Union Pacific Rules

Air Brake and Train Handling Rules

Effective January 20, 2012
Includes Updates as of July 2, 2013
PB-20329

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These rules become effective at 0001, Friday, January 20, 2012. At that time, all previous rules and instructions that are inconsistent with these rules become void.

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31.0: Locomotive Requirements Chapter 31
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GLOSSARY: Glossary

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  - 30.11: Air Brake Tests and Inspection Procedures
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  - 30.11.2: Brake Pipe Leakage Test
30.0: Train Air Brake Tests and Inspections

Rule Updated Date
February 12, 2013

30.1: Compliance with FRA Regulations

<table>
<thead>
<tr>
<th>30.1</th>
<th>Compliance with FRA Regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR</td>
<td>Inspect and test brake equipment in accordance with Federal Railroad Administration (FRA) regulations contained within these rules. This is the responsibility of the employee(s) who perform the work, unless otherwise instructed.</td>
</tr>
<tr>
<td>215.13</td>
<td>The status of the inspection/test must be communicated to the relieving crew verbally or by written notification left on the controlling locomotive.</td>
</tr>
<tr>
<td>232.1</td>
<td></td>
</tr>
</tbody>
</table>

Rule Updated Date
January 20, 2012

30.1.1: Qualified Inspectors

<table>
<thead>
<tr>
<th>30.1.1</th>
<th>Qualified Inspectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR</td>
<td>Inspections and air brake tests must be performed by either a &quot;Qualified Person&quot;, &quot;Qualified Mechanical Inspector&quot; or a &quot;Qualified Maintenance Person&quot; as specified by Federal Regulations.</td>
</tr>
<tr>
<td>232.203</td>
<td></td>
</tr>
</tbody>
</table>

Reference
Glossary

Rule Updated Date
January 20, 2012
30.2: General Requirements

30.2.1: Coupling and Securing Air Hoses

Before coupling air hoses between locomotives and/or cars, employees must:

- Shake debris out of the hoses.
- Blow all condensation from the locomotive brake pipe or yard air line.

30.2.2: Operative Brakes

These requirements apply to air brake tests and inspections:

- All cars must have operative air brakes.

Exceptions:

- Cars with defective air brakes may be moved for repairs when properly tagged on both sides by a Qualified Mechanical Inspector.
- Scale test cars are not required to be equipped with air brakes, but if equipped, the brakes must be operable.
- Brakes that fail enroute.
30.2.3: Employee in Charge During Air Brake Test

The employee performing the air brake test is in charge while the test is being conducted and must ensure that all other employees are safely positioned before beginning the test.

The employee in control of the air brakes must not apply or release brakes without permission from the employee performing the air brake test.

30.2.4: Standard Brake Pipe Pressure

Regulating valve must be set at 90-psi. (Passenger and Freight Equipment)

Note: When UP employees are operating foreign line passenger trains, they are governed by the foreign line's instructions.
30.2.5: Charging Air Brake System

When charging the system:

- Do not charge a train's air brake system with more than one automatic brake valve cut-in unless utilizing distributed power locomotives.
- If main reservoir pressure falls below 100-psi, engine RPM may be increased but is not to exceed throttle position 2.
- If using a remote control locomotive, use the charge feature on the remote control transmitter.

In yards where trains are made up, when unattended locomotives are used to charge the brake system, the automatic brake valve may be left in release position.

Rule Updated Date

July 2, 2013

30.2.6: Air Brake Tests Using Gauge or End-of-Train Device

When required to determine brake pipe pressure at rear of train, any of the following devices may be used:

- An accurate gauge.
- An EOT.
- A distributed power locomotive.

To determine that the brakes apply and release on the rear car, the requirement is considered fulfilled when either an EOT or power consist attached to the rear of the train indicates the following:

- Brakes are applied when brake pipe pressure decreases by at least 5-psi.
- Brakes are released when brake pipe pressure increases by at least 5-psi.

Rule Updated Date

January 20, 2012
### 30.3: Initial Terminal Air Brake Test (Class I Air Brake Test)

**Rule Updated Date**

January 20, 2012

### 30.3.1: Initial Terminal Air Brake Test (Class I) Requirements

<table>
<thead>
<tr>
<th>30.3.1</th>
<th>Initial Terminal Air Brake Test (Class I) Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 232.205</td>
<td><strong>A.</strong> Test Must be Conducted Where:</td>
</tr>
<tr>
<td>Reference Rule 1.33</td>
<td>• Train is originally assembled.</td>
</tr>
<tr>
<td>30.10.1</td>
<td>• Train consist (including train received in interchange) is changed by other than one or more of the following:</td>
</tr>
<tr>
<td>30.11.1</td>
<td>a. Adding one solid block.</td>
</tr>
<tr>
<td>30.11.2</td>
<td>b. Removing one solid block.</td>
</tr>
<tr>
<td>Glossary</td>
<td>c. Removing defective cars.</td>
</tr>
<tr>
<td></td>
<td>d. Repositioning cars to meet hazardous material or restricted car placement requirements.</td>
</tr>
<tr>
<td></td>
<td>e. Changing locomotive consist(s).</td>
</tr>
<tr>
<td></td>
<td>or</td>
</tr>
<tr>
<td></td>
<td>• A unit or cycle train has traveled 3,000 miles since its last Initial Terminal Air Brake Test, Class I.</td>
</tr>
<tr>
<td></td>
<td><strong>B.</strong> Test Must be Conducted on a Portion of the Train or Cars Added to the Train When:</td>
</tr>
<tr>
<td></td>
<td>• Car(s) added are not a solid block.</td>
</tr>
<tr>
<td></td>
<td>• A portion of the train has been off air for more than 4 hours.</td>
</tr>
<tr>
<td></td>
<td>• A solid block of cars being added to the train is composed of cars from more than one previous train.</td>
</tr>
<tr>
<td></td>
<td>• Cars added from a previous train have not remained continuously and consecutively coupled with the train line remaining connected unless:</td>
</tr>
<tr>
<td></td>
<td>a. Removing defective equipment from the solid block.</td>
</tr>
<tr>
<td></td>
<td>b. Separated into multiple solid blocks due to space or trackage constraints.</td>
</tr>
<tr>
<td></td>
<td>Cars must be re-coupled in the same relative order as removed.</td>
</tr>
</tbody>
</table>
30.3.2: Initial Terminal Air Brake Test (Class I) Procedure

When performing an Initial Terminal Air Brake Test (Class I), comply with the procedures outlined in Rule 30.10.1.

30.3.3: Initial Terminal Air Brake Test (Class I) Notification

The engineer and conductor must know they have the required written notification that an Initial Terminal Air Brake Test (Class I) was performed on their entire train. Notification will be left on the controlling unit and will include:

- Name of inspector.
- Date and time test was completed.
- Location where test was performed.
- Number of cars inspected.

Written notification may be provided to the engineer and conductor by:

- Air Brake Test Form at the initial terminal.
- Electronic means in the space provided on the train documentation.

or

- Information may be communicated to the engineer or conductor that the test has been completed and entered on the Air Brake Test Form or on space provided on train documentation.
If the test was performed by train crew members, the required information must be entered on an Air Brake Test Form, if available, or in space provided on the train documentation by the conductor or engineer.

Note: When there is a conflict between train documentation and the Air Brake Test Form, the Air Brake Test Form will govern.

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**30.3.4: Cycle Trains**

<table>
<thead>
<tr>
<th>30.3.4</th>
<th>Cycle Trains</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>49 CFR</strong></td>
<td>Cycle trains must meet the following conditions:</td>
</tr>
<tr>
<td>232.205</td>
<td>- Not to be operated more than 3,000 miles before another Initial Terminal Air Brake Test (Class I) is required.</td>
</tr>
<tr>
<td>232.207</td>
<td>- 1,000 Mile Inspection (Class IA) must be performed each 1,000 miles.</td>
</tr>
</tbody>
</table>

Reference Rule 30.3.5

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**30.3.5: Trains Designated as Extended Haul**

<table>
<thead>
<tr>
<th>30.3.5</th>
<th>Trains Designated as Extended Haul</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>49 CFR</strong></td>
<td>Trains designated as Extended Haul must be given an Initial Terminal Air Brake Test (Class I) performed by a Qualified Mechanical Inspector at the initial terminal.</td>
</tr>
<tr>
<td>232.213</td>
<td>These trains must not:</td>
</tr>
</tbody>
</table>

Reference Rule 30.1.1

- Operate more than 1,500 miles before an additional air brake test is performed.
- Make more than one pick up and one set out between the initial terminal and the next designated inspection point, excluding set out of defective equipment.
- Move any cars with defective equipment, regardless of whether tagged appropriately.
Any cars or solid block of cars added enroute must be given an Initial Terminal Air Brake Test (Class I) by a Qualified Mechanical Inspector (either at the time of pick up or pretested) at the location the cars are added.

Rule Updated Date
January 20, 2012

30.3.6: Attaching Locomotive to Cars Previously Class I Tested Using Yard Air or Other Locomotive

<table>
<thead>
<tr>
<th>30.3.6</th>
<th>Attaching Locomotive to Cars Previously Class I Tested Using Yard Air or Other Locomotive</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR</td>
<td>232.205</td>
</tr>
<tr>
<td></td>
<td>232.217</td>
</tr>
<tr>
<td>Reference Rule 30.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30.3.1</td>
</tr>
</tbody>
</table>

After locomotive is attached, one of the following procedures must be used:

- If cars have been off air 4 hours or less and yard air or locomotive pressure setting was 90 psi, then perform Application and Release Test (Class III). If train has been off air more than 4 hours, perform a Rule 30.3 (Initial Terminal Air Brake Test, Class I) on the entire train.

**Note:** When attaching locomotive to the opposite end of air source, an overcharged condition may occur. To correct condition, comply with Rule 32.5.1 prior to performing air test.

Rule Updated Date
January 20, 2012

30.4: 1,000 Mile Inspection Tests (Class IA Brake Test)

| 30.4 1,000 Mile Inspection Tests (Class IA Brake Test) |

Rule Updated Date
January 20, 2012

30.4.1: 1,000 Mile Inspection Tests (Class IA Brake Test)
### 30.4.1

49 CFR
232.207

Reference Rule
30.10.1

| 1,000 Mile Inspection Tests (Class IA Brake Test) |
| At designated locations, comply with procedures outlined by Rule 30.10.1. |

**Rule Updated Date**
January 20, 2012

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### 30.5: Transfer Train Movement Air Test

**30.5 Transfer Train Movement Air Test**

**Rule Updated Date**
January 20, 2012

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### 30.5.1: Transfer Train Movement Air Test

| 30.5.1 |
| 49 CFR |
| 232.215 |

Reference Rule
30.10.1

| Transfer Train Movement Air Test |
| A train making transfer movements not exceeding 20 miles in one direction is considered a transfer train. Intermediate switching is permitted enroute. Comply with the procedures outlined in Rule 30.10.1. |

**Rule Updated Date**
January 20, 2012

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### 30.6: Test When Cutting Off and Recoupling

**30.6 Test When Cutting Off and Recoupling**

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30.6.1: Test When Cutting Off and Recoupling

Before proceeding when a train is uncoupled and recoupled in 4 hours or less:

- Restore brake pipe pressure as indicated by gauge or device at the rear end of the train.
  
  or
  
- Verify that the brakes on rear car apply and release from a 20-psi brake pipe reduction.

If more than 4 hours, conduct a Rule 30.3.1 (Initial Terminal Air Brake Test, Class I) or a Rule 30.5.1 (Transfer Train Movement Air Test)—whichever applies to the type of test previously performed on those cars that did not remain charged.

30.7: Application and Release Test (Class III Brake Test)

Test must be conducted when:

- Restore brake pipe pressure as indicated by gauge or device at the rear end of the train.
  
  or
  
- Verify that the brakes on rear car apply and release from a 20-psi brake pipe reduction.
49 CFR
232.211
Reference Rule
30.3
30.3.6
30.10.1
33.6

- Any change is made to a locomotive consist.
- A caboose is changed.
- Picking up a block of previously tested cars that have not been off air for more than 4 hours.
- Helper locomotives are added anywhere in the train or removed from other than the rear end of the train.
- One or more consecutive cars are set out of the train.
- Defective equipment is set out of train.

or

- Rearranging previously tested cars in train for hazardous materials, train make-up, or helper placement.

Comply with the procedures outlined in Rule 30.10.1

Rule Updated Date
January 20, 2012

30.8: Inbound Train Inspection

Rule Updated Date
January 20, 2012

30.8.1: Inbound Train Inspection

<table>
<thead>
<tr>
<th>30.8.1</th>
<th>Inbound Train Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Rule 32.1.3</td>
<td>Make a 70-psi brake pipe reduction at terminals where the Mechanical Department will make immediate air brake inspections and repairs after locomotives are detached.</td>
</tr>
</tbody>
</table>

Rule Updated Date
January 20, 2012
### 30.9: Train Information

**Rule Updated Date**

January 20, 2012

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### 30.9.1: Train Information

<table>
<thead>
<tr>
<th>30.9.1</th>
<th>Train Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>49 CFR 232.211</strong></td>
<td>A train crew taking charge of its train will be provided a train consist. If a consist is not available or if the consist does not include all the following, the information may be provided by other means:</td>
</tr>
<tr>
<td>1. Weight and length of the train.</td>
<td></td>
</tr>
<tr>
<td>2. Weight distribution of train, if necessary, for proper train handling.</td>
<td></td>
</tr>
<tr>
<td>3. Information related to car or locomotive defects.</td>
<td></td>
</tr>
<tr>
<td>4. If train air brake test, i.e., Class I or Class IA, is required prior to next crew change point.</td>
<td></td>
</tr>
</tbody>
</table>

**Rule Updated Date**

January 20, 2012

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### 30.10: Air Brake Test and Inspection Charts/49 CFR 232

**Rule Updated Date**

January 20, 2012

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### 30.10.1: Air Brake Test Requirements
<table>
<thead>
<tr>
<th>Type of Test</th>
<th>Perform safety inspection per Rule 1.33</th>
<th>Charge system to at least 75-psi at rear of train as indicated by gauge or device.</th>
<th>Leakage test as required per rule 30.11.2</th>
<th>20-psi brake pipe reduction</th>
<th>Brake application and inspection per rule 30.11.1</th>
<th>Release brakes and check release&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Brake pipe pressure being restored as indicated by gauge or device at rear of train</th>
<th>Brake test notification required</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.3 Class I</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>30.3.5 Ext. Haul&lt;sup&gt;2&lt;/sup&gt;</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>30.3.1/30.3.5&lt;sup&gt;2&lt;/sup&gt; Car added enroute</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>30.4.1 Class IA</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>30.5.1 Transfer Train&lt;sup&gt;3&lt;/sup&gt;</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>30.6.1 Recoupling</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>30.7.1 Class III</td>
<td>X</td>
<td>X&lt;sup&gt;4&lt;/sup&gt;</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

<sup>1</sup>Rolling release inspection may be made not exceeding 10 MPH.

<sup>2</sup>Cars must be inspected by a Qualified Mechanical Inspector.

<sup>3</sup>Cars added enroute must be tested as required by Rule 30.5.1. When cars are set out—determine that brake pipe pressure at the rear car has been restored.

<sup>4</sup>Required when cars were previously tested from a Yard Test Plant.

<sup>5</sup>Class III rear car brake requirements are considered fulfilled when brake pipe pressure is decreased by 5 psi and increased by 5 psi per Rule 30.2.6.

**Rule Updated Date**

January 20, 2012
30.11: Air Brake Tests and Inspection Procedures

Rule Updated Date
January 20, 2012

30.11.1: Brake Inspection Requirements

<table>
<thead>
<tr>
<th>30.11.1</th>
<th>Brake Inspection Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 232.205</td>
<td>Inspect both sides of the cars while performing the air brake test to determine that:</td>
</tr>
<tr>
<td></td>
<td>• Angle cocks are properly positioned.</td>
</tr>
<tr>
<td></td>
<td>• Air hoses are in condition for service and properly coupled.</td>
</tr>
<tr>
<td></td>
<td>• Air brake system leakage is minimal; if necessary, make repairs to reduce leakage.</td>
</tr>
<tr>
<td></td>
<td>• Retaining valves are in exhaust (EX) position.</td>
</tr>
<tr>
<td></td>
<td>• Piston travel meets the following requirements:</td>
</tr>
<tr>
<td></td>
<td>• Comply with requirements as outlined by stenciling or badge plate.</td>
</tr>
<tr>
<td></td>
<td>• Truck-mounted brake piston travel must be within the limits of the travel indicator when brakes are set and provide brake shoe clearance when brakes are released.</td>
</tr>
<tr>
<td></td>
<td>or</td>
</tr>
<tr>
<td></td>
<td>• Body-mounted brake requirements:</td>
</tr>
<tr>
<td></td>
<td>• Class I air brake test must be between 6 and 9 inches when brakes are set.</td>
</tr>
<tr>
<td></td>
<td>• Class IA and Transfer Train Test, piston travel must be between 6 and 10 1/2 inches. When piston travel exceeds 10 1/2 inches it is no longer considered an operative brake.</td>
</tr>
<tr>
<td></td>
<td>• Brakes are applied and remain applied until signal is given to release the brakes. If any car's brakes release prior to signal being given to release the brakes, then that car may be retested once. On retest, the brakes must remain applied for at least 3 minutes.</td>
</tr>
<tr>
<td></td>
<td>• Brake rigging does not bind or foul.</td>
</tr>
<tr>
<td></td>
<td>• All parts of the brake equipment are properly secured.</td>
</tr>
</tbody>
</table>
## Brake Pipe Leakage Test

<table>
<thead>
<tr>
<th>30.11.2</th>
<th>Brake Pipe Leakage Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 232.205</td>
<td>When a leakage test is required per Rule 30.10.1, use one of the following methods:</td>
</tr>
<tr>
<td>Reference Rule 30.10.1</td>
<td></td>
</tr>
</tbody>
</table>

**A. Air Flow Method (AFM)**
To qualify a non-DP train's air brake system, use AFM as follows:

- The controlling locomotive must be equipped with an AFM indicator with a direct reading of air flow in increments no greater than 10 cubic feet per minute (CFM).
- After charging the brake system to at least 75-psi, air flow must not exceed 60 CFM. If air flow exceeds 60 CFM, then the train must be inspected for leakage. Once the leakage is corrected, the train must be re-tested.

**B. Brake Pipe Leakage Method**
If unable to use AFM, conduct a brake pipe leakage test as follows:

1. Charge the brake system to at least 75-psi.
2. After the signal is received, reduce brake pipe pressure by 20-psi.
3. After the brake pipe exhaust stops, wait 1 minute.
4. Cut-out the automatic brake valve, and then wait an additional minute for brake pipe pressure to equalize.
5. Time the brake pipe leakage for 1 minute. If the leakage does not exceed 5-psi, then the test is complete. If the leakage exceeds 5-psi, then the train must be inspected; the leakage must be corrected, and the train must be re-tested.
6. After receiving the proper signal, release the brakes.

**C. Distributed Power Trains**
The Distributed Power system's automated brake pipe leakage function must be used when checking leakage on DP trains.
Union Pacific Rules
Air Brake and Train Handling Rules

31.0: Locomotive Requirements Chapter 31

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- 31.4: Standard Air Pressure
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- 31.6.2: Locomotive Consist Limits
- 31.6.3: Hostling Locomotive
- 31.6.4: Moving Locomotives within Mechanical Department Limits
- 31.6.5: Turntable
- 31.7: Locomotive Placement
- 31.7.1: Locomotive Alignment Control
- 31.8: Locomotive Inspections and Procedures
- 31.8.1: Conducting a Locomotive Daily Inspection
- 31.8.2: Changing Operating Ends Procedure
- 31.8.3: Light Engine Setup
- 31.8.4: Procedure for Conducting Locomotive Consist Air Brake Test
- 31.8.4.1: Light Engine Running Air Brake Test
- 31.8.4.2: Remote Control Light Engine Running Air Brake Test
- 31.8.4.3: Electronic Alertness Control Device (Alerter) Test
### 31.0: Locomotive Consist Requirements

**Rule Updated Date**

January 20, 2012

### 31.1: Taking Charge of Locomotive Consist

<table>
<thead>
<tr>
<th>31.1</th>
<th>Taking Charge of Locomotive Consist</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 218.55 218.57 229.23</td>
<td>Engineers are responsible for the following:</td>
</tr>
<tr>
<td>Reference Rule 31.8 31.8.4.3</td>
<td></td>
</tr>
<tr>
<td><strong>Locomotive Safety Devices</strong></td>
<td></td>
</tr>
<tr>
<td>Inspect that required safety devices and systems are cut-in and sealed on lead controlling locomotive for the route to be used except:</td>
<td></td>
</tr>
<tr>
<td>- When a safety device becomes defective enroute.</td>
<td></td>
</tr>
<tr>
<td>or</td>
<td></td>
</tr>
<tr>
<td>- During drag loading/unloading operations under 5 MPH.</td>
<td></td>
</tr>
</tbody>
</table>

When the controlling locomotive on the lead consist is equipped with an Electronic Alertness Control Device (alerter), the device must be tested per Rule 31.8.4.3 prior to departure from a train's initial terminal, or when the controlling locomotive is changed enroute, to ensure that a penalty brake application of the locomotive brakes will occur if the warning timing cycle expires. If a penalty brake application does not occur, the locomotive must not be used as a controlling locomotive.
Note: Does not apply to Commuter Trains and Yard Switching Operations.

If a safety device becomes defective enroute, inform the train dispatcher and Mechanical Department as soon as possible.

Do not cut-out, tamper with, or disable a safety device without proper authorization or unless authorized by rule. When a locomotive is enroute, this authorization may come from the train dispatcher, mechanical supervisor, or other manager.

### Rule Updated Date
July 2, 2013

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#### 31.2: Locomotive Inspections

**31.2 Locomotive Inspections**

**Rule Updated Date**
January 20, 2012

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#### 31.2.1: Inspection Requirements

<table>
<thead>
<tr>
<th>31.2.1</th>
<th>Inspection Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>When locomotive inspection forces are not immediately available, an engineer taking charge of a locomotive must know that the brakes are in operating condition.</td>
</tr>
<tr>
<td></td>
<td>The engineer is responsible for ensuring that each locomotive in his charge, including locomotive(s) picked up enroute, is inspected each day the locomotive is in service. Determine if the locomotive needs to be inspected by checking the locomotive daily inspection card in each locomotive cab. The card will indicate the date and time of the last daily inspection.</td>
</tr>
<tr>
<td></td>
<td><strong>Exception</strong>: On a multiple-locomotive consist, the engineer may assume that all trailing locomotives in the consist and any distributed power locomotives in the train were inspected on the same date as the locomotive daily inspection card on the controlling locomotive.</td>
</tr>
<tr>
<td></td>
<td><strong>A. Inspected Previous Calendar Day</strong></td>
</tr>
<tr>
<td></td>
<td>If the locomotive daily inspection card indicates that the locomotive was inspected the previous calendar day, then complete the current daily inspection before the end of the tour of duty. The</td>
</tr>
</tbody>
</table>
engineer may be relieved from requirements to perform a daily inspection when instructions provide for mechanical forces to make the inspection.

Ensure that the Electronic Locomotive Inspection Report is completed.

Inspection should be performed during daylight hours when possible.

**B. Not Inspected Previous Calendar Day**

If the locomotive daily inspection card indicates that the locomotive was not inspected during the previous day, or if there is no record on the locomotive, inspect the locomotive before it is placed into service on the current day.

**C. Locomotive Picked Up Enroute**

When picking up a locomotive on line, the engineer must determine which locomotives will require a daily inspection. No locomotive in resulting consist may have a date older than the lead controlling locomotive.

**D. Locomotive Set Out on Line**

When setting out a locomotive on line that was inspected on the previous calendar day, inspect the locomotive, unless notified that the locomotive will be inspected by the Mechanical Department.

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**Rule Updated Date**

January 20, 2012

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**31.2.2: Complete Required Daily Inspection Forms**

| 31.2.2 | Complete Required Daily Inspection Forms |
| 49 CFR 229.21 | Locomotive Inspection Report |

Complete an Electronic Locomotive Inspection Report for each locomotive inspected.

The locomotive daily inspection card must include the following information:

- Date.
- Location.
- Time.
- Complying or non-complying (check appropriate box).
- Union Pacific employee number. Legible signatures may be used by other than Union Pacific employees.

The locomotive daily inspection card must remain in the holder in the locomotive cab.
31.2.3: Event Recorder/Track Image Recorder

<table>
<thead>
<tr>
<th>31.2.3</th>
<th>Event Recorder/Track Image Recorder</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Only authorized personnel may remove the recorder data pack or download recorder data.</td>
</tr>
</tbody>
</table>

31.2.4: Speed Indicator

<table>
<thead>
<tr>
<th>31.2.4</th>
<th>Speed Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 229.117</td>
<td>A. Speed Indicator Test</td>
</tr>
<tr>
<td></td>
<td>The engineer must test the speed indicator of the controlling locomotive using identified test miles or mile posts as soon as possible after departure.</td>
</tr>
</tbody>
</table>

**B. Operative Speed Indicator**

A locomotive used as a controlling unit at speeds above 20 MPH must be equipped with an operative speed indicator.

Speed indicator requirements:

- Locomotive speed indicators must be accurate within:
  - ±3 MPH at speeds between 10 and 30 MPH.
  - ±5 MPH at speeds above 30 MPH.

**Note:** A speed indicator that exceeds the above tolerances must be handled as a non-complying condition found enroute.

**C. Speed Indicator Fails Enroute**

If a speed indicator on a controlling locomotive fails enroute, the locomotive may continue as a controlling locomotive at normal track speed only to the next facility where repairs can be made or until the locomotive is due a daily inspection, whichever occurs first. Movement beyond a facility where repairs can be made or location where daily inspection was conducted must not exceed 20 MPH.
31.2.5: Locomotive with Non-complying Condition Safe to Move

A. During the locomotive daily inspection, if a non-complying condition is discovered, it may be moved only:

- As a single locomotive under power not attached to cars.
- In a locomotive consist not attached to cars.
- If isolated or shut down when attached to cars.

Exceptions:

- A controlling locomotive found with defective speed indicator during daily inspection may be operated under power attached to cars not exceeding 20 MPH.
- Locomotives found with any of the following defects during the daily inspection may be operated under power attached to cars as a trailing locomotive:
  - Inoperative headlights.
  - Both ditch lights inoperative.
  - Inoperative horn or bell.
  - Defective speed indicator.
  - Window cracks that obscure view.
  - Cab seats not properly secured.
  - Inoperative automatic or independent brake controls.
  - Inoperative electronic alertness control device on lead locomotive.

Prior to moving a non-complying locomotive, perform the following:

1. Complete a non-complying locomotive tag, and attach it to the isolation switch of the non-complying locomotive. The tag must include the following information:
   - "Non-complying locomotive" written on the tag.
   - Locomotive initials and number.
   - Name of the inspecting railroad.
   - Inspection location and date.
   - Nature of the defect.
   - Movement restrictions, if any.
   - Destination.
• Signature of the employee making the inspection.

2. Secure a copy of the non-complying tag on the control stand of the controlling locomotive.

3. Make sure the engineer in charge of the locomotive movement receives written notification of the non-complying locomotive (A copy of a non-complying locomotive tag meets this requirement.). The engineer must inform all other crew members of the non-complying unit and of any restrictions.

4. Notify the train dispatcher/Mechanical Help Desk, yardmaster, or other proper authority.

However, a locomotive may be moved as a single or dead unit within a yard solely for repairs, not to exceed 10 MPH, without complying with Items 1, 2, and 3 listed above.

**B. Non-complying Condition Found Enroute**

A locomotive that develops a non-complying condition enroute may continue operating if the engineer or other qualified employee determines the locomotive is safe to move. The locomotive may be operated at normal speed until the next daily inspection or until it reaches the nearest point where repairs can be made, whichever occurs first.

The engineer must:

- Apply a non-complying tag to the isolation switch on the non-complying locomotive and the controlling locomotive.
- Report non-complying conditions to the train dispatcher/Mechanical Help Desk as soon as possible.
- Notify the relieving engineer of any non-complying conditions when possible.


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### Rule Updated Date

July 2, 2013

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#### 31.2.6: Defects Other than Non-complying Conditions

<table>
<thead>
<tr>
<th>31.2.6</th>
<th>Defects Other than Non-complying Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Report all defects through the Electronic Locomotive Inspection Report for each locomotive in the consist. A locomotive that is not loading properly must be reported to the Dispatcher/Mechanical Help Desk.</td>
</tr>
<tr>
<td></td>
<td>Examples of a defect or problem that is not a non-complying condition include:</td>
</tr>
<tr>
<td></td>
<td>- Weather stripping is defective.</td>
</tr>
<tr>
<td></td>
<td>- Windshield wipers are not working.</td>
</tr>
</tbody>
</table>
31.2.7: Major Internal Defects

If a locomotive has a major internal defect, shut down the engine and do not restart until inspected by mechanical forces.

Report condition to Dispatcher/Mechanical Help Desk, and fill out a "Non-Complying Locomotive" tag. Attach the tag near the engine starting control.

If instructed to set out locomotive, leave the locomotive where mechanical personnel can access it, when possible.

31.3: Locomotive Air Brake Tests

31.3.1: Locomotive Consist Air Brake Test Requirements

- One headlight bulb is burned out.
- Ground relay is tripped.
- Safety valve on the air compressor or main reservoir is popping off.
Conduct a locomotive air brake test when:

- Making up a locomotive consist.
- Adding locomotive to a consist.
- Other than rear locomotive is removed from consist.
- Locomotive consist is rearranged.

or

- Changing operating ends.

**Rule Updated Date**

January 20, 2012

**31.4: Standard Air Pressure**

**31.4 Standard Air Pressure**

**Rule Updated Date**

January 20, 2012

**31.4.1: Standard Locomotive Air Pressures**

**31.4.1 Standard Locomotive Air Pressures**

Before initiating movement, ensure that air pressures are as follows:

- Main reservoir pressure is 120 to 140-psi.
- Locomotive brake cylinder pressure must be adjusted to pressure indicated on badge plate.

**Note:** Foreign line locomotives may require different main reservoir and brake cylinder pressures.

**Rule Updated Date**

January 20, 2012
31.5: Dynamic Brake/Locomotive Warnings

Rule Updated Date
January 20, 2012

31.5.1: Dynamic Brakes

<table>
<thead>
<tr>
<th>49 CFR 232.109 Reference Rule 31.8.1</th>
<th>Dynamic Brakes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Controlling Dynamic Brake</td>
<td>On train movements equipped with operative dynamic brakes, the lead controlling locomotive must have:</td>
</tr>
<tr>
<td></td>
<td>• An operative dynamic brake.</td>
</tr>
<tr>
<td></td>
<td>or</td>
</tr>
<tr>
<td></td>
<td>• The ability to control the operative dynamic brakes of trailing locomotives in a consist and an operative accelerometer that displays current change in speed or predicted change in speed in miles per hour per minute.</td>
</tr>
<tr>
<td>Note: The above requirement would not apply to low-speed yard and transfer movements on level or near level grade.</td>
<td></td>
</tr>
<tr>
<td>B. Controlling Dynamic Brake – Enroute Failure</td>
<td>May continue operating as the lead locomotive if:</td>
</tr>
<tr>
<td></td>
<td>• The engineer or other qualified employee determines the train is safe to move.</td>
</tr>
<tr>
<td></td>
<td>• The train may then be operated at normal speed until:</td>
</tr>
<tr>
<td></td>
<td>• The train reaches the nearest repair point.</td>
</tr>
<tr>
<td></td>
<td>or</td>
</tr>
<tr>
<td></td>
<td>• The lead locomotive can be replaced.</td>
</tr>
<tr>
<td>C. Locomotives with Inoperative Dynamic Brakes</td>
<td>Inoperative dynamic brake:</td>
</tr>
<tr>
<td></td>
<td>• Must be individually tagged, and an additional defect tag must be left on the controlling locomotive as information to the locomotive engineer.</td>
</tr>
<tr>
<td></td>
<td>• Information may be shown on train consist.</td>
</tr>
<tr>
<td>Tag indicating inoperative dynamic brakes should include the following information:</td>
<td></td>
</tr>
</tbody>
</table>
Dynamic brakes cut-out to comply with dynamic brake axle limitations are not considered inoperative brakes.

### Rule Updated Date

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#### 31.5.2: Dynamic Brake Warning Light

<table>
<thead>
<tr>
<th>49 CFR 229.115</th>
<th>Dynamic Brake Warning Light</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If the Dynamic Brake Warning Light illuminates, reduce the dynamic brake until the light goes out.</td>
</tr>
<tr>
<td></td>
<td>If condition continues, cut-out the dynamic brake on defective unit.</td>
</tr>
</tbody>
</table>

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#### 31.5.3: Wheel Slip Warning Light

<table>
<thead>
<tr>
<th>49 CFR 229.115</th>
<th>Wheel Slip Warning Light</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If the wheel slip light is illuminated, reduce power or dynamic brake until the light goes out. If light does not go out:</td>
</tr>
<tr>
<td></td>
<td>• Ensure that wheels are rotating freely.</td>
</tr>
<tr>
<td></td>
<td>• If wheels rotate freely and wheel slip light remains on during throttle reduction, isolate affected locomotive.</td>
</tr>
<tr>
<td></td>
<td>• If the wheels do not rotate freely, notify the dispatcher and set out the locomotive.</td>
</tr>
</tbody>
</table>

**WARNING:** A wheel slip light continuously illuminated for 6–8 seconds or longer at speeds above 15 MPH may indicate a locked wheel or a slipped pinion gear. Should this occur, stop and determine that all wheels rotate freely.
31.6: Moving Locomotives

31.6.1: Moving Light Locomotive Consists

<table>
<thead>
<tr>
<th>31.6.1</th>
<th>Moving Light Locomotive Consists</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Operate a light locomotive consist from the cab nearest the direction of travel when any one of the following conditions exists:</td>
</tr>
<tr>
<td></td>
<td>• Distance to be traveled exceeds 2 miles.</td>
</tr>
<tr>
<td></td>
<td>• A member of the same crew does not control movement using hand signals or radio.</td>
</tr>
<tr>
<td></td>
<td>or</td>
</tr>
<tr>
<td></td>
<td>• Visibility is impaired.</td>
</tr>
</tbody>
</table>

Exceptions: This may not be required when it is necessary to maintain a DP link when moving a locomotive to train or when other operating conditions prevent occupying the cab nearest the direction of travel.

31.6.2: Locomotive Consist Limits

<table>
<thead>
<tr>
<th>31.6.2</th>
<th>Locomotive Consist Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Rule 31.8.3</td>
<td>Limit freight trains to eight locomotives on the lead consist. The maximum of eight locomotives includes units that are:</td>
</tr>
</tbody>
</table>
Train management may authorize up to 10 locomotives in the lead consist on freight trains but must not exceed power axle and dynamic brake limitations.

The eight locomotive limit does not apply to power transfers. Limit power transfers to a maximum of 25 locomotives.

Do not move or switch more than eight coupled locomotives within locomotive servicing facilities. This includes movements between service tracks and train yards.

**31.6.3: Hostling Locomotive**

Multiple locomotive consists may be moved within a terminal area with only the brake pipe connected, provided the speed does not exceed 10 MPH.

Perform the following inspection and test before the initial movement of locomotives coupled together and whenever locomotives are added or the controlling locomotive is changed:

1. Brake pipe is connected and angle cocks are open between each locomotive.
2. Automatic brake valve must be cut-out on all locomotives coupled together except the controlling locomotive.
3. Independent brake valve must be cut-in on the lead unit on each consist and handle in release.
4. Allow brake pipe to charge.
5. Perform a standing brake test as follows:
   a. Make a 10-psi service brake application.
   b. Ensure that sufficient locomotive brakes apply for safe movement.
      **Note:** Brakes may not apply on locomotives that are shut down unless the dead engine feature is cut-in.
   c. Release the automatic brake application.
   d. Ensure brakes release on each locomotive.
31.6.4: Moving Locomotives within Mechanical Department Limits

<table>
<thead>
<tr>
<th>31.6.4</th>
<th>Moving Locomotives within Mechanical Department Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>When moving locomotives within Mechanical Department limits:</td>
</tr>
<tr>
<td></td>
<td>1. Charge and properly position brake equipment before moving the controlling locomotive.</td>
</tr>
<tr>
<td></td>
<td>2. On controlling locomotive, apply and release locomotive brakes to verify that brake cylinder pistons are operating and brake cylinder lines to trucks are not cut-out.</td>
</tr>
</tbody>
</table>

31.6.5: Turntable

<table>
<thead>
<tr>
<th>31.6.5</th>
<th>Turntable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Do not move on or off a turntable unless correctly lined and locked.</td>
</tr>
</tbody>
</table>

31.7: Locomotive Placement

| 31.7 Locomotive Placement |
# 31.7.1: Locomotive Alignment Control

<table>
<thead>
<tr>
<th>LOCOMOTIVE PLACEMENT TABLE</th>
<th>Locomotives Equipped for MU</th>
<th>Locomotives Not Equipped for MU.</th>
</tr>
</thead>
<tbody>
<tr>
<td>UP and Foreign Line/Waybilled Locomotives with Alignment Control</td>
<td>When running, they may be placed anywhere in consist. If shutdown or isolated, place behind lead consist and MU.</td>
<td>Couple directly behind lead consist and set-up by Mechanical Department.</td>
</tr>
<tr>
<td>UP Locomotive without Alignment Control</td>
<td>When consist has locomotives with alignment control, they must be placed second in consist, one per train when handling cars.</td>
<td>Shut down and place between the tenth and fifth cars from rear of train. If two locomotives are handled in one train, they must be separated by one car. No more than two may be cut-in to a train. Entrained locomotives must be set-up by Mechanical Department.</td>
</tr>
<tr>
<td></td>
<td>When consist has no locomotives with alignment control, up to three non-alignment control locomotives may be placed on head end when handling cars.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>On light locomotive consist, up to five locomotives may be handled on rear of consist.</td>
<td></td>
</tr>
<tr>
<td>Foreign Line/Waybilled Locomotives without Alignment Control</td>
<td>Special Train Move only (light locomotive consist)</td>
<td></td>
</tr>
</tbody>
</table>

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^Top
31.8: Locomotive Inspections and Procedures

31.8.1: Conducting a Locomotive Daily Inspection

<table>
<thead>
<tr>
<th>31.8.1</th>
<th>Conducting a Locomotive Daily Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR</td>
<td>Inspect these three general areas of each locomotive:</td>
</tr>
<tr>
<td>229.21</td>
<td>• Control Compartment/Locomotive Cab.</td>
</tr>
<tr>
<td>229.53</td>
<td>• Walkways and Engine Compartments.</td>
</tr>
<tr>
<td>232.105</td>
<td>• Ground Level.</td>
</tr>
<tr>
<td>236.553</td>
<td></td>
</tr>
</tbody>
</table>

Note: B-units and units designated or modified not to be occupied are not required to have or be equipped with all the devices included in the inspection.

Remote control locomotives (RCL) must be in manual mode when conducting inspection.

Not all defects are non-complying conditions. The following items are non-complying conditions if they do not function properly during the daily inspection.

A. Control Compartment/Locomotive Cab
Operate sanders to deposit sand in front of each locomotive's lead wheels using the reverser position to determine the direction.

On each locomotive ensure that:

• Each air gauge registers within 3-psi of the required pressure.
• Locomotive cab is free of stubbling or slipping hazards.
• No traction motors have been cut-out. However, on GE AC, GE-8 DC, GE-9 DC, and EMD AC locomotives, one or more traction motors/trucks may be cut-out and not considered a non-complying condition.
• Cab seats are properly secured.
On lead locomotive ensure that:

- At least one headlight bulb is operational on each end of the locomotive consist.
- At the initial terminal, both ditch lights are operational. At least one ditch light must be operational at other than initial terminal.
- Horn and bell operate.
- Gauge lights and engineer’s overhead cab light illuminate. If burned out and other available lighting is sufficient to allow visibility from the crew's normal position, report as a defect but not a non-complying condition.
- Speed indicator functions accurately. After a daily inspection, if the speed indicator failure is identified on the lead locomotive as soon as it begins moving, the failure is a non-complying condition discovered during the daily inspection.
- Windows provide a clear view. Small cracks that do not obscure view must be reported as defects but not non-complying conditions.
- The locomotive toilet facility is sanitary and operational.
- Only a telemetry head end unit (HEU) calibrated within the last 368 days may be used.

**Exception:** Calibration is not required on the Wabtec HEU with the sticker reading, "This unit is equipped with a Wabtec synthesized radio that complies with FRA-2004-18895."

**B. Walkway and Engine Compartment**
Inspect both sides of each locomotive to ensure that:

- Walkways and walk-in compartments (car body-type locomotives) are clear of debris, tools, and accumulated oil or grease that present a hazard to the crew.
- Handrails, hand holds, steps, ladders, safety chains, and guards are secured and ready for service. Inspect for broken, bent, damaged, or loose equipment. Make sure safety chains are connected high enough for safe passage.
- All electrical and rotating equipment guards are in place.
- The diesel engine has no apparent exhaust, oil, water, or fuel leaks.
- The hand brake is operational.
- Walkway and engine compartment lights are working. If burned out and other available lighting is sufficient to allow visibility, report as a defect but not a non-complying condition.

**C. Ground Level**
Inspect the exposed areas for apparent defects, but do not crawl under or between locomotives to make the visual inspection. Set hand brakes, if necessary, and walk around both sides of the locomotive to ensure that:

- Sand is deposited on the rail in front of the lead wheels of each locomotive in the consist.

**Exceptions:**
• In road service as lead locomotive, if sanders are found to be defective enroute, the locomotive may continue in service until it is placed in a repair facility but under no conditions for more than 14 calendar days.
• In road service as a trailing locomotive, if sanders are found to be defective enroute, the locomotive may continue in service until it is placed in a repair facility.
• In switching service, if sanders are found to be defective at a location where repair facilities are not available, the locomotive may remain in service for no more than 7 calendar days.
• Fuel tank is not leaking.
• No defects such as cracks and broken or missing parts are on the following:
  • Locomotive trucks.
  • Wheels.
  • Gear cases.
  • Draft gears.
• Brake cylinder piston travel shall be sufficient to provide brake shoe clearance when the brakes are released.
• Maximum brake cylinder piston travel is 1 1/2 inches less than the travel entered on FRA Form F 6180-49A (blue card) in the locomotive cab.
• Brake shoes are secured and approximately in line with the tread of the wheel with no obvious lips or overhangs.
• Foundation brake rigging is secured, and all components other than wheels and sand hoses are at least 2 1/2 inches above the top of the rail.
• Snowplow, pilot, or endplate is properly secured and is between 3 inches and 6 inches above the top of the rail.
• No part of the electrical cable is lying on the coupler.
• Unused electrical cables are stowed, or the disconnected ends are placed into a dummy receptacle or a multiple-unit cable holder.
• There is no apparent physical damage to the ATC/ACS receiver bars on locomotives equipped with ATC/ACS.
  • These bars are located above the rail and in front of the wheels. This requirement applies only to lead locomotives on trains operating in ATC/ACS territory. Any apparent damage must be reported, but it does not constitute a non-complying defect.
Reference Rule
31.8.4.1

Change operating ends on a locomotive consist by cutting out the operating controls on the controlling end and proceeding immediately to the opposite end of the locomotive consist and restore controls.

A. Cut-Out Operating Controls as follows:
1. Fully apply the independent brake.
2. Make a 20-psi brake pipe reduction.
3. Remove the reverser.
4. Apply sufficient hand brakes to hold locomotive consist. Cut-out the independent and automatic brakes. (On electronic brake systems, toggle independent setting from LEAD to TRAIL, and accept and confirm the change. This will also place the automatic brake in the cutout position.)
5. Place the automatic brake valve handle in HANDLE OFF/CONTINUOUS SERVICE.
6. Place independent brake valve handle in release position.
7. Place the generator field switch in the OFF position.
8. Disarm two-way EOT, if equipped. (DP must be unlinked to change ends.)
9. Position headlight switch as necessary.

B. Restore Operating Controls as follows:
1. Place the independent brake valve handle in FULL APPLICATION.
2. Cut-in the independent brake. (On electronic systems, toggle setting from TRAIL to LEAD.)
3. Place the automatic brake valve handle in RELEASE.
4. Cut-in the automatic brake. (On electronic systems, toggle setting from CUT OUT to CUT IN.)
5. Replace the reverse lever.
6. Place switches and breakers in proper positions.
7. Conduct locomotive consist air brake test.

Application:
After changing operating ends, perform a light engine running air brake test or a locomotive consist air brake test.

Rule Updated Date
April 20, 2012

System Special Instructions
Effective Date: April 20, 2012

^Top

31.8.3: Light Engine Setup
31.8.3 Light Engine Setup

When light engine power transfers are operated, set-up as shown below:

<table>
<thead>
<tr>
<th>Light Engine Power/Dynamic Brake Setup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Units</td>
</tr>
<tr>
<td>1–8</td>
</tr>
<tr>
<td>9–12</td>
</tr>
<tr>
<td>13–15</td>
</tr>
<tr>
<td>16–18</td>
</tr>
<tr>
<td>19–21</td>
</tr>
<tr>
<td>22–25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Light Engine Air Brake Setup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Units</td>
</tr>
<tr>
<td>1–8</td>
</tr>
<tr>
<td>9–25</td>
</tr>
</tbody>
</table>
Light engine movements must not be operated in DP mode except when moving power consists from the service track to a yard track. Site-specific instructions may be created to govern movement of light engine moves within the terminal limits.

Rule Updated Date
July 2, 2013

System Special Instructions
Effective Date: April 23, 2013

31.8.4: Procedure for Conducting Locomotive Consist Air Brake Test

<table>
<thead>
<tr>
<th>Rule</th>
<th>Procedure for Conducting Locomotive Consist Air Brake Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>31.8.4</td>
<td>Ensure locomotive consist is properly secured.</td>
</tr>
<tr>
<td>49 CFR 229.46 229.59 232.105 229.140</td>
<td>From the ground, observe that the locomotive brakes apply and release during this procedure:</td>
</tr>
<tr>
<td>31.3.1</td>
<td>1. With the independent and automatic brake valve handles in RELEASE, apply the independent brake.</td>
</tr>
<tr>
<td></td>
<td>2. After observing that the brakes apply on each locomotive, release the independent brake.</td>
</tr>
<tr>
<td></td>
<td>3. When the brakes are released on all locomotives, apply the automatic brake by making a 10-psi brake pipe reduction.</td>
</tr>
<tr>
<td></td>
<td>4. After the brakes apply on all locomotives, actuate and observe that the brakes release.</td>
</tr>
<tr>
<td></td>
<td>5. Reduce brake pipe pressure by at least an additional 10-psi to reapply the brakes.</td>
</tr>
<tr>
<td></td>
<td>6. Determine that all brakes apply on all locomotives.</td>
</tr>
<tr>
<td></td>
<td>7. Move the automatic brake valve handle to RELEASE position.</td>
</tr>
<tr>
<td></td>
<td>8. Determine that all brakes release.</td>
</tr>
</tbody>
</table>

When adding or removing a non-controlling locomotive to a DP remote consist, it is not necessary to unlink. Add the following to the above procedure:

1. Ensure that the train is properly secured.
2. Utilize the lead (head end) locomotive to apply and release the brakes on the remote consist (Items 1–8 above).

Rule Updated Date
April 23, 2013
31.8.4.1: Light Engine Running Air Brake Test.

<table>
<thead>
<tr>
<th>31.8.4.1</th>
<th>Light Engine Running Air Brake Test.</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 232.105</td>
<td>An engineer must perform this air test when:</td>
</tr>
<tr>
<td>Reference Rule</td>
<td>○ Taking charge of engine not coupled to other equipment and originally made up and tested by other than the assigned engineer,</td>
</tr>
<tr>
<td>31.3.1</td>
<td>○ Controlling ends have been changed.</td>
</tr>
<tr>
<td>31.8.2</td>
<td>When test is required, perform the following tasks:</td>
</tr>
<tr>
<td></td>
<td>1. Release the independent brake and open throttle sufficiently to cause locomotive to move.</td>
</tr>
<tr>
<td></td>
<td>2. Close throttle. Locomotive should roll freely. If it does not, check for the cause and correct.</td>
</tr>
<tr>
<td></td>
<td>3. Apply and release the independent brake while speed is low. A speed reduction indicates brakes have applied.</td>
</tr>
<tr>
<td></td>
<td>4. With the independent brake released, make a light automatic brake pipe pressure reduction. A speed reduction indicates brakes have applied.</td>
</tr>
<tr>
<td></td>
<td>5. Actuate and determine that the brakes release. The locomotive should roll freely.</td>
</tr>
<tr>
<td></td>
<td>When defects or malfunctions are noted, the condition must be corrected.</td>
</tr>
<tr>
<td></td>
<td>A Locomotive Consist Air Brake Test may be made instead of a Light Engine Running Air Brake Test.</td>
</tr>
</tbody>
</table>

Rule Updated Date
January 20, 2012

31.8.4.2: Remote Control Light Engine Running Air Brake Test

<table>
<thead>
<tr>
<th>31.8.4.2</th>
<th>Remote Control Light Engine Running Air Brake Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 232.105</td>
<td>A remote control operator must perform this air test unless being relieved and the transmitter is given directly to the relieving crew when:</td>
</tr>
<tr>
<td></td>
<td>• Taking charge of a remote control engine not coupled to other equipment and originally made up and tested by other than the assigned engineer,</td>
</tr>
<tr>
<td></td>
<td>or</td>
</tr>
<tr>
<td></td>
<td>• Controlling ends have been changed on a remote control consist.</td>
</tr>
</tbody>
</table>
When test is required, perform the following tasks:

1. Select direction on the RCT, press either vigilance button then position Speed Selector to Couple Setting to cause locomotive to move.
2. Verify brakes are released and then position Speed Selector to 10 MPH.
3. Move Speed Selector to Coast and apply a low setting with the Independent Brake Override. A speed reduction indicates brakes have applied.
5. Position Automatic Brake Selector to Light Setting and verify that brakes do not apply.
6. Position Automatic Brake Selector to Medium Setting. A speed reduction indicates brakes have applied.
7. Position Automatic Brake Selector to Released Setting. The locomotive should roll freely.

When defects or malfunctions are noted, the condition must be corrected.

A Locomotive Consist Air Brake Test may be made instead of a Remote Control Light Engine Running Air Brake Test.

Note:
Belt Pac RCL equipment is not designed to allow for a light engine running air brake test. A locomotive consist air brake test must be performed.

Rule Updated Date
July 2, 2013

System Special Instructions
Effective Date: April 20, 2012

^Top

31.8.4.3: Electronic Alertness Control Device (Alerter) Test

Procedure for conducting alerter test:

1. Protect locomotive from unintended movement.
2. Place the automatic and independent brakes in release.
3. Allow the timing cycle to expire and observe that warning lights and audible alarm function.
4. Allow the alerter to "time out" and observe:
   - PC or PCS indicator light illuminate.
   - Reduction in equalizing reservoir pressure.
5. Recover penalty brake application.
### 31.8.5: Starting Procedure

<table>
<thead>
<tr>
<th>Rule</th>
<th>Start Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>31.8.5</td>
<td>Follow this procedure to start a locomotive:</td>
</tr>
<tr>
<td></td>
<td>1. Check the cooling water level.</td>
</tr>
<tr>
<td></td>
<td>2. Check that the governor low oil button, over-speed trip, and low water and crankcase protective devices are in the proper positions.</td>
</tr>
<tr>
<td></td>
<td>3. Check that switches or breakers for air conditioning, lights, heaters, refrigerator, and other accessories are in the OFF positions.</td>
</tr>
<tr>
<td></td>
<td>4. Ensure that the fuel pump circuit breaker is on.</td>
</tr>
<tr>
<td></td>
<td>5. Check that the engine run and control switches on the engineer's control console are on.</td>
</tr>
<tr>
<td></td>
<td>6. Make sure the Isolation Switch is in the START/STOP/ISOLATE position.</td>
</tr>
<tr>
<td></td>
<td>7. Close the main battery switch.</td>
</tr>
<tr>
<td></td>
<td>8. Prime the engine as indicated on the badge plate.</td>
</tr>
<tr>
<td></td>
<td>9. Crank the engine until the engine starts, but not longer than 20 seconds for EMD locomotives and 45 seconds for GE locomotives. Allow two minutes between cranking attempts.</td>
</tr>
<tr>
<td></td>
<td>10. After starting, place switches or breakers for air conditioning, lights, heaters, refrigerator, and other accessories in the ON positions, as appropriate.</td>
</tr>
<tr>
<td></td>
<td>11. Check that the air brake system is charged and operative before releasing the hand brake.</td>
</tr>
</tbody>
</table>

### 31.8.6: Weak Batteries

<table>
<thead>
<tr>
<th>Rule</th>
<th>Weak Batteries</th>
</tr>
</thead>
<tbody>
<tr>
<td>31.8.6</td>
<td>When a weak battery condition is determined by the Mechanical Department, do the following:</td>
</tr>
<tr>
<td></td>
<td>• Tag locomotives with weak batteries to prevent shutdown until the condition is corrected.</td>
</tr>
<tr>
<td></td>
<td>• Report the condition on engineer electronic inspection report.</td>
</tr>
</tbody>
</table>
Locomotives identified with such tags or other identified mechanical problems that would prevent starting where repair facilities are not available may be left running for no more than seven calendar days.

### 31.8.7: Locomotive Fuel Conservation and TPA Compliance

**A. Locomotive Shutdown**

Shut down locomotive when:

- Left standing unattended for 15 minutes or longer.
- The trailing locomotive(s) in lead consist are isolated.

Locomotive should be left running when:

- The temperature is expected to drop below 35 degrees F in the next 12 hours.
- Necessary to maintain the air supply, one locomotive may be left running.
- Distributed power locomotives are actively linked.
- "Genset" locomotive auto-start is enabled.

**B. Fuel Conservation**

Trains are subject to the Fuel Conservation Speed (FCS) requirements below:

- **FCS Train Operations**: Exceeding throttle position 5 while in power is prohibited at a speed greater than specified below.

### Fuel Conservation Speed

<table>
<thead>
<tr>
<th>Train Type</th>
<th>Coal Trains (loaded or empty)</th>
<th>Freight Trains (including light engine movements)</th>
<th>Passenger and Business Car trains are exempt. Freight trains that are exempted by track bulletin.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>40</td>
<td>50</td>
<td>No FCS Restrictions</td>
</tr>
</tbody>
</table>
Coal trains may be authorized to operate at FCS 50 by timetable or subdivision general order. Higher throttle positions may be used, up to and including run 8, to achieve and maintain FCS-authorized speed. The train dispatcher may cancel fuel conservation speed restrictions.

C. Tons Per Powered Axle (TPA)

Trains must be operated as required by TPA limits for the current crew district as indicated on their TCS train lists (BC), and not to exceed those limits. Non-working status codes (DG, DB, PD, IB) are assigned to locomotive units which are not to be used for power, in order to comply with TPA limits and maximize fuel efficiency. Locomotives with non-working status codes on the BC must always be either isolated or shut down, depending on ambient air temperature, and according to the instructions in 31.8.7 Section A.

Each head-end locomotive isolated or shut down for fuel conservation purposes must be identified by placing a fuel conservation tag on the isolation switch. The lead unit must also be tagged identifying all of the locomotives in the head-end consist that are isolated or dead. Any changes made must be noted on the lead unit’s tag.

At each crew change point, inbound engineers must communicate the configuration of their head-end locomotive consist to the relieving crew, either in person or by using appropriate tags attached to isolation switches. If unable to ascertain in person from an inbound engineer if the head-end locomotives are set up according to the BC, the outbound engineer must first examine any tags attached to the isolation switch on the lead unit, and then compare that information with the BC train list for their crew district.

Adjustments to the head-end consist configuration must only be made as necessary to ensure compliance with locomotive status codes and crew district TPA limits.

If it is necessary to go through the locomotives in order to release handbrakes, the engineer must verify that the correct units are running and on line at that time.

Locomotive axles / traction motors must not be cut-out to comply with TPA restrictions. Additional locomotive(s) may be on line if the engineer determines that the train may stall due to locomotive defects, not to exceed system or subdivision maximum powered axle limitations. DG units that are used for power must be reported using the locomotive inspection reporting process at tie-up.

The controlling unit of each consist, including DP consist(s), must not be manually isolated or shut down to comply with these instructions. This does not prohibit the isolation or shutdown of other units in remote consists.

**Note:** When calculating TPA/TPDBA, do not round off EPA/EDBA numbers used in making the calculation. After completing the calculation, if the final number is not a whole number, round up the result to the nearest whole number.

**Example:** A train has 10,469 tons and three locomotives with a total of 36.3 EPA. The detail train consist indicates the following TPA limit:

MAXIMUM TPA BETWEEN SX263 AND NX039 IS 430, CURRENT TPA IS 289. If one unit was
isolated weighing 200 tons, the train would then have 24.2 EPA, and TPA will increase to 441. This exceeds the maximum TPA for the territory to be operated over. Therefore, all three locomotives must be left on line.

Rule Updated Date
July 2, 2013

31.8.7.1: Shutdown Procedure

Reference Rule
35.5.1

31.8.7.1 Shutdown Procedure
Follow this procedure to shut down a locomotive:

1. Make sure hand brake is fully applied if leaving locomotive unattended.
2. Place generator field switch OFF.
3. Remove reverser.
4. Move the engine control switch (isolation switch) to the START/STOP/ISOLATE position.
5. Shut down engine (EFCO Switch in Locomotive Cab).
6. Wait 2 minutes.
7. Open all non-covered accessory switches and circuit breakers on the Engineer's Control Panel. Open all covered circuit breakers in accordance with shutdown sticker on locomotive.
   - If locomotive is GE AC Model (i.e. C44AC, C44ACTE, C45ACCTE, etc.) open BCCB circuit breaker first, wait until the operator screens go blank and green LED extinguishes. Then turn off the remaining breakers prior to opening the main battery switch.
8. Wait 2 minutes.
9. Open main battery switch, except:
   - Main battery switch may be left closed for up to two hours to maintain cab signal link on locomotives operating in cab signal territory.
   - Main battery switch may be left closed on RCL to maintain link during short-term securement.

Rule Updated Date
July 2, 2013

31.8.7.2: Prevent Engine Cooling System from Freezing
### 31.8.7.2 Prevent Engine Cooling System from Freezing

The engineer is responsible for protecting locomotives from freeze damage. If an engine dies and cannot be restarted, the engine must be drained if the temperature is below 32 degrees F. Notify the train dispatcher.

If the failure is in the distributed power, immediately contact the train dispatcher.

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**Rule Updated Date**

January 20, 2012

[^Top]
32.0: Securement/Train Operations - Chapter 32

- 32.0: Securement / Train Operations
- 32.1: Securing Equipment
- 32.1.1: Securement Procedures
- 32.1.2: Securing an Unattended Train or Portion of Train with Locomotive Attached
- 32.1.3: Securing an Unattended Train Before Detaching Locomotives
- 32.1.4: Single Car Securement
- 32.1.5: Securing Specialized Equipment
- 32.1.6: Releasing Hand Brakes
- 32.2: Securing Locomotives
- 32.2.1: Unattended Locomotive(s)
- 32.2.1.1: Securing Locomotive Cab Doors
- 32.2.2: Separating Locomotives
- 32.3: Train Line
- 32.3.1: Undesired Emergency Resulting in Train Separation
- 32.3.2: Coupling Brake Pipe Connections
- 32.3.3: Coupling to Opposite End of Cars
- 32.4: Inclement Weather
- 32.4.1: Required Air Brake Test During Inclement Weather
- 32.5: Overcharge
- 32.5.1: Reducing Pressure in Overcharged Train Brake Systems
- 32.6: Flat Spots
- 32.6.1: Reporting Flat Spots
- 32.7: Air Brake Operation
- 32.7.1: Air Brakes Not Operating Properly
- 32.7.2: Sticking Brakes
- 32.7.3: Procedure to Cut-Out Control Valve and/or Bleeding Off Car
- 32.7.4: Placement of Cars with Cut-Out Air Brake Equipment
- 32.8: Setting Out Cars
- 32.8.1: Setting Out Defective Cars
- 32.9: Telemetry
- 32.9.1: Emergency Application Capability from Rear of Train
- 32.9.2: Installation
- 32.9.3: Arming HEU/EOT
- 32.9.4: Testing HEU/EOT
32.0: Securement / Train Operations

<table>
<thead>
<tr>
<th>32.0 Securement / Train Operations</th>
</tr>
</thead>
</table>

Rule Updated Date
January 20, 2012

32.1: Securing Equipment

<table>
<thead>
<tr>
<th>32.1</th>
<th>Securing Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 232.103</td>
<td>Crew members are responsible for securing standing equipment with a sufficient amount of hand brakes to prevent undesired movement. The air brake system must not be depended upon to prevent an undesired movement. On cuts of two or more cars, or on multi-platform cars with two hand brakes, a minimum of two hand brakes must be applied unless otherwise specified.</td>
</tr>
</tbody>
</table>

Rule Updated Date
January 20, 2012

32.1.1: Securement Procedures

<table>
<thead>
<tr>
<th>32.1.1</th>
<th>Securement Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>The number and location of hand brakes to be applied depends on the following:</td>
<td></td>
</tr>
<tr>
<td>- Grade:</td>
<td></td>
</tr>
<tr>
<td>- On low end when slack is bunched.</td>
<td></td>
</tr>
<tr>
<td>- On high end when slack is stretched.</td>
<td></td>
</tr>
</tbody>
</table>
All retaining valves must be in EXHAUST position.

A. Primary Securement Procedure
Verify that the hand brake(s) applied on equipment will prevent movement by releasing all air brakes.

B. Secondary Securement Procedure
Comply with requirements contained in Securement Chart when not practical to comply with Primary Procedure or where site-specific instructions are in effect.

The following table must be used to determine the number of brakes required when using the Secondary Procedure.

<table>
<thead>
<tr>
<th>Grade (%)</th>
<th>Tons</th>
<th>0+</th>
<th>0.25+</th>
<th>0.5+</th>
<th>0.75+</th>
<th>1.00+</th>
<th>1.25+</th>
<th>1.50+</th>
<th>1.75+</th>
<th>2.00+</th>
<th>2.25+</th>
<th>2.50+</th>
<th>2.75+</th>
<th>3.00+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;1000</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>1000+</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>2000+</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>9</td>
<td>11</td>
<td>12</td>
<td>14</td>
<td>15</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>3000+</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>20</td>
<td>23</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>4000+</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td>10</td>
<td>13</td>
<td>15</td>
<td>18</td>
<td>20</td>
<td>23</td>
<td>25</td>
<td>28</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>5000+</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>9</td>
<td>12</td>
<td>15</td>
<td>18</td>
<td>21</td>
<td>24</td>
<td>27</td>
<td>30</td>
<td>33</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>6000+</td>
<td>5</td>
<td>7</td>
<td>8</td>
<td>11</td>
<td>14</td>
<td>18</td>
<td>21</td>
<td>25</td>
<td>28</td>
<td>32</td>
<td>35</td>
<td>39</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>7000+</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>13</td>
<td>16</td>
<td>21</td>
<td>24</td>
<td>29</td>
<td>32</td>
<td>37</td>
<td>40</td>
<td>45</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>8000+</td>
<td>5</td>
<td>8</td>
<td>10</td>
<td>14</td>
<td>18</td>
<td>23</td>
<td>27</td>
<td>32</td>
<td>36</td>
<td>41</td>
<td>45</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>9000+</td>
<td>5</td>
<td>9</td>
<td>12</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>40</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>10000+</td>
<td>6</td>
<td>10</td>
<td>13</td>
<td>17</td>
<td>22</td>
<td>28</td>
<td>33</td>
<td>39</td>
<td>44</td>
<td>50</td>
<td>55</td>
<td>60</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>11000+</td>
<td>6</td>
<td>11</td>
<td>15</td>
<td>18</td>
<td>24</td>
<td>30</td>
<td>36</td>
<td>42</td>
<td>48</td>
<td>54</td>
<td>60</td>
<td>66</td>
<td>All</td>
</tr>
</tbody>
</table>
32.1.2: Securing an Unattended Train or Portion of Train with Locomotive Attached

<table>
<thead>
<tr>
<th>Reference Rule</th>
<th>Securing an Unattended Train or Portion of Train with Locomotive Attached</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.6</td>
<td>To secure a train or a portion of a train with the lead locomotive consist attached, perform the steps below:</td>
</tr>
<tr>
<td>32.1.1</td>
<td>1. Determine the minimum number of hand brakes required to secure a train. Count locomotive hand brakes toward the total hand brakes required.</td>
</tr>
<tr>
<td>32.1.3</td>
<td>2. Comply with Rule 32.1 (Securing Equipment).</td>
</tr>
<tr>
<td></td>
<td>3. Complete Train and Locomotive checklist.</td>
</tr>
</tbody>
</table>

System Special Instructions

Effective Date: January 25, 2012
Before detaching locomotives or locomotives and cars:

2. Make a 20-psi brake pipe reduction.
   - At terminals where Mechanical Department will make immediate air brake inspections and repairs after locomotives are detached, comply with Rule 30.8.1.

After brake pipe exhaust ceases, close the angle cock on the rear locomotive or last car to be detached from portion left standing. Leave the angle cock open on the portion left standing. (Do not bottle the air.)

When removing locomotive(s) from a previously secured train or cut of cars, tie additional hand brakes on cars equal to the number of locomotives removed.

---

32.1.4: Single Car Securement

A. Do not detach and leave a single car standing when the car can be coupled to and left secured with other equipment.

After performing a single car securement test as required below, a single car may be left standing when:

- Spotting a customer's facility or industry track.
- An articulated car is equipped with two hand brakes and both hand brakes are applied and functioning.
- The Car Department has chained the car to the rail.
- In a yard or facility equipped with derail protection.

When leaving only two cars, both cars must be equipped with wheel or ratchet type brakes.

B. When making single car set-outs, perform the following steps in the order outlined to prevent uncontrolled movement. Apply hand brake(s) on car to be set-out.

1. Move car a sufficient distance to ensure hand brake is operational.
2. Slowly bunch or stretch the slack at the coupler where uncoupling is to be made.
32.1.5: Securing Specialized Equipment

A. Roadrailer Equipment
Roadrailer equipment is equipped with a spring-loaded parking brake (hand brake). The spring-loaded parking brake applies any time the brake cylinder pressure is lost. When this equipment is set out:

1. Place the train in emergency.
2. Inspect 20% of the equipment (not fewer than 10 units) to ensure the brakes are applied.

B. Equipment with Multiple Hand Brakes
When applying brakes on cars with multiple hand brakes, all hand brakes on car must be applied. When determining number of required hand brakes, each brake is considered one car.

32.1.6: Releasing Hand Brakes

To prevent wheel damage, release hand brakes before moving cars or locomotives.

A. Release Hand Brakes Before Movement
Release all hand brakes to prevent wheel damage except when required to:
When releasing hand brakes, check for slack and white paint showing on chain when equipped, and at least three additional hand brakes beyond the last applied hand brake.

If a hand brake is difficult to release:

- Charge the air brake system.
- Make a full service or emergency application.
- Release the hand brake.

If the hand brake cannot be released using the above method, do not move the car except to set it out. The car must be watched during the entire movement to set out, and limit speed to 5 MPH. Report defect to Mechanical Help Desk/Dispatcher.

### B. Controlling Slack

Charge air brake system before releasing hand brakes. On ascending grade, do not release all hand brakes until it is known that slack is stretched.

---

#### 32.2: Securing Locomotives

**32.2 Securing Locomotives**

**Rule Updated Date**

July 2, 2013

---

#### 32.2.1: Unattended Locomotive(s)

<table>
<thead>
<tr>
<th>32.2.1</th>
<th>Unattended Locomotive(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 232.103</td>
<td>When securing engine:</td>
</tr>
<tr>
<td></td>
<td>1. Place throttle in idle.</td>
</tr>
<tr>
<td></td>
<td>2. Place transition handle (if equipped) in OFF position.</td>
</tr>
</tbody>
</table>
3. Place generator field switch in OFF position.
4. Remove and leave reverser handle.
5. Apply hand brakes on all locomotives.
6. Comply with Rule 32.1 (Securing Equipment) unless locomotive(s) are coupled to previously tested equipment.
7. Fully apply the independent brake.
8. When engine is running, make a 20-psi brake pipe reduction after allowing the brake system to charge.
9. Place headlight switch to OFF position unless required by rule to leave on dim.
10. Place engine control switch to isolate or start on all locomotives.
11. Close doors and windows.
12. Perform the following steps from the DP screen on the lead controlling locomotive when linked DP is not separated from train:
   - Select ISOLATE and execute for each remote consist in the train. This will cut-out the brake valve on the isolated remote(s) and disable throttle commands to the remote(s).
   - When train is ready to proceed, remote(s) must be returned to NORMAL status from the DP screen before releasing the automatic brakes.
13. Perform the following steps from the DP screen on the lead controlling locomotive when linked DP consist is separated from train:
   - Comply with Rule 32.1 (Securing Equipment).
   - From the DP screen select SET OUT and execute.
   - Separate the train. Leave remote(s) in SET OUT until train is re-coupled.
   - After re-coupling, remote(s) must be returned to NORMAL status from the DP screen, and automatic brake must be in release before opening the angle cock on rear portion of the train.
14. When terminating a DP train:
   - From the SYSTEM screen select UNLINK and execute. Allow the brake system to vent at a service rate to 0-psi.
   - Select END DIST POWER and return to conventional operation before detaching the lead consist from the train.

Exceptions:

1. When on an unattended train, distributed power remote locomotives do not require hand brakes to be applied or engine control switch to be placed in ISOLATE when train is otherwise properly secured.
2. Distributed power remote consists may be left standing with all hand brakes applied at any location, even on the main track, for short durations when in the process of making up or disassembling a DP train.

At mechanical facilities, when locomotives are protected by outbound derails on designated servicing tracks, apply a sufficient number of hand brakes to prevent undesired movement, with a minimum of one per locomotive consist.
Additional securement guidelines for unattended locomotives not coupled to other equipment:

- Must not be left unattended on a main track. However, when necessary to switch a locomotive in a consist (reposition, wye, etc.), a properly secured locomotive may be left unattended if crew remains in the area performing the switch move.
- Must have all hand brakes applied. Release locomotive brakes to determine hand brakes will prevent movement. Fully apply independent brake and make a 20 psi automatic brake pipe reduction.

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July 2, 2013

32.2.1.1: Securing Locomotive Cab Doors

32.2.1.1 Securing Locomotive Cab Doors

A. Unattended Locomotives

Controlling locomotives equipped with door locks and latches must be locked to prevent cab entry before leaving consist unattended outside of yards or terminals. Trailing locomotives may be left unlocked.

Secure controlling locomotive in consist as follows:

- Latch/lock rear cab doors from inside cab, then exit and lock front door using the slide bolt padlock.

Union Pacific locomotive padlocks require a double cut key, number D575, to operate. All crew members are required to have this key available while on duty.

On trains and locomotives that will be delivered to foreign line railroads or interchange locations, crewmembers must leave locomotive cabs unlocked.

B. Attended Locomotives

Ensure cab doors on lead consist are unlocked when locomotives are attended except when necessary to prevent unauthorized entry.

C. Distributed Power

Distributed power locomotives must remain unlocked.

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32.2.2: Separating Locomotives

<table>
<thead>
<tr>
<th>32.2.2</th>
<th>Separating Locomotives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>When separating locomotives, do the following:</td>
</tr>
<tr>
<td></td>
<td>1. Apply hand brakes on locomotives to be cut away from.</td>
</tr>
<tr>
<td></td>
<td>2. Reposition walkway end platforms and safety chains to create a continuous barrier at ends of locomotives.</td>
</tr>
<tr>
<td></td>
<td>3. Disconnect MU cables.</td>
</tr>
<tr>
<td></td>
<td>4. Plug the MU cables into a dummy receptacle.</td>
</tr>
<tr>
<td></td>
<td>5. Close cutout and angle cocks.</td>
</tr>
<tr>
<td></td>
<td>6. Cut-in and fully apply independent and automatic air brakes.</td>
</tr>
<tr>
<td></td>
<td>7. Separate locomotives, allowing hose connections to pull apart with movement of locomotive.</td>
</tr>
<tr>
<td></td>
<td>8. Attach air hoses to the dummy couplings or place them in the pockets.</td>
</tr>
</tbody>
</table>

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32.3: Train Line

| 32.3 Train Line |

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January 20, 2012

32.3.1: Undesired Emergency Resulting in Train Separation
32.3.1 | Undesired Emergency Resulting in Train Separation
---|---
When train separation occurs:
1. Notify train dispatcher and Mechanical Help Desk.
2. Immediately secure detached portion(s) using Secondary Securement Procedure.
3. Close the angle cock on the rear of the cars still attached to the lead locomotive consist.
4. Recharge the air brake system.

Additional hand brakes may be required on low end:
- Before releasing air brakes when necessary to control slack or prevent movement while recharging.
- When necessary to work under or between equipment.
- To prevent movement while recharging.

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32.3.2: Coupling Brake Pipe Connections

<table>
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<tr>
<th>32.3.2</th>
<th>Coupling Brake Pipe Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Rule</td>
<td>33.6.2</td>
</tr>
</tbody>
</table>

Maintain brake pipe connections to enable the air brake system to function properly. Angle cocks must not be left partially closed or partially open.

Before coupling air hoses to charge brake pipe:
1. Make a 20-psi brake pipe reduction. On a grade, if necessary to prevent an undesired release of the cars being coupled to, make a 40-psi brake pipe reduction.
2. Signal that the brake valve exhaust has stopped by sounding whistle signal 5.8.2, (2) (Sounding Whistle), or using the radio.
3. Couple the air hoses and open angle cocks slowly to prevent an emergency brake application.

**Note:** Distributed power trains, in some cases, require a different procedure when coupling to rear portion of train. Refer to Rule 33.6.2.

1. When adjusting air hose height:
   - Couple the air hoses.
   - Verify that the brake pipe hose support is adjusted so that the glad hands are at least 4 inches above the top of the rail.
32.3.3: Coupling to Opposite End of Cars

<table>
<thead>
<tr>
<th>32.3.3</th>
<th>Coupling to Opposite End of Cars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Rule: 32.1</td>
<td>When a locomotive will immediately run-around or couple to cars at the opposite end, first comply with the following:</td>
</tr>
<tr>
<td></td>
<td>• Make a 20-psi brake pipe reduction before cutting away from cars.</td>
</tr>
<tr>
<td></td>
<td>• Allow air brake system to go into emergency.</td>
</tr>
<tr>
<td></td>
<td>• Wait one minute.</td>
</tr>
<tr>
<td></td>
<td>• Close angle cock on the standing portion of the train.</td>
</tr>
</tbody>
</table>

Do not bottle air or maintain air pressure in the brake pipe when locomotives are detached or yard air is uncoupled.

32.4: Inclement Weather

32.4.1: Required Air Brake Test During Inclement Weather

<table>
<thead>
<tr>
<th>32.4.1</th>
<th>Required Air Brake Test During Inclement Weather</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 232.107</td>
<td>During inclement weather conditions that may cause snow or ice build up to occur between brake shoes and wheels, brake applications must be performed periodically to ensure proper braking effort is being provided.</td>
</tr>
</tbody>
</table>
To allow any accumulation of ice or snow to melt from brake shoes before braking is necessary, the engineer must make a brake pipe reduction sufficiently in advance of locations where train will be required to:

- Reduce speed.
- Operate at Restricted Speed.
- Stop.

or

- Before cresting grade.

If brakes do not provide sufficient braking effort, stop train immediately using an emergency brake application, if necessary. Train must not proceed except as instructed by proper authority.

### Rule Updated Date

January 20, 2012

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### 32.5: Overcharge

#### 32.5 Overcharge

#### Rule Updated Date

January 20, 2012

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### 32.5.1: Reducing Pressure in Overcharged Train Brake Systems

#### 32.5.1 Reducing Pressure in Overcharged Train Brake Systems

To reduce pressure in an overcharged train brake system, do the following:

1. Adjust the regulating valve to the required pressure.
2. Make a full service brake pipe reduction.
3. Wait at least 30 seconds after the brake pipe exhaust stops. Move the automatic brake handle to release, and charge the system to the required pressure.
4. An emergency application may be made to correct the condition.
32.6: Flat Spots

32.6.1: Reporting Flat Spots

<table>
<thead>
<tr>
<th>Rule</th>
<th>Reporting Flat Spots</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 215.103 229.75</td>
<td>While inspecting car and locomotive wheels, measure and report flat wheels to proper authority and Mechanical Help Desk when length of flat area exceeds 1 inch. If wheel has a flat spot more than 2-1/2 inches long or wheel has adjoining flat spots that are each at least 2 inches long, the equipment must not be moved faster than 10 MPH and set out at first available point.</td>
</tr>
</tbody>
</table>
32.7.1: Air Brakes Not Operating Properly

<table>
<thead>
<tr>
<th>32.7.1</th>
<th>Air Brakes Not Operating Properly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Rule 30.7.1</td>
<td>If the train air brake system is not operating properly, stop the train immediately and:</td>
</tr>
<tr>
<td>1.</td>
<td>Inspect the air brakes to identify and correct the problem.</td>
</tr>
<tr>
<td>2.</td>
<td>Before proceeding, conduct an Application and Release test.</td>
</tr>
</tbody>
</table>

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32.7.2: Sticking Brakes

<table>
<thead>
<tr>
<th>32.7.2</th>
<th>Sticking Brakes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Rule 30.2.2</td>
<td>To minimize the possibility of sticking brakes, comply with the following:</td>
</tr>
<tr>
<td>1.</td>
<td>To prevent overcharge, when cars are placed on rear portion of a train, the engineer handling the rear portion must make a full service brake application before angle cocks are opened.</td>
</tr>
<tr>
<td>2.</td>
<td>When a running release of train brakes is to be made and operating conditions permit, increase the brake pipe reduction to at least 10-psi and allow brake pipe exhaust to stop before releasing brakes.</td>
</tr>
<tr>
<td>When brakes do not properly release:</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Stop the train as soon as possible.</td>
</tr>
<tr>
<td>2.</td>
<td>Determine why the brake(s) did not release and correct if possible.</td>
</tr>
<tr>
<td>3.</td>
<td>Inspect for:</td>
</tr>
<tr>
<td></td>
<td>• Hand brakes applied.</td>
</tr>
<tr>
<td></td>
<td>• Retaining valve not in EXHAUST.</td>
</tr>
<tr>
<td></td>
<td>• Leak in the air brake system.</td>
</tr>
<tr>
<td></td>
<td>• Defective control valve.</td>
</tr>
<tr>
<td>4.</td>
<td>Inspect car before departing for wheel defects, and set out car if necessary.</td>
</tr>
</tbody>
</table>

If air brake devices are cut-out enroute, notify train dispatcher and Mechanical Help Desk.
# 32.7.3: Procedure to Cut-Out Control Valve and/or Bleeding Off Car

<table>
<thead>
<tr>
<th>Procedure to Cut-Out Control Valve and/or Bleeding Off Car</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut-out control valves on defective cars as follows:</td>
</tr>
<tr>
<td>1. Close the branch pipe cutout cock.</td>
</tr>
<tr>
<td>2. When cutting out a control valve, drain the air reservoirs completely by operating the brake cylinder release valve.</td>
</tr>
</tbody>
</table>

Bleed off cars only when:

- Repairing the brake system on a car.
- Cutting out the brakes on a defective car.
- Switching.

# 32.7.4: Placement of Cars with Cut-Out Air Brake Equipment

<table>
<thead>
<tr>
<th>Placement of Cars with Cut-Out Air Brake Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow these requirements when air brake devices must be cut-out:</td>
</tr>
<tr>
<td>• Make sure no more than two consecutive air brake devices have been cut-out in a train.</td>
</tr>
<tr>
<td>• If necessary to cut-out a third consecutive air brake device, separate it from the other two cars with cut-out brakes by at least one car with operative brakes.</td>
</tr>
<tr>
<td>• If one air brake device/control valve is cut-out on a car with multiple control valves, consider the remaining brakes on that car to be operative.</td>
</tr>
</tbody>
</table>

**Rear Car Brakes**

The rear car of a train must have operative air brakes. If rear car air brakes become defective enroute, set car out at first available location or reposition car in train.
Note: If the brake pipe on the disabled car is broken, the car with a broken brake pipe must be handled to set out location with brake pipe pressure in air hoses between the car ahead and the disabled car.

