

BACK SHORE  
OF  
MICHIGAN SOUTHERN RAILWAY  
CORPORATION

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NOTES

CONTAINING THE  
RECORDS

A RECORD OF EQUIPMENT

AIR SERVICE EQUIPMENT

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SEPTEMBER 1907



3910

THIS BOOK  
IS THE PROPERTY OF THE  
LAKE SHORE  
AND  
MICHIGAN SOUTHERN RAILWAY  
COMPANY  
AND IS LOANED TO

NAME	EMPLOYED AS
<i>W. Ferguson</i>	<i>Engineer</i>

Who hereby agrees to return it to the proper officer when called for, or upon leaving the service.

LAKE SHORE 400  
AND  
MICHIGAN SOUTHERN RAILWAY  
COMPANY

✱  
RULES  
GOVERNING THE USE  
AND CARE OF

AIR-BRAKE EQUIPMENT  
AND  
AIR-SIGNAL EQUIPMENT



SEPTEMBER 1903 PRMD  
55.00





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## GENERAL NOTICE.

THE following rules and instructions are issued for the government of all employes of this railroad whose duties bring them in contact with the maintenance or operation of the air-brake and air-signal equipment. All such employes will be examined from time to time, to determine their qualification for such duties, by a supervisor of air-brakes, or other person who may be appointed. Every such employe who has been in the service for a length of time equivalent to two years, will be required to have in his possession a certificate of competency to perform those duties, which certificate will be given him only after having passed a satisfactory examination. He must have a copy of these rules at hand when on duty. Men entering the employ of the railroad company shall be given a copy of these rules, and within a reasonable time they must be familiar with these rules.

If the directions in this book are observed and the rules and instructions herewith are obeyed, no failure of the air-brake or air-signal should occur at any time, and the employes will be held responsible for a proper manipulation under all conditions. If a failure does occur, it will be assumed that some employe has neglected his duty, and an investigation will be made to ascertain who is responsible for the failure. If in any



particular case an employe finds that a correction should be made in any of these rules, it shall be the duty of such employe to report the same to his superior officer.

While these rules have been, for convenience, grouped under instructions to each class of employes concerned in the operation or maintenance of air-brake and air-signal apparatus, it is expected that each employe will consider all of the rules as instructions to him. Furthermore, as no set of rules can be framed which will cover all conditions, it is expected that each employe will so familiarize himself with the workings of air-brake and air-signal appliances as to be able to act intelligently and promptly under all circumstances; good judgment must be used when rules do not apply.

H. S. STORRS,

*General Superintendent.*

H. F. BALL,

*Superintendent of Motive Power.*

W. H. MARSHALL,

*General Manager.*

## TESTING BRAKES.

## TESTING BRAKES.

1. Before testing brakes on passenger trains at terminals, the engineman must ascertain whether the ordinary quick-action brake, or the quick-action brake with the high-speed addition, is to be used, and he will put the reversing cock in the proper position and open or close, as may be necessary, the cock in the air-pipe leading to the low-pressure governor. Immediately after changing from high-speed to the ordinary quick-action brake, the pressure in the train line must be reduced below the pressure for which the low-pressure train line governor is set. The high-speed addition must always be used on trains which are properly equipped with it.

When any train is made up at terminal, air-hose coupled and angle cocks all opened, except the one at rear of rear car, air will be turned in from the locomotive and, after the train line has been charged to 35 or 40 pounds, the inspector will make an examination for leaks. When the air-gauge on locomotive indicates between 65 and 70 pounds train line pressure, the engineman will, on request, make a service application by first drawing off 7 pounds and noting the length and force of discharge at train line exhaust, and then continue to draw off 10 to 15 pounds additional. He



will leave the brake-valve handle on lap position until signaled to release. In order to assure that, when on the road, all pistons are moved past the leakage groove, particular attention should be paid to the length of time for this exhaust, in order to be able to duplicate the same on the road.

When making up freight trains, the slack must be stretched before examining the train for leaks.

**2.** Enginemen will not apply or release brakes when testing except on receiving the proper signals, in exact accordance with the following.

**3.** The air-signal is to be used to signal for application of air-brakes when testing. The signal is to be given always from the forward car of the train. The signal to release the brakes in testing will be given from the rear car of the train to show that the whistle connections have been properly made.

**4.** In the absence of the air-signal, the hand or lantern signal will be used, and the signal to apply brakes is to be given from the head end of the train, and the signal to release brakes shall be given from the rear end of the train.

**5.** When it is ascertained that each brake is applied, the engineman must be signaled to release the brakes, and the brake on each car must be examined to see that each is released.

**6.** The above tests must be repeated to the extent of knowing that all brakes apply and release in response to the engineer's brake-valve after every change in the make up of trains, or when the air-brake ap-

paratus is in any way disturbed from its condition when last tested.

**7.** Inspectors, or in their absence, the trainmen, will ascertain whether the cars on passenger trains are equipped in a suitable manner for the operation of the high-speed addition and notify the engineman accordingly. If the train is to be operated by the high-speed brake, each and every car must be equipped with the automatic reducing valve, or those not so equipped must have a safety valve screwed into the oil hole in the brake cylinder. If a car is added between terminals to a train which is to be operated by the high-speed addition to the quick-action brake, trainmen or inspectors must make sure that such car is properly equipped with high-speed fittings.

**8.** Inspectors, or in their absence, the trainmen, will examine all brake cylinder pistons to see that they have the proper travel, and note the cars with the improper piston travel. If necessary to adjust the piston travel on a car or engine charged with air, the cut-out cock must first be closed to prevent brake application and possible personal injury; when adjustment is finished, cut-out cock must again be opened and brakes retested as per Rule No. 6.

**9.** In case of taking on cars on head end of train, air-hose should be properly coupled, angle cocks all opened, except one on rear, and air turned in and cars charged up to not more than 60 pounds, before coupling them on balance of train. The whole train should then be tested as provided for in Rule No. 6.

**INSTRUCTIONS TO ENGINEMEN  
CONCERNING THE  
HANDLING OF BRAKES.**



## INSTRUCTIONS TO ENGINEMEN CONCERNING THE HANDLING OF BRAKES.

**10.** Enginemen, when taking charge of locomotives, must see that the air-brake and air-signal apparatus (if locomotive is equipped with air-signal) on both engine and tender is in good working order; that the air-pump and the lubricator are in good order; that the pump regulator prevents the train-pipe pressure exceeding the proper maximum pressure provided for in Rule No. 12; that the proper excess pressure specified in Rule No. 12 is maintained in the main reservoir when the handle on the engineer's brake-valve is placed in position 2 (running position); that the engineer's brake-valve works properly in each and every position of the handle; and that, when the brakes are applied, the driver-brake pistons do not travel less than one third nor more than two thirds of their full stroke, and the tender-brake piston travels not less than five inches nor more than seven inches. Enginemen will be held responsible for hose on either end or on both ends of locomotives being hung in dummy couplings, as per Rule No. 47, when hose is not in use.

**11.** No engineman must take out a locomotive knowing that any part of the brake or signal apparatus

on it is defective, unless he has received special order from the proper officer to do so. Enginemen must report in writing, and on the proper form, to engine-house foremen at the end of each trip, or day's work, any defect in the air-brake or in the air-signal apparatus discovered while on the road; also any apparent variation from the dimensions for the travel of driver-brake and tender-brake pistons which are mentioned in Rule No. 10.

### Standard Air Pressures.

12. Standard air pressures are, for the ordinary quick-action brake, 70 pounds in the train line and 100 pounds in the main reservoir; for the high-speed addition of the quick-action brake, 110 pounds in the train line and 130 pounds in the main reservoir.

An excess of air pressure in the main reservoir above the pressure in the train line, can only be maintained by carrying the brake-valve handle in running position, where it should be placed when brakes have been released. The excess pressure, when thrown in the train line in full release position, insures the prompt and uniform release of all brakes, and quick recharging of auxiliary reservoirs. Brakes cannot be operated successfully without it.

### Service Applications.

13. In making service applications of the brakes, the first reduction should be not more than 5 pounds

with trains of 30 cars or less, and 7 pounds with trains exceeding 30 cars of air-brakes. This will insure the travel of all pistons beyond the leakage grooves. Subsequent reductions of from 2 pounds to 3 pounds, made at proper intervals, can be made to increase the breaking power sufficient to stop the train. Service stops should be made with one application, except as per Rule No. 20, and with not more than 12 to 15 pounds total reduction. This reduces to a minimum the liability of skidding wheels and leaves in the auxiliary reservoirs a reserve braking power for any emergency. One application includes the first reduction and all subsequent reductions until brakes are again fully released.

14. Twenty-five pounds train line reduction is the maximum amount that should be made in service application; any further reduction is a waste of air.

### Extra Precaution.

15. In cases of emergency, even though the reduction be 25 pounds from the train line pressure, the handle of the brake-valve should be placed in emergency position.

### Emergency Application.

16. An emergency application should be made only when it is necessary to stop the train to prevent a possibly impending accident; in which case the brake-valve handle must be placed in the emergency



position and left there until the train is stopped, or the cause for such application is removed. If an emergency application is made on a freight train, brakes should not be released until the train is stopped.

### The Use of Sand.

17. The use of sand increases the stopping power of brakes considerably, and should always be used in cases of emergency; its proper application in a service stop, when rail is bad or slippery, is also a benefit. The proper method is to commence its use before the brakes are applied very hard, and continue up to the stop. Do not begin using it when nearly stopped.

### Running Test.

18. The engineman handling a passenger train shall make a "running test" of the air-brake within one half mile from stations where locomotives have been changed, and at all other times after parted hose has been re-coupled; also at least one mile before reaching railroad drawbridges, railroad grade crossings, and other hazardous places, and before going down heavy grades. The "running test" shall be made by making a five-pound service reduction of train line pressure. If the brakes are felt to be applying, and if the length of time occupied in discharging the air from the train line exhaust is proportional to the number of cars in the train, the engineman will at once understand that there is an air connection throughout his train. He

will then place his air-brake valve handle in full release position, and leave it in that position long enough to insure the release of all brakes, and then return it to running position. Steam should not be shut off when making the test, if the conditions are such as do not require it.

### Avoiding Shocks when Releasing.

19. In making all stops with passenger trains, except exact position stops at water cranes, coal chutes, etc., the brakes should be released just before coming to a stop to avoid the recoil of the cars and the very annoying shock to passengers. A safe rule to follow in this case is, at about the last turn of the driving wheels (varying as to the amount of reduction being greater or less) to place brake-valve handle in full release position for a sufficient length of time to start all the brakes off, and then return to running position. If in any case the brakes have been released a little too soon and the train keeps moving, the brake-valve handle should be brought to service application position and held there until the train is stopped.

### Stops of Passenger Trains.

20. In addition to instructions given in Rule No. 13, stops of passenger trains should be made with two service applications, except that suburban and local passenger trains may be stopped exactly in accordance with Rule No. 13; the first application should reduce



the speed to about six or eight miles per hour when the train has got to within two or three car lengths of the point at which the train is to be stopped. Moving brake-valve handle to full release position for only sufficient length of time to release all brakes, and then returning it to lap, will make it possible to catch up the brakes again on second light service application. Brakes should be left set while taking coal or water. At stations where car inspectors inspect the brakes, the brakes must be released.

### Applying Brakes on Freight Trains.

**21.** In addition to the instructions given in Rule No. 13, great care must be exercised in the application of brakes on freight trains wholly, or in part, equipped with air; sufficient time should elapse after shutting off steam to allow the slack to run in, or bunch, before drawing off the first reduction for a service application. Subsequent reductions must not be made too close together. Train-pipe leaks increase the difficulty of good braking; the fact, that after the first reduction the leaks will increase the braking power, must be taken into consideration, and the subsequent reductions made by the engineer's brake-valve should be correspondingly less.

**22.** In making stops with trains entirely equipped with air-brakes, the variations in piston travel and other conditions will determine which way the slack will run. But either way, with the proper application of the brake, it will take place gradually and no harm

will result. With trains partly equipped with air-brakes the slack will run in, or bunch. Care should be exercised to keep it bunched until stop is made.

**23.** After a reduction to apply brakes, brake-valve handle must not be placed in release position until air ceases to discharge at train line exhaust.

### Stops with Freight Trains at Water Cranes and Coal Chutes.

**24.** Applying and releasing either automatic or straight-air brakes on a long freight train while moving at a slow rate of speed (six or eight miles per hour) may result in more or less shock that is damaging to lading or draft rigging. If stop is to be made at a coal chute or water crane the train must be stopped with one application, and at a short distance from chute or crane the locomotive must be cut off. The air-brake on the train must be applied by the engineman before the locomotive is detached, and the brakes must remain applied while the locomotive is temporarily detached.

If train stands on a grade, the air-brake must not be depended upon to hold the train; enough hand brakes must be set to insure holding the train.

**25.** After re-coupling any and all parted hose, to ascertain if the brakes are working, the following "Road Tests" should be made: the brakes should be applied by the engineman and noted by the train crew, to see if they apply and release at forward and



rear of train; at the same time engineman noting the discharge from the exhaust port of the brake valve.

### Releasing Brakes on Freight Trains.

**26.** To release the brakes the brake-valve handle should be placed in full release position, and allowed to remain in the release position until the black hand of the gage shows that the train line pressure has been raised to within a few pounds of the normal train line pressure. "Kicking off" brakes will not be permitted; by "kicking off" is meant the practice of making a quick movement of the brake-valve handle to running, or full release position, and back to lap, causing a slight rise in train line pressure, the object being to release only part of the brakes.

**27.** Particular attention must be paid to releasing brakes on long trains at slow speeds, on account of brakes releasing on forward end of train first and slack running out before brakes are released on rear end of train. Sufficient time should elapse to insure the release of brakes before again using steam to start the train. When the air-brakes are applied on moving trains of 25 cars or more, moving at a speed of 10 miles, or less, per hour, the brakes must not be released until the train is stopped; except that if the locomotive is equipped with the straight-air brake and this brake is used, the automatic brakes may be released at speeds of 10 miles or less. See Rule No. 28.

**28.** The straight-air brake is placed on freight locomotives to be used to prevent parting of, or shocks

to, trains, when the automatic brake is released while the train is in motion. When it is found necessary, or desirable, to release the automatic brake while the train is in motion, the straight-air brake on engine and tender must be applied before the handle of the engineman's brake-valve is placed in the release position.

The straight-air brake must not be released until the automatic brakes are released; the indications that the automatic brakes are released shall be as explained in Rule No. 26. The straight-air brake must be released before steam is used again in the locomotive cylinders. The straight-air brake must not be used for making ordinary stops of trains.

**29.** In case of changing locomotives at terminals where the train line on cars is not charged, or locomotives being detached from the train for any purpose, when coupling to train again, have maximum main reservoir pressure and reduce the train line pressure on the locomotive by applying and releasing, then place brake-valve on lap until all angle cocks are open to train, after which place brake-valve in full release position; this will prevent tender and driving brakes from sticking. If the locomotive is to be coupled to cars the train-pipe of which is already charged to maximum pressure, the above instructions for applying and releasing on locomotive need not be followed.

Trains must not under any circumstance be permitted to start from terminals, or other points, where train or hose has been parted, until all brakes have been applied and released by brake-valve on outgoing locomotive as required in Rule No. 6.



## Brakes Applying from Unknown Cause.

**30.** Enginemen should shut off steam and place brake-valve handle in lap position immediately upon feeling brakes apply from any unknown cause; in case train has broken in two, hose burst, or conductor's valve opened, the pressure in main reservoir will be thereby maintained, for releasing brakes and recharging as soon as may be necessary. In cases of breaking-in-two, as soon as the angle cock is closed at the rear of the section to which the locomotive is attached, and signal given to back up, the handle of engineer's valve should be placed in full release position only long enough to release the brakes, as it is not then desirable to fully recharge the auxiliary reservoirs. In case train is stopped from a bursted hose, the brake-valve handle should be placed momentarily at short intervals of time in release position, to assist trainmen in finding defective hose; when train has been entirely united brakes must be tested as per Rule No. 6.

## Holding Freight Trains on Down Grades.

**31.** In holding freight trains on heavy down grades the pressure retaining valves must be used if the rules of the division require; the straight-air brake may be used on locomotive while the engineer's valve is in release position, but not so long as to overheat the tires, and advantage should be taken of "let ups" in grade to recharge, even though the pressure has been reduced by only a few pounds. Keep the train\*line

pressure as near the maximum as possible. Do not let the train line reduce below 55 pounds without being in a position to safely release brakes to recharge auxiliary reservoirs to 70 pounds. Before releasing brakes be sure that the speed of the train has been reduced and that there is ample time to recharge the auxiliary reservoirs to the maximum pressure before commencing another application.

**32.** If the rules of a division require the use of pressure retaining valves on down grades, the engineman shall say how many of these valves shall be used. See Rule No. 58.

**33.** If the rules of a division require the use of hand brakes on down grades, enough hand brakes shall be applied to control the speed of the train. The order of setting the hand brakes will be from the leading end of train toward the rear and the order of releasing shall be in the reverse order. The hand brakes shall not be left set on any car long enough to overheat the wheels or brake shoes; if there is possibility of overheating wheels or brake shoes, the brakes must be set on additional cars and released on others.

## Holding Passenger Trains on Down Grades.

**34.** On down grades passenger trains shall be controlled to a safe speed, and advantage must be taken of "let ups" in grade to recharge, even though the pressure in train line has been reduced by only a few pounds. Keep the train line pressure as near the



maximum as possible. Before releasing the brakes be sure that the speed of train has been reduced, and that there is ample time to recharge the auxiliary reservoirs to the maximum pressure before commencing another application.

### Backing Up of Freight Trains.

**35.** In stopping a train which is partly equipped with air-brakes, and the train is being pushed, hand brakes should be used on cars on leading end of train, but before moving train again the brakes must be whistled off and time allowed for trainmen to release them.

### Backing Passenger Trains through Yards.

**36.** In pushing passenger trains in or out of stations or through yards where trains are controlled by man on leading car by means of angle cock, or back-up hose, train line should first be charged to maximum pressure, and when starting to push, handle of engineer's brake-valve should be placed to running position. This gives the man on leading car absolute control, and in case brakes are felt to apply, engineman should temporarily place valve handle on lap.

### Double Heading.

**37.** When two or more locomotives are coupled in the same train the air-hose must be coupled and the brakes tested and operated from the leading loco-

otive. For this purpose the cut-out cock in the train-pipe, just below the engineer's brake-valve, on all but leading locomotives, should be closed, air-pumps kept running, brake-valve handle in running position, and the maximum pressure maintained. This rule may be departed from in snow-plough service.

### Straight-air Brake.

**38.** Only the brakes on engine and tender can be set with straight-air. Always keep both the automatic and the straight-air brakes cut in and ready for operation, unless failure of some part requires cutting out one or the other. If the automatic brake is in proper condition, a locomotive or train can be safely handled by it; but if only the straight-air brake is in proper condition, then only a locomotive can be safely handled by it.

**39.** Always carry an excess pressure in the main reservoir, because the excess pressure is necessary to insure uniformly satisfactory operation of the brakes.

**40.** Except as provided in Rule No. 28, the straight-air brake shall be kept in release position when using automatic brake, and the automatic brake-valve shall be kept in the running position when using the straight-air brake.

**41.** The straight-air reducing valve should be kept adjusted at 35 lbs., and the driver and tender safety-valves at 53 lbs. When a full application of the straight-air causes either or both safety-valves to



operate, it indicates too high adjustment of the reducing valve, or too low adjustment of the safety-valves, and they must be reported for test and repair. The single hand gage in the cab shows the pressure in the brake cylinders when the straight-air brake is applied.

**42.** Locomotives equipped with straight-air brake may be handled with the straight-air brake when doing switching work; but because the straight-air brake applies on the locomotive nearly as powerfully as the automatic the same care must be exercised to avoid shocks when applying the straight-air brake.

## INSTRUCTIONS TO TRAINMEN.



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### Use of Conductor's Valve.

**43.** A call for brakes from a locomotive on a passenger train when running must be promptly responded to by each trainman opening a conductor's valve, and if the air-brake does not apply each trainman will apply the hand brakes. Under no other circumstance must the hand brake be applied when the air-brake is being used. Conductor's valves must be closed as soon as the train is stopped.

### Use of Hand Brakes.

**44.** If necessary to assist with hand brakes, they must be applied immediately back of the last air-brake car, and they should be released before the air has been released and the slack has run out, excepting on heavy descending grades, when special instructions shall govern.

**45.** It is necessary that all hand brakes be fully released and not used on air-brake cars that are charged up and being used in a train. Applying the brakes on the caboose when the engineman is controlling the train with air-brake is liable to cause break-in-two.



## Making up Air-Brake Trains.

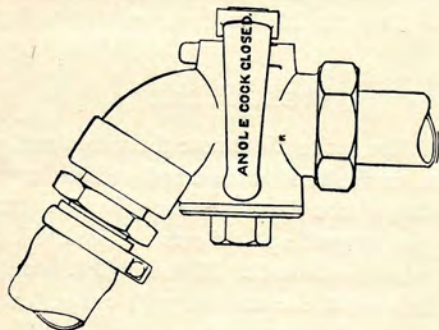
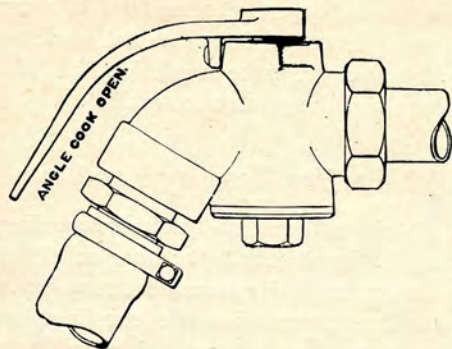
**46.** It is intended that all cars in the train (even if only one) that are equipped with air-brakes, unless otherwise provided for, or unless defective, shall be cut in and used in accordance with foregoing rules. Yardmasters making up trains will so place the cars having air-brakes that the brakes can be used.

**47.** The hose on passenger equipment cars and on both ends of all locomotives when not in use must be hung in dummy coupling, and should be so inserted that the opening in the gasket will be entirely closed. Couplings that are in any way distorted, must be renewed. If, when charging, the triple valve leaks at exhaust or retaining valve, close cut-out cock in cross-over pipe and partially bleed the auxiliary reservoir, then close the release cock and open cut-out cock quickly. If this fails to stop the leak, car should be cut out and reported.

### Angle Cocks.

**48.** Angle cocks must not be opened on head end of train while locomotive is detached. When backing onto a train that is already charged with air, the angle cock on rear of tender, or on cars if any are attached to locomotive, must be opened first to allow the hose to become charged and avoid the application of brakes on train when cock on adjacent car is opened.

Always open angle cocks slowly.



**49.** In setting out a car at any place, first release the brakes; then close the angle cocks on both sides of the hose that are to be parted, then part the hose and hang up properly in the dummy couplings, if there are dummy couplings, the hose of the car that is to be set out. Before the car is left on the side-track the air-brake should first be released and the hand brake applied if necessary to hold the car. The air-brake



should never be depended upon to hold a car on a grade for any length of time when not connected to a locomotive, since the brake may leak off and allow the car to run down the grade uncontrolled.

### Parting Hose by Hand.

**50.** All air-brake and air-signal hose couplings must be parted by hand. Air-brake hose couplings must not be used to tap leaky steam-heat couplings. If air hose couplings contain ice the couplings must be thawed out so as to prevent injury to the rubber gaskets. Care should also be taken not to burn the hose.

### Brake Sticking.

**51.** If the brake sticks note the piston and see if it is out, otherwise hand brake may be set, levers caught, slack taken up too closely, retainer handle turned up, or its pipe stopped up. If retainer handle is turned down open release cock. If this fails to release the brake disconnect the retaining valve pipe (except on the road, when brake may be cut out) at union, near triple. If it is then released leave the brake cut in with the retaining valve pipe disconnected, reporting same on defective air-brake card as being stopped up. When the air-brake on any car in a train repeatedly gives trouble in failing to release it may be cut out, but air-brakes must not be cut out unnecessarily. The car next to the locomotive must have a quick-action brake in good working order.

**52.** If the brakes are found sticking the engineman must be signaled to release them. If he cannot do so and calls for a release, and the hands on the gage record the maximum pressure, the brake on the car should be cut out, auxiliary reservoir pressure discharged, and the car carded with defective air-brake cards.

**53.** Any defect either in the air-brake or air-signal apparatus of cars in passenger trains discovered upon the road must be reported to the foreman inspector at the end of the run, and the defect must be remedied before the car is again placed in service, unless otherwise ordered by the proper officer. Defects in the air-brake apparatus on freight cars must be reported by applying the air-brake defect cards, and indicating thereon the nature and location of defect in manner prescribed by instructions governing the use of such card.

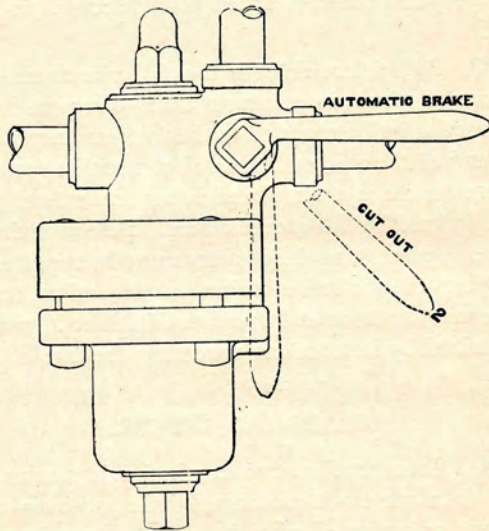
### Cutting Out Brakes.

**54.** Not more than two cars in freight service, nor more than one car in passenger service, with air-brake cut out or equipped with the plain automatic triple valve, should be placed together in the same train, made up of cars equipped with quick-action triples. If, through any defect in the air-brake apparatus while on the road, it becomes necessary to cut out the brakes on any car, it may be done by closing the cock in cross-over pipe, and the auxiliary reservoir release cock opened and all the air allowed to escape from the auxiliary reservoir. When necessary to cut out the

