. Keep the animal standing, if possible; if not, provide a good bed. Heat some oats or common salt, place in a sack and spread over the loins to relieve the pain. If hot water is available a hot blanket wrung out, placed over the back and loins, and covered with dry blankets is very beneficial. This should be changed often. After a few hours the average case can be moved slowly to the stable, provided the distance is not too great. At this time he should be given a purgative (aloes ball) and be fed on bran mashes, grass, and hay for a few days.

j. Scratches.—(1) *Symptoms.*—Occurs on the back of the pasterns or bulbs of the heels. The skin is hot, painful, and more or less swollen. It may crack and little blisters may form, followed by an oily fetid exudate. There is usually lameness. Hair on the affected part falls out.

(2) *Causes.*—Filthy stables; standing in dung, urine, and slush. The washing of the lower limbs and not drying them thoroughly also leaving mud on the legs, especially if it contains irritating substances such as alkali, are contributing factors.

(3) *Treatment.*—Rest the animal, give laxative feed, thoroughly cleanse the parts, keep dry and free from dirt. Apply a white lotion pack twice daily. When the parts become dry, hard, and scabby an ointment made of 1 part of zinc oxide and 10 parts of lanolin or cosmoline may be applied twice daily. When the parts are moist and oily dry dressings such as boric acid, either powdered on loosely or held in place by a piece of cotton and a bandage, may be used.

189. Lice and ticks.—*a. Lice—Causes and symptoms.*—(1) Usually found on neglected animals. The insect is one-tenth of an inch in length and may be readily detected on looking carefully into the coat. Great itching, chiefly at the roots of mane and tail.

(2) *Treatment.*—Clip the animal, if practicable, and burn the hair where it falls. Wash the skin with a creolin solution not over 2 per cent in strength.

b. Ticks.—Causes and symptoms.—This insect imbeds its head in the animal's skin. If pulled out the head remains in the skin and festers. Certain localities abound in ticks; animals grazing in such places are very likely to become infested.

(2) *Treatment.*—Touch the tick with iodine or turpentine. If very numerous wash with a 2 per cent solution of creolin or lysol.

190. Wounds.—*a. Classification.*—Wounds may, for the purpose of description, be divided into—

Incised, wounds or cuts.

Lacerated, wounds or tears.

Punctured, wounds or holes.

b. Treatment of wounds.—(1) *General.*—The great principle in the successful treatment of wounds may be summed up in the word cleanliness. Cleanliness of the wound itself, of the dressings, and the dresser are of the greatest importance.

(2) *Bleeding.*—Stoppage of bleeding is the first point to be attended to if it is serious. The readiest means of stopping bleeding is pressure, which may be carried out by tight bandaging above and below the wound or by placing a pad on the wound and bandaging over it. For ordinary wounds a simple pad and bandage is usually sufficient to control the flow. If there happens to be a large vessel cut and the end exposed it should be tied around with clean thread which has been soaked in antiseptic.

(3) *Cleaning wounds.*—When the bleeding has stopped cut the hair from the edges of the wound and remove all dirt, clots of blood, splinters, and foreign bodies of every kind. This may be done by carefully syringing the parts with clean warm water or a warm antiseptic solution. Foreign bodies may be removed with forceps or by pressing small pieces of cotton soaked in an antiseptic solution gently over the surface of the wound. Punctured wounds (except those around joints) should be probed to ascertain if any foreign bodies are in the channel.

(4) *Closing wounds.*—(*a*) Sutures and bandages are used for this purpose, but no wound that has been dirty must ever be entirely closed. Sutures and instruments must be aseptically clean,

(*b*) Sutures as a rule may be dispensed with entirely. They may be occasionally used in parts where there is little flesh, such as around the forehead, eyelids, and nose. They are less useful in the fleshy parts, because the movements of the muscles and the swelling resulting from the inflammation of the injured tissues cause them to pull out. Again, sutures must not be used when the edges of the wound are badly torn.

(*c*) In applying sutures the borders of the wound must be brought together in their natural position, care being taken not to allow the edges of the skin to curl inward. The thread, with the aid of a needle, is passed through the skin at one side of the wound and out at the other. The sutures should be from one-fourth to one-half inch from the edge, about three-fourths of an inch apart, and their depth should be about equal to their distance from the edge of the wound. They should be drawn just tight enough to bring the edges of the skin together. As a rule, they should be removed in about eight days.

(5) *Drainage.*—In all wounds drainage is necessary for the removal of pus that would otherwise accumulate in them. The escape of such material must be provided for at the lowest part of the wound. If the wound be a vertical (upright) one this may be accomplished by leaving out a stitch at the bottom. In horizontal wounds (those running lengthwise of the body) a small vertical opening must be made below the line of the stitches.

(6) *Dressings.*—Wounds that have been sutured and also wounds that are to be treated without suturing should be dried carefully with gauze or cotton, treated with an antiseptic, covered with dry gauze or cotton, and a bandage applied. Or cotton soaked in an antiseptic may be put on and held in position by a bandage, care being taken to avoid undue pressure.

If the location will not permit bandaging the injured parts may be treated with an antiseptic and covered with a clean piece of cloth or gunny sack, the inside of which may be lined with a piece of gauze large enough to cover the wound.

(7) *Rest and restraint.*—This will depend entirely upon the nature and extent of the wound. If the injury is slight the animal may continue at work; otherwise he may be kept in a box stall, crosstied, or subjected to some other form of restraint. (See paragraph 176.)

(8) *Aftercare.*—All wounds should be kept dry and dressings should be changed only often enough to keep the wound

clean. As little washing as possible should be done, and the parts should be sopped instead of rubbed. After cleaning and drying a new dressing should be applied.

(9) *Flies.*—The healing of wounds that can not be covered is sometimes retarded by the presence of flies. Such wounds may be painted once or twice daily with the following preparation: Creolin, one-half ounce; oil of tar, or linseed, 1 ounce; oil, olive, 10 ounces. Mix.

(10) *Maggots and screw worms.*—Wounds sometimes get fly-blown and maggots appear. Their presence is recognized by a thin bloody discharge from the wound and the red, angry appearance of its edges. If the bottom of the wound is carefully examined movement of the worms may be seen.

With forceps pick out all the worms that are visible and wipe out the cavity with a swab of cotton that has been saturated with tincture of iodine. Turpentine (1 part) and cottonseed or linseed oil (3 parts) may be used in the same way. Chloroform, if available, is the most valuable agent. Inject into wounds with a syringe.

(11) *Excessive granulations (proud flesh).*—In sluggish, slow-healing wounds small rounded fleshy masses, which protrude beyond the edges of the wound, are often formed. These fleshy masses are called proud flesh. The growth should be kept down by the use of burnt alum or caustics.

191. Injuries.—*a. Contusions.*—Bruises when the skin is unbroken are not, as a rule, serious. On the legs, especially on the tendons, they may cause lameness. Fomentation will relieve the pain and probably enable the animal to continue work, though the accompanying swelling may not subside for some time. On the back and in any position where they are liable to be pressed by the saddle, harness, or pack they will rapidly become worse unless relieved of the pressure. Beyond this they require no further treatment than a cold-water application.

b. Injuries to the eyes are usually due to blows or to small objects getting stuck on the front of the eyeball. The eye turns milky white, is closed, and weeps. Keep a cloth over it to prevent light entering. Oil below the eye to prevent tears making the skin sore and apply a weak boric-acid solution. To remove anything from the front of the eye wipe it firmly with a smooth cloth over the finger. Foreign bodies may be removed by carefully washing out the eye with clear water or the careful use of a tightly rolled swab of cotton or gauze.

c. Treads and overreaches are practically the same injury, with the exception that the overreach is caused by the animal striking its own fore leg with the hind foot, whereas the tread may be inflicted by another animal. Overreaches occur either above the fetlock or the fore leg or on the side of the coronet and back of the heels. Treads are generally found on the outside of the coronets and sometimes above the fetlock in the hind legs. In these wounds there is generally an underlip of skin hanging from it. In bandaging care should be taken to retain the lip in its proper position, where it will heal; but should it be hanging by a small neck of skin only, cut it off. Treatment consists of the application of antiseptics. As a rule it will be found possible to bandage these injuries, which should be done from below upward, in order to keep the cut ends in position, sufficiently thick pads of cotton being placed under the bandages to prevent any undue pressure.

d. Sprains of tendons and ligaments are most frequent at the back tendons between the knee and fetlock of the fore legs. The fetlocks and hocks are also liable to sprains from slips and stumbles on bad ground. In all cases the general symptoms of sprains are the same—that is, swelling of the part with pain on pressure. Unless these are present, the cause of lameness should be sought elsewhere. In addition, the part is hot, compared with the rest of the leg. Lameness is always present.

Sprains of back tendons, if taken at once, may have a pressure bandage put on them. This is applied as follows: A thick pillow of cotton is placed evenly around the leg, care being taken to have it so thick that the subsequent pressure of the bandage will not injure the skin. Over this is wound, as tightly and evenly as possible, an ordinary bandage. It should exert an even firm pressure over the whole injured surface and extend well above and below it. The padding should also project at each end to insure that there is no cutting of the skin by the edges of the bandage. When this becomes loose it shows that the swelling is reduced and should be replaced. This is a simple and effective way of treating sprains when taken early and properly applied, but any treatment of severe sprains necessitates long rest from work.

e. Stifle slip, or dislocation of the stifle, may occur in the horse or mule from slipping or when struggling to pull a load. It most frequently occurs among very young animals or those

out of condition. The leg is dragged behind with the front of the foot on the ground and can not be bent or brought forward. There is an enlargement on the outside of the stifle, caused by the displaced bone.

Put a rope around the pastern, pull the foot forward, backing the animal at the same time, and push the displaced bone forward and slightly downward into place. When replaced tie the foot forward for 24 hours either to a surcingle or a rope passed round the neck.

f. Heel galls or rope burns from getting the heels over the picket line or tie rope may occur in both fore and hind feet. They should be cleaned and treated antiseptically. If much inflamed a warm-water bandage will give relief from the pain. The skin should be kept supple by the use of ointments, with daily exercise after the acute pain has subsided. Lameness is usually great at first, but diminishes with exercise. They may be prevented by attention to the length of the tie rope.

192. Injuries to the feet.—*a. Pricks in shoeing.*—(1) *Causes.*—Nails driven into the soft structures, causing immediate lameness, or driven too close, causing a bulging of the inner layer of horn and pressure on the soft structures.

(2) *Symptoms.*—Lameness may be in evidence at once, but it usually develops slowly and does not appear for several days. Heat is present in the foot.

(3) *Treatment.*—Remove the nail and disinfect the nail hole with iodine.

b. Pus in the foot.—(1) *Causes.*—May result from any penetrating injury. It is a common result of a puncture of the sole or frog made by dirty objects.

(2) *Symptoms.*—The pain caused by the pus in the foot is intense, the animal is extremely lame, and the foot is hot. Unless the pus in discovered and drained out it gradually works up and out at the coronet. In this case the resulting sore is called "quittor." The quantity of pus may be trifling. The color is grayish.

(3) *Treatment.*—A good opening should be made in the horn to admit of a free discharge of pus and the wound syringed with antiseptics, care being taken to keep it open until all discharge has ceased. Dirt should be excluded by a cotton pad and boot on the foot. To retain dressings on the sole of the foot a piece of tin may be slipped under the shoe and pressed

flat. This will be found useful when boots are not available and the injury is to the sole or frog.

c. Bruises of the sole.—(1) *Causes.*—Caused by work over stony ground and failure to remove stones lodged in the feet.

(2) *Symptoms.*—Pain on pressure on the sole and a red stain on the horn caused by blood from the bruised fleshy sole soaking through.

(3) *Treatment.*—A leather sole nailed on beneath the shoe is usually sufficient to give relief. It is important not to pare out the sole.

d. Corns.—(1) *Causes.*—Undue pressure at the angle of the heel between the wall and the bar. Contributing causes are: Dry feet, contraction of the quarters and heels, heels taken down too low, continued use of calked shoes, lack of frog pressure, excessive concussion or pressure of the shoe on the sole, and unlevel shoeing.

(2) *Symptoms.*—Lameness may or may not be present. The horn is discolored and where bruises and inflammation are severe great lameness is shown and suppuration may occur.

(3) *Treatment.*—(*a*) In case of a dry corn with no pronounced contraction of the heels, shoe with the bar shoe, cutting away the bearing surface of the wall, and removing the pressure from a point just in front of the discolored horn, back to and including the buttress. Pack the foot with oakum and tar and cover with a leather pad.

(*b*) Where the bruise has been so severe that pus has gathered in the heel preliminary treatment should be as indicated above for pus in the foot. After suppuration has ceased treat as described for a dry corn.

(*c*) *Sand cracks.*—(1) *Causes.*—Excessive dryness of the hoof, causing brittleness, lack of frog pressure, contracted heels, long toes, heavy shoes, large nails, and nails set too far back.

(2) *Symptoms.*—A fissure or crack in the wall at the toe or quarter. The fissure may be shallow and not cause lameness, or it may be a deep one, which extends through the thickness of the wall and causes lameness, frequently with hemorrhage.

(3) *Treatment.*—(*a*) The first step is to remove the shoe and soften the horn by poultices or by standing in warm or cold water for a few days. After this, clean out the crack and cut away the hard overlapping edges of the horn. If for a quarter crack, trim away the bearing surface of the wall from a point

one-half inch in front of the crack back to and including the buttress, so that the affected quarter does not come in contact with the shoe; shoe with a bar shoe providing considerable frog pressure. Keep the foot soft and elastic by applying tar, oakum, and a leather pad. Keep the wall surface soft, especially over the crack, by daily applications of tar and oil. Rest the animal, if possible.

(*b*) In the case of a toe crack the operation is the same. In shoeing, the wall is cut away at the toe. A bar shoe rolled at the toe and with a clip on each side of the crack is recommended.

c. Dry feet.—(1) *Causes.*—Lack of exercise, lack of frog pressure, dry weather, and rasping away the outside covering of the hoof (periople).

(2) *Symptoms.*—A hard, dry, and inelastic condition of the horn. The first symptom of lack of moisture in the hoof is evidenced by the horny frog.

(3) *Treatment.*—Soften the feet by foot baths and apply an oily dressing to the wall surface. Pack the cavity between the branches of the shoe with white rock or wet clay two or three times a week. An excellent oil dressing for dry, brittle, or contracted feet is made of the following: Creolin, 4 ounces; pine tar, 4 ounces; raw linseed oil, 24 ounces. Mix and apply to both wall and sole twice a week. When the animal is shod the foot should be prepared and a coating of the dressing applied to the sole before nailing on the shoe.

Contraction of quarters and heels.—(1) *Causes.*—Dry feet, thrush, cutting of the bars, opening up the heels, cutting away the horny frog, continued use of heel calks on open shoes, and allowing the shoes to remain on the feet too long a time.

(2) *Symptoms.*—The contracted foot is easily recognized from its appearance. The quarters, and especially the heels, are narrower and higher than in nature and there is little or no frog pressure. The foot may resemble a mule's foot more than that of a horse. The frog atrophies and is often affected with thrush.

(3) *Treatment.*—(*a*) Soften the feet as prescribed for dry feet.

(*b*) If the contraction is not pronounced, if the horny frog is in a healthy condition and of sufficient size to come in contact with a bar shoe, use the bar shoe well rolled at the toe, pack

the feet with oakum and tar, and cover with a leather pad. Alternate the packing at each reshoeing—that is, pack the shoe at one shoeing and omit at the next.

(*c*) If the contraction is pronounced the following method may be used: Remove the wall proper from the affected quarter or quarters, if both are contracted, from a point near the bend or widest part of the hoof, back to and including the buttress and from the coronary band to the lower border of the hoof. The wall proper should be removed with the rasp and knife, being careful not to draw blood. Shoe with a bar shoe and pack the foot with pine tar and oakum. Dress the cut surface of the wall with pine tar.

h. Thrush.—(1) *Causes.*—Dirt, wet, and neglect, from muddy and filthy picket lines, corrals, and stable floors. Thrush is particularly liable to occur in animals shod in such a way that insufficient frog pressure on the ground results or whose frogs have been cut away in shoeing. The disease is largely preventable.

(2) *Symptoms.*—In the early stages there is simply increased moisture in the cleft of the frog, accompanied by an offensive odor. Gradually the frog becomes softer and the odor more marked. If not treated the cleft deepens, the horn spreads and becomes underrun and loosened, and the sensitive structures may be exposed. Lameness may be present.

(3) *Treatment.*—Pare away all loose particles of the frog and touch the soft spots with iodine. When the iodine is dry cover with a pine-tar dressing. Repeat the treatment daily until cured. If the feet are contracted shoe as described for contraction of the quarter and heels.

i. Loose wall or seedy toe.—(1) *Causes.*—Laminitis, with structural changes in the feet, nail pricks in shoeing, stepping on sharp objects, injuries to the wall from blows, pressure from heavy, deep-seated clips, and excessive moisture.

(2) *Symptoms.*—A soft, flaky condition of the horn, lameness usually being absent. If there is marked crumbling of the horn with the formation of a cavity between the hoof and the sensitive structures underneath, lameness may result from injury to the sensitive structures.

(3) *Treatment.*—Remove the unsound horn, clean the cavity, protect the foot by means of a leather pad, and apply a dressing of tar and oakum. Use the bar shoe well rolled at the toe. No nails should be driven in the diseased part, but side clips

should be used, care being exercised that they bear only on the healthy horn.

193. Lameness.—*a. General.*—(1) Lameness may best be detected at the trot. The animal should be led straight away from and back toward the person examining it. When an animal is lame it takes as much weight as possible off the injured or painful leg and places it on the opposite one. The extra weight placed on the sound side gives an uneven appearance to the action. If lame in a fore leg the animal will be seen to bob its head every time the sound foot comes to the ground. If lame behind, the hock of the sound leg comes higher and dips lower than that of the lame one. In each case the bobbing of the head and the dipping of the hock is caused by the extra weight placed on the sound side. Animals lame in both fore and hind legs take short strides with both, potter along instead of striding out. Lameness is very difficult to detect when it is not severe. An animal very lame in one fore leg appears to be lame in the diagonal hind leg also.

(2) The majority of causes of lameness occur at or below the knee and hock. The foot is the most common seat. Lameness in the shoulder is comparatively rare. In all cases where no apparent or sufficient cause can be detected the foot should be thoroughly examined.

b. Sidebones.—(1) *Causes.*—Contracted heels, concussion, or unbalanced feet.

(2) *Symptoms.*—A hard, unyielding condition of the lateral cartilages is noticed at the coronet over the heels. On soft footing the horse rarely goes lame, but the stride is shortened and the natural freedom and assurance in planting the foot are absent. On hard footing the horse frequently shows lameness, accompanied by fever in the feet.

(3) *Treatment.*—(*a*) For saddle or pack animals use one of the following methods: If the heels are not badly contracted, shoe with a plain shoe, well rolled at the toe, and use a pad. The pad may cover the entire sole, with the packing of tar and oakum underneath, or it may be placed between the shoe and the bearing surface of the foot only. Rubber sheeting one-eighth inch thick makes a better pad than leather for use between the shoe and the bearing surface of the foot. If the contraction of the heels is pronounced, shoe with the bevel-edged shoe, which forces the heels and quarters outward and relieves the pressure on the affected part.

(*b*) For draft animals shoe with the Memphis bar, or the 4-calked shoe. The feet may also be packed with tar and oakum.

c. Coffin-joint lameness or navicular trouble.—(1) *Causes.*—Contraction of the heels, excessive concussion, long toes, feet broken back, slipping, stepping on a rolling stone, or stepping into a hole.

(2) *Symptoms.*—Lameness slight at first, but increasing in severity. While traveling, the affected leg takes a shorter step than the others and the toe strikes the ground before the heel. In some cases the lameness may disappear for a day or two. When resting, the animal points the toe, and if lame in both feet the legs are advanced and the feet rested alternately. The shoe shows abnormal wear as far back as the second or third nail hole. Usually affects the front feet only. Heat over the coffin joint, tenderness on pressure.

(3) *Treatment.*—Give the animal rest and reduce the inflammation by the use of foot baths. After the inflammation has been reduced the animal may be shod, using one of the following methods:

(*a*) If the injury was caused by stepping on a rolling stone or stepping in a hole, shoe with the 4-calked open shoe if the animal is to be used on hard footing, or with the Memphis bar if the animal is to be used on soft footing. Pack the feet with tar and oakum and cover with a leather pad. If it is not desired to pack the feet, use a pad of rubber or leather between the shoe and the bearing surface of the foot.

(*b*) If the injury was caused by concussion from continued use over hard roads or from continued use of open calked shoes, it is usually accompanied by pronounced contraction of the heels and practical absence of the horny frog. Shoe with the bevel-edged shoe with a rocker toe. The horn structures must be kept soft as prescribed for dry feet. (See paragraph 192 *f.*)

d. Laminitis (founder).—(1) *Symptoms.*—Sudden and intense lameness, which may be ushered in by a chill. Usually the fore feet are affected, although occasionally all four are involved. When the fore feet are affected they are placed far in advance of the body and the hind feet are placed well forward under the belly to take all weight possible off the fore feet. The affected feet are very hot. The pulse and respiration are greatly accelerated and the temperature may reach 105° or more.

(2) *Causes.*—The most common are: Long-continued fast work on hard roads; overexertion; exhaustion; rapid changes of temperature; the eating of various improper foods, such as musty hay, grain, etc.; and the drinking of cold water when the animal is overheated.

(3) *Treatment.*—(*a*) Remove the shoes from the affected feet and place the animal in a well-bedded box stall. Cover the affected feet and legs as high as the knees and hocks with several layers of burlap and keep saturated with cold water. If running water is available, place the animal in it and allow him to stand for 24 or 36 hours. In this case the shoes need not be removed. Laxative diet is indicated. Give one aloes ball, or preferably 1 pint of raw linseed oil as a drench. Feed bran mashes and a little hay. Cases that are not cured in four to five days are liable to develop the disease in chronic form. Chronic laminitis is practically incurable. Early treatment is an important factor.

(*b*) Following a case of a mild attack of laminitis, shoe with the plain bar or open shoe, preferably the bar. Avoid sole pressure. The shoe should be thinned from the first nail hole on either side to the point of the toe and from the fourth nail hole to the point of the heel, making a form of rocker-motion shoe. Pack the feet with tar and oakum and cover with a leather pad.

(*c*) Where separation of the sensitive and horny structures has taken place, evidenced by a dropped sole, use the 4-calked bar or open shoe with a thin sheet of metal covering and in contact with the sole. Use tar and oakum in sufficient quantity to furnish a fair padding between the sheet metal and the horny sole. Avoid sole pressure by the shoes.

194. **Sore backs.**—*a. General.*—Sore backs are probably the greatest cause of disability among Cavalry mounts. It is seldom that sore backs can not be prevented.

b. Causes.—The common causes are: Improper saddling, poorly fitting saddles, dirty or improperly folded saddle blankets, careless riding such as lounging in the saddle, unevenly placed loads, and poor conformation.

c. Prevention.—(1) The individual rider must be held strictly responsible that the adjustment of his saddle, arms, and pack is correct; that his blanket is clean and accurately folded; and that he reports at once to his immediate superior the slightest injury of any kind discovered on the back of his animal. Offi-

cers and noncommmissioned officers must be unremitting in their efforts to prevent men from slouching in the saddle. Riders must sit erect in the saddle at all times. Riding on the cantle or standing in one stirrup is sure to bring saddle sores.

(2) Poor conformation is the hardest cause to overcome. However, intelligent application of the principles of correct saddling can usually overcome this cause. On field service riding animals lose flesh, which results in poor fitting saddles. Small pads made from old blankets or strips of felt inserted under the covering of the bags take the place of lost flesh.

d. Treatment of sore backs.—(1) Ascertain and remove the cause, if possible. In fresh cases, where the skin is not broken, apply cold irrigations or baths with gentle hand rubbing. This should be followed by the application of packs saturated and kept wet with cold water and held in position by means of a surcingle or bandage. The pad may be of oakum or it may be made by folding a gunny sack three or four times.

(2) Injuries to the withers and ridge of the spine should be irrigated or bathed with cold water but without pressure and without massage.

(3) Slight galls, chafes, or abrasions are treated with white lotion or powdered boric acid.

(4) When sitfasts appear apply warm baths or warm poultices until the dead skin becomes loose. Then remove all dead and bruised tissue with the forceps and a knife, after which the injury is treated with iodine and boric acid. Sitfasts are patches of dry dead skin and may involve deeper tissues. They are caused by continuous pressure of the saddle, cinch, or collar.

(5) If it is necessary to continue to ride an animal with a sore back means must be devised to relieve pressure from the affected part.

195. Collar injuries.—*Injuries due to the ordinary collar.*—(1) *Causes.*—Collar injuries are caused by friction, not pressure. Friction must be stopped if a sore shoulder is to be cured. One marked exception to this rule is the injury caused to the neck in front of the withers. This is almost invariably a gall, the result of pressure.

(2) *Remedies.*—Figure 1 shows the position of injuries produced by the collar. They are numbered from 1 to 5.

(*a*) Injury No. 1 is the gall just mentioned. It is an injury giving rise to extreme pain, so much so that the animal can only be examined with great difficulty. Not uncommonly the skin

dies and a piece comes away as in a sore back. It is the only approach to a sitfast that is met with in collar injuries. This injury is more common in pole than in shaft draft and is caused by the strain inflicted on the neck in pulling up or in going down hill, owing to the pull of the pole chains, aggravated by a loose housing strap. The injury may occur on perfectly level roads and is often due to carelessness on the part of the driver in shortening the pole chains too much and so throwing the

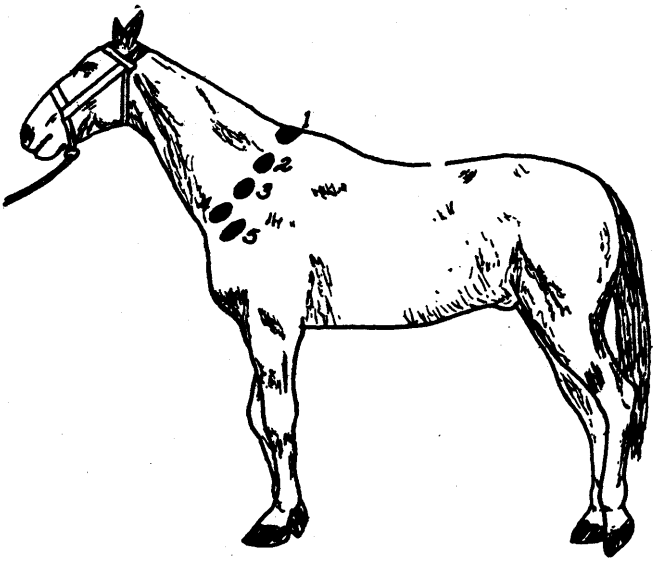


FIGURE 1.—Position of collar injuries

weight of the pole on the horse's neck. The pole should not rest on the neck, but should be perfectly free to move up and down, and the chain, though taut, should not lift the pole an inch. When the vehicle is backed the collar should not do the pulling. In the adjustment of the harness see that the pole chain does not become taut before the breeching. Neglect of these adjustments causes a great percentage of sore necks.

(*b*) Injury No. 2 is almost invariably due to a tight collar, especially in horses with very fleshy necks. The remedy is

simple. Remove some of the stuffing or stretch the collar. In stretching a collar it should be borne in mind that there is a risk of damaging it, especially at the throat. There is no use stretching a collar without altering the hames. If these are too straight the collar will continue to pinch.

(*c*) Injury No. 3 is practically always due to a loose collar—that is, one too wide. It is a very common gall and frequently occurs under the point of the draft—that is, the attachment of the hames. It is a difficult injury at times to deal with. The remedy is to plug the collar (insert more straw) and so make it narrower. All movement in the collar should be stopped. Sometimes injuries occur at this part which appear to be well behind the collar when the latter is fitted. In these cases the collar is generally very much too wide, and if pulled over toward the injury will be found to touch it.

(*d*) Injury No. 4 is caused by a loose or a tight collar. The whole neck for about 5 inches is very tender and the appearance of the collar is indicative of the cause. The remedy is to make it narrower with strips of numnah or wider by wetting it and stretching it on a block. It should be remembered that stretching a collar shortens it.

(*e*) Injury No. 5 occurs just above the shoulder joint and is almost invariably due to the raw edge of the afterwale touching the skin. Such collars are generally old and the stuffing, having settled down, allows the afterwale to cut into the skin, though this may not be apparent until the horse is tested in draft, when it can at once be seen. At other times the cause of the injury can be determined by simply pressing the collar on the shoulder, when the afterwale may be seen to touch. The remedy is either to restuff the collar or, if there is no time for this, to cut off the edge of the afterwale close up to the lacing.

(*f*) Sometimes an injury occurs in the region of No. 5 but above the edge of the afterwale. This is due to the friction of a wide collar, and the remedy is to deal with it as with No. 3.

(*g*) An animal may be worked with sore shoulders if the collar has been fitted. It is not advised that an animal be worked when the shoulders are badly inflamed, but after the acute inflammation has subsided it may be possible to begin work before the injury has completely healed.

(*b*) *Injuries due to breast collars* (*Field Artillery harness*).—(1) *Causes.*—The injuries are in all cases due to friction. The

greatest friction is at the neck, and this is the usual seat of collar injuries in collars of the breast type. Failure to use a metal or leather pad, incorrect adjustment of the two straps which pass over the collar pad, especially for wheel harness, are the usual causes of neck sores.

(2) *Prevention.*—The careful fitting of the straps passing over the collar pad will in most cases prevent neck sores. For the wheel harness the strap which supports the neck yoke must be neither too long nor too short. If too short the strain in draft comes on the neck; if too long the draft place falls below the point of the shoulder. The surface next to the animal's skin must in all cases be free from seams or stitches and must be clean. A lining made of a single piece of leather is best.

(3) *Remedies.*—As soon as a neck sore is noticed the neck strap should be taken off and the collar held up by attaching it to the saddle by straps. The straps should be so arranged that the collar will assume as nearly as possible its normal position.

SECTION V

ADJUSTMENT AND FITTING OF EQUIPMENT

196. Attention to the fitting of bits and saddles.—The proper fitting of bits and saddles should receive systematic, continuous attention. There is no phase of horsemanship more important to the service than a knowledge of the ordinary measures for the prevention of sore backs. Both thorough knowledge of and habitual conscientious attention to this subject are indispensable to the efficiency of a mounted organization.

197. To fold the saddle blanket.—The blanket, after being well shaken out, should be folded into six thicknesses, as follows:

a. Hold it up by two corners, so that the long edge of the blanket is up and down.

Double it lengthwise (so the fold will come between the "U" and "S"), the folded corner between the thumb and forefinger of the right hand, thumb pointing to the left.

Slip the left hand down the folded edge two-thirds its length and seize it with the thumb and second finger.

Raise the hands to the height of the shoulders, the blanket extended between them.

Bring the hands together, the double fold falling outward,

Pass the folded corner from the right hand into the left hand, between the thumb and forefinger.

Slip the second finger of the right hand between the folds and seize the double-folded corners.

Turn the left (disengaged), corner in and seize it with the thumb and forefinger of the right hand, the second finger of the right hand stretching and evening the folds.

After evening the folds grasp the corners and shake the blanket well in order to smooth the folds.

Raise the blanket and place it between the chin and breast.

Slip the hands halfway down the blanket, the first two fingers outside, the other fingers and thumb of each hand inside.

Seize the blanket with the thumbs and first two fingers of each hand and let the part under the chin fall forward.

Hold the blanket up, arms extended, and even the lower edges.

Seize the middle points of the blanket between the thumb and forefinger of each hand and flirt the outside part over the right arm.

Hold the blanket thus until ready to place it on the horse.

b. The preceding is a description of the normal method of folding the saddle blanket. Departure from this method may be resorted to, however, with the view to preventing undue wear on the bearing surface and along the folded edges of the blanket, and, on occasion, for the relief or prevention of sore backs. Recruits should be given careful instruction in the various methods practiced in the service by which the above objects are accomplished.

198. Care of saddle blankets.—*a.* Saddle blankets should be kept clean, soft, and free from wrinkles, and should be refolded so that the side next to the horse will be changed frequently. Occasionally they should be hung in the sun and wind and then brushed and shaken. When necessary, they should be thoroughly cleaned by repeated immersions in tepid water and then, without wringing or pressing, hung over a pole or line to dry. Before folding saddle blankets to put them in storerooms after use they should be dried thoroughly and cleaned, if necessary, and so stored as to prevent deterioration.

b. In the field the use of saddle blankets as bedding for the men will not be allowed. Special care will be exercised to keep the saddle blanket free from dirt.

199. To saddle (McClellan saddle).—*a.* For instruction the saddle may be placed 4 yards in rear of the horse, the stirrups crossed over the seat, the right one uppermost; the cincha and cincha strap crossed above the stirrups, the strap uppermost; the saddle blanket folded, horse side in, folded edge to the front, double fold to the right, across the seat of the saddle.

b. The instructor commands: BLANKET. Approach the horse on the near (left) side, with the blanket folded and held as described in paragraph 197. Place the blanket well forward on the horse's back by tossing the part of the blanket over the right arm to the off (right) side of the horse, still keeping hold of the middle points. Slide the blanket once or twice from front to rear to smooth the hair on the horse's back, being careful to raise the blanket in bringing it forward. Put the blanket in place, the edges falling equally on either side of the backbone, the double fold resting on the withers. Smooth the blanket and remove the locks of mane that may be under it.

c. The blanket having been placed on the horse, the instructor commands: SADDLE.

Seize the pommel of the saddle with the left hand and the cantle with the right.

Approach the horse on the near side from the direction of the croup and place the center of the saddle on the middle of the horse's back, the front end of the side bar about 3 fingerwidths behind the point of the shoulder blade and about the width of a man's hand in rear of the double-folded edge of the blanket.

Let down the cincha strap and cincha.

Pass to the off side, adjust the cincha and strap, and see that the blanket is smooth.

Return to the near side and raise the blanket slightly under the pommet arch so that the withers may not be compressed.

Take the cincha strap in the right hand and reach under the horse and seize the cincha ring with the left hand.

Pass the end of the strap through the ring from underneath (from inside to outside), then up and through the upper ring from the outside; if necessary, make another fold in the same manner.

c. Cincha strap.—The cincha strap is fastened as follows:

Pass the end through the upper ring to the front and seize it with the left hand.

Place the fingers of the right hand between the outside folds of the strap and, pulling from the horse with the right hand, take up the slack with the left hand.

Cross the strap over the folds and, with the right hand, pass the end of it underneath and through the upper ring back of the folds, then down and under the loop that crosses the folds and draw it tight.

Weave the end into the folds of the cincha strap.

Another method of fastening the cincha strap is as follows:

Pass the end through the upper ring to the rear and seize it with the right hand.

Place the fingers of the left hand between the outer folds of the strap.

Pull from the horse with the left hand and take up the slack with the right hand.

Pass the end of the strap underneath and draw it through the upper ring until a loop is formed.

Double the loose end of the strap, push it through the loop, and draw the loop taut. The free end of the strap should be long enough to be seized conveniently with the hand.

The cincha strap, when first adjusted, should admit a finger between it and the horse's belly. After exercising the horse for a while the cincha should be examined; if too loose, it should be readjusted.

Having fastened the cincha strap, let down the right stirrup, then the left.

The surcingle is then buckled over the saddle, and should be a little looser than the cincha.

d. Breast straps.—A breast strap is not usually required. When used it should be so fitted that the upper edge of the rosette, or ring, is 3 fingerbreadths above the sharp breastbone. The breast strap should admit the breadth of the hand between it and the flat of the shoulder.

e. Quarter straps.—After placing the saddle in the middle of the horse's back the quarter-strap ring should be pushed forward and fixed by the sliding loops so that when tightened the cinch will be over the sternum of the horse and not over his floating ribs. If the sliding loops become loose, it will be well to fix the quarter-strap ring in place by the use of a short thong or by putting a rivet through the quarter strap in rear of the quarter-strap ring.

The quarter strap should be adjusted to such a length that the quarter-strap ring is over the lower edge of the blanket. The buckle of the quarter strap should be against the cantle-halter square.

f. Stirrup straps.—The stirrup strap should be put on the saddle so that the hair side of the leather encircles the stirrup loop on saddle and the spreader of the stirrup. This leaves the flesh side of the leather out. The buckle of the stirrup strap should be inside, and at the front of the stirrup, and against it, so that under no circumstances can it touch the gun boot, the blanket, or the saber.

200. To unsaddle (McClellan saddle).—The instructor commands: UNSADDLE.

Stand on the near side of the horse and unbuckle and remove the surcingle.

Cross the left stirrup over the saddle and loosen the cincha strap and let down the cincha.

Pass to the offside and cross the right stirrup, then the cincha.

Pass to the rear side and cross the cincha strap over the saddle.

Grasp the pommel with the left hand, the cantle with the right hand, and, removing the saddle over the croup, place it in rear of the horse, pommel to the front.

Grasp the blanket at the withers with the left hand and at the loin with the right hand.

Remove it in the direction of the croup, the edge falling together, the wet side in.

Place the blanket on the saddle, the folded edge on the pommel.

If unsaddling in the stable, place the saddle on its peg when taken off the horse.

201. Fitting the saddle.—The following principles are of general application in saddle fitting:

a. The withers must not be pinched nor pressed upon.

b. The central line of the back must have no pressure put upon it.

c. The shoulder blades must have free and unhampered movement.

d. The weight must be evenly distributed over a surface which extends from the ploy of the shoulders to the last true rib.

202. Balance of the saddle weight.—*a.* The exact balance of the weight of the saddle is of so much importance that all concerned must understand how serious may be the least variation. Riders will be required to maintain the seat described in regulations. (See also pars. 20 and 24.)

b. Excessive local pressure caused by the faulty position assumed by the rider is irregular and intermittent. It is not nearly so productive of evil as the pressure due to an uneven distribution of arms and pack, the effects of which are permanent and constant. Accordingly, the weight of such articles as are attached to one side of the pommel and cantle should be exactly balanced by the weight of those of the opposite side. The weight of the pack on the pommel should also equal that placed on the cantle. Furthermore, this relation must be maintained throughout the vicissitudes of field service which are sure to produce changes in the weight carried on the saddle.

203. To put on the single-snaffle bridle.—*a.* The instructor commands: BRIDLE.

Take the reins in the right hand, the crownpiece in the left hand.

Approach the horse on the near side, passing the right hand along his neck.

Slip the reins over the horse's head and let them rest on his neck.

Take the crownpiece in the right hand and the snaffle bit in the left hand.

Bring the crownpiece in front of and slightly below its proper position.

Insert the thumb into the side of the horse's mouth, above the tusk, and press upon the lower jaw so as to cause him to open his mouth.

Insert the bit by raising the crownpiece and, with the left hand, quietly draw the ears under the crownpiece and arrange the forelock.

Secure the throatlatch.

b. The bridle should be adjusted so that the snaffle bit will touch lightly the upper corners of the lips and so that the throatlatch will admit 4 fingerbreadths between it and the throat.

c. At the direction of the instructor the halter may be taken off before bridling, the reins being first passed over the horse's neck.

d. A noseband, when used, should be 2 fingerbreadths below the cheek bone and should admit 2 fingerbreadths between it and the nose.

204. To take off the single-snaffle bridle.—*a.* The instructor commands: UNBRIDLE.

Stand on the near side of the horse and pass the reins over the horse's head, placing them on the bend of the left arm.

Unbuckle the throatlatch.

Grasp the crownpiece with the right hand and, assisting with the left hand, quietly disengage the ears.

Lower the crownpiece with the right hand and gently remove the bit from the horse's mouth with the left hand.

Place the crownpiece in the palm of the left hand and, taking the reins in the right hand, pass them over the crownpiece.

The bridle is placed across the saddle on the blanket.

b. If unsaddling in the stable the bridle is hung on its peg by the crownpiece.

c. If the horse is not equipped with a halter, unbridle and push the bridle back so that the crownpiece will rest on the neck behind the poll. The horse may be held thus until a halter is put on, after which the bridle should be removed.

205. To put on the bit and bridoon.—*a.* The bit and bridoon is put on by the same command and by essentially the same movements as prescribed for the single-snaffle bridle in paragraph 203.

Variations in procedure for the two types of bridles are as follows:

Before bridling, the curb chain is unhooked on the near side.

After placing the reins over the horse's head the lower left branch of the curb bit is held in the left hand, the forefinger against the mouthpiece, the snaffle bit above and resting on the mouthpiece of the curb bit.

After the throatlatch has been secured the curb chain is hooked up on the near side below the snaffle bit.

206. Adjustment of the bit and bridoon.—The bits should be of sufficient width to fit the horse's mouth, the branches of the curb touching lightly the outer surfaces of the lips.

The snaffle should touch lightly the upper corners of the lips.

The curb should rest just below the snaffle.

The curb chain should lie flat in the chin groove and be of such length as to cause the reins, when stretched from the

pommel of the saddle, to form a right angle with the branches of the curb.

If the bit is placed high it is less severe; if placed low it is very powerful; if placed too low its effects are painful. It should not be placed so low as to strike the teeth.

When horses are restive it is often due solely to faulty adjustment of the bits and the curb chain.

The noseband is adjusted as described in paragraph 202. If tightened it renders the effect of the bits much more pronounced. If too much lowered and tightened it will make the effect of the curb bit too severe. With the bit and bridoon the adjustment of the noseband requires the strictest attention.

207. To take off the bit and bridoon.—The procedure is the same as prescribed in paragraph 204 for the single-snaffle bridle with the following modification:

After passing the reins over the horse's head the curb chain is unhooked on the near side.

208. To adust the length of stirrup straps.—To approximate the correct length of stirrups straps, before mounting, they are adjusted so that the length of the stirrup strap, including the stirrup, is about 1 inch less than the length of the arm, the fingers extended.

209. Fitting of collars.—The fitting of collars for animal-drawn transport is described in paragraph 257. Instructions governing the adjustment of the breast collar, issued with Field Artillery harness, are contained in the Field Artillery Field Manual.

210. To put on the cavesson and to fold and handle the longe.—*a.* The cavesson consists of a strong bridle headstall, to which is attached a noseband (fig. 2).

The headstall consists of a crownpiece, brow band, cheek pieces, throatlatch, and jowl strap.

The noseband is metal jointed and is lined inside with thick felt. On the noseband are three rings, to one of which the longe is attached, usually to the ring in the center.

The longe consists of a flat tape of strong material or a stout rope. It should be about 30 feet long.

b. The cavesson should be adjusted so that the noseband rests just below the cheek bones. The more the noseband is lowered below its normal position the more severe it becomes. If placed very low the noseband is unduly severe. Moreover, it is apt

to injure the sensitive cartilage of the nose and to hinder breathing.

The noseband should be buckled snugly under the lower jaw. To allow play to the metal portion of the noseband makes its effect severe; if very much play is allowed its effect on the nose will be painful.

The jowl strap should be lightly adjusted in order to assure that the cheek piece on the outside does not injure the horse's eye.

c. If the longe is held in the hand in circular loops it is apt to become entangled in the fingers or burn the hand when paid

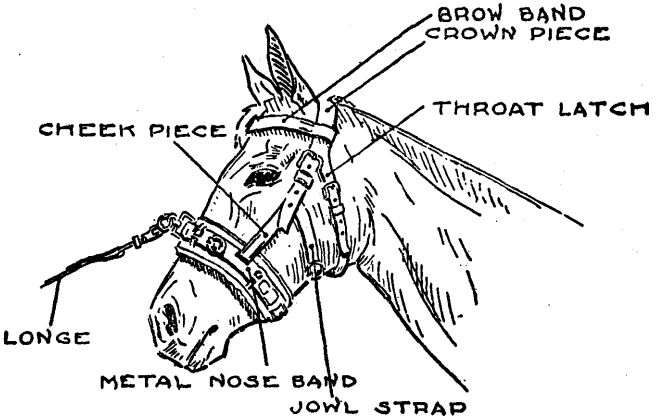


FIGURE 2.—The cavesson

out rapidly. It should therefore be held in successive superimposed loops, somewhat like figures of 8.

d. All troopers should know how to put on a cavesson and how to fold and handle a longe. They should also be able to exercise a horse on the longe.

211. Care of saddlery.—*a. General.*—The care of saddlery is important and officers and noncommissioned officers will be thoroughly familiar with the methods involved. All men will receive instruction in this subject. Cleaning will be done habitually under proper supervision.

b. Cleaning materials.—Castile soap (or white soap), saddle soap, and neat's-foot oil are the authorized cleaning and pre-

serving materials. Castile soap (or white soap) is a cleaning agent and has no tendency to soften and preserve leather. Neat's-foot oil is an oiling agent only. Saddle soap combines both cleaning and oiling properties.

c. Frequency and methods of cleaning.—(1) As often as used leather equipment should be wiped off with a sponge slightly dampened in water to remove mud, dust, or other foreign substances. This maintains the appearance of saddlery, but is, however, insufficient of itself to preserve it. Bits and other metal should be wiped off with a rag moistened with oil.

(2) At intervals of from one to four weeks, depending upon climatic conditions and the use to which it has been subjected, it is essential that leather equipment be thoroughly cleaned. To do this properly all parts of the equipment should be separated and the entire equipment reduced to its simplest elements. All surface dust and mud should be wiped off with a damp sponge. Then, with the sponge slightly damp, a lather is formed of castile soap and thoroughly worked into each piece of leather. After the leather parts are clean the sponge is rinsed out and a thick lather made from saddle soap. This is applied to the parts of the equipment to obtain a fine surface dressing and to restore the oil removed by the castile soap. Finally, when partially dry, the equipment is rubbed with a soft cloth to give it a finished appearance.

d. Frequency and method of oiling.—(1) During the first few months of use a set of new leather equipment should be given at least two applications of neat's-foot oil per month. Thereafter the frequency of oiling is a matter of judgment, as indicated by the appearance and pliability of the leather. Frequent light applications of oil are more valuable than occasional heavy ones.

(2) As far as practicable, the oil should be applied on the flesh side. Leather which has been cleaned should still be damp at the time of oiling. New leather should be slightly moistened and the oil quickly and lightly applied. A small rag may be used to apply the oil, care being exercised not to use an excess. The tendency is to use too much oil; about 1 ounce to a set of saddlery is sufficient.

e. Metal parts.—The bit, curb chain, and spurs may be polished. Dark metal should be cleaned and oiled only, and should never be attacked with abrasive agents.

f. Field measures.—In active campaign or on the march advantage should be taken of such opportunities as the situation affords to keep equipment out of the mud and to protect it from rain, dust, and heat. Racks can be improvised from materials at hand. A piece of canvas thrown over the equipment affords considerable protection. In cases where shelter is provided for animals provision should also be made for horse equipment. The saddle must not be thrown about nor left where animals may step upon it.

SECTION VI

TRANSPORT OF ANIMALS BY TRUCK, RAIL, AND WATER

TRUCK

212. If required by the necessities of the situation, animals can be transported rapidly in cargo trucks by building up the sides of the body and constructing suitable ramps for loading and unloading. The standard B cargo truck can be adapted to the transportation of six horses and will carry five horses with their riders and equipment.

RAIL

213. Type trains, mixed trains, or freight trains.—While the use of type trains adapted in passenger and cargo space to the organizations they are intended to carry facilitates the movements of troops in or near the theater of operations, with the long hauls of the zone of the interior, the usual fast schedules can not be maintained if the trunk lines are encumbered with the slower-moving type trains. For this reason it may be necessary to limit the use of type trains to those situations in which it is expected that the troops will be immediately employed on detraining. The initial concentrations and most movements entirely within the zone of the interior will be executed by using separate passenger and freight trains often moving over different roads. These can be assembled at or near their destination so as to permit men, equipment, and animals to be detraining at the same time. It will usually be necessary for freight and animals to be sent on in advance. Where an organization is too small to warrant complete passenger and freight trains a mixed train may be made up, but as such trains are slower moving than the usual passenger traffic their use is

attended with the same disadvantage as that of the type train. Their use should, therefore, be kept to a minimum.

214. Maximum cars in single shipment.—A single shipment should not exceed 30 cars, as there are few rest stations where more than 30 carloads of animals can be unloaded at one time.

215. Halters and tie ropes.—*a.* In all shipments of animals, except to remount depots, one halter and tie rope for each animal should accompany the shipment.

b. Halters and tie ropes should ordinarily be carried in sacks by the attendants, but halters may remain on the animals, the tie ropes being carried in sacks.

216. Forage.—*a. Less than carload.*—In less-than-carload shipments of animals, whenever there is room for forage in the car, the necessary forage for the entire journey will be furnished by the Quartermaster Corps and loaded in the car at the initial point of shipment.

b. One or more carloads.—In shipments of one or more carloads of animals, or in less-than-carload shipments whenever there is no room for forage in the car, forage will not be furnished by the Quartermaster Corps but will be supplied by the carriers at their regular feeding points, except when the animals are accompanying troops, in which case the necessary forage will be carried in box cars attached to the train.

217. Preparation of cars.—*a.* The health of the animals is the primary consideration, and shipment should be made only in cars that have been properly cleaned, disinfected, and sanded.

b. Cleaning and disinfection.—(1) *By whom done.*—The necessary and usual cleaning and disinfection of cars must be done by the carrier without expense to the Government.

(2) *Additional disinfection.*—Any additional disinfection that may be ordered will be done at Government expense.

(3) *How disinfected.*—To disinfect a stock car, spray with either chloride of lime (4 per cent) or creolin solution, using 60 cubic centimeters (8 tablespoonfuls) to a bucket of water, or else clean thoroughly and whitewash with freshly prepared whitewash.

c. Sanding.—Sanding of cars will be done at Government expense.

d. Papering.—(1) For the better protection of animals in severe weather one side of ordinary stock cars, and also both ends, if not solid, should be closed with heavy paper or slats

fastened on the outside of the cars to avoid projecting nails if torn off.

(2) It will be done at Government expense.

e. Advance charges.—The cost of disinfecting, sanding, or papering done at Government expense will be treated as an advance charge against the bill of lading.

f. Inspections.—(1) *By a veterinary officer.*—Stock cars will be inspected on arrival and also when ready for loading by a veterinary officer, who will advise the consignor as to any sanitary defects to be corrected and will also supervise any additional disinfection that may be ordered.

(2) *By the consignor.*—Prior to loading, all stock cars will be thoroughly inspected by the consignor.

(*a*) Hayracks and water troughs must be in good repair.

(*b*) Special attention should be given to the condition and repair of the floor.

(*c*) Projecting nails must be removed; they can best be detected by looking along the surface instead of at it from the front.

218. Loading.—*a.* Number of animals to a car.—(1) *Thirty-six foot car.*—(*a*) The following are the maximum numbers of animals to be placed in a 36-foot car:

Heavy-draft horses	18
Light-draft horses	20
Riding horses	22
Draft mules	21
Pack mules	22

(*b*) In very hot weather the numbers given in (*a*) above may be reduced by two.

(2) *Forty-foot car.*—When 40-foot cars are used the number of riding horses and pack mules given in (1) (*a*) above may be increased by three, and the number of heavy-draft horses, light-draft horses, and draft mules may be increased by two.

b. Methods used.—(1) Animals can be most conveniently loaded through a stockyard chute or from a freight platform level with the floor of the car; when these are not available portable or improvised ramps must be used.

(2) When a ramp is used it must be well supported and have strong sides.

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(3) The loading should proceed without noise or confusion, the animals being led quietly to the car door and there turned over to four men, two for each end, who do the loading. They should follow one another promptly, in order to avoid delay, and should be kept moving, so as to reduce the tendency to balk. They should be led in single file by means of halter straps or tie ropes, which should not be removed until the animals are in place in the car. In some cases it may be necessary to blindfold an animal before he can be led into the car. A rope or strap passed in rear of the haunches and drawn forward by a man at each end is often effective in urging an animal into the car. The first animal loaded should be led to one end of the car, the second animal to the other end, and so on, leaving the center of the car for the last animals loaded. Except as prescribed in (4) below, arrange the animals so that alternate ones face in the same direction. The gentler animals should be placed opposite the doors and should therefore be loaded last. Before starting the loading the door on the farther side of the car must be closed and fastened. As soon as the loading is complete the opposite door must also be closed and fastened. Adequate ventilation must, however, be provided for at all times.

(4) Teams of mules should be loaded and should stand in the cars as they are driven together in the team. Mules should be tagged with numbers so as to be quickly identified. Horses used to service together should be loaded together and in the same car. If necessary for identification they should be tagged.

(5) Sick or injured animals should be loaded in a car by themselves and a separate stall built for each animal, if practicable, unless palace stock cars are furnished.

219. Rest and feeding en route.—*a.* Shipments will be so handled that animals will not be kept on cars for a period longer than 28 consecutive hours without being unloaded (act June 29, 1906, 34 Stat. 607), except in the most extreme cases on account of unavoidable delays or through military necessity.

b. Release; when signed.—The Government representative in charge of a shipment will sign a release only in these extreme cases.

c. Time limit.—(1) Animals should be unloaded, fed, watered, and rested after 20 hours, or even less, rather than risk exceeding the 28-hour limit.

(2) In no case will more than 36 consecutive hours be permitted to elapse without unloading for rest and feeding.

d. Period of rest.—Animals will be allowed not less than five consecutive hours of rest at each unloading point.

e. Notice to Bureau of Animal Industry.—When representatives of the Bureau of Animal Industry are stationed at points where it is anticipated animals will be fed and watered these representatives should be notified in advance of arrival in order that pens and yards may be disinfected and in readiness to receive the animals.

f. Notice to railroad authorities.—When no representative of the Bureau of Animal Industry is available a similar notice should be given the railroad authorities. This is particularly important in trainload shipments.

g. Inspection and cleaning of mangers and troughs.—(1) Upon arrival at a feeding station and before unloading the animals the attendant will make a careful inspection of all mangers and water troughs.

(2) If found to be in an insanitary condition they will be cleaned and disinfected before using. This cleaning and disinfecting is done by the railroad company without expense to the Government.

h. Watering.—Water troughs should be drained before the animals are unloaded, and they should not be allowed free access to water for at least two hours after being fed hay.

i. Feeding.—(1) Enough hay will be purchased at each feeding point to keep hay constantly before the animals while they are in the corrals.

(2) Each time the animals are loaded four bales of hay will be placed in each car, two bales scattered on either side of the car.

j. Guard.—All forage, mangers, and water troughs should be kept under close supervision at the time of feeding and guard will be kept at all times while the animals are in the corrals.

k. When unloading not necessary.—When the stock cars provided are such that the animals can be fed and watered on the train it is unnecessary to unload them for exercise or recuperation unless the weather is very hot and the journey long.

220. Unloading.—*a.* The door should not be opened until the car is opposite the unloading point.

b. Each animal should be led to the door so that his body will be athwart the car before he starts to leave it.

WATER

221. **Kind of vessel required.**—For the transportation of animals by sea the transport service should be equipped with large steamers provided with bilge keels. The interior fittings should be of the most substantial character, the construction and arrangement of the stalls being in accordance with approved plans on file in the office of the Quartermaster General.

222. **Instructions and specifications for conversion.**—Specifications for hasty conversion of commercial vessels for use as animal transports and forms for contracts are on file in the office of the Quartermaster General, in the office of each general superintendent, Army transport service, assistant general superintendent, Army transport service, or local quartermasters near important ports in the United States. Additional copies can be furnished by air mail where needed. As these specifications are based on the use of standard commercial fittings and materials readily secured locally in shipping centers, the acquisition and conversion of vessels can be expeditiously carried out either by the corps area commander or by telegraphic instructions from the War Department.

223. **Equipment required.**—Transports carrying animals will be equipped with the following for each 100 animals:

6 stable brooms.	4 manure baskets.
6 stable forks.	4 hoes.
6 buckets.	4 brooms.
4 shovels, short handle.	200 hay nets.

224. **Inspections before sailing.**—The port remount officer will inspect animal transports as follows:

a. On arrival.—He will inspect every animal transport on its arrival in port, after which inspection he will recommend to the port commander any changes or alterations to be made and the number of animals to be loaded. During his inspection he will pay special attention to the following points:

(1) The ramps and other facilities for loading.

(2) The accommodations for the animals, including the type and suitability of the fittings, adequacy of head room, space for each animal, space for cleaning, feeding, removal of sick or injured, method of tying in stalls, supply of hay nets and feed boxes, provisions for insuring and supplying an adequate supply of fresh air, both by artificial means or auxiliary ventilating apparatus, such as wind sails and suction or blower fans.

(3) The arrangement for cleaning and flushing all decks, the lighting, including lanterns and candles, in case of failure of the electric lighting system.

(4) The water supply, adequacy and provisions for renewal, and the cleanliness of storage tanks; the forage, as to quantity, quality, and storage facilities.

(5) The supply of thermometers for each hold in which animals are carried; the supply of cleaning and grooming utensils.

b. On day before sailing.—On the date preceding the sailing of the vessel he will make another inspection and submit written report to the port commander covering the following points:

(1) Number of animals to be shipped.

(2) Have specifications for fitting, etc., been carried out in a satisfactory manner?

(3) Are there 5 per cent spare stalls on each deck?

(4) Is ventilation of horse decks satisfactory?

(5) Is drainage of horse decks satisfactory?

(6) Is water service satisfactory?

(7) Is lighting service satisfactory?

(8) Is ventilating apparatus satisfactory?

(9) Amount of forage aboard.

(10) Is storage of forage satisfactory?

(11) Is supply of cleaning utensils satisfactory?

(12) Is supply of grooming utensils satisfactory?

(13) Is supply of veterinary medicines, etc., reported as satisfactory by the transport veterinarian?

(14) Number of attendants, both remount service and veterinary service.

(15) Are precautions against fire satisfactory?

c. Immediately before sailing.—After animals have been loaded and immediately before sailing of the vessel he will make a final inspection and will submit written report to the port commander covering the following items:

(1) Name of transport remount officer in charge of animals.

(2) Name of transport veterinarian.

(3) Number of animals loaded, by classes.

(4) Is the ship in all respects ready for sea?

225. Transport remount officer.—*a.* On each animal transport there will be assigned 1 officer of the remount service as transport remount officer; 1 senior noncommissioned officer, Quartermaster Corps, as first sergeant; 1 noncommissioned officer, Quartermaster Corps, as forage master; 1 cook for each

20 attendants; 1 noncommissioned officer and 13 privates of the remount service for each 100 animals; 1 veterinary officer as transport veterinarian; and enlisted men, Medical Department (Veterinary Service), as follows: 1 staff sergeant, 1 private or private first class to each 100 animals, and 1 additional noncommissioned officer to each 4 privates or privates first class. This personnel will, as far as possible, be permanent as long as the transport to which they are assigned is employed for the shipment of animals. When the number of animals exceeds 1,200 an additional veterinary officer as assistant to the transport veterinarian may be assigned.

b. Under direction of the port remount officer the transport remount officer will have direct charge of the loading of the animals of his transport. He will have charge of all animal attendants on board and will assign officers and men to appropriate duties. He will have direct charge of all animals on board. When additional personnel is necessary for care of animals he will make request for same to the commanding officer of troops aboard the transport. Upon return from each trip he will make written report to the port commander, through the port remount officer, covering the following:

(1) Name of transport.
(2) Name of transport veterinarian.
(3) Name of attendants.
(4) Number of animals, by classes, loaded.
(5) Number of animals, by classes, delivered at destination.
(6) Number of animals, by classes, died, giving reasons.
(7) Condition of animals upon unloading.
(8) Nature of voyage.
(9) Quantity and quality of forage furnished.
(10) Water supply.
(11) Ventilation.
(12) *Fitting of ship.*—If not satisfactory, detailed recommendations to be submitted.
(13) *Equipment.*—If not satisfactory and complete, detailed recommendations to be submitted.
(14) *General recommendations.—Transport veterinarian.—a.* The transport veterinarian will have charge of all veterinary attendants and will, under the transport remount officer, assign officers and men of the Veterinary Corps to appropriate duties. He will be constantly present during the loading of the transport. He will promptly report to the port veterinarian any

defects in sanitary conditions which should be corrected before loading. He will, under the transport remount officer, have charge of the sanitation of that part of the ship occupied by animals. He will act as veterinary adviser to the transport remount officer. He will be responsible for the proper care of all sick or injured animals and will request their removal to such places as he may consider advisable. He will be responsible for the proper economical use of all veterinary supplies and equipment. On arrival at the home port he will take prompt steps to renew supplies and repair or replace equipment, to the end that both may be adequate and serviceable at all times.

b. He will familiarize himself with the quarantine regulations of foreign and home ports and with the prevalent communicable animal diseases thereat in order that he may advise necessary measures to prevent the admission and limit the extension of such diseases.

226. Attendants.—*a.* The senior noncommissioned officer, Quartermaster Corps, exercises a general supervision and acts as first sergeant of the Quartermaster Corps detachment on board.

b. Attendants, at the rate of not less than one for each 50 animals, will be constantly on duty with the animals day and night.

227. Animals not accompanying organizations.—In general, unless an organization accompanies a shipment of its own animals, it will turn into the remount depot at its station all of its animals and will draw new animals from the remount service after arrival overseas. However, if it is desired to reissue to any organization its own animals after arrival overseas, and the organization does not accompany the animals, the supply company or a detachment of the organization with a sufficient number of men attached to furnish one man to every 10 animals will be left to care for animals in the stables or animal shelters at the station of the organization until such time as the animals can be sent to an embarkation depot. Where there is a remount depot the facilities thereat will be used to full capacity for caring for these animals awaiting shipment. The supply company or detachment with attached personnel will accompany and care for the animals while en route to an embarkation depot, while at the embarkation remount depot, and while on board ship en route overseas.

228. Animals accompanying organization.—*a. To be shipped in advance.*—When animals of an organization can be accommodated at embarkation remount depots in advance of the date of departure of the organization for a port of embarkation, and it is intended that the animals accompany the organization, the animals will be shipped at least two weeks in advance of the date of departure of the organization, in charge of the personnel prescribed in the above paragraph.

b. Loading; care while on transport.—When organizations proceed on the same animal transports with their own animals, the organization commander will, under the port remount officer, take charge of the loading, and the animals will be cared for while on the transport by the personnel of the organization.

229. Preparation for shipment.—As far as military requirements will permit, no animal will be shipped without having been held at least two weeks in an embarkation remount depot. The shipment to an embarkation remount depot for transportation overseas of sick or unserviceable animals is prohibited. When ordered to send animals to a port of embarkation the commanding officer of the organization to which the animals are issued or assigned will submit all sick and unserviceable animals to the action of an inspector, who will recommend that such animals as he finds unfit for shipment to a port of embarkation, but not to be destroyed, be turned in to the nearest remount depot to be sold or continued in service, and those which should be destroyed will be disposed of by the responsible officer in accordance with the provisions of Army regulations. The animals so condemned or ordered turned in will be immediately replaced by the issue, from the reserve supply of animals at the remount depot, of healthy and serviceable animals. Before shipment the manes of all public animals will be roached closely and animals to be shipped to the Tropics should be clipped. Animals will be freshly shod in front only, with smooth shoes, unless intended for immediate use after debarkation, when they may be shod smooth all around. Before loading, animals will be given soft feed for at least two or three days, and for 24 hours previous to shipment the forage rations will be cut in half. Animals will be watered immediately before loading, unless loading is to be by slinging, in which case no water should be given for four or five hours previous to loading.

230. Loading.—*a.* The additional personnel required for loading will be furnished by the port remount officer from the personnel on duty at the remount depot. With the transport at the wharf the animals are led on board by ramps, or they are hoisted by means of slings or flying stalls. The ramps, decks, etc., should be covered with cinders, sawdust, or litter.

b. In loading by ramps the animals should be led quietly, without interruption, starting with a gentle animal. Those that offer resistance should be set aside and later, if necessary, forced up the ramp by a rope passed in rear of haunches. On reaching the stable deck the animals will at once be led to the farthest vacant stalls, where a feed of hay should be ready for them in a hay net.

c. When animals are slung all the apparatus will be carefully inspected, and great care will be taken to prevent injury in hoisting or loading. When all is ready and the word "Hoist away" is given the animals should be hoisted steadily and rapidly to the required height and then carefully lowered.

231. Debarkation.—*a.* Additional personnel required for unloading will be furnished from the remount depot at the port of debarkation. Unloading will be in charge of the transport remount officer.

b. With the transport alongside a wharf the animals may be led off the ship by use of ramps or hoisted and lowered by means of slings or the flying stall, the latter being preferred.

c. A bed of sawdust, soft earth, or straw should be prepared to prevent injury to the knees of animals which may fall upon landing. Animals will be received by men on shore, and when a sufficient number has landed they will be led to the stables, picket lines, or corrals provided.

d. When it is necessary to lower horses into lighters the greatest care must be taken, especially if there is a swell, to prevent injury. The horse should be received by several careful men on a bed of straw, and the tackle must be slackened down rapidly or let go altogether as soon as he strikes the boat in order that he may gain his footing.

e. In smooth water it is best to construct a ramp from the ship to the lighter. This will facilitate unloading and save risk of injury.

f. Animals may be landed by swimming, being lowered into the water by means of a sling or the flying stall, or they may be led to a port and forced into the water. The latter method,

when practicable, is safer and quicker. A gangplank constructed of boards 16 feet long, the crosspieces being nailed on the under sides, is poised on the edge of the port. The animal is led to the port, a light rope is tossed up from a boat below and passed through the halter ring; the animal, after being led onto the gangplank, is forced into the water by lifting up the interior end of the plank. When he begins to swim he is pulled up close to the boat, care being taken not to hold his head too high for swimming. At the beach the rope is given to a man who wades out from shore and takes charge of the animal.

232. **Routine on transport.**—*a. General.*—The ship will be divided into sections, to each of which a noncommissioned officer with a squad will be assigned. Stalls will be numbered and the limits of the sections accurately defined so that each noncommissioned officer will know exactly for what animals and space he is responsible. The noncommissioned officer in charge of the squad makes his own details, keeps a forage record, and notes on the bulletin board the names of the men on guard and the number of horses sick.

b. Ventilation.—(1) Too much importance can not be attached to the provision of ample means for ventilation. It is at all times difficult to ventilate lower decks and holds which are beneath the water line, and special care should be taken to provide methods both for withdrawing the foul air and for pumping in fresh air; this is especially necessary in the vicinity of stalls which are farthest removed from the neighborhood of the hatchways.

(2) In addition to hatchways and portholes, which should be kept constantly open whenever possible, the means for ventilation are—

(a) Permanent air funnels.

(b) Iron wind scoops.

(c) Canvas wind sails.

(d) Electric fans or blowing machines.

c. Feeding.—(1) No hard and fast rules as regards feeding on board ship can be prescribed. The following will serve as a guide:

(*a*) Feed no oats for first two days.

(*b*) For the next two days feed about 2 pounds of oats and 1 pound of bran per day to each animal.

(*c*) Thereafter increase to, but do not exceed, 3 pounds of oats daily and 1 pound of bran.

(*d*) Bran mashes and hay may be given freely throughout the voyage.

(*e*) Not to exceed one-third pound of linseed should be fed each animal daily. This may be fed dry or as a mash.

(2) The greater the heat that is encountered the more should the oats be cut down and a greater reliance placed on hay and bran. The consequences of overfeeding with oats on board ship are disastrous, as digestive disarrangements are certain to follow.

d. Watering.—(1) A supply of pure drinking water of not less than 10 gallons per day for each animal must be provided. Animals will be watered not less than four times a day—before being fed in the morning, at noon, before feeding in the afternoon, and again about 8 o'clock in the evening.

(2) If water is freely given and no horse is ever allowed to suffer for a moment with thirst the good condition of horses on the ship is assured. If given an abundant and frequent supply of water the animals will maintain and even put on flesh aboard ship on a diet of hay alone. It is generally safe to assume that a consignment of animals arriving at a port of debarkation in markedly poor condition has been neglected as regards watering. If the feed boxes are water-tight it is a good plan, after the final watering in the evening, to leave the boxes full of water, to be taken down during the night, when empty, by the guard.

e. Grooming and exercise.—This will be carried out wherever and whenever possible. Every animal will be taken out of his stall at least a few minutes each day and moved about before being groomed. Hand rubbing the legs will help to offset the lack of exercise.

f. Bathing.—Use hose pipe with sea water twice daily, when possible, for all animals suffering from heat or voyage. This lessens sweating, conserves condition, and purifies the atmosphere.

g. Sick.—(1) *Space for.*—Not less than 5 per cent of the stalls on each deck near the hatchways will be reserved for sick animals. As forage is used other space will become available for ailing animals.

(2) *Treatment.*—The sooner a sick animal is detected and removed to an airy upper deck the better will be the chances of recovery and the less the spread of infection. Ordinarily no attempt should be made to treat hopeless cases, as it is contrary

to hygienic principles and may lead to infection of neighboring animals.

h. Foothold.—To insure a satisfactory foothold, ashes will be sprinkled freely on platforms in rough weather and along alleyways whenever an animal has to be moved.

i. Policing—(1) *Outgoing*—(*a*) *General.*—The ship will be thoroughly policed each morning. All manure will be removed and decks flushed down. Each stall will be cleaned while the horse is being exercised and groomed. Feed boxes, stalls, and passageways will be washed out each day.

(*b*) *Disinfection.*—Disinfectants will be used as required. Where the ammonia gas is bad on account of poor ventilation, pieces of sacking saturated with water and springled with a solution of chloride of lime will be hung up in places where the ammonia is most evident and kept spread out so as to present the largest possible surface to the air.

(2) *On return voyage.*—When transports return empty they will be thoroughly cleaned and disinfected during the return voyage so that loading may not be delayed after arrival. All of the attendants will be considered available for this duty.

j. Daily inspection.—That portion of the ship occupied by animals will be thoroughly inspected at least once a day by the transport remount officer and transport veterinarian. The stalls and passageways must be cleaned and the scuppers clear. The noncommissioned officers in charge of squads will be present when that portion of the ship assigned to them is inspected.

SECTION VII

SHOEING ANIMALS

233. General considerations.—The serviceability of riding, draft, and pack animals depends largely on the condition of their feet. To maintain feet in good condition they must be properly shod. Officers of mounted units and those in charge of draft and pack animals, as well as their stable sergeants and horseshoers, must have a good working knowledge of the construction and functions of the animal's foot, must know when the foot is in need of shoeing, what type of shoe is best suited to the work the animal has to perform, how to prepare the foot for shoeing, and how to fit and secure the shoe.

234. Parts of the foot.—The horse's foot is composed of four parts:

(1) The bones.

(2) Certain elastic structures of cartilage or gristle.

(3) A layer of highly sensitive flesh or quick, the corium, which covers this bony and elastic framework.

(4) The box, or case of horn, called the hoof, which incloses and protects the sensitive parts.

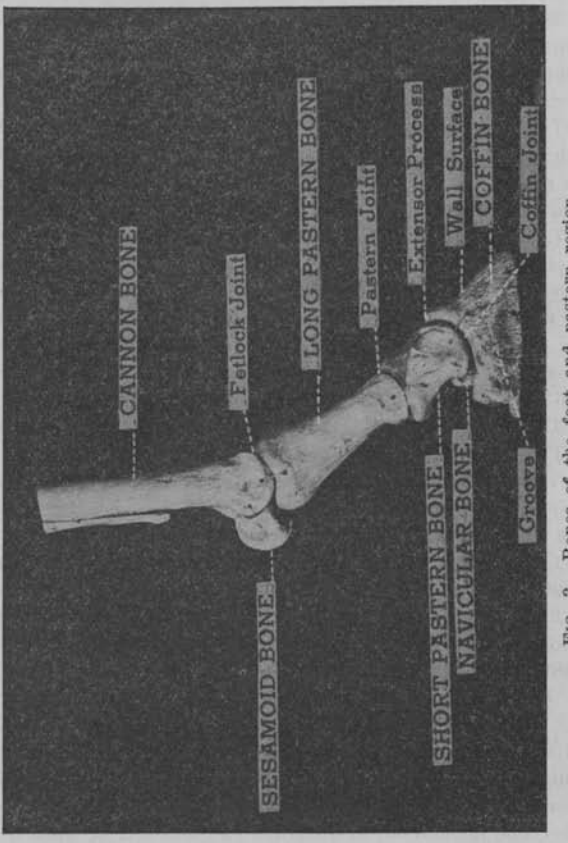


FIG. 3.—Bones of the foot and pastern region

235. Bones of the pastern and foot.—The bones of the pastern region and foot form a column extending downward from the fetlock joint into the hoof and are named as follows: The long pastern bone, the short pastern bone, the coffin bone, and the navicular bone. (See fig. 3.)

236. Elastic structures of the foot.—*a.* All structures of the foot are more or less elastic and yield when pressure is applied. Certain parts, however, have a high degree of elasticity, their special use being to overcome the effects of concussion or jar when the foot strikes the ground. These parts are the lateral cartilages and the plantar cushion.

b. The lateral cartilages are two large plates of cartilage, one attached to the top of each wing of the coffin bone. They extend backward and upward so that their borders may be felt under the skin above the coronet at the heels. (See fig. 4.)

c. The plantar cushion is a very elastic wedge-shaped pad, which fills up the space between the lateral cartilages on the sides of the frog below and the deep flexor tendon of the foot above. (See fig. 4.)

237. Sensitive structures of the foot.—*a.* Over the bones and elastic parts of the foot is found a complete covering of very sensitive flesh called the corium. From each part of this layer of flesh some portion of the hoof is secreted. The sensitive parts are the coronary band, the perioplic ring, the sensitive laminæ, the sensitive sole, the sensitive frog. (See figs. 5 and 6.)

b. The coronary band secretes the horny wall of the hoof.

c. The perioplic ring secretes the periople or hoof varnish. This varnish prevents drying out of the feet.

d. The sensitive laminæ secrete the horny laminæ or inside lining of the horny wall.

e. The sensitive sole covers the sole surface of the coffin bone and secretes the horny sole.

f. The sensitive frog covers the lower surface of the plantar cushion and secretes the horny frog.

238. The hoof.—*a.* The hoof is the outer horny covering of the foot. It is divided into three parts—the wall, sole, and frog. In a healthy foot these parts are firmly united. (See fig. 7.)

239. Frequency of shoeing.—*a.* No shoe should be allowed to remain on an animal's foot longer than 30 days. The wear on the shoe depends on the nature and amount of work and the kind of roads or terrain over which it is performed. Hard-surfaced roads and rocky soil cause the shoes to wear much faster than soft roads and turf. But the growth of horn is approximately the same for all cases, and after a month's growth the horn is too long and needs trimming. Whenever

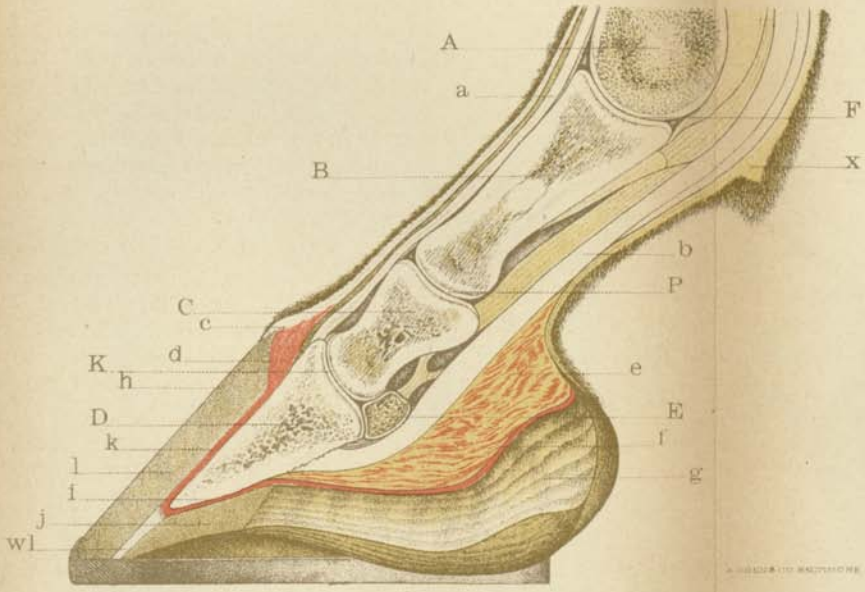


FIGURE 4.—PARTS OF THE PASTERN AND FOOT

A. Cannon bone.
B. Long pastern.
C. Short pastern.
D. Coffin bone.
E. Navicular bone.
F. Fetlock joint.
K. Coffin joint.
P. Pastern joint.

a. Extensor tendon.
b. Deep flexor tendon.
c. Perioplic ring.
d. Coronary band.
e. Plantar cushion.
f. Sensitive frog.

g. Horny frog.
h. Perioplc.
i. Sensitive sole.
j. Horny sole.
k. Sensitive laminae.
l. Horny wall.
wl. White-line.
x. Ergot.

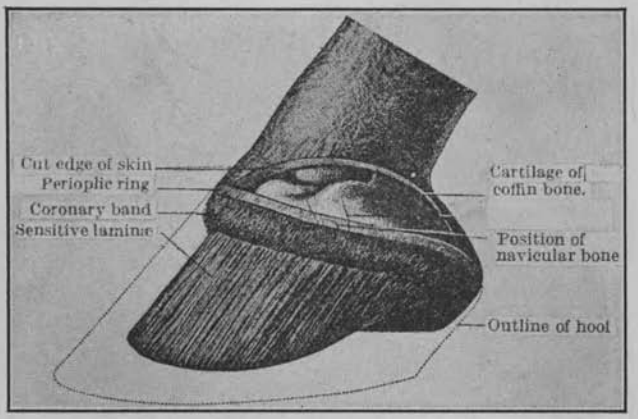


FIGURE 5.—Side view of foot after removal of hoof and part of skin

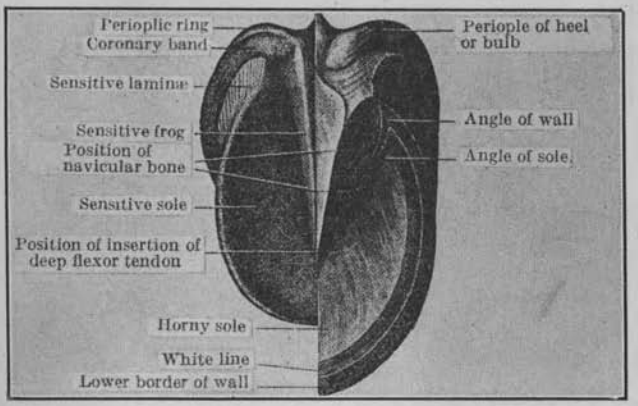


FIGURE 6.—Ground surface of foot after removal of half of hoof

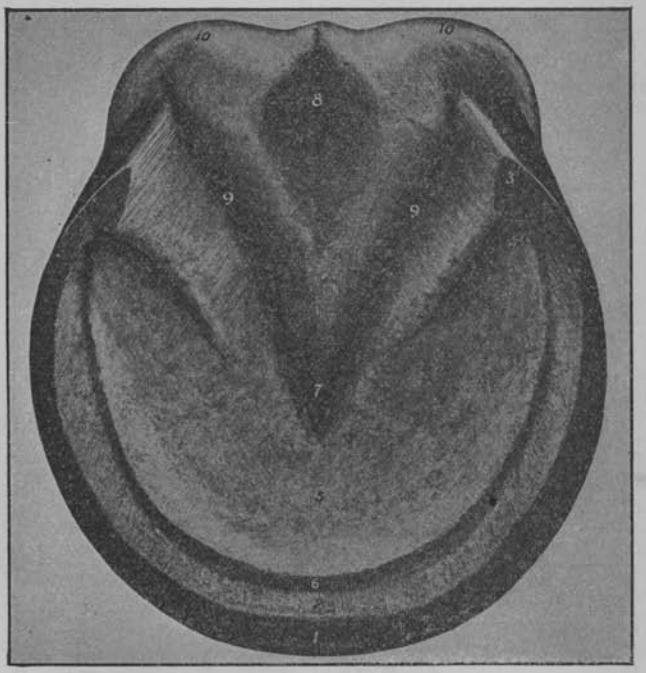


FIGURE 7.—Ground surface of foot

1. Bearing surface of wall.
2. Horny laminæ.
3. Angle of wall or buttress.
4. Bar.
5. Horny sole.
6. Angle of sole.
7. Point of frog.
8. Cleft of frog.
9. Commissures.
10. Bulbs of frog.
11. White line or junction of wall and sole.

justified by the amount of wear left in them, old shoes which have been on for 30 days may be reset, after paring off the excess horn.

b. The horseshoer should know from his shoeing roster (see par. 177) exactly when each animal should be shod to conform to the 30-day requirement. He should inspect the feet of all animals daily, preferably at "Stables." Animals found to need attention should be attended to with the least practicable delay. It is the duty of officers to see that this inspection is made.

240. Normal shoes.—*a.* By a normal shoe is meant a shoe for a sound foot of a horse with proper gaits. The service shoe as issued is a normal shoe. Six sizes of shoes are issued (Nos. 1, 2, 3, 4, 5, and 6, front and hind). Each size is made in five different weights, as follows: "Extra extra light," "extra light," "light," "medium," and "heavy."

b. For riding and pack animals in garrison service the "extra extra light" or "extra light" weight is generally the most desirable shoe to use.

c. For riding and pack animals in field service the "light" weight is in most cases the best shoe to use.

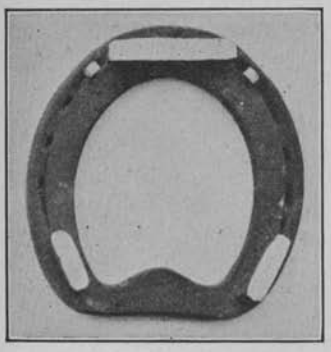
d. For draft animals in both garrison and field service the "medium" weight shoe will be found best in the majority of cases.

e. The size of shoe required is determined by inspection, being careful not to take a shoe in which the last nail hole is in rear of the bend of the quarter of the hoof.

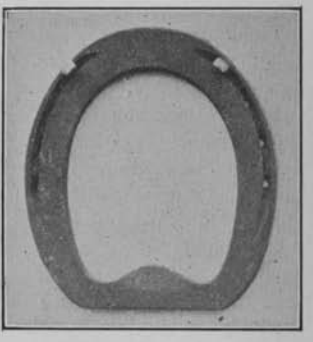
241. Pathological shoes.—*a.* Pathological shoes are used for the relief of diseased feet.

b. The bar shoe (*fig. 8b*) is most commonly used in pathological shoeing, as it produces frog pressure which increases the blood circulation. It is also a strong shoe and gives great protection to the feet. The bar shoe is made from the service shoe. Its general shape and fit are the same as the service shoe, except that it has a bar across the frog. In some cases one toe calk and two heel calks are welded on the ground surface of the shoe (fig. 8*a*). See paragraph 192 for the diseases for which the bar shoe and calked bar shoe are used, and paragraphs 22–33, Training Manual, United States Army—The Horseshoer, for a description of the methods of making these shoes.

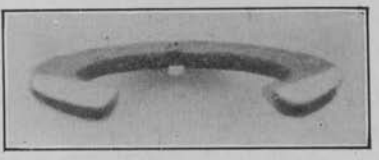
c. The Memphis bar shoe (*fig. 8d*).—This shoe is used in cases of chronic lameness. It permits the foot to be planted



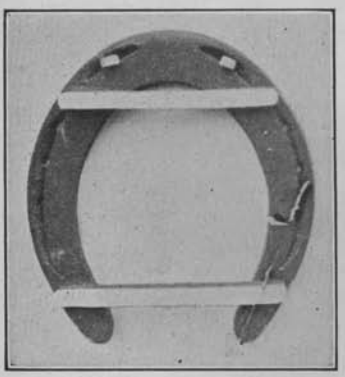
a. Calked bar shoe



b. Bar shoe



c. Bevel-edged shoe (viewed from the heels)



d. Memphis bar shoe



e. Four-calked shoe.

FIGURE 8.—Pathological shoes

and break over with the minimum amount of concussion and effort. The Memphis bar shoe is made from the service shoe. A bar is welded on the ground surface of the open shoe across the toe behind the first nail holes and another across the ends of the heels. See paragraph 192 for the diseases for which the shoe is used and paragraph 34, Training Manual, United States Army—The Horseshoer, for a detailed description of the shoe.

d. The 4-calked shoe (*fig. 8e*).—This shoe has practically the same uses as prescribed above for the Memphis bar shoe. It is made from the service shoe. Heel calks are provided and short calks are welded on the ground surface of the shoe between the first and second nail holes near the crease on both sides of the toe. See paragraph 192 for the diseases for which the shoe is used and paragraph 35, Training Manual, United States Army—The Horseshoer, for a detailed description of the shoe.

e. The bevel-edged shoe (*fig. 8c*).—The bevel-edged shoe is used principally for animals with contracted heels and quarters. It is made from the service shoe by beveling the bearing surface as described in paragraph 36, Training Manual, United States Army—The Horseshoer. See paragraphs 192 and 193 for diseases for which the shoe is used.

242. Shoeing to correct faults in gaits.—*a. Forging.*—(1) Forging or clicking is a fault in the trot, in which the toe of the hind foot overtakes and strikes the bottom of the front foot on the same side at the moment the front foot is breaking over or immediately thereafter and before the front foot has attained sufficient elevation to clear. This condition may be due to faulty conformation, to improper shoeing, or to leg weariness.

(2) For the animal with good conformation shoe with a rocker-toe shoe in front and with normal shoes behind. The rocker-toe shoe is a service shoe with the toe bent or rocked upward. See paragraph 42, Training Manual, United States Army—The Horseshoer, for a description of the shoe.

(3) For the riding animal with faulty conformation shoe in front with rocker-toe shoes; shoe behind with a shoe squared at the toe and fitted on the foot so that approximately one-fourth inch of the wall projects beyond the shoe at the point of the toe. The heels of the shoe should be long and turned out. See paragraphs 42 and 43, Training Manual, United States Army—The Horseshoer, for a description of the rocker-toe and the square-toe shoes.

(4) For the draft animal with faulty conformation shoe in front with the rocker-toe shoe if a plain shoe is used. If conditions necessitate the use of calks, use the 4-calked bar or 4-calked open shoe. See paragraphs 33, 35, and 44, Training Manual, United States Army—The Horseshoer, for a description of the shoes mentioned above. Shoe the hind feet with toe and heel calks, the toe calk being placed well toward the front edge of the shoe at the toe, with clips on both sides of the toe between the first and second nail holes.

b. Interfering.—(1) Interfering is a fault in gait in which the horse strikes any part of the leg, from the coronet to the knee in front and to the fetlock behind, with the shoe of the opposite foot.

(2) (*a*) The causes of this condition may be temporary or permanent.

(*b*) The temporary causes may be fatigue, faulty preparation of the feet, and improper shoeing, such as trimming the inner wall too low, failure to remove large wings or flares on the inner quarters, fitting the shoes too full on the inner quarters, rough or careless clinching of the nails, allowing the nailheads to protrude below the shoes, and using shoes that are too heavy.

(*c*) The permanent causes are faulty conformation such as pointed toes, toeing out, narrow chest, and front legs close together and narrow behind with hind legs close together.

(3) The general principle involved in the correction of interfering is to increase the clearance between the legs by removing any growth or projecting surface on the inside of the foot or shoe and to induce the feet to break over at the center of the toes.

(4) Temporary causes of interfering may be removed by proper preparation of the feet, leveling, using proper-weight shoes, removing large wings or flares, smoothing rough clinches, rounding the edge of the shoe and fitting it close at the inner quarters, and seating the nailheads well into the shoe.

(5) Permanent causes may be counteracted temporarily by special shoeing, but when the special shoe is removed the fault will almost invariably return. Such special shoeing is impracticable in the field. If a horse interferes due to faulty conformation leather boots which fit around the fetlocks should be provided. This will minimize the effects of striking the leg with the opposite foot.

c. Stumbling.—(1) The horse stumbles in breaking over, or just after breaking over, as a result of not raising and carrying the foot high enough to clear the ground.

(2) For stumbling due to temporary causes such as fatigue, debility, faulty preparation of the feet, or shoes too heavy or improperly fitted, the correction is obvious.

(3) For stumbling due to permanent causes, such as faulty conformation, use the methods given below.

(*a*) *For stumbling in front.*—Preparation of the feet normal. If the nature of the work and the footing permit a plain shoe, use the rocker-toe shoe. If calks are necessary use the 4-calked shoe.

(*b*) *For stumbling behind.*—Preparation of the feet normal. Use a light-weight shoe with low heel calks.

243. The fitted shoe for riding horses.—*a.* The shoe should follow accurately the outline of the foot. Nail holes should fall over the outer edge of the white line.

b. The web of the shoe should be wider at the toe than at the heels. At the toe the width of the shoe should be about twice the thickness of the wall of the hoof at that point.

c. The bearing surface of the shoe must be level, smooth, and accurately shaped to support the bearing surface of the foot. When the foot surface of the shoe is wider than the bearing surface of the foot the inner part of the shoe must be concaved to avoid harmful sole pressure.

d. The heels should extend back, covering the buttress, and be even with the bulb of the frog. It is important that the bearing surface of the shoe cover the buttress.

244. The fitted shoe for mules.—The fitting of shoes for mules differs from the fitting of shoe for horses in that the heels of mule shoes should extend beyond the buttress a considerable distance and should be slightly turned out from a point just beyond the buttress to give lateral support to the foot. The plain shoe in front and the calked shoe on the hind feet will best suit the needs for most work.

245. Shoeing draft animals.—*a.* It is advisable under most conditions, ice-covered roads excepted, to shoe draft animals with plain shoes in front and calked shoes with toe and heel calks on the hind feet. For work on ice-covered roads shoe light draft horses with ½-inch dull-pointed heel calks both fore and hind; heavy draft horses should be shod with both heel and

toe calks. When calks are used on front shoes use the bar in place of the open shoe.

246. Nails.—*a.* The sizes of nails in general use in the service are Nos. 5, 6, and 7. A No. 5 nail is used for a No. 1 and No. 2 shoe, a No. 6 nail for a No. 3 and No. 4 shoe, and a No. 7 nail for the shoes of heavy draft horses.

b. Each size of nail is made in three different patterns of head—the "plate head," the "city head," and the "regular head." The "plate head" is best for use with stamped or countersunk shoes. The "city head" is best for use with lightweight shoes, such as extra extra light and extra light. The "regular head" is best for use with the heavier pattern shoes.

c. One side of the shank of the nail is flat. The other side is concave and has a bevel near the point. The bevel as it enters the horn forces the nail in the direction of the flat side. Therefore the nail must always be held *with the flat side toward the outside edge f the shoe.*

247. Preparation of the foot for shoeing.—*a. General.*—In order to prevent injury to the foot, proper preparation for shoeing is necessary. Officers charged with the care of animals must understand the principles involved so that proper supervision may be exercised over their horseshoers.

b. Removal of old shoes.—(1) The clinches are cut off or straightened with the clinch cutter and hammer. If even one clinch is left holding it may break off that portion of the wall to which it is fastened.

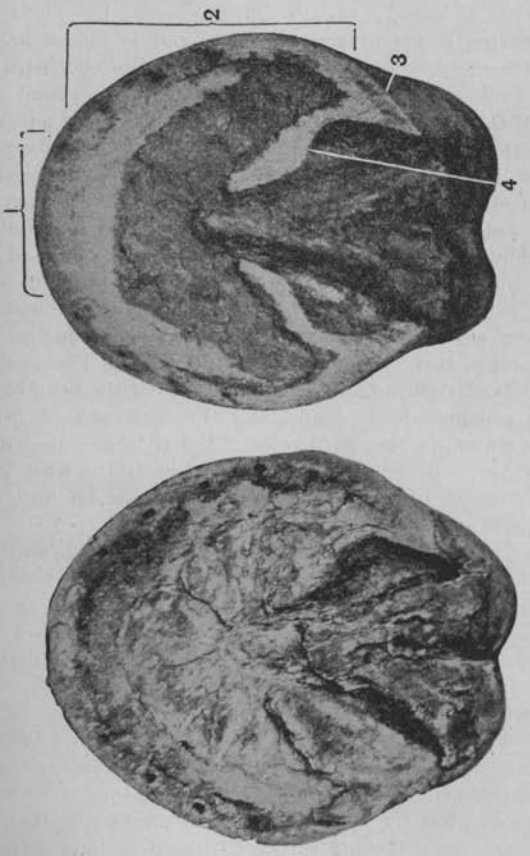
(2) After clinches are straightened the shoe is loosened with the pinchers. The pinchers are first applied at the heels, then gradually worked toward the toe, until all nails are free except at the toe. The shoe is then firmly grasped at the toe with the pinchers and pulled off *toward the heel.*

c. Preparation of the foot (see fig. 9).—(1) The details of how to prepare the foot are given in Section VI, Training Manual, United States Army, The Horseshoer. Only the main considerations will be mentioned in these regulations.

(2) In general the foot should be prepared so that it will approximate as nearly as possible to a state of nature. Trimming should be sufficient only to cause the size of the foot to correspond to the size of the animal and to expose live horn over the white line and the outer border of the sole.

(3) The shoeing knife is used to pare away dead horn of the white line and of the wall and sole bordering the white line

until live horn is reached. Cutting should not extend farther back than the last nail hole. The nippers are then used to remove the surplus growth of horn from the wall. Final leveling of the foot is done with the rasp. To determine the level



a. Appearance of the foot after the old shoe has been removed

b. Foot ready for the new shoe. 1, Toe; 2, quarters; 3, buttress; 4 bar

FIGURE a.—Preparation of the foot

of the foot examine it with the foot on the floor and by raising the foot and sighting over the bearing or ground surface. In sighting over the bearing or ground surface the foot should hang naturally; no pressure should be against it with the thumb.

(4) The use of the knife to remove ragged portions of horn on the frog is permissible. No further cutting should be done unless there is a great accumulation of dead horn present on the sole or frog. Cutting away the bars or opening the heels *weakens* the foot and may result in contraction of the quarters and heels.

248. Securing a fitted shoe.—*a.* The shoe is placed on the bearing surface of the foot and held firmly in position with the left hand, back up. A nail is placed between the thumb and forefinger of the left hand, the *flat side of the nail faced outward.* The nail is held squarely in the center of the most convenient nail hole, usually the third hole on the right side of the shoe. With a toe clip on the shoe, the second nail hole is generally used. The nailhead is tapped lightly with the driving hammer. The nail should be held firmly to determine the feel and the thumb and forefinger should not be removed until the nail needs no further guidance. The shoe is then grasped firmly and the nail is driven with slightly increased force. After the point of the nail emerges turn it upward with the claw of the hammer until it stands at right angles to the wall. Next the head of the hammer is grasped in the hand and the claw pushed firmly downward, clutching the nail point. A half turn downward and a slight pull will wring off the point close to the wall, leaving enough nail to form the clinch. In wringing off nails the hammer is held in the hand nearest the nail point.

b. As the first nail driven may cause the shoe to shift, it is essential to place it exactly in the center of the nail hole. If the shoe has altered its position on the foot a pressure on the opposite side of the shoe by the palm of the hand and a few light blows of the hammer on the lower border of the wall where the first nail is driven will move the shoe back in place.

c. The second nail should be driven on the side opposite the first nail. When these two nails have been driven the foot should be allowed to rest on the floor and the foot and shoe should be examined from all sides. The purpose of this examination is to see that the nails are properly placed and that the shoe is properly set. Having satisfied himself in these particulars, the shoer drives the remaining nails, the fourth nails on either side being driven first. As each is driven it is promptly wrung off. When all nails have been driven the heads are forcibly hammered well into the crease, thus securing the shoe evenly upon the foot.

d. The clinching block is now placed under one of the nail points and the nailhead is struck with the hammer. This bends the nail point over toward the bottom of the foot and the nail is drawn up into the wall, thus tightening the shoe.

e. In seating the nailheads into the crease and in drawing up the nails and turning the clinches the shoer begins on either side of the foot and takes the nails in the following order: The toe nail on one side, the heel nail on the same side, the toe nail on the opposite side, the heel nail on that side, and then the quarter nails.

f. For very thin walled or tender feet it is best to seat and draw up the nails one at a time, alternating from side to side and beginning at the toe.

g. After the clinches have been formed the foot is brought forward upon the knees. With the rasp the clinches are made of equal length, being in length about the width of the nail at this point. The end of the nail is brought to a thin edge by filing off the corner of the underneath side.

h. On the march, in case no horseshoer is available, a loose shoe may be replaced by the rider or driver who will follow the above procedure in so far as conditions permit.

249. Inspection of shoeing.—*a.* Organization commanders and platoon leaders should inspect all animals under their commands daily. At "Stables" they should inspect animals freshly shod, the horseshoer and stable sergeant being present for this inspection. Animals should be examined on a level surface; otherwise it is impossible to determine whether the animal is standing correctly or not.

b. The following points should be carefully noted and any improperly or carelessly shod animals returned to the shop for correction:

(1) *With foot on a level surface.*—(*a*) *Pastern and foot axes.*—View the foot from the front to see that the legs are set vertically under the body. View from the side to see that the long pastern bone makes an angle of about 45° with the cannon bone.

(*b*) *The fit of the outline of the shoe.*—Does the shoe follow the outline of the foot to the last nail hole and from there extend outward, allowing proper space for expansion? Note particularly whether the wall has been rasped to fit the shoe.

(*c*) *The toe clip.*—Is the toe clip in the center of the toe? Is its height equal to about twice the thickness of the shoe, properly finished, and seated?

(*d*) *The clinches.*—Are they about 1 inch above the bearing surface of the foot and the proper distance apart? Are they well turned and set in? Are they smooth and of sufficient strength? (See also par. 248.)

(2) *With the foot raised.*—(*a*) *The shoe.*—Is it the proper size and weight? The last nail hole not farther back than the bend of the quarter?

(*b*) *The preparation of the foot.*—Has enough horn been removed? Has too much been removed? Is the foot level?

(*c*) *Bearing surface of the foot.*—Does the shoe rest evenly on the wall, covering the buttress and showing no air spaces at any point?

(*d*) *Concaving the shoe.*—Is the shoe properly concaved? There should be no sole pressure at any point.

(*e*) *Use of the knife.*—Has the knife been used on the bars, sole, or frog? (See par. 247.)

(*f*) *The nails.*—Are they well seated in the crease? Are they of the correct size? All the same size?

(*g*) *The heels of the shoe.*—Are they the correct width and thickness, properly rounded, without sharp edges or points? Is their length even with the bulb of the frog?

(3) *In the case of animals shod with calked shoes.*—(*a*) *Toe calk.*—Is it properly secured and of proper height and length?

(*b*) *Heel calks.*—Are they of the same height as the toe calk? Are they properly turned and finished?

250. Important field measures.—*a.* On going into the field troops should, whenever possible, start out freshly shod. One front and one hind fitted shoe with 16 nails for each animal will be included in the equipment of the rider or driver. An extra supply of shoes and nails should be carried on the supply wagons. Nails issued to individual enlisted men should be placed in a woolen container and oiled from time to time to prevent rust.

b. Any animal losing a shoe on the march must be given proper attention immediately. If neglected, lameness will almost surely result. Officers, noncommissioned officers, riders, and drivers must be constantly on the lookout for loose or cast shoes. The feet of animals will be inspected at every halt by the rider or driver.

c. A cast or loose shoe is secured to the foot as prescribed in paragraph 248. All officers and noncommissioned officers of mounted organizations and organizations equipped with animals must understand how to drive a nail and secure a fitted shoe. In case no shoe is available, an animal losing a shoe may be enabled to continue the march by the use of a piece of canvas, leather, or gunny sack as a covering to protect the foot.

d. As soon as possible after reaching camp the feet of each animal should be inspected by the responsible officer and by the horseshoer.

SECTION VIII

DUTIES OF ENLISTED SPECIALISTS

251. The stable sergeant.—The stable sergeant is directly responsible to the organization commander for the efficient care of the animals of the organization, of the organization stables (or picket line in the field) and all public property pertaining thereto. He should be quartered at the stables or in the vicinity of the picket line.

In detail his duties may be enumerated as follows:

a. To have a good working knowledge of the contents of these regulations and of Training Manual, United States Army, The Horseshoer.

b. To supervise and control the activities of all enlisted men on duty at the stables.

c. To take charge of the restraint and safe-keeping of all animals of the organization when they are not in use.

d. To take charge of the feeding and watering of the animals at the hours and the amounts specified by the organization commander.

e. To execute the orders of the veterinarian in regard to the treatment of animals sick in stables and, in the absence of a veterinarian, to care for sick animals. To have a good working knowledge of the contents of the stable sergeant's veterinary set.

f. To receive, check, and care for the forage and bedding issued to the organization. To issue the forage and bedding for feeding and bedding purposes and determine its fitness for use.

g. To take charge of the general police and minor repair of the stables and stable fittings.

h. To care for all transportation equipment, tools, etc., which are stored or habitually kept at the stables.

i. To keep the following records (see par. 177): (1) Descriptive card of public animals (or horse record card).

(2) Record of stable property.

(3) Forage record.

(4) Shoeing record.

(5) Morning report of horses.

(6) Sick report of horses.

i. To enforce the following rules for the care of animals at all times:

(1) Animals require gentle treatment.

(2) Before entering an animal's stall and when coming up behind him, speak to him gently, then approach quietly.

(3) Never kick an animal, strike him about the head, or otherwise abuse him.

(4) Never punish an animal, except at the time he commits an offense, and then only in the proper manner, never in anger.

(5) Give an animal an opportunity to drink before leaving the stable or picket line and before putting the bit in his mouth.

(6) Never take a rapid gait until the animal has been warmed and circulation in the feet started by gentle exercise.

(7) When an animal is brought to the stable or picket line in a heated condition never allow him to stand uncovered. Put a blanket on him and rub his legs or walk him until he is cool. If he is wet, put him under shelter, not in a draft, and rub him with a wisp until dry.

(8) Never feed grain or fresh grass to an animal when heated. Hay will not hurt an animal, however heated he may be.

(9) Never water an animal when heated, unless the exercise or march is to be immediately resumed. Sponging out the mouth and nostrils is refreshing to the heated animal and will not hurt him.

(10) Never allow an animal's back to be cooled suddenly. To cool the backs of riding animals gradually, remove the pack and equipment from the saddle, loosen the girth, remove the blanket, replace it with the dry side next to the animal, and replace the saddle, girthing it loosely. With pack animals remove the load and later the pack saddle or aparejo.

(11) Never put an animal up for the night until he is thoroughly cooled out and clean, especially around the legs, pasterns, and feet.

(12) Individual men returning from mounted duty or pass should report their return to the stable sergeant, who should inspect each animal and see that it is properly cared for.

(13) Never mount or ride an animal in a stable.

252. Enlisted assistants of the stable sergeant.—*a. General.*—The stable sergeant's assistants are the horseshoers, the stable orderly or orderlies, and such other men as may be detailed for special duty at the stable. The horseshoers and the stable orderlies should, when practicable, be quartered at the stables or in the vicinity of the picket line in the field.

b. Duties of the horseshoers.—In detail, the horseshoers' duties may be enumerated as follows:

(1) To have a good working knowledge of these regulations (especially those parts pertaining to shoeing animals) and of Training Manual, United States Army, The Horseshoer.

(2) To maintain the shoeing shop in a good state of police.

(3) To care for the tools issued for horseshoeing purposes.

(4) To inspect the feet of animals daily, preferably at "Stables," and attend to any that need it.

(5) To shoe the animals assigned by the stable sergeant.

c. Duties of stable orderlies.—The stable orderly or orderlies and other men detailed for special duty at the stables are required by the stable sergeant to perform the actual work of policing the stables, feeding and watering the animals, bedding down the stalls, making minor repairs to the stables, especially the stall floors, and performing such other duties connected with the animals or stables as the stable sergeant may direct. At least one man must be kept on duty at the stables day and night.

d. Veterinary Corps personnel.—Enlisted men of the Veterinary Corps who may be attached to the organization are under the control of the stable sergeant for administrative purposes, but carry out the instructions of the veterinarian in regard to the care of sick and injured animals of the organization.

253. Stable sergeant's veterinary set.—The stable sergeant is issued a veterinary set, which consists of a chest containing an instrument case and a supply of dressings, medicines, and equipment. A detailed list of the contents is given on the in-

side of the cover of the chest. This chest is for the use of the stable sergeant in carrying out the instructions of the veterinarian in regard to the care of animals sick in stables and in caring for sick animals in the absence of a veterinarian. In the field the chest is carried on the organization wagon and the stable sergeant carries in his saddlebags or elsewhere such minor articles as are likely to be needed on the march.

CHAPTER 4

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SECTION I

HARNESS AND HARNESSING

254. How to put on, adjust, and take off the halter.—The wagoner folds or coils the halter shank or rope, takes the halter and shank in the left hand, and approaches the animal just in front of the near shoulder. He places the halter under the animal's neck, grasps the crownpiece with the right hand over the neck, slides it forward with the right hand, and extends the noseband forward with the left hand until it is in position; the halter is then raised by the use of both hands until the noseband is in position around the animal's nose. The halter is then buckled sufficiently tight to prevent its slipping off, but not so tight as to interfere with breathing and comfort. As soon as the crownpiece is buckled its end is passed through the keeper. A sufficient number of holes should be punched in the crownpiece to permit of its proper adjustment.

255. How to put on, adjust, and take off the bridle.—*a.* To put on the bridle the wagoner takes the reins in the right hand and the crownpiece in the left hand, approaches the animal on the near side, slips the reins over its head, and lets them rest on the neck. He then takes the crownpiece in the right hand and places it in front and just a little below its proper position. With the bit lying in the palm of the left hand, which is held under the animal's jaw, the thumb is inserted into the side of

the mouth above the tush. The wagoner presses open the lower jaw and inserts the bit by raising the crownpiece. With the left hand the ears are gently drawn under the crownpiece, beginning with the left ear, after which the throatlatch is secured. The throatlatch should be loose enough to permit easy breathing and tight enough to hold the bridle securely on the animal's head. The checkstraps should be adjusted so that the bit is well up in the corners of the mouth but does not wrinkle it.

b. To unbridle, the wagoner passes the reins over the animal's head, places them on the bend of the left arm, unbuckles the throatlatch, grasps the crownpiece with the right hand, and gently disengages the ears. He removes the bit by lowering the crownpiece. The bridle is hung on the left hame by one of the bit rings or by the crownpiece.

256. How to put on the harness.—*a. Ambulance or escort wagon wheel harness.*—The wagoner first takes the breeching off the harness peg, thus releasing the collar, which he places over his left arm, top down. He slips his right arm through the breeching and backband, grasps the off hame with his right hand at about the center and the near hame with his left hand also at the center, walks to the near side of the animal, and gently places the harness on its back. He now puts on the collar and adjusts the hames upon it. He pulls the breeching into place, the bellyband through the loop in the end of the chokestrap, buckles it, snaps the side straps into the chokestrap ring and puts on the bridle.

b. Ambulance or escort wagon lead harness.—The wagoner proceeds as with the wheel harness, except that he places, adjusts, and secures the crupper in lieu of the breeching.

c. Buckboard harness.—To put on buckboard harness, the wagoner takes the bridle from the peg and passes it over his left arm, takes down the collar and places it on the same arm, takes down the harness with breeching and backband over his right arm, grasps the right hame about the center with his right hand and the left hame also at the center with his left hand, approaches the animal on the near side, gently places the harness on the animal's back, puts on the collar, and adjusts and fastens the hames upon it. He then draws the breeching into place and buckles the crupper around the tail, slips the end of the chokestrap over the bellyband, buckles the band, and puts on the bridle.

d. Cart harness.—The wagoner takes down the harness and places the breeching over the right arm. Grasping the pad with the right hand on its rear end and the left hand on its front end, he approaches the animal on the near side and gently places the pad on its back. The breeching is then adjusted and the bellyband fastened. The wagoner then takes down the collar, places it on his left arm, takes down the hames, the right one in the right hand, the left one in the left hand, and places them on the animal's back in front of the pad and then puts on the collar. He then fastens the hames on the collar and puts on the bridle.

257. How to adjust the harness.—*a. The collar.*—A collar should be selected which when buckled will fit so that there is just room to pass the hand between the collar and throat at the bottom. It should not be so narrow that it will pinch the animal's neck or so wide that the bearing surface will come on the outer part of the shoulder. The top of the collar should be so fitted as to follow the contour of the crest and conform to the animal's neck. If the collar is too short it will choke the animal; if too long or too wide it will cause abrasions on the point of the shoulders. The collar should be moist when first used so that it will shape itself to the animal's shoulders and neck by the pressure of draft. This moisture is most effectively given by wrapping it in wet sacks and leaving them on for one night before it is used. Collar pads are useful with large collars when proper sizes can not be obtained.

b. The hames.—The hames should be adjusted in length by shifting the upper straps to the proper holes. The length should be such that the point of the attachment of the trace will be opposite the middle of the surface of the shoulder over which the collar rests. This is for the purpose of distributing the pressure evenly over the shoulder and thus reducing it to the minimum at any particular point. In adjusting hames the straps should not be so tight as to squeeze the collar. The upper hame strap should be just long enough to be taut when the lower strap is buckled snugly.

c. The traces.—The traces should be adjusted to the larger animal of the pair. All four traces of the pair should be of equal length. The traces are hooked long enough so that the singletrees will not interfere with the movement of the animals;

the wheel traces so adjusted as to allow at least 14 inches between the hind quarters and the singletree when in draft.

d. Breast strap.—The breast strap should be so adjusted that it will not be tight or leave too much slack to properly guide the pole. This trap is not intended to hold back the load.

e. Breeching.—The turnback strap should be so adjusted that the ring in the end will be even with the point of the hips, and the hip straps should be adjusted so that the breeching will hang squarely around the buttocks. The breeching should not hang too low, as this has a tendency to pull the animal's feet from under him and reduce his backing power when backing a load. The side straps should be adjusted so that there is no strain upon the breeching other than when backing the vehicle and so that they do not have an unnecessary amount of slack at other times.

f. Lines.—The spread lines are passed through the rings on the spreader straps and adjusted so that the animals will be squarely in front of their own singletrees. If the spread lines are too short they will draw the animals' heads together; if too long they will allow their heads to spread them apart.

g. Backband.—The backband is adjusted so that there will be no slack above the traces and so that there will be no downward strain upon it from the traces when the animal is in draft.

h. Bellyband.—The bellyband should be buckled sufficiently tight to hold the harness in position but loose enough to permit of the traces straightening without bringing a strain upon it.

i. The crupper.—The turnback should be adjusted so that the crupper will not pull on the animal's tail or be allowed to hang down from its proper position. The hip straps should be adjusted to such length that there will be no strain upon them when the animal is in draft and sufficiently short to have no unnecessary or unsightly slack.

j. In adjustment of the various parts of the harness care should be taken to the end that straps are not twisted, causing the buckles to be turned in toward the skin of the animal, producing irritation and abrasions.

258. How to prevent and care for bunches.—*a.* Careful fitting, adjusting, and cleaning of harness and equipment and care in use of the lines and brake, particularly at the time of starting heavy loads, will prevent bunches. Prompt attention will prevent bunches from becoming large. It is much easier to prevent them than to eradicate those already formed.

b. Padding should never be placed over a bunch, as it only makes the bunch worse. If felt collar pads are not obtainable, pieces of sheepskin with thongs attached are very handy for use in case of sore shoulders or collar boils. They are tied one on each side of the affected part, and should be large enough to cover the entire half of the collar except the sore spot. Small pieces would only cause undue pressure on the spots covered by them. If felt collar pads are available, the padding should be removed from them so as to relieve pressure from the bunch.

259. How to unharness.—*a. Ambulance or escort wagon harness.*—The wagoner unbridles, unfastens the side straps from the chokestrap ring, unbuckles the bellyband and slips it out of the chokestrap loop, unbuckles the lower hames strap, raises the hames, and places them in rear of the collar, unbuckles the collar, and places it over the right arm. He then slides the harness over the animal's croup, passes the right arm through the breeching and backband and grasps the right hame with the right hand about the center and the left hame with the left hand about the center in a similar manner as when harnessing. He then hangs the hames on the harness peg by the upper hames strap, allows the collar to fall from the arm down over the turnback strap, and hangs the breeching on the harness peg. Lead harness is taken off in a similar manner, except that the crupper is hung on the harness peg in lieu of the breeching.

b. Buckboard harness.—The wagoner unbridles, slides the left arm through the bridle so that the reins and crownpiece hang upon it, unfastens the lower hame strap, raises the hames and places them in rear of the collar, unbuckles the collar, takes it on the left arm with the bridle, and unfastens the bellyband. He slides the harness off over the animal's croup, allowing the breeching and backband to pass over the right arm, and grasping the hames, one in each hand near the center, hangs hames, backband, breeching, collar, and bridle on the harness peg.

c. Cart harness.—The wagoner unbridles and unbuckles the lower hame strap and the collar. Taking the collar on his left arm and the hames in both hands, he hangs the hames and collar on the harness peg. He then unbuckles the bellyband, slides the saddle off over the animal's croup, and places it on the harness peg, hanging the breeching over it.

260. How to hitch.—*a. A team consisting of two pairs.*—(1) *First method.*—The animals being harnessed and in their stalls, the wagoner backs out the wheel team and snaps the breast

strap of the near wheeler into the bit ring of the off wheeler. He then backs the lead team out of its stall into position in front of the wheelers, snaps the spread line from the near leader into the bit ring of the off leader, hitches the near trace of the near leader into the bit ring of the near wheeler, and takes the team out to position in front of the wagon by leading the near leader. Upon arriving in front of the vehicle tongue he fastens the other lead spread line and takes down the near leader's line, which he holds in one hand, releases the trace from the near wheeler's bit ring, backs the wheeler into place, passes the near lead line through the ring on near wheeler's rein strap and places it over the near wheeler's back, fastens the spread lines on the wheelers, snapping them in the bit ring of the opposite animal. He then passes the breast straps through the rings of the pole chains and snaps them into opposite hame rings and takes down the near wheeler's line. He steps behind the near wheeler and hooks the near trace on the off wheeler, off trace on near wheeler, near trace on near wheeler, passes the lines over to the off side of wheelers, hooks near trace on near leader, off trace on near leader, near trace on off leader, off trace on off leader, takes down off leader's line and passes it through the ring on off wheeler's rein strap, takes down the line on off wheeler and hooks off trace on off wheeler, all in order named, after which he gathers up the lines and mounts to the seat.

(2) *Second method.*—The animals being harnessed and in their stalls, the wagoner enters the stall on near side of near wheeler, unties and passes in front of it, unties off animal, and standing at their heads, between and facing them, grasps both bridle reins near the bit, right hand holding near animal and left hand holding off animal, and backs them out of their stall. He then releases the outside rein and, leading them, walks between them, causing them to turn so that the near animal will be on the off side. He then brings out the lead team in like manner, places each in rear of its wheeler, and ties it by its halter shank to its wheeler's backstrap. He then takes the team to the vehicle by leading the wheelers, approaches the vehicle from the front, stopping at the front end of the pole and causes the wheelers to turn in alongside of it. He then snaps the inside line of near wheeler to off wheeler and the inside line of off wheeler to near wheeler, takes down the breast straps and fastens them through the pole-chain rings and

attaches them to opposite hame rings, steps to off side and takes down off wheeler's line, hooks the off trace, passes around head of the team, takes down near wheeler's line, steps behind near animal, hooks inside trace of off animal and inside and outside trace of near animal, unties near leader and then off leader and leads them to position in front of the wheelers, attaches spread lines, takes down near leader's line, passes it through the ring on near wheeler's rein strap and places it on the near wheeler's back, hooks inside trace of off leader, inside and outside trace of near leader, takes up lines of the two wheelers and near leader and passes them over to the off side of the wheelers, takes down off leader's line, passes it through the ring on off wheeler's rein strap and places it with the other lines. He then hooks the off leader's off trace, gathers up the lines, and mounts to the seat.

(3) Either of the above methods may be used, the first being the most expeditious with animals which are docile and will stand quietly. The second method is preferable for animals which will not stand quietly. Either method when used with untrained or nervous animals will require the assistance of one or more men to hold each pair while the wagoner hitches them.

b. A team consisting of a single pair.—The wagoner backs the pair from their stall and, leading them, passes between them so as to have the off animal on the near side, takes them to the vehicle by leading one animal by each hand, approaches it from the front, and leads them to a point opposite the middle of the tongue, one being on each side of it, turns them about and into position, fastens the spread lines and breast straps, takes down line on near animal and tosses it over to the off side of off animal, hooks near trace on near animal, passes around in front of the pair, takes down line on off animal, hooks off trace on near animal, near trace on off animal, off trace on off animal, gathers up the lines, and mounts to seat. One man can ordinarily hitch a single pair without assistance, but with untrained or nervous animals it may be necessary for an assistant to stand in front of the pair until the hitching is completed.

c. To hitch a single animal.—(1) *To cart with cart harness.*—The wagoner leads out the animal and backs it in between the shafts, takes down the lines, raises the shafts into position and passes the chain over the saddle, fastening it to the opposite shaft. He then hooks the trace chains into the hooks on the hames, holdback chains into the hooks on the shafts and fastens

the bellyband, after which he takes the lines and mounts to the seat.

(2) *To other vehicles with light express or single buckboard harness.*—The animal is backed out of the stall and led to a position in front of and facing from the vehicle. The lines are taken down and fastened into the bit rings. If the vehicle is a light one it is then run forward into position with one of the shafts on each side of the animal. If it is a heavy vehicle the animal is backed into position between the shafts, which are run through the shaft tugs. The wagoner then takes down the line on the off side and passes it through the ring on the hame and through the terret, hooks the off trace and wraps the backing strap once or twice around the shaft from the bottom up, passes the end through the loop on the underside of the shaft and buckles it. He then passes to the near side, takes down the line and runs it through the ring on the hame and through the terret, hooks the near trace, fastens the backing strap, as explained for other side, buckles the bellyband, hooks the check rein, takes the lines, and mounts to the seat.

261. How to unhitch.—*a. A team consisting of two pairs.*—(1) *First method.*—The wagoner unhooks the off trace on off wheeler, near trace on off wheeler, off trace on near wheeler, does up line on off wheeler, unhooks off trace on off leader, near trace on off leader, off trace on near leader, does up line on off leader, unsnaps spread line from bit ring on near leader, does up line on near leader, unhooks near trace on near leader, unhooks breast straps on wheelers, snapping breast strap of near wheeler into bit ring of off wheeler, unsnaps spread lines on wheelers, does up line on near wheeler, unhooks near trace on near wheeler, and hooks trace from near leader into bit ring of near wheeler. He then takes the team to the stable by leading the near leader. He unhooks the trace from the bit ring of near leader, unsnaps spread line from the bit ring of the off leader, and leads the lead pair into its stall, after which he unsnaps the breast straps from the bit ring of the off wheeler and leads the wheel pair into its stall.

(2) *Second method.*—This differs from the first method in that all traces and the breast straps are unhooked before any of the lines are done up. The leaders are tied to the wheelers on their side by means of attaching the halter shank to the backstrap, and the team is taken to the stable by leading the wheelers.

(3) Either of the above methods may be used, the first being the most expeditious with animals which are docile and will stand quietly. The second method is preferable for animals which will not stand quietly. Either method when used with untrained or nervous animals will require the assistance of one or more men to hold each pair while the wagoner unhitches them.

b. To unhitch a single pair.—The wagoner unhooks off trace on off animal, near trace on off animal, off trace on near animal, and does up line on off animal. He then passes in front of the pair, unhooks near trace on near animal, does up line on near animal, unfastens pole straps, and unsnaps the spread line. He then unsnaps the outside lines from the bit rings and leads the pair to its stall.

c. To unhitch a single animal.—(1) *From the cart with cart harness.*—The wagoner unhooks holdback chain on off side, unhooks trace chain on off side, does up lines on off side by folding them in a convenient number of folds and passing the bight through hame ring, over hame and pulling them tight, unhooks holdback chain on near side, unhooks trace on near side, unhooks chain holding up shafts, and lowers shafts to the ground. He then unsnaps the near line from the bit ring and leads the animal to its stall.

(2) *From other vehicles with light express or single buckboard harness.*—The wagoner unhitches and does up off trace, unfastens and does up backing strap on off side, does up the off line, unhooks and does up the near trace, unfastens and does up the backing strap on near side, unbuckles the bellyband, does up the near line, slips the shaft tug off each shaft, and leads the animal to its stall.

d. Harnessing and hitching up by command.—For the purposes of instruction and to promote uniformity the various operations of harnessing and hitching up may be performed by number or command.

SECTION II

DRIVING

262. Driving.—*a.* The wagoner should sit comfortably in his seat, body erect, without stiffness, elbows close to the sides. He should not lean forward, half stand, or slouch back in his seat, because in these positions a falling or shying animal may

pull him off his seat. The driving gloves should be large and comfortable. The hands should be held close together in front of the center of the body, knuckles to the front, forearms nearly horizontal.

b. In driving with the left hand the right hand is used only for shortening the reins, assisting the left hand in stopping the team, and for using the whip. The left wrist should be slightly bent to the rear. This gives a more flexible contact with the animals' mouths than if the wrist is straight and rigid. The lines should never be shortened by elevating the left hand, which disturbs the seat. The right hand should be used to assist in shortening them.

c. To hold the lines the wagoner brings the line on the near wheeler under the little finger of his left hand up through the palm of his hand and over his thumb. He passes the line on the near leader between the little finger and the one next to it up through the palm of his hand and over his thumb. He brings the line from the off wheeler between the second and third fingers of the right hand and down inside the third and little fingers. He brings the line from the off leader between the first and second fingers of the right hand and down inside with the other line.

d. To hold all lines in one hand the wagoner passes the lead line from the right hand over the top of the first finger of left hand and the wheel line from the right hand over the top of the second finger of left hand and turns both lines down inside the left hand.

e. In starting the team with a heavy load or in any situation where it is necessary to get the united power of the animals the lines should be held fairly tight so that the animals may be made to feel the aid and guidance of the driver. The unremitting attention of every driver is required in order that each animal of his team shall at all times do its proper share of the work. In starting all traces should be stretched before the team moves. A common fault is to start one pair before the others are in draft, the tendency of which is to make the animals balky, fatigue them by jerks, gall their shoulders, and break the harness.

f. While en route the lines should be sufficiently tight to prevent their becoming entangled or an animal passing his tail over one of them, to give each animal the feeling of being on the hand, and to maintain pairs abreast of each other. In

reducing the gait, halting, and backing, the pull on the lines should be gradual and used in conjunction with the voice and brake.

g. In turning to the right the off lead and wheel reins should be grasped in front of the left hand by placing the middle and little fingers of the right hand over them. These reins should then be shortened by pulling on them, or the near reins lengthened by allowing the left hand to move slightly to the front. In turning to the left the near lead and wheel reins should be handled in the same manner. In stopping, all four reins are shortened by pulling them through from behind, or the right hand may be placed over the reins in front of the left and the weight used to assist.

h. In crossing ruts or turning sharp corners the leaders should be out of draft; otherwise the pole may be snapped off or the wheelers pulled down.

i. Before arriving at the crest of a hill the team should be steadied for the descent, and with just enough traction from the leaders to prevent their singletrees hitting them. If a wheeler slips in descending the hill, especially if near the bottom, he should not be pulled up, but the team should be allowed to go a little faster.

j. In no case should the lines be used to accelerate the pace or gait, and the wagoner should never be permitted to "milk" the lines.

k. Jerking the lines should never be tolerated other than to stop a team which is running away.

263. How to use the whip.—*a.* To use the whip the wagoner passes the lines to his left hand, holding the whip by the butt end of the stock and the end of the lash between his forefinger and thumb. With a backward swing of the arm he releases the end of the lash, allowing it to swing back in a circular motion, and with a forward stroke the lash is brought down upon the desired animal.

b. The whip is used only for slow or lazy animals and in a hard pull, in which case a slight cracking of it is preferable and usually sufficient.

c. Use of the whip should be limited to necessity, and unnecessary cracking of whips should be prohibited.

264. How to use the brake.—To put on the brake, the lever is pushed forward either with the hand or foot, and is held by the ratchet. To take off the brake, the catch is released from

the ratchet and the lever is pulled back. The brake is used in going downhill, in crossing ditches, to stop the wagon at a halt, and to hold it while the team is at a standstill. It should be used to hold the wagon at halts while ascending slopes. If a team starts to run away, the brake should be used to help stop it.

265. How to get out stalled wagons.—*a.* In pulling heavy loads or on heavy ground, if there is any liability of the team stopping, the wagoner should stop the animals before they get stalled. Many animals will not pull again on a load in the same place where they have met with resistance which has impressed them as insurmountable. If the team should get stuck, it may be induced to try again by turning the tongue slightly to the right or left and then getting all off together, straightening the pole as the pull is commenced.

b. If the wheels are sunk, the earth in front of them should be removed by using the spade prior to attempting to start, and if the wagon is in a very difficult position time will usually be gained by attaching additional animals, making use of the snatch block and fall, or unloading the wagon.

266. What to do if a wagon upsets.—should a wagon upset, the cover, bows, and lash rope are removed, after which it is unloaded, placed upright on good ground, and then reloaded.

SECTION III. OPERATION

267. Assembling vehicles.—Animal-drawn vehicles are usually shipped knocked down and their component parts should be carefully checked as soon as uncrated in order to be certain that all are present. A list of component parts with instructions for assembling will ordinarily accompany the shipment. A study of the details for assembling the particular vehicle should be made before attempting to assemble it. All nuts and bolts should be tightened at time of assembling and frequently thereafter, as the life of animal-drawn vehicles depends to a great extent upon keeping the nuts and bolts tight.