32.8: Setting Out Cars

32.8 Setting Out Defective Cars

32.8.1: Setting Out Defective Cars

49 CFR 232.215

Set out a defective car whenever it cannot be safely moved to the next repair location. When defective car must be set out, do the following:

1. Report to the train dispatcher and Mechanical Help Desk.
2. Set out where repair crew can access car.
3. If an overheated wheel or journal is involved, inspect the car for signs of fire before departing.

The defective car must be properly tagged.

32.9: Telemetry
32.9.1: Emergency Application Capability from Rear of Train

<table>
<thead>
<tr>
<th>32.9.1</th>
<th>Emergency Application Capability from Rear of Train</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 232.407</td>
<td>A. Requirements</td>
</tr>
<tr>
<td>Reference Rule 31.8.3</td>
<td>Trains must be operated with the ability to place the train in emergency from the rear. The following trains are exempt from the requirement of this rule:</td>
</tr>
<tr>
<td></td>
<td>• Passenger and Commuter Trains.</td>
</tr>
<tr>
<td></td>
<td>• Light engine consist with 8 or fewer units.</td>
</tr>
<tr>
<td></td>
<td>• Locals, road switchers, and work trains that do not operate on mountain grades.</td>
</tr>
<tr>
<td></td>
<td>• Trains that do not exceed 30 MPH and do not operate in heavy grade or mountain grade territory.</td>
</tr>
</tbody>
</table>

In the application of this rule, locals, road switchers, and work trains are defined as a train that does not exceed 4,000 trailing tons and travels over a distance that can normally be operated by a single crew in a single tour of duty.

B. Providing Emergency Application Capability from Rear of Train

Any one of the following methods fulfills the requirement to provide emergency application capability from the rear of the train:

• An operable, two-way, end-of-train telemetry system (HEU/EOT), which must be armed and tested at point of installation.
• Distributed power placed on rear of train.
• Trains with a manned helper, caboose/shoving platform or passenger equipment at the rear of train equipped with an emergency brake valve and manned by an employee equipped with two-way radio communication with the engineer at head end of train.
### 32.9.2 Installation

<table>
<thead>
<tr>
<th>49 CFR 232.409</th>
</tr>
</thead>
</table>

End-of-train device must have been calibrated within the last 368 days. Check the affixed stickers prior to installation.

**Exception:** Calibration is not required on the Wabtec EOT with the sticker reading, "This unit is equipped with a Wabtec synthesized radio that complies with FRA-2004-18895."

After entering the EOT number on the HEU of the locomotive, push the COMM TEST button to establish one-way communication with the EOT.

After charging the train, the EOT pressure reading displayed in the locomotive HEU must be compared with that on the rear-end unit. The EOT device shall not be used if the difference between the two readings exceeds three pounds.

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### 32.9.3: Arming HEU/EOT

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<tr>
<th>32.9.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 232.409</td>
</tr>
</tbody>
</table>

**Arming HEU/EOT**

To arm the HEU:

1. Press the TEST button on the EOT, which will display the ARM NOW message on the HEU.
2. Immediately press the COMMUNICATIONS TEST/ARM button on the HEU, which will display the ARMD message and light the EMERG ENABLED status LED at the same time.

If NOT ARMD appears on the HEU, the system did not accept the arming sequence. Repeat steps above. Some foreign HEU/EOT systems are self-arming when telemetry is established and may be so indicated by a "*' displayed on the HEU.

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### 32.9.4: Testing HEU/EOT

<table>
<thead>
<tr>
<th>32.9.4</th>
</tr>
</thead>
</table>

**Testing HEU/EOT**
To test the emergency application capability from the rear of the train, do the following:

1. Close the angle cock ahead of the last car.
2. Initiate an EOT emergency from the lead locomotive HEU. The brake pipe pressure on the EOT must reduce to 0-psi.
3. Open the angle cock and determine that brake pipe pressure is restored before proceeding.

A. Establishing Communications
If the End of Train Telemetry System is unable to establish communications at the installation point, train may be moved a maximum of one mile at Restricted Speed in an attempt to establish communications.

B. Engineer Notification
When the test of the emergency application capability from the rear is conducted, the engineer must be notified verbally or in writing that the test was successfully performed. If verbal notification is made, the train crew must record this notification on Air Brake Test form.

The written notification must include the following:

- Date and Time of test.
- Location of test.
- Name of employee conducting test.

Written notification must be maintained in the cab of the controlling locomotive.

---

**32.9.5: Emergency Switch**

Once a system is properly armed, an emergency brake application can be made at any time. To initiate an emergency brake application at the end of the train:

1. Lift the red cover of the EMERGENCY SWITCH.
2. Push the toggle switch up.
3. Verify that:
   - a. The EMERGENCY message briefly appears in the message display window.
   - b. The brake pipe pressure reading quickly drops to 0-psi.
   - c. The LOW PRES message is displayed while the last car pressure is below 45-psi.
## 32.9.6: Loss of Emergency Application Capability from Rear of Train

<table>
<thead>
<tr>
<th><strong>32.9.6</strong></th>
<th><strong>Loss of Emergency Application Capability from Rear of Train</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>49 CFR</strong></td>
<td>Trains required to be equipped with rear-of-train emergency capability are considered to have an enroute failure when any one of the following conditions occurs:</td>
</tr>
<tr>
<td><strong>232.407</strong></td>
<td><strong>EOT/HEU indicates:</strong></td>
</tr>
<tr>
<td><strong>Reference Rule</strong></td>
<td>• Loss of front to rear communication. Message = FR NOCOM or NOCOM.</td>
</tr>
<tr>
<td><strong>Glossary</strong></td>
<td>• Emergency valve not enabled. Message = NOT ARMD and/or &quot;Emergency Enabled&quot; indicator NOT illuminated.</td>
</tr>
<tr>
<td></td>
<td>• Emergency valve failure or EOT valve failure. Message = VALVFAIL.</td>
</tr>
<tr>
<td></td>
<td>• Loss of communication exceeding 16 minutes 30 seconds as indicated by control console for distributed power locomotive on lead controlling locomotive at head end of train.</td>
</tr>
<tr>
<td></td>
<td>• A loss of voice radio communication between a manned helper, caboose, or passenger equipment at the rear of the train and the lead controlling locomotive.</td>
</tr>
</tbody>
</table>

When an enroute failure occurs:

- On other than mountain grades:
  - Train must not exceed 30 MPH.
  - Notify dispatcher.
- On mountain grades:
  - Train must not proceed until failure corrected.
  - or
  - Another method of compliance is used.

When communication is lost on mountain grade, a train may:

- Move a train length to attempt to reestablish communication or sufficient distance to clear obstruction.
- Move train in sections due to enroute failure.
- Continue during a loss of radio communication between the employee at rear of train, provided train does not exceed 5 MPH above maximum authorized speed.

In the event of an emergency, use the emergency toggle switch to initiate emergency application, even if NO COM condition exists.
32.9.7: Disarming HEU/EOT

<table>
<thead>
<tr>
<th>32.9.7</th>
<th>Disarming HEU/EOT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>When a two-way EOT armed to a HEU are to be separated or when changing either an EOT or HEU enroute, the HEU must be disarmed as outlined below:</td>
</tr>
<tr>
<td></td>
<td>1. Set the HEU ID code to 00000, or follow the disarm procedures on the electronic display.</td>
</tr>
<tr>
<td></td>
<td>2. Press the COMMUNICATIONS TEST/ARM button.</td>
</tr>
<tr>
<td></td>
<td>3. Verify that the HEU displays EMERG DISABLED.</td>
</tr>
<tr>
<td></td>
<td>GE locomotives with screens displaying &quot;Armed Other&quot; indicate the HEU was not disarmed from the last two-way EOT utilized. This condition can be corrected by either of two methods:</td>
</tr>
<tr>
<td></td>
<td>• Enter the EOT number of the last EOT, and disarm as prompted by the EOT screen display.</td>
</tr>
<tr>
<td></td>
<td>or</td>
</tr>
<tr>
<td></td>
<td>• If last EOT identifying number is not known, HEU may be disarmed by arming the EOT by entering a valid EOT number. Push test button on EOT, then depress &quot;Arm Now&quot; button that will briefly appear in the lower right corner of the EOT screen.</td>
</tr>
</tbody>
</table>
### 32.10.1: Unusual Air Brake Conditions

<table>
<thead>
<tr>
<th>32.10.1</th>
<th>Unusual Air Brake Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Follow this process when unusual air brake conditions exist:</td>
</tr>
<tr>
<td>1.</td>
<td>Train must be stopped, secured, and inspected.</td>
</tr>
<tr>
<td>2.</td>
<td>Notify the Dispatcher/Mechanical Help Desk.</td>
</tr>
<tr>
<td>3.</td>
<td>The Dispatcher must then notify the appropriate operating manager for the territory.</td>
</tr>
<tr>
<td>4.</td>
<td>Manager assisting crew will determine if the train can be moved safely or if it must be held for inspection.</td>
</tr>
</tbody>
</table>

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33.0: Distributed Power and Manned Helper Requirements

- 33.0: Distributed Power and Manned Helper Requirements
- 33.1: Distributed Power Requirements
- 33.1.1: Employee Familiarization
- 33.1.2: Brake Pipe Communication Test (BP Test)
- 33.1.3: DP Radio Communication Interruption
- 33.2: Remote Consist Unlinked/Shutdown
- 33.2.1: Setting Out Remote Locomotive
- 33.3: Changing from Independent to Synchronous Mode
- 33.3.1: Operating DP Consist in Independent Mode
- 33.3.9.1: High Strength Coupler Identification
- 33.4: Rear Remote Limitation
- 33.4.1: Maximum Locomotives
- 33.5: Descending Grade
- 33.5.1: Distributed Power, Descending Grade Exceeding 1.8%
- 33.6: Manned Helper Requirements
- 33.6.1: Operating Responsibilities with Manned Helper
- 33.6.2: Adding Manned Helper Mid-train or Rear of Train
- 33.6.3: Removing a Mid-train Helper
- 33.6.4: Manned Helper Added to Head End of Non DP Train
- 33.6.5: Manned Helper Removed from Head End of Train
- 33.6.6: Transferring Control of Train Brakes
- 33.7: Process for Set-up and Linking Locomotives for DP Service
- 33.7.1: Conventional Set-up
- 33.7.2: Display Screen and Remote Set-up
- 33.7.3: Set-up Distributed Power Lead
- 33.8: Procedures for Distributed Power Operation
- 33.8.1: Distributed Power Brake Pipe Communication Test (BP TEST)
- 33.8.2: Distributed Power Automated Leakage Test
- 33.8.3: Set-out Function
- 33.8.4: Train Check

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33.0 Distributed Power and Manned Helper Requirements

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33.1: Distributed Power Requirements

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33.1.1: Employee Familiarization

33.1.1 Employee Familiarization
Employees who set-up or operate distributed power equipment must comply with the requirements and instructions for the type of system they will operate.

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33.1.2: Brake Pipe Communication Test (BP Test)

33.1.2 Brake Pipe Communication Test (BP Test)
A brake pipe communication test is required when a distributed power train:

- Is originally made up following radio link.
- Any time cars are added between the head consist and any remote consist.
33.1.3: DP Radio Communication Interruption

<table>
<thead>
<tr>
<th>33.1.3</th>
<th>DP Radio Communication Interruption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Rule 6.23</td>
<td>During a radio communication interruption, keep the train moving, if possible, to a location where communication is restored.</td>
</tr>
</tbody>
</table>

**A. If communication is interrupted:**

- When brake valve is cut-in on remote(s), the last throttle and brake pipe pressure will be maintained for up to 90 minutes.
- If brake valve on remote(s) is cut-out (BV Out), remote locomotives in power will return to idle.

**B. When necessary to idle the remote during communication interruption, make a full service brake pipe reduction to signal the affected remote(s) to return to idle. In addition:**

- Brake valve on remote(s) will automatically cut-out.
- Dynamic brake on remote(s) will be maintained at last command until communication is restored.
- If necessary to idle dynamic brake, stop and then place train in emergency.

**C. Recovering from Emergency During Communication Interruption**

After required train inspection and air flow is at or below 60 CFM on the lead consist, train may be moved to a location where communication may be restored. Remote locomotive brakes will respond to normal changes in brake pipe pressure, similar to a freight car.

**A. Communication Restored**

When communication is restored, the remote locomotive automatic brake valve will be cut-out. The operator must normalize the controlling remote(s) to return to standard DP operations.
### 33.2.1: Setting Out Remote Locomotive

<table>
<thead>
<tr>
<th>Rule Updated Date</th>
<th>Setting Out Remote Locomotive</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 20, 2012</td>
<td>Set out the remote locomotive or move to the head end of train as directed by dispatcher or proper authority if:</td>
</tr>
<tr>
<td></td>
<td>• Remote consist is unlinked.</td>
</tr>
<tr>
<td></td>
<td>• Controlling remote is shut down due to enroute failure.</td>
</tr>
</tbody>
</table>

### 33.3: Changing from Independent to Synchronous Mode

<table>
<thead>
<tr>
<th>Rule Updated Date</th>
<th>Changing from Independent to Synchronous Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 20, 2012</td>
<td>Operating DP Consist in Independent Mode</td>
</tr>
</tbody>
</table>

### 33.3.1: Operating DP Consist in Independent Mode

<table>
<thead>
<tr>
<th>Rule Updated Date</th>
<th>Operating DP Consist in Independent Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 20, 2012</td>
<td>When operating distributed power consists in independent mode, do not place consists in synchronous mode until all consists are in the same throttle setting unless cresting a grade using multiple remote consists.</td>
</tr>
</tbody>
</table>
33.3.9.1: High Strength Coupler Identification

This rule has been deleted.

Rule Updated Date
April 20, 2012

System Special Instructions
Effective Date: April 20, 2012

33.4: Rear Remote Limitation

33.4.1: Maximum Locomotives

<table>
<thead>
<tr>
<th>Reference Rule</th>
<th>Maximum Locomotives</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSI Item 5-B / 5-C</td>
<td>A distributed power consist on the rear of a train is limited to no more than two locomotives. However, when necessary to assist distributed power trains with manned helper operations, additional locomotives may be placed on the rear of the train; powered axle limits must not be exceeded.</td>
</tr>
</tbody>
</table>

Rule Updated Date
January 20, 2012

33.5: Descending Grade
33.5 Descending Grade

Rule Updated Date
January 20, 2012

33.5.1: Distributed Power, Descending Grade Exceeding 1.8%

When operating distributed power trains with lead consist in dynamic brake and helper(s) in power, do not exceed throttle position 4 on helper consist(s).

Rule Updated Date
January 20, 2012

33.6: Manned Helper Requirements

33.6 Manned Helper Requirements

Rule Updated Date
January 20, 2012

33.6.1: Operating Responsibilities with Manned Helper

Comply with these helper operating responsibilities:

- The engineer in the lead locomotive is in charge of train movement. Helper engineer must follow lead engineer instructions regarding train handling and other operating responsibilities.
- Helper locomotive engineers must closely observe brake pipe gauge in order to appropriately react to either a service or emergency brake pipe reduction and control locomotive brakes as necessary.
• Engineers must comply with site-specific instructions regarding trains operating with helper(s) when applicable.

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33.6.2: Adding Manned Helper Mid-train or Rear of Train

Adding Manned Helper Mid-train or Rear of Train

Procedure for Adding Mid-train or Rear Helper:

1. When a helper is entrained or coupled at rear of train, before the angle cocks are opened, the engineer on the helper must:
   
   a. Make a 20-psi brake pipe reduction.
   
   b. Cut-out the automatic brake valve and place the handle in Handle Off position.
   
   c. Leave the independent brake valve cut-in.
   
   d. Couple the brake pipe hoses. Open the brake pipe angle cock on manned locomotive first, and then open angle cock on car or engine.

2. After the helper is placed in the train or coupled at the rear of the train, the engineer of the leading locomotive must:

   a. Increase the brake pipe reduction to 20-psi. Observe at least a 5-psi brake pipe reduction at the rear of train as indicated by gauge or device.

   b. Release the train brakes and determine that there is at least a 5-psi brake pipe increase at rear of train as indicated by gauge or device.

On DP trains, do not select set out, BV out, or isolate. Leave remote(s) in normal status.

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January 20, 2012

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33.6.3: Removing a Mid-train Helper

33.6.3
Removing a Mid-train Helper

After a mid-train helper is removed, an Application and Release Test is required. An Application and Release Test is not required when removing manned helpers from the rear of the train.

Rule Updated Date
January 20, 2012

33.6.4: Manned Helper Added to Head End of Non DP Train

When a helper is coupled on the head end of the train, transfer control of the air brakes and throttle to the helper as follows:

1. After coupling, connect the MU cable and brake pipe between consists.
2. Before opening angle cocks between the road locomotive and the helper, the engineer on the road locomotive will:
   a. Make at least a 6-psi brake pipe reduction.
   b. After the brake pipe exhaust has ceased, cut-out the automatic brake valve and place handle in Handle Off position.
   c. Notify the engineer on the manned helper of the amount of brake pipe pressure reduction made.
   d. The independent brake valve must be left cut-in.
3. The engineer on helper will:
   a. Move the automatic brake valve handle into the service zone to reduce the equalizing reservoir pressure 2-psi below the brake pipe pressure reduction made by the engineer on the road locomotive.
   b. After opening the angle cock, increase brake pipe reduction to at least 20-psi, and observe at least a 5-psi reduction as indicated by gauge or device at the rear of train.
   c. Release the automatic air brakes and observe a 5-psi increase in pressure as indicated by a gauge or device at rear of train.

Rule Updated Date
January 20, 2012
### 33.6.5: Manned Helper Removed from Head End of Train

<table>
<thead>
<tr>
<th>Rule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.6.5</td>
<td><strong>Manned Helper Removed from Head End of Train</strong></td>
</tr>
<tr>
<td>49 CFR 232.219</td>
<td>When helper will be detached from the head end of train, do the following:</td>
</tr>
<tr>
<td></td>
<td>• Engineer on helper will make at least a 6-psi brake pipe reduction before detaching.</td>
</tr>
<tr>
<td></td>
<td>• After cutting off helper, road engineer will:</td>
</tr>
<tr>
<td></td>
<td>a. Move the automatic brake valve handle to the release position to recover the equalizing reservoir pressure.</td>
</tr>
<tr>
<td></td>
<td>b. Move the automatic brake valve into the service zone to reduce the equalizing reservoir pressure 2-psi below the brake pipe pressure reduction made by the helper locomotive engineer.</td>
</tr>
<tr>
<td></td>
<td>c. Cut-in the automatic brake.</td>
</tr>
<tr>
<td></td>
<td>d. Increase the brake pipe reduction to 20-psi and observe at least a 5-psi reduction as indicated by a gauge or device at the rear of the train.</td>
</tr>
<tr>
<td></td>
<td>e. Release the automatic air brakes and observe that brake pipe pressure is being restored by observing a 5-psi increase as indicated by a gauge or device at the rear of the train.</td>
</tr>
</tbody>
</table>

**Rule Updated Date**

October 26, 2012

### 33.6.6: Transferring Control of Train Brakes

<table>
<thead>
<tr>
<th>Rule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.6.6</td>
<td><strong>Transferring Control of Train Brakes</strong></td>
</tr>
<tr>
<td></td>
<td>Transfer control of the train air brakes to other entrained locomotive as follows:</td>
</tr>
<tr>
<td>Original controlling locomotive:</td>
<td></td>
</tr>
<tr>
<td>1. With the train air brakes applied and the brake pipe pressure equalized, cut-out the automatic brake valve.</td>
<td></td>
</tr>
<tr>
<td>2. If detaching the locomotive, do not close the angle cocks until transfer of the air brakes has been completed.</td>
<td></td>
</tr>
<tr>
<td>New controlling locomotive:</td>
<td></td>
</tr>
</tbody>
</table>
The train must be secured before transferring train air brakes unless both the original and new controlling locomotives are occupied by qualified train service engineers.

1. If not previously coupled to train, reduce the equalizing pressure 20-psi, and then cut-out the automatic brake valve before opening angle cocks between locomotive and cars. Open the brake pipe angle cock on the locomotive first, and then slowly open the brake pipe angle cock on the car.
2. Move the automatic brake valve handle to the release position to recover the equalizing reservoir pressure.
3. Move the automatic brake valve handle into the service zone until the equalizing reservoir pressure is slightly below brake pipe pressure.
5. Immediately reduce brake pipe pressure to not less than a 20-psi reduction.

Note: The train must be secured before transferring train air brakes unless both the original and new controlling locomotives are occupied by qualified train service engineers.

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**Rule Updated Date**

January 20, 2012

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**33.7: Process for Set-up and Linking Locomotives for DP Service**

**33.7 Process for Set-up and Linking Locomotives for DP Service**

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**Rule Updated Date**

January 20, 2012

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**33.7.1: Conventional Set-up**

**33.7.1 Conventional Set-up**

When DP consist has not been previously tested and inspected by mechanical forces for distributed power service, the following tasks must be performed:

- Each consist must be set-up as an individual conventional consist. Each consist must be properly set-up, air tested, and loading.
- Set equalizing reservoir pressure on controlling locomotives to 90-psi.
- Clear any air brake computer faults.
- Connect brake pipe only between consists.
- Controlling locomotive of each consist must be running during set-up. Override auto stop if necessary.
### 33.7.2: Display Screen and Remote Set-up

<table>
<thead>
<tr>
<th>A. Display Screen Set-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>The standard method of screen set-up is that the primary screen displays gauges, speed indicator and DP main menu; the secondary screen displays a full-size DP control screen:</td>
</tr>
<tr>
<td>- C45ACCTE &amp; SD70ACe: The default setting is the primary screen on right display only. The screen controls key may be used to modify the default setting, if desired.</td>
</tr>
<tr>
<td>- C44ACCTE w/IDP: The screen selected by the user to access the initial DP set-up menu defaults as the primary screen. After linking, press the DIST PWR key to access the DP control screen on the secondary display.</td>
</tr>
<tr>
<td>- SD9043AC: Functions the same as C44ACCTE; the screen display selector switch must be set to &quot;both.&quot;</td>
</tr>
<tr>
<td>- To view the DP Control screen and gauges on a single screen, press DP combined/DP operation key from DP main menu on primary screen.</td>
</tr>
</tbody>
</table>

### B. Set-up – Distributed Power Remote

Use the following sequence to set-up remote DP consist(s):

1. Start from the rear consist first and work forward.
2. Set independent brake to lead and fully apply.
4. Remove reverser handle.
5. Place generator field switch to off.
6. Place dynamic brake, control, and fuel pump switches to on.
7. Position locomotive isolation switch to run.
8. Turn on DP circuit breaker(s) on back wall. (May be labeled as Data Radio) *No breaker on SD70ACe.*
11. On engineer's primary display screen, press DIST POWER soft key, then press REMOTE SET UP.
12. Enter LEAD unit number using soft keys.
33.7.3: Set-up Distributed Power Lead

Use the following sequence to set-up lead DP consist:

1. Set the independent brake to lead and fully applied.
2. Set the automatic brake to cut-in and release.
3. Turn on DP circuit breaker(s) on the back wall. (May be labeled as Data Radio) No breaker on SD70ACE.
4. Position the isolation switch on back wall to Run.
5. On the engineer's primary screen, press the DIST POWER soft key, then press the LEAD SET UP key.
6. Enter controlling REMOTE unit number.
7. Press theLINK soft key. System will display "Linked OK" when radio communication is established.
8. System will prompt to enter another controlling remote unit. Enter if train has additional remote consist(s).
9. Press the DONE or ACCEPT key when finished.
10. Select FTE (Full Tractive Effort) or CTE (Controlled Tractive Effort) as applicable and EXECUTE.
11. Follow on-screen prompts to recover air. Do not attempt release until "Go to Release" is displayed.
12. Press DIST POWER key on Secondary screen to activate DP Control screen.

Caution: Do not bypass this step.

Press the DONE or ACCEPT soft key.

Place automatic brake to handle off and independent brake to release. Insert keeper pin in automatic brake handle if equipped.

Place trailing headlight on dim if rear locomotive.

Press the DONE or ACCEPT soft key.

Lock the engineer's seat so it does not swivel.

Release the hand brakes on all locomotives in the remote consist.
13. DP Control screen will indicate flow on each consist. When flow displays less than 20 CFM on all consists or stabilized, press BP TEST key and EXECUTE from System Menu on Primary screen.
14. Apply minimum service when prompted.
15. System will display "BP Test OK" when complete.
16. If test fails, release air, recharge train, and attempt test again. Most BP Test failures are due to air flow not being fully stabilized.
17. Select the LEAKAGE key and EXECUTE from the System Screen on Primary Display to perform Automated Leakage Test.
18. From the DP main menu on the primary display, select the MODE key, and press RUN and Execute.

Rule Updated Date
January 20, 2012

33.8: Procedures for Distributed Power Operation

33.8.1: Distributed Power Brake Pipe Communication Test (BP TEST)

The following procedure is required any time cars are added between the lead consist and any remote consist:

1. The DP Control screen will indicate flow on each consist. When the flow displays less than 20 CFM on all consists or the flow has remained stable for 90 seconds, press BP TEST key and EXECUTE from System Menu on the Primary screen.
2. Apply Minimum Service when prompted.
3. System will display "BP Test OK" when complete.
   - If the test fails, recharge the train and re-test. Most BP Test failures are due to air flow not being fully stabilized.
33.8.2: Distributed Power Automated Leakage Test

The following procedure is required when performing a brake pipe leakage test.

1. On the primary screen, press the system key, then the LEAKAGE key and EXECUTE.
2. The system will automatically make a 20-psi brake pipe reduction, cut-out brake valves on all consists, and calculate brake pipe leakage.
3. Follow the screen prompt when "Apply Full Service Reduction to End Test" is displayed.
4. The primary screen will display the amount of leakage when test is complete. The leakage test may take up to 5 minutes.
5. Release the automatic air brakes when prompted. This will cut-in brake valves.
   • If the train is ready for immediate departure, train check is not required.
6. On primary screen, from DP main menu, select MODE, press RUN key and EXECUTE.

33.8.3: Set-out Function

Use set-out function when trainline is separated between lead consist and remote, including train separation. If train is in emergency, comply with step 1 before recovering the air.

Make a 20-psi reduction and allow brake pipe to exhaust, then:
33.8.4: Train Check

Perform a train check when a DP train is stopped:

1. A BP reduction of at least 10-psi must be in effect before the TRAIN CHECK key will display. On the Primary screen from the DP Main menu, select SYSTEM, then press TRAIN CHECK and EXECUTE.
2. Release the brakes when ready to depart. "Train Check OK" message should display in less than one minute.

If the "Train Check Fail" message is displayed, comply with one of the following:

- Repeat Train Check with brake pipe reduction greater than 10-psi.
- Perform a manual train check by selecting BV OUT on Remote Screen, then select NORMAL and EXECUTE. Then release the automatic reduction. If the remote BV cuts in, this satisfies the Train Check requirement.
- If the test fails three times, inspect the train for closed angle cock(s).

Note: Train Check is not required when exceptions contained in Rule 34.4 apply.
34.0: Train Handling

34.1: Train Handling Responsibilities
34.2: Train Handling Guidelines
34.2.1: Starting/Accelerating Train
34.2.2: Slowing or Controlling Speed
34.2.3: Slowing/Controlling Speed on Level or Descending Grade, with Dynamic Brakes, Slack Bunched
34.2.4: Stretch Braking
34.2.5: Ascending Grade
34.2.6: Cresting Grade
34.2.7: Undulating Grade
34.2.8: Stopping
34.2.9: Unplanned Stops
34.2.10: Emergency Brake Applications
34.2.11: Shoving Equipment
34.2.12: Switching Movements
34.2.13: Disturbed Track/Temporary Speed Restrictions/Heat Restrictions
34.2.14: Thermal Misalignment
34.3: Grade Operations
34.3.1: Balance Braking
34.3.2: Recharging on a Grade
34.4: Delayed Departure
34.5: Car Air Brakes
34.5.1: Applying or Reapplying Automatic Brakes
34.5.2: Releasing Brakes
34.5.3: Unintentional Brake Release
34.5.4: Regulating Valve Braking
34.5.5: Retaining Valves
34.5.6: Use of Automatic Brakes During Cold Weather Conditions
34.6: Locomotive Operation
34.6.1: Independent Brake (Locomotive Brake)
34.6.2: Throttle and Reverser Positions
34.6.3: Dynamic Braking
34.6.4: Short Time Rating/Minimum Continuous Speed
34.6.5: Penalty Brake Application
34.0: Train Handling

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January 20, 2012

34.1: Train Handling Responsibilities

<table>
<thead>
<tr>
<th>34.1</th>
<th>Train Handling Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crew members must exercise judgment and plan ahead to operate their train safely and efficiently. The engineer is responsible for properly controlling the slack in the train. Good train handling requires the proper combination of communication, throttle modulation, dynamic braking, and air braking to:</td>
</tr>
<tr>
<td></td>
<td>• Prevent injury.</td>
</tr>
<tr>
<td></td>
<td>• Prevent damage to the track structure, equipment and lading.</td>
</tr>
<tr>
<td></td>
<td>• Use the most fuel-efficient method consistent with good train handling.</td>
</tr>
<tr>
<td></td>
<td>Controlling and limiting in-train forces are essential to safe train operation. Unless an emergency or other condition requires immediate speed reduction, make:</td>
</tr>
<tr>
<td></td>
<td>• Throttle position changes one notch at a time.</td>
</tr>
<tr>
<td></td>
<td>• Dynamic brake changes gradually.</td>
</tr>
<tr>
<td></td>
<td>• Air brake applications to allow slack to adjust.</td>
</tr>
</tbody>
</table>

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34.2: Train Handling Guidelines

<table>
<thead>
<tr>
<th>34.2</th>
<th>Train Handling Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 232.109</td>
<td>Train handling guidelines for starting, stopping, slowing, and controlling trains as well as unplanned stops.</td>
</tr>
</tbody>
</table>
34.2.1: Starting/Accelerating Train

A. On level and ascending grade:
   - Advance the throttle to a position sufficient to hold the train when necessary.
   - Release the automatic brake.
   - Use the lowest throttle position possible to start the train. It may be necessary to retard starting acceleration by use of the independent brake.
   - Allow the locomotive load meter to stabilize before advancing the throttle to the next higher position.
   - Once the train is moving, do not increase the throttle until the locomotive load meter stabilizes.
   - To accelerate, advance the throttle slowly, one notch at a time to avoid excessive draft forces.
   - In curved territory, use only enough power to start the train to reduce the possibility of string-lining in curves because of excessive lateral forces.
   - If the train will not start, reapply brakes, reduce throttle to idle, and determine the cause. Applying power on a standing DC locomotive longer than necessary will damage traction motors.

B. On descending grade:
   1. With the independent brake fully applied, activate the dynamic brake.
   2. Release the automatic brake and wait for all brakes to release and slack to adjust. On heavy descending grades the automatic brakes may remain applied.
   3. Gradually reduce the independent brake until the train begins to move.
   4. Release the independent brake as the dynamic brake becomes effective.
   5. Adjust dynamic brake to allow train to accelerate.
34.2.2: Slowing or Controlling Speed

When slowing or controlling train speed, the following methods should be utilized (listed in preferred order for best fuel efficiency):

1. Throttle modulation/drifting when conditions allow.
2. Dynamic braking.
3. Dynamic braking supplemented with train air brakes.
4. Stretch braking.

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34.2.3: Slowing/Controlling Speed on Level or Descending Grade, with Dynamic Brakes, Slack Bunched

When slowing or controlling speed on level or descending grade with dynamic brakes and slack bunched do the following:

1. If in power, gradually reduce the throttle to idle.
2. To avoid excessive buff forces, activate the dynamic brake and gradually bunch the slack.
3. Increase braking to the desired level.
4. If necessary to control speed, make a minimum brake pipe reduction and further split reduction(s) as needed.
5. When the speed is controlled and the automatic brake is released, maintain enough dynamic braking to keep the slack bunched until the brakes release throughout the train.

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January 20, 2012

34.2.4: Stretch Braking
### 34.2.4 Stretch Braking

**Reference Rule 34.5.1**

Stretch braking is permitted only where more fuel efficient methods will not provide the necessary control of slack and/or train speed. Stretch braking above throttle position 6 is prohibited.

When it becomes necessary to apply the train brakes while in power, ensure that locomotive brakes do not apply and observe the following:

1. Make the desired throttle adjustment sufficiently in advance to allow the slack to adjust.
2. After the slack has adjusted, make a minimum brake pipe reduction.
3. Reduce the throttle when tractive effort increases from the effect of the brake pipe reduction. If a portion of the train is on a grade, the drawbar force may increase rapidly, requiring further throttle reduction(s).
4. Make additional brake pipe reductions as necessary.

If the entire train is on a descending grade and the train brakes must remain applied, it is permissible to use limited power to control train speed. Do not exceed throttle position 4, reducing throttle as necessary to prevent excessive tractive effort.

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**Rule Updated Date**

January 20, 2012

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### 34.2.5: Ascending Grade

**34.2.5 Ascending Grade**

When slowing or controlling speed on an ascending grade, do the following:

- Allow the grade to slow the train.
- Reduce the throttle one notch at a time to maintain a slack-stretched condition.
- If necessary, make automatic brake pipe reduction(s) to reduce speed.

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**Rule Updated Date**

January 20, 2012

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### 34.2.6: Cresting Grade
34.2.6 **Cresting Grade**

When approaching and cresting a grade:

1. Reduce the throttle as the lead locomotive crests the grade.
2. On the lead consist, continue to reduce the throttle and/or apply dynamic brake when necessary to keep the speed from increasing or make slack adjustments.
3. When cresting grade with helper(s) on rear or entrained, reduce helper throttle consistent with good train handling to minimize in train forces.

When operating in heavy or mountain grades, refer to System Special Instructions for additional requirements.

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**Rule Updated Date**

January 20, 2012

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34.2.7 **Undulating Grade**

34.2.7 **Undulating Grade**

On trains without entrained helper, when slowing or controlling speed on undulating grade:

1. As the train approaches the undulation, reduce the throttle as necessary to control train speed.
2. Reduce the throttle further as the head end of the train begins descending.
3. Just before the head end of the train reaches the ascending grade, increase the throttle.
4. Continue to increase the throttle as the train ascends the grade.
5. Reduce the throttle as the rear of the train approaches the ascending grade.

On trains with entrained or rear helper, do not operate DP trains in synchronous mode through undulations. Maintain sufficient power on helper(s) to control slack. Site specific train handling instructions may apply.

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34.2.8 **Stopping**

34.2.8 **Stopping**

1. Reduce the throttle as the lead locomotive crests the grade.
2. On the lead consist, continue to reduce the throttle and/or apply dynamic brake when necessary to keep the speed from increasing or make slack adjustments.
3. When cresting grade with helper(s) on rear or entrained, reduce helper throttle consistent with good train handling to minimize in train forces.

When operating in heavy or mountain grades, refer to System Special Instructions for additional requirements.
A. Level or Descending Grade using Dynamic Brake
When stopping on level or descending grade using dynamic brake:

1. If in power, gradually reduce the throttle to idle.
2. Activate the dynamic brake and gradually bunch the slack.
3. At a sufficient distance from the stop, make a minimum brake pipe reduction.
4. Make further split reduction(s) as needed.
5. As dynamic brake retarding force decreases, apply independent brake to avoid slack run-out.

B. Level or Descending Grade without Dynamic Brake
When stopping on level or descending grade:

1. If in power, gradually reduce the throttle to idle and wait for the slack to adjust.
2. At a sufficient distance from the stop, make a minimum brake pipe reduction.
3. Make further split reduction(s) as needed.
4. As the train comes to a stop, use no more independent brake than necessary to maintain a slack bunched condition.

C. Level or Ascending Grade, Slack Stretched
When stopping on level or ascending grade:

1. Gradually reduce the throttle.
2. Maintain sufficient power to keep slack stretched while allowing train to slow.
3. If necessary, make automatic brake pipe reduction(s) to reduce speed.
4. When train is approaching the stopping point, make a brake pipe reduction.
5. As train comes to a stop apply independent brake.
6. After the independent brake is fully applied, reduce the throttle to idle.

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34.2.9: Unplanned Stops

A. Non-Emergency
To stop in the shortest possible distance without using an emergency brake application, use the following procedure:
34.2.10: Emergency Brake Applications

<table>
<thead>
<tr>
<th>34.2.10</th>
<th>Emergency Brake Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR</td>
<td>When emergency braking is necessary to protect life or property, use the maximum braking effort available consistent with safe train handling techniques.</td>
</tr>
<tr>
<td>232.407-f</td>
<td></td>
</tr>
</tbody>
</table>

A. Initiated by Engineer

When conditions warrant, use an emergency brake application without hesitation and comply with the following:

1. Make an emergency brake application by moving the automatic brake valve handle quickly to EMERGENCY, and leave it there until the train or locomotive stops.

2. Lift the red cover of the EMERGENCY SWITCH, and activate the emergency valve on the end-of-train device (EOT) if equipped.

B. Trackside Detectors

When a detector is actuated, train must be stopped as soon as possible consistent with requirements contained in System Special Instructions governing trackside detectors. The type of detector, train makeup, slack condition, location of switches, grade and track curvature must be considered.

**WARNING:** Heavy brake applications may cause complete failure of a defective hot journal before train stops.
34.2.11: Shoving Equipment

When shoving equipment, use the lowest throttle position possible to avoid jackknifing, wheel climb, or rail turnover, when exceeding 12 equivalent axles of power.

### A. Starting on Level or Ascending Grade

When starting a shoving movement on a level or ascending grade:

1. Release the automatic brake, and wait for slack to adjust.
2. Reduce the independent brake, and use the lowest possible throttle position to start the movement.
B. Starting on Descending Grade with Slack Stretched

When starting a shoving movement on a descending grade with slack stretched:

1. Ensure that the independent brake is fully applied.
2. Activate the dynamic brake to full.
3. Release the automatic brake, and wait for slack to adjust.
4. Reduce the independent brake gradually as the train begins to move.
5. Slowly release the independent brake as the dynamic brake becomes effective.

C. Stopping on Ascending Grade, Slack Bunched

When stopping shoving movements on an ascending grade with the slack bunched, do the following:

1. Use the lowest possible throttle position to maintain a slack bunched condition.
2. At a sufficient distance from the stop, make a minimum brake pipe reduction.
3. Make further split reduction(s) as needed.
4. Observe tractive effort and reduce the throttle as necessary to avoid high buff forces.
5. As the train stops, fully apply the independent brake.
6. After the independent brake is applied, reduce the throttle to idle.

D. Stopping on Level or Descending Grade with Slack Stretched

When stopping shoving movements on level or descending grade with the slack stretched, do the following:

1. If in power, gradually reduce the throttle to idle and allow the slack to adjust.
2. Activate the dynamic brake. If the dynamic brake is unavailable use the independent brake to maintain a slack-stretched condition.
3. Gradually increase braking to the desired level.
4. At a sufficient distance from the stop, make a minimum brake pipe reduction.
5. If needed, make further split reduction(s).

As the train comes to a stop, use independent brake as necessary to maintain a slack stretched condition.

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34.2.12: Switching Movements

When switching cars, the following must be considered:

1. When starting, slowing, or stopping switching movements, gradually stretch or bunch slack.
   - When starting RCL movements, including light engine, use the "couple" setting.
2. Care must be taken to limit buff and draft forces and avoid damage to track and equipment when:
   - Using multiple locomotives in consist.
   - Switching with air brakes cut-in on one or more cars.
3. Do not use automatic brake to increase locomotive brake cylinder pressure.

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January 20, 2012

34.2.13: Disturbed Track/Temporary Speed Restrictions/Heat Restrictions

When proceeding through the limits of the track bulletin or wherever instructed to comply with Rule 34.2.13, the engineer must use the following train handling techniques to minimize in-train forces when possible:

- Use throttle modulation or low dynamic brake amperage.
- Avoid making slack adjustments.
- Avoid applying or releasing automatic brakes.
- Make power and brake adjustments before or after the restriction.

When operating with distributed power at the rear of the train on:

- Level or ascending grades, operate in synchronous mode with low throttle settings, or operate in independent mode with distributed power 1–3 throttle positions below the lead consist.
- Descending grades, operate in synchronous mode with low dynamic brake settings, or operate in independent mode with distributed power 1–3 dynamic brake positions above the lead consist.
34.2.14: Thermal Misalignment

When an obvious thermal misalignment is observed ahead of a moving train, the train must be stopped, if possible, prior to the lead locomotive passing over the misaligned track. If the train cannot be stopped in time with service applications, to minimize additional buff forces imparted on the track, the preferred method for train handling is as follows:

- When the train is equipped with a two-way EOT, stop the train using the emergency toggle switch on the HED to place the train into emergency from the rear end and control slack.
- When the train is equipped with distributed power, stop the train using a full service brake application.

34.3: Grade Operations

The following must be considered when operating in grade territory:

- Tons per operative brake.
- Tons per dynamic brake axle.
- Percent of grade.
- Track curvature.
- Rail and weather conditions.
- Train speed, ensuring that maximum speed is consistent with grade limitations required by area timetables.
34.3.1: Balance Braking

When a constant speed on a grade is required for long distances, use a combination of train air brakes and dynamic brake as follows:

1. Make a minimum brake pipe reduction when dynamic brake is not sufficient to maintain speed.
2. Use additional reductions until the desired speed is maintained.
3. If a greater than 18-psi brake pipe reduction is required to control train speed, stop the train using emergency application and inspect to determine reason before proceeding.
   **Exception:** If an 18-psi reduction is due to Equalizing Reservoir leakage, apply Item 4 below.
4. If equalizing reservoir leakage is discovered and speed is decreasing, stop and secure the train, if necessary. After placing the automatic brake handle in release, place the brake valve cutoff valve in PASSENGER, if equipped. While operating in PASSENGER, movement of the automatic brake valve handle toward RELEASE will release the brakes throughout the train.

When practicable, use a combination of train air brakes and dynamic brake to control speed when operating on descending grades exceeding 1.75%.

---

34.3.2: Recharging on a Grade

When necessary to recharge the air brake system while stopped on a grade and the independent brakes may not hold the train:

1. Apply a sufficient number of hand brakes.
2. Leave independent brake fully applied, and release the automatic brake.
3. Recharge the air brake system.
4. After recharging the system, make a sufficient brake pipe reduction to hold the train while releasing the hand brakes.

Do not apply power to hold a train stationary on a grade unless:
### 34.4: Delayed Departure

When stopped and movement is delayed, apply train brakes with at least a 10-psi brake pipe reduction when operating conditions permit.

Do not release train brakes until ready to proceed except when:

- Stopped on a grade where it will be necessary to reapply the brakes or will not require the brakes to be released to start the train.
- Charging the brake system in heavy or mountain grade territory.
- Making air test and train movement is initiated within 10 minutes after releasing the train brakes.

When trains equipped with an operable EOT are stopped and movement delayed, before moving, verify brake pipe continuity by releasing the air brakes (unless on descending grade and the train brakes will remain applied), and observe an increase in pressure on the EOT prior to moving the train.

Distributed power trains must use the automated train check feature to verify brake pipe continuity.

Suspect trainline blockage when a decrease in pressure occurs at the rear of the train that has not been initiated by a brake pipe reduction; cause must be determined before departing:

- Inspect train for cause of blockage.
- A visual observation of a set and release at the rear car is sufficient to determine that no blockage exists.

If excessive tractive effort is needed (based on existing conditions) to start the train, inspect the train to determine the cause.
34.5: Car Air Brakes

When applying or reapplying automatic brakes, make brake pipe reductions according to these guidelines:

- Make a minimum reduction followed by additional reductions, as necessary.
- Charged condition of brake pipe must be considered before reapplying air brakes.
- Make a final reduction when operating conditions permit as train is nearing a stop to prevent a run out of slack.

To prevent the locomotive brakes from applying during an automatic brake application, the independent brake valve handle must be actuated (bailed) when application is made and held in ACTUATE position until exhaust ceases.

34.5.2: Releasing Brakes

Before releasing the brakes, consider the following conditions to avoid damage to equipment, lading, or track:
Running release of the automatic train brakes must not be made when brake application exceeds 18-psi.

When operating conditions allow releasing the brakes:

- Make at least a 10-psi total reduction before releasing the brakes unless the brakes will be reapplied shortly.
- Allow the exhaust at the automatic brake valve to stop before releasing the train brakes.

### 34.5.3: Unintentional Brake Release

**Unintentional Brake Release**

If an unintentional brake release occurs while the brakes are applied, stop the train and determine the cause before proceeding. Promptly notify dispatcher of the occurrence.

### 34.5.4: Regulating Valve Braking

Use of the regulating valve to control braking is prohibited.
34.5.5: Retaining Valves

Retaining Valves

Retainers may only be used after consulting with a Manager of Operating Practices for the location involved.

When retaining valves are used:

- Retaining valves must be set in the "HP" (High Pressure) position on the entire train.
- Do not exceed 15 MPH.
- Freight car brake cylinder pressure is not retained until a brake pipe reduction of at least 10-psi has been made and released. Further brake pipe reductions will add to this pressure in the brake cylinder.

When retaining valves are not in use, place them in EX (Exhaust).

34.5.6: Use of Automatic Brakes During Cold Weather Conditions

Use of Automatic Brakes During Cold Weather Conditions

49 CFR 232.107

During extreme cold weather, (below 10 degrees F) when operating conditions and outstanding instructions permit, throttle manipulations and dynamic braking must be used in lieu of train air brakes whenever possible in controlling and stopping freight trains.

34.6: Locomotive Operation
### 34.6 Locomotive Operation

**Rule Updated Date**

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#### 34.6.1: Independent Brake (Locomotive Brake)

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<th>34.6.1</th>
<th>Independent Brake (Locomotive Brake)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Use of the independent brake valve:</td>
</tr>
<tr>
<td></td>
<td>• The independent brake valve on the controlling unit must be cut-in at all times, and the handle must not be blocked in actuate position.</td>
</tr>
<tr>
<td></td>
<td>• The independent brake must not be applied while power or dynamic brake is being used except when starting, stopping, or to control wheel slips at speeds below 15 MPH.</td>
</tr>
<tr>
<td></td>
<td>• When conditions require the independent brakes to be applied, brake cylinder pressure must be controlled to prevent overheating or sliding of the locomotive wheels, excessive slack action and high in-train forces. The independent brake must not be used when the same results can be obtained with the dynamic brake.</td>
</tr>
<tr>
<td></td>
<td>• When controlling the independent brake during an emergency brake application, actuate while applying the independent brake to the desired pressure, without sliding the locomotive wheels. When emergency brake cylinder pressure is desired, release the handle from the actuate position.</td>
</tr>
<tr>
<td></td>
<td>• The maximum independent brake cylinder pressure indicated for locomotive must not be exceeded.</td>
</tr>
</tbody>
</table>

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#### 34.6.2: Throttle and Reverser Positions

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<th>Throttle and Reverser Positions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With the throttle open, the generator field switch must never be closed or moved to the &quot;ON&quot; position.</td>
</tr>
</tbody>
</table>
When moving, reverser handle must not be in a position other than the direction of travel, except when loading a bulk commodity unit train.

Reverser must be centered when locomotive is stopped. However, reverser may be left in forward position when train is stopped in ATC or ACS territory at locations where next signal is not visible.

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34.6.3: Dynamic Braking

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<th>Dynamic Braking</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 232.109</td>
<td>When using dynamic brake, comply with the following:</td>
</tr>
<tr>
<td></td>
<td>• When lead or remote consist includes a DC locomotive, pause for 10 seconds in idle before changing from power to dynamic braking.</td>
</tr>
<tr>
<td></td>
<td>• Do not supplement the dynamic brake with the locomotive brakes unless in the process of starting or stopping and speed is below the effective range of the dynamic brakes in your locomotive consist.</td>
</tr>
<tr>
<td></td>
<td>• Comply with Equivalent Dynamic Brake Axle limitations by cutting out trailing locomotives(s) or traction motor(s).</td>
</tr>
<tr>
<td></td>
<td>• Approaching and operating through turnouts or disturbed track areas with train's air brakes released, limit retarding force to 50% of maximum. Continue to limit the braking effort until at least half the train has passed the restricted area.</td>
</tr>
</tbody>
</table>

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34.6.4: Short Time Rating/Minimum Continuous Speed

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<th>34.6.4</th>
<th>Short Time Rating/Minimum Continuous Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Short Time Rating</td>
<td>Short time rating limits for DC locomotives when necessary, are indicated on rating plate located near or on the load meter; short time rating must not be exceeded.</td>
</tr>
</tbody>
</table>
If the locomotive exceeds the short time rating, stop the train and double the train over the grade or allow traction motors time to cool before continuing, unless otherwise instructed.

To provide for sufficient cooling of traction motors, allow the locomotive a minimum of 20 minutes without a short time event.

**B. Minimum Continuous Speed**

Minimum continuous speed is the slowest speed at which a DC locomotive can operate continuously in throttle position 8 before overheating. The minimum continuous speed varies and is indicated by the rating plate on the locomotive.

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**34.6.5: Penalty Brake Application**

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<tr>
<th>34.6.5</th>
<th>Penalty Brake Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR</td>
<td>A penalty brake application may be initiated by one of the following safety control devices:</td>
</tr>
<tr>
<td>236.501</td>
<td>• Alertness Device.</td>
</tr>
<tr>
<td>236.503</td>
<td>• Overspeed.</td>
</tr>
<tr>
<td>236.507</td>
<td>• Cab Signal.</td>
</tr>
<tr>
<td>236.511</td>
<td></td>
</tr>
<tr>
<td>236.564</td>
<td></td>
</tr>
<tr>
<td>238.237</td>
<td></td>
</tr>
</tbody>
</table>

If a safety control device sounds a warning or when a penalty brake application occurs, comply with the following:

1. Move automatic brake valve handle to SUPPRESSION position.
2. Hold the independent brake handle in the actuate position. Move the independent handle to a position in the application zone that will develop the desired brake cylinder pressure without sliding wheels or developing excessive buff or draft forces.

After train stops, reset PCS and release brakes when operating conditions allow.

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**Rule Updated Date**

January 20, 2012
35.0: Remote Control Operations

- 35.0: Remote Control Operations
- 35.1: Reference Materials
- 35.2: Remote Control Area
- 35.3: Equipment
- 35.3.1: Operator Equipment
- 35.3.2: Remote Control Mode
- 35.3.3: Setup and Testing
- 35.3.4: RCL Strobe Lights
- 35.4: Operation
- 35.4.1: Man-down Transmission
- 35.4.2: Remote Control Transmitter Attachment
- 35.4.3: "Pitch and Catch" Operations
- 35.4.4: Operating the Equipment
- 35.4.5: RCL Fails to Respond to Stop Command
- 35.5: Securement
- 35.5.1: Securing Remote Control Equipment
- 35.6: RCL Zone
- 35.6.1: Positive Stop Protection (PSP)
- 35.6.2: Overriding PSP
- 35.6.3: Disabling PSP
- 35.6.4: RCL Zones with Road Crossing Equipped with Cameras
- 35.7: Main Track
- 35.7.1: Remote Control Main Track Operation

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35.1: Reference Materials

<table>
<thead>
<tr>
<th>35.1</th>
<th>Reference Materials</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Employees who set-up or operate remote control equipment must be familiar with the requirements and instructions for the type of system they will operate. While on duty, remote control operators must have available:</td>
</tr>
<tr>
<td></td>
<td>• Remote Control Locomotive Technical Guide.</td>
</tr>
<tr>
<td></td>
<td>• Remote Control Quick Reference Card for the type of system they are operating.</td>
</tr>
</tbody>
</table>

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35.2: Remote Control Area

<table>
<thead>
<tr>
<th>35.2</th>
<th>Remote Control Area</th>
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<tbody>
<tr>
<td>6.7</td>
<td>A. Designated Remote Control Areas</td>
</tr>
<tr>
<td></td>
<td>Timetable Special Instructions will designate areas of remote control operations. Signs advising that remote control operations may be in effect will be posted at access locations to remote control areas.</td>
</tr>
<tr>
<td></td>
<td>B. Track Removed from Service or Working Limits Established</td>
</tr>
<tr>
<td></td>
<td>The RCO in control of a remote control locomotive must be notified of any track removed from service or working limits established for the protection of another craft. The RCO must conduct a job/safety briefing with all members of the crew.</td>
</tr>
</tbody>
</table>

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35.3: Equipment

| 35.3 Equipment |
35.3.1: Operator Equipment

Remote control operators are issued the following equipment:

- A Union Pacific approved vest designed to hold the remote control transmitter; RCT must be securely attached to vest by using all 4 "D" rings. The RCL vest must be worn as the outer most garment.
- At least one approved hands-free light. In case of failure, a lantern may be used in place of the hands-free light.
- A hand-held radio equipped with a wired microphone. Radio must be holstered or affixed to a belt.

Remote Control Transmitters are considered safety devices. Employees are prohibited from tampering with or disabling any remote control transmitter or safety feature except as provided for in RCO rules. Employees are prohibited from knowingly using a remote control transmitter with a disabled safety device.

35.3.2: Remote Control Mode

Each locomotive in the remote control consist must have a tag placed in a visible location on the control stand indicating the locomotive is being used in remote control mode. Remove tag when the locomotive is placed in manual mode.
35.3.3: Setup and Testing

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</tr>
</thead>
</table>

35.3.3: Setup and Testing

Prior to operating a remote control system, the RCO must ensure the equipment is properly setup and tested in accordance with prescribed procedures.

When two remote control transmitters are utilized, the conductor/foreman must always link as "Operator A" and the second operator as "Operator B."