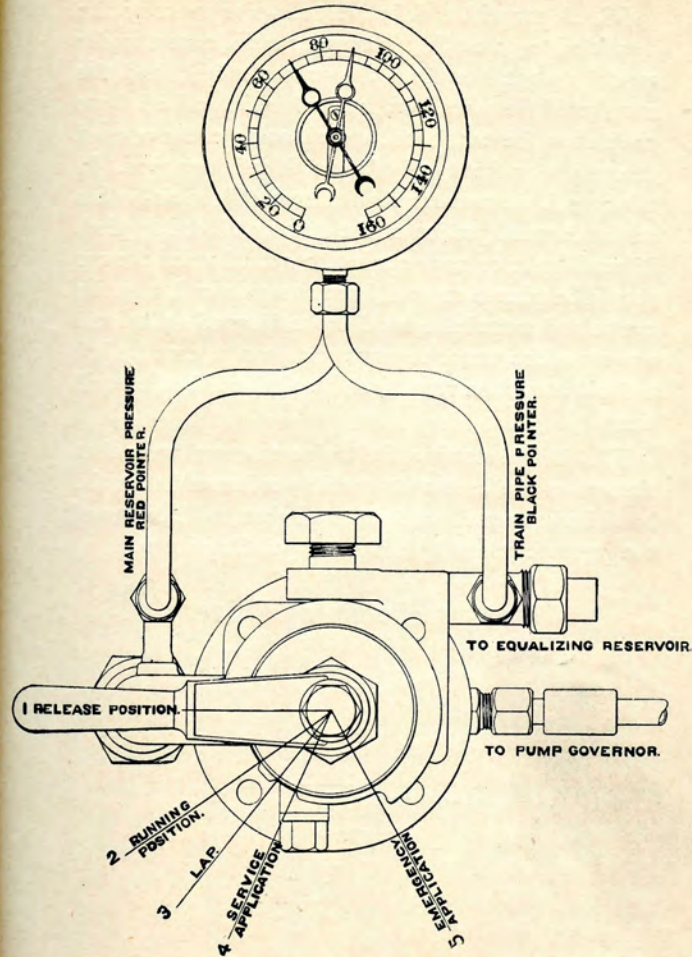


air-brake of a car in passenger service, or in freight service, the conductor must notify the engineman.

### Straight Way Cut-out Cock.



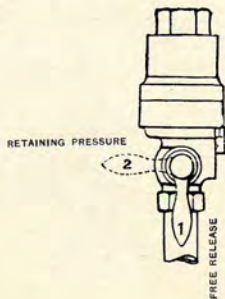
55. No passenger train must be taken from a terminal or division station with the brakes upon any car cut out, or in a defective condition, without special orders from the proper officer. If such a car is taken, except that it have a defective air-pipe, the car shall not be placed at rear of train. At points where there are no inspectors, trainmen must carry out these instructions.



**56.** A car with a defective train-pipe must not be permitted to go out in a passenger train, except under special instructions from the proper officer, and the car should be placed on rear of train and its hose coupled to the car ahead, and all angle cocks opened except one on front end of car with defective pipe. In this case, if the rear car should break off, the air-brakes on the forward portion of the train would be applied. If hand brake on such car is also out of order the car should be placed second from the rear end, and the car behind must have hand brake in good order, and under no circumstance must such car or cars be left without a man on rear car to handle hand brake at all times.

**57.** Before starting, the trainmen must know that the brakes are in proper working order and that the hand brakes are all released, and that the handles of the pressure-retaining valves are pointing down.

### Pressure-Retaining Valve.



### Pressure-Retaining Valve.

**58.** When this valve is to be used the engineman will advise the number of valves to be turned up for any particular grade. After brakes have been given a "Running Test," as explained in Rule No. 18 for freight trains, the trainmen must pass over the train and turn the handles of the pressure-retaining valves horizontally (position 2) upon all, or part, of the cars, as may be directed, beginning at the leading end of train. At the foot of the grade all handles must be turned downward again (position 1), beginning at the rear end of the train. Special instructions will be issued as to the grades upon which these valves are to be used.

### High-Speed Brake Used on Passenger Equipment.

**59.** The use of the high-speed brake addition to the quick-action automatic brake is confined to passenger equipment trains. A car equipped with the automatic reducing valve can be used in any train, but a car not equipped with the automatic reducing valve cannot be used in trains on which the high-speed brake is used, unless the car not equipped with the automatic reducing valve is provided with a safety valve screwed into the oil hole of the brake cylinder. The safety valve is for temporary use only. If to a train which is being operated with the high-speed brake a car is added, the inspector or, in his absence,



the trainmen must notify the engineman whether the car is properly equipped to be used with the high-speed brake, and the engineman will be governed accordingly and operate the reversing cock and the cock in the air-pipe leading to the low-pressure governor as indicated in Rule No. 1. The auxiliary reservoir on each car equipped with the high-speed brake is stenciled "High-Speed Brake."

### **Car Discharge Valve.**

**60.** In making up trains all couplings and discharge valves must be examined to see if they are tight. Should the car discharge valve on any car become defective while on the road, it may be cut out by closing the cock in the branch pipe leading to the valve. The conductor must be immediately notified when the signal has been cut out on any car, and he must report the same for repairs.

### **Rules Governing Use of Air-whistle Signals.**

**61.** When a passenger train is made up at terminal and train line is charged, the inspector will signal the engineer to apply the brakes. After proper examination as per Rule No. 1, the signal to release brakes will be given, using signal cord on rear car of train. In using the signal, pull directly down on the cord during one full second and allow three full seconds to elapse between each pull. Note at the same time that there is a sharp, quick discharge of air from car-discharge valve.

## **GENERAL INSTRUCTIONS TO ENGINEMEN, ENGINE-HOUSE FOREMEN AND INSPECTORS.**

**GENERAL INSTRUCTIONS TO ENGINEMEN,  
ENGINE-HOUSE FOREMEN  
AND INSPECTORS.**

**62.** It is the duty of the engine-house foreman to see that air-brake and air-signal equipment is properly inspected each trip and the brakes applied upon the locomotive, and it must be ascertained that all pipe joints, connections and all other parts of the equipment are in good working order, giving particular attention to the brakes leaking off, and that the air-brake and air-signal hose are hung up properly in the dummy couplings where these are provided.

**Train Air-Signals.**

**63.** Forty pounds is the standard pressure for the train air-signal line. The air-signal equipment must be examined and tested by suitable appliances from both the front end of the locomotive and the rear of the tender to know that the whistle responds properly. Pressure gage must be applied to the signal pipe at each inspection to ascertain if the reducing valve maintains the pressure in the signal pipes at 40 pounds per square inch.



## Air-Pumps.

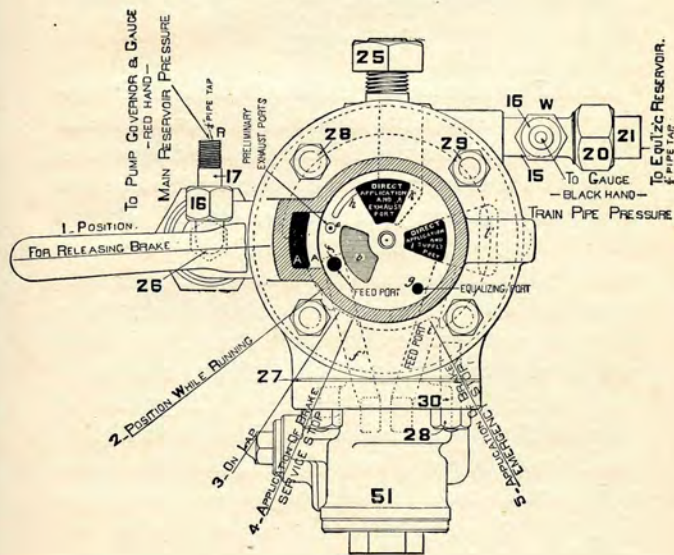
64. Air-pumps must be started slowly, drain cocks must be open (these cocks should be opened and left open while pump is shut off), lubricator should be started at once, and from 10 to 15 drops allowed to feed rapidly and then set to feed not less than one drop nor more than two drops per minute for passenger train service and not less than one drop per minute nor more than three drops per minute for freight train service, as the conditions of the service may demand. After the air-gauge indicates about 50 pounds main reservoir pressure the drain cocks must be closed. A good swab must be maintained on the piston rod of the pump, and it must be oiled with valve oil at time of starting pump. When there are indications that the air-cylinder is not lubricated properly, it should be oiled with a small quantity of valve oil through the oil cup placed on air-cylinder for that purpose.

## Pump Governor.

65. The pump governor should shut off the steam supply to the pump when the train-pipe pressure has reached 100 pounds main reservoir pressure with the quick-action brake and 130 pounds main reservoir pressure when the high-speed feature of the quick-action brake is cut in; and also with the duplex governor on freight locomotives when the engineer's valve is in the lapped position. If the governor does not so control the pressure, the governor must be regulated to do so.

## Engineer's Brake-Valve.

66. This valve must be kept clean and in working order; with the handle in running position (2) the main reservoir pressure must be maintained as required by Rule No. 12. The valve must be tested with handle in lap position (3) and service position (4) to note that the equalizing piston responds promptly, and that there is no leak from port to port, under the rotary valve.



### Draining Water from the Equipment.

67. The main reservoir and also the drain cup in the train-pipe under the tender must be drained of any accumulation of water each time the locomotive is inspected. The auxiliary reservoirs, the equalizing reservoir and the triple valves must also be drained frequently, and daily in cold weather, and train-pipe under the engine and tender blown out.

### Driver, Tender and Engine Truck Brake Cylinders.

68. The driver, tender and engine truck brake cylinders must be examined, cleaned and lubricated with the special lubricant which is provided for the purpose, at least once every six months; also triple valve and high-speed reducing valve must be examined, cleaned and oiled every six months. Care should be used in cleaning the leakage grooves. Piston packing for both driver and tender brake cylinders should be carefully examined each time cylinders are cleaned and lubricated, and if leather is found to be split or worn thin, it should be replaced with a new one. The packing of cylinders that are in a horizontal position, when slightly worn, should be turned around, in replacing, so as to get an equal wear on all sides of the packing. Auxiliary reservoir is to be stenciled with white paint and according to standard drawings as follows, in one-inch block letters, the date and place of cleaning triple valve, also the correct piston travel.

TRIPLE CLEANED			
W.A.	2	20	03.
PISTON TRAVEL		INCHES.	

69. Brake cylinders on locomotives and cars to be stenciled with white paint as follows, in one-inch block letters, with date and place of cleaning and oiling.

W.A.	2	20	03.
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The auxiliary reservoir on passenger cars and tenders which are equipped with high-speed brake is stenciled "High-Speed Brake" in one-inch block letters.

### Testing Driver, Tender and Engine Truck Brake.

70. Driver brake piston travel should be determined for each locomotive by the following method: screw an air-gage into the oil plug hole in the cylinder, and after charging the auxiliary reservoir to 70 pounds make a full service application. This should, with both pistons traveling the same distance, equalize at 50 pounds. Leaving the brake valve handle on lap position and noting the rapidity with which the brake cylinder reduces will determine the condition of the cylinder packing-leathers and air-pipe connections. The cylinder pressure should not reduce



faster than five pounds in five minutes. Tender brake and engine truck brake cylinders should be tested in the same manner. If, in this test the high-speed reducing valve does not relieve at a pressure between 58 and 62 pounds, it should be adjusted to do so.