268. Loading wagons.—*a.* Animal-drawn vehicles should not be overloaded, as doing so will result in injury to them and to the harness and animals. The standard load of 3,000 pounds for the escort wagon includes 235 pounds for weight of the driver, his equipment, and the grain carried for the team, and this load should not be exceeded except in cases of extreme emergency. In such cases a full report and explanation should

be made to the commanding officer by the person responsible for the overloading. The standard load for the spring wagon is 1,000 pounds.

b. In loading, heavy articles should be placed in the bottom of wagon bed and in front, with lighter articles in rear and on top so as to have the weight of the load near the bottom and in the forward third of the wagon bed. Articles should be placed so that there is no vacant space between them in order to prevent their shifting. Articles which may be required en route should be so placed in the load as to be always accessible. The tail gate should not be lowered to carry a larger load, as this not only makes the load too heavy in the rear but will be almost certain to split the side of the bed outward, there being nothing left to support its rear end. The bows should be pushed well down into their staples and should not be raised to provide greater loading space. The cover is then placed on the bows and tied down to the rings on the side of the bed. Its ends are drawn together by a rope, the ends of which are then crossed and made fast to rings on the opposite sides of the wagon bed.

c. When wagons are loaded the loads should be securely lashed with the escort wagon lash rope before the cover is put on. The manner in which the rope is used depends on the nature of the load. Ordinary loads are lashed by securing an end of the rope around one end of the front crossbar and lacing the rope from side to side over the load, using the lash cleats provided on the sides of the wagon bed for engaging the rope. The rope should be drawn tight and passed around one end of the rear crossbar, after which it is carried forward along the sides of the load by passing it around the first (rear) loop that goes over the load and taking all slack out by pulling it to the rear, after which it is carried to the next loop and so on until the forward loop is reached, to which it is attached by two or more half hitches after all slack has been taken out.

269. **How to load and unload.**—*a.* When possible, the cargo vehicles should be loaded in the evening, after which they are packed under guard.

b. Loading and unloading should be done as expeditiously as possible and arrangements made so that at least two wagons of each section may be loaded or unloaded simultaneously, but the work will not be hurried to such an extent as to prevent accurate checking and preparation of loading slips or verifica-

tion of loads. In order that sections may work simultaneously in loading and unloading, the company should be formed in line of section columns, each wagon taking its place in the company formation upon completion of its loading or unloading either in the park or in single column preparatory to marching.

c. Upon arrival at its destination cargo should be unloaded at once.

270. Rates of travel.—The rates of travel of animal-drawn transportation vary with the nature of the vehicle, the size of the load, the class and condition of the animals employed, condition of the roads and weather, and length of the column. Passenger-carrying vehicles can be driven at the rate of 7 miles per hour for three or four hours under favorable conditions. Should the distance be great and animal-drawn transportation necessarily employed, arrangements should be made to change the animals every 15 miles by placing them in relays. Heavily loaded vehicles can maintain the rate of march prescribed for infantry under favorable conditions.

271. Road rules.—The rules in common use by drivers of private vehicles, no matter whether in the United States or foreign countries, will be strictly adhered to by drivers of all Government vehicles. Halts will always be made at one side of the road, leaving a clear passage. In the United States, Hawaii, Panama, and Porto Rico the rule will be followed of passing on the right and overtaking on the left. On a hill, all teams coming up have the right of way over those going down. In case of a breakdown the vehicle will be immediately removed so as not to obstruct traffic.

272. Parking.—The rules prescribed for parking the wagon company are equally applicable to all other combinations of animal-drawn vehicles.

SECTION IV

MAINTENANCE

273. Care of vehicles.—The proper care of vehicles not only requires daily examination and repair in the field but attention to many other details.

a. Upon return of troops from field duty the transporation should be immediately overhauled, thoroughly repaired, and necessary accessories replaced.

b. At each inspection of the transportation required repairs should be noted and assigned to individuals whose duty it is to make them.

c. When on field duty the transportation must be carefully examined at the end of each day's march to see that the spokes of wheels and nuts on axles and bolts are tight and to arrange for proper repairs of vehicles and harness, including the replacement of broken or lost spare parts.

d. Tail gates and chains will not be allowed to hang down or drag.

e. In garrison, or in camp where there is a probability of movement by rail, blocks for securing vehicles on freight cars and a ramp for unloading vehicles and animals should be prepared and kept on hand.

f. Specifications and blue prints of animal-drawn vehicles will be furnished to persons concerned upon application to the commanding officer, Jeffersonville Quartermaster Intermediate Depot, Jeffersonville, Ind.

g. Vehicles will be greased twice a week regularly and as often in addition as may be found necessary. If in constant use, wagons will require daily greasing. In greasing, the old grease, dirt, and sand should be removed and not allowed to accumulate. The axle is usually raised for greasing by use of a jack. Should it be necessary to grease a heavy vehicle without use of a jack, the nut is first removed. The nuts on the right hand are right-handed and those on the left are left-handed. A board or stick, slightly longer than the distance from the axle to the ground, is secured and placed with one end on the ground and inside the wheel, the other end leaning toward the wheel; the upper end is placed under the spoke which is about horizontal. The wheel is then raised slightly by lifting carefully on the spoke on the opposite side, when, if it has been sufficiently greased, the weight of the vehicle will cause the wheel to slide down the spindle. It should not be allowed to slide more than three-fourths of the way off, but should be taken off far enough to scrape off the old grease. This method can not be used if the axles have not been properly greased. To put the wheel on, the procedure should be reversed, placing the stick on the outside. The wheel will not run on as easily as it did off, but with the stick inclined and a slight pressure on the wheel it will go on. The nearer the upper end of the stick is placed to the hub the less power will be required to lift the wheel off the ground.

h. In garrison, wagons should be kept under cover whenever practicable. Mud should not be allowed to accumulate on vehicles. Facilities should be made available to permit their being washed off at the end of the day's work.

i. All vehicles in use should be painted at least once a year. Escort wagons and such Army wagons as are in use will be painted olive-drab color. The following is the formula for mixing olive-drab paint for use in painting them: 6 pounds white lead ground in raw linseed oil, 1 pound raw umber, 1 pint turpentine, one-half pint japan dryer, and 1 quart raw linseed oil. Iron parts should be painted black by use of the following mixture: 1 pound drop black and 1½ pints coach varnish for each wagon. The canvas cover of stationary tops of light vehicles and ambulances should be waterproofed by use of the following mixture: 1 gallon boiled linseed oil, 1 pint dryer, and 1 pound dry ocher. Thoroughly mix the material and let it stand for 24 hours before applying. Before applying this material the canvas surface should receive a sizing coat of water and soft soap as thin as paint. The paint is to be applied while the canvas is still wet and rubbed in briskly, using a 4-inch common paintbrush.

j. Marking vehicles.—(1) All animal-drawn vehicles, including canvas covers therefor, if any, will be marked with the letters "U. S." by means of a stencil, with white paint, height of letters to be 4 inches. This marking will be done by the issuing agency before the vehicles are placed in service, and will be stenciled as follows, on both sides, unless otherwise prescribed:

Type of vehicle	Location of marking
Escort wagons	In the center of the panel under the driver's seat.
Ambulances	On the body, in the center of the space between the prolongation of the first and second bows from the front.
Spring wagons	In the center of the end of the driver's seat.
Rolling kitchens	In the center of the upper rear panel of the limber.
37-mm. carts	In the center of the tool chest.
Machine-gun carts, gun	In the center of the gun box; on the left side only of the gun cart, but on both sides of the spare gun cart.
Machine-gun carts, ammunition.	In the center of the tool chest.
Types not enumerated above.	In the center of the end of the driver's seat, if practicable; if not, as close thereto as practicable.
Canvas covers	To appear in middle of cover, on both sides, when cover is in place on the vehicle; bottom of marking to be 24 inches above hem of cover.

(2) The side marking of vehicles assigned to units will be done by means of a stencil, using white paint, except for divisional (or other unit) distinctive insignia, which will be in approved colors. This marking will consist of the approved divisional (or other unit) distinctive insignia, followed by the designation of the unit and that of the component within the unit, the whole between two horizontal lines. Figures and capital letters will be 3 inches in height when the available space permits; otherwise, of a size appropriate to the space available. The height of small letters will be half that of capital letters. The marking will be placed as follows on both sides, unless otherwise specified:

Type of vehicle	Location of marking
Escort wagons	In the center of the available space between the second and third bows from the front.
Ambulances	On the body, in the center of the space between the prolongation of the third and fourth bows from the front.
Spring wagons	On the body, in the center of the interval between the driver's seat and the middle seat.
Rolling kitchens	In the center of the trailer or the upper half thereof, according to type.
37-mm. carts	In the lower left-hand corner of the ammunition rack, in the rear only.
Machine-gun carts, gun	At the forward end of the gun box; on the left side only of the gun cart, but on both sides of the spare gun cart.
Machine-gun carts, ammunition.	In the lower left-hand corner of the ammunition rack, in the rear only.
Canvas covers	In the center of the cover, on both sides, when cover is in place on the vehicle.

(3) Vehicles in use at posts, camps, and other stations, but not assigned to units, will be given a serial number, which will replace the side marking prescribed in subparagraph (2) for vehicles assigned to units.

(4) Rear marking of escort wagons and ambulances assigned to units will consist of the designation of the unit, followed by the serial number of the vehicle within the unit, the whole between two horizontal lines, the height of the capital letters to be 5 inches and of the small letters 2½ inches, placed as follows:

Type of vehicle	Location of marking
Escort wagons	Midway between the middle chain staple and the bottom of the tail gate.
Ambulances	In the center of the tail gate.

(5) Animal-drawn medical ambulances will be marked with a red cross 24 inches high and 24 inches wide, having arms 8 inches wide, centrally placed upon a white field 30 inches square. This marking will be placed on the vehicle in four places, as follows: In the center of the outside of the rear half of the side curtains, on both sides; in the center of the top, outside; in the center of the rear curtain, outside.

In addition to the marking required above, medical ambulances will also be marked with a red cross 6 inches high and 6 inches wide, having arms 2 inches wide, centrally placed upon a white field 8 inches square. This marking will be placed in the center of the space between the prolongation of the first and second bows from the rear, on both sides.

(6) Veterinary ambulances only will be marked as prescribed in subparagraph (5) for medical ambulances, except that the color of the cross will be green and the marking will be placed as prescribed for the large red cross only, the markings in the center of the top and the center of the rear curtain being omitted.

(7) Medical and veterinary ambulances only will be marked with a caduceus in maroon, centrally placed upon a white field 8 inches square; the distance between the tips of the wings will be 5 inches and the length of the staff 6 inches. The marking required will be placed on the body in the center of the space between the prolongation of the third and fourth bows from the front on both sides.

k. Information as to vehicle spare parts and accessories and where carried will be found in War Department circulars publishing basic allowances.

l. The loading of vehicles on freight cars is covered in AR 30-940 and 30-945.

274. Arrangement and care of harness.—*a.* In garrison, when the harness is not in use it should be conveniently arranged on pegs on the heel posts of stalls, and, if practicable, should be sacked to keep off the dust, or it should be placed on proper supports in a harness room.

b. In the field when the harness is not in use and no other shelter has been provided it should ordinarily be kept in the wagon bed.

c. When removed from the animals at night the collars should be carefully wiped off and the dust removed from the remainder so far as practicable. The harness should never be thrown on

the ground where it will get muddy and dirty, for where the mud hardens and rubs against the animal's skin sores will result. Collars should be buckled when removed from the animals.

d. Before using a new harness it should be wiped clean and a light coat of oil applied.

e. Harness should be cleaned once a week and whenever it gets muddy and the leather work kept soft and pliable. It should be oiled once a month after cleaning; oftener, if necessary.

f. To clean and oil black leather harness take the harness completely apart, unbuckling straps, and removing buckles, loops, etc., wherever possible. The equipment to be used is a bucket of lukewarm water, sponge, harness soap, harness dressing, neat's-foot oil, and lampblack. Hot water must never be used or the leather allowed to soak in any water. A rack should be provided on which to hang the harness. When no better arrangement is available one end of the wagon pole can be inserted between the spokes of one of the hind wheels, above the hub, and strapped to the axle. A set of harness can then be hung on the pole, the sponge moistened in clean water, and passed over the harness until the dirt becomes soft. The sponge should be rinsed as often as necessary and the dirty water replaced frequently with clean water. A good lather is then obtained by rubbing the sponge on the harness soap and the harness is given a good heavy coating of this lather, the rubbing being continued until all the dirt is removed. In some instances it may be necessary to use a thin piece of wood to scrape off the dirt.

g. When the harness is thoroughly clean the leather parts are well coated with a thick lather and allowed to dry, after which it is rubbed clean.

h. When the harness has not been cleaned for some time and is hard it should be cleaned as described in subparagraph *f*. Afterwards, for each single set of harness to be cleaned, a pint of neat's-foot oil is poured into a pan, mixed with lampblack in the proportion of 1 teaspoonful to each pint of oil, and stirred until it has a glossy black appearance. In cold weather the oil should be heated until it is lukewarm, but never hot, before using on harness. The mixture is applied with a small sponge, rubbing it in well. About 48 hours should elapse before using

harness again. In cold weather the harness, after being thus oiled, should be allowed to hang in a warm room for an hour. It must be dried gradually; never close to a hot fire or stove or in the hot sun.

i. In cleaning and oiling fair leather harness the procedure is the same, omitting the use of lampblack and such soap as tends to blacken the leather.

j. A buckle must not be worn in the same hole all the time, but should be shifted a hole or so occasionally, as this precaution will prevent the leather from rotting in that place.

k. The quartermaster and wagon master should examine the harness at each inspection of transportation and each driver should examine that of his own team every day upon completion of work. The necessary repairs should be made without delay. No alterations should be permitted.

l. Cleaning and preserving materials for equipment are furnished by the Quartermaster Corps.

SECTION V

THE WAGON COMPANY

275. Organization.—*a.* The organization of a wagon company is prescribed in Tables of Organization.

b. Companies are made up of two and three sections of 30 wagons each. Each company headquarters has one field and one repair wagon, which form a part of the regular equipment. The enlisted personnel is increased for war strength, but the number of animals, vehicles, and harness remains the same. All the enlisted personnel but the wagon master, mess and supply sergeant, clerk, messenger, orderly, mechanic, and two wagoners should be permanently assigned to sections. Teams with harness and vehicles should be permanently assigned to wagoners; mounts with horse equipment permanently assigned to those individually mounted and changes in such assignments not permitted without the company commander's orders.

c. Should the company be divided into two or more parts, the company headquarters personnel should be proportionately divided. Division into units smaller than a section should be avoided if possible.

d. Under favorable conditions with selected animals and personnel and careful adherence to a properly prepared training schedule a wagon company may be organized and prepared to

take its place as a unit in the transportation system and render good service after four weeks' training.

276. Wagon companies formed temporarily.—*a.* When there are no wagon companies at a post, camp, or station the animal-drawn transportation should be formed temporarily in companies and operated as such as near as practicable. In this case the responsibilities and duties of the captain, wagon master, and assistant wagon master will devolve upon civilian train masters and wagon masters, and the guard required for parked vehicles will usually be performed by civilian watchmen.

b. Should a portion of such post transportation be assigned to field duty to accompany commands on the march, it will be operated temporarily as a wagon company under the supervision of the quartermaster of the command which it accompanies, who will be responsible for it while under his charge. He will make an inspection in company with the post quartermaster of all such transportation before leaving the garrison, will then receipt to the post quartermaster for all the animals and equipment forming a part of it, and will again make a detailed inspection in company with the post quartermaster upon his return to the station, at which time he will report to the post quartermaster the condition of animals, vehicles, and equipment, and the manner in which the duties of the various members of the personnel have been performed while under his charge.

277. Duties of the captain.—*a.* The captain commands the company and is responsible for the instruction, care, equipment, training, and discipline of its personnel; for the training, care, and condition of animals, and for the care and condition of vehicles, harness, and equipment.

b. He must possess a thorough knowledge of the duties of each member of the personnel, and be skilled in their practical performance in order that he may not only instruct but also demonstrate the manner of performing each duty.

c. He should possess special knowledge of training draft and riding animals and repairs of vehicles, harness, and equipment, of the principles of draft and the possibilities of animal-drawn transportation.

278. Duties of the lieutenant.—*a.* The lieutenant assists the captain and should have a thorough knowledge of all his duties and be prepared to replace him during temporary absences.

b. Should a section of the company be detached, the lieutenant accompanies and commands it.

279. Record of cargo.—*a.* Cargo is checked as it is loaded on the wagons assigned to each section by its assistant wagon master and checked off at the destination by verification with the check slip used in loading. The loads of particular wagons should be verified upon unloading by the same assistant wagon master who checked upon loading.

b. A waybill should be prepared, in triplicate, by consolidating the loading slips for each wagon which should show the date, place of receipt, and place of delivery. The captain receipts for the cargo by furnishing one copy of this waybill to the person from whom it is received and upon delivery of the cargo gives one copy of the waybill to the person to whom it is delivered, taking receipt for it upon the other copy, which he retains.

280. How to load and unload.—(See Sec. III, par. 269.)

281. How to care for cargo.—Special effort should be made by all members of the personnel to care for and properly protect all cargo. Each wagoner will be responsible for his load while on the march and the guard responsible for all cargo while the company is parked.

282. How to adjust loads on the march.—*a.* Should the load of a wagon require attention on the march an assistant wagon master of the section to which the vehicle pertains at once takes charge of it, causes it to be moved clear of the marching column and the load to be unlashed, replaced in position, and relashed, after which the vehicle resumes its march, taking position in any portion of the column which may be passing at that time. The assistant wagon master and such personnel as may be individually mounted who have assisted in adjusting the load take up an increased gait and rejoin their section. The members of the personnel who have assisted in adjusting the load and are not individually mounted are assigned to the nearest wagons, upon which they ride for the remainder of the day's march. Should adjustment of a load cause a wagon to take position in the column in another section from which it originally belonged it will rejoin its proper section at the end of the day's march. In case of a breakdown, should it be possible to repair the broken wagon, the load is removed, if necessary, the repairs made, the wagon reloaded, and again placed in column. In case the wagon can not be repaired, necessitating abandonment, it is unloaded, removed from the road, the load transferred to a spare wagon or distributed throughout the train, and

the wagon destroyed if there is any danger of its falling into the hands of the enemy.

b. In the case of draft animals which are sick, weak, or temporarily disabled the team will halt clear of the column and the animal or animals be replaced by extra ones. The team will then take position in the nearest section and rejoin its proper section at the end of the day's march. There are a wheel and a lead pair of extra draft mules which accompany each section for this purpose, one pair being led ordinarily behind its fifteenth and one behind its last wagon. Collars are carried on the extra draft animals, and the remainder of the harness of the animals which they replace is utilized for them.

283. Transportation possibilities.—Under favorable conditions a 2-section wagon company can transport 83 tons of net cargo of average bulk a distance of 20 miles per day at the rate of 2½ miles per hour for six days per week, while a faster rate and greater distance may be attained for a few days with lighter loads when accompanying commands on forced marches.

284. Marches.—*a.* All animal-drawn transportation not otherwise employed should make practice marches of from 5 to 10 miles per day, Sundays and holidays excepted, in order to keep personnel, animals, and equipment in condition, during which marches the personnel will be instructed in their duties on the march, in bivouac, and in camp, and the animals grazed for short periods when practicable.

b. For normal formation, for marching on ordinary roads, the captain and wagon master are at the head of the company, the lieutenant in rear of it, the assistant wagon masters in charge of each section at the head of their section, and their assistants at the rear of their section. The remainder of the personnel which are individually mounted are equally spaced throughout the column and ride on the windward flank, each observing the vehicles forward of him and in rear of the man he follows. The normal distance to be maintained between sections is 20 yards. The position of sections in the company should be rotated on marches, the rear section for one march being the leading one for the next. From time to time the assistant wagon masters in charge of the section halt on the windward flank of the column and observe the wagons of their sections as they pass, resuming their former positions after observing the last vehicle of their sections. Like observations of the entire company are made from time to time during the march by the captain and

wagon master, who alternate in such duty so that at least one of them is always at the head of the company during the march. These observations should determine the condition of animals, vehicles, and loads, whether any animals are in distress, any loads require adjustment, whether teams are being driven so that each animal is doing its share of the work, and if proper distances are being maintained. A mounted man should be stationed near each difficult place to warn each wagoner prior to his approaching it. This man resumes his former position after the last wagon has passed.

c. In ascending and descending steep slopes the company should be halted and wagons sent up at short intervals, which will give opportunity for each team to rest at the top of the hill. When halted a number of times during an ascent each team is moved out in time for the next one to halt on the same ground. At such halts the brake should be put on firmly, and if insufficient to remove the strain from the animals the hind wheels should be blocked. In descending, if application of the brake is insufficient to hold the wagon off the team the lock chain should be used on one or both hind wheels.

d. During forced marches the loads should be light and should not ordinarily exceed 2,000 pounds. Night marches are difficult for wagon companies, although animals usually travel well at night. If the night is dark, proper observation and supervision are nearly impossible. Wagons must be kept well closed up, all personnel especially alert, special care taken to prevent the head of the column from taking the wrong road, the entire company halted if any loads require adjustment, and lights provided to aid wagoners while crossing difficult places.

e. Difficult crossings must be reconnoitered before being attempted. A load moving swiftly over a bridge causes about twice the amount of strain that it would if it were stationary or moving slowly. If the road is such that many difficult crossings are encountered, several members of the personnel should be placed on wagons near the head of the company and be supplied with picks, spades, and axes for the hasty repairing of such places before crossing is attempted. This is usually done in the best manner by cutting brushwood, placing it across the road, throwing earth upon it, and then tramping same down. Small, frail bridges may often be made passable and steady by use of the same method. Should a stream requiring fording be encountered, the company will halt and a mounted

man will be sent across to ascertain by trial the depth, velocity of the current, and condition of the bottom and approaches, after which the wagons will be sent across with distances of about 30 yards between them. If the stream is so deep as to be dangerous, mounted men will be stationed along the downstream side. If deep enough to require swimming, the captain should seek another crossing or arrange for having the vehicles and loads crossed in boats or on rafts, the harness being placed on the vehicles, and the animals crossed by swimming. Should the approaches be difficult, they should be prepared before crossing is attempted, a few of the lead wagons halted at the side of the road, and the teams used as snatch teams for doubling the number of animals on each vehicle during the time of its crossing, there being three-fifth chains carried with each section for use in doubling teams.

285. Road discipline.—*a.* In the morning, upon completion of hitching and loading the vehicles, wagoners will take position on the seats of their vehicles in readiness to move forward when directed to do so. There should be no driving about by individual teams unless same is directed by proper authority.

b. Each wagoner will move forward in time so as to take his proper position and the company will form in normal march order of single column as it leaves the camp.

c. The normal distance from the head of one team to the tail gate of the preceding wagon is 5 yards, which distance will be maintained unless otherwise directed.

d. At halts wagoners will immediately make an examination of their team, harness, vehicle, and load, making any adjustments required, and then resume their position on the seat. Men individually mounted will dismount, examine their animals and equipment, retaining their position in the column and mounting as it moves forward. After examination of the animals and adjustment of equipment the personnel of the company direct their attention to the head of the column in order that they may observe the signal for resuming the march.

286. Details of a day's service on the march.—*a.* The entire personnel is awakened one hour before reveille. The cooks, under supervision of the mess sergeant, start preparation of the morning meal. The wagoners and men individually mounted, under supervision of the officers, wagon master, and assistant wagon masters, immediately feed, groom, and harness their teams and saddle their mounts.

b. The personnel then prepare for and eat breakfast. Camp is broken and wagons not already loaded are loaded and lashed, animals watered and bridled, and teams hitched.

c. Wagons which are not parked near their loads are driven to their loads, loaded, lashed, and returned to the park. The picket lines are policed, taken up, loaded, and the march commenced.

d. At the end of the march cargo is delivered as directed and the wagons parked.

e. The wagon master indicates location of kitchen, picket lines, and tent lines and supervises their establishment.

f. Teams are unhitched, animals unharnessed or unsaddled, watered, and sent on herd, if grazing is practicable, and if not they are tied to picket lines. If animals are tied to picket lines they are given a noon feed of hay and grain.

g. The noon meal is then served.

h. Tents are pitched, wagons overhauled and greased, and harness and equipment cleaned.

i. Such cargo as is ready is loaded on the wagons preparatory for the march of the following day. Animals are watered, groomed, carefully examined, ailments treated, and harness adjusted to relieve bunches, after which the animals are fed grain and hay. During the daylight hours while in camp the horseshoers are occupied in shoeing the animals, the mechanic in overhauling the vehicles, and the saddlers in making necessary repairs to harness and equipment.

j. The evening meal is served.

287. Parking.—*a.* Upon reaching camp or bivouac the wagons of the company are parked in as convenient a manner as the nature of the ground will permit. They are usually parked in column of sections or half sections, with axles on a line and just sufficient intervals between hubs to permit of wagoners passing between them. Where space is available a model camp is formed by halting the company in columns of sections with 60 yards distance between sections and the headquarters repair and baggage wagons placed one on the right of each section. Picket lines are then established parallel to and 60 feet in front of each line of vehicles and shelter tents pitched on lines parallel to and 60 feet in rear of each line of vehicles. The latrine is located 50 yards from the left flank and opposite the center of the company camp and the kitchen 50 yards from

the right flank and opposite the center. Men not belonging to sections pitch tents on the right of one of the sections, officers' tents are placed on the right flank and opposite the center of the camp, and riding animals are tied to section picket lines on the right flank. The horseshoer's shop is established at the right end of the first section picket line and the saddler's and mechanic's shop is established in a similar position at the end of the picket line of the second section. A camp in two lines may be formed by halting in section column with 60 feet distance, establishing picket lines on the left flank of the lines of vehicles, and pitching shelter-tent camp on the right flank of the lines of vehicles.

b. If the ground will not permit a "model" camp formation the form best adapted to available ground must be taken. If the ground is low, the highest should be given to the wagons and the lowest to the animals.

c. In an emergency the company may bivouac by halting in order of march, clear of the road, animals being tied to wagons, and personnel sleeping under the wagons; kitchen and shops established near the center of the column and latrines opposite both ends of column. Such a formation is to be avoided, if possible, and its objectional features may be somewhat improved by making the formation in line of section columns with each column clear of and on opposite sides of the road.

d. For defense, the wagons may be parked in lines facing each other or in the form of a square, rectangle, oval, or circle, the poles inside, leaving necessary open spaces; the inclosure thus formed furnishes shelter for personnel and animals. Wire entanglements may be constructed and shelter trenches dug outside of the inclosure. A diamond-shaped park lends itself to emergencies, as it can be rapidly formed and the march quickly resumed. The animals of the two front sides are unhitched and placed inside or countermarched prior to halting.

288. Drill and instruction.—*a.* Although it is appreciated that the many duties of the personnel in connection with their daily work will occupy most of their time, companies made up of enlisted personnel should have short periods of drill daily, Sundays and holidays excepted, and the captain must find time for this important duty. These drills should seek to develop physical qualifications, discipline, equitation, marksmanship, and company service.

(1) Setting-up exercises, running, jumping, rope climbing, wall scaling, swimming, and other suitable outdoor exercises insure physical development.

(2) Facings, salutes, manual of the rifle, and marching, as prescribed for the Infantry squad and company, are suitable for the development of discipline.

(3) Mounted instructions as prescribed for the Cavalry trooper and in training remounts should be followed in equitation. Work should be conducted with intervals and distances and practically none of it should be in close order. This instruction should be given to all who are individually mounted.

(4) Instruction in markmanship should be limited to care, preservation, and use of the pistol, and include firing the dismounted pistol course annually. This instruction should be given to members of the personnel who are armed with a pistol. Preliminary position and aiming drills, nomenclature, care, and preservation of the rifle, gallery practice, and practice in firing the slow and rapid fire, including individual courses of target practice annually, should be given to members of the personnel who are armed with the rifle. All members of the personnel should be instructed in the manner of preventing accidents with the rifle and pistol.

(5) Drill in company service should include care of animals, vehicles, harness, and equipment, assembling wagons, loading, adjusting loads, and lashing loads.

(6) A systematic series of lectures should be given to the entire personnel and should be arranged so as to completely cover all duties of each member of the company.

b. Drill for the purpose of producing skill and accuracy in driving should be executed by sections and by companies. Good ground should be selected for the purpose and short periods devoted to exercises in changing from one formation to another. The following formations and exercises are suggested for the company:

(1) *Line.*—The wagons are on one line with 1 yard interval. The captain is posted 30 yards in front of the center with the wagon master 5 yards in rear of him. The lieutenant is 20 yards in rear of the center of the line. Section chiefs are 5 yards in front of the center of their sections and their assistants are 5 yards in rear of the center of their sections. The remaining personnel, which is individually mounted, is in line between the assistant section chiefs.

(2) *To move to the front.*—The captain commands or signals: 1. *Forward,* 2. *MARCH,* and moves his mount forward. The section chiefs repeat the command or signal and the company moves forward.

(3) *To halt.*—The captain commands or signals: 1. *Company,* 2. *HALT,* and halts his mount. The command or signal is repeated by the section chiefs and the company halts.

(4) *To form column.*—The captain commands or signals: 1. *Column,* 2. *MARCH,* and moves his mount forward. The chief of the first section commands or signals: 1. *Forward,* 2. *MARCH,* and follows the captain at a distance of 30 yards. When disengaged the leader of the second section commands or signals: 1. *Forward,* 2. *MARCH,* leads his section forward and inclines to the right so as to follow the leading section at a distance of 90 yards.

(5) *Being in a column to form line.*—The captain commands or signals: 1. *Line,* 2. *MARCH.* The chief of the leading section advances 25 yards and halts his section. The chief of the rear section inclines to the left in advancing and halts his section when it arrives on the line.

(6) *Being in line to move forward in double column.*—The captain commands or signals: 1. *Line of sections in column of fours* (twos or wagons), 2. *MARCH,* and moves his mount forward. The section chiefs take post in front of their right four (two or wagon) and command or signal: 1. *Right by fours* (twos or wagons), 2. *MARCH,* and move their mounts forward followed by the leading element of their column. The other elements successively move forward, incline to the right, and follow the leading element. The distance between elements in column of fours is 15 yards, in column of twos, 10 yards, and in single column, 5 yards.

(7) *Being in line of double columns to form line.*—The captain commands or signals: 1. *Line,* 2. *MARCH.* The section chiefs command or signal: 1. *Left front into line,* 2. *MARCH,* advance 25 yards, and command or signal: 1. *Section,* 2. *HALT.* The leading elements of the sections follow their section chief and halt at his command. The other elements incline to the left at the command *March* until opposite their place in line, when they move forward, halting when they arrive upon the line.

(8) *Being in line to form single column of fours (twos or wagons).*—The captain commands or signals: 1. *Column of*

fours (twos or wagons), 2. *MARCH*, and moves his mount forward. The chief of the right section takes position in front of the element designated on the right of his section and moves it forward following the captain. The other elements move out successively and follow the leading element at normal distance, each section chief leading his section, his assistant following in rear of it and other personnel individually mounted taking post in the column of file closers on the windward side.

(9) *Being in single column of fours (twos or wagons) to form line.*—The captain signals or commands: 1. *Left into line*, 2. *MARCH*. The leading element changes direction 90° to the left and moves forward 25 yards when the captain commands or signals: 1. *Company*, 2. *HALT*, and it halts. The other elements change direction when opposite their place in line, move forward, and halt when on the line.

(10) *Being in column of fours (twos or wagons) to form column.*—The captain commands or signals: 1. *Column*, 2. *MARCH*, 3. *Company*, 4. *HALT*. The section leaders command or signal: 1. *Left front into line*, 2. *MARCH*, and halt their leading vehicles at the command *Halt*. Rear elements incline to the left until opposite their place in line, when they move forward and halt when on the line.

(11) *Being in column of fours (twos or wagons), to change direction.*—The captain commands or signals: 1. *Column right* (left, half right, or half left), 2. *MARCH*, the leading element changes direction 90° to the right, followed by the other elements which turn on the same ground.

(12) In line the interval may be prescribed by the officer or noncommissioned officer conducting the drill.

(13) When in line the sections preserve alignment upon the vehicle which marches immediately in rear of each section chief, unless some other vehicle is designated as guide. When marching in line or about to march in line the guide may be announced as: *GUIDE CENTER* (right, left). In successive formation the guide is toward the point of rest or base and the rear elements should halt short of the line and then dress toward the base with precision. After halting, traces should be stretched by causing the mules to take a step or two forward.

(14) Wagons should rarely, except in an emergency, be required to march at a gait faster than a walk. The only exception is the change of direction in line, which is executed as follows: The command is: 1. *Right* (left) (half) *turn*, 2.

MARCH. At the command *March* the pivot wagon turns 90° (45°) to the right (left) and advances in the new direction; the others maintain their alignment on the flank and their intervals from the pivot, increase the gait and move to the right (left) until on the new line, when they decrease the gait and continue in the new direction.

289. Inspections.—*a.* Systematic inspections of wagon companies should be made frequently, notes being taken of irregularities, defects, and shortcomings and the manner of correcting same outlined.

b. Inspections of barracks and stables should be made daily. They should include kitchens, latrines, picket lines, corrals, shops, vehicles, harness, and equipment.

c. Weekly and monthly inspection should be made of wagon companies loaded and equipped for the field or in model camp.

(1) For mounted inspection the personnel should be fully equipped for the field and wagons completely loaded, lashed, and covered. Formation will ordinarily be with wagons either in line or in column of sections. The captain and lieutenant are posted 30 yards in front of the center of the line or of its leading section if in column. The wagon master and personnel individually mounted and not belonging to sections are in line 5 yards in rear of the captain. Personnel individually mounted belonging to sections are on the right of the sections, with their animals' heads abreast of the line of leaders, with the exception of the assistant wagon masters in charge of each section, who are posted, facing to the front, 10 yards in front of their respective sections. This formation is assumed at the command: 1. *Prepare for inspection,* 2. *MARCH.* The entire personnel dresses to the right until the command *Front* is given. Upon approach of the inspector the captain salutes and accompanies him during the inspection of the company. In passing in review the vehicles are formed in column of fours, with 10 yards intervals and 25 yards distances. The captain rides at the head of the column, followed by the wagon master, the lieutenant in rear of the column, each section chief in front of his section, and other personnel individually mounted on the right flank of the right vehicles of the column posted one on the right of each No. 1 wagon.

(2) Model shelter-tent camp for a wagon company is formed as prescribed in paragraph 24 *a.* For this inspection animals are tied to the lines, vehicles parked, tents pitched, kitchen

established and utensils displayed, horseshoers', saddlers', and mechanic's shops established and tools displayed, members of the personnel armed and standing in front of their tents with their personal equipment displayed in front of them. The captain, standing on the right, calls the company to attention upon approach of the inspector, salutes, and accompanies him during the inspection.

290. Execution of transportation signals.—*a.* To avoid noise and confusion, signals with the arm or hand or headdress may be used except when darkness, fog, or dust or other causes render such signals invisible or inappropriate. Every signal should be made with vigor and precision, and every position taken by the hand and arm during the signal be distinct and clear cut. Signals are ordinarily made with the right arm, but may be made with the left when more convenient; when made with the left, the reins are taken temporarily in the right hand.

b. The signals for transportation formations and movements consist of two parts—a preparatory signal and a signal of execution. The preparatory signal designates the formation or movement and the signal of execution is the return of the hand to the side.

c. Ordinarily, before making a signal for the execution of a movement, the captain places himself where he can be seen by the company and signals the attentions with the whistle.

d. The whistle blast may be used to attract attention, and hand signals made with or without the headdress in the hand.

e. The signals prescribed for the different maneuvers are preparatory signals; for the signal of execution the arm is extended vertically and then lowered quickly to the side. If the movement involves a change of direction of march, the captain moves his horse in the new direction on making the preparatory signal.

f. Chiefs of section repeat the signals of the captain or give appropriate commands to their sections in time to insure the proper execution of the maneuver. The chiefs of section ordinarily give their commands verbally, supplemented, if necessary, by the appropriate arm signal, and see to it that commands are properly understood and executed. If a chief of section does not see a signal, he governs himself by the signal that he sees executed by the adjoining sections.

291. Attention.—Extend the hand upward vertically to the full extent of the arm, palm to the front, and move the arm and hand slowly back and forth several times from right to left, left

to right, in a vertical plane. This signal may precede any command; not a preparatory signal.

292. Forward.—Extend the hand vertically to the full extent of the arm, palm to the front, and lower the arm and hand in the direction of movement until horizontal.

293. Halt.—Extend the hand vertically to the full extent of the arm and hold it there until the signal is understood. A leader habitually halts as he makes the signal of execution.

294. Change direction.—Carry the hand that is on the side toward the new movement across the body to the opposite shoulder and, with the palm down and the forearm horizontal, swing the forearm in a horizontal plane, extending the arm and hand to point in the new direction.

(*a*) *Line to the right (left) from column.*—Use signal for right (left) flank.

(*b*) *Column to right (left) from line.*—Use signal for right (left) flank.

(*c*) *Right (left) by section.*—Point to the right (left) section with the arm fully extended, palm of hand down, and signal forward march.

(*d*) *Sections column right (left).*—Signal a change of direction to the right (left); then move the hand up and down several times from the wrist, holding the arm steady while the arm is fully extended to the right (left).

(*e*) *Right (left) into line.*—Signal a change of direction to right (left), followed by describing small circles with the hand while the arm is extended to the right (left).

(*f*) *Right (left) front into line.*—Describe several large vertical circles on the right (left) side of the body with arm and hand fully extended.

295. Company or companies.—Place the hand against the back of the neck, back of hand to the rear.

(*a*) *Wagon.*—Raise the arm vertically, extend first finger, other fingers closed.

(*b*) *Twos.*—Raise the arm vertically, extend and separate first and second fingers, other fingers closed.

(*c*) *Fours.*—Raise the arm vertically, extend and separate fingers, thumb against palm.

(*d*) *By the right (left) flank.*—Extend the arm vertically and lower it to the right (left) until horizontal.

(*e*) *Single column to front from line.*—Indicate "wagon," then point at right (left) wagon and signal forward.

(*f*) *Line of sections in column of fours.*—Extend the arm horizontally to the front, palm to front, four fingers extended and separated, describe a large circle in front of body, then give signal for right (left) front into line.

(*g*) *Right by fours, twos, or wagon.*—Indicate with fingers, fours (twos or wagon), then point to right wagon, and signal forward march.

(*h*) *Countermarch.*—Extend the arm vertically and describe quickly several horizontal circles with the hand.

(*i*) *Increase the gait.*—Carry the hand to the shoulder, forearm vertical; extend the arm vertically from this position and repeat several times.

(*j*) *Decrease the gait.*—Hold the arm horizontally above and in front of the forehead.

(*k*) *Disregard.*—Place the hand against the back of the height of the waist, back of hand toward body; not a preparatory signal.

SECTION VI

TRANSPORTATION BY RAIL OR WATER

296. Entraining—Rail.—*a.* All quartermasters should familiarize themselves with instructions covering troop movements, contained in AR 30–930, 30–935, 30–940, and 30–945.

b. Escort wagons, animal-drawn ambulances, and other similar nonmotorized vehicles should always be shipped "knocked down," unless it is anticipated that conditions will not permit of the delay necessary to reassemble such vehicles upon arrival at destination.

c. In such shipments as referred to above articles are handled as ordinary freight shipments.

d. Care should be exercised to discover in advance of the shipment whether or not proper facilities for unloading exist at the detraining point.

e. Where conditions do not permit shipping of vehicles "knocked down" they are shipped on their own wheels. The drop-end gondola is the most suitable type of car for all kinds of animal-drawn vehicles which are shipped on their own wheels, including nonmotorized Artillery, Engineer, and Signal Corps types.

f. A permanent loading detail consisting of experienced officers and men, the number depending upon the size of the movement,

should be selected at the entraining point to load all mobile equipment. This detail should be subdivided into teams for dropping brakes and gondola ends, repairing car floors, driving in nails, hauling vehicles on to cars, blocking and lashing, and brake replacing. These teams should consist of such numbers of men and be so coordinated that when assisted by a 10-ton tractor and 500 feet of flexible wire cable or a Browning or similar crane, if trackage and crane are available, they can load and properly block five to eight cars per hour. It will be found that permanent teams are more efficient and accomplish twice as much loading within a given time than when each organization loads its own mobile equipment.

g. The above details are separate and distinct from those required for loading of company or troop property.

h. Organizations should deliver vehicles at entraining points in proper condition for shipment. Tops, tail gates, etc., should be securely fastened to prevent wind whip or loss and damage.

297. Loading from ramps.—*a.* Animal-drawn vehicles can be easily and rapidly loaded from permanent or temporary end ramps on flat cars or drop-end gondolas, six to ten cars in a string, either by hand or mechanical towing.

b. In loading vehicles on flat cars or drop-end gondolas from an end ramp the first vehicle loaded should be pulled through to its place on the last car and the others following. Runways made of 2 by 12 inch by 8-foot planks, ends beveled, with 2 by 4 inch strips on the bottom to prevent slipping, should be placed between cars. As vehicles are loaded these runways can be removed and spiked to car floor for use in unloading.

298. Construction of temporary ramp (end ramp).—*a.* Temporary end ramps can be constructed in a number of ways, depending upon material available.

c. A temporary end ramp may be constructed by building up a cribwork at end of cars to be loaded, using railroad ties or similar timber. On this crib nail four 2 by 12 inch by 12-foot planks. A ramp of this kind will hold any vehicle except the heavy guns.

d. Two pairs of 8 by 12 inch by 16-foot timbers, with ends beveled, make a good temporary ramp when properly supported by cribwork.

e. Two escort wagon wheels, with axle and two planks may be used as a temporary end ramp.

299. **Blocking.**—*a.* All vehicles should be properly blocked and secured before train is permitted to depart.

b. For escort wagons, ambulances, animal-drawn, spring wagons, carts, rolling kitchens, and vehicles of a similar nature 2 by 4 inch lumber may be used as follows:

(1) two pieces of 2 by 4 inch lumber about 3 feet long should be spiked to car floor, parallel with each wheel, one piece on the inside of wheel and the other on the outside. These pieces will prevent side movement of vehicle. To these pieces a piece of 2 by 4 inch about 8 feet long should be spiked in front and rear of each wheel. A short piece should be spiked across each set of 2 by 4 inch to prevent wheel from slipping out. A further precaution may be taken by passing a piece of burlap or canvas around the felloe of the wheel and spiking it to the car floor.

300. **Detraining—Rail.**—Upon arrival of train at detraining point, if ramp has been constructed, have train moved so that the first car containing the first vehicles loaded is placed opposite the ramp, remove blocks from wheels of vehicles, place runways of 2 by 12 inch by 8-foot planks, ends beveled, between the cars and then proceed to pull the vehicles either by hand or mechanical means, if available, from the cars. The first vehicle loaded to be the first vehicle unloaded. Vehicles should be pulled clear so as not to interfere with the movement of vehicles in rear.

301. **Embarking.**—*a.* Animal-drawn vehicles for shipment by water may be grouped under two general classes—those vehicles which are shipped direct from a depot "knocked down" and consigned to a supply agency overseas, and those vehicles belonging to organizations shipped either with the organization or on a separate ship for delivery to the organization upon their arrival overseas.

b. In all shipments timely notice is given the general superintendent, Army transport service, to prevent unnecessary accumulation of supplies awaiting shipment.

c. Where shipments are to be made from a depot direct to a supply agency overseas the manner of handling the shipment is the same as for shipping ordinary heavy freight. Vehicles are shipped on a Government bill of lading, consigned to the port from which shipment is to be made, for transshipment to consignee. The bill of lading is accomplished at the port where vehicles are consigned and turned over to the last carrier. Cargo

is loaded, discharged, and checked on and off the ships by checkers and stevedores under direction of the general superintendent or assistant general superintendent, Army transport service, at ports where there are such officers; otherwise, under arrangements made by a transport quartermaster.

d. In the case of animal-drawn vehicles belonging to organizations being transported on the same ship with their organization where vehicles are "knocked down" the manner of making the shipment is the same as outlined for shipment from depots. Where the necessity exists for immediate use, upon debarking, of certain vehicles it will be necessary to ship these vehicles on their wheels. In such cases the number of vehicles to be shipped, together with their cubic dimensions, is sent in advance to the general superintendent, Army transport service, at the port from which shipment is to be made in order that proper space on the ship may be assigned.

e. In "unit shipments," such as referred to above, the commanding officer of the port will prepare the schedules of embarkation of troops, material, and supplies on transports after consultation with the commander of troops to be embarked. Following this, the commander of troops issues an embarkation order based upon this schedule, which prescribes the time at which vehicles will be placed on the docks ready for releasing to the transport service.

f. Packing lists showing description, weight, and cubic dimensions of articles must be submitted by organization commander to the general superintendent, Army transport service. Organization commanders certify on this list that no unauthorized or inflammable materials are included in the organization property, except those prescribed by Army Regulations, which are boxed separately and plainly marked.

g. Boxing, crating, etc., will be in accordance with standard War Department specifications for export shipments and will be marked in accordance with AR 850–20.

302. Debarking.—The discharge and checking out of all cargo is a function of the checkers and stevedores under the general superintendent, Army transport service. Responsibility of organization commanders begins when articles are unloaded at debarking points and checked to the organization commander.

For further details see AR 30–930, AR 30–935, AR 30–940, AR 30–945, AR 30–1105, AR 30–1255, and AR 30–1285.

SECTION VII

SPECIALISTS

303. The wagon master.—*a.* The wagon master is first sergeant of the company and will perform all the duties which are ordinarily performed by first sergeants in addition to his duties as wagon master.

b. He must possess a thorough knowledge of the duties of each enlisted man in the company and be skilled in their practical performance, of the care and training of draft and riding animals, and be able to instruct others in caring for, training, riding, and driving horses and mules; in harnessing, hitching, unhitching, and unharnessing, and in adjusting harness and equipment; in assembling and caring for wagons and harness.

c. He will assist and instruct the personnel in the proper manner of adjusting harness in such a way as to prevent bunches and sore places and result in keeping the animals sound.

d. He will exercise supervision over the wagoners at all times and see that they give proper attention to animals, harness, wagons, and loads.

304. The assistant wagon masters.—*a.* The assistant wagon masters will assist the wagon master in his duties, one being wagon master of each section, and having an assistant to aid him in the performance of these duties. When in camp or garrison two of the assistant wagon masters will be on duty at the stables and have direct supervision over the stables, animals, harness, and vehicles.

b. They will supervise the adjusting of the harness and see that all teams are properly hitched to wagons and should be fully qualified to perform the duties of wagoners. They will be expected to examine the bodies of the animals frequently and see that they are in a thoroughly sound condition.

c. They will be responsible for the placing of all cargo upon the wagons, equalizing the loads, and loading according to orders. They will observe the animals while traveling and see that wagoners properly perform their duties.

d. In camp or bivouac they will supervise the placing of vehicles, harness, and equipment, and the establishment of picket lines.

305. The horseshoers.—*a.* Horseshoers will be provided with a horseshoer's set of tools, and they will keep on hand for field

service a suitable number of shoes properly fitted for the animals, together with the necessary number of nails. When necessary, they will use the horseshoer's field kit, taken from the set.

b. They will give assistance in loading and unloading when required, and with other members of the personnel will repair bad portions of the road and assist wagons over them.

c. While traveling their duties will be to ride up from behind, keeping watch on the feet of the animals so that they may know the condition of the shoes and to what extent the animals will need to be reshod at the halt. They will also pick up all shoes cast by the animals and replace them at the halt, provided they are serviceable. It will also be their duty to put in new nails should they observe animals with loose shoes. They will indicate to wagoners any load that may need attention.

306. The blacksmith and wheelwright.—The mechanic performs the combined duties of a blacksmith and wheelwright.

307. The saddler.—In addition to his specific duties in the field, while on the march, one saddler is assigned to act as messenger for the assistant wagon master in charge of each section.

308. The wagoner.—*a.* The wagoner must have a thorough knowledge of—

(1) The adjustment of the harness, of driving, and of the methods of receiving, stowing, and caring for cargo, and of securing loads on wagons.

(2) The nomenclature of vehicles, harness, spare parts, and accessories, and where they are carried on the vehicle.

(3) How to groom, water, feed, and care for animals.

(4) How to ride and train saddle animals.

(5) How to clean and care for vehicles, harness, and equipment.

(6) How to harness and unharness.

(7) How to hitch and unhitch.

(8) How to lash loads.

b. He must be skilled in the practical performance of all of the above-mentioned duties and ready to perform any other that may be required by proper authority. He must be resourceful and able to cope with unusual situations, depending upon his own initiative for results.

c. He will be responsible for his team, harness, and wagon, with tools and spare parts, and the condition in which he keeps

them will be a measure of his efficiency. A successful wagoner is one who keeps his wagon and animals in good condition and gets his load to its destination at the proper time.

d. He will look over the feet of the animals of his team each morning and evening, clean them out, and note if the shoes are loose. It is a good idea to tap the shoes with a knife handle or hammer. If the animal flinches there is usually something wrong.

e. He should be familiar with the individual characteristics of the animals which make up his team. In referring to draft mules, two are called a pair, the one on the left side is called the "near" mule and the other the "off" mule. The pairs assigned to the traction of a single vehicle are termed, collectively, "a team," those in front being called the lead pair or leaders, those attached directly to the vehicle the wheel pair or wheelers. The name or number of each animal and its rider or driver should be placed over its stall.

CHAPTER V

USE AND CARE OF PACK TRANSPORT, INCLUDING TRAINING OF PACK ANIMALS

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SECTION I

GENERAL CONSIDERATIONS

309. Pack transportation classified.—*a.* Pack transportation is of three distinct types, viz:

(1) Cargo pack trains, which transport all kinds of military supplies capable of being packed. The loads, generally bulky and of considerable weight, are secured to the saddle by ropes. The gaits of the animals are the walk and the amble. These trains are operated by the Quartermaster Corps.

(2) Artillery combat pack units, with heavy compact side loads and high riding top loads packed in steel hangers and carriers. The gaits of these animals are the walk and the amble. These units are operated by the Artillery.

(3) Cavalry pack transportation, with loads of reduced weight and bulk packed in hangers and carriers and so positioned as to enable the animals to maintain equilibrium at the walk, trot, and gallop. Special cargo loads are secured to the saddle with ropes. Infantry pack transport is placed in this classification.

b. The first two types use mules exclusively, while the third type uses both mules and horses.

c. Each type requires skilled personnel to properly handle it.

d. Unremitting care and closest supervision are necessary to maintain pack transport in the high state of efficiency, without which continuous operation is impossible.

310. Pack transportation terms.—*a. The packsaddle.*—This term includes the frame, saddle pad, and saddle cover.

b. Packsaddle accessories.—This term includes the pads, breeching, and breast straps, and all other parts for securing and protecting the saddle while on the animal.

c. Packsaddle complete.—This term includes the packsaddle plus packsaddle accessories.

d. Pack load.—This term includes all material or matériel which is transported on a packsaddle; in other words, the cargo.

e. Pack-load accessories.—This term includes the hangers, load covers, and other parts for protecting and securing the load while on the animal.

311. Transportation possibilities.—*a.* Under normal conditions a pack train can transport 250 pounds per cargo animal of net average bulk cargo for a distance of 25 miles per day at a rate of 4 miles per hour for six days per week.

b. Loads as heavy as 400 pounds may be carried for short distances, while greater distances at faster rates may be attained with lighter than normal loads.

312. Inspections.—*a.* Systematic inspections of pack trains should be made frequently, notes being made of irregularities, defects, and shortcomings, and the manner of correcting same outlined.

b. Inspections of barracks and stables should be made daily and should include kitchens, latrines, picket lines, corrals, shops, and equipment.

c. Weekly and monthly inspections should be made of pack trains loaded and equipped for the field or in a model camp.

SECTION II

TRAINING PACK ANIMALS

313. Pack animals easily trained.—Animals of suitable age, size, and conformation will ordinarily give little trouble, and with systematic training and kind treatment will soon develop into excellent pack animals. Horses are usually preferable for use as pack animals, which are led in accompanying commands mounted on horses, as they load more freely than mules and

their gaits conform better to those of the horses of the command. When not led and when worked in large numbers mules are usually preferable, as they are more easily managed than horses under these conditions and superior as weight carriers.

SECTION III

THE PHILLIPS PACKSADDLE AND PACKING

314. Description.—The design of the Phillips packsaddle employs the principle of a pack frame with pads in which the frame is an integral part of the saddle. The saddle is equipped with specially designed accessories of breeching, breast collar, and cinchas.

315. The pads.—The outside of the pads is of selected tan leather reinforced with 1 by $\frac{1}{8}$ inch spring-steel ribs arranged longitudinally for stiffening, and one wider rib at the top for the attachment of two staples through which the top of the pad is locked to the frame. On the outside lower corners are aluminum alloy pockets with foot rests for locking the bottom of the pad to the frame. The foot rests are used for holding the ropes of hitched loads and for keeping the pads off of the ground in the field. The contact side of the pads is of high-grade woven felt, which is durable, soft, flexible, easily cleaned, and with considerable gripping qualities.

The pads are stuffed in a mold with selected long, curled hair, which retains its resiliency indefinitely. Handholes for adjusting the padding are cut through the outside of the pads, thus enabling the pads to be adjusted without disturbing the smooth contact surface obtained in the molds.

Practically any soft material found in the field, such as grass, leaves, pieces of gunny sacks, paper, etc., may be used for building up the pads. Pads are made in "rights and lefts," and new pads may be obtained when needed.

316. The frame.—The frame is scientifically designed so as to be light in weight and yet sufficiently rugged to withstand hard usage. The side bars and the bottom bars are of the hard aluminum alloy "duralumin" and the other parts are of steel. The ribs are of spring steel and the hitch hooks are of nickel steel.

The frame is free of all projections which might tear or injure cargo loads. Side-hanger loads, top loads, and rope-hitched loads may be carried.

317. Special features of the frame are: (*a*) The hanger bars connecting the arches strengthen the bridge-type assembly and enable simple hooks to be used on hangers.

(*b*) The wide wings of the arches form a base for top carriers of various lengths and also add greatly to the strength and rigidity of the frame.

(*c*) A depression in the rear center of each arch with hole through it forms a seat for locking top carriers to the frame.

(*d*) The spring-steel ribs connecting the side bars and the bottom bars support the saddle and distribute the weight of a load over the entire saddle, thus reducing pressure upon the weight-carrying muscles and ribs of the animal. This assembly also distributes cinch pressure over the entire saddle.

(*e*) A nickel-steel hook on the lower center of each bottom bar eliminates a lash cinch whenever a rope hitched load is carried. Three steel staples for tying down side-hanger loads and two cinch D rings are also attached to each bottom bar.

(*f*) Both ends of the frame are alike, thus making it reversible. Pads are easily and quickly attached to or detached from the frame without the use of tools.

318. The saddle cover.—This is a canvas cover with leather borders; it covers the pads of the saddle, protects them from rain and wear, keeps the heat of the sun from entering the pads, and shades the animals' spinal column, thus conserving energy.

319. The saddle cinchas.—The saddle is equipped with two mohair-strand cinchas. The front cinch of the Cavalry pack-saddle is 22 inches long with 24 strands and the rear cinch is 24 inches with 26 strands. The cinchas of the Artillery-cargo saddle are: Front, 20 inches with 24 strands, and rear, 22 inches with 26 strands.

The mohair-strand cinch is soft, strong, light, cool, inexpensive, and is easily cleaned.

320. The cinching device.—A cinching device is provided for each cinch. This device enables rapid cinching and release of cinches, the careful adjustment of cinch pressure, and eliminates tying and untying of cinch straps.

321. The breeching.—The breeching was developed with the saddle. It consists of a croup piece, which rests on the croup just forward of the dock; the breeching body which passes around the buttocks and is attached to the croup piece by one 4-inch ring on each side, thus allowing the breeching body to

swing with the buttocks at each gait. The breeching body is lowered to the position found necessary for remaining in place at the trot and gallop. A "lead-up" strap on each side of the buttocks holds the breeching body up and in place. The breeching is attached to the saddle by two "hold-up" straps from the croup piece to the top D rings on the rear edges of the saddle and by two "holding straps" from the breeching body straps to the lower D rings of the saddle. The "hold-up" or top straps merely hold the breeching up and in place; they have no other function. The "holding straps" (the lower straps) operate the breeching, and therefore must be adjusted tighter than the hold-up straps. A pull on the holding straps is transmitted to the croup piece and to the breeching body.

322. The breast collar.—The saddle is equipped with a breast collar of simple design. It consists of a breast collar body, a neck piece which rests on the neck in front of the saddle and holds the breast collar body in place, and of two holding straps which are attached to the lower D rings on the front edge of the saddle. This breast collar is useful for animals of poor conformation when moving at the gallop and for steep grades. It is adjusted for the animal when at the gallop.

323. The woven mohair pad.—Cushioning material to absorb friction and pressure is required under all saddles in the field, and especially packsaddles. This cushioning material should be elastic, should absorb sweat and evaporate it, be durable, and comparatively light in weight.

The mohair pad was developed with the saddle. It is woven of selected long, fleecy Angora goat hair, the most durable material known for the purpose. The material is cooler than wool and, as the pad is woven, it shapes itself instantly to the conformation of the animal. The pad is easily cleaned by brushing, gentle beating, or by washing.

Mohair pads are made in three sizes to fit each of the standard packsaddles. The size for the pony saddle is 24 by 38 inches; for the Cavalry saddle, 27 by 38 inches; and for the Artillery-cargo saddle, 28 by 50 inches.

Leather thongs are attached to the front edges of the pads for tying the pads to the saddle, if desired. Canvas markers are sewed in the middle of each lower edge for marking the organization number on the pad. With the markers in these positions the pads may be reversed end to end or sides reversed to reduce wear of the pads.

324. Superarches for top carriers.—Aluminum alloy superarches for the attachment of "top carriers" for special loads carried on top of the saddle are standard equipment for use as required. These superarches fit over and are bolted to the packsaddle arches. The assembly consists of the superarch, a steel connecting piece, two aluminum filler pieces, and three bolts for each superarch.

The steel connecting piece fits under the saddle arch and is bolted to the superarch on its outside face by two bolts; on the inner face the connecting piece is bolted to the saddle and the superarch by one large bolt which passes through the hold in the depression on each saddle arch, through the holes in the filler pieces which fit in the depression, and through the hold in extension on the inner face of the superarch.

Top carriers for simplified loads such as the picket-line load do not require these superarches.

325. Types of saddles.—There is one type and three sizes of the Phillips packsaddle. These three standard sizes meet all packsaddle requirements in a simplified manner. The smallest sizes is the pony saddle for all Philippine-type ponies and so-called Spanish mules. This saddle may also be used on all Cavalry horses, and it will successfully carry most Cavalry loads.

The pads of the pony saddle are 20 by 19 inches and the saddle weighs approximately 45 pounds.

The standard Cavalry saddle is the medium-sized saddle. This saddle carries all Cavalry loads and all Infantry light loads.

The pads of this saddle are 23 by 19 inches and the saddle weighs approximately 50 pounds.

The Artillery-cargo saddle is the largest saddle. This saddle carries all pack-Artillery loads and all types of pack-train cargo loads.

The pads of this saddle are 24 by 25 inches and the Artillery-cargo saddle weighs approximately 64.5 pounds.

Thus only one size of saddle is required for most of the using services. Many of the parts of each size of saddle are interchangeable.

326. Characteristics of the assembled saddle.—*a.* The saddle is issued ready for immediate use and does not require fitting or breaking in. This characteristic is important in the beginning of a campaign and for newly organized troops.

b. The saddle will fit either horses or mules. The saddle may be changed from one animal to another, in case of injury or casualty, without adjusting the pads.

c. In adjusting the pads in the field for animals that have lost flesh in campaign or to relieve an injury any soft material, such as hay, grass, pieces of sacks, or even paper may be used, as all adjustments are through the outside, thus conserving the smooth contact surface.

d. The exact adjustment required may be determined by detaching a pad and holding it in place upon the animal's back. No tools are required for detaching or attaching pads.

e. The design of the saddle and the method of cinching it exerts pressure or grip mainly vertically and upon the animal's weight-carrying muscles, with minimum pressure against the swell of the ribs. The method does not pinch or bunch the animal nor does it interfere with locomotion of the hind or propelling members. The method further, admits of considerable and proper adjustment of cinch pressure longitudinally.

f. Final adjustment of cinchas may be, and is made, AFTER the load is placed upon the saddle. Cinchas may be adjusted on the march WITHOUT removing the load. The cinching device affords a rapid means for adjusting cinchas.

g. A lash cinch is not required for diamond-hitched loads; the method of the diamond hitch, therefore, is greatly simplified and easily remembered.

h. No separate or special frame for hanger loads is required. The frame is an integral part of the saddle, and troops using the saddle are equipped either for hanger loads or rope-hitched loads.

NOTE.—Many types of frames are required for other packsaddles.

i. The breast collar, breeching, and cinchas are not on the weight-bearing parts of the animal. Adjustment of these parts are made WITHOUT removing the load.

j. The saddle is made in three sizes to fill all packsaddle requirements. One size is for ponies or larger animals, one size for all Cavalry or Infantry light loads, and one size for all Artillery or cargo pack-train loads.

k. Hangers of all supply services may be carried on either size of the saddle, as hanger measurements are standardized.

327. Fitting the saddle.—The Phillips packsaddles are designed so as to fit all horses and mules that measure up to or

approach the specifications prescribed for Cavalry horses, pack mules, and pack ponies without adjusting the saddle pads. The general principles of fitting these saddles to all standard-type animals are therefore the same as for riding saddles.

No adjustment of saddle pads is required for at least 95 per cent of all standard-type horses and mules that are suitable for packsaddle purposes. Animals of abnormal size or conformation may be fitted by adjusting the saddle pads. Adjustments for fitting abnormal animals, to prevent injuries, and to relieve injuries are discussed under paragraph 345.

The first and most important requirement in packsaddlery is the careful selection of animals. This requirement is especially important for Cavalry.

Hair on the backs of pack animals should be kept short.

328. Saddling.—The animals' back and sides should be groomed and the woven mohair pad clean and soft before saddling.

Standing on the near side of the animal, place the mohair pad upon the animal's back, short sides of the pad from front to rear, and smooth out all folds. The forward edge of the pad should be about 2 inches forward of the saddle when the saddle is properly positioned.

Saddling should first be practiced without the breeching and breast collar.

The saddle, with cinchas attached to the off **D** rings and resting on top, should be about 1 yard in rear of the animals' hind quarters. The saddle is best handled by two soldiers, one on each side taking hold of the "foot rests" on the lower corners and lifting it. The saddle is raised over the croup and placed upon the animal's back in position similar to that of the riding saddle, i. e., with the forward edge of the saddle about 4 inches in rear of the animal's shoulder blades. The saddle should be viewed from the rear to see that it is "centered" and from the sides to see that the "bottom bars" are horizontal or inclined slightly downward and forward. *The bottom bars should never incline downward toward the rear.* The conformation of the animal may require moving the saddle farther toward the rear.

With the saddle properly positioned, the soldier on the off side lowers the front cinch and passes it under the animal's belly to the soldier on the near side, who takes hold of the cinch quick-release device and engages the hooks of the device

to the front cinch ring of the saddle and cinches sufficiently to hold the saddle in place. The rear cinch is then lowered and cinched.

329. To cinch.—*To operate the cinching device.*—If necessary to lengthen the running strap in order to hook the cinching device to the cinch ring of the saddle, push downward on the metal square of the running strap while holding the device.

With the cinching device hooked to the cinch ring of the saddle, take up the slack of the running strap in the same manner as when cinching the McClellan saddle, and when tight pull the free end of the running strap until the metal square is snug against the buckle of the device. This latter movement positively locks the straps. In the few cases when it may be desirable to cinch very tight, after taking up the slack pull downward on the free end of the running strap until the required tension is obtained. This latter method, however, is seldom necessary and should not generally be used, as it has a tendency to pull the saddle off center, toward the near side.

For neatness after cinching, place the free end of the running strap through the metal square and fold the strap back upon itself.

After cinching it is always good practice for one member of the team to observe the saddle from the rear to see that it is centered. If the saddle is inclined to one side the other member of the team should place a forearm on the opposite bottom bar of the saddle and with the hand of the other arm move the saddle to center.

330. To uncinch.—If the free end of the running strap has been passed through the metal square, remove it. Release the running strap by pressing downward on the metal square, keeping the hand close to the animal's belly; with one hand on the lower bar of the cinching device, pull outward, which then releases the straps and the device may be unhooked. Occasionally when new straps are assembled to the device they may bind slightly, due to being too thick, in which case it may be easier to release the running straps, after pressing downward on the metal square, by sliding them through the buckle, as when releasing the cinch straps of the McClellan saddle.

The straps of the device should be clean and lightly oiled. New straps should be moved back and forth until they operate smoothly.

331. Adjustment of cinchas.—Too much stress can not be laid upon correct cinching. A packsaddle covers such a great amount of movable surface and parts that proper cinching is vital to success. There must be no excessive binding of the front cinch, which may injure the backs or sides, interfere with breathing, or cause cinch galls. And the rear cinch must not be as tight as the front cinch, for the rear of the saddle covers the area of greatest motion, the flexible short-ribbed region and the tender region over the kidneys. It must be remembered that the hind legs are the propelling members, and the hind quarters not only oscillate from side to side in travel but also have an up-and-down motion which must not be bound by cinch pressure. There must be no interference with locomotion.

The saddle is cinched principally with the front cinch. The rear cinch should be only sufficiently tight to hold the type of load carried. A high top load naturally requires a tighter rear cinch than a snug side load.

A fast gallop requires tighter cinchas than a walk.

The exact amount of cinch pressure required can only be determined by experience of the soldiers handling the pack.

A safe rule to follow is to cinch with only sufficient pressure to hold the saddle and load in place. The fingers of a hand should pass easily between the cinchas and the animal's belly. In testing cinch pressure the fingers should be inserted from rear to front so that when they are withdrawn the hair will not be ruffled so as to cause a gall.

In the endeavor to secure minimum cinch pressure troops at first frequently do not have sufficient pressure to hold the saddles in place or, in cinching all saddles alike, they do not have sufficient pressure for the high or bulky loads.

"Grip" is a combination of saddle grip and cinch grip. The design of the saddle admits of maximum saddle grip; therefore minimum cinch grip is required.

Final adjustment of cinch pressure is made *after the load* is placed upon the saddle.

332. Adjusting cinchas on the march.—After the animal is on the road for a few miles its belly draws up and the saddle, under weight of load, settles in place. These two movements usually require a further adjustment of cinch pressure at the first halt.

When not practicablee to remove packsaddle loads at halts, great relief will be afforded the animal and injuries possibly prevented by releasing cinch pressure. At every halt cinches should at least be inspected and readjusted, if necessary, before resuming the march. An excessively tight rear cinch will invariably cause injuries. Adjustment of cinchas is a simple operation with the cinching device.

333. To test the cinching device.—The cinching device is especially valuable for the rapid adjustment of cinchas. This device was tested under service conditions, with cinch straps wet and oiled, and in every case passed a satisfactory test.

The settling of the saddle in place and the contraction of the animal's belly cause a looseness of cinch pressure, but with no release of the cinch straps.

To test the device.—After the saddle is cinched draw a pencil line across the running strap under the lower crossbar of the buckle and, later, if the position of this line has moved, the cinch straps have slipped.

334. Adjustment of the breeching.—With the saddle cinched in its proper position upon the animal the breeching may be adjusted.

To adjust the breeching.—Place the breeching upon the animal's croup so that the croup piece will be flat a few inches above the dock. Attach the two top or "hold-up" straps to the top D rings on the rear edges of the saddle pads to hold the breeching in place.

Adjust the two "lead-up" straps in rear to hold the breeching body, which passes around the animal's buttocks, horizontal.

The two lower or "holding straps" should now be attached to the two bottom D rings on the rear edges of the saddle pads. The breeching functions through these two holding straps. The holding straps should be adjusted to admit an easy and free swinging motion of the breeching body around the buttocks at each gait without undue pressure or binding. Each strap must be adjusted to the same length. The animal should be moved about at the different gaits to assure a correct adjustment.

As the breeching functions through the holding straps by transmitting pull both to the croup piece and the breeching body, it is important that the holding straps be adjusted tighter than the top or "hold-up" straps. The only function of these top

hold-up straps is to hold the breeching up and in place, and if these straps are tighter than the lower or holding straps the breeching can not function and will be pulled up out of place.

A breeching not properly adjusted may cause the saddle to ride out of place and thus cause a saddle injury. In no case should the breeching be too tight.

The adjustment of the breeching is very simple and it should be carefully made.

The metal buckle covers on the lead-up straps in rear prevents the animal's tail being caught in the tongues of the buckles.

335. Adjustment of the breast collar.—The breast collar is placed upon the animal by detaching the left snap of the breast collar neck strap from the breast collar body and passing this strap around and over the animal's neck from the off to the near side, then reengaging the snap into the near **D** ring of the breast collar body. The breast collar is attached to the saddle by engaging the snaps of the breast collar holding straps to the lower **D** rings on the front edges of the saddle pads.

To adjust the breast collar.—The breast collar neck strap is adjusted so that the breast collar body will rest on the breast of the animal below the windpipe. The breast collar holding straps are adjusted so that the breast collar body will barely come into action against the breast of the animal at the gallop. This gives a fairly loose breast collar at the walk, with space of about the width of one hand between the animal's breast and the breast collar.

There is a tendency in the service to have snug-fitting breast collars at the walk for neat appearance. A snug breast collar at the walk will be an excessively tight breast collar when the animal extends itself in going up hill and at the gallop. A tight breast collar will pull the saddle forward with each movement of the animal's shoulders, causing the front of the saddle to move upward, throwing weight on the kidneys and causing the breeching to bind.

In most cases the saddle will ride better in its proper position without breast collars.

A tight breast collar should never be allowed.

336. Halter bridle equipment.—The Cavalry pack animal normally is equipped with the model 1917 halter bridle, carrying the model 1909 snaffle bit, to which is attached check or driving reins. The model 1912 halter tie rope is snapped to the chin-

strap ring. The animals are driven by either the check rein or the halter tie rope, as prescribed in Cavalry drill regulations. Artillery pack mules are led, while pack-train mules are loose and herded on the march.

337. To unsaddle.—Release the breast collar on the near side by unsnapping the neck strap snap and the breast collar body snap and place the breast collar upon the saddle. Release the cinchas by operating the cinching devices and throw the cinchas over the saddle from the off side. Move the saddle to the rear a few inches to free the breeching; then raise the breeching up over the animal's croup and place it upon the saddle, being careful to see that none of the breeching straps are twisted.

The saddle is removed by a soldier on each side taking hold of the foot rests and lifting the saddle over the croup of the animal.

The mohair pad is then removed, folded with *wet side* in and placed upon the saddle.

The wet sides of pads or blankets should never be exposed to the sun to dry.

338. To saddle with the assembled saddle.—The method of saddling with the assembled saddle is similar to that described for "fitting the saddle," with the exception that the saddle is equipped with the breast collar and the breeching.

339. To saddle.—With the assembled saddle about 1 yard in rear of the animal, the animal either tied, held, or with or without blinds, the mohair pad is placed upon the animal. Two members of the team then lift the assembled saddle and place it upon the back a few inches in rear of its proper position, drop the breeching, then move the saddle to place. The breeching is then straightened out.

The soldier on the off side lowers the front cinch and passes it under the belly to the soldier on the near side, then lowers and passes the rear cinch. The saddle is cinched by the soldier on the near side.

The soldier on the near side, after lowering the cinches, lowers the breast collar, throws the neck strap over the animal's neck, and, moving around the front of the animal to the near side, carries the breast-collar body, which he attaches to the saddle and connects the neck strap.

When the saddle is cinched one member of the team views the saddle from the rear to see that it is centered.

340. Adjustment of saddle pads.—No adjustment of the saddle pads is required for pack animals of normal conformation. Adjustments, therefore, come under two general classifications:

First. Adjustment to prevent injuries.

Second. Adjustment to relieve injuries.

Under the first class are—

(*a*) Adjustments for fitting animals of abnormal conformation. These adjustments usually require the removal of hair to reduce pressure in parts of the pads.

(*b*) Adjustments for maintaining the fit or bearing surface of the pads for animals of normal conformation which have lost flesh in campaign. These adjustments require the addition of hair or other material for building up the pads.

341. Adjustments to relieve injuries.—These require reduction of pressure and friction usually by removal of hair from that part of the pads covering the injury and occasionally the addition of hair to other parts of the pads.

342. To adjust the pads.—The pads are adjusted by first detaching them from the frame. The pads are held to the frame at the top by two bronze staples that are engaged to two single hooks of the frame and, at the bottom, by the bottom base pockets. No tools are required for detaching or attaching the pads.

343. To detach a pad.—Press downward upon the head of each bottom bar pocket pin, turning the pin to the left until the lug or the pin springs upward through the keyway of the pocket; remove the pin. When both pins are removed take hold of a cinch ring with one hand and, with the other hand near the outer edge of the pad, push the lower part of the pad from the frame. Swing the pad to the middle of the frame and remove it by lifting it off the staple hooks at the top of the frame.

NOTE.—The pad can not be detached until it is swung to the middle of the frame.

344. To attach the pads.—Turn the saddle frame on its "back"; put the canvas saddle cover in place, leaving room in the four openings of the cover for attaching the staples of the pads to the staple hooks of the frame. Attach a pad by holding it near a line through the middle of the saddle arches—away from the bottom bars of the frame—and engaging the staples

to the hooks, lifting upward to secure them. Hold the pad engaged and bring it against the bottom bar of the frame.

NOTE.—By holding the engaged pad against the bottom bar it can not become detached. In case one man is attaching the pads, rest that side of the frame with the engaged on the ground. Repeat for the opposite pad. Hold the pads to the frame and turn the saddle "right side up" and straighten the canvas cover. The cover is easily straightened by swinging the pads toward the middle of the frame, then pulling the cover downward. Swing the pads back and engage them to the bottom bars of the frame; the bottom bars are pressed into the pockets of the pads by holding one hand on the foot of each pocket, in turn, and pushing the pad outward toward the bottom bar with the other hand. Insert the bottom bar pocket pins in the holes of the pockets and engage them by pressing down the heads and turning lug on the pins one-quarter turn to the right, when the lugs should snap into place.

345. **Adjustment of pads to prevent injuries.**—As the pads of the Phillips packsaddle are molded to form, no change of this form should be made unless absolutely necessary.

In fitting animals of abnormal conformation it is good practice first to place the saddle in position on the animal, without the blanket or mohair pad, and observe the fit from the front, sides, and rear.

The front of the saddle should fit smoothly against the animal with no compression of the withers. The sides of the saddle should not be pushed outward. The rear of the saddle should follow its natural curved lines without pinching the animal. And there should be uniform bearing of the pads along the weight-bearing muscles of the back as viewed from the rear. If any of the above conditions are not found the pads should be adjusted.

The abnormal types of animals usually found, in so far as conformation of the body for packsaddles is concerned, are:

Withers—too thick, too flat, or too thin.

Back—too short, swayed, or roached.

Chest—broad-ribbed draft type.

Barrel—excessively large.

The thin, withered, and sway-back types require the addition of hair to build up the pads. The others, with the exception of the "short-backed" type, require removal of hair. The short-back type can not be fitted by adjusting the pads. This type, if used, requires a smaller saddle.

Adjustments for building up the pads for all normal animals that have lost flesh in campaign consists merely in replacing

with air the flesh lost. These adjustments are seldom required and should not be resorted to until necessary to prevent injuries. When made, however, the normal shape of the pads should gradually be restored as the animal gains in flesh.

In fitting the saddle, especially for abnormal types, there are two convenient methods for obtaining an accurate fit, each depending on whether hair should be added or removed; these methods are:

In cases requiring the addition of hair, thoroughly wet the saddle position (back and sides) of the animal, then carefully place the saddle in position without the mohair pad and cinch it tightly, leaving the saddle in place for a few minutes. When the saddle is removed the dry spots indicate the positions where hair should be added.

In cases requiring the removal of hair from the pads, wet the place on the animal where hair should be removed, then place the saddle, without mohair pad, in position and cinch tightly. The wet marking on the pads indicates the spots where hair should be removed.

The spots or region requiring adjustment should be marked with chalk or colored pencil.

The amount of hair to be added or removed may conveniently be determined by holding the detached saddle pad in position upon the animal where the fit may be observed.

After adjusting the pads attach them to the frame and check the accuracy of the adjustments by again saddling without the mohair pad and observe the fit of the saddle. In fitting the withers, space must be left for the mohair pad.

346. How to make the adjustments.—All adjustments are made through the handholes in the leather backs of the pads, thus conserving the original smooth contact surface. As the pads are formed and tied in a mold, it is important to untie only the minimum number of thongs.

Untie the thongs covering the markings and tie a loose knot near the ends. If thongs are removed it is necessary to use the awl to replace them. Remove the leather slip covering the handhole. If hair is to be added, use the iron stuffing tool of the saddle kit for pushing the hair to place; if hair is to be removed, use the hair hook. Hair should be well loosened before stuffing and only small amounts put in at a time. It should be firmly compressed into place, being careful not to push the tool through the felt contact surface.

In removing hair pull small amounts of hair from the back of the pad and push in the contact surface. Thongs must be tied tight after adjustment. Place the contact side of the thong on a small stick or rock when making the tie.

347. Adjustment of pads to relieve injuries.—With properly positioned hanger loads there is but small chance for either the saddle or the load to be a primary cause of injury. Before adjusting the pads determine the cause of the injury and decide whether or not it may be corrected by other means.

Basically all packsaddle injuries may be relieved by reducing or removing pressure or friction from over the injured part; this may be accomplished by chambering or making a recess in that part of the pad immediately over the injury.

Many injuries are relieved by correcting a faulty position of the saddle, by readjusting the breeching or breast collar, and by attention to cinch pressure and loads.

A minor bruise would not ordinarily require removal of hair from the pads, nor would removal of hair be necessary for a swelling that has subsided, unless the swelling was caused by a lump of hair in the pad. And it is often possible to relieve pressure by tightening a thong instead of removing hair.

The methods for determining the parts of the packs from which hair should be removed, how to add and remove hair, checking the accuracy of the adjustment, and tying thongs are described under "Adjustment to prevent injuries."

In restoring the normal shape of the pads or in building up pads in the field any soft material may be used if curled hair is not available. Pieces of gunny sacks, grass, hay, or paper may be used until curled hair can be obtained.

The resiliency of curled-hair pads may be restored by pounding the pads with the clenched fist.

348. To chamber a pad.—Detach the pad from the frame and loosen all thongs passing through the marked area so as to have a chamber of at least 1 inch greater radius than the marked area. Tie a loose knot in the end of the thongs. Pull out the leather slip of the handhold nearest the marked area. Use the hair hook of the tool kit and pull the required amount of hair, pulling small amounts each time from the back of the pad. Press in the chamber on the contact or felt side and tie the thongs. Rest the contact side of the thong on a rock or stick to secure a tight hold.

Check the accuracy of the work by holding the pad on the animal in the exact position it would occupy, observe the chamber, and see that all pressure would be relieved when the pad is attached to the frame. Repeat this checking with the pad attached to the frame.

As soon as the injury is healed the normal shape of the pad should gradually be restored.

349. Tool kit for adjustment.—A saddle-tool kit is issued with each lot of 10 or smaller number of saddles shipped to a separate organization. Each tool kit contains:

1 awl for thongs.
1 hair hook for pulling hair.
1 iron stuffing tool for compressing hair into the pads.
24 leather thongs.

The awl is used for pulling thongs through the pads. To use it: Push the awl through the proper hold in the leather back of the pad and through the felt side; insert the point of a thong through the edge and pull the awl out, bringing the thong with it.

350. Preservation.—Phillips pack equipment should receive the same care as that bestowed upon riding equipment.

351. Care of the saddle pads.—A moth-proof substance is mixed with the curled hair to protect both the hair and the felt of the pads from attacks by moths. After the saddles have been in use and sweat has worked into the pads there is practically no danger from moths. This also applies to the mohair pads, as it does to woolen saddle blankets.

The pads of all saddles require attention.

The felt facing of the pads should be kept clean and free of dirt and of salt from sweat. Brushing is all that is required to keep the felt pads clean.

Packsaddles should never be stacked one on top of another, as this is injurious to the contour of the contact surface.

The pads should occasionally be detached from the frame for thoroughly cleaning.

One of the functions of the foot rests on the lower corners of the saddle is to keep the lower edges of the pads off the ground in camp.

352. Breeching and breast collar.—The smooth contact surfaces of the breeching croup piece, the breeching body (which passes around the buttocks), and the breast collar body should be free of dirt or grit. Castile-soap or saddle-soap suds should

be used, being careful to rub with the grain of the leather. The occasional use of neat's-foot oil is desirable. These parts must be rubbed dry to prevent collection of gritty matter which will rub the animal.

353. **Mohair pads.**—Mohair pads in storage should be protected from moths. In the field these pads should receive the same care that packers bestow upon coronas to keep them smooth, soft, and free of gritty material.

After unsaddling the pads should be folded once with the wet side in and placed upon the packsaddle, folded edge to the front.

Loose hair collected from the animal should be brushed out before the pack equipment is arranged in camp.

If the pack equipment is cleaned immediately after unsaddling, the final brushing and cleaning of the mohair pads should be several hours after unsaddling, when the pads have dried. The pads should never be exposed to the sun to dry, as this causes them to dry hard.

Mohair pads should occasionally be washed in cold water to free them of salt and dirt. Care should be exercised in brushing the pads. The pads should never be used for soldiers' bedding.

354. **Pack loads.**—Pack loads should always be removed from the saddle before removing the saddle.

SECTION IV

MARCHES

355. **Road rules.**—*a.* Pack transportation passes to the right and overtakes on the left and should clear the road for wheel transportation or marching troops.

b. Closed single column should be maintained on narrow trails.

c. In open country the column should be shortened and animals follow the bell at will, sometimes several abreast of each other, but they should not be permitted to maintain so compact a formation as to prevent proper observation of individual loads.

d. The march should be commenced as soon as loading is completed, and halts limited to actual necessities, so that it may be completed expeditiously and loads carried for a minimum of time.

356. **Marches.**—*a.* All pack trains not otherwise employed should make practice marches of from 5 to 10 miles per day,

Sundays and holidays excepted, in order to keep the personnel, animals, and equipment in condition, during which the personnel will be instructed in their duties on the march, in bivouac, and in camp, and the animals grazed for short periods where practicable.

b. In open country the personnel should take position so that each man may observe five packs. They ordinarily ride, with mate following mate, about 30 yards from the windward side of the train.

c. On narrow trails one man should ride behind each fifth animal. Should a pack require attention the man in rear calls out to the one ahead, who assists him in catching the animal and adjusting its load. While the two packers are thus engaged others move forward and fill in places which have been left vacant, and when the load is adjusted and the animal turned loose they then take the places made vacant by those who have gone ahead.

d. In mountainous country the pack master should have one or two assistants with him at the head of the train, and he should ride far enough in advance to enable him, should occasion require, to station either or both of them to keep animals in the trail to guard against accidents. If grades are very steep the loads should be lightened and the animals permitted to travel slowly.

e. During forced marches the load should be lightened and should not ordinarily exceed 200 pounds.

f. Night marches are very difficult for pack trains. Although the animals travel well at night, it is difficult to load properly, to keep the loads adjusted, and to prevent animals from leaving the trail. If heavy loads are carried, cinchas very tight, or animals tired, they will leave the trail and lie down in spite of all precautions. If night marches are necessary, the loads should be lightened and cinchas but moderately tight, and the entire personnel must be especially alert and the train kept well closed up and care taken to prevent animals from leaving the road or trail. Additional personnel should be detailed for the march and the animals led.

g. Should two or more trains meet or pass each other, halts should not be made which will permit animals to leave one train and join another. The personnel of two trains passing each other should be placed between them, and they should pass at

such distance as will enable them to prevent the animals from leaving the train to which they belong.

h. Pack trains marching on the same road or trail should have an open distance of at least 100 yards between them.

SECTION V

CAVALRY PACK TRANSPORTATION (OMITTED)

NOTE.—To be included at a later date, when new training regulations are completed and approved.

