



**APTA BTS-BC-RP-008-20**

Published: February 4, 2020

Bus Brake & Chassis Working Group

# Transit Bus Brake Valve Treadle Assembly Maintenance

**Abstract:** This *Recommended Practice* provides guidelines for maintaining, rebuilding and replacing transit bus brake valve treadle assemblies.

**Keywords:** barium lube, brake valve, pivot pin, roller, treadle, treadle plate

**Summary:** This document establishes a recommended practice for brake valve treadle maintenance and rebuild procedures. Individual operating agencies may modify these guidelines to accommodate their specific equipment and mode of operation. This *Recommended Practice* is to be used in conjunction with the original vehicle equipment manufacturer and brake valve manufacturer service manuals.

**Scope and purpose:** This *Recommended Practice* provides guidelines for transit brake valve treadle maintenance, rebuilding and replacement. This document addresses common transit bus brake valve treadle assemblies installed on many different manufacturers' transit vehicles. The tables and examples in this document are for commonly used transit applications. Not all transit bus brake valve treadle assemblies are included. The purpose of this *Recommended Practice* is to provide a uniform method for transit bus brake valve treadle maintenance. Proper transit bus brake valve treadle maintenance can help ensure a safe braking system and maximize brake friction material life.

This document represents a common viewpoint of those parties concerned with its provisions, namely transit operating/planning agencies, manufacturers, consultants, engineers and general interest groups. The application of any recommended practices or guidelines contained herein is voluntary. APTA standards are mandatory to the extent incorporated by an applicable statute or regulation. In some cases, federal and/or state regulations govern portions of a transit system's operations. In cases where this is a conflict or contradiction between an applicable law or regulation and this document, consult with a legal advisor to determine which document takes precedence.

© 2020 The North American Transportation Services Association (NATSA) and its parent organization APTA. No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without prior written permission of NATSA.

# Table of Contents

Participants.....	iii
Introduction.....	iii
<b>1. Safety provisions .....</b>	<b>1</b>
1.1 Personal protective equipment.....	1
1.2 Training.....	1
1.3 Tools .....	1
<b>2. Securing vehicle.....</b>	<b>1</b>
<b>3. Cleaning .....</b>	<b>1</b>
<b>4. Inspection .....</b>	<b>2</b>
<b>5. Parts replacement as needed .....</b>	<b>6</b>
<b>6. Lubrication.....</b>	<b>7</b>
<b>7. Final assembly .....</b>	<b>7</b>
<b>8. Final inspection.....</b>	<b>9</b>
Definition.....	10
Abbreviations and acronyms.....	10
Document history.....	10

## List of Figures and Tables

<b>FIGURE 1</b> Typical Brake Treadle.....	2
<b>FIGURE 2</b> Pivot Pin Wear .....	2
<b>FIGURE 3</b> Rubber Boot Wear.....	3
<b>FIGURE 4</b> Plunger Wear.....	3
<b>FIGURE 5</b> Base Plate Plunger Bore Wear .....	4
<b>FIGURE 6</b> Pivot Pin Bore Hole Wear .....	4
<b>FIGURE 7</b> Pedal Pin Bore Wear .....	5
<b>FIGURE 8</b> Roller and Pin Wear .....	5
<b>FIGURE 10</b> Pedal Stop Button Wear .....	6
<b>FIGURE 11</b> Lubrication .....	7
<b>FIGURE 12</b> Actuating the Plunger.....	7
<b>FIGURE 13</b> Cotter Pin Installation.....	8
<b>FIGURE 14</b> Roll Pin Insertion.....	8



## Participants

The American Public Transportation Association greatly appreciates the contributions of the **Bus Brake & Chassis Working Group**, which provided the primary effort in the drafting of this document.

At the time this standard was completed, the working group included the following members:

### **Jerry Guaracino**, SEPTA, *Chair*

James Baldwin

Mark Barker, *Haldex Brake Products*

Tom Baurmann, *MAN Engines & Components*

Kenneth Bisson, *Greater Cleveland RTA*

Pat Breen, *SEPTA*

John Brundage, *Jacobs*

John Campo, *Power Brake*

Bruce Dahl

Garrett Davis, *Webb Wheel Products*

Carlos Manuel Delgado, *Miami-Dade Transit*

Tim Derr, *MAN Engines & Components*

David Domine, *Link Engineering Company*

Richard Dooley, *Central Ohio Transit Authority*

Joe Doyle, *Marathon Brake Systems*

Heiner Falke, *MAN Engines & Components*

Steve Farrar, *Bendix*

Mitch Forbes, *Haldex Brake Products*

Frank Forde, *Los Angeles County Metropolitan Transportation Authority*

Jim Fox, *Charlotte Area Transit System*

Victor Guillot, *WMATA*

Samet Gursel, *Maryland Transit Administration*

Jim Heuchert, *New Flyer Service Organization*

Chip Hurst, *Webb Wheel Products*

Randy King, *MGM Brakes*

Michael Konrad, *Bremsskerl North America*

David Kwapis, *MBTA*

David Lawrence, *Fraser Gauge*

Geoff Lawrence, *Fraser Gauge*

Ricky Mares, *Harris County METRO*

Brian Markey, *Custom Training Aids*

Dennis McNichol, *Link Engineering Company*

Peter Morse, *Commercial Vehicle Components*

Kenneth Peterson, *King County Metro*

Karl Robinson, *NFI Parts*

Christopher Sabol, *Haldex Brake Products*

James Szudy, *Bendix*

Don Tirrell, *MGM Brakes*

Oscar Tostado, *OMNITRANS*

Anthony Van de Riet, *Bi-State Development Agency*

Hans Wimmer, *Friedrichshafen AG*

John Wolf, *Meritor*

Aaron Woods, *ABC Companies*

### **Project team**

Lisa Jerram, *American Public Transportation Association*

Bruce Dahl, *Contractor*

## Introduction

*This introduction is not part of APTA BTS-BC-RP-008-19, "Transit Bus Brake Valve Treadle Assembly Maintenance."*

This *Recommended Practice* reflects the consensus of the APTA Bus Standards Program members on the items, methods and procedures that have provided the best practice based on the experiences of those present and participating in meetings of the program task forces and working groups. *Recommended Practices* are voluntary, industry-developed and consensus-based practices that assist equipment suppliers, vehicle and component manufacturers, and maintenance personnel in the construction, assembly, operation and maintenance of transit bus vehicles. *Recommended Practices* may include test methodologies and

informational documents. *Recommended Practices* are non-exclusive and voluntary; they are intended to neither endorse nor discourage the use of any product or procedure. All areas and items included herein are subject to manufacturers' supplemental or superseding recommendations.

This *Recommended Practice* provides guidelines for transit bus brake valve treadle maintenance. APTA recommends the use of this *Recommended Practice* by:

- Individuals or organizations that inspect and maintain transit buses;
- Individuals or organizations that contract with others for the inspection and maintenance of transit buses; and
- Individuals or organizations that influence how transit buses are inspected and maintained.

Test results must meet or exceed federal, state or other local regulatory agency requirements if different from the recommendations outlined in this document.

# Transit Bus Brake Valve Treadle Assembly Maintenance

The pictures used in this *Recommended Practice* are specific to a Bendix treadle pedal assembly; however, the procedure is applicable to all pedal assemblies currently used in transit applications.

## 1. Safety provisions

**WARNING:** Failure to comply with the safety provisions in this section can result in personal injury or death.

### 1.1 Personal protective equipment

Personal protective equipment should be worn at all times during the maintenance process as required by the operating agency.

### 1.2 Training

The operating agency and/or its maintenance contractors should develop and execute training programs that provide employees with the knowledge and skills necessary to perform the tasks outlined in this *Recommended Practice* safely and effectively.

### 1.3 Tools

The following tools are recommended for the procedures in this document:

- Basic mechanics tools
- Additional tools as recommended by the OEM or as used by the transit industry
- Wheel chocks

## 2. Securing vehicle

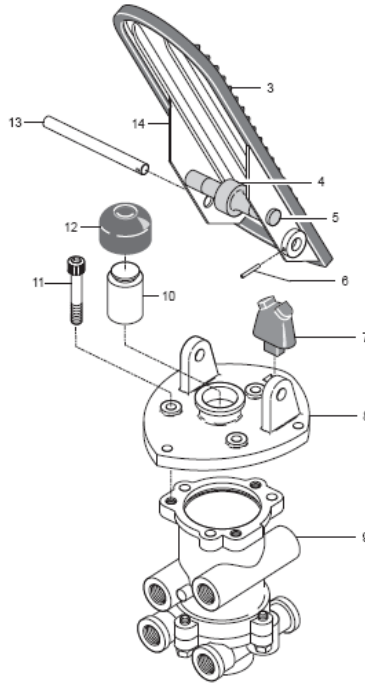
Follow your operating agency recommendations or standard operating procedures for securing any vehicle for service operations.

## 3. Cleaning

Every three months, 25,000 miles or 900 operating hours:

- Clean any accumulated dirt, gravel or foreign material away from the heel of the treadle, plunger boot and mounting plate; and
- If needed, use a shop vacuum to clean the area under and around the throttle and brake treadles.

**FIGURE 1**  
 Typical Brake Treadle





## 4. Inspection

Instructions	Figure
<p>Disassemble brake treadle and clean all metal parts.</p> <ul style="list-style-type: none"> <li>- Remove roll pin.</li> <li>- Remove pivot pin and inspect for evidence of damage and/or corrosion.</li> </ul>	<p><b>FIGURE 2</b>                      Pivot Pin Wear</p> <p>The photograph shows three cylindrical pivot pins arranged vertically. The top pin is labeled 'Normal Wear' and appears clean and smooth. The middle pin is labeled 'Corrosion, Improper Lubrication' and is heavily rusted and pitted. The bottom pin is labeled 'Improper Lubrication' and shows significant surface wear and discoloration.</p>

**APTA BTS-BC-RP-008-20**  
**Transit Bus Brake Valve Treadle Assembly Maintenance**



<p>Remove and inspect rubber boot for cracks, tears, holes, elongation and deterioration.</p>	<p align="center"><b>FIGURE 3</b> Rubber Boot Wear</p> 
<p>Inspect plunger for excessive wear corrosion and scoring.</p>	<p align="center"><b>FIGURE 4</b> Plunger Wear</p> 

