

MAINTENANCE, INSPECTION AND TESTING OF CAR AIR BRAKE EQUIPMENT

Recommended Practice RP-001-21

Adopted: October 6, 2021 Revised: June 10, 2022

Abstract: This recommended practice provides a methodology and a standardized form for maintaining car equipment operated by Tourist, Scenic, Historic and Excursion Railroad Operators.

Keywords: Air Brakes, Single Car Test, Inspection and Maintenance.

Summary: This document contains recommendations for periodic and reliability-centered maintenance based on historical precedent, as well as technology improvements that may be applied to the referenced equipment. It outlines practices that may be modified to reflect local conditions and circumstances of operation by the tourist and historic railroads, with guidelines and processes to document the reasoning behind those modifications.

Scope and purpose: This document provides a structured, systematic method for the uniform maintenance of car equipment, including obsolete or non-interchange cars used in Tourist, Scenic, Historic and Excursion Operations, for which railroad industry standards no longer apply, or are no longer supported. It applies to freight and passenger equipment that was constructed to applicable industry standards at the time of manufacture, which are no longer supported or maintained by the railroad industry.

This document outlines practices that may be modified to reflect local conditions and circumstances of operation by the equipment operators, with guidelines and processes to document the reasoning behind those modifications.

This document represents a common viewpoint of those parties concerned with its provisions, namely Tourist, Scenic, Historic and Excursion Operators and their trade associations. The application of any recommended practices or guidelines contained herein is voluntary. Federal and/or state regulations may govern portions of an operation. In those cases, the government regulations take precedence over this publication. The Heritage Rail Alliance recognizes that for certain applications, the standards, or practices, as implemented by individual operators, may be more or less restrictive than those given in this document.

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Introduction

On December 11, 2020, the Federal Railroad Administration (FRA) published Miscellaneous Amendments to Brake System Safety Standards and Codification of Waivers. With this publication, the FRA implemented Subpart H-Tourist, Scenic, Historic and Excursion Operations Braking Systems Regulations in the Code of Federal Regulations (CFR), 49 CFR Parts 232.700 through 232.719. This rulemaking was carried out to rationalize the overlapping regulations and, sometimes, conflicting operation and maintenance practices that have evolved between the railroad industry and tourist and historic operations that typically use equipment which is no longer in interchange or general railroad system use.

The FRA regulation now cites industry standards issued by the Association of American Railroads (AAR) and the American Public Transit Association (APTA), some of which are incorporated in the regulation by reference. The referenced AAR and APTA documents contain references to historic maintenance and test practices that were the most recent issues governing the systems addressed in this recommend practice.

Brake System Inspection, Test and Maintenance

1. Periodic Attention

Cleaning, Oiling, Testing and Stenciling (COT&S) of brake systems must be carried out in compliance with the specifications and test codes contained in the following industry standards:

CODE OF AIR BRAKE SYSTEM TESTS FOR FREIGHT
EQUIPMENT—SINGLE CAR TEST - AAR Standard S-486, latest revision

CODE OF TESTS FOR PASSENGER CAR EQUIPMENT USING SINGLE CAR
TESTING - APTA PR-M-S-005-98, Rev 4, or latest revision

PASSENGER EQUIPMENT CAR MAINTENANCE REQUIREMENTS - AAR Standard
S-4045, latest revision

1.1 Obsolete Freight Brake Equipment

Freight brake equipment that is no longer listed in the AAR Field Manual of Interchange Rules is to be maintained and tested to the last documentation which was available at the time the system was eliminated from interchange service.

1.2 Obsolete Passenger Brake Equipment

Passenger brake equipment that is listed APTA PR-M-S-005-98, Table 4 Equipment-Dependent Instructions, is to be maintained and tested to the last issued document for those systems, as listed in the standard. The requirements for periodic attention for obsolete passenger brake valves are specified in AAR Standard S-4045, Table 2.1 - COT&S performance on air brakes.

1.3 Current Passenger and Freight Brake Equipment

Freight Brake Equipment newer than AB and Passenger Brake Equipment newer than UC, are to be maintained and tested to the current AAR and APTA standards. That attention is to be carried out as prescribed by 49CFR Part 238 for passenger, AAR Standard S-4045, and the AAR Interchange Rules 3 and 4 for freight.

2. Modification of Periodic Attention Schedules

The periodic attention schedule of obsolete braking systems may be modified or extended based on the circumstances and conditions of their use by tourist and historic railroads. The railroad industry has had a long history of brake development wherein new brake valve, maintenance, and testing technologies have allowed the periodic attention of some brake equipment to be extended. Once the improvement has been identified, testing was typically carried out to demonstrate the ability of the brake valve to reliably function for a longer period without attention, supported by more frequent testing and examination of equipment after removal from the test.

Primarily for economic reasons, the brake suppliers and the railroads have not carried out any life-extension tests for brake valves that have been superseded by newer designs. As a result, attention extensions based on operating environment, improved component materials, and lubricants have not been realized. This document provides a process or "road map" to document and justify extended periods for COT&S of valves commonly found in tourist and historic railroads.

It should be noted that any equipment being moved by a common carrier railroad for the purpose of transporting it must meet the more stringent requirements of the

current standards identified in Section 1 and may not move on an extended COT&S date.

2.1 Applicability

Modification of the COT&S Period may only be considered for obsolete brake valvular equipment that is not currently in interchange or Amtrak/commuter rail service, defined as Pre-ABD for freight and Pre-D22 for passenger valves.

2.2 Supporting Information

With the advent of modern materials that may be used in valve construction and repair, as well as lubricants and filtering devices, extended COT&S intervals may be extended with no deterioration in valve performance. Most obsolete air valves see greatly diminished service with consequently less wear on valve parts, thereby making longer cleaning and lubrication intervals possible.

When considering an extension of periodic attention, the operator should consider a number of factors including those outlined in this section. Historically, extensions of time are considered after careful analysis of possible failure modes, data collected through examination of valves after extended demonstration periods, and additional periodic testing and record keeping during the demonstration period. Once all of this information has been collected, a determination of the acceptable extension of time, balanced by whatever failures may have been observed, can be made.

Factors for such extensions include:

2.2.1 Technology Improvements

2.2.1.1 Materials

2.2.1.2 Lubricants

2.2.1.3 Filters

2.2.2 Environmental and Operational Factors

2.2.2.1 Consistent Operating Environment

2.2.2.2 Consistent Storage Environment

2.2.2.3 Air Quality

2.2.2.4 Reduced Operating Cycles

2.2.3 Decision Tree

Extending the COT&S interval may be considered if any or all of the following can be shown to provide more consistent operation of the valve over longer periods of time.

- 2.2.3.1 Substitution of materials in the valve**
- 2.2.3.2 Use of lubricants whose properties remain consistent for longer periods**
- 2.2.3.3 Filters that effectively prevent foreign matter from entering the valve**
- 2.2.3.4 Operating environment with more consistent and/or favorable climatic conditions (e.g., Captive service where the car is not going from the Pacific northwest to Florida)**
- 2.2.3.5 Consistent and/or favorable environment for out-of-service storage (e.g., In a climate-controlled building versus outdoors)**
- 2.2.3.6 Clean air from the supply source**
- 2.2.3.7 Reduced operating cycles that reduce wear and degradation of parts and lubricants**

2.3 Extension of Periodic Testing Intervals and Credit for Out of Service Time

In addition to the conditions cited in 2.2.1, 2.2.2, and 2.2.3, a single car test shall be used as often as needed to ensure proper operation of the valve, but not less than the most recent revision of the COT&S schedule for that valve.

If a COT&S extension is desired for U-type or older equipment, the justification must be stated as shown in Appendix B. To support the periodic attention for U-type or older equipment, the owner/operator of a piece of rolling equipment must keep a written record of out of service months, and this record must be available for inspection by FRA inspectors. If no record is kept for a given piece of rolling equipment, then that piece of equipment will be considered to be in service every calendar month, and the COT&S interval for that piece of equipment will be held to 24 calendar months instead of service months, as shown as the baseline interval in Appendix A. Additionally, if the FRA determines that operational, environmental or other conditions are such as to prohibit a COT&S extension, then a piece of equipment may be held to a 24 calendar month COT&S interval instead of service months as shown as the baseline interval in Appendix A.

Credit for out of service months (i.e., any calendar month in which a piece of rolling equipment performs no revenue service) for U-type and all older equipment may be accumulated and justified by the methodology outlined in Appendix B. COT&S interval may be extended past the calendar month equivalent as shown in Appendix A by the number of out of service months justified as outlined in Appendix B.

In no case may a COT&S for U-type and all older equipment be extended beyond a term of 60 calendar months. In any case, ultimate acceptance of a desired COT&S extension period will be determined by local FRA jurisdiction, as there are many different factors that weigh on air brake performance that may vary from one operation to another, as outlined in section 2.2.

In no case may the COT&S for AB type equipment be extended beyond the calendar month requirements as shown in Appendix A. For all types of brake equipment, in no case may a Brake Cylinder and Packing Cup inspection be extended beyond the calendar month requirements as shown in Appendix A.

In summary:

Note that per the current scope of this RP, the availability for out of service extension only applies only to the valvular components of U-type or older equipment. The potential for out of service extension for this equipment exists regardless of the type of rolling stock on which this equipment is in use.

AB-type equipment will be held to the calendar month requirements as shown in Appendix A.

All passenger and freight equipment newer than the equipment called out in this RP is subject to the requirements of currently published standards.

2.4 Test Codes and Records

In general, the most recent test code that applies to a specific valve family, must be used for all tests. A record sheet should be developed that documents each step that was taken in the test process, and where applicable, the result or pressure value observed may be entered. Examples of test forms are shown in Appendix C.

In cases where a car is equipped with a Hybrid Brake System, i.e. one fitted with some, but not all of the same generation or type of valves, a plan should be developed to document what test codes apply to the individual valves.

An example of a system update may be to apply a ABDX control valve to a passenger car that was originally equipped with a UC valve. In this case, the original conductor's valves, brake cylinder and slack adjuster, as well as other equipment such as the water raising system, would be continued in service; but now at the periodic attention schedule for the new control valve. The Test Code for the new valve does not contain any test instructions for those other components, so a table must be constructed to include all of the other components and direct the tester to the correct test instruction for those components. Additionally, a review of the older components must be carried out to justify that they can provide satisfactory service over the longer term, which may necessitate increased periodic testing.

An example of a plan that reflects the elements of 26-C passenger system tests in comparison to ABDX freight tests is shown in Appendix D.

2.5 Test Plan Acceptance

In accordance with 49 CFR Part 232.717(c) all operators of discontinued (obsolete) brake systems to which 49 CFR Part 232 applies must adopt a written maintenance plan. The testing procedures and intervals contained within this document have been accepted by the FRA and should form the basis of a written maintenance plan (Note: acceptance is pