**NATIONAL RAILROAD PASSENGER CORPORATION-**

AMTRAK®

# AIR BRAKE AND TRAIN HANDLING RULES AND INSTRUCTIONS

These instructions govern the testing and operation of air brake and other equipment on Amtrak trains and must be observed by all employees whose duties are in any way affected by them.

These instructions apply to all Train and Engine service employees, QP'S, QMP'S, QMI'S, Mechanical employees, certain Engineering employees, Yardmasters, and Supervisors. Amtrak employees governed by these instructions are not governed by the air brake and train handling rules/instructions of Host Railroads. The Host Railroads listed below have additional rules and instructions which modify Amtrak's AMT-3. These instructions are printed in text boxes included in the applicable AMT-3 rule or instruction and identified by the Host Railroad name.

Burlington Northern Santa Fe
CSX Transportation
Norfolk Southern
Union Pacific

Employees whose duties require that they understand and comply with these instructions must attend the required classes.

Employees who are governed by these instructions will be provided with a copy, must maintain same and have it with them while on duty.

This document is divided into four (4) major sections: (1) All Operations, (2) Passenger Operations, (3) Non-Passenger Operations and (4) Tables and Forms and Mechanical Standards

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## 2.0 LOCOMOTIVES

## 2.1 Employee Responsibility – Locomotive Inspection, Testing and Documentation

**2.1.1** At the beginning of the tour of duty, engineer will check that a MAP 100 is located on each locomotive in consist.

**NOTE:** When MAP 100 or MAP 101 is referenced in the following instructions, METROLINK Locomotives and Cab Cars will use Calendar Day Inspection Forms SMP 100/1173 and SMP101.

**2.1.2** Locomotive Calendar Day Inspection Requirements

A. Each locomotive must receive a Locomotive Calendar Day Inspection each calendar day, regardless of whether delayed enroute.
NOTE: This instruction also applies to non-complying locomotives.

B. At the beginning of the tour of duty, engineer will check MAP 100 on each locomotive in consist to determine that Locomotive Calendar Day Inspection remains valid.

C. The date on which a locomotive(s) receives the last calendar day inspection and test will be determined by the MAP 100 information entered in the “Signature Of Supervisor approving unit for service and all work above”, ”Occupation”, “Place”, “Date”, “Time” (blocks 35-39). The MAP 101 will have the same date, same location and approximate time as the above sections of the MAP 100. In the event the MAP 100 does not have the “Signature Of Supervisor approving unit for service and all work above”, ”Occupation”, “Place”, “Date”, “Time” (blocks 35-39) section completed, the Engineer will use the most recent date on the MAP 101 to determine the date of the last calendar day inspection.

D. If a locomotive has NOT been inspected today and will be in service past 11:59PM tonight, a Locomotive Calendar Day Inspection is required before 11:59PM tonight.

E. When Locomotive Calendar Day Inspection has expired and Mechanical Department personnel are not available, engineer will perform inspection according to Instruction 2.2. before placing locomotive in service.

F. When Locomotive Calendar Day Inspection will be required before 11:59PM tonight and Mechanical Department personnel are not available, engineer will perform inspection as per Instruction 2.2 after:

1. contacting train dispatcher to arrange for location to perform inspection.
2. OR, when communication is not available with train dispatcher, perform inspection at any point prior to 11:59PM tonight.

G. When Locomotive Calendar Day Inspection is not current on locomotive(s) within a Mechanical Facility, the locomotive(s) may be moved to a repair or servicing track in order to perform the inspection within the same mechanical facility. Before movement is made:

1. Determine that locomotive is safe to move,
2. Comply with AMT-3 Section 2.16.1,
3. Perform locomotive air brake tests as prescribed by AMT-3 Sections 2.5 and 2.6, and,
4. Movement must not exceed 5 mph.

**2.1.3** Mechanical Department Employees

A. Mechanical department personnel who are employed to perform locomotive calendar day inspections, air brake daily inspections, and the locomotive departure brake test must perform the above mentioned inspections / tests in accordance with all applicable Standard Maintenance Procedures and the current edition of the AMT-3 instruction manual.

B. Mechanical personnel must perform the air brake daily inspection as outlined in section 2.4 and the locomotive air brake departure test as outlined in section 2.3 prior to dispatching the locomotive for service.

C. Mechanical personnel shall submit a written report of the air brake daily inspection and air brake departure test. Use appropriate MAP form(s) or WMS template.

**2.1.4** Each locomotive placed in service must receive all required inspections to ensure compliance with the requirements listed in 49 CFR Part 229.

A. Each locomotive in service must receive the following inspections:

1. Periodic (Once each 92 days). (ACS-64 Locomotives–Once each 184 Days).
2. Annual (Does not exceed 368 calendar days).
3. Biennial (Does not exceed 736 calendar days).

**2.1.5** All inspections, other than the daily inspection will be noted on Form F6180.49A (“Blue Form”) and must be checked for proper dates.

**2.1.6** Trains/Locomotives must not enter any Train Control System Territory with defective or cut out Train Control System or “Acknowledger” unless relieved by Rule, Special Instruction, General Order, Bulletin Order or other directive.

**2.1.7** The “Acknowledger” must be tested prior to entering any Train Control System territory. Perform test by briefly depressing the “Acknowledger” to verify sounding of the audible alarm.

# 5.0 TRAIN HANDLING

## 5.1 General

**5.1.1** This Instruction is intended to provide engineers with approved standards for operating Amtrak trains. It is designed for the Engineer to use these acceptable train handling techniques to maximize smooth handling, safe operation and conserve energy on our trains.

NOTE: Conductor must, at once, inform the Engineer when train handling is not smooth in order that technique may be changed.

**5.1.2** The following are some actions which will cause the most severe slack action at slow speeds and should be avoided except when absolutely necessary.

A. Sudden heavy brake application.

B. Sudden movement of throttle/controller to “Idle”, ”Off” or “Zero”.

**5.1.3** Engineer must handle train in a safe and fuel/energy efficient manner, taking full advantage of throttle modulation and dynamic braking where conditions permit.

**5.1.4** Engineer must be familiar with physical characteristics of the territory and plan ahead for action to be taken.

**5.1.5** The following factors will affect the slowing and stopping ability of trains: speed, weight, length of train, grade, weather conditions, brake pipe leakage, brake pipe gradient and operative brakes.

**5.1.6** Where conditions permit, slowdowns or stops should be made with not more than 15 psi total brake pipe reduction. This reduces in-train forces and provides reserve braking capability in the event that additional retardation is required.

**5.1.7** Prolonged use of locomotive air brakes or excessive brake cylinder pressure, especially at high speeds, is prohibited. Such action will cause burned and damaged brake shoes/pads and overheated wheels.

**5.1.8** During switching operations, throttle and independent brake must be handled in a manner that will permit slack to be adjusted smoothly.

**5.1.9** Dynamic Braking

A. Engineers must utilize dynamic brake on descending grades to control train speed when conditions permit. Engineers will carefully consider other locations where dynamic brake may be used without sacrificing schedule time or causing excessive buff or draft forces.

B. Dynamic brake must be used with consideration given to locomotive dynamic brake capability, train consist and physical characteristics of territory involved.

C. Exercise care by applying and releasing dynamic brake gradually to avoid unnecessary slack action.

D. When operating through turnouts and crossovers with more than 3 units in consist with effective dynamic brake, limit dynamic brake effort to 50% of maximum (dynamic controller position 4). Limit dynamic brake effort until one-third of train is through turnout or crossover.

E. Automatic brake may be used during dynamic braking. Ensure that locomotive brake cylinder pressure does not develop during the use of dynamic brake except as provided in 5.1.9 F.

**F.** Independent brake must NOT be applied during dynamic braking. If speed is less than 15 mph and dynamic brake effort is insufficient, the independent brake may be used to supplement dynamic braking effort. **Locomotive brake cylinder pressure must never exceed 15 psi while manual dynamic brake is applied.**

**5.1.10** Train Braking

A. Train braking must be handled in a manner that will ensure passenger safety and prevent damage to cars and lading, keeping brake shoe\pad, wheel wear, and fuel\energy consumption to a minimum.

B. Trains Other Than Mixed Consist - The procedures outlined in Section 5.2 will be used to slow or stop Trains Other Than Mixed Consist. When operating electric locomotives, do not use the procedures in Section 5.2.4 unless dynamic brake is inoperative.

C. Mixed Consist – The procedures outlined in Section 5.3 will be used to slow or stop Mixed Consist trains. In order to conserve fuel/energy, do not use the procedures in Section 5.3.6 unless train handling using other procedures in Section 5.3 cannot be done smoothly.