**APTA BTS-BC-RP-008-20**  
**Transit Bus Brake Valve Treadle Assembly Maintenance**



<p>Clean and inspect the treadle base.</p> <ul style="list-style-type: none"><li>• Use compressed air to remove any loose debris from bore.<ul style="list-style-type: none"><li>○ Make sure to wear safety glasses while using compressed air.</li><li>○ Wipe the bore out using denatured alcohol and lint-free wipe.</li></ul></li><li>• Inspect plunger bore for pitting, scoring or excessive wear.</li></ul> <p><b>NOTE:</b> Do not use wire wheel to clean surfaces and avoid removing any plating from surfaces.</p>	<p style="text-align: center;"><b>FIGURE 5</b> Base Plate Plunger Bore Wear</p>  <p>The image shows a cut-away view of a metal component, likely a base plate plunger bore. The central bore is heavily worn, showing a dark, pitted, and scored surface. The surrounding metal is a lighter, yellowish-brown color. A white label at the top reads "Cut-Away" and another white label in the middle reads "Base Plate Plunger Bore Wear".</p>
<p>Check pivot pin bore holes for excessive wear.</p>	<p style="text-align: center;"><b>FIGURE 6</b> Pivot Pin Bore Hole Wear</p>  <p>The image shows a close-up of a metal component with a circular hole. The hole is significantly worn and elongated, with a dark, pitted surface. The surrounding metal is a lighter, yellowish-brown color. A white label at the top reads "Worn, Elongated Pivot Pin Hole".</p>



**APTA BTS-BC-RP-008-20**  
**Transit Bus Brake Valve Treadle Assembly Maintenance**

<p>Check for excessive wear on pin bores on the pedal.</p>	<p><b>FIGURE 7</b> Pedal Pin Bore Wear</p>  <p>Check for Wear, Elongation and Corrosion</p>
<p>Check roller and pin for corrosion, wear and signs of the roller frozen to the pin.</p>	<p><b>FIGURE 8</b> Roller and Pin Wear</p>  <p>Check for Wear, Elongation and Corrosion</p>

**APTA BTS-BC-RP-008-20**  
**Transit Bus Brake Valve Treadle Assembly Maintenance**

<p>Check the rubber treadle cover for excessive wear.</p> <p>Make sure there are no flat spots or holes on the treadle cover.</p> <p>Replace as necessary.</p>	<p style="text-align: center;"><b>FIGURE 9</b> Treadle Cover Wear</p> 
<p>Inspect rubber pedal stop button for wear.</p>	<p style="text-align: center;"><b>FIGURE 10</b> Pedal Stop Button Wear</p> 

## 5. Parts replacement as needed

- Brake treadle pedal
- Roller, pin and cotter pin
- Pivot pin and roll pin
- Plunger and boot
- Base plate

## 6. Lubrication

- All the parts use barium lubricants as recommended by the manufacturer.
- Apply a light film of lubricant to the pivot pin, roller pin, plunger and plunger bore (see Figure 11).
  - Use nitrile gloves while handling the barium grease.
  - Apply a light film of lubricant on the parts. Make sure not to over-lubricate.

**FIGURE 11**

Lubrication



## 7. Final assembly

- Put the boot on the plunger.
- Inset the plunger into the bore hole on the base plate. Make sure the boot snaps onto the baseplate retaining ridge.
- Manually actuate the plunger to ensure proper boot installation (see Figure 12).

**FIGURE 12**

Actuating the Plunger



- Insert stop button onto the base plate.
- Assemble the pedal.
  - Insert lubricated roller pin and roller into the pedal.
  - Insert the cotter pin (see Figure 13) and bend the ends.

**APTA BTS-BC-RP-008-20**  
**Transit Bus Brake Valve Treadle Assembly Maintenance**

**FIGURE 13**  
Cotter Pin Installation



- Install pedal onto the base plate.
  - Insert lubricated pivot pin.
  - Insert roll pin (see Figure 14).

**FIGURE 14**  
Roll Pin Insertion



## **8. Final inspection**

- Build vehicle pressure to governor cutout.
- Depress and hold the brake valve treadle.
  - Make sure there are no air leaks at the pedal.
- Make sure the pedal moves freely.
- Make sure the pedal returns to normal (released) position.

**APTA BTS-BC-RP-008-20**  
**Transit Bus Brake Valve Treadle Assembly Maintenance**

**Definition**

**treadle:** The brake pedal valve.

**Abbreviations and acronyms**

**OEM**      original equipment manufacturer

**NATSA**    North American Transportation Services Association

**Document history**

<b>Document Version</b>	<b>Working Group Vote</b>	<b>Public Comment/ Technical Oversight</b>	<b>CEO Approval</b>	<b>Policy &amp; Planning Approval</b>	<b>Publish Date</b>
First published	Feb. 14, 2019	June 30, 2019	Oct. 18, 2019	Jan. 31, 2020	Feb. 4, 2020