## **INSTRUCTIONS TO CAR INSPECTORS.**

## INSTRUCTIONS TO CAR INSPECTORS.

**71.** Inspectors must have on hand, in a convenient place, all necessary parts, in good condition, for making prompt repairs to the air-brake and air-signal equipment. After the train is fully charged the inspector will signal the engineman to apply the brakes for test. When the brakes have been applied, they must be examined upon each car to see that they are applied with proper piston travel. This having been ascertained, the inspector must signal the engineman to release brakes, after which he must again examine brakes on each car to note that each is released. In this test it is important that all brakes be released from brake valve on outgoing locomotive. If any brakes are necessarily cut out the engineman must be notified as per Rule No. 54.

**72.** Inspectors will be held strictly responsible for the condition of all the brake and signal apparatus upon cars placed in trains at their stations. They will also make any examination of the air-brake and necessary repairs to same which they may be called upon to do by the trainmen.

**73.** On freight cars the piston travel should be adjusted to not less than 5 inches nor more than 7 inches, except with heavily loaded cars with brakes hung from car body or truck bolster, in which case it



should not be less than 7 inches nor more than 8 inches. On passenger cars the travel should not be less than 5 inches nor more than 7 inches; the adjustment is made by means of the truck dead lever, and if that is not sufficient, the bottom truck connection must be shortened one or more holes and the adjustment then made by the truck dead lever.

**74.** Air-brake cylinders on freight and passenger cars should never be lubricated without being cleaned at the same time. Cylinder head should be taken off, the piston removed and thoroughly cleaned and lubricated with the special lubricant which is provided for the purpose, at least once in six months for passenger cars and once in twelve months for freight cars. Expander ring should fit cylinder nicely when piston is removed. When necessary to remove cylinder packing-leather the specially prepared oil-tanned leather, furnished by the Railroad Company for this purpose, must be used; and the rough, or flesh, side must go next to the walls of the cylinders. In cleaning the cylinders the outer end of the cylinder lever must not be disconnected. A triple valve which has been cleaned, oiled and tested must be applied at the same time. The place of latest cleaning and oiling must be stenciled with white paint upon the cylinder as per standard drawings.

TRIPLE CLEANED

W.A.        7        20        99.

The reservoir on passenger cars equipped with high-speed brake is stenciled "High-Speed Brake" in one-inch block letters.

**75.** Triple valves in passenger service should be cleaned every six months, and those in freight service every twelve months.

**76.** The cleaning of triple valves should take place at a shop. The strainer in the triple, and also the one in the train line T where the branch pipe couples on, should also be cleaned.

**77.** When time permits, a more general inspection must be made. See that auxiliary reservoir and brake cylinder are not loose on car body.

**78.** See that dummy couplings are in proper condition, angle cocks tight on end of train-pipe and pointing toward the center, or middle, of the track. In replacing hose gaskets no trimming or cutting must be practised.

**79.** If retaining valve pipe is disconnected do not couple it up unless car is charged with air, so that it can be tested at once; also see that it is properly clamped. If leak at hose clamp cannot be stopped by hammering the clamp lightly, or drawing up the clamp, hose should be removed and chalk-marked at defect. Hand-brake rod stop on passenger cars must be examined and known to be secure.

### **Adhering to Standards.**

80. Under no circumstance must an employe, by filing or otherwise, alter any of the brake or signal equipment. When any change is deemed desirable, it must receive the sanction of the proper officer.

If there is anything in these rules that is not clearly understood by those in any way interested, they will report it at once in the regular way to the Supervisor of Air-brakes.

## **GENERAL INSTRUCTIONS.**



## GENERAL INSTRUCTIONS.

81. Watch the air-gauge.
82. Do not sacrifice safety in the interest of time; be sure that the air-brakes are in proper working order before starting.
83. Economy in the use of air contributes to safety in maintaining the ability of the pump to replace that used; carry maximum train-line pressure if possible, no more, no less.
84. Do not let go of the brake-valve handle while it is in full release position; it is only a matter of a few seconds, and you might forget it and overcharge the train-line.
85. Apply the brakes so as to run the train-line slack in carefully, and after bunching the train endeavor to keep it so while the brakes remain applied.
86. Avoid quick applications, except in cases of emergency.
87. Cut in all brakes that are in good order, and report all those not so.
88. Do not practise using full-service braking power (25 pounds reduction) for service stops. Always endeavor to hold a portion in reserve.
89. Do not fail to test brakes, as per foregoing rules.

**90.** Release before fully stopping with passenger trains, but do not do so with freight trains.

**91.** The conductor and engineman are both responsible for knowing that the brakes are in perfect working order on their train, and properly connected throughout the whole train, before starting from terminal stations and from stations at which it has been disconnected. They should endeavor to repair any leak or defect in the apparatus, if possible for them to do so.

**92.** Trainmen must see that in all cases hand brakes are off before starting.

**93.** Car inspectors must be particular in examining all parts of the brake; they must see that any defects are promptly repaired, and before allowing cars to be sent out on a train they must be sure that it is in perfect working order on each of them.

**94.** Car inspectors at junctions must see that the air-brake apparatus is in good working order when cars are received from other railways.

**95.** Conductors will report to the engineman when the handling of the train is not smooth, in order that the engineman may improve on the manipulation of the brake.