D. When equipped, Slow Speed Backing may be used in conjunction with the automatic brake when backing a train.

15. MU equipment – Perform a pneumatic emergency brake application from the automatic brake valve. Ensure that emergency application is transmitted through the entire train. Recover from emergency application.
16. Verify communication of brake pipe pressure changes at the rear of the train by use of gauge, Two-Way End of Train Device or observe application and release of brakes on rear unit.
17. Brake indicators may be used instead of directly observing the brake application/release at each car ONLY if a QP determines that direct observation poses a safety hazard. See definition of Brake Indicator.
    a. When using brake indicators, employees must position themselves in each car or as close as possible to each car to accurately observe each indicator.
    b. When using brake indicators to determine application/release at each car, indicators must change during application and release (plungers-in/out; lights-amber/green).

**P4.2.3** Class II Brake Test

A. Test Requirements

1. Whenever control stand is changed or air brake computer is de-energized (circuit breaker turned off).
2. When previously tested and inspected cars/locomotives are added to a passenger train.
3. When cars or equipment are removed from the train.
4. When Engineer first takes charge of train except for face-to-face relief.

NOTE: When any of the following occurs, it is considered FACE-TO-FACE RELIEF:

- When the inbound Engineer does not leave the equipment unattended and communicates with the outbound Engineer the condition of the brakes and the status (location) of the MAP 1173(s).
- When the inbound Conductor or Assistant Conductor does not leave the equipment unattended and communicates with the outbound Engineer the condition of the brakes and the status (location) of the MAP 1173(s).
- When a mechanical department employee who is a QMP or QP who participated in the required brake test does not leave the equipment unattended and communicates with the outbound Engineer the condition of the brakes and the status of the MAP 1173(s) (located on the locomotive, or in possession of conductor, etc.).

5. After any emergency application of brakes.
6. Where indicated by rule or special instructions.
7. When control valve or brakes are cut out.
8. After determining cause for brake pipe continuity loss (P8.1.2F), make Class II brake test using Two-Way End-of-Train device.
9. Any point where a brake pipe angle cock has been turned except when performing the Two-Way-End-Of-Train device emergency function test.

NOTE: Passenger trains must not depart a terminal or yard, which is a repair point, where a Class II brake test has been performed with brakes cutout, inoperative or defective. To determine a repair point for a particular train, contact CNOC mechanical desk either directly at 1-800-424-0217 or through the train dispatcher.

B. Test Procedure For Other Than High Speed Trainsets

1. Charge system to required pressure
2. Await signal to apply
3. 20 psi automatic brake reduction
4. Brakes apply on rear passenger equipment. It is permissible to verify application at the rear most wheel set/axle. Brake shoe/pad must be firmly seated against the wheel or disc.
5. Await signal to release
6. Brakes release on rear passenger equipment. It is permissible to verify release at the rear most wheel set/axle. Brake shoe/pad clearance must be observed.
7. MU equipment – Perform a pneumatic emergency brake application from the automatic brake valve. Ensure that emergency application is transmitted through the entire train. Recover from emergency application.

8. When rear passenger equipment is equipped with a device (gauge or EOT) capable of indicating/displaying brake pipe pressure, device **must** be used to determine application & release of brakes on rear passenger equipment.
9. When rear passenger equipment is NOT equipped with a gauge or EOT, brake indicators may be used instead of directly observing the brake application/release at rear car ONLY if a QP determines that direct observation poses a safety hazard. See definition of Brake Indicator.
    a. When using brake indicators, employees must position themselves in the rear car or as close as possible to the rear car to accurately observe each indicator.
    b. When using brake indicators to determine application/release at the rear car, indicators must change state during application and release (plungers-in/out; lights-amber/green).
10. Communicating signal and/or two-way radio system tested and operating.

C. Test Procedure For High Speed Trainsets
1. Engineer or QMP will apply Parking Brake
2. Engineer or QMP will charge system to required pressure
3. Engineer or QMP will open CB74 “EP Assist” circuit breaker on lead power car located on electrical locker No. 3
4. Conductor, Assistant Conductor, QP or QMP will give signal to apply air brakes.
5. Engineer, QP or QMP will make a 20 psi automatic brake reduction
6. Conductor, Assistant Conductor, QP or QMP observes 20 psi brake pipe pressure drop on MFD-2 of rear power car
7. Conductor, Assistant Conductor, QP or QMP will give signal to release air brakes.
8. Conductor, Assistant Conductor, QP or QMP observes brake pipe pressure restored on MFD-2 of rear power car
9. Engineer, or QMP will close CB74 “EP Assist” circuit breaker on lead power car located on electrical locker No. 3
10. Conductor, Assistant Conductor, QP or QMP will give signal to apply air brakes.
11. Engineer, QP or QMP will make a 20 psi automatic brake reduction
12. Conductor, Assistant Conductor, QP or QMP observes 20 psi brake pipe pressure drop on MFD-2 of rear power car
13. Conductor, Assistant Conductor, QP or QMP will give signal to release air brakes
14. Conductor, Assistant Conductor, QP or QMP observes brake pipe pressure restored on MFD-2 of rear power car
15. Engineer, Conductor, Assistant Conductor, QP or QMP will ensure that two-way radio system is tested and operating.

**NOTE:** When MFD-2 on the rear power car is inoperative, Conductor, Assistant Conductor, QP, or QMP will go to the MFDB screen in the Conductor’s office to observe the rear Power Car brake application and release. Simultaneously, a second employee assisting with the brake test (Conductor, Assistant Conductor, QP, or QMP) must observe the brake indicators (RED) on the rear Power Car for application and release of the brakes.

**P4.2.4** Running Brake Test

A. Test Requirements
1. After leaving initial terminal.
2. Any point where motive power, engine crew or train crew has been changed.
3. Any point where a brake pipe angle cock or end cock has been turned.
4. After any standing brake test has been made.
5. After striking debris on tracks.
6. Electro-pneumatic brake circuit cables between power units and/or cars are disconnected.
7. Periodically, when communication of the two-way end of train device fails en route.
8. When indicated by special instructions.

## Union Pacific

8. A running test of train air brakes must be made not more than three (3) miles before descending grades of 1.8% or greater.

# P6.0 EN ROUTE CONDITIONS

## P6.1 General

**P6.1.1** Inadequate Performance of Train Brakes

A. If brake performance is found to be inadequate for the brake application made, train must be stopped and a walking inspection of a brake application must be performed to determine cause.

B. If no defects are found, train may proceed, making periodic running brake tests.

C. When equipped with Two-Way End of Train Device, verify changes in brake pipe pressure at rear of train during running brake tests.

**P6.1.2** Failure To Maintain Required Pressure

A. If pressure required for safe handling of train cannot be maintained, train must be stopped, secured and train dispatcher notified.

B. If main reservoir pressure falls below 100 psi, immediately bring train to a safe stop.

C. **NOTE:** If brake pipe pressure falls below 50 psi, you will not be able to transmit an emergency application of the brakes.

**P6.1.3** Sticking Brakes

A. Train and engine crews must keep a lookout for brakes sticking on their train and on trains being met or passed.

B. They must advise one another of location in train of cars with sticking brakes.

C. Probable causes of sticking brakes:

1. Hand brake/parking brake not fully released.
2. Overcharged brake system.
3. Binding or fouling brake rigging.
4. Retaining valve not in release position.
5. Defective control valve.
6. Excessive brake pipe leakage.
7. Improper handling of ABV.

D. If brakes are stuck from improper handling of ABV, usually an additional heavy automatic brake reduction and release will correct condition.

**P6.1.4** If Train Breaks In Two

A. SHUT DOWN AND ISOLATE HEP, IF EQUIPPED, AS SOON AS POSSIBLE.

B. After train is re-coupled and brake system has been recharged, perform a Class II brake test.

C. After proceeding, as soon as speed of train permits, a Running Brake test must be made.

**P6.1.5** Reporting Defects – Report defects according to Instruction 9.1.1

**P6.1.6** Emergency Application

A. ABV initiated

1. Full emergency brake effort must be allowed to apply.
2. Leave handle in emergency until stopped.
3. Move throttle/controller to “Idle”/”Off”.
4. **NOTE:** It is acceptable to regulate locomotive brake cylinder pressure from an undesired emergency (UDE) brake application.

B. When equipped with Two-Way End-Of-Train device, engineer or other train crew members must activate the Two-Way End-Of-Train device using the “emergency” toggle switch when any emergency application occurs.

C. Conductor′s valve or back-up hose

1. Open valve quickly.
2. Leave valve open until stopped.
3. Do not attempt to release brakes until stopped.

D. Recovery from emergency after stopping

1. If conditions required use of conductor’s valve, caboose valve or back-up hose, reset it.
2. Move ABV to release.
3. Inspect ENTIRE train for derailed cars, shifted loads, etc.
4. Perform a Class II brake test.

E. After proceeding, a Running Brake test must be made.

**P6.1.7** Inoperative Locomotive Dynamic Brake

A. On locomotive so equipped, Engineer will be informed of the operational status of the dynamic brake when first taking charge of the train.

B. If the locomotive is found to have an inoperative dynamic brake reference section 2.7.13.

## P7.0 TRAIN CONTROL SYSTEMS

See 7.0 All Operations Section for instructions.