SECTION VI

ARTILLERY PACK TRANSPORTATION

357. Scope.—The 75-mm. pack howitzer is so designed that it may be divided into six pack loads for convenience in transporting on pack animals.

358. Artillery pack loads.—The weights of the various loads upon the weight-bearing surface of the animals are as follows:

Load No. 1—Howitzer tube:	Weight
Howitzer tube	221.0
Accessories	12.2
Phillips packsaddle	70.0
Total load weight	303.2

The tube is placed on the frame, breech end foremost, and is protected from dirt by the breech tube dust cover (weight, 1.2 pounds) and the muzzle cover (one-half pound), accessories to the carriage. The load arches are provided for attachment to the saddle arches for holding the tube. The tube is held in place by stud on the underside of the tube and a load cincha over all.

NOTE.—The center of gravity of the tube with tube dust and muzzle covers in place (222.7 pounds) is 20.32 inches from the rear end of the tube.

Load No. 2—Bottom sleigh and recoil mechanism:	Weight
Bottom sleigh and recoil mechanism	203.5
Accessories (including oil cans, cover, and 2 lifting bars)	21.5
Phillips saddle	70.0
Total load weight	305.0

The recoil mechanism and bottom sleigh assembly are placed upside down upon this pack frame and a load cincha (3 pounds) assembled over the load to hold it down.

NOTE.—The center of gravity of the bottom sleigh unit (203.5 pounds) is 18.47 inches forward of the rear face of rear lug for top sleigh.

Load No. 3—Cradle and top sleigh:	Weight
Cradle	101.0
Carriage top sleigh	121.0
Accessories, with 2 lifting bars	20.5
Phillips saddle	70.0
Total load weight	312.5

The cradle is placed right side up and muzzle and foremost on the pack frame with bracketed pockets of the cradle dropping over the arches to prevent fore-and-aft movement. The top sleigh is placed in the cradle muzzle end to the front and a cincha passed around the load.

NOTE.—The center of gravity of the cradle and top sleigh (222 pounds) is 18.56 inches forward from the center of rear boss (trunnion) of the cradle.

Load No. 4—Front trail:	Weight
Front trail and elevating mechanism	230.0
Accessories (load arches)	9.2
Phillips saddle	70.0
Total load weight	309.2

The front trail is carried front foremost and right side up, secured with a load cincha. The center of gravity of the front trail group (220 pounds), without axle bearings, is 6.4 inches to rear of the rocker trunnions and slightly to the right of the vertical central plane; therefore the longer adapter of the cantle arch is on the rear (left) side of the animal. The axle bearings, with their bolts, weigh 7.9 pounds.

Load No. 5—Rear trail, axle, sight, and accessories:	Weight
Rear trail	95.0
Axle and traversing mechanism	66.5
Accessories for rear trail, axle, sight, and tools, including accessory and tool chest and 2 lifting bars	57.2
Carriage accessories	9.5
Phillips saddle	70.0
Total load weight	297.7

The pack-frame combination is exactly like that for loads 2 and 3. The accessory chest contains the sight mount, sight extension, and the bore sponge (chest and tools, 23 pounds). The tool chest contains accessories (chest and tools, 23 pounds).

NOTE.—The center of gravity of the rear trail and axle (161.5 pounds) is 22.84 inches, measured parallel to the normal top of trail to rear of the center of the 1¼ hole in the trail hinge.

The rear trail is inverted on the pack frame, spade end to the rear. The axle and traversing mechanism assembly is placed inside, with the traversing handwheel in front of the rear trail front transom. The handspike is laid alongside the axle, the accessory and tool chest hung on as side loads, and the whole secured by a long cincha.

Load No. 6—Breech and wheels:	Weight
Howitzer breech	121.0
Wheels (2)	97.5
Accessories	35.0
Phillips saddle	70.0
Total load weight	323.5

For this pack frame special arches are connected by the superframe assembly, a skeleton framework adapted to receive the breech ring and provided with a quick-acting metallic strap for holding the breech to the superframe. The leather breech dust cover is adjusted to protect the threads. The wheels are carried one on either side on hangers consisting of a short axle spindle hung by two steel straps from the hooks of the pack frame side hinges. Leather straps hold the wheel hangers to the pack frame.

Load No. 7—Shafts and harness:	Weight
1 pair of folding shafts with singletree	77.0
1 set tandem harness (old model) (new not received)	82.0
Phillips saddle	70.0
Total load weight	229.3

Above transported as improvised cargo load.

Ammunition:	Weight
2 ammunition boxes with 5 rounds each	242.0
Phillips saddle	70.0
Total load weight	312.3

Pioneer roll:	Weight
Pioneer roll, right	77.5
Pioneer roll, left	78.5
Lantern chest, including 2 lanterns	22.0
Phillips saddle	70.3
Total load weight	248.3

359. Special equipment for Artillery pack loads.—For transport by pack animals certain pack-load accessories are furnished. This special pack equipment is intended for use with the Phillips packsaddle, which consists of (naming the articles in the order in which they are assembled upon the back of an animal):

1 mohair saddle pad.
1 Phillips packsaddle, Artillery cargo, complete.
1 load cincha.
1 halter bridle.

The average weight of this packsaddle, complete, is taken as 70 pounds, including the mohair pad. The Phillips packsaddle is supplied by the Quartermaster Department.

SECTION VII

ENGINEER PACK TRANSPORTATION

360. Scope.—The engineer pack transportation, like all engineer transportation, serves two purposes—one to transport unit tools and equipment to the work site and the other to maintain the supply of materials while the unit is at work. The pack must be a general cargo carrier as well as a special equipment carrier.

361. Engineer pack trains.—*a.* The mounted battalion with the Cavalry division and the combat regiment with the Infantry division are provided with pack transportation. In the mounted battalion the tool section of the pack platoon in the line company is a pack unit. It is an integral part of the platoon and carries engineer equipment and general supplies so as to permit the unit to operate away from the company and its wagon transportation.

b. In the combat regiment there is a pack section in the service platoon of the headquarters and service company. It is primarily a transport unit to carry engineer equipment and

general supplies for small mounted detachments and for detachment in whole or in part to the battalions or companies for operation in terrain where wheel transport can not be used.

c. In both units after the tools and equipment reach the site of the work the animals are used as cargo carriers for the execution of engineer work. The standard engineer pack train consists of eight pack horses. The normal assignment is one unit to each pack platoon of the mounted company and two units to each pack section of the combat regiment.

362. Engineer pack loads.—*a. Mounted battalion.*—The gross weight of the load does not exceed 200 pounds, as the pack platoon must be able to maintain the gait of the Cavalry. This limits the useful load to about 140 pounds with the cargo type Phillips packsaddle.

b. The pack section carries about 700 pounds of engineer equipment and about 420 pounds of miscellaneous supplies and equips a working party of three squads. The engineer equipment consists of carpenter, demolition, and pioneer tools. When aparejos are used at least two animals must be added to the train to carry the equipment or otherwise the pack platoon will be short of equipment for engineer work.

c. Combat regiment.—The gross weight of the load does not exceed 300 pounds. The normal gait of the train is that of foot troops. The useful load is about 240 pounds with the cargo type Phillips packsaddle. The pack section carries about 2,100 pounds of engineer equipment and 1,260 pounds of miscellaneous supplies and equips a working party of eight squads or two platoons. The engineer equipment consists of 10 packs, 2 carpenter and bridge repair, 4 demolition, and 4 pioneer.

363. Special equipment for engineer pack loads.—The standard engineer packs, designed to carry engineer tools and equipment, are provided with boxes or containers for the tools and special hangers for fastening the pack to the packsaddle. For carrying general cargo standard packing methods are employed suitable to the packsaddle that may be issued.

SECTION VIII

SPECIALISTS

364. Pack master.—*a.* The pack master will be held responsible for the proper and complete equipment of his train and its management and discipline.

b. He should have a thorough knowledge and understanding of the art of "setting up" the aparejo and of adjusting the Phillips packsaddle.

c. He will assist and instruct the cargador in readjusting the fitting of the aparejos in such manner as will result in preventing "bunches" or sore places and in keeping the animals sound.

d. He will exercise supervision over packers at all times and see that they give due attention to the animals' packs and that none fall off or become disarranged during travel.

e. He will inspect the condition of the animals' bodies after each day's travel. He will observe the condition of the coronas as to cleanliness when in bivouac and will cause all canvas and blankets to be spread out and dried, when found wet, if the opportunity offers.

f. He will assign a suitable number of packers as guards for animals on herd.

g. He will count all "rigging" at the end of each march and report to his immediate superior anything found missing.

h. He will cause animals in his train to be brought to "rigging" in the evening while there is light, if possible, and will then verify the train by count and see that animals are then thoroughly groomed and that particular care is given to the parts were aparejos, cruppers, and cinchas come in contact with the skin.

i. He will see that animals which show signs of distress or weakness are relieved of a portion or all of their loads.

j. He will place the personnel in such a manner as to insure safety to animals along the column in the neighborhood of bad or dangerous places. Should streams requiring fording be encountered, he will halt the train and send a man across to ascertain by trial the depth, velocity of current, and condition of bottom and approaches, after which the animals will be watered and the stream crossed. If so deep as to be dangerous, he will station men along the downstream side. If deep enough to require swimming, he will seek another crossing or have the loads and rigging removed and crossed in boats or on rafts, as loaded pack animals can swim very little. He will take special precautions to avoid boggy ground, as the weight of loads will cause animals to sink in, when they will lie down, and great difficulty will be experienced in getting them out.

k. He will see that any person found maltreating animals under his care is subjected to rigorous disciplinary action.

l. On leaving camp in the morning and in moving forward after halts on a march the pack master will station himself opposite the head of the train on the windward side, facing the column, and will count the cargo animals as they pass him. When necessarily occupied with other duties, he may detail the cargador or horseshoer to perform this duty.

365. Cargador.—*a.* The cargador must, with the assistance of the pack master, set up the "rigging."

b. He will be expected to keep animals' bodies sound, and failure to do this will prove his unfitness for the position.

c. He must attend to needed repairs to aparejos and equipment and will be supplied with a saddler's set and materials for that purpose.

d. He will be responsible for making up all cargo, equalizing the packs, and loading animals according to their strength and condition. He will keep a watch on animals and packs while traveling and also on packers to see that they attend to their duties, and will promptly report any inattention or disobedience of orders to the pack master.

e. He will cause the cargo, the rigging, and the picket line to be placed as indicated by the pack master, and will have charge of the train in the absence of the pack master.

f. He will keep a memorandum of all cargo and equipment received and to whom same is issued, together with dates, and will mark and tag packages when necessary.

g. In bivouac he will see that all halter shanks are gathered and placed on rigging and all blinds placed on cargo before same is covered.

h. He will be responsible that all aparejos are marked with the number of the animal's respective coronas and that all coronas are kept clean.

366. Horeshoer.—*a.* The horseshoer will be provided with the horseshoers' set. He will keep 200 shoes on hand, properly fitted, for field service, together with the number of necessary nails. He will fit and shoe all animals of the train, and must have a thorough knowledge of the approved method of fitting shoes and of the intelligent care of the hoof.

b. He will, when required, give assistance in packing, and while the train is being packed his duties are to keep the animals close to the bell, keeping correct count of the animals

as they are turned loose, and reporting any accident promptly to the pack master or cargador.

c. While traveling his duties are to ride up from behind, keeping watch on the feet of the animals, so that he may know the condition of the shoes and to what extent the train will need to be reshod at the halt. He will also pick up all shoes cast by the animals and replace them at the halt, if they are serviceable. He will put in new nails should he observe that shoes on the animals are loose.

d. He will call the attention of the packers to any load that may need adjustment.

CHAPTER 6

USE AND CARE OF MOTOR TRANSPORT

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SECTION I

GENERAL CONSIDERATIONS

367. Motor transport is the service of overland transportation by means of motor-driven vehicles. In the United States Army motor transport includes—

a. The organized motor-transport service of the Quartermaster Corps, composed of three main branches, namely:

(1) Operation of the motor-transport vehicle service, including motor vehicles and motor-transport companies, motor-transport trains, and convoys.

(2) Maintenance of the motor-transport vehicle service, including emergency road and garage repairs, service stations, repair shops, overhaul and reconstruction parks, and the motor-transport supply system. Maintenance includes the operation of motor-repair sections, motor-repair companies, and motor-repair battalions.

(3) Administration of the motor-transport service, including supervision over both operations and maintenance, application of both as a service to all military activities. It includes the activities of motor commands.

b. Organizational motor transport composed of motor vehicles and motor-vehicle drivers, motor-transport companies and trains assigned as integral parts of organizations other than the motor-transport service, Quartermaster Corps, such as vehicles

of field and combat trains in regiments of the combat arms and special motor vehicles and motor-vehicle organizations of the supply and staff services such as ammunition trains of the Field Artillery, Ordnance, and Signal companies, and the trains of engineer and medical regiments.

c. Motor vehicles and motor-vehicle organizations, similar to those of the motor-transport service, Quartermaster Corps, which are assigned to mechanized forces, are naturally best maintained by the maintenance branch of the motor-transport service assigned to higher commands under which mechanized forces operate. The functions of procurement, storage, issue, and maintenance of such vehicles as with organizational motor transport is a part of the motor-transport service of the Army.

SECTION II

PLANNING

368. All modern military planning must embrace motor-transport considerations. These are logically presented in the following categories and in the following order:

a. Tactical organization involving the motor-transport elements of the field forces, i. e., combat and supply organizations and general headquarters organizations. The result of these considerations are shown in Tables of Organization.

b. Territorial organization, involving consideration of the theater of war. The general character of the terrain of the theater of operations of the zone of the interior, combat zone, and communication zone largely governs the use of motor transport. The existence of roadways and road nets, the percentage of "off-road" terrain that can be negotiated by "cross-country" motor vehicles, the location of waterway and railway transportation systems and terminal organizations of such systems, ether already established by commerce or to be established in military operations, must be considered in military planning. The results of these considerations are included in war plans.

The guiding principle in all planning, involving motor transport, is the principle of mobility. That means of transport which will give the greatest degree of mobility in movements incident to combat and supply should always be employed whenever and wherever possible. Motor transport, animal transport, and railway transport have distinctly different characteristics. Under different conditions, especially conditions of terrain capac-

ity of transport, time, and distance, these three ways and means of overland transport will be found to give varying degrees of mobility according to their natural fields of operation.

Motor transport is best employed and most powerfully developed under the principle of elasticity of transport. In accordance with this principle it is organized and operated as a service, as follows:

a. To give superior mobility to organizations, activities, and operations to which it naturally applies.

b. To supplement and be coordinated with all other forms of transport—animal, rail, water, and air—and to be tied in with the operations of these other forms in organized terminal stations, flying fields operations, including regulating water and rail heads, relay and distributing points. When conditions of terrain, road nets, and conditions affecting other forms of transportation demand motor transport should replace or be replaced by that form of overland transportation which will give greatest mobility under the circumstances.

c. To provide for effective and economical operation, maintenance, and administration of motor transport itself so as to centralize control under responsible commanders and balance military and technical responsibility with appropriate authority over motor-transport equipment and personnel.

SECTION III

OPERATIONS

369. The operation of motor transport embraces the following:

a. Operation and care of single vehicles by drivers or chauffeurs.

b. Operation of vehicles by groups in road formations designated as trains and convoys, in permanent motor-transport organizations designated as companies and trains. These are operated from territorial motor-transport organizations designated as motor-transport pools and subpools and motor-transport centers and subcenters throughout an organized local service considered a part of the motor transport and general transportation services of higher commands.

c. Motor-transport operations embrace the operation of garages and parks and the emergency repairs made by vehicle and company personnel on the road and in garages. In these

first two echelons of motor repair and motor supply the organization and principles of motor-transport maintenance govern. In carrying on such emergency repairs and supply operating personnel are in fact a part of the maintenance branch of motor transport. They receive technical instruction from and are technically supervised by properly qualified and designated motor-transport officers of the maintenance branch.

d. Operations include organization and operation of the road net for motor transport in accordance with plans of road circulation and general traffic regulations prescribed by the commander of the area covered by the road net.

e. Motor-transport traffic control, the execution of troop and supply movements, passenger and messenger services, by time schedules, by troop and supply movement tables as by emergency orders are fundamentally operating functions of motor transport. The connection of garages, parks, pools, terminals, loading, and unloading points by communication nets and the operation thereof through chief or central and local dispatchers, acting on calls or standing orders of commanding officers, but technically supervised by operating officers of the motor transport, are essential functions of motor-transport operations.

370. The motor-transport operating company.—A motor-transport truck company is the basic field unit in the operations branch of motor transport. It is operated by the company commander, the truck master, section leaders, and the individual motor-vehicle operators in accordance with orders received through the dispatching system.

a. In a motorized company or similar unit the company commander is responsible for the discipline of his command and for the care, maintenance, and operation of his vehicles in convoy.

b. The truck master is usually the first sergeant and executive of the company. He is responsible to the company commander to see that all orders, regulations, and other requirements are carried out, that the men perform their duties properly, and he reports to the company commander any cases requiring disciplinary action. He should be a man chosen more for his administrative and executive ability than for his mechanical knowledge.

c. Each section leader is responsible for the discipline, instruction, and all other matters pertaining to the personnel of

his section, and for the operation and maintenance of the equipment assigned thereto.

d. The motor-vehicle operator is required to keep his vehicle and its equipment clean and in proper operating condition. He should be familiar with the mechanism of his vehicle and its proper operation. He utilizes time when the vehicle is standing still to do all the cleaning and minor repair work required thereon. He does not wait until his vehicle reaches the garage or park. He attends to the lubrication of all parts of his vehicle and promptly reports any defects or repairs needed beyond the scope of his equipment or ability. In transporting supplies he will be responsible that the vehicle is not overloaded, except on the direct order of a commissioned officer, and that the cargo is properly loaded and lashed. The duties of the operator also include the recording of the total weight of each load carried, the recording of distance traveled with each load, and the distance his vehicle is operated without load, the recording of the amounts and kinds of supplies used. He will wear proper uniform when driving. He will be required to carry with him at all times a unit of fatigue clothing to be worn when working about his vehicle. See also TR. 75–85.

371. Motor-car and motor-cycle companies are organized and operated on the same principle as motor-truck companies.

372. The motor-transport pool, an administrative operating organization described under Section V, is the basis of motor-transport operations. It may be composed of a few vehicles and their drivers, or it may consist of a large park or number of garages in which are housed and operated several motor-transport companies. The repair elements of a pool vary from a small garage shop where emergency repairs only are made to a service shop operated by a motor-repair section, Quartermaster Corps. It does not include overhaul and reconstruction, although a pool invariably is organized at overhaul and reconstruction parks as adjuncts to such parks.

373. The motor-transport officer, or his subordinate who commands the pool, organizes it in the three characteristic branches, namely:

a. Administrative branch.

b. Operating branch.

c. Maintenance branch.

These are described in Sections I and V.

374. Naturally, the operating branch is the principal and most important branch of motor transport; therefore, only such administrative and maintenance overhead as may be necessary for efficient and economical operation is provided.

375. The administrative branch is composed of the motor-transport officer, the pool or center commander, his administrative assistants, including his assistants in charge of operations and maintenance, his clerks and messengers. This branch may be part of the transportation division of the quartermaster's office or, as in large commands, a separate motor-transport field office may be organized near the operating parks, garages, and vehicle equipment. The office personnel is provided by the assignment of motor commands, by detail from other organizations, and by hire of civilian employees.

376. The field force of the operating branch is composed of motor-truck companies, motor-car companies, motor-cycle companies, and by individual vehicles and vehicle operators assigned to the pools. The key position of the pool is that of the chief dispatcher. His office is the nerve center of the operating branch. He is provided with switchboard connections or other means of communication to all local dispatchers and to all key points in the motor-transport system served by the pool, as well as to the motor-transport officer and commanding officer. He operates directly under the supervision of the motor-transport officer. In large pools the motor-transport officer's assistant, designated as the operating officer, controls dispatchers, operating equipment, personnel, and units.

377. The maintenance branch is composed of such maintenance personnel and such shop and warehouse facilities as may be required. It is organized and operated under the unit repair and unit replacement system, which is described in Circular No. 1, Office of the Quartermaster General.

378. Administrative offices in the motor-transport service appear in the three branches in large pools, i. e., administrative, operation, and maintenance. The field organizations operated by the latter two are termed parks and garages in operations, and motor-repair shops and motor-supply depots in maintenance.

379. Operation of the motor-transport pool.—There are two classes of service to be performed by a motor-transport pool—long-distance service and local service.

(*a*) *Long-distance service.*—The term "long-distance service" is applied to movement requiring vehicles to be away from their

station for a time exceeding 24 hours. Vehicles may operate on long-distance service singly or in convoys of two or more vehicles.

(*b*) *Local service.*—In this service trucks are detailed to various warehouses and supply points for work either on special call or on regular daily details. Vehicles are also operated on circuit work in local service, collecting cargo from one or more points and redistributing the cargo in the local area. Passenger vehicles are operated in the same manner as taxicabs.

380. Pool commander.—The pool commander is charged with the efficient and economical operation of the pool.

381. The operations officer.—(*a*) The operations officer should have supervision over all vehicles being operated by the pool. This officer should be selected for his knowledge and experience with motor transportation. He should familiarize himself with the routine work to be performed at the camp and the vehicles necessary to accomplish it. Particular attention should be paid to receipt and delivery of cargoes at terminals and to loading of cargo and proper distribution of weight so that all vehicles may be operated with capacity loads.

(*b*) The operations officer is responsible to see that all motor-transport vehicles needing mechanical attention are promptly reported to the maintenance officer for necessary repairs and adjustments. He is responsible for a daily record of the performance of each vehicle operated, giving the weight of cargo, the number of passengers carried, the mileage, and the consumption of gasoline and oil.

(*c*) The dispatcher functions under the operations officer, and his instructions in regard to the dispatching of vehicles are to be regarded as the orders of that officer. A suitable noncommissioned officer is detailed as dispatcher, assistants being detailed when necessary, so that one man will be constantly on duty within reach of the telephone or other means of communication. His duties are to record properly the receipt of orders for transportation and to make out written orders for the vehicles to perform the work.

(*d*) The dealings of outside organizations with the pool will be largely through him and the impression which these organizations get of the pool will depend to a great extent upon his intelligence and tact. As most of his dealings will be over the telephone, the selection of a man with a "telephone voice" is important.

382. Garage commander.—The duties of the garage commander are to see to the housing and care of the vehicles and personnel, to see that all rules and regulations are strictly enforced, that fire-prevention methods are taken, and that the repair and supply sections are properly operating.

383. Supply officer.—The supply officer is responsible to see that sufficient supplies are on hand or requisitioned to take care properly of the vehicles in the pool and to keep such stock records and property records as may be necessary.

384. Maintenance officer.—The maintenance officer is responsible for the prompt and proper repair of all vehicles. He organizes and supervises shop operation and also spare-parts storage in keeping with the general character of repair work carried on under his charge.

385. Inspector.—The inspector's principal task is to maintain a high standard of vehicle serviceability and repairs. Daily inspections will be made and written report of inspections submitted to the pool commander. If the inspector decides that a vehicle should go to the repair shops, he will make the report to the garage or organization commander, who will make final decision as to what disposition is to be made of the vehicle.

386. Motor-vehicle convoys.—The purpose of a motor-vehicle convoy is to effect the safe and efficient transportation of personnel and material. The success of any convoy depends largely upon—

(*a*) The condition of the vehicles.

(*b*) The training and discipline of the personnel.

387. Observance of set rules is, therefore, absolutely necessary. Certain formations are prescribed and must be followed, and the reason for primary convoy rules must be understood thoroughly before the motor-transport officer or soldier can appreciate to the fullest extent the necessity for the hard and fast rules of convoy. First among these rules governs speed and distance between trucks.

a. Distance is gauged from the front of the convoy and the speed from the rear. The individual driver must judge his distance from the truck immediately in front of him. On the road he must always try to keep his truck the prescribed distance behind the preceding truck. The natural elasticity, however, of a convoy working over an extended section of road means, in effect, that if the leading truck of a company is going

an average of 10 miles an hour the rear truck will often be making 12 miles, as intermediate trucks close up the distance they have lost because of road irregularities.

b. Though distance is taken from the truck ahead by the individual driver, the speed is set from the rear. If the convoy commander finds the rear truck can not keep up with the convoy, he will cause the speed of the entire convoy to be so fixed that the rear truck will not be left behind.

Maintenance of discipline in a column of trucks is the second and possibly the most vital rule of convoy. Without discipline the trucks can not be kept in proper formation. Discipline is essential to the proper operation of trucks, especially in large numbers, for the protection of vehicles, passengers, and cargoes against damage, to insure promptitude in obedience of orders, maintenance of a spirit of "safely deliver the passengers or cargo at the right place and right time," whether an officer is present or not, and the systematic handling of trucks in large numbers. Any ordinary driver can handle a single truck independently. Motor transport includes the handling of large numbers of trucks in a systematic manner to avoid confusion and to move efficiently in large bodies. When his company is in convoy the company commander is responsible for the discipline of his men and the proper operation of his convoy or section of convoy as at all other times. He must see that all vehicles of his organization are properly maintained and operated in the convoy and that all rules and regulations applying to convoys are rigidly obeyed.

388. Before a convoy starts the convoy and company commander will assure themselves that the supplies of gasoline and oil for vehicles, rations, clothing, and other supplies for men are sufficient, and that the cargo in each truck is properly loaded and secured. The convoy commander will provide himself with the necessary passes, orders, maps, etc., and will order or make an informal but effective inspection of his personnel and vehicles. The truckmasters are usually in charge of the informal inspection. Assistant truckmasters report to the truckmaster and are held responsible by company commanders for the preparation of their respective sections.

389. It may be unnecessary for the convoy commander to accompany the convoy in cases where but few trucks are employed or when the convoy is proceeding to or from well-known

loading or unloading points. In such cases a subordinate officer or the senior truckmaster or one of the assistant truckmasters will be placed in charge. If the convoy is so divided that the number of assistant truckmasters is not sufficient, a qualified driver will be appointed as acting assistant truckmaster for each group of vehicles assigned to duty. Ordinarily the convoy commander will be in active command and present with his convoy. With the exceptions here noted, he should habitually ride in the rear, passing the vehicles of the convoy occasionally to assure himself of their efficient operation. Position is taken in rear in order that the convoy commander may personally note all vehicles that may be compelled to fall out and give the necessary instructions for towing, repair, and return to duty. However, in the absence of other competent personnel, the convoy commander may precede his convoy for such reasons as the following:

(*a*) When covering roads that are not well known or well marked.

(*b*) To reconnoiter loading and unloading points and camp sites and in preparing for the arrival of his convoy.

(*c*) Before entering a large town or city. He should reconnoiter the route through the town and obtain information regarding traffic rules, etc., having instructed the officer or truckmaster left in charge where to halt the convoy and await his return.

(*d*) At all other times when the situation demands such action.

It should be remembered that the usual place for a convoy commander is *with his vehicles*, and that it is *his* duty to operate his convoy rather than to turn its operation over to a subordinate while he himself acts as advance agent.

While the convoy commander is in rear the senior officer or truckmaster is the guide of the convoy. If a truckmaster, he always rides on the first truck of the first section, unless otherwise instructed by the convoy commander. If the truckmaster is in charge of the convoy, he will follow the above instructions for a convoy or company commander, and will appoint an assistant truckmaster, usually the section leader of the first section, to act as guide.

It is always advisable for convoy commanders to remain with their convoys and delegate the duties of reconnoitering, routing, purchasing, and other duties in advance of the convoy to a

junior designated as "advance agent of the convoy." This agent, if properly trained and qualified, can do a great deal to assist in the success of the convoy. Examples of his duties are:

(*a*) The posting of markers or dropping of guides at cross-roads.

(*b*) Examination of bridges.

(*c*) Location of detours and of alternate routes.

(*d*) Advance payment of ferry and bridge tolls.

(*e*) Arrangement for city and State police motorcycle escorts.

(*f*) Obtaining suitable camp sites and billets.

(*g*) Procurement of gasoline and oil.

The mess sergeant of the organization may sometimes be dispatched ahead with the advance agent to make purchases, or he may furnish the advance agent with a list of articles desired.

Under certain conditions the mess and gasoline trucks may be sent ahead for refilling purposes, either with the advance agent or with orders to meet him at a specified point.

An officer, preferably the same officer who acts as advance agent, should be appointed as an agent finance officer and provided with sufficient funds under proper allotment numbers to pay in cash for any purchases which may be necessary. Unless this is done, it will frequently be found that it will be difficult to make purchases owing to the fear of merchants that payment may be uncertain or delayed.

For any extended convoy movement funds should be secured covering estimated needs for the following items:

(*a*) Gasoline and oil.

(*b*) Spare parts for vehicles.

(*c*) Camp sites.

(*d*) Telegraph and telephone.

(*e*) Ferry and bridge tolls.

(*f*) Fuel.

390. Starting the convoy.—The start should be made as early in the morning as conditions will permit in order to take advantage of daylight hours for running. Sufficient time should be allowed prior to departure to warm up the trucks and to start any which may be "balky." This is particularly true in cold weather. The leading truck should pull out slowly until the convoy is straightened out on the road, the guide looking back and observing whether or not any of the vehicles have developed trouble in starting, and if they have he should stop or slow down the convoy until all of the vehicles are under way.

In estimating the speed of convoys allowance should be made for a slower rate of speed during the first hour, as it is during this time or late in the afternoon that trouble usually develops.

391. Speeds.—*a.* The main object of a convoy is not to cover a given stretch of road in the shortest possible time but to cover the required distances within a reasonable time and have the motor-transport equipment and men in condition for further operations upon arrival or troops and animals carried fresher and ready for combat. Under certain conditions of extreme urgency it may be possible to operate convoys at higher rates of speed than those regularly prescribed, but when this is done conditions must be such as to justify large wastage of material and with a full realization of the fact that the life of the vehicles in service is being materially shortened thereby.

b. A convoy which includes heavy trucks is making excellent time if it averages 10 miles an hour on open, flat, or rolling country. Due allowance must be made for heavy grades, traffic, weather, and road-surface conditions. It is usually safe, except when any of these conditions are extremely bad, to estimate half speed over the road distance affected by adverse conditions.

392. Formations and distances.—*a.* The prescribed distance between trucks on open roads is 20 yards, or three truck lengths. When a unit is operating independently on a road and can therefore disregard the road space which it occupies, it is wiser to increase the distance to 30 yards, or about four truck lengths. This distance can also be gauged by the distance between telephone poles along the road.

b. The distance between sections is 40 yards and between companies 50 yards.

c. When operating in hilly or mountainous country the distance between trucks may be increased to from 50 to 100 yards, This distance is obtained by increasing the speed of the leading truck on approaching a hill, decreasing the speed after the top of the hill is reached, thus allowing the vehicles to close up.

d. On approaching thickly settled districts the speed of the convoy is decreased and the vehicles closed up. In suburban districts trucks should be operated at a distance of 5 yards, or about a truck length apart, while in passing through the congested sections of large cities the trucks should be closed up to about a yard apart. This will prevent delays and accidents due to attempts by civilian vehicles to cut through the convoy.

In all changes of speed and distances it should not be forgotten that while the speed of the whole convoy is controlled from the rear, distances are taken from the truck immediately in front.

393. Halts.—*a.* Vehicles of a convoy should stop gradually, pulling well to the right-hand side of the road while reducing speed. The assistant drivers pass on the command or signal "*HALT*" to the vehicle behind or the vehicle ahead, as the case may be. Vehicles ordered to halt will immediately close up. Streets, crossroads, or forked roads, however, will not be blocked by halted convoys.

b. When a halt is made the convoy commander will require that each driver and assistant driver does whatever may be necessary to prepare the vehicles for an immediate start. Every halt should be the occasion for a brief but thorough inspection of each vehicle by its driver or assistant driver, or both. Grease cups can then be turned down, loose parts tightened, etc. The responsibility of the convoy commander in this matter passes through subordinate officers, truckmasters, and the assistant truckmaster of each section, who will personally see that each driver and assistant driver gives the vehicle to which he is assigned the attention due it. The men should be notified of the duration of the halt in order that they may answer calls of nature, etc. Guards should be posted at both ends of the convoy to facilitate the safe passage of other vehicles. The men should be kept off the road in order to allow the passage of other vehicles without danger of accident.

c. Halts should be made when possible on straight stretches of roads and on the level or on down grades. When halting on grades the rear wheels of vehicles should be scotched.

d. Halts should also be made when possible where water for the trucks is available and away from towns or built-up sections.

394. Road difficulties.—Road difficulties, which may be expected, consist of sand, mud, etc., resulting from bad road conditions, accidents and ditched vehicles, and mechanical breakdowns. Observation of the following simple rules will assist in meeting road difficulties:

a. When passing through sand or mud the essential thing is to keep the vehicles moving to prevent their settling down in the soft going. The trucks may be chained together so that those on hard surfaces can pull out those which can not get

traction. Chains on the wheels should be used in soft going and removed promptly as soon as the trucks get back onto hard-surfaced roads.

b. Accidents will seldom occur in a properly operated and controlled convoy. If, however, they take place an accident report should be made out at once.

c. A block and tackle should always be carried in the mechanic's truck, and with the aid of this and the other vehicles of the convoy there are few cases where a ditched truck can not be pulled out.

395. Road repairs.—The mechanic's truck should be the last truck of the convoy. Unless the mission of the convoy will not permit delay, vehicles should not be left behind for repairs. A great many repairs can be made while a damaged vehicle is proceeding in tow with the convoy, while halts are being made, or upon arrival in camp. Tools and spare parts to be carried with the convoy depend upon the types of vehicles accompanying the convoy. No attempt can be made to carry a complete supply of parts, but simple items, such as spare tires, tubes, patching equipment, vehicle tool kits, spark plugs, etc., and parts which experience shows are particularly subject to breakage should be carried.

396. Camps and billets.—*a.* Selection of camps and billets is the duty of the advance agent preceding the convoy. The principal considerations in the selection of a camp site are—

(1) A hard-surfaced parking place for the vehicles.

(2) A good and plentiful water supply.

(3) Fuel.

(4) Latrines or space for the erection of same.

(5) Other considerations are bathing facilities for the men, working space for the mechanics, space for the mess, etc.

b. When leaving billets or camp sites care should be taken to police the camp site or building thoroughly and, when possible, a certificate from the proper authorities secured as to the condition in which the area has been left.

397. Troop movements by motor transport.—(For troop movements by motor transport see C. S. and L., Ch. VI, as published by the General Service Schools, and pars. 330 to 341, inclusive, Field Service Regulations, 1923.)

398. Loading cargo.—The loading of cargo presents few difficulties which can not be solved by the exercise of ordinary common sense. The problem is merely one of loading so as to

move loads safely and without shifting from one place to another—

(1) Without damage to the vehicle or load.

(2) Without undue expenditure of money, as represented by labor, gasoline, or material.

399. General operating rules.—The number of vehicles and amount of motor-transport personnel assigned to a movement depends entirely upon the volume of freight and number of passengers to be handled, the availability and capacity of vehicles and drivers, distances and time elements involved, and the conditions under which the pool is to operate.

a. Operating rules.—The number of vehicles or amount of motor transport assigned or dispatched for any movement depends upon volume of freight in tons or cubic contents, the number of passengers, the availability and capacity of vehicles and drivers, and distances and time elements involved.

b. In dispatching cargo-carrying vehicles endeavor to operate with the least empty mileage; have the operators instructed to call up the dispatcher's office for instructions in case they encounter an empty haul. Arrange ahead for return loads. Delay movements, if possible, and with proper authority until return loads can be arranged for.

c. Passenger vehicles and motor cycles can be worked in the same manner, especially on long-distance service. On local service they operate as a taxicab or local delivery business would operate—the vehicles are dispatched, perform their work, and return to their station as soon as the authorized movement is completed. Necessary dispatcher's records must be kept to insure proper use and operation of the vehicle.

d. When cargo vehicles are ordered find out the tonnage to be moved and the exact number of vehicles that can work at a given time; do not send 10 vehicles to move a great amount of tonnage if only 2 vehicles can be worked at one time.

e. Instruct all personnel to be courteous, prompt, and at all times alert.

400. It is the duty of an officer charged with the operation of a group of vehicles in a pool or other source of transportation to know the transportation needs of the troops in his area, to estimate in advance what their needs will be, when they will occur, and how they are to be met. He may often, by offering transportation to organization supply officers at slack times,

avoid peak loads and demands which he is unable to fill if they come all at once.

Orders should never be taken for transportation without learning the weight of the load which it is desired to transport, the points between which it is to be transported, and the nature of the loads in order that suitable vehicles may be furnished for the work.

A pool or convoy commander should be familiar with routes and terminal facilities in the area in which he is to operate. He should investigate conditions at loading and unloading points, either through personal reconnaissance or from reports of subordinates competent to judge the existing conditions, and to render accurate reports thereon.

Loading and unloading in the field will often require work at inconvenient localities. Whatever the conditions, the duty of the convoy commander is to deliver the freight in the best possible condition, in the quickest possible time, with due regard to the condition of his own command, and, when possible, to park the trucks for loading and unloading so as to minimize the work of handling the cargoes by the stevedores.

The loading and unloading of trucks at parks or dumps of any description involves, first of all, systematic methods in sending the trucks to and from unloading points rapidly and without interference of one truck with another. It is frequently advisable to place a noncommissioned officer on duty at a loading or unloading point, designated as "spotter," to direct the movements of the trucks in order to avoid confusion or delay.

There are as many varied methods of distribution of supplies as there are organizations. No two localities will have the same local conditions. The motor-transport officer must be sufficiently resourceful to adapt his truck operation to local conditions. Not many definite rules can be laid down for the handling of the infinitely wide range of possibilities. However, to load a vehicle inefficiently not only reduces its carrying capacity but endangers the safety of the entire cargo, should the truck be subject to rough travel. A poorly loaded truck with a swaying cargo is always in danger of overturning. One loose box or crate can release an entire load. A correctly loaded truck has greater carrying capacity. Its chances to reach its destination safely are far greater than those of the poorly loaded vehicle. Overloading or underloading are equally undesirable and are to

be guarded against. The following rules for loading will be found helpful:

a. Heavy goods should be placed at the bottom and near the back of trucks and as close as possible to the rear axle in order to give added traction. In building up a load goods should be equally distributed on both sides, as unbalanced loads will result in swaying and, on rough roads, in broken springs.

b. Every load should be securely lashed, and if the truck is not covered a tarpaulin should be placed over the load as a protection against the sun, dust, or rain. The equipment of every truck on active service should include two 60-foot lash lines, which should be sufficient to lash an ordinary cargo.

c. A top-heavy load is always dangerous, but in ruts or on rough roads it is a menace. An overturned truck may block an entire convoy. A truck with a load wider than the prescribed limit may be too wide to pass large vehicles on narrow roads. Whenever possible, information regarding the road to be traveled should be gathered and extra precautions taken in loading, lashing, and operation, if information received so indicates. In any case extra lash lines should be carried.

d. Lumber should be loaded with heavy pieces at the bottom, working up with higher material to about twice the depth of the bed. The method usually followed is to place stakes of flat material such as 2 by 4's (cut to the desired loading height) around the bed, every 3 feet from front to back. These supports will stay the load. They are placed inside and against the side of the bed and are held in place by the loaded lumber. Stakes must never be nailed, but should be securely lashed.

e. Boxed goods will be found in cases of various sizes and shapes. Large and heavy boxes should be placed at the bottom and to the rear. The load or capacity weight should not be exceeded.

f. Baled goods, consisting of hay, straw, blankets, canvas, and occasionally clothing, will come in various sizes and weights. Loads must conform to the dimensions of trucks and never extend over the sides. When the end gate is chained flush to the floor the load may extend to the rear beyond the bed length. The larger bales are loaded first, and when rising above the side of the bed they should be pyramided with bales piled as close together as possible.

g. Sacked goods are principally forage and food supplies. Extreme care should be employed in loading, handling, and

transporting such material to prevent shifting on rough roads. When the bed has been filled the sacks should be pyramided until there is but a single row on the top, parallel to the bed length. Such a load should be lashed and covered with special care. If sacks shift back and forth the friction will wear them and loss of contents will occur. Hooks produce the same result and therefore should never be used on sacks.

h. Barreled goods are difficult to load, especially when there is no specially constructed bed. If headed, barrels should be placed on their sides, parallel to the bed, layer on layer, or barrel on barrel, until the top of the sides is reached. They should then be pyramided. Unheaded barrels, or barrels covered only with burlap, should stand on end and be carefully lashed. A load of unheaded barrels is, of course, materially smaller than one of headed barrels.

i. Bundles will be found to consist principally of canvas. The loading of this material is comparatively simple. Load large bundles first and pyramid; after the top of the sides is reached such a load will ride well.

j. Crated goods consist usually of furniture, hardware, food supplies, and miscellaneous articles. Crates must be loaded with heavy crates at the bottom and to the rear of the truck, with light, fragile crates on top.

k. Loose material presents the greatest loading problem. Such material is usually heavy hardware, heavy implements, and such items as cans, wheelbarrows, rolls of barbed wire, coils of spring wire, and corrugated iron. Barbed-wire entanglements are difficult to load because of their character. Mixed loads prevail in handling loose material and must be made up according to the nature of the material to be shipped. The use of much common sense is the only rule that can be laid down. Every bit of available space should be utilized without overloading.

l. Lashing and covering loads.—(1) Equipment for lashing loads on trucks consists of the two 60-foot lengths of rope provided as part of the equipment of each vehicle and the lash hooks or rings through which to pass the lines. After the first tie at the front side has been made a rope is passed over the top of the load (adjusted to pass over some article which binds goods beneath it) and brought down on the opposite side. It is not brought through the hook or ring directly opposite the other side but the one just in rear of it. This process is re-

peated until the rear of the truck has been reached. It should be borne in mind that only every other hook or ring on a side is used in attaching.

(2) When this process is completed the extra rope is used, starting at the opposite side, and criss-crossed to the rear of the wagon to effect the same operation as with the first rope. This rope also is attached to every other hook or ring of those omitted in the first lashing. The load will so bind that nothing less than a complete turnover will spill it, provided, of course, that it is correctly stacked.

(3) An uncovered truck is supplied, in addition to lash lines, with a tarpaulin which can be tied snugly on or fitted over the tops.

m. In estimating loads it will usually be found that the size of the load is limited by bulk rather than weight. Ammunition is an exception. A capacity load of ammunition will usually only partially fill a truck, and care must be exercised to see that weight limits are not exceeded.

n. It would seem unnecessary to issue warning against loading kerosene and foodstuffs together or against hauling clean laundry in a truck which has just been used for hauling coal, or using a 3-ton truck to carry a trunk locker, but these are typical occurrences in poorly organized and operated motor transport where common sense is not used and intelligent supervision is not exercised in making up loads.

Following are tables showing loads which can be carried by various classes of Army vehicles:

Quartermaster stores

Articles	Unit			1½-ton truck, 10 by 5′ 1″ by 2′				3-ton truck, 12 by 6′ 6″ by 2′				5-ton truck, 12 by 6′ 6″ by 2′			
				Not lashed		Lashed		Not lashed		Lashed		Not lashed		Lashed	
	Package	Weight	Cubic feet	Number units	Weight	Number units	Weight	Number units	Weight	Number units	Weight	Number units	Weight	Number units	Weight
		Lbs.			*Tons*		*Tons*		*Tons*		*Tons*		*Tons*		*Tons*
Rations	Box	72	2.67	46	1½	40	1½	72	2½	83	3	72	2½	136	5
Beans															
Flour															
Potatoes	Bag	100	3.75	30	1½	30	1½	60	3	60	3	100	5	100	5
Rice															
Sugar															
Coffee	Box	88						68	3						
Corn meal	Bag	90	3.40	33	1½	33	1½	66	3	66	3	110	5	110	5
Vinegar	Case	156	5.23	12	1	18	1½	18	1⅜	38	3	10	1⅜	3	2¾
Hay	Bale	100		26	1¼	26	1¼	60	3	60	3	60	3	60	3
Oats	Bag	100		26	1¼	26	1¼	50	2½	50	2½	20	2½	50	2½
Blankets	Box	47	5.00	22	½	36	⅞	36	⅞	60	1½	36	⅞	60	1½
Clothing	do	64	5.00	22	⅝	36	1⅛	36	1⅛	60	2	36	1⅛	60	2
Cots	Bundles	106	4.72	22	1½	28	1½	33	1¾	56	2	33	1¾	84	3
Axes	Crate	50	6.00	60	1½	60	1½	120	3	120	3	200	5	200	5
Helves:															
Ax	do	100	4.72	24	1¼	30	1½	31	1½	60	3	31	1½	75	3¾
Pickax	do	67	3.07	35	1⅛	45	1½	47	1½	90	3	47	1½	100	3⅜
Pickaxes	do	146	2.47	20	1½	20	1½	40	3	40	3	60	4½	69	5
Shovels	Btrs	35	1.05	86	1½	86	1½	140	2⅜	178	3	140	2⅜	200	3½
Tents (pyramidal)	Bale	115	6.50	16	⅞	26	1½	24	1⅜	52	3	24	1⅜	52	3
Coal	Ton		9.00	1½				3				5			
Hard bread	Case									60	4⅛				
Bacon	do	100	2.20	30	1½					54	3				
Firewood (green)	Cord		128.00					1½		1½				2¼	

Size	Article	Maximum load for 1 truck			Remarks
		1½-ton, 10′ by 5′ 1″ by 2′	3-ton, 12′ by 6′ 6″ by 2′	5-ton, 12′ by 6′ 6″ by 2′	
37 m/m	Complete cartridge	1,800–30 cases	4,020–67 cases	5,760–90 cases	Cases on bottom.
	Fuze, H. E	1,846–56 cases	297–33 cases		
75 m/m	Complete cartridge	135–15 cases	270–30 cases	495–51 cases	13 trucks for 1 lot.
	Fuze			22 cases	1 truck for fuzes.
4.7 gun	Complete cartridge fuze.	50–25 cases	102–25 cases	170–85 cases	Cases on bottom.
5″ S. C. gun	Shell	52 loose, or 12 cases	104 loose, or 24 cases	172 loose, or 40 cases	Shell on end, case flat.
	Fuze charge, primer	166 (weight full)	330 (weight full)	440 (space full)	Cartridge on end.
155 m/m	Shell	32 loose, or 13 cases	62 loose, or 27 cases	112 loose, or 45 cases	Shell on end, 3 tons, 35. Cases flat. Shells and powder 9.5.-ton trucks for 1 lot and 2 trucks for charges.
	Fuze charge, primer	150 cases (weight full)	250 cases	250 cases (space full)	Cartridge on end.
6″ S. C. gun	Shell	33 loose, or 11 cases	66 loose, or 22 cases	110 loose, or 37 cases	Shell on end, cases flat.
	Fuze charge, primer	75 cases (weight full)	150 cases (weight full)	187 cases (space full)	Cases on end.
8″ S. C. gun	Shell	15 loose, or 13 cases	30 loose, or 27 cases	50 loose, or 44 cases	Shell on end, cases flat.
	Fuze charge, primer	26 cases (weight)	48 cases (weight)	54 cases (space)	Containers on end.
8″ How	Shell	15 loose, or 13 cases	30 loose, or 27 cases	50 loose, or 44 cases	Shell on end, cases flat.
	Fuze charge	26 cases (weight)	48 cases (weight)	54 cases (space)	Containers on end.
	Primer shell	10 loose	20 loose	34 loose	Shell on end.
9.2″ How	Charge	132 loose, or 66 cases	182 loose, or 91 cases	182 loose, or 91 cases	Containers on end.
	Fuze primer shell		12	19	Shell laid down.
10″ S. C. gun	Fuze charge, primer	13 cases (weight)	26 cases (weight)	35 cases (space)	Cases on end.
12″ S. C. gun	Shell fuze	4		14	Shell laid down.

Ordnance material

	1½-ton cases	3-ton cases	5-ton cases
6" Newton TMB (complete) (Ird. complete per case)	70	140	233
3" Stokes TMB (complete) (3 rounds per case)	70	140	233
Cal. .45 pistol ball (2,000 rounds per case)	25	50	83
Cal. .30, model 1916 (1,200 rounds per case)	30	60	100
Front-sight covers (1,000 per case)	24	48	80
Rifles (model 1903) (10 per case)	18	35	58
Helmets, steel (25 per case)	20	40	67
Bayonets, rifle (model 1903) (100 per case)	22	44	73
Bayonet scabbards (250 per case)	18	35	58
Pistols (1911) (50 per case extra magazines)	20	40	67

Signal Corps material

	1½-ton	3-ton	5-ton
Wire, twisted, pair, field (1-mile reels) miles	10	19	25
Wire, twisted, pair, No. 17, O. D., in coils 600 to 1,000 feet feet	75,000	150,000	200,000
Wire, field, single on ½-mile spools, wooden miles	20	40	60
Wire, field on ¼-mile metal spools do	10	19	25
Wire, outpost, twist plait, on ¼-mile metal spools do	30	60	80
Wire, G. I., No. 14, ½-mile coils do	30	60	80
Cable, 10 pr. on 2,500-foot reel feet	2,500	5,000	7,500
Cross arms, light 2-pin	1,000	2,000	2,700
Cross arms, light 8-pin	400	750	950
Cross arms, heavy 6-pin	250	400	600
Lance poles	350	700	850
Switchboards, 40-line camp	10	18	24
Switchboards, 12-line monotype	80	175	270
Switchboards, 4-line monotype	150	300	450
Telephones, camp	140	275	400

Engineer material

	1½-ton truck	3-ton truck	5-ton truck
Bricks	750	1,000	1,700
Camouflage, finished rolls of 20 square yards	80	100	100
Cracked stone, cubic yards	1½	3	5
Cement, barrels, (4 100-pound bags)	8	15	25
Corrugated, iron sheets, square feet	1, 200	3, 000	3, 000
Duck-boards (6′ 6″ by 1′ 6″)	100	150	150
Expanded metal, large mesh, square feet	1, 600	2, 500	2, 500
I beams, 4″, 12′ long, pieces	40	80	150
I beams, 6″, 15′, long, pieces	20	40	65
Lumber, feet b. m., 13′ long, 5′ high	800	1, 600	2, 600
Nails, all sizes, 100-pound kegs	30	60	80
Paint, 50-gallon, barrels	4	8	14
Pickets, wood, 50 per cent long, 50 per cent short	350	500	450
Posts, angle iron, 50 per cent 5′ 10″ long, 50 per cent 3′ 6″ long	500	1, 000	1, 700
Posts, screw, 50 per cent long and 50 per cent short	700	1, 000	1, 200
Rails, 10′ long, 25-pound, per yard	40	80	110
Rails, 15′ long, 35-pound, per yard	20	40	70
Riveting, fascines, 10″ by 9′	30	35	35
Riveting, gabions, 2′ by 3′ 2″	25	32	32
Riveting, hurdles, 7′ 3″ by 3′ 2″	50	75	75
Road planks, 5″ by 9′	42	70	70
Roofing, felt (216 square feet, rolls)	80	130	130
Sand bags, number	10, 000	15, 000	15, 000
Round posts, 6″ rough, lineal feet	650	1, 000	1, 000
Tar, waterproofing, 50-gallon barrels	10	20	24
Ties, for narrow gauge, 4′ 6″ by 6′ 6″	46	92	152
Telegraph conduit cable spools	1	2	3
Wire, barbed, 50-pound rolls	40	50	50
Wire, barbed, folding frame, large	-------	-------	50
Wire, barbed, folding frame, small	-------	-------	300
Wire, woven reinforced rolls	-------	-------	30
Wire, plain	-------	-------	80
Sheet iron, heavy	-------	-------	50
Sheet iron, medium	-------	-------	110

Miscellaneous quantities which can be loaded into motor trucks

Articles	How packed	Loaded and lashed		
		1½-ton	3-ton	5-ton
Gas tanks	50 gallons, full	8	16	25
	350 pounds	[1] 400	[1] 700	[1] 1, 250
	50 gallons, empty	16	30	30
	13 gallons, full	[1] 390	700	1, 300
		30	60	100
	13 gallons, empty	80	125	125
Tires, pneumatic	Assorted sizes	100	200	150
Mail bags	-------	60	125	150
Tarpaulins	-------	25	50	70
Barrack bags [2]	-------	55	110	180
Trunks, Army	-------	30	60	60

[1] Gallons.
[2] Weight, 42 pounds.

401. Shipment of motor vehicles may be made overland under their own power. Long-distance shipments are usually made by means of other transportation agencies, such as rail and water transport. Considerable saving in space can be made in the latter case by the shipment of vehicles knocked down or crated, but this has the disadvantage of necessitating considerable work at the delivery point before the vehicles are ready for service. When vehicles are shipped ready for service, either by rail or water, great care should be taken in blocking and otherwise securing the vehicle in place for transit in order to prevent damage to the vehicle and the conveying agency as the result of movement caused by swaying and jolting trains or rolling vessels. When vehicles are shipped by boat precaution should be taken to prevent damage to the metal work of the vehicles by salt water. In shipping vehicles either by rail or water all gasoline and water should be drained and the batteries removed and properly prepared for shipment in separate containers.

Road rules and traffic regulations are laid down in AR 30-1075.

SECTION IV

MAINTENANCE

402. The maintenance of motor transport embraces the following:

a. Care, cleaning, lubrication, tightening, constant adjustment and emergency repairs of motor vehicles on the road and in the garage. These functions overlap operation functions and are performed normally by operating personnel under the supervision of maintenance personnel.

b. Organization and operation of service repair shops by organized motor-repair sections made up of skilled motor mechanics. These provide for light repairs, removal and replacement of mechanical unit assemblies and subassemblies in repair. By the periodical inspection exercised by skilled motor mechanics deterioration of vehicles and the need of repairs to motor vehicles is prevented.

c. Organization and operation of overhaul and reconstruction shops by organized motor-repair companies and motor-repair battalions, made up of skilled motor mechanics, to provide for the periodical overhaul of motor vehicles and unit assemblies in

groups to effect "quantity production" results. Overhaul and reconstruction parks make major repairs to motor vehicles and unit assemblies and the latter parks reconstruct parts, unit assemblies, and vehicles as may be required in the motor-transport service. The maintenance functions of motor-transport service, Quartermaster Corps, include the maintenance of all motor-vehicle equipment of all organizations and mechanized forces, except special vehicles charged to the Ordnance Department for maintenance.

d. Maintenance includes organization and operation of motor supply, in accordance with the unit repair and unit replacement system and in accordance with the five echelons of motor repair, namely:

(1) Emergency road repair supplies (supplies carried on the vehicle).

(2) Emergency garage repair supplies (supplies carried on the repair truck of a motor-transport company or in established garages).

(3) Service repair-shop supplies, including reserve stocks of unit assemblies, subassemblies, and spare parts required by such shops and the operating organizations served by these shops.

(4) Overhaul-shop supplies, including all stocks of spare units and spare parts required in the operation of the overhaul shop and in addition reserve stocks of spare units and spare parts required to maintain and supply-service repair shops that are based for operation on these overhaul shops.

(5) General motor-transport supplies required by reconstruction shops, by the overhaul shops, service repair shops, and the general field of motor-transport operations that may be based thereon. These are known as motor supply depots.

Maintenance is effected therefore in five echelons, which include motor repairs, motor supply, and motor salvage:

a. On the road.

b. In garages and parks.

c. In service stations located at designated motor-transport service centers.

d. In overhaul parks.

e. In reconstruction parks.

The evacuation of vehicles, unit assemblies, and spare parts which require repair by a higher echelon or which constitute reclaimed motor supplies recovered in salvage is through these

echelons of maintenance as well as through the echelon of military supply and command.

SECTION V

ORGANIZATION FOR ADMINISTRATION

403. A proper conception and organization of motor transport is all important.

Conceived as so many vehicles, motor driven, used to replace as many vehicles, animal drawn, because of greater speed, carrying capacity, and operating radius, the motor vehicle has represented a decided improvement in field transportation. Procured and assigned to divisions and smaller units in great numbers, motor vehicles have in the past given trouble and have been disappointing for the following reasons: Without specially trained personnel, without definite organization relative to effective and economic operation and maintenance, without definite organization relative to purposes, missions, terrain, and road nets, troops and supplies to be moved and to other systems of transportation, motor transport has been found to be extravagant, to lose its mobility and its capacity to transport. It has frequently constituted a serious encumbrance to military operations, blocking roads in combat areas and repair shops in the service of supply. In short, poorly conceived and organized in the beginning, it has presented many troublesome and unsatisfactory conditions in all armies where it has been extensively used.

404. Conceived as a transportation service, the equal in power of railway and waterway services, motor transport holds, still undeveloped, great powers of mobility. As in rail and waterway transport, in which a comparatively short time was required to realize the vastly increased capacity and power of organized, mechanically driven vehicles over the older animal-drawn and wind-driven vehicles, motor transport requires special organization to develop its full power and to realize its economies.

405. Rail, water, and air transport are confined to their own ways. They are peculiarly fitted for very heavy and very rapid movements, but in every case they require terminals and terminal organization and operation. Motor transport, on the other hand, is peculiarly fitted to operate within these terminals to reach every point of them and to connect them with each other and with outside points and with every activity and individual in any way connected with transportation. As a col-

lecting and distributing service, in which its vehicles may be quickly gathered and rapidly operated in short-haul transport, motor transport has no equal. In the most modern conception of transportation, known as "coordinated transport," motor transport is the coordinating factor. It is of great value inside and outside of terminal operations in general transportation.

406. In peace and war, in carrying out commercial and military missions, the principles upon which successful transportation is based remain unchanged. The character of all transport changes, as it is viewed from rear to front in any theater of war, only in a superficial way. The personnel changes from civilians to soldiers. The nomenclature of organizations changes. Commercial terms, such as supply centers, production and consumption centers, and terminals, become regulating stations, depots, railheads, and distributing points, the majority of passengers become troops, and supplies are variously classified according to military use, but there is no change in principles of transportation, and military expediency is often lost by failure to reorganize, to coordinate, and combine military and transportation principles and requirements.

407. A convenient way to visualize and organize motor transport so as to preserve its principles and unity and apply it to all organizations of the military service is to consider it in every command and in every situation as a service, organized similarly throughout, and in keeping with the motor-transport service of every higher and lower echelon of military organization. The operations of any one motor-transport service may then fit in with the operations of another, all may be administered equally well, and all may be effectively and economically operated and maintained under one school of motor transport and by one repair and supply system.

408. In the office of the Quartermaster General motor-transport functions are diagrammatically charted on the vertices of a triangle. Each vertex represents one of the principal branches or functions of motor transport. The two field functions—"operations" and "maintenance"—form the base vertices of the triangle. The office function of "administration" forms the apex. At the top of the large triangle thus formed the motor-transport officer functions at the apex. A short way down on either side is marked a point and the two points are connected by a horizontal line parallel to the base. These two points form the operation and maintenance vertices of a small

triangle similar to the large one which represents the entire motor-transport service. At each of these two base vertices in the small triangle function the office assistants of the motor-transport officer who have charge of "operations" and "maintenance."

409. The base vertex of the large triangle marked "Operations" is conceived as resting upon every organization of the Army below the War Department, wherein the character of motor transport is principally an operating service. Inasmuch as each local operating service must have some maintenance functions and its operations and maintenance must be administered and coordinated, a small triangle is formed to represent the local or subordinate service by setting off a point on the base of the triangle to represent maintenance and another on the side of the triangle to represent administration. The correct organization of the motor-transport functions of the local motor-transport office would be indicated by forming a smaller triangle at its top, as in the organization of the motor-transport office in the office of the Quartermaster General, to represent the office functions and assistants pertaining to local operations and maintenance.

410. The base vertex of the large triangle, representing maintenance, is similarly conceived as resting upon every organization of the Army below the War Department, wherein the character of motor transport is principally a maintenance service. Such organizations are reconstruction and overhaul parks and motor-supply depots and service parks operating independently as such, and not a part of some large operating service, as the motor-transport service of a division or a large post or camp. In every such maintenance organization there is necessarily some local operation of motor transport, so the functions of local operation and local administration are represented and the local motor-transport office organized on a small similar triangle formed at the maintenance vertex of the large triangle.

411. The diagrammatic picture of motor transport, or geometrical, functional chart, appears now as a large triangle, with small similar triangles at each main vertex, which are in turn subdivided into smaller similar triangles, each subdivision representing a lower echelon of motor transport corresponding to a lower echelon of military command. In every triangle of the motor-transport service of a command the motor-transport

officer functions at the administrative apex. He is considered the technical and military head of a definitely organized and charted military service, over which he is given full technical and military authority. He is held technically responsible by the Quartermaster General that the triangular service of the motor-transport administration, operation, and maintenance is internally held together, organized, and operated as indicated by its triangle chart, and that as a *service* it is applied to every purpose and mission of the command as the commander required of his motor-transport officer. He is held responsible by his commanding officer that his functions are technically correct and that his military responsibilities are fully met.

412. In these triangles all diagonal lines represent technical motor-transport control. All horizontal lines represent technical motor-transport cooperation. A vertical line drawn from each apex through chief of transportation and quartermaster to the commanding officer represents military control over the organized service of motor transport. The conception is not lost nor the military and technical controls weakened by conceiving the triangle suspended by vertical lines from commanding officers through the quartermasters and transportation officers. In fact, funds, application to movements of utilities, troops and supplies, and coordination with railway and waterway transport movements are effected through these vertical lines.

The triangular chart of motor transport is shown on page 283.

413. **Motor-transport pool.**—A policy of pooling motor vehicles within any one command is necessary to economy and to the successful and efficient use of motor transport. The vehicles and personnel of the organized motor-transport service, Quartermaster Corps, naturally form the nucleus of a motor pool, because motor-transport experience and training, the knowledge of transportation principles and policies, and of operation, maintenance, and administrative organization and operation are usually found to the greatest degree among qualified officers and men of the motor-transport service, Quartermaster Corps. Such personnel is especially selected and trained in quartermaster schools, and the funds and office set up for the operation and maintenance of motor transport are supplied only by the Quartermaster Corps through its transportation service to the quartermaster of the command concerned.

414. Motor vehicles and personnel of organizations, other than the motor transport, belonging to any one command, should be pooled with the organized motor-transport service of that command for operation in the general passenger and supply movements of the command whenever the tactical use of such vehicles and personnel is not required. For maintenance and upkeep, including mechanical inspection, service, overhaul, and repair, all such organic motor transport should be pooled with the organized motor transport. Pools are actual and physical whenever practicable, so as to reduce overhead and centralize operation and care under the direct observation of the senior and responsible motor-transport officer of the command. This officer operates best under the quartermaster who controls all forms of transportation, rail, water, motor, and animal, who moves most of the supplies, operates most of the utilities, and receives and expends most of the funds of the command. The quartermaster and his motor-transport officer are obviously in closest touch with the commander's problems, which require economical and effective motor transport. They can be made to serve in connection with problems that do not come directly under their authority and responsibility, especially motor-transport service required by other staff corps and by combat troops, through the coordinating activities of the commander's administrative staff

415. Where the area covered by the command is too large, distances separating the activities of the command too great, or the need of holding organic transport with its tactical organization appears to outweigh economic reasons presented from a purely transportation point of view, the principle of massing forces and the motor-transport policy of pooling which recognizes this principle may be adhered to by establishing subpools which operate locally and under the general supervision of the main pool administrative organization where the central dispatcher is located.

416. Motor-transport center.—The principles and policies which apply to motor-transport pools also apply to motor-transport centers. Pools and subpools are established for posts, camps, and stations, and for tactical divisions and smaller units.

417. Motor-transport centers and subcenters are established by corps and armies and for the larger territorial organizations. Corps and army areas and the various zones of the theater of war are subdivided into motor-transport areas, the boundaries

of which are determined arbitrarily by the commanders of areas to be thus subdivided, the determining factors being the extent of his jurisdiction, the location of railway and waterway terminals, supply and transportation centers, and the economical limits of motor-transport operations which are normally around 50 to 75 miles for controlled daily operations.

418. Subcenters are naturally located at the principal supply and transportation centers. The radius of motor-transport control exercised from such subcenters is normally 50 to 75 miles. The area thus indicated is actually outlined by natural boundary lines such as State, county, and zone boundaries, rivers, and mountain chains. The road net within the area controlled by the subcenter is then organized and coordinated with other considerations and with contiguous motor-transport areas and the whole system connected to the center by an effective communication net. Control points within such an area are naturally pools and subpools, railway and waterway freight, and passenger stations, military loading and unloading points, administrative offices of the commander and his subordinate commanders, and similar nerve centers of an organized transportation system, complete and effective control by commanders and immediate technical and operating control by motor-transport officers operating under their commanders is the object sought.

419. Within territorial jurisdiction of higher commanders, to effect further centralization of control and economy in administrative overhead, a number of submotor-transport areas, each controlled by its subcenter, are grouped about a single motor-transport center. Here are centered general administration over motor-transport operations, involving the commanders' policies and transportation policies, the relation of motor transport to rail and water and air systems, centralization of financial aspects, major motor repair and motor supply functions and major movements of troops and supplies. Considering the United States Army's military activities as covering the entire United States and the motor transport as national in scope, administration, operation, and maintenance are organized as follows:

420. Administration is parallel to military administration and part of the transportation in the Quartermaster Corps. Its object is to control technically motor-transport operations and maintenance, coordinate them, wield them into a balanced

service to carry out the military commander's orders and give him full and immediate control over an organized and well operated and maintained service instead of the worry and uncertainty of trying to get reliable mobility out of a lot of individually operated and indifferently maintained vehicles.

421. Operations are organized to *decentralize* military control to commanders responsible for movements by assignment of companies and detachments to meet routine and organic movements, by temporary detail of companies and detachments to meet unusual movements. It is organized to centralize technical control under authorized and qualified motor-transport officers on the staffs of such commanders. Reliable and continued mobility, effective and economical operation, and the avoidance of the need for repairs are the objects sought.

422. Maintenance is organized to centralize military and technical control under higher commanders and as much as possible under G. H. Q., to be performed as much as possible in the service of supply. In no other way can motor transport in military operations be kept mobie and motor repair and motor repair and motor supply economically and effectively performed.

423. Motor supply is a party of maintenance. It is organized on parallel lines to motor repair and in keeping with the five echelons of repair. Both are organized under the unit repair and unit replacement system.

Fiscal, automotive engineering, personnel, and other functions pertaining to motor transport, not strictly operations or maintenance, and in addition to similar functions performed in the office of the quartermaster for all divisions of his corps are organized as part of administration.

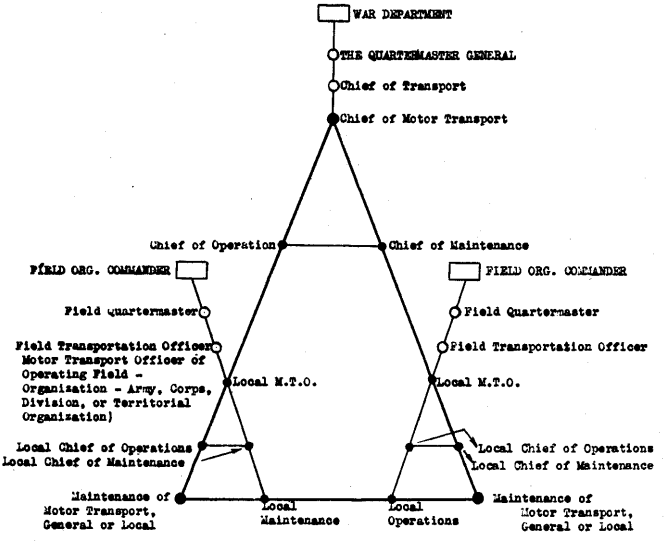
424. The motor-truck company is an administrative unit organized for the control and care of operating personnel and equipment. In common with other motor-transport units, it is extremely flexible and may be operated as a unit, subdivided into sections, or operate individual vehicles in a pool. The equipment of the company varies with conditions and may include passenger cars, trucks, or tractors. (See T. of O., 95 P. and W.)

425. The motor-cycle company corresponds in general to the motor-truck company in organization, but operates motor cycles and in some cases passenger cars. (See T. of O., 97 P, and W.)

426. The repair section operates a service park and is made up of mechanics qualified to perform field repairs. Its equipment consists of a machine-shop truck and a number of auxiliary vehicles. (See T. of O., 96 P. and W.)

427. The motor-repair battalion is an organization of four companies of mechanics and is used to man overhaul and reconstruction parks. Each company is so organized and equipped as to be capable of operating alone and is in turn capable of fur-

DIAGRAMMATIC FUNCTIONAL CHART
OF THE
MOTOR TRANSPORT SERVICE
IN THE
QUARTERMASTER CORPS



ther subdivision into platoons, each having specialized mechanics in all necessary branches of automotive work. (See T. of O., 294 P. and W.)

428. The motor command is a small organization designed to serve as a headquarters when a number of operating or maintenance units are grouped together. (See T. of O., 194 P. and W.)

CHAPTER 7

USE AND CARE OF TRACTOR TRANSPORT

		Paragraphs
SECTION I.	General description of standard vehicles	429–431
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SECTION I

GENERAL DESCRIPTION OF STANDARD VEHICLES

429. Tractor, Ordnance caterpillar 20, M–2 (light).—*a.* Standard commercial tractor manufactured by the Caterpillar Tractor Co. and modified for military use by the addition of pintles, radiator guard, muffler, electric head and tail lights, and odometer. It supersedes the caterpillar 2-ton tractor.

b. Distinguishing features.—Hood over engine; side opening louvered hood plates; starting crank is foremost part of vehicle; two steering-control levers installed vertically; clutch and brake pedals; gasoline tank forms cowl and suspends instruments; radiator sides labeled "Twenty."

c. Specifications.—Engine: Bore, 4 inches; stroke, 5½ inches; revolutions per minute, 1,100; drawbar horsepower, 20; gasoline tank, 22 gallons; engine-oil sump, 3 gallons; miles per hour, governed speed, first 1.79, second 3.07, third 4.67, reverse 2.26; length of ground contact 57 inches, overall 115.5 inches; width

of track shoe 11 inches, between tracks 31 inches, tread 42 inches, overall 61 inches; height without cab 60½ inches, at pintle 29 inches; ground clearance, 12 inches; weight, 7,500 pounds.

430. Tractor, Ordnance caterpillar 30, M–1 (medium).—*a.* Adopted standard commercial tractor manufactured by the Caterpillar Tractor Co. and modified for military use by the addition of pintles, radiator guard, electric head and tail lights, odometer, and muffler. Replaces the substitute standard 5-ton Artillery tractor, M1917.

b. Distinguishing features.—Gasoline tank on left fender; no hood over engine; steering lever control; starting crank is foremost part of vehicle; radiator sides labeled "Thirty."

c. Specifications.—Engine: Bore, 4¾ inches; stroke, 6½ inches; revolutions per minute, 850; drawbar horsepower, 30; gasoline tank, 40 gallons; engine-oil sump, 5 gallons; miles per hour, governed speed, first 1.75, second 2.62, third 3.62, reverse 2.00; length of ground contact 68 inches; overall 129.1 inches; width of track shoe 13 inches, between tracks 30.6 inches, tread 43¾ inches; overall 59.3 inches; height without top 78 inches, at pintle 29 inches; ground clearance, 11½ inches; weight, 10,000 pounds fully equipped.

431. Tractor, Ordnance caterpillar 60, M–1 (heavy).—*a.* Adopted standard commercial tractor manufactured by the Caterpillar Tractor Co. and modified for military use by the addition of pintles, bumper, radiator guard, muffler, electric head and tail lights, and odometer. Replaces substitute standard 10-ton Artillery tractor M1917.

b. Distinguishing features.—Gasoline tank on right fender; no hood over engine; solid-front bumper; steering-bar control; no starting crank; radiator sides labeled "Sixty."

c. Specifications.—Engine: Bore, 6½ inches; stroke, 8½ inches; revolutions per minute, 650; drawbar horsepower, 50; gasoline tank, 73 gallons; engine-oil sump, 5 gallons; miles per hour, governed speed, first 1.93, second 2.63, third 3.63, reverse 1.35; length of ground contact 89 inches, overall 152 inches; width of track shoe 16 inches, between tracks 56 inches, tread 72 inches, overall 95 inches; height without cab 89½ inches, with cab 101½ inches, at pintle 29 inches; ground clearance, 14 inches; weight, approximately 20,000 pounds.

SECTION II

DAILY CARE OF TRACTORS

432. Daily inspection.—*a.* Drivers and assistant drivers must be on a constant lookout for the first symptoms of indications of trouble. The pressure registered on the oil gauge will be constantly watched, including on night marches. En marche, the alternate driver occasionally dismounts and, walking around the tractor, checks by feeling and observing whether: A track roller or sprocket bearing is "running hot"; oil leaks out excessively or at an unusual place; water leaks badly at water-pump glands or elsewhere; fan is slipping or fan belt is loose or broken; gasoline leaks owing to broken line or other cause; track is tight or loose, or track pins are working out. In this manner faults may be corrected or checked before actual damage occurs.

b. Further inspection should be made at all halts and with engine stopped for cooling. The crank-case oil level may be checked. Any operation requiring tools not forming a part of individual tractor equipment is necessarily one for accomplishment by the mechanics in the maintenance section.

c. At the final halt for the day (camp or bivouac), gasoline, water, oil, and antifreeze mixture will be brought up. Vehicles will in every case be filled up at the end of a day's run. Points designated in "daily" lubrication chart will be lubricated, in addition to those giving evidence of needing lubricant. A constant leakage of lubricant is evidence of undue wear, and it, together with any other unusual evidence of damage or wear, will be immediately reported to the battery mechanic, who will direct relief measures of a temporary or permanent character.

433. General care and maintenance.—*a.* In camp, bivouac, or park drivers and assistant drivers will lubricate their vehicles in accordance with chart, will drain crank-case oil and cooling system and replenish same, and will assist mechanics from the motor-repair section in all classes of repair to be done.

b. Mud and dirt will be scraped off, and when sufficient water is available vehicles will be washed. Spots where paint has been removed will be repainted. Original color scheme for camouflage will be maintained.

c. Lubrication will include greasing the track rollers and bringing oil in transmission, final-drive, and bevel-pinion housings up to the proper level.

d. When the route of convoy is known to be over hard or improved roads the track pins should be slushed with oil. When muddy, dusty roads or cross-country convoy is undertaken the track pins should not be oiled.

SECTION III

REFUELING AND LUBRICATION

434. Fuel-supply systems.—*a. The caterpillar 20.*—Twenty-two gallons of gasoline are carried in the gasoline tank, which is located vertically in front of driver. The gasoline is filtered through a strainer direct to the carburetor by gravity only. The carburetor air inlet operates through an air cleaner.

b. The caterpillar 30.—Forty gallons of gasoline are carried in the main tank (including 2.6 gallons in reserve compartment), located on left rear fender alongside of driver's seat. The gasoline is filtered through a strainer direct to the carburetor by gravity only. The carburetor air inlet operates through an air cleaner.

c. The caterpillar 60.—Seventy-three gallons of gasoline are carried in the main tank (including 3 gallons in reserve compartment), located on right fender alongside of the driver's seat. The gasoline is filtered through a strainer to the carburetor by means of a vacuum tank. The carburetor air inlet operates through an air cleaner.

d. Gasoline not being available, other fuels, such as kerosene or alcohol, may be used. A special carburetor is needed for using alcohol. When kerosene is used a special venturi is installed in the carburetor, and a supply of high-test or ordinary gasoline should be kept in the reserve compartment of the tank for easy starting only. Tanks should be filled at the end of a day's run and, if after dark, by the aid of flashlights; never near an open flame.

e. Gasoline-tank trucks, or cargo trucks carrying drums of gasoline, pass along the line and issue fuel as needed. Gasoline may be strained through fine mesh metal screen but never through chamois skin.

f. Air cleaners should be cleaned as often as possible. Oil-type air cleaners must be cleaned daily on dusty roads.

435. Lubrication.—*a. All types.*—The crank-case oil level must never be permitted to be lower than "zero" on the gauge blade. Replenish until level is at "high."

b. Capacities of crank cases of tractors when empty are as follows: "20," 3 gallons; "30," 5 gallons; "60," 5 gallons.

c. Oil-pressure gauges should register 10 points for the "20" and "30" when motor is hot, at governor speed, and 20 points on the "60." Hot engines registering less or more pressure, or when the gauge hand is unsteady, indicate need of inspection. Hot, thin oil and loose bearings reduce pressure. Obstructions in oil passages increase pressure. Low oil supply will cause fluctuation of gauge hand and show low pressure at governor speed.

d. Oil in crank cases is brought up to proper level as required until the vehicle has run about 500 miles, or 50 hours, at which time the sump is drained, slushed by turning engine over a few times, and new oil put in. Only that oil prescribed for the tractor will be used. Certain tractors, owing to greater piston and cylinder wear, require heavier oil than others (so noted in log book). Oil in containers carried in each vehicle is permissible, but the can must be closed at all times to prevent admission of dust and water.

e. An oil pump in the oil sump of the crank case, driven from the cam shaft, pumps the oil through a filter through passages to the three main or crank-shaft bearings, then through passages to the connecting-rod bearing journals. Oil escaping at these journals forms a mist which lubricates cylinder walls. From the front main bearing the oil passes onto the timing-gear train and flows back into the sump. On the "20," valve rocker arms are lubricated by oil cups on top of covers. On the "30" and "60," rocker-arm bearings are oiled under pressure from crank-shaft journal oil passage. A second pump is located in the front end of crank case to return the oil to the sump when tractor is climbing steep grades. A by-pass and regulating valve are provided.

f. Using the pump-type oiler, all moving parts should be given a "shot," including track frame where idler bracket slides; track adjusting screw threads; valve rocker arms; governor; throttle and control-rod clevis pins; pintle latches; auxiliary spring pads; and starting crank shaft.

g. Using one of the company high-pressure grease guns, inject grease into track rollers, track sprockets, water-pump shaft glands, and all places where "alemite" connections are located.

h. Put a few drops of special oil in magneto oil cups weekly.

SECTION IV

UPKEEP AND SUPPLY OF SPARE PARTS

436. Lists of spare parts.—*a.* Spare parts applicable by drivers or motor mechanics are obtainable from the company or battery sets. Items desired and not so listed are classed as necessary to repairs of a major character only and may be drawn upon requisition approved by the battalion commander under especially favorable conditions based on skill of personnel, character of repair, time, and proximity to zone of fire. Addendums to Standard Nomenclature Lists and Technical Regulations show, respectively, the lists of parts carried by and the procedure of repair by ordnance maintenance companies which are charged with the making of all repairs beyond the facilities of the company, battery, or platoon.

b. The Standard Nomenclature List for the vehicle shows the spare parts to be carried in each tractor and those carried by each battery. Replacement to the tractor set are made from the battery set. Replacements to the battery set are made upon requisition on the ordnance maintenance company.

437. Procurement of spare parts from the Ordnance Department.—*a.* Initial issue of spare parts to organizations is made in sets listed in Standard Nomenclature Lists.

b. Replacement of spare parts to the battery set is made by requisition on the ordnance maintenance company serving such organization. Adjustments may be made to this list through coordination with the ordnance maintenance company when changes in quantities or additions to the list are found practical. Requisitions to complete the set of spare parts should be submitted in sufficient time to avoid complete exhaustion of stock. Anticipation of immediate requirements is essential and desirable, but in no case will stock be "hoarded." Accumulated surplus or undesired matériel may be turned back to the ordnance company.

438. Accountability and responsibility for spare parts.—*a.* Matériel installed by the ordnance maintenance company will be furnished, delivered, and expended by them. Repair matériel will be expended by the battery commander by a certificate upon the filled requisition. This class of matériel includes gaskets, taper and cotter pins, standard bolts and nuts, lock and plain washers, pump packing, hose clamps, steel balls

(symbol "R" in SNLs). Expendable and nonexpendable matériel (symbol "X" and "no symbol" in SNLs) will be obtained by requisition on the ordnance company, which will ship same on shipping ticket, providing the matériel is to complete an authorized set of spare parts, or providing the requisition bears a certificate giving reason for not presenting items for exchange, which certificate must be authenticated by the unit commander. Such matériel will be "picked up" on battery stock record cards. Certificate of exchange will be used in connection with the presentation of unserviceable matériel in exchange for serviceable matériel. This certificate by the battery commander declares items listed thereon "worn out through fair wear and tear, etc."

b. Unserviceable matériel will be presented for exchange in a fairly clean condition and as removed from the tractor. Deliberate damage to an unserviceable item which would prevent its repair by the ordnance company for reissue is prohibited. Matériel does not pass from the battery to the scrap pile, but to possible salvage of all or part of it by skilled ordnance mechanics having the necessary equipment.

Section V

CARE AND SYSTEM OF ACCOUNTABILITY FOR TOOLS AND ACCESSORIES

439. Lists of tools and accessories.—*a.* Tools and accessories as carried on each tractor, by each company or battery, and by the ordnance maintenance company for replacement purposes are so listed in Standard Nomenclature Lists.

b. The driver of a tractor is responsible for the tools and accessories assigned to his tractor, their condition, and availability for use at all times.

c. Each maintenance section repair crew is responsible for its set of battery tools and is required to maintain the set in a serviceable condition at all times.

d. Tools and accessories are obtained in the same manner and have the same degree of expendability as spare parts described in Section IV.

e. Tools and accessories must be clean upon presentation for exchange and show only "fair wear and tear." Funnels having a punctured strainer screen can be repaired by the ordnance company and need not be battered out of shape to be called un-

serviceable. Likewise, an end wrench having initial opening of $1\frac{7}{32}$ inches will wear to a $1\frac{5}{16}$-inch opening. This wrench will even appear serviceable, but may be exchanged on account of the fact that it no longer properly fits the item it was intended for without possibility of rounding the corners of the item.

440. Tools on the tractor.—*a.* Tools carried with each tractor and listed in Standard Nomenclature Lists are limited to the minor repairs and adjustments which the driver is able to make en marche, under fire, and in assisting mechanics at the halting points. Such tools and accessories are carried in the tractor tool box and under the seat. The driver is accountable for the tools and accessories in his tractor and their condition.

441. Tools on separate vehicles.—*a.* The light repair truck used by the battery repair section will contain such special tools as they are allowed to use, as well as a limited supply of tools for replacement purposes for the tractors they serve.

b. As initially equipped, this truck contains a 2-ton chain hoist, chests of carpenters and other special tools, towing cables, chains, jacks, and ropes for rigging purposes.

c. Battery sets of tools for use by the crews of the maintenance section will be carried in this truck in canvas tool rolls.

442. Responsibility of the driver.—*a.* The driver of a tractor is responsible for the appearance of and condition of his vehicle, its tools and accessories, and for its being in condition for immediate and prolonged service at all times.

b. He is also responsible for the load he is hauling, in so far as its movement is concerned.

443. Responsibility of the motor mechanic.—*a.* Mechanics are responsible for the tool kits they are issued and the condition of the vehicles in their sections. After a fault or signs of an anticipated fault have been reported to the maintenance section, designated mechanics either remedy the fault or institute a temporary repair, and advise the driver as to necessary precautions with relations to the defect.

b. Any tractor deemed unfit for continuance in the convoy will be ordered halted by the mechanic, the motor sergeant notified, and the decision to proceed without the inoperative tractor made by the battery commander.

444. Responsibility of commanding officer, maintenance section.—*a. The battery maintenance section.*—A staff sergeant, called motor sergeant, is the noncommissioned officer in charge,

whose personnel consists of drivers for the spare and utility tractors and mechanics.

b. The battery motor officer is responsible for the maintenance and load of the light repair trucks, cargo trucks, tractors, and trailers in his battery, and the condition of his vehicles and men to go on a march at all times, including the training of men as replacements to drivers and mechanics.

c. He is also responsible for the maintaining of the system of color camouflage as originally applied by the Engineer Corps.

d. The battery commander acts on the motor officer's recommendations as to the temporary or permanent abandonment of vehicles.

SECTION VI

MAINTENANCE

445. Drivers.—*a.* En marche, during a halt, drivers are allowed and supplied tools for making repairs and adjustment to include the following: Tighten water connections and cylinder head; adjust fan belt; change spark plugs; adjust steering-clutch throw-out levers; adjust track; clean out fuel lines; clean out air cleaner; tighten and repack water-pump glands; adjust master clutch; clean magneto distributor and breaker points; tighten all loose bolts, nuts, and pins.

b. Operations such as replacing gland packing or hose and gaskets on the cooling system, which necessitates the removal or loss of water, must first be sanctioned by the motor officer, who will determine the delay to the convoy incident to the procurement of water.

c. Lubrication en marche and at a halt is covered in Section III.

d. In camp, bivouac, or park drivers assist mechanics in all necessary repairs and adjustments.

446. Mechanics.—*a.* En marche mechanics are required to keep in close touch with each tractor crew by running up and down alongside the convoy in their light repair trucks or other conveyances. They designate repairs, lubrications, and adjustments that must be made at the next halt, or declare a vehicle unfit to continue. Such vehicles will drop out of the line and be repaired by them.

b. By direction of the battery motor officer, a substitute spare tractor may be unloaded and run up, take the load, and con-

tinue the convoy. A portion of the repair crew remain with the tractor if it is thought possible to repair it with the tools and spare parts available, and catch up to the convoy at its next halt after work is accomplished. The tractor may be loaded into a truck to catch up with convoy.

c. At a halt, motor mechanics, with the assistance of the crew, inspect and make all possible repairs and adjustments necessary for the tractors to proceed at the time set.

d. Inoperative tractors may not be abandoned except upon approval of the battery commander. Such vehicles are moved out of the way of traffic and will be repaired or otherwise disposed of by the ordnance company upon notification.

447. Maintenance section.—*a.* This section of the battery is known as the "maintenance section" in charge of a motor officer, and is subdivided into crews of mechanics, transported by its light repair truck. It may also use the battery light repair truck or other conveyance. Ingenuity is the keynote of this section.

b. En marche this section brings up the rear with the spare-parts trucks and gasoline trucks.

c. The scope of the repairs which can be made by this section is determined by its tools and spare parts and the time element. During the convoy its mechanics institute temporary relief measures and superintend the towing in of disabled vehicles. At a halt the principle of exchanging whole assemblies will be employed.

SECTION VII

TRAINING OF TRACTOR TRANSPORT UNITS TO MARCH IN FORMATION

448. Forming for the march.—Upon receipt of orders to march all battery motor officers coordinate upon the order of their vehicles in the columns. Normally the speed of a convoy is that of its slowest unit. Thus in a mixed convoy comprising two or more types of tractors, the slower type forms the head end of the column.

b. Tractors proceed to couple onto their respective guns, caissons, reels, and carts, and move up to a designated point, halting at right side of road and shutting off the engines. At the halt the distance should not exceed 2 yards between vehicles to

conserve road space. The crews remain with the tractors, making any last-minute adjustments.

c. Behind the tractor-hauled sections follow the trucks bearing baggage and accessories, spare parts, spare tractors, and gasoline trucks, towing water cart and kitchen, and the light repair trucks when not traveling alongside of the column.

d. When the location of the next halt is known, the gasoline and baggage trucks, with extra personnel, may be sent on ahead of the convoy to choose and prepare the site. Cooks with the mess outfit will also proceed to arrive ahead of the convoy proper.

449. En marche.—*a.* Patrols will be sent ahead of the convoy to determine depth of water and condition of banks and bottom of streams in order to provide more than one fording; condition of bridges; choose the best and shortest of roads or the advisability of cross-country travel; to check headroom at viaducts and tunnels; to detect and possibly eliminate hostile attack and observation posts. Guard details may be ordered along the flanks for the latter reason also.

b. Vehicles passing over muddy roads, meadows, or swamps will avoid, as far as possible, driving in each others tracks. Upon arrival at the edge of a steep down grade, drivers will engage the second or first gear, using the engine as a brake. Brakes on the towed vehicles will also be operated, as directed by the driver of its tractor by prearranged set of signals. Steering of the tractor while being pushed by its load is accomplished the opposite to normal method. A steer to the left is made by using the right steering lever.

c. Before starting to climb a steep grade the tractor will be shifted into the speed gear that is known will take it over the grade, and engine allowed to pull at governor speed until it and its load are over, then throttle down to a slower speed to allow the rest of the column to catch up.

d. Vehicles upset or ditched will have to be uncoupled before hauling them out. Using two or more towing cables or chains coupled together, one or more tractors will haul mired vehicles out onto the road. The towing and towed vehicles should be connected at their rear pintles and so that the pull is nearly direct. After the tractor is returned to hard ground, inspections for damage, oil level, and pressure should be made.

e. Driving on night marches will be done either by the red glow from tail lights or by occasional flashes from flashlights

carried by personnel afoot. Such flashes will be directed particularly upon obstacles in the line of march.

f. The speed of a convoy of tractor-drawn artillery averages 3½ miles per hour. On dusty roads and on night marches speed will be reduced and distances increased. In an emergency the speed can be brought up to 7 miles per hour.

g. Loaded or towing convoys have the right of way over those proceeding light. Faster convoys will overtake and pass slower convoys. Doubling or overtaking is not permitted when faster or same speed convoys are met, ascending or descending at steep grade, at crossroads, on curves, at railroad crossings, narrow bridges, or defiles.

h. In meeting a convoy coming from opposite direction loaded or towing convoys have the right of way. If road is narrow, convoy running light pulls over to extreme right and halts, dimming its lights to prevent blinding.

i. Signals from the tractor driver to his cannoneer or trailer-brake operator are transmitted by hand and arm movement. They may be relayed through the assistant driver. An easy "backaway" motion directs the cannoneer to apply his brake just sufficiently to help "tighten the draw." A clenched fist in a backaway motion directs a hard application of brakes. A "come-along" motion directs the release of brakes. Straight arm outward signals for turns and halts in the usual manner, which signals are relayed back all along the column. At night flashlight or tail-light blinking will be the method of signaling.

j. Personnel injured en marche or at halts are given first-aid treatment and carried back to the ambulances of the attached medical detachment or otherwise evacuated. A reserve of potential drivers will be had among the other Artillery personnel for replacements.

450. Starts and halts.—*a.* Prior to the start, the commanding officers of the various units comprising the convoy confer as to the probable day's march, the nature of the roads or terrain, possible air raids and concealment, condition of their vehicles and supplies, and the first halt. The first sergeant, who normally rides the lead vehicle of each column, is so instructed in order that the convoy will not be held up if the pilot vehicle is lost at curves or crossroads.

b. Barring disability of vehicles or the necessity of halting for other reasons, such as permitting a faster convoy to overtake it or to permit one to cross through it at a corner, the

convoy will halt for a brief period after about an hour's run to rest the men and cool off the engines. Men will be cautioned to remain near their vehicles and off the road during these halts. Mess will be prepared and served at the most convenient and sheltered point along the line of march. Vehicles will not remain halted on steep hills, curves, on bridges or viaducts, narrow roads or defiles, nor within 50 yards of crossroads, forks, or railroad crossing.

c. At a given signal engines are started, drivers and cannoneers mount, and convoy is ready to start.

451. Road distances.—*a.* The distance between the rear of one tractor and load and the front of the next will not be less than 3 nor more than 4 yards. Between trucks, 15 yards. These distances will be increased when air attacks are threatened or when a steep grade, mudhole, or ford is to be traversed.

b. Drivers will remain clear of the foot of such steep grade, or clear of mudhole or ford, until tractor in front of it shall have successfully negotiated it, and remain at right side of road to permit spare tractor to come up and assist, if necessary. Vehicles will run slower than average beyond the obstacle, to permit other vehicles to catch up to them.

c. At a halt, vehicles will close up to distances of about 2 yards. This shortens the column, but still permits any vehicle to pivot out of line, if so directed.

d. Halting in double column, at least 18 inches must be clear between columns.

e. Convoys of two or more batteries will be broken up into sections of batteries or battalions, with distances between each to be determined by the unit commander as regards traffic condition.

452. Vehicles temporarily disabled while in line.—*a.* A driver discovering something irregular in the operation of his tractor that he knows is likely to become immediately serious will pull over to the extreme right side of the road, halt, and shut off his engine. The remainder of the column behind this tractor halts also. Signals are transmitted forward along the column until the whole column is halted.

b. Doubling or overtaking of vehicles having the same or higher road speeds is not allowed, nor the breaking of the column, except by order of the battery commander. Circumstances may warrant this officer issuing orders for the convoy to proceed without disabled vehicles. In any case, mechanics

will have been called up from the rear to diagnose and remedy the trouble. If the column moves on without the disabled tractor the spare tractor will be coupled on to the load and proceed with the convoy, not necessarily in the same section held by the disabled vehicle. When the vehicle is restored to duty it will proceed to catch up with the convoy, assuming its proper place therein at the next halt or camp.

c. If spare tractor is being carried in its truck the disabled tractor may first be entrucked and repairs made en route.

Airplane raids.—a. A convoy protects itself against hostile attacks and observation by the employment of its antiaircraft machine guns, by distribution into small units and groups, by night marches, by natural concealment through wood terrain, and by camouflage. When air attacks are anticipated, the convoy will slow down, and starting with the lead vehicle, will increase distances to approximately twenty yards. The column may be temporarily halted, or ordered off the road, to permit the personnel to seek security beneath their vehicles.

SECTION VIII

CAMPING AND BIVOUACING OF TRACTOR TRANSPORT UNITS

453. Camps.—*a. Camp sites.*—(1) The usual procedure of selection of camp sites for troops will be followed, with a view to sanitation, security, and comfort of personnel. Tractors and artillery should be parked in natural camouflage, if available. When possible, vehicles and personnel should be close together to facilitate guard. The following should be considered:

(2) Use of a large area of hard, flat ground, adjacent to the road.

(3) Availability of water for washing vehicles and flushing cooling systems.

(4) Proximity to permanent ramp platform for either entrucking or entraining.

(5) Avoidance of permanent structures or landmarks whose range may be known.

b. Normal layout.—When practicable, tractors, guns, and caissons will be formed in lines parallel to the road, the tractors being uncoupled and moved up a few yards to permit working all around them and for fueling. At one end of the lines of

tractors the maintenance section will set up a temporary base for its activities, with constructed workbench and shelter. The spare-parts trucks and light repair trucks are also parked there, with spare-parts chests moved to make each available.

c. Camp routine and discipline.—(1) Special regulations covering the particular situation will be posted and enforced. Repairs of all characters may be made, including those by the ordnance company, except that the vehicles may not be disassembled beyond the point where they can not be completed within a few hours' notice.

(2) Ideal camping places will be used many times, and the policing up and latrine system should be strictly enforced. Night lights and open fires may be prohibited by the commanding officer.

(3) If near a stream of pure water, it will be used for filling of water carts, bathing, watering of animals, washing of vehicles and clothes, in the order named, downstream.

(4) Formal inspection of vehicles and equipment and ordnance technical inspection may be made at this halt.

454. Bivouacs.—*a. Sites.*—Temporary halts for one night are usually made by leaving the convoy at extreme right side of road in column. The personnel may set up their shelters or choose to sleep around the vehicles. Convoy may be stretched out or run off of the road to obtain natural concealment or to lessen casualties in the event of enemy fire. Bivouacs will be made in wooded territory whenever possible.

b. Concealment and camouflage.—When no natural concealment is available all matériel should be covered with brush and branches. A detail will be sent out for this matériel if none is available. Paulins may also be used. Original camouflage color schemes may be sufficient.

c. Discipline.—Troops will be advised as to the limited use of lights and fires, places designated as "out of bounds," and degree of silence. The motor sergeant makes informal inspection. Bivouacs are not generally made near cities or villages.

SECTION IX

TRANSPORTATION OF TRACTOR VEHICLES

455. Entrucking.—*a. Formation of tractors and trucks.*—(1) Liberty Class "B" or 5½-ton Mack trucks are provided for transporting the "20" and "30" tractors. Lighter trucks

may be substituted for transporting the "20" when this size of tractor only comprises a convoy, the lighter trucks being faster. Until a suitable truck for carrying the "60" is adopted this tractor will be transported on the "10-ton trailer, M1918," towed by a truck carrying light baggage or other light load.

(2) Two wooden, built-up ramps, with reinforcing horses, are provided each tractor-carrying truck for loading and unloading from the ground. The trailer is provided with two steel arched ramps which fit onto the rear cross member.

(3) When loading tractors from the ground trucks will be in line, at right angles to and beyond the column of tractors, with rear wheels blocked front and rear, using tractor blocks carried in the trucks. Tractors move up until all uncover their trucks and execute a left pivot and back onto their ramps which have previously been hooked into place with reinforcing horses beneath them. Guided by the assistant tractor driver on the ground, the tractor is driven on the ramps and backed onto the truck body on its centerline, far enough forward to permit closing of the end gate. Tractors must be backed onto trucks to make starting crank available for detrucking. If loaded frontward tractor crank may be cleared by cranking vehicle back in reverse, *with ignition switch off.*

(4) Inoperative tractors will be towed aboard their trucks by means of two or more towing cables or chains fastened together.

(5) Whenever possible, a ramp platform should be utilized. In an emergency such a platform can be made by using a flat car and a pile of railroad ties. The ramp of ties is "cribbed" at one end or side of the flat car and the trucks back up to the other side to receive the tractor. A few ties on the ground at the car side will raise the truck-body floor to an even height with car floor if necessary.

(6) The loading of the "60" from the ground is accomplished by placing the steel ramps in place at rear end of trailer and driving tractor aboard. Care must be exercised when running over the peak of the ramp that the tractor is eased down onto trailer floor.

(7) For entrucking from flat car on station platform see paragraph on "Detraining."

b. Securement on trucks.—Tractors are secured on both trucks and trailers by means of four standard chocking blocks, jammed against each track, front and rear, but not fastened to

floor. These blocks are carried in the tractor-carrying vehicle for this purpose and to chock truck wheels while loading and unloading. They are 20 inches long by 10 inches wide at their base, 6 inches long by 10 inches wide at top, and 10 inches high. (See fig. 5.) The slope may be either flat or curved, and normally fits the curve formed by the track grousers. In some cases, when the grouser or lip of the track shoe is exactly 10 inches from the floor, the blocks may be reversed and jammed under the lips. Blocks are stored at sides of truck body while tractor is being maneuvered aboard. Ramps are stored beneath tractor and reinforcing horses at sides. When loading from platform these ramps and horses need not be disturbed. Tractor foot-pedal ratchets are engaged after brakes have been finally set, locking both tracks.

c. Accessories and baggage.—(1) Accessories and baggage will be stored aboard empty vehicles, which will be available if any tractors have been abandoned, and in other lightly loaded vehicles. No other means being available, baggage may be stored alongside of the loaded tractors, on trucks and fore and aft of tractors loaded on trailers. Baggage will not be loaded on top of or in tractors nor in front of tractors loaded on trailers higher than to provide a safe position for the brake operator of that vehicle. Absence of side or end gates necessitates careful loading.

(2) Ramps are stored beneath the tractor on trucks, reinforcing horses toward end gate at sides. Steel trailer ramps are stored on rear of trailer, ends resting on rear fenders.

(3) In inclement weather or for purposes of camouflage the entire load may be covered by means of the paulin provided each vehicle.

(4) In solid convoys of "60" tractors the baggage and accessories will form the loads of the towing vehicles.

456. Detrucking.—*a. Formation of tractors and trucks.*—(1) Sites for detrucking should be chosen with a view to having the trucks stop in line, at right angles to the road, with rear end just clear of the road. A slight decline or ditch will materially reduce the ramp angle and lessen possibility of accident.

(2) Ramps are laid, reinforcing horses installed, tractor engine started, and vehicle run off onto the ground, where it pivots and moves up to a designated point. Inoperative tractors are towed off and into position.

(3) When the nature of ground does not permit of above formation the trucks will remain in column and maintain convoy distances of about 50 feet and proceed as above.

(4) Trailers carrying the "60" tractor will normally be unloaded from the column formation.

b. Loading of accessories and baggage.—(1) Baggage will be moved from the sides of one tractor first. After this truck is unloaded of its tractor it will proceed down the line or column and receive a full load of baggage, followed by a second truck, and so on. Ramps, reinforcing horses, and chocking blocks must remain in their respective trucks, truck paulins folded and stored atop of truck cabs or load. Tractor paulins folded and stored alongside of driver's seat.

(2) Empty trucks move to position designated by battery executive. Baggage trucks deposit their loads at point designated for camp and repair park. Spare-parts trucks retain their load at battery maintenance section location.

c. Formation of column for march.—Tractors unloaded from trucks or trailers and ready for the march are formed in column in the immediate vicinity of the guns and caissons they are to haul. At the signal of the battery motor officer the tractors will run up and couple to the guns or caissons as directed and proceed to the point designated for forming the sections of the convoy.

457. Entraining.—*a. Sites and loading.*—(1) Entrainment officers having knowledge of the types and quantities of vehicles to be shipped will make a reconnaissance of the territory with a view to halting the convoy at the most practical point. This point will be determined by the location and type of loading platform, types of cars furnished, length of track, order of types of tractor in the convoy, and the number of inoperative vehicles to be loaded. Engines or tractors should be available for possible train or car "shunting." Brake wheels and shafts should be removed when tractors are to pass over cars and both ends of each gondola should be dropped. Chocks should be placed under several car wheels. Red flags or markers should be placed between rails at end of train to prevent "bumping" by switchers. The order of loading will be determined by the order of the various types and lengths of cars, calculated before the arrival of the convoy, and marked on the side of each car. Trains composed of flat and gondola cars should be made up so that a flat car is between each two or four gondolas to facilitate loading at several points at one time.

Automobile end-door cars may be mixed in with a train of flat cars, having each two with doors facing upon a common flat car for loading. All necessary blocking, cleats, and nails will be in place along the outer edges of each car. No other platform being at hand, one will be built either of railroad ties or a combination of flat car, embankment, and ties. A knowledge of the availability of water is desirable.

(2) Battery commanders, with their motor officers, arrive before their convoy and receive instructions as to their halt position. This gives them an opportunity to reform the convoy before its arrival at the entraining point.

(3) Tractors mounted on trucks and trailers may be uncovered and warmed up en route. In cold weather tractors that have been drained may be towed aboard cars and into position quicker than by filling with water. Using this method, as with inoperative tractors, a tractor on the side of car opposite to the loading platform hauls the vehicle atop the center flat car of the train. Another tractor aboard the train pivots the vehicle and pushes it, steered by driver, to extreme end of train and returns. Meanwhile another tractor works the other end of the train. "Pusher" tractors will be provided with suitable wood bumpers to protect radiators and starting cranks. This method is impractical where drop-end gondolas are to be used, as the vehicles must be "bunched" at closed end of gondola till open end is closed, then "spread out" by means of starting cranks and gears. Tractors at each end or alongside of train, towing by means of long cables or ropes, may be substituted for "pushers" when nature of yards and type of cars permit.

(4) A checker lists each vehicle as it is loaded and prepares a "bill of lading," which must be submitted before train may depart. A guard will be placed over the train at all times when it is not being worked upon and until the train departs.

b. Types of cars and vehicles on them.—(1) Flat cars, drop-end gondola cars (side door), box cars, automobile cars (end door), drop-floor gondola cars, and rigid-end gondola cars are the types of cars available for tractor shipment, arranged in order of their preference. All cars must have wooden floor for securement of tractors. Normally the flat or drop-end gondola cars will be employed. Automobile or box-car loading necessitates a platform or substitute alongside. Drop-floor gondola cars (coal cars) must have their pits trestled with heavy planks and, as with the rigid-end gondola cars, will not be used for

tractor shipment until positive knowledge is obtained that crane facilities for unloading are available at destination.

(2) Flat and gondola cars are obtainable in lengths of 34, 36, 40, 42, and 44 feet. Width, 8½ feet. Cars ordered will arrive in lengths specified by requesting officer or longer. Shorter cars substituted only after consultation with shipper.

(3) The lengths of the various types of tractors which constitute the divisors for determining the number of vehicles to be loaded per car are as follows: "20," 10-foot; "30," 11-foot; "60," 14-foot. (These lengths are approximate and will vary owing to pintles and bumpers.) Six inches clearance is required all around the brake wheel, which permits of "straddling" the wheel if additional length is needed. Automobile cars are 36 to 50 feet in length, 8⅓ to 9 feet wide, and 8 to 10 feet high in clear. In addition to side doors these may have doors at one end, opening outward from sides.

(4) Three feet must be deducted from the length of drop-end gondola cars in calculating close-together capacity, as the tractors must be temporarily "bunched" before drop end can be raised and latched.

(5) For calculating length of train add 4 feet to each car for couplers and bumpers and 70 feet for engine and tender. Tractors may be "staggered" (right and left of lateral center line) about 6 inches, to allow pintles to pass.

(6) Weight of tractors is not a factor to consider in loading cars, as the maximum allowable load can not be exceeded in tractor shipment. Weight should be evenly distributed on both trucks.

(7) Trains made up of flat cars only, or flat cars and drop-end gondola cars (with the latter type interspersed, not grouped), loading will be accomplished from the side of one or more of the flat cars, according to the nature of the ground. Steel plates between cars are not necessary. When one car is fully loaded blocking should be commenced, brake wheel installed, and brakes set.

(8) Box cars and the like should only be used for tractor shipment in an emergency and when platform facilities are available at both shipping point and destination. A flat car with built-up ramp of ties will substitute for a "flat-top" platform. This necessitates double trackage and moving of train past improvised ramp as each car is loaded. End-door automobile cars are loaded from their adjoining flat cars. These flat

cars are then loaded by bunching at each end, pivoting the center tractor into place, and returning other tractors to their proper distance.

c. Ramps.—(1) The use of a permanent platform having a ramp to the ground and of freight-car floor height is desirable. This platform should be alongside of the railroad spur, so designed that trucks may be backed up to it along the opposite side at floor level. Permanent rail-end ramp or platforms are desirable for flat and drop-end gondola car loading only. When no platform is available a crib of railroad ties may be constructed or the ramps accompanying the tractor-carrying vehicle may be used. In order that these ramps shall not be too steep for loading several pairs are used together, suitably reinforced. The first pair is laid to the car floor, the second about two-thirds of the way up the first, and so on. Each is braced by the reinforcing horses and blocking, and the number used is determined by the available room. Ramps should be lashed together at points of contact and to car floor to prevent slippage. This procedure must be followed in loading the "60" tractor on account of its weight. The "60" is loaded from its trailer by pivoting thereon 90° and crossing over onto another trailer that bears lower end of ramp, or is first unloaded to the ground and loaded therefrom. The loading site should be chosen with a view to a suitable embankment which may be spanned by ramps. Ramps used to load box or automobile cars direct, without an intermediate flat car or flat platform, may cause vehicle to strike car roof.

d. Securement on cars.—(1) Immediately one car is loaded the blocking crew will check up spacing and clearances and commence blocking. Tractors will be secured on cars against both lateral and transverse movement. Lateral movement of the tracks is prevented by the use of wood blocks, suitably shaped to conform roughly with the curves formed by the track shoes at both ends. Movement of the vehicle on its rollers within the track is partially overcome by the setting of the brake-pedal ratchets. Side movement or slippage is prevented by nailing to the car floor a wooden strip, about 2 inches high, 4 inches wide, the full length of the floor contact, and closely against each track. (See figs. 1, 2, 3, and 4 for types of blocks.)

(2) Tractor movement in transit is not the rolling motion of wheeled vehicles, but effort to climb the obstacles represented by the blocking. Most of the pressure exerted when train is

bumped is downward on the end blocks. Side slippage is due to the rocking motion of the car and affects floor strips very little.

(3) Figure 1 shows the simplest block that can be made, having suitable timbers and a saw. This block is elaborated when machines are available by cutting the face to the required curve to fit tracks and cutting a "heel" to facilitate nailing, (figs. 2 and 3). Figure 4 shows a substantial block made up of planks about 1½ or 2 inches thick by 10 or 12 inches wide, which will be made when no timbers are available; 5 and 6 inch widths cleated together is permissible.

(4) For the "20" and "30" one block is nailed to the floor of the car at each end of each truck, using 3 twenty-penny nails at outer end of heel and one each side of block near contact end. Cement-coated nails are preferred. For the "60" the quantity of blocks is doubled, at least on one side, each end.

(5) No other blocking being available, railroad ties may be substituted. This should be known before tractors are spotted on cars, as it may be possible to "pyramid" the ties in such a manner that one stack will block the adjoining ends of two tractors. Ties will be spiked together and to the car floor by means of forty-penny spikes, cleated together at ends, and braced from top to floor with braces not less than 3 feet long. At bumper ends of car these braces will be shorter, as the metal ends of car prevent use of nails. Angle blocks may be made to brace the ties.

(6) At least 12 inches must be allowed between extremities of adjoining tractors, which allows each vehicle a 6-inch lateral movement if the brakes fail to function. This also allows a passageway for cranking and tying down of paulin.

e. Accessories and baggage.—(1) Accessories and baggage, exclusive of boxed-seat cushions and tools, should be loaded in box or automobile cars. By themselves, if a whole carload is to be moved, or underneath tractors. No box cars or the like being in the train, the baggage will be loaded alongside of tractors on gondola or flat cars, in the order named. Boxed tools cleated or nailed to car floor beneath the tractors to which they pertain.

(2) No accessories or baggage will be loaded on, in, nor close against side of the tractors. On flat cars short stakes may be driven into stake pockets of car to retain baggage.

(3) No tools or accessories will be left in tractor-tool boxes except grousers, towing cables, and headlights, the latter se-

curely wrapped. On the "60" the "starting bar" remains with the tractor at all times.

(4) Tractors equipped with tops over all will have side curtains dropped and lashed. Tractors with or without cabs will be covered by paulin, same to cover baggage alongside also. No baggage will be loaded alongside of inoperative tractors, as it will interfere with repairs which may be made en route.

458. Detraining.—*a. Sites and unloading.*—(1) The detrainment officer will prepare unloading site and specify positions of trucks or matériel to be hauled before arrival of the train. Knowing the types of cars making up the train, as well as their contents and position in the train, he will arrange his platforms or other unloading facilities to suit and designate the place where the train is to stop.

(2) To save time, when the train is in the near vicinity of the detraining point or held up for any reason, unblocking may be commenced before its arrival at the platform. Brakes on tractors will be set and depended upon to hold the vehicle for this short distance. Baggage interfering with this work may be piled up at ends of car or, if the train is stopped, loaded into trucks. Sledges and 6-foot claw-end crowbars are the tools necessary for unblocking. A 2-inch block of wood or the flat sides of the sledge are needed as a fulcrum to the lever after the block has been started. These tools carried in the light repair truck are made available by the detraining crew. Blocking will be carefully stored away against a possible future entrainment at this or near-by points.

(3) Rules for entrainment, in reverse order, will be followed. If detraining to trucks, trucks will proceed to point designated by battery motor officer, which will be at right side of road, facing new direction of convoy unless directed to stand by to haul a trailer or other vehicle. Trucks loaded with tractors may proceed to other cars to receive their complement of baggage.

(4) If unloading to the ground for tractor convoy, and no ramp platform has been provided, the "20" and "30" tractors may first be entrucked, moved away, and detrucked to the ground. The "60" tractor must be detrained to the ground at once.

(5) In freezing weather it is desirable to heat some water which may be used to warm engine manifolds or to take the chill off of the antifreeze mixture in the cooling system to facilitate

starting. A bonfire within a cordon of G. I. cans is one method of heating a large supply of water.

(6) Tractor engines should be given at least a one-quarter turn by means of their cranking facilities to insure against water pumps being frozen. If free, tractors may be towed from their position, in gear, in an effort to start engines. In towing in gear, where the track drives the engine, the third speed is the lowest speed and is the least effort for the towing vehicle.

b. Loading of accessories and baggage.—When accessories and baggage are loaded in separate box cars which are close to engine these cars may be spotted at a convenient place after rest of the train has been spotted at unloading point. Trucks are designated to receive this baggage, which may later be transferred to tractor-loaded trucks. In "60" tractor convoys trucks carrying light loads of baggage will haul the trailers carrying tractors. Trucks designated as spare-parts trucks will remain in the immediate vicinity of the park established for the repair of inoperative vehicles.

c. Formation into march column.—(1) In cooperation with the detrainment officer, the battery motor officer directs the order in which the loaded trucks will form and definitely locates the lead truck at a point sufficiently distant to form the convoy in column facing the desired direction of march. Baggage and spare-parts trucks and light repair trucks bring up the rear.

(2) If a tractor convoy, he designates the order in which the tractors will pick up guns and caissons and definitely locates the leading section. Baggage and such inoperative tractors as can be repaired with battery facilities will follow the tractor convoy. The trucks carrying baggage may be ordered to proceed ahead of the convoy to prepare mess and bivouac at the designated night halting place.

459. Embarking.—*a. Sites and equipment.*—(1) Embarkation officers will have formulated a plan of stowage after consultation with the ship's commander, knowing the complement of and before the arrival of the convoy to be embarked.

(2) There will be available sufficient containers to receive the unused gasoline in the vehicles, ropes for aiding in grappling, and all necessary blocks, nails, and other lumber for securing vehicles in the hold. One or more empty gasoline tank or drum trucks at the pier is a desirable method of saving this surplus gasoline.

(3) Additional temporary lighting facilities should be provided as an aid to the blocking and stowage of vehicles. Water drainage may be permitted on the floor of the vessel. If water must be thrown overboard larger container than the canvas water bucket carried with each vehicle should be provided to avoid unnecessary work and to allow canvas buckets to be boxed with other tools and accessories.

(4) New tractors may be delivered to the pier boxed and will be handled as ordinary cargo, right side up, however.

b. Formation of approach to pier.—(1) Embarkation officers will designate to the battery motor officers their positions of arrival for loading aboard ship in sufficient time that the convoy may be reformed to suit. Loading is accomplished by means of cranes or by the tractor being driven aboard through doors in sides of the ship, or both.

(2) The radius or reach of the boom of the ship's crane being known, the tractor is operated within this reach, or the truck brings the tractor within reach of the hoisting tackle.

(3) Trucks bearing tractors for embarkation will replenish their fuel tanks from the tractor gasoline tank, leaving about 2 gallons for maneuvering at the pier.

(4) Motor officers will have assorted the accessories and baggage into groups to be stowed at the tractors, on deck, and elsewhere, according to access desired en voyage.

(5) Tractors used for "jockeying" matériel around should be loaded last, or near the door or hatch, as they will likewise be needed for debarking, and should be in position to be unloaded first.

c. Preparation of vehicles for stowing.—Before tractors are run or hoisted aboard the vessel all gasoline will have been drained out of the main tank and about 2 gallons left in the reserve tank for use in placing the tractor in position in the hold. After final placement, gasoline will be drained out of tank and carburetor. Water will be drained from cooling system if cold weather is anticipated. For long periods of water travel light oil should be slushed over all exposed bright metal. On the "20" the front and rear sprocket dirt shields must be removed to permit grappling. The cap screws holding these shields must be screwed back in place and the shields carefully stowed on the driver's floor plate.

d. Grappling.—(1) The "30" and "60" tractors are grappled for hoisting by the use of four chains "snatched" around the top spoke of each idler and drive sprocket.

(2) The "20" is grappled likewise, except that the dirt shields covering idler and driver sprockets must first be removed.

(3) "Running lines" are attached to front and rear pintle to guide hoisted tractor and prevent spinning and to guide it through the hatch. These ropes should be ⅜-inch diameter and about 50 feet long.

(4) Tractors should be raised on an even keel to prevent loss of crank-case oil and "boomed" rearward out of trucks to prevent damage to truck cabs.

e. Accessories and baggage.—(1) Spare parts for tractors are boxed and are classed as accessories herein. These boxes, suitably marked, will be stowed in the immediate vicinity of the tractors, anchored to floor of vessel, to permit access for repairs en route.

(2) Other accessories and baggage will be stowed in place designated by the ship's officer. These will be loaded aboard either by use of crib or sling on the crane or by hand truck through vessel's side doors.

f. Personnel.—At the halt of the convoy the driver and assistant driver follow their tractor into the hold of the ship, maneuver it as directed. If tractor is hoisted aboard, the crew handle the guide lines. After taking proper position in the hold they will drain water and gasoline and otherwise prepare the tractor for its voyage and assist in blocking, if so directed. They are responsible for the blocking being properly done, both that the tractor does not break away and that the bracing does no damage to the tractor.

g. Securement in vessels.—(1) Ship's officers will have formulated a plan of stowage in the hold and on deck based on distribution of weight and the general type of cargo.

(2) Blocking will normally be the same as on freight cars, except that the vehicle itself rather than only the track may have to be blocked. Tractors are usually stowed in alternate positions, i. e., one row lengthwise of the vessel, the next crosswise, and so on. In this method the rolling movement of tractors is nondirectional.

(3) If directed to block the vehicle proper, the front and rear, either at pintles or frame, will be braced to the floor,

using timbers at least 4 by 4 inches in section, at least 4 feet long, and floor cleats at ends.

460. Debarking.—*a. Sites and equipment.*—Debarkation officers will arrange to provide the convoy with gasoline, water, and oil. Sufficient containers for gasoline should be available to allow at least five crews to "gas up" at once. If towed away from the ship, tractors may pass a gas-tank truck and be filled up there. Water should be available by one or more lengths of hose.

b. Priorities.—While tractors are being unblocked, filled with water, gasoline, and otherwise made ready for operation, the ship's crane will lower baggage into waiting trucks which move up under the crane in column. Tractors are unloaded by crane directly into their carrying trucks, or to the ground, where they drive or are towed away. For towing away and starting one or more light tractors will be available. Starting of engines may be prohibited in the vessel, necessitating a towing vehicle in the hold also. These towing vehicles are unloaded and conditioned first.

c. Loading of accessories and baggage.—Trucks moving up in column formation will receive the baggage which is lowered by crane. It may be practicable to load a sling full of baggage alongside of each tractor after it is loaded on its truck. Spare parts will be stored in a designated truck or trucks with nothing else. They will be brought out last, unless their presence in the hold interferes with unloading the vehicles. Tools and accessories are unboxed and stored in their respective vehicles.

d. Formation on pier.—(1) In forming a truck convoy the trucks may either back up to the position to receive their load or run to outer end of pier and turn around. After receiving its tractor or its tractor and baggage the lead truck drives up to a designated point forming the head end of the convoy.

(2) In forming a tractor convoy, when the artillery matériel has been unloaded, the tractor couples to the gun or caissons and moves up to form the head end of the convoy. When tractors outnumber the artillery matériel to be hauled, they may move up to position and leave sufficient distance to allow guns and caissons to be brought up and coupled on at a later time.

(3) Convoy may form in one or more lines or in two or more columns, according to the character of the pier. In the former case the convoy is formed after all vehicles have been unloaded.

SECTION X

TRAINING AND DUTIES OF ENLISTED SPECIALISTS CONCERNED WITH TRACTOR TRANSPORT

461. Drivers.—*a.* Drivers holding "driver's permit" will operate the tractor to which they are assigned. Assistant drivers ride alongside of the driver, and may operate the tractor if they hold "assistant driver's permit" and when authorized by the motor sergeant or higher authority.

b. It is the duty of the driver to at all times maintain his tractor in its highest state of efficiency and to use good judgment in its operation. This includes proper functioning of the vehicle mechanically, and that he has a positive knowledge at all times as to his supply of oil, water, and gasoline; that his antifreeze mixture is ample for the existing or anticipated temperature; and that he has his prescribed complement of tools, spare parts, and accessories in a serviceable condition.

c. The repairs and adjustments that the crew of a tractor can or may make are limited by their degree of skill, the time element, the nature of the ground to be traveled, and because of the highly trained personnel attached to his organization whose duties are wholly that of repairs and adjustments.

d. Drivers are responsible for the keeping of all required data in the Ordnance Motor Book (log book) which accompanies each vehicle. Entries of crank-case oil changed, miles run, gasoline and oil consumed, minor repairs, accidents, and transfer of drivers are essential to the commander's future estimates as well as to the driver's efficiency record. Books are kept in a canvas cover and should be posted not later than the night following the day's march. Extra pages for this loose-leaf record are carried by the battery supply sergeant.

462. Mechanics.—*a.* Battery mechanics bring up the rear of either a tractor or truck convoy. They operate a light repair truck, which contains tools, accessories, and such spare parts as can readily be installed en march.

b. It is the duty of this crew to run up and down the line of march to obtain from the drivers of the vehicles and by observation information to forestall possible breakdowns. They will decide the nature of the malfunction of tractors and report to the motor sergeant the approximate time that will elapse before the vehicles will again be in service. On this information the

motor officer will decide whether to halt the convoy or section or to proceed without the inoperative vehicle. Damages of a major character will be the basis of recommendation for abandonment, which will be acted upon by the battery commander.

463. Maintenance section.—*a. General.*—(1) This section is made up of artillery personnel who have been highly trained in the maintenance, repair, and operation of the tractors, trucks, trailers, guns, caissons, and other matériel in the battery.

(2) The scope of their duties includes: The prompt detection of faults; correction of faults and overcoming their causes; the repair of vehicles en route and at a halt; and assisting the movement of the convoy over obstacles by using their own tractor in tandem with others.

(3) Repairs of a minor nature may be effected on board truck, trains, or ship, at halts along the road, or in bivouac or camp. Replacement of damaged parts is made by installing entire subassemblies where the labor involved will not delay the departure of the convoy. Damage to carburetors, magneto, air cleaner, fan, or vacuum tank will be overcome by the installation of a new unit, the damaged one going back to the ordnance for repairs. At camp or bivouac or at halts of several hours' duration track shoes, rollers, and sprockets may be exchanged.

(4) The spare tractor and crew in this section will be at places such as mudholes, shell craters, fords, and steep grades where any doubt exists as to the convoy vehicles being able to negotiate them, to assist them over the obstacles. Tractors or guns mired or upset will be returned to the column by this means.

b. Motor mechanics.—(1) Two men in the maintenance section are designated as motor mechanics and are specialists in the repairs and adjustments pertaining to the engine. They undertake such engine replacements as are authorized, including cylinder head assembled with valves and, by grinding-in the valves, prepare the one removed against another exchange.

(2) Adjustments of magneto breaker points, replacement of breaker complete and ignition cables are authorized. Leaks in the radiator in the outer rows of tubes may be soldered if the damage does not necessitate disassembling of the radiator tanks.

(3) Crank-shaft and connecting-rod bearings are accessible through crank-case side-plate openings and may be taken up in the field. Pistons will not be removed from cylinders.

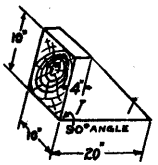


FIG. 1.

SOLID, STRAIGHT-FACED BLOCK

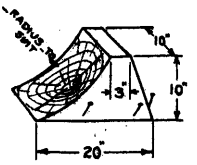


FIG. 2.

PLAIN, CURVED-FACE BLOCK WITH EXTENSION HEEL.

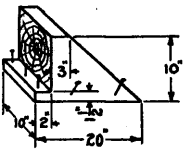
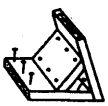


FIG. 3.

SOLID, STRAIGHT-FACED BLOCK WITH INCUT HEEL.



(APPLY DIMENSIONS FOR FIGS. 1 AND 3.)

FIG. 4.

3-PIECE "A"-BLOCK. (MADE OF PLANKING WHEN NO TIMBERS ARE AVAILABLE.)

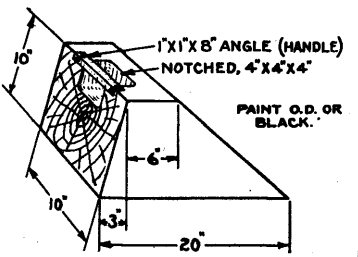
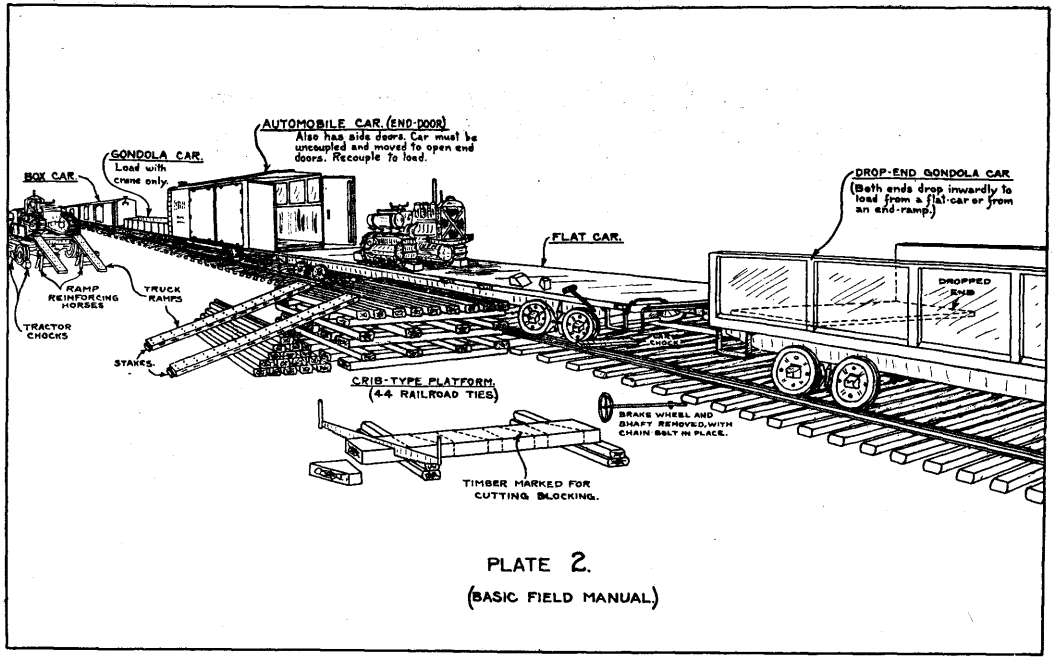


FIG. 5.

TRACTOR CHOCKING BLOCK. (ACCESSORY TO TRACTOR-CARRYING VEHICLES)

PLATE 1.
(BASIC FIELD MANUAL)

62033—29——21



View showing various types of freight cars, ramps, and platforms, also layout of timber for making chocking blocks shown in Figure 1