35.4: Operation

<table>
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<tr>
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</tr>
</thead>
</table>

35.4: Operation

Strobe lights must be on during Remote Control Operations.

If both RCL strobe lights fail during a tour of duty, the locomotive may be used until end of the shift or the next daily inspection, whichever occurs first. Strobe lights must be repaired before locomotive is again used in remote service.
35.4.1: Man-down Transmission

<table>
<thead>
<tr>
<th>35.4.1</th>
<th>Man-down Transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The designated supervisor must monitor radio communications for man-down messages transmitted by remote control locomotive radios.</td>
</tr>
<tr>
<td></td>
<td>If a man-down message is transmitted, the supervisor will immediately attempt to contact the crew whose RCL-equipped locomotive has transmitted the man-down message. If unable to determine the reason for the man-down message, 911 must be called immediately.</td>
</tr>
<tr>
<td></td>
<td>At locations without supervisors, employees hearing a man-down message must determine the reason for the message and take appropriate action. This does not relieve nor prevent any employee from declaring an emergency and contacting 911 when such a message is heard.</td>
</tr>
<tr>
<td></td>
<td>Employees must follow local emergency procedures when man-down message is transmitted.</td>
</tr>
</tbody>
</table>

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35.4.2: Remote Control Transmitter Attachment

<table>
<thead>
<tr>
<th>35.4.2</th>
<th>Remote Control Transmitter Attachment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>When a linked RCT is attached to a vest, lean forward with RCT hanging freely until tilt warning is activated, then upright the RCT before timing out.</td>
</tr>
<tr>
<td></td>
<td>When transferring linked RCT’s to another crew, RCT &quot;A&quot; must be transferred to the primary/conductor/foreman operator and RCT &quot;B&quot; to the secondary/helper/switchman operator.</td>
</tr>
</tbody>
</table>

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35.4.3: "Pitch and Catch" Operations
35.4.3: "Pitch and Catch" Operations

Either operator may initiate transfer of control after verbally verifying that the secondary operator is in position to assume control. After pitching control of the RCL, the new primary must verbally confirm catching the pitch.

Remote Control Transmitters must not be placed in "sleep" or "dismissal" mode in lieu of pitch and catch operation.

Rule Updated Date
July 2, 2013

System Special Instructions
Effective Date: April 20, 2012

35.4.4: Operating the Equipment

When operating RCL equipment, comply with the following:

- Only licensed operators or RCO students may operate an RCT. Students or class 7 operators MUST be accompanied by a current class 6 operator.
- An RCO shall control only one locomotive consist at a time.
- Do not operate Remote Control Transmitter from a vehicle.
- Use "couple" setting when starting all movements, including light engine.
- Limit excessive buff and draft forces by moving the speed selector one setting at a time, unless kicking cars or in emergency conditions.
  (Moving the speed selector from any setting to the coast or coast B position is acceptable).
- After a penalty or emergency application of the brakes, if cars take longer than expected to move, stop and inspect that cars are properly positioned on the rail and that the brakes are released.

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### 35.4.5: RCL Fails to Respond to Stop Command

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<tr>
<th>35.4.5</th>
<th>RCL Fails to Respond to Stop Command</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If the locomotive fails to respond properly to a stop command from the remote control transmitter, the RCO must:</td>
</tr>
<tr>
<td></td>
<td>1. Place RCT in emergency.</td>
</tr>
<tr>
<td></td>
<td>2. Immediately power off the transmitter or remove RCT battery.</td>
</tr>
<tr>
<td></td>
<td>The RCO must then secure the equipment including the transmitter. The RCO must contact the manager on duty and not attempt to operate the locomotive until authorized by a DSRCO or Mechanical Department employee.</td>
</tr>
</tbody>
</table>

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### 35.5: Securement

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<tr>
<th>35.5</th>
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</thead>
</table>

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### 35.5.1: Securing Remote Control Equipment

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<tr>
<th>35.5.1</th>
<th>Securing Remote Control Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Remote control locomotives and remote control transmitter(s) must not be left unattended unless secured. At the end of a shift, RCT’s must be unlinked and stored in a locked cabinet with battery placed in charger unless transferred directly to another RCL job.</td>
</tr>
<tr>
<td></td>
<td><strong>A. Short Term Securement (90 minutes or less)</strong></td>
</tr>
<tr>
<td></td>
<td>The RCO will secure the remote control locomotive as follows:</td>
</tr>
<tr>
<td></td>
<td>1. Isolate and apply hand brakes on all locomotives.</td>
</tr>
<tr>
<td></td>
<td>2. Perform securement check before turning off the remote control transmitter.</td>
</tr>
<tr>
<td></td>
<td>3. RCO must maintain possession of the transmitter(s).</td>
</tr>
</tbody>
</table>
35.6: RCL Zone

### B. Long Term Securement (more than 90 minutes) or Ending Tour of Duty

The RCO will secure the remote control locomotive as follows:

1. Isolate and secure consist.
2. Leave the RCL breaker on.
3. Place RCL in MANUAL mode as outlined in the RCL Technical Guide.
4. Remove remote control warning sign(s).
5. Ensure that one locomotive is set-up for lead unit operation.
6. Perform locomotive securement test.
7. Shut down the locomotive(s) as required.

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July 2, 2013

35.6.1: Positive Stop Protection (PSP)

<table>
<thead>
<tr>
<th>Reference Rule</th>
<th>Positive Stop Protection (PSP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.7</td>
<td>The RCO must verify that the PSP is operational on initial movement into an activated RCL zone. Receiving a remote control transmitter message when entering the limits verifies that PSP is functioning properly.</td>
</tr>
</tbody>
</table>
### 35.6.2: Overriding PSP

<table>
<thead>
<tr>
<th>Rule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.6.2</td>
<td>Use procedures in the RCL Technical Guide to override and reactivate PSP for each RCL system. When PSP is overridden, point protection must be provided. PSP must be seen to be functioning as intended before it can be depended on to stop the locomotive again.</td>
</tr>
</tbody>
</table>

### 35.6.3: Disabling PSP

<table>
<thead>
<tr>
<th>Rule</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.6.3</td>
<td>PSP may only be disabled in the event of GPS or PSP failure.</td>
</tr>
</tbody>
</table>

### 35.6.4: RCL Zones with Road Crossing Equipped with Cameras

<table>
<thead>
<tr>
<th>Rule</th>
<th>Description</th>
</tr>
</thead>
</table>
| 35.6.4 | Reference Rule 6.32  
RCL Zones with Road Crossing Equipped with Cameras  
When using cameras for movements over road crossings, movement must not exceed 4 MPH until crossing is occupied. An employee must observe the monitors to ensure that automatic crossing warning devices activate and remain active until the crossing is occupied.  
If cameras are not used or are inoperative, employee must provide warning at the crossing. |
35.7: Main Track

Main track movements include train movements, yard transfers, etc.; it does not include doubling a train together, using the main track for head room or adding cars to a train on the main track, i.e., switching movements.

When main track movements exceed 1 mile, do not exceed the following limits:

- 12 equivalent powered axles (EPA).
- 60 cars/platforms/wells.
- 4,000 tons.
36.0: Positive Train Control Chapter 36

- 36.0: Reserved for PTC Operations

36.0: Reserved for PTC Operations

Reserved for PTC Operations

Rule Updated Date

January 20, 2012

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Union Pacific Rules
Air Brake and Train Handling Rules

37.0: Reserved for Future Use - Chapter 37

- 37.0: Reserved for Future Use

37.0: Reserved for Future Use

Reserved for Future Use

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January 20, 2012
38.0: Commuter/Business Train Operations - Chapter 38

- 38.0: Commuter/Business Train Air Brake Rules
- 38.1: Passenger Equipment Inspections
  - 38.1.1: Inspections and Brake Tests
  - 38.1.2: Class I Brake Test
  - 38.1.3: Class IA Brake Test
  - 38.1.4: Class II Brake Test
  - 38.1.5: Running Brake Tests
- 38.2: Commuter Operation Air Brake Test and Inspections
  - 38.2.1: Air Brake Test Requirements
  - 38.2.2: Procedure for a Running Brake Test
  - 38.2.3: Changing Operating Ends on Trains Equipped with Cab Cars
  - 38.2.4: Parking Brake and Hand Brakes
  - 38.2.5: Using Blended Braking
- 38.3: Operative Brakes
  - 38.3.1: Defective Train Brakes
  - 38.3.2: Operative Brake Conditions
  - 38.3.3: Operable Brakes
  - 38.3.4: Defective Brake Chart

38.0: Commuter/Business Train Air Brake Rules

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38.1: Passenger Equipment Inspections

<table>
<thead>
<tr>
<th>38.1</th>
<th>Passenger Equipment Inspections</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inspect and test passenger equipment according to Federal Railroad Administration (FRA) regulations contained within these rules.</td>
</tr>
</tbody>
</table>
### 38.1.1: Inspections and Brake Tests

**38.1.1** Inspections and Brake Tests

Inspections and brake tests must be performed on commuter/business passenger trains by a Qualified Maintenance Person or by a Qualified Person.

- Only a Qualified Maintenance Person may perform a Class I brake test.
- Either a Qualified Maintenance Person or a Qualified Person may perform a Class IA or a Class II brake test.

### 38.1.2: Class I Brake Test

**38.1.2** Class I Brake Test

#### When to Perform a Class I Test

A Class I brake test must be conducted on commuter/business passenger trains:

- Once each calendar day that the train is placed or continues in service.
- On each car added to a train at the time it is added to a train, unless documentation is provided to the train crew that a Class I brake test was performed on the car on that calendar day, and the car has not been disconnected from a source of compressed air for more than four hours prior to being added to the train. However, a Class IA test may be conducted on the car in lieu of the above.
- The test may be performed in conjunction with the calendar day exterior mechanical inspection.
- Except as provided in these rules, a train may not be used in passenger service or hauled from a location where a Class I brake test has been performed, or was required to have been performed, with less than 100% operative brakes.

**Notification of Completed Test**
A Qualified Maintenance Person that performs a Class I brake test on a train may notify the crew of the
Class I brake test or place a written statement (see Appendix A) in the rear cab car's B-1 locker until the
next Class I brake test is performed. The statement shall contain:

- The date and the time the Class I brake test took place.
- The location where the test was performed.
- The identification number of the controlling locomotive of the train.
- The total number of cars inspected during the Class I brake test.
- The signature or employee ID of the inspector.

### Rule Updated Date
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### 38.1.3: Class IA Brake Test

#### A. When to Perform a Class IA Brake Test

Either a Class I or Class IA brake test shall be performed prior to the first calendar day departure of
each commuter/business passenger train, unless all of the following conditions are satisfied:

- A Class I brake test was performed within the previous 12 hours.
- The train has not been used in commuter/business service since the performance of the Class I
  brake test.
- The train has not been off a compressed air source for more than four hours since the
  performance of the Class I brake test.
- A commuter/business train that provides continuing late night service that began prior to
  midnight may complete its daily operating cycle without performing another Class I or Class IA
  brake test. A Class I or Class IA test shall be performed on such a train before it starts a new
  daily operating cycle.

Either a Class I or Class IA brake test shall be performed prior to placing a commuter/business
passenger train in service that has been off air for more than four hours.

### Rule Updated Date
January 20, 2012
### 38.1.4: Class II Brake Test

<table>
<thead>
<tr>
<th><strong>38.1.4</strong></th>
<th><strong>Class II Brake Test</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>49 CFR</strong></td>
<td><strong>238.317</strong></td>
</tr>
<tr>
<td>Reference Rule</td>
<td>38.2.1</td>
</tr>
</tbody>
</table>

**A. When to Perform a Class II Brake Test**

A Class II brake test shall be performed on a commuter/business passenger train when any of the following events occur:

- Whenever the control stand used to control the train is changed or any time the controlling end is cut-out and then cut back in.
- Prior to the first calendar day departure where a Class I brake test remains valid.
- When cars that have received a Class I brake test within the previous calendar day and have not been disconnected from a source of compressed air for more than four hours are added to the train.
- When cars or equipment are removed from the train.
- Before a train enters the main track when a crew first takes charge of the train, except for face-to-face relief.

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### Rule Updated Date

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### 38.1.5: Running Brake Tests

<table>
<thead>
<tr>
<th><strong>38.1.5</strong></th>
<th><strong>Running Brake Tests</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>49 CFR</strong></td>
<td><strong>238.319</strong></td>
</tr>
</tbody>
</table>

**When to Perform Test**

As soon as conditions safely permit, a running brake test shall be performed on a commuter/business train after the train has departed a point where:

- A Class I, Class IA, or Class II brake test was performed.
- Any angle cocks or cutout cocks have been closed.
- A train has struck debris on the track.
- A train reaches a point designated by the timetable or special instructions.
- Locomotive or operating ends have been changed.
- Crew changes are located.
- Movement is being controlled with a back-up hose or valve. The back-up hose or valve must be used to conduct the test.

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### Rule Updated Date
38.2: Commuter Operation Air Brake Test and Inspections

<table>
<thead>
<tr>
<th>Type of Test</th>
<th>Perform Walking Inspection</th>
<th>Brake pipe pressure set at 90-psi</th>
<th>Leakage test as required per rule 30.11.2 Part B. Leakage must not exceed 5 lbs/min.</th>
<th>20-psi brake pipe reduction</th>
<th>Check that brake shoes are properly fastened and seated against the wheel. Brake rigging does not bind or foul. Angle cocks are properly positioned.</th>
<th>When notified, release the brakes. Proper release of the brakes can be determined by observation of the clearance between the brake shoe and the wheel.</th>
<th>Verify brake pipe pressure changes at rear of train by observing gauge during application and release of rear car</th>
<th>Verify the communicating signal system is tested and known to be operating as intended. Any one of the following meet this requirement: two-way radio system, electrical line (buzzer) or PA system.</th>
<th>Verify the emergency brake application and deadman pedal or other emergency control devices function as intended.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Class IA</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Class II</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Running Test

Perform the test as follows:
1. Leave power in low throttle position.
2. If operating from the locomotive, actuate the independent brake.
3. Apply the train air brakes with enough force to determine the brakes are operating properly.
4. If the train brakes are operating properly, release the brakes and proceed.

If the air brakes do not operate properly, stop the train and contact Commuter Control or the Train Dispatcher for instructions. Be governed by the instructions in Defective Train Brake procedures (Rule 38.4.3).

1 Cars must be inspected by a Qualified Maintenance Inspector.
2 Cars must be inspected by a Qualified Maintenance Inspector or Qualified Person.
3 Cars added enroute must be tested as outlined above. Cars are set out—determine that brake pipe pressure at the rear car has
been restored.

\(^4\) As indicated by the brake pipe gauge on the engine or cab car where the air brakes are being controlled.

\(^5\) A qualified maintenance person (or qualified person only if gauge is not available) can verify the application and release by observing a brake shoe on the rear car.

*49 CFR 238.313 / 238.315 / 238.317 / 238.319*

**Rule Updated Date**

July 2, 2013

**System Special Instructions**

Effective Date: April 20, 2012

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### 38.2.2: Procedure for a Running Brake Test

<table>
<thead>
<tr>
<th>Reference Rule</th>
<th>Procedure for a Running Brake Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>38.2.2</td>
<td>Conduct the Running Brake Test as follows:</td>
</tr>
<tr>
<td>49 CFR</td>
<td>• Perform the test as soon as the train has enough speed to prevent stalling.</td>
</tr>
<tr>
<td>238.319</td>
<td>• Use the train’s automatic brake.</td>
</tr>
<tr>
<td><strong>Reference Rule</strong></td>
<td>• Do not use blended braking during the running test.</td>
</tr>
<tr>
<td>38.4.1</td>
<td>Perform the test as follows:</td>
</tr>
<tr>
<td></td>
<td>1. Leave power in low throttle position.</td>
</tr>
<tr>
<td></td>
<td>2. If operating from the locomotive, actuate the independent brake.</td>
</tr>
<tr>
<td></td>
<td>3. Apply the train air brakes with enough force to determine the brakes are operating properly.</td>
</tr>
<tr>
<td></td>
<td>4. If the train brakes are operating properly, release the brakes and proceed.</td>
</tr>
<tr>
<td></td>
<td>If the air brakes do not operate properly, stop the train and contact Commuter Control or the Train Dispatcher for instructions. Be governed by the instructions in Defective Train Brake procedures.</td>
</tr>
</tbody>
</table>

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**Rule Updated Date**

January 20, 2012

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### 38.2.3: Changing Operating Ends on Trains Equipped with Cab Cars
38.2.3 Changing Operating Ends on Trains Equipped with Cab Cars

Use the procedures listed below to change operating ends on a commuter train.

A. Cut-Out Operating Controls on a Locomotive or Cab Car

Cutting out controlling locomotive:
1. Apply sufficient hand brake(s) to hold train.
2. Fully apply the independent brake.
3. Make a 20-psi brake pipe reduction.
4. Move the independent brake handle to release without actuating.
5. Cut-out the automatic brake valve.
6. Place the automatic brake valve handle in handle off position.
7. Remove the reverser.
8. Place switches and breakers in proper positions.

Cutting out controlling Cab Car:
1. Apply sufficient hand brakes to hold train.
2. Fully apply the parking brake.
3. Make a 20-psi brake pipe reduction.
4. Cut-out the automatic brake valve.
5. Place the automatic brake valve handle in handle off position.
6. Release the parking brake.
7. Remove the reverser.
8. Place switches and breakers in proper positions.

B. Cutting in Operating Controls on Locomotive or Cab Car

Cutting in controlling locomotive:
1. Fully apply the independent brake.
2. Place the automatic brake valve handle in release.
3. Cut-in the automatic brake valve.
4. Insert the reverser.
5. Place switches and breakers in proper positions.
6. Release hand brake(s).

Cutting in controlling Cab Car:
1. Fully apply the parking brake.
2. Place the automatic brake valve handle in release.
3. Cut-in the automatic brake valve.
### 38.2.4: Parking Brake and Hand Brakes

<table>
<thead>
<tr>
<th>38.2.4</th>
<th>Parking Brake and Hand Brakes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Parking Brake</strong></td>
<td></td>
</tr>
<tr>
<td>Cab cars are equipped with a parking brake that has two positions:</td>
<td></td>
</tr>
<tr>
<td>1. Released.</td>
<td></td>
</tr>
<tr>
<td>2. Fully applied.</td>
<td></td>
</tr>
<tr>
<td>When the cab car automatic brake is cut-out, the parking brake is inoperative.</td>
<td></td>
</tr>
<tr>
<td>Except in an emergency, do not use the parking brake to slow or stop a train. It must be determined that the parking brake is released on the cab car prior to initiating movement.</td>
<td></td>
</tr>
<tr>
<td><strong>B. Hand Brakes</strong></td>
<td></td>
</tr>
<tr>
<td>It must be determined that hand brakes are released on all cars and locomotives prior to initiating movement.</td>
<td></td>
</tr>
</tbody>
</table>

---

### 38.2.5: Using Blended Braking

<table>
<thead>
<tr>
<th>38.2.5</th>
<th>Using Blended Braking</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 238.231</td>
<td>Locomotives may be equipped with a combination air brake and dynamic brake system called blended braking. If so equipped, blended braking is the preferred method of slowing and stopping the train. The amount of blended braking varies with speed and amount of air brake application.</td>
</tr>
</tbody>
</table>
Blended braking will occur with an automatic brake application if:

- Blended brake cut-out switch is ON.
- Throttle is in IDLE.
- Independent brake valve handle on the locomotive is released and not actuated.

### 38.3: Operative Brakes

<table>
<thead>
<tr>
<th>38.3</th>
<th>Operative Brakes</th>
</tr>
</thead>
</table>

### 38.3.1: Defective Train Brakes

<table>
<thead>
<tr>
<th>38.3.1</th>
<th>Defective Train Brakes</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 238.215</td>
<td>Commuter/business equipment that develop inoperative brakes enroute may be moved in compliance with <strong>Rule 38.3.4</strong> when a tag or card is placed on both sides of the defective passenger equipment. The information on the tag or card must include:</td>
</tr>
</tbody>
</table>

- Equipment number.
- Railroad.
- Location.
- Date.
- Nature of defect.
- Destination for repair.
- Signature and title of person reporting the defect.

### Rule Updated Date

January 20, 2012
38.3.2: Operative Brake Conditions

<table>
<thead>
<tr>
<th>38.3.2</th>
<th>Operative Brake Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 238.215</td>
<td>The following brake conditions do not render car air brakes inoperative for the purpose of calculating operative brakes:</td>
</tr>
<tr>
<td></td>
<td>- Failure or cutting out of dynamic or blended brake systems.</td>
</tr>
<tr>
<td></td>
<td>- Inoperative or otherwise defective hand brakes or parking brakes.</td>
</tr>
<tr>
<td></td>
<td>- Piston travel in excess of the Class I brake test limits.</td>
</tr>
<tr>
<td></td>
<td>- Power brakes overdue for inspection, testing, maintenance, or stenciling.</td>
</tr>
</tbody>
</table>

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38.3.3: Operable Brakes

<table>
<thead>
<tr>
<th>38.3.3</th>
<th>Operable Brakes</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 238.215</td>
<td>When necessary to cut-out air brakes enroute on Commuter/Business trains, the crew must comply with the following restrictions when braking percentage drops below 100%:</td>
</tr>
<tr>
<td></td>
<td>- 85 to 99%</td>
</tr>
<tr>
<td></td>
<td>- Operate at normal speed.</td>
</tr>
<tr>
<td></td>
<td>- Continue normal operation to either next repair point or end of trip, whichever occurs first.</td>
</tr>
<tr>
<td></td>
<td>- 75 to 84%</td>
</tr>
<tr>
<td></td>
<td>- Do not exceed 40 MPH.</td>
</tr>
<tr>
<td></td>
<td>- Discharge passengers at the next station where it is safe to do so.</td>
</tr>
<tr>
<td></td>
<td>- Proceed to nearest repair point.</td>
</tr>
<tr>
<td></td>
<td>- 50 to 74%</td>
</tr>
<tr>
<td></td>
<td>- Do not exceed 20 MPH.</td>
</tr>
<tr>
<td></td>
<td>- Discharge passengers at next forward station.</td>
</tr>
<tr>
<td></td>
<td>- Proceed to nearest repair point.</td>
</tr>
<tr>
<td></td>
<td>- Less than 50%</td>
</tr>
<tr>
<td></td>
<td>- Train must not be moved with passengers on board.</td>
</tr>
<tr>
<td></td>
<td>- Do not exceed 20 MPH to nearest repair point.</td>
</tr>
</tbody>
</table>
To calculate operable brake percentage:

1. Determine total number of trucks in the train.
2. Subtract the number of cutout trucks from the total number of trucks in the train.
   - Count each cut-out locomotive truck as 2 cut-out trucks.
3. Divide the number of operative trucks by the total number of trucks in the train then multiply it by 100.

   **Example:** Train Information – 1 Locomotive / 2 trucks and 5 Cars / 10 trucks

The crew is required to cut-out one truck on a car. Use the following formula to calculate the new braking percentage:

Locomotive trucks + car trucks 2 + 10 = 12 Total trucks

Subtract BO truck(s) = 1 from total trucks

12 – 1 = 11 Total operative trucks

Divide number of operative trucks by the total number of trucks in the train, then multiply by 100.

Operative trucks 11/ total trucks 12 = .916 X 100 = 91.6%

**When Front or Rear Unit are Inoperative**

If power brakes on the front or rear unit are inoperative, the following shall apply:

- If the hand brake is located inside the interior of the equipment:
  - A Qualified Person must be stationed at the hand brake on the unit.
  - The car must be locked out and empty, except for the railroad employee manning the hand brake.
  - Comply with applicable speed restriction.
- If the hand brake is located outside the interior of the equipment or is inaccessible to a Qualified Person:
  - The car must be locked out and empty.
  - The train may be moved at Restricted Speed to the first location where car must be removed or repositioned in the train.
- Notify the Mechanical Department of the failure.

**Rule Updated Date**

January 20, 2012

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**38.3.4: Defective Brake Chart**
## Defective Brake Chart

| Number of cut-out trucks on entire train (Each locomotive truck counts as two trucks) |
|---|---|---|---|---|---|---|---|---|
| Units | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | 50% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| 2 | 75% | 50% | 25% | 0% | 0% | 0% | 0% | 0% |
| 3 | 83% | 67% | 50% | 33% | 17% | 0% | 0% | 0% |
| 4 | 88% | 75% | 63% | 50% | 38% | 25% | 13% | 0% |
| 5 | 90% | 80% | 70% | 60% | 50% | 40% | 30% | 20% |
| 6 | 92% | 83% | 75% | 67% | 58% | 50% | 42% | 33% |
| 7 | 93% | 86% | 79% | 71% | 64% | 57% | 50% | 43% |
| 8 | 94% | 88% | 81% | 75% | 69% | 63% | 56% | 50% |
| 9 | 94% | 89% | 83% | 78% | 72% | 67% | 61% | 56% |
| 10 | 95% | 90% | 86% | 80% | 75% | 70% | 66% | 60% |
| 11 | 95% | 91% | 86% | 82% | 77% | 73% | 68% | 64% |
| 12 | 96% | 92% | 88% | 83% | 79% | 75% | 71% | 67% |
| 13 | 96% | 92% | 88% | 85% | 81% | 77% | 73% | 69% |
| 14 | 96% | 93% | 89% | 86% | 82% | 79% | 75% | 71% |

### If the brakes on the first or last unit in the train are completely inoperable:
- Relocate passengers to other units and lock the car.
- Operate at 20 MPH or less
- Remove or reposition unit in the train when and where it is safe to do so.

| Under 50% | Operate at 20 MPH or less. | Discharge passengers at the next station where it is safe to do so. | Proceed to the nearest repair point. |
| Under 74% | Operate at 20 MPH or less. | Discharge passengers at the next station where it is safe to do so. | Proceed to the nearest repair point. |
| Under 84% | Operate at 40 MPH or ½ operating speed, whichever is less. | Discharge passengers at the next station where it is safe to do so. | Proceed to the nearest repair point. |
| Under 99% | Operate at normal track speed. | Continue normal operation forward to either the next open repair point or end of trip, whichever occurs first. | Proceed to the nearest repair point. |

Compiled by Metra’s Workforce Education and Training Division
39.0: Equipment Charts/Diagrams - Brakes - Chapter 39

- 39.0: Freight Car and Locomotive Components
  - 39.1: Freight Car Components
    - 39.1.1: Freight Car End and Platform Identification
    - 39.1.2: Wheel and Journal Identification on Cars
    - 39.1.3: High Strength Couplers
      - 39.1.3.1: High Strength Coupler Identification
    - 39.1.4: Freight Car A-1 Reduction Relay Valve
    - 39.1.5: Freight Car Automatic Vent Valve
    - 39.1.6: Retaining Valves
    - 39.1.7: Charging Time Chart
  - 39.2: Locomotive Components
    - 39.2.1: Automatic Brake Valves
    - 39.2.2: Automatic Brake Valve Cutout Valve
    - 39.2.3: Independent Brake Valves
    - 39.2.4: MU-2A/Double-Ported Cutout Cock
    - 39.2.5: Electro pneumatic Automatic and Independent Brake Valves
    - 39.2.6: Locomotive Electronic Air Brake Computer Resets Resetting CCB Faults
    - 39.2.7: Air Flow Meter
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  - 39.3: Charts and Diagrams
    - 39.3.1: Car Chart Components
    - 39.3.2: Terminology for Articulated Car Identification Diagram
    - 39.3.3: Coupler Diagram
    - 39.3.4: Locomotive Axle, Journal, and Wheel Identification Diagram
    - 39.3.5: Locomotive Air Brake Equipment

39.0: Freight Car and Locomotive Components

Rule Updated Date
January 20, 2012
39.1: Freight Car Components

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January 20, 2012

39.1.1: Freight Car End and Platform Identification

Identify car ends as follows:

- On cars with one hand brake, the "B" end of the car is the end with the hand brake. The other end is the "A" end.
- On cars with more than one hand brake, the letters "A" and "B" are stenciled on the appropriate ends of the car.
- On cars with more than one platform, each section if stenciled.

Example: A five-platform articulated spine car is designated with an "A" platform on one end and the adjacent platform is designated as "E" then "D", then "C" and then "B" on the opposite end.

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39.1.2: Wheel and Journal Identification on Cars

To determine the correct wheel numbers on cars:

1. Face the "B" end of the car.
2. From the "B" end of the car, identify the designation of wheels, journals, and axles as follows:
39.1.3: High Strength Couplers

Each car is to be considered equipped with a standard type coupler unless it is known the car is equipped with high strength couplers.

Coal cars, covered hopper cars and cars designed to carry TOFC vans and/or containers are equipped with high strength couplers. If it is not known that a car is equipped with high strength couplers, it can be determined by looking at the coupler casting identification located on top of the coupler.

A high strength coupler will have the letter "E" or "EX" as the last character(s) of identification. Examples of high strength coupler identifications are E60HTE, SBE60CE, E60DE, EF512WEX.

39.1.3.1: High Strength Coupler Identification

If it is not known that a car is equipped with high strength couplers, it can be determined by looking at the coupler casting identification located on top of the coupler. A high strength coupler will have the letter "E" or "EX" as the last character of identification. Examples of high strength coupler identifications are E60HTE, SBE60CE, SBE60DE, EF512WEX.
39.1.4: Freight Car A-1 Reduction Relay Valve

<table>
<thead>
<tr>
<th>39.1.4</th>
<th>Freight Car A-1 Reduction Relay Valve</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Some long cars have an A-1 reduction relay valve that helps transmit a service or emergency brake pipe reduction by compensating for the added brake pipe length of the car.</td>
</tr>
<tr>
<td></td>
<td>The relay valve functions as follows:</td>
</tr>
<tr>
<td></td>
<td>• Service brake reductions are assisted through the B-1 quick service portion.</td>
</tr>
<tr>
<td></td>
<td>• Emergency brake pipe reductions are transmitted by the No. 8 vent valve portion. If the No. 8 vent valve fails to reset after an emergency brake application, causing a continuous blow at the exhaust port, plug the valve by removing the vent protector and screwing in the threaded plug.</td>
</tr>
</tbody>
</table>

The following freight cars are equipped with the relay valve:

- Cars with AB or ABD control valves and more than 75 feet of brake pipe between hose couplings.
- Cars with ABDW control valves and more than 100 feet of brake pipe between hose couplings.

Note: Cars with ABDW control valves having between 75 and 100 feet of brake pipe have a No. 8 vent valve added.
Some multi-platform cars are equipped with what is known as an automatic vent valve (AVV), which is an emergency portion of a control valve. This valve is used only to propagate an emergency brake application through the brake pipe. Should an AVV become defective, the cutout cock is used to cut it out.

The retaining valve on each car controls the brake cylinder pressure exhaust. All freight cars have retaining valves located at the "B" end of the car or at the side near the control valve. The retaining valve can be positioned to function as follows during a brake release:

- Allow the exhaust of brake cylinder pressure to atmosphere.
- Retain brake cylinder pressure while the system is recharged.

A. Three-Position Retaining Valve

The three-position retaining valve includes these positions.

- DIRECT EXHAUST (EX)-Exhausts all brake cylinder pressure. Handle is turned down.
- HIGH PRESSURE (HP)-Exhausts brake cylinder pressure to 20 psi. Handle is 45 degrees below horizontal.
- SLOW DIRECT EXHAUST (SD)-Exhausts brake cylinder pressure for a blow down time of approximately 86 seconds and continues to exhaust until all pressure is vented. Handle is 45 degrees above horizontal.

B. Four-Position Retaining Valve

The four-position retaining valve includes the positions listed above and one additional position:
39.1.7: Charging Time Chart

When the brake system is uncharged and not equipped with an air flow meter, use the following chart to determine the minimum and maximum charging times:

<table>
<thead>
<tr>
<th>Brake Pipe Length (in feet)</th>
<th>Minimum Charging Time (Minutes)</th>
<th>Maximum Charging Time (Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2500 or less</td>
<td>8</td>
<td>25</td>
</tr>
<tr>
<td>3000</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>4000</td>
<td>15</td>
<td>35</td>
</tr>
<tr>
<td>5000</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>6000</td>
<td>26</td>
<td>55</td>
</tr>
<tr>
<td>7000</td>
<td>35</td>
<td>65</td>
</tr>
<tr>
<td>8000</td>
<td>45</td>
<td>75</td>
</tr>
<tr>
<td>9000</td>
<td>57</td>
<td>100</td>
</tr>
<tr>
<td>10,000</td>
<td>71</td>
<td>125</td>
</tr>
<tr>
<td>11,000</td>
<td>80</td>
<td>160</td>
</tr>
</tbody>
</table>
### 39.2: Locomotive Components

#### 39.2.1: Automatic Brake Valves

<table>
<thead>
<tr>
<th>39.2.1</th>
<th>Automatic Brake Valves</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. 24RL-MC Automatic Brake Valve</strong></td>
<td>The 24RL-MC automatic brake valve is a maintaining, non-self-lapping automatic brake valve. This brake valve maintains in LAP. Therefore, cut-out the maintaining feature during brake pipe leakage tests. Handle positions include:</td>
</tr>
<tr>
<td></td>
<td>• FULL RELEASE. Releases the train and locomotive brakes and charges the brake pipe through the regulating valve, preventing overcharge. When the handle is in this position, air is heard exhausting at the brake valve.</td>
</tr>
<tr>
<td></td>
<td>• RELEASE. Releases the train and locomotive brakes and charges the brake pipe through the regulating valve.</td>
</tr>
<tr>
<td></td>
<td>• FIRST SERVICE. Reduces the equalizing reservoir 6 to 10 psi at a service rate, then continues to reduce brake pipe pressure at a slow rate.</td>
</tr>
<tr>
<td></td>
<td>• LAP. Maintains brake pipe pressure at the same level as equalizing reservoir pressure.</td>
</tr>
<tr>
<td></td>
<td>• SERVICE. Reduces equalizing reservoir and brake pipe pressures at a service rate.</td>
</tr>
<tr>
<td></td>
<td>• EMERGENCY. Vents brake pipe pressure directly to the atmosphere, causing brakes to apply at an emergency rate.</td>
</tr>
</tbody>
</table>

| **B. 24RL-MC1 Automatic Brake Valve** | The 24RL-MC1 automatic brake valve is a maintaining, non self-lapping automatic brake valve. This brake valve maintains in MAINTAINING. Use LAP during brake pipe leakage tests. Handle positions include: |
|  | • FULL RELEASE. Releases the train and locomotive brakes and charges the brake pipe through the regulating valve, preventing overcharge. When the handle is in this position, air is heard exhausting at the brake valve. |
|  | • RELEASE. Releases the train and locomotive brakes and charges the brake pipe through the regulating valve. |
C. 26C, 30CDW, Knorr CCB and WABCO EPIC Automatic Brake Valves

These maintaining, self-lapping brake valves regulate brake pipe pressure, controlling both locomotive and train brakes.

Brake Valve Features

These automatic brake valves have these features:

- The maintaining feature maintains constant brake pipe pressure unless the cutout valve is in OUT.
- The regulating valve controls the supply of air pressure to the equalizing reservoir, which regulates brake pipe pressure.

Handle Positions:

- RELEASE. Charges the brake pipe to the regulating valve setting and releases the locomotive and train brakes.
- MINIMUM REDUCTION. Reduces equalizing reservoir and brake pipe pressures 6 to 8 psi.
- SERVICE ZONE. Gradually reduces equalizing reservoir and brake pipe pressures in increasing amounts as the brake handle is moved to the right.
- Moving the brake handle to the left with the brake valve cutout valve in PASS will increase equalizing reservoir and brake pipe pressures. Use extreme care when operating freight trains with the automatic brake valve cutout valve in PASS.
- FULL SERVICE POSITION. Reduces equalizing reservoir and brake pipe pressures to near equalization.
- SUPPRESSION. restores control of the locomotive after a safety control (penalty) brake application. To recover control, leave the brake handle in this position for 60 seconds. Moving the brake handle farther to the right toward HANDLE OFF/CONTINUOUS SERVICE, reduces equalizing reservoir and brake pipe pressures at a service rate. Use this handle position for:
  - Trailing locomotives
39.2.2: Automatic Brake Valve Cutout Valve

A. Two-Position Cutout Valve

- **IN.** Provides control of brake pipe pressure from the automatic brake valve. Equalizing reservoir and brake pipe pressures will increase when the automatic brake valve is in RELEASE.
- **OUT.** Disconnects control of brake pipe pressure from the automatic brake valve. Use this position when:
  - Not using the automatic brake valve to control brake pipe pressure (trailing locomotives or locomotives hauled dead-in-tow)
  - Conducting brake pipe leakage tests

B. Three-Position Cutout Valve

- **FRT.** Same as IN position described in two-position cutout valve above.
- **OUT.** Same as OUT position described in two-position cutout valve above.
- **PASS.** Provides control of brake pipe pressure from the automatic brake valve. Equalizing reservoir pressure and brake pipe pressure will increase from any movement of the brake handle toward RELEASE. Use this position when operating passenger or commuter trains to utilize the graduated release feature.
Note: In freight service, if the equalizing reservoir is leaking, PASS may be used only if it is necessary to maintain constant brake pipe pressure during an automatic brake application. Because of the possibility of an undesired release, placing the three-position cutout valve in PASS position must only be done with the automatic brake valve handle in RELEASE position.

Rule Updated Date
January 20, 2012

39.2.3: Independent Brake Valves

The following describes the positions and functions of the independent brake valve:

- RELEASE/ACTUATE. Normal position to release the locomotive brakes. To release the locomotive brakes while an automatic brake application is in effect, depress the handle while it is in the RELEASE position (actuate).
- APPLICATION ZONE. All handle movements between RELEASE and FULL APPLICATION increase or decrease locomotive brake cylinder pressure as follows:
  1. Increase by moving the brake handle to the right (or forward).
  2. Decrease by moving the brake handle to the left (or back towards operator).
- FULL APPLICATION. Position for creating maximum locomotive brake cylinder pressure from the independent brake system.

Rule Updated Date
January 20, 2012

39.2.4: MU-2A/Double-Ported Cutout Cock

The handle for the MU-2A cutout cock is spring-loaded; push it in before changing positions.

The MU-2A valve has three positions:
LEAD or DEAD. Engages control of the independent brakes. Use when a locomotive is a single unit, a controlling unit, or is being hauled dead-in-tow.
**Rule Updated Date**
January 20, 2012

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### 39.2.5: Electro pneumatic Automatic and Independent Brake Valves

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>39.2.5</td>
<td>Electro pneumatic Automatic and Independent Brake Valves</td>
</tr>
</tbody>
</table>

Electro pneumatic automatic and independent brake valves (Knorr CCB or WABCO EPIC) are cut-in or cut-out through electronic display screens. The air brake setup screens options are:

- **Independent Brake:**
  1. Lead.
  2. Trail.

- **Automatic Brake Valve:**
  1. Pass (passenger-to be used only in passenger service).
  2. Freight.
  3. Cut Out.

**Note:** To avoid an undesired emergency brake application when cutting in the automatic brake on these systems, cut-in the independent brake first by selecting "Lead" and saving changes before changing automatic brake valve setup to "Freight" (or "Pass"). Most units now have graceful cut-in eliminating this problem.

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**Rule Updated Date**
January 20, 2012
### 39.2.6: Locomotive Electronic Air Brake Computer Resets Resetting CCB Faults

Knorr CCB systems may sometimes detect a system fault enroute or when setting up that may be cleared as follows:

1. Secure locomotive.
2. Close end cocks on affected unit, including main reservoir line.
3. Verify that air brake computer (CCB) circuit breaker is closed and remove reverser handle.
4. Set unit air brake setup to TRAIL. Note: If unit will not go to TRAIL, select LEAD, save and confirm. Try Step 4 again.
5. Place automatic brake valve handle in EMERGENCY position.
6. Place independent brake valve handle in RELEASE position.
7. After 60 seconds, place automatic brake valve handle in RELEASE position.
8. Change air brake setup to LEAD-CUT IN, and charge brake pipe to 90 psi.
9. Place automatic brake valve handle in SUPPRESSION position for 10 seconds.
10. Return automatic brake valve handle to RELEASE position. Allow equalizing reservoir and brake pipe to FULLY charge and allow brake cylinder pressure to go to 0 psi.
11. Place independent brake valve handle in FULL APPLICATION position.
12. Place independent brake valve handle in RELEASE position.
13. ACTUATE (BAIL) for 10 seconds.
14. Place automatic brake valve handle in EMERGENCY position.
15. After 60 seconds, place automatic brake valve handle in RELEASE position.
16. Place independent brake valve handle in FULL APPLICATION position.
17. Faults should be cleared. If faults do not clear, follow message instructions on operator's display.

### Rule Updated Date

January 20, 2012

### 39.2.7: Air Flow Meter

The air flow meter measures the rate in cubic feet per minute (CFM) that air flows into the brake pipe. The Air Flow Method uses this meter to determine brake pipe leakage.
A. Air Flow Meter Readings

The air flow meter provides the following brake pipe flow information:

- As the brake system begins charging, a high flow into the brake pipe is indicated by:
  
  a. Higher numbers (more than 60 CFM).
  
  or
  
  b. The pointer moving to the right.

- As the brake system becomes charged, a lesser air flow into the brake pipe is indicated by:
  
  a. Lower numbers (less than 60 CFM).
  
  or
  
  b. The pointer moving to the left.

- If the air flow meter shows a reading (less than 60 CFM or left of the calibration mark) that is stabilized, the brake system is charged.

B. Air flow information

The air flow meter also provides the following information about the train's brake system:

- After a brake application and release, the air flow meter will indicate high flow. As the brake system recharges, the brake pipe flow rate will decrease until the air flow pointer reaches the reference value, indicating that the brake system is recharged.
- Air flow less than the reference value may indicate a closed angle cock.
- Air flow greater than the reference value may indicate increased leakage to the brake system.
- With a brake application in effect, a decrease in air flow may indicate that an unintentional brake release is occurring.

Once the air flow meter shows a constant reading, the engineer should:

1. Note the rate of flow and use this number as a reference to determine when the brake system is charged.
2. If the air flow meter is equipped, adjust the reference pointer to agree with the flow pointer.

**Note:** This reading is a reference value to use to monitor fluctuations in air flow to the brake pipe.

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**Rule Updated Date**

January 20, 2012

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**39.2.8: Overspeed Control**
39.2.8 Overspeed Control

The overspeed control prevents the train from running at speeds higher than the safe mechanical limits of the traction motors. It functions as follows:

- If train speed increases to an unsafe level, the safety control device sounds a warning.
- If the train does not slow within 6 to 12 seconds of the first warning sound, the overspeed control device applies the train brakes and trips the PC switch.

Exception: Some BNSF locomotives allow an Overspeed Penalty Application to be prevented by placing automatic brake valve to MINIMUM position. When warning whistle is heard, move automatic brake valve to MINIMUM position. If speed reduces sufficiently, train brakes may be released, when desired. If Penalty Brake Application occurs as indicated by PCS open and service brake application, move automatic brake valve handle to SUPPRESSION to recover.

A. Slowing Train due to Overspeed Application

To slow the train when the safety control device sounds a warning, comply with the following:

1. On locomotives with 26L, 30CDW, and CCB brake equipment, move the automatic brake handle to SUPPRESSION within the 6 to 12 second warning period.
2. On locomotives with other brake equipment, reduce the brake pipe pressure 6 to 8 psi, or more if necessary.

B. Recover Overspeed

To recover when the overspeed control applies the train brakes:

1. On locomotives with 26L, 30CDW, and CCB brake equipment, move the automatic brake handle to SUPPRESSION.
2. On locomotives with other brake equipment, move the automatic brake handle to LAP.
3. Move the throttle to IDLE and wait 60 seconds.
4. After the train stops, move the automatic brake handle to RELEASE and note that:
   - Brake pipe pressure is restored.
   - PC light goes out.
   - Brakes release.

Note: Some locomotive equipment has been modified to slow the train during the warning period with the automatic brake valve in MINIMUM REDUCTION. Unless the engineer knows that the locomotive being operated includes this modification, the SUPPRESSION position should be used.

Rule Updated Date

January 20, 2012
39.3: Charts and Diagrams

39.3 Charts and Diagrams

Rule Updated Date
January 20, 2012

39.3.1: Car Chart Components

<table>
<thead>
<tr>
<th>39.3.1</th>
<th>Car Chart Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>(To be used when notifying the Dispatcher’s Office or others of location of defects, etc.)</td>
<td></td>
</tr>
<tr>
<td>To determine axle number, journal number, and wheel number on a car, stand facing the hand brake end of the car (the B end) and count the closest axle as number one and the wheels and journals on right and left sides as R1, R2, etc., and L1, L2, etc., respectively, as shown in the diagram.</td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> For all multi-unit articulated cars, the journal-wheel number will be stenciled on the side frame directly above the journal.</td>
<td></td>
</tr>
<tr>
<td>1. Horizontal end hand hold</td>
<td></td>
</tr>
<tr>
<td>2. Hand brake housing</td>
<td></td>
</tr>
<tr>
<td>3. End ladder tread</td>
<td></td>
</tr>
<tr>
<td>4. Hand brake wheel</td>
<td></td>
</tr>
<tr>
<td>5. Telescoping uncoupling rod</td>
<td></td>
</tr>
<tr>
<td>6. Uncoupling lever guide</td>
<td></td>
</tr>
<tr>
<td>7. Hand brake chain</td>
<td></td>
</tr>
<tr>
<td>8. End platform (combined crossover and brake step)</td>
<td></td>
</tr>
<tr>
<td>9. Bell crank</td>
<td></td>
</tr>
<tr>
<td>10. Vertical hand brake rod</td>
<td></td>
</tr>
<tr>
<td>11. Front draft gear stop</td>
<td></td>
</tr>
<tr>
<td>12. Striker</td>
<td></td>
</tr>
<tr>
<td>39. Brake shoe</td>
<td></td>
</tr>
<tr>
<td>40. Wheel</td>
<td></td>
</tr>
<tr>
<td>41. Axle</td>
<td></td>
</tr>
<tr>
<td>42. Truck live lever</td>
<td></td>
</tr>
<tr>
<td>43. Brake beam</td>
<td></td>
</tr>
<tr>
<td>44. Roller bearing adapter</td>
<td></td>
</tr>
<tr>
<td>45. Roller bearing end cap</td>
<td></td>
</tr>
<tr>
<td>46. End cap retaining bolt</td>
<td></td>
</tr>
<tr>
<td>47. End cap locking plate</td>
<td></td>
</tr>
<tr>
<td>48. Truck side frame</td>
<td></td>
</tr>
<tr>
<td>49. Truck spring</td>
<td></td>
</tr>
<tr>
<td>50. Truck bolster</td>
<td></td>
</tr>
<tr>
<td>51. Roller bearing assembly</td>
<td></td>
</tr>
<tr>
<td>52. Truck side bearing roller</td>
<td></td>
</tr>
<tr>
<td>53. Truck side bearing housing</td>
<td></td>
</tr>
<tr>
<td>54. Truck dead lever</td>
<td></td>
</tr>
<tr>
<td>55. Clevis at dead lever</td>
<td></td>
</tr>
<tr>
<td>56. Clevis at dead lever fulcrum</td>
<td></td>
</tr>
<tr>
<td>57. Dead lever anchor ¾ underframe mounted</td>
<td></td>
</tr>
<tr>
<td>13. Coupler knuckle pin</td>
<td>58. Center pin</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>14. Coupler knuckle</td>
<td>59. Truck center plate cast integral with truck bolster</td>
</tr>
<tr>
<td>15. Type E coupler head</td>
<td>60. Air hose</td>
</tr>
<tr>
<td>16. Coupler carrier</td>
<td>61. Hand brake chain at bell crank</td>
</tr>
<tr>
<td>17. Coupler wear plate</td>
<td>62. Hand brake rod guide</td>
</tr>
<tr>
<td>18. Striker flange</td>
<td>63. Hand brake rod</td>
</tr>
<tr>
<td>19. Angle cock</td>
<td>64. Hand brake chain at cylinder</td>
</tr>
<tr>
<td>20. Draft key washer</td>
<td>65. Cylinder push rod</td>
</tr>
<tr>
<td>21. Draft key</td>
<td>66. Air brake cylinder</td>
</tr>
<tr>
<td>22. Draft key retainer</td>
<td>67. Cylinder pipe, 3/4&quot;</td>
</tr>
<tr>
<td>23. Brake pipe, 1-1/4&quot; (Train line)</td>
<td>68. Floating lever guide</td>
</tr>
<tr>
<td>24. Follower block</td>
<td>69. Floating lever</td>
</tr>
<tr>
<td>25. Coupler yoke</td>
<td>70. Pipe clamp, 3/4&quot;</td>
</tr>
<tr>
<td>26. Draft gear</td>
<td>71. Top rod &quot;A&quot; end</td>
</tr>
<tr>
<td>27. Rear draft gear stop</td>
<td>72. Branch pipe tee</td>
</tr>
<tr>
<td>28. Rear draft gear stop reinforcement</td>
<td>73. Branch pipe tee support</td>
</tr>
<tr>
<td>29. Hydraulic piston</td>
<td>74. Combined dirt collector and cutout cock</td>
</tr>
<tr>
<td>30. Center sill</td>
<td>75. Connection hose</td>
</tr>
<tr>
<td>31. Back stop plate</td>
<td>76. Pipe clamp, 1-1/4&quot;</td>
</tr>
<tr>
<td>32. Rear lug casting</td>
<td>77. Retainer pipe</td>
</tr>
<tr>
<td>33. Striker casting</td>
<td>78. Retainer valve</td>
</tr>
<tr>
<td>34. Coupler key</td>
<td>79. ABD control valve</td>
</tr>
<tr>
<td>35. Cushioning unit</td>
<td>80. Release rod</td>
</tr>
<tr>
<td>36. Restoring mechanism</td>
<td>81. Auxiliary reservoir pipe, 3/4&quot;</td>
</tr>
<tr>
<td>37. Inspection plate</td>
<td>82. Emergency reservoir pipe, 3/4&quot;</td>
</tr>
<tr>
<td>38. Rear cross key</td>
<td>83. Reservoir support</td>
</tr>
<tr>
<td></td>
<td>84. Combined auxiliary and emergency reservoir</td>
</tr>
<tr>
<td></td>
<td>85. Cylinder lever guide</td>
</tr>
</tbody>
</table>
86. Brake lever fulcrum
87. Brake slack adjuster
88. Cylinder lever
89. Top rod "B" end

Note 1: Reduction Relay Valve or Vent Valve, when Required
END-OF-CAR CUSHIONING

"A" END

LEFT SIDE

WHEELS AND JOURNALS

L1

WHEELS AND JOURNALS

L2

"B" END
(Hand Brake End)
39.3.2: Terminology for Articulated Car Identification Diagram

<table>
<thead>
<tr>
<th>39.3.2</th>
<th>Terminology for Articulated Car Identification Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control Valve</strong> – Operates truck-mounted brakes. It consists of two valve portions bolted to a pipe bracket and has a cutout cock. It is located by the air reservoir. Each control valve operates the brakes on two trucks:</td>
<td></td>
</tr>
<tr>
<td>• The control valve on the A platform operates the brakes on A and F trucks.</td>
<td></td>
</tr>
<tr>
<td>• The control valve on the D platform operates the brakes on E and D trucks.</td>
<td></td>
</tr>
<tr>
<td>• The control valve on the B platform operates the brakes on C and B trucks.</td>
<td></td>
</tr>
<tr>
<td><strong>A.A.V. (Accelerated Application Valve)</strong> – Does not operate brakes, but does propagate the signal to operate brakes. It consists of one valve portion bolted to a pipe bracket and has a cutout cock. However, do not cut-out the A.A.V. unless there is a continuous blow of air through the valve.</td>
<td></td>
</tr>
<tr>
<td><strong>No. 8 Vent Valve</strong> – Does not operate brakes but does propagate the signal to operate brakes. It consists of a single vent valve and does not have a cutout cock. It does have a plug that can be installed if there is a continuous blow of air through the valve.</td>
<td></td>
</tr>
<tr>
<td><strong>Hand Brakes</strong> – Five platform cars have a hand brake on the B platform. Also, there may be a hand brake on the A platform. When there are hand brakes on both the A and B platforms, they are painted orange. If the car is set out and the use of hand brakes is necessary, apply both hand brakes.</td>
<td></td>
</tr>
</tbody>
</table>
39.3.3: Coupler Diagram

39.3.3 Coupler Diagram

**KNOW YOUR COUPLERS**

- **KNUCKLES MARKED “E 50” FIT “E” TYPE COUPLERS**
- **KNUCKLES MARKED “F 51” FIT “F” TYPE COUPLERS**
- **ROUND CORNER TYPE “E”**
- **SQUARE CORNER TYPE “F”**

KNUCKLES ARE NOT INTERCHANGEABLE

Rule Updated Date

January 20, 2012

39.3.4: Locomotive Axle, Journal, and Wheel Identification Diagram

39.3.4 Locomotive Axle, Journal, and Wheel Identification Diagram

(To be used when notifying the Dispatcher's Office or others of location of defects, etc.)

To determine axle number, journal number, and wheel number on a locomotive, stand facing the same direction as the specific locomotive is headed and count axles from the front of that locomotive as axle one, two, etc., and wheels and journals on the right and left sides as R1, R2, etc., and L1, L2, etc., respectively, as shown in the diagram.
39.3.5: Locomotive Air Brake Equipment

Place air brake valves in the proper position on freight and helper locomotives. To MU locomotives, position brake valves and cutout cocks as indicated in the following tables:

<table>
<thead>
<tr>
<th>26 and 30CDW Brake Equipment Positions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Lead</strong></td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>Automatic Brake Valve</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Independent Brake Valve</td>
</tr>
<tr>
<td>MU-2A Valve or Double-Ported Cutout Cock</td>
</tr>
</tbody>
</table>

^Top
## CCB Brake Equipment Positions

<table>
<thead>
<tr>
<th></th>
<th>Lead</th>
<th>Trail</th>
<th>Helper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic Brake Valve</td>
<td>Release</td>
<td>Handle Off/Continuous Service</td>
<td>Handle Off/Continuous Service</td>
</tr>
<tr>
<td>Independent Brake Valve</td>
<td>Applied Full</td>
<td>Release</td>
<td>Release</td>
</tr>
<tr>
<td>Air Brake Setup</td>
<td>Lead/Cut-in</td>
<td>Trail</td>
<td>Lead/Cut-out</td>
</tr>
</tbody>
</table>

## 24RL Brake Equipment Positions

<table>
<thead>
<tr>
<th></th>
<th>Lead</th>
<th>Trail</th>
<th>Helper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic Brake Valve</td>
<td>Release</td>
<td>Release</td>
<td>Lap</td>
</tr>
<tr>
<td>Independent Brake Valve</td>
<td>Applied Full</td>
<td>Release</td>
<td>Release</td>
</tr>
<tr>
<td>Automatic Brake Valve Cutout Valve</td>
<td>Open</td>
<td>Closed</td>
<td>Closed</td>
</tr>
<tr>
<td>Rotair Valve</td>
<td>Pass Frt</td>
<td>Frt Lap</td>
<td>Pass or Frt</td>
</tr>
<tr>
<td>MU-2A Valve</td>
<td>Lead or Dead</td>
<td>Trail</td>
<td>Lead or Dead</td>
</tr>
</tbody>
</table>

**Note:** On SD70ACe and C45 locomotives, when the locomotive is other than the controlling locomotive, the automatic brake valve pin, if available, must be inserted to insure the brake valve handle remains in the proper position. The engineers seat must be left secured/locked. This also applies when these locomotives are set out.

**Rule Updated Date**

January 20, 2012
Union Pacific Rules
Air Brake and Train Handling Rules

GLOSSARY: Glossary

- GLOSSARY: GLOSSARY

GLOSSARY: GLOSSARY

GLOSSARY

Accelerometer
An indicator that displays the predicted increase or decrease in speed in MPH per minute.

AC Locomotive
Alternating Current (AC) locomotives are equipped with AC traction motors and are not affected by maximum continuous current ratings or short-time operating ratings.

Actuating
Using a feature of the independent brake valve to charge the actuating pipe from the main reservoir and prevent or release a locomotive brake application initiated from a brake pipe reduction.

Air Brake
A system of compressed air devices controlled manually, electronically, or pneumatically that make the car or locomotive slow down or stop.

Air Brake Equipment
The equipment that supplies and exhausts air to and from the brake cylinders but does not include foundation brake gear and hand brakes.

Air Brake Hose
The flexible hose at each end of a car or locomotive that includes a coupling (glad hand) that fits into an identical coupling on the adjoining car or locomotive. The complete arrangement connects air between the brake pipes of the cars and the locomotives throughout the train.

Air Brake System
All of the devices for operating air brakes to control the speed of and stop a locomotive or train. The system includes the operating devices, pipes, hoses, fittings, and foundation brake gear.

Air Compressor
A locomotive device, powered by the diesel engine or an electric motor, that compresses air for operating the air brakes and all other air-operated devices on locomotives and cars.

Air Compressor Control Switch
A device that controls the loading and unloading of the compressor at the proper main reservoir pressures.

Air Flow Indicator (AFI)
A gauge installed in some locomotives that indicates the pressure differential of air flowing into the brake pipe through the
automatic brake valve. It is not adjustable and cannot be used for air flow method leakage testing of trains or cars. This gauge is labeled on the face "AIR FLOW INDICATOR" and graduated from 0 to 14 in even numbers (0, 2, 4, 6, etc. to 14).

**AFM Indicator or Air Flow Measurement (AFM)**
A gauge installed in some locomotives that indicates the volume of air in cubic feet per minute (CFM) flowing into the brake pipe through the automatic brake valve. This gauge is calibrated every 92 days and can be used in the Air Flow Method of leakage testing on trains and cars. It is labeled on the face as "AFM INDICATOR" and is graduated in 10 CFM increments. The gauge is marked at 20, 40, 60, and 80, and lines mark the 10 CFM steps between those numerals.

**Air Flow Method**
Shortened name, or slang, for Air Flow Method of leakage testing. The method of train/car leakage testing to determine the amount of air in cubic feet per minute (CFM) flowing into the brake pipe through the automatic brake valve to maintain desired pressure against leakage.

**Air Gauge**
An instrument that indicates air pressure in pounds per square inch (psi).

**Alignment Control Coupler**
Specially equipped couplers installed on most locomotives that only allow the coupler in buff to move laterally within certain limits. This equipment minimizes rail turnover, wheel climb, and jackknifing.

**Ampere (Amperage, Amps)**
The standard unit for measuring electric current.

**Angle Cock**
A manually operated device located at each end of the brake pipe on locomotives and cars to permit or prevent air flow.

**Articulated Multi-platform Car**
A car with multiple units (segments) that have articulated couplings and in which the units share a common truck.

**Automatic Brake Valve**
A manually operated electronic controller or pneumatic valve on the locomotive that controls the train and engine brakes.

**Auxiliary Reservoir**
A storage volume, charged from the brake pipe, to receive and store air to apply brakes on a car or locomotive. In freight car equipment, the auxiliary reservoir and emergency reservoir are combined in one structure.

"B" End (of car)
The end where the hand brake is located unless otherwise identified.

**Back-up Valve or Hose**
A device, either portable or permanently connected to the brake pipe, which controls brakes from the car that it is attached to. The device can apply the brakes with a service or emergency application.

**Balanced Braking**
The combined use of train air brakes and dynamic brake to stabilize, increase, or decrease train speed on a descending grade.

**Bleed (Bleed-off)**
Venting air pressure to the atmosphere, such as venting air pressure from the brake cylinder of individual cars, by using the release valve.
**Blended Brake**
The combination of air and dynamic braking by making an automatic service brake application with the throttle in idle.

**Brake Application**
A brake pipe pressure reduction (no matter how made) that causes the control to move to the service or emergency position.

**Brake Cylinder**
A cylinder containing a piston. Compressed air forces the piston outward to apply the brakes. When the air pressure is released, the piston returns to its normal position by a release spring coiled around the piston rod inside the cylinder.

**Brake Pipe**
The section of air brake piping of a car or locomotive that supplies the reservoirs. It also connects the piping to allow the locomotive engineer to control the car brakes. The pipe is 1-1/4” in diameter and extends from one end of the car to the other. At the ends, flexible hoses connect the cars. When a train is made up and all brake pipes on the cars are joined together, the entire pipe line is called the brake pipe.

**Brake Pipe Gradient**
The difference in brake pipe pressure between the locomotive (or source of supply) and the rear car of the train. Brake pipe gradients may be:

- **Normal**: The gradient that exists when the system is fully charged
- **False**: The temporary gradient that exists when the system is less than fully charged (For example, the exaggerated difference between the head end and rear end after a release)
- **Inverse**: The temporary condition when the brake pipe pressure is higher at the rear of the train than at the head end of the train (For example, during a service brake application)

**Brake Pipe Pressure**
The amount of pressure in pounds per square inch (psi) in the brake pipe (commonly expressed in pounds).

**Brake Valve Cutoff Valve**
A device on locomotives that can cut-out the charging and service functions of the automatic brake valve. This valve also properly positions the brake valve for passenger or freight operation.

**Branch Pipe Cutout Cock**
A device on locomotives and cars that isolates the control valve from the brake pipe.

**Buff Forces**
A term used to describe compressive coupler forces in a train. Buff forces bunch the slack in a train.

**Cab Car**
Railroad rolling equipment intended to provide transportation for members of the general public that is without propelling motors but equipped with one or more control stands. Locomotive rules apply to cab car operation.

**Calendar day**
A time period running from one midnight (0001) to the next midnight on a given date.

**Code "L"**
Code "L" is used to identify territories or corridors with relatively light grades and low to moderate track curvature in the coupler limit tables.
**Code "H"**

Code "H" is used to identify territories or corridors with heavier grades and severe track curvature in the coupler limit tables.

**Compensated Grade**

A grade, the curved portion of which has been reduced by an amount sufficient to compensate for the resistance due to the curvature.

**Consist**

The term "consist" usually refers to a set of locomotives coupled together to pull a train. The term may also be used to refer to an entire train—its locomotives and all its cars.

**Control Valve**

A device on locomotives or cars that charges the reservoirs and applies or releases brake cylinder pressure when brake pipe pressure reduces or increases.

**Controlled Tractive Effort (CTE)**

CTE mode is a method of limiting maximum tractive effort to 110,000 lbs. at speeds below 14 MPH. CTE mode will affect all linked remote consists if the controlling locomotive on the remote is so equipped. The effect of CTE mode is shown in System Special Instructions under Locomotive Information.

**Conventional Car**

A car such as a gondola, hopper, intermodal flat car, box car, bulkhead flat car or single well car. Does not include multi-platform spine cars or multi-well cars (articulated cars).

**Coupler Limit**

The location in the train where maximum trailing tonnage allowed for standard or high strength couplers occurs. Helper locomotive(s) may be used to reduce the amount of tonnage handled by a consist.

**DC Locomotive**

Direct Current (DC) locomotives are equipped with DC traction motors and are affected by maximum continuous current ratings or short-time operating ratings.

**Dead Engine Feature**

A device used when a unit is handled dead-in-train. When the dead engine cutout cock is opened, the main reservoirs are charged from the brake pipe to operate the engine brakes.

**Distributed Power (DP)**

One or more locomotive consists that are remotely controlled from the lead locomotive.

**Disturbed Track**

A section of passable track that has a temporary speed restriction imposed because various defects or track maintenance have affected the integrity of the track.

**Draft Forces**

A term used to describe tension coupler forces in a train. Draft forces stretch out the slack in a train.

**Draft Gear**

The connection between the coupler rigging and the center sill. This connection receives and cushions the shocks associated with in-train forces or coupling.
Drawbar Forces (In-train Forces)
Forces at the couplers between cars and/or locomotives that may be either draft (stretched) or buff (compressed), depending on train operation.

Dynamic Brake
An electrical device that converts some of the energy developed by a moving locomotive into an effective retarding force:

- **High Capacity Dynamic Brakes** – Provide approximately 13,500 lbs. of effort per axle instead of 10,000 lbs. per axle as other dynamic brake systems.
- **Flat (Grid Control) Dynamic Brake System** – A dynamic brake system that provides retardation that is controlled solely by the position of the dynamic brake lever. Maximum retardation occurs at Position 8.
- **Taper (Speed Control) Dynamic Brakes** – A dynamic brake system that provides retardation relative to both speed and dynamic brake handle position. The higher the speed, the greater the retarding force developed for a given handle position. At higher speeds, full dynamic brake effort is reached at Position 4.

Dynamic Brake Holding Feature
A feature of the lead, controlling locomotive that allows dynamic braking effort when a PCS open condition exists.

Dynamic Brake Interlock (DBI)
A device that will automatically keep the locomotive brakes from applying when automatic brakes are applied during dynamic braking.

Equalization
A term used to describe the condition that exists when brake cylinder pressure and auxiliary reservoir pressure become equal.

Electronic Alertness Control
A safety control system that senses the activity of the engineer. If activity or manual resetting of the device does not occur within a predetermined time frame, a penalty brake application is initiated.

Electronic Controlled Brakes
An air brake system that can be controlled electronically is referred to as electronically controlled pneumatic brakes or ECP. The ECP systems that are being utilized are overlay brake systems. Overlay means the freight car brake system can be operated in either ECP or conventional pneumatic mode. All cars in the train must be equipped with ECP to operate in the electric mode.

Emergency Application
A rapid reduction of brake pipe pressure that causes the control valves to move to the emergency position and the vent valves to open. This equalizes auxiliary reservoir, emergency reservoir, and brake cylinder pressures.

Emergency Brake Valve
A manually operated device on equipment that initiates an emergency brake application.

Emergency Reservoir
A storage volume, charged from the brake pipe, to receive and store air used during emergency brake applications and certain recharge features.

Engine/Locomotive
A self-propelled unit of equipment designed for moving other railroad rolling equipment in revenue service including a self-propelled unit designed to carry freight or passenger traffic, or both, and may consist of one or more units operated from a single control.
End-of-Train Telemetry System

End-of-train telemetry device is a radio end-of-train telemetry system that consists of:

- End-of-train device (EOT) mounted on the trailing coupler of the last car or linked DP consist located on the rear of the train.
- Head-of-train device (HEU) in the locomotive.

A two-way EOT that has been armed (emergency enabled) provides the capability to initiate an emergency brake application at the rear of the train. An Emergency toggle switch associated with the HEU cab display is used to activate the EOT emergency valve. For this to happen, both the head-end and the rear-end units must be equipped for two-way communication and armed (emergency-enabled).

Equalizing Reservoir

A small reservoir used in automatic air brake operations. It is only cut-in on the controlling unit. When a brake pipe reduction occurs, air is drawn from the equalizing reservoir. The reservoir then automatically draws the proper amount of air from the brake pipe. For this reason, the brake pipe pressure and the equalizing reservoir pressure are always the same, except when they are equalizing after a brake pipe reduction or when the brake pipe is charging/recharging.

Foundation Brake Gear

The levers, rods, brake beams, etc. that connect the brake cylinder piston rod to the brake shoes so that when air pressure forces the piston out, the brake shoes are forced against the wheels.

Full Service Application

A brake pipe reduction made only to the point at which the auxiliary reservoir and brake cylinder pressures equalize. From a 90-psi fully charged air brake system, service equalization will occur following a 26-psi brake pipe reduction, at 64-psi. Any further reduction in the brake pipe pressure, except an emergency application, will not affect the amount of pressure in the brake cylinder. Additional reductions greater than 26-psi may result in the loss of the ability to obtain an emergency brake application.

Full Tractive Effort (FTE)

Allows locomotive to operate at full tractive effort at speeds below 14 MPH.

Grade (of Track)

Grade is other than level track and is usually expressed as a percentage. The percentage is the number of feet the track rises or falls in a distance of 100 feet. For example, a 1% ascending grade means that the track rises 1 foot in elevation for every 100 feet the equipment travels on the track. Unsecured rail equipment may roll on a grade.

- Grade designations include the following:
  - Light Grade: Less than 1.0%
  - Heavy Grade: At least 1.0% for a distance of 3 miles or more
  - Mountain Grade: 2.0% or greater for a distance of 2 miles or more

Hand Brake

A mechanical arrangement of levers, chains, rods, gears, and fulcrum. When applied manually by wheel or lever, the hand brake forces the brake shoes against the braking surfaces (wheel tread or disc) to control car or locomotive movement.
**Head of Train Device (HEU)**
A radio device located in the locomotive cab that communicates with an End of Train Device (EOT) or distributed power (DP) consist. The HEU displays:

- Last car brake pipe pressure
- Last car motion status (moving or stopped)
- Marker light status (on or off)
- EOT battery status
- Communication Status with EOT
- Two-way Armed Status
- Distance measurement referenced to locomotive movement

And it provides:

- Audible alarms pertaining to status changes
- Arming capability to a selected two-way EOT
- Interface for Manual and Automatic initiated EOT emergencies

**Helper**
Distributed power or manned helper added to a train to assist movement.

**Head End Power (Passenger)**
Power generated on board the locomotive of a passenger train used for purposes other than propelling the train, such as heating, illumination, ventilation, and air conditioning.

**Horsepower Per Trailing Ton (HPT)**
The total horsepower of all working locomotives divided by the total trailing weight of the train in tons. For example, a train powered by 15,000 horsepower and having a trailing weight of 4,285 tons has a 3.5 horsepower per trailing ton ratio (15,000 HP divided by 4,285 tons).

**Independent Brake Valve**
A brake valve that controls the locomotive brakes independent of the automatic brake valve handle position.

**Independent Pressure Switch (IPS)**
A device on a locomotive that cancels the extended range portion of dynamic braking or all dynamic braking when a sufficient independent brake application occurs. This switch prevents the locomotive wheels from sliding because of excessive braking.

**Initial Terminal**
Means a location where a train is originally assembled.

**Interchange**
A location where railroads exchange cars and/or locomotives.

**Intercom System**
A two-way voice communication system through which voice communication is transmitted and received.

**Intermodal Equipment**
Equipment designed to carry trailers, containers, or automobiles. Intermodal trains are trains made up entirely of intermodal equipment.
Isolation Switch
A switch on diesel electric locomotives that has two or three positions. In the RUN position, the unit is "on the line," responds to control, and develops power. In the ISOLATION (or Stop-Start) position, the unit is isolated from the consist and does not develop power or respond to control.

Linking
The process of electronically connecting DP or RCL equipment:

- The controlling lead unit to the controlling distributed power unit on a distributed power train
- The controlling locomotive unit to the remote control transmitter(s)

Light Locomotive
One or more units, with or without a caboose, not coupled to cars.

Jackknife
Excessive lateral forces caused by heavy buff forces resulting in wheels lifting over the high rail or rail rolling over.

Journal
The part of a rail car axle on which the journal bearing rests or is mounted. Found at each end of each axle of a rail car.

Main Reservoir
An air reservoir on the locomotive for storing and cooling compressed air.

Minimum Continuous Speed
Minimum continuous speed is the slowest speed at which a DC locomotive can operate continuously in Throttle 8. Locomotive traction motors operating under these conditions develop the highest amperage possible before overheating. The minimum continuous speed varies and is indicated by the rating plate on the locomotive.

Minimum Reduction
The first position of the automatic brake valve that initiates a service application of 6 to 8-psi.

Man Down Feature
Safety feature on a remote control transmitter that transmits an emergency message over the radio when RCL transmitter is tilted beyond prescribed limits.

Manned Helper
A helper controlled by an engineer in the controlling unit of the locomotive helper consist.

Multiple Unit (MU)
Lead locomotive followed by one or more locomotives. Cables and hose connections between the locomotives allow control of the trailing units from the lead locomotive.

Note: Locomotive(s) handled DIC/Isolated at rear of consist will be considered MU’d when all air hose connections have been made and Rule 31.8.4 Locomotive Consist Air Brake Test performed.

MU Cutout Cock (MU-2-A, Dual-Ported Cutout Cock)
A device for cutting in or out the independent brake valve.

Non-articulated Multi-platform Cars
A car with multiple units (segments) that are connected with solid drawbars. Each unit is a stand-alone unit and does not share a common truck with another unit.
**Off Air**
Not connected to a continuous source of compressed air of at least 60 pounds per square inch (psi).

**Overcharge**
Brake equipment charged to a higher pressure than the regulating valve is adjusted for or can maintain. In such a condition, brakes on a portion of the train may not release.

**PA System (public address system)**
A one-way voice communication system.

**Parking Brake**
A Cab Car brake valve that controls the brakes on the lead truck of the Cab Car only and does not have the capability to actuate any brakes applied from the automatic brake valve handle.

**Penalty Brake Application**
An automatic full service brake application caused by various safety devices.

**Pitch and Catch**
Transferring controls of the locomotive to another linked RCT.

**Plug Door**
A type of side door used on insulated and refrigerator cars that fits flush with the side of the car when closed.

**Positive Stop Protection (PSP)**
Positive Stop Protection is designed to stop movements before reaching the end of a remote control zone if the RCO fails to control the movement.

**Power Cut-off Switch (PCS)**
An air-operated switch, activated by an emergency or penalty brake application, that drops the engine speed to idle on EMD locomotives or throttle notch 1 on GE locomotives.

**Power Holding Feature**
A feature of the lead, controlling locomotive that allows tractive effort to continue for approximately 20 seconds when a PCS open condition exists. This feature will not function when an emergency application is initiated by either the conductor's or the engineer's brake valve.

**Pressure Maintaining Braking**
Controlling train speed by making enough of a brake pipe reduction to stabilize speed on a grade, then allowing the automatic brake valve pressure maintaining feature to hold the brake application constant regardless of brake pipe leakage.

**Pressure Maintaining Feature**
A system designed to overcome brake pipe leakage both in the RELEASE and SERVICE positions of the automatic brake valve.

**Primary Remote Control Operator (Primary Operator)**
The employee operating the transmitter while controlling a remote control movement.

**Qualified Person (Freight)**
A train service employee given fundamental training on freight car inspections and air brake tests.

**Qualified Person (Passenger)**
A train service employee given fundamental training on passenger car inspections and air brake tests.
Qualified Mechanical Inspector (Carman)
A person, such as a carman, who has been given more extensive training that encompasses more detailed inspection and repairs.

Qualified Maintenance Person (Passenger Car Inspector)
A person, such as a carman, who has been given more extensive training that encompasses more detailed inspection and repairs and is qualified to conduct a Passenger Class I Brake Test.

Remote Control Locomotive
A locomotive equipped with radio control, operated by a remote control operator.

Remote Control Operator (RCO)
Employee trained in remote control operations who uses an RCT to operate a remote control locomotive and possesses a Class 6 or 7 operator's license.

Remote Control Transmitter (RCT)
A portable unit attached to an RCO vest. The RCT sends commands to the RC receiver on the locomotive.

Reduction (of the brake pipe)
A decrease in brake pipe pressure at a rate and of an amount sufficient to cause a train brake application to be initiated or increased.

Reduction Relay Valve
A device on long cars that helps reduce brake pipe pressure during service and emergency brake applications. The valve compensates for the added length of brake pipe on long cars.

Regulating Valve
The valve that reduces air pressure from the locomotive's main reservoir to the desired pressure in the brake pipe. The regulating valve will automatically maintain that pressure when the automatic brake valve is in the RELEASE position.

Retaining Valve
A manually operated valve used on cars to exhaust brake cylinder pressure completely or to maintain a predetermined pressure.

Restricted Car Limits
A defined number of cars immediately behind the lead locomotive consist, immediately ahead of and behind an entrained helper, or immediately ahead of a rear helper. The number of cars within a restricted car limit can change based on the train tonnage, territory type, and number of powered axles for each power consist.

Restricted Car Placement
When rules restrict the placement of cars, each platform or well is to be considered one car.

Service Application
When brake pipe pressure exhausts at a service rate to apply the train brakes.

Slack Action
Movement of part of a coupled train at a different speed than another part of the same train.

Slug
A unit with traction motors but no diesel engine and incapable of propelling itself. The unit receives electrical power through a power cable from an adjacent, specially equipped locomotive. Slugs are used where low speeds and high tractive effort are needed.
Solid Block (of cars)
One or more cars coupled together that:

- Are charged or have not been off air for more than 4 hours
- Have been tested as outlined in Rule 30.10.1 (Procedure for Inspection and Test)
- Have been inspected as outlined in Rule 1.33 (Inspection of Freight Cars)
- Have been inspected as outlined in Section III (Inspection) of Instructions for Handling Hazardous Materials

Split Service Reduction
A term describing a method of making an air brake application in two or more steps to produce a more uniform application.

String-Lining
Cars pulled off the inside of curves, trying to approach a straight line when the train is in draft.

Standard and High Strength Couplers
Each car is to be considered equipped with a standard type coupler unless it is known the car is equipped with high strength couplers. Coal cars, covered hopper cars, auto rack cars, and cars designed to carry TOFC/COFC are equipped with high strength couplers. If it is not known that a car is equipped with high strength couplers, it can be determined by looking at the coupler casting identification located on top of the coupler. A high strength coupler will have the letter "E" or "EX" as the last character of identification. Examples of high strength coupler identifications are E60HTE, SBE60CE, E60DE, and EF512WEX.

Thermal Cracks (in wheels)
Cracks in a railroad wheel, normally caused by heat generated on the tread and flange of the wheel from excessive braking.

Throttle Modulation
The action of adjusting the throttle one notch at a time between idle and position 8 to control train speed without the application of air brakes.

Tons per Dynamic Brake Axle (TPDBA)
The total gross trailing tonnage of the train divided by the number of axles of locomotives, including helper locomotives, operating in dynamic brake.

When making this calculation, include in the gross trailing tonnage the weight of any locomotive, including a helper locomotive, not operating in dynamic brake or with dynamic brake cut-out.

Tons per Operative Brake (TPOB)
The gross trailing tonnage of the train divided by the total number of cars having operative brakes.

Tons per Equivalent Powered Axle (TPA):

- **TPA** is calculated by dividing the total trailing tonnage by the total equivalent powered axles (includes lead and helper power). The weight of dead or isolated locomotives must be added to the total trailing tonnage before making this calculation.
- **TPA Limit** – The maximum tonnage per equivalent powered axle specified over a given route. Trains may not exceed maximum TPA at origin, unless there is a plan in place to pick up additional power or reduce tonnage (scheduled set-out) prior to reaching the ruling grade. TPA may only be exceeded enroute when authorized by proper authority. Train consist TPA numbers will govern any discrepancies.
Track-Train Dynamics
A general term used to describe the interaction of a locomotive and cars with the track structure during the movement of a train. Track-Train Dynamics are affected by variables such as weather, speed, train make-up, train handling, condition of track and equipment, grade, curvature, and operating policies.

Transfer Train Movement
An engine with one or more cars that travels between a point of origin and a point of final destination not exceeding 20 miles. Such trains may pick up or set out while enroute to destination.

Tread Build-up
Tread build-up is the formation of metal on the running surface of a wheel. Tread build-up on a car can occur due to:

- Failure to remove a hand brake
- Air brake system defect on the car
- Retainer left in the retaining position

Unattended
Equipment is unattended when an employee is not in a position to immediately control the brake system (hand or air brakes).

Attended cars must be properly secured with hand brakes when:

- Air brakes are not applied in emergency.
- There are less than 5 cars.
- Standing on grade exceeding 1%.

Undesired Emergency (UDE)
An unintentional emergency application of train air brakes.

Unit Train
A train made up entirely of cars used to transport coal, grain, ore, potash, molten sulfur, soda ash, phosphate rock, oil, taconite, or other bulk commodities.

- Empty Bulk Commodity Unit Train is made up entirely of empty cars.
- Loaded Bulk Commodity Unit Train is made up entirely of loaded cars.

Unplanned Stop
The shortest stop possible without using an emergency application

Vent Valve
A valve attached to the brake system of a car or locomotive. The valve responds to an emergency brake pipe pressure rate of reduction by venting the brake pipe at each vehicle to the atmosphere. As a result, the emergency application spreads throughout the train.

Vestibule
The area of a passenger car that normally does not contain seating and is used for passing from the seating area to side exit doors.

Wheel Sliding
When the wheel rotates slower than lengthwise movement dictates.
**Wheel Slipping**  
When the wheel rotates faster than lengthwise movement dictates.

**Yard Test Plant**  
A system of piping and fittings that supplies air at convenient locations to charge and to test cars without a locomotive. Charging pressure must be adjusted to 90-psi.

**Rule Updated Date**  
July 2, 2013

**General Order**  
Effective Date: July 2, 2013