## P8.0 TWO-WAY END-OF-TRAIN DEVICE

## P8.1 Two-Way End-Of-Train Device

**P8.1.1** Device Components

A. A two-way end-of-train device consists of:
   1. A Locomotive Control Unit (LCU),
   2. An End-of-Train (EOT) Unit,
   3. The ability to monitor various train-related functions,
   4. The ability to initiate an emergency brake application from the rear of the train, and
   5. Satisfies the rear of train marker light requirement.

B. The LCU:
   1. Consists of a telemetry receiver/transmitter, provides displays and controls in the locomotive cab to monitor and communicate with the associated EOT, and,
   2. On G.E. locomotives so equipped, this information is displayed on the Integrated Function Display (IFD) screens.

C. The EOT:
   1. Consists of a telemetry transmitter/receiver attached to the rear of car coupler and brake pipe,
   2. Transmits information regarding brake pipe pressure, motion, battery condition and marker light status to the associated LCU, and,
   3. Responds to a radio signal command from the LCU to initiate an emergency brake application at the rear of the train.

**P8.1.2** Device Requirements

A. Amtrak passenger trains are **NOT** required to have a two-way end-of-train device, regardless of consist size, when:
   1. All cars in the train are equipped with an emergency brake valve readily accessible to a crew member, or,
   2. The rear car of the train is equipped with an emergency brake valve readily accessible to a crewmember in radio contact with the engineer.

B. Amtrak passenger trains must have an operable two-way end-of-train device whenever one or more of the following occurs:
   1. The train has 25 or more cars, and a crewmember does not have access to an emergency brake valve on the last car of the train.
   2. The train has 13 to 24 cars, and a crew member does not have access to an emergency brake valve on the last car of the front two-thirds (or further back) of the train consist.
   3. The train has 12 or fewer cars, and a crew member does not have access to an emergency brake valve on the last car of the front half (or further back) of the train consist.

4. Use the following table to determine if a two-way end-of-train device is required. If your train exceeds the maximum number of inaccessible cars on the rear, a two-way end-of-train device is required.

| Number of Cars in Train[1] | Two-Way End-of-Train Device is **NOT** Required If Crew Member Has Access to This Car[2] | Maximum Number of Inaccessible Cars on Rear |
|---|---|---|
| 1 | 1 | 0 |
| 2 | 1 | 1 |
| 3 | 2 | 1 |
| 4 | 2 | 2 |
| 5 | 3 | 2 |
| 6 | 3 | 3 |
| 7 | 4 | 3 |
| 8 | 4 | 4 |
| 9 | 5 | 4 |
| 10 | 5 | 5 |
| 11 | 6 | 5 |
| 12 | 6 | 6 |
| 13 | 9 | 4 |
| 14 | 10 | 4 |
| 15 | 10 | 5 |
| 16 | 11 | 5 |
| 17 | 12 | 5 |
| 18 | 12 | 6 |
| 19 | 13 | 6 |
| 20 | 14 | 6 |
| 21 | 14 | 7 |
| 22 | 15 | 7 |
| 23 | 16 | 7 |
| 24 | 16 | 8 |
| 25 or more | Rear | 0 |

- Count back from the locomotives (do not count any locomotive).

C. Location of Crew Members on Trains Not Equipped with a Two-Way End-of-Train Device: Crew members must take the following actions when a train, that is not required to be equipped with a two-way end-of-train device (due to meeting the criteria shown in the previous table), will descend a section of track on which the average grade is 2% or greater for at least two continuous miles:
   1. At least 10 minutes prior to descending the specified grade, the engineer must communicate with the conductor to ensure that a crew member with a working two-way radio is stationed in the rearmost car equipped with a readily accessible emergency brake valve when the train begins its descent.
   2. The crew member must remain stationed at this location, and remain in constant radio communication with the engineer, until the train has completely traversed the grade.
   3. EXCEPTION: This requirement does not apply to trains which have all cars in the train equipped with a readily accessible emergency brake valve, or to those in which the rear car has a readily accessible emergency brake valve.

D. EN ROUTE Failures:
   1. An EN ROUTE failure of the two-way end-of-train device is defined as the inability to initiate an emergency brake application from the rear of the train due to a communication failure or other reasons.
   2. A communication failure is considered a loss of communication between the LCU and EOT for a continuous period of 16 minutes and 30 seconds.
   3. NOTE: On G.E. locomotives so equipped, a communication failure is considered to have occurred when the " ONE WAY NO COMM" alarm light is displayed on the IFD screen for a ten minute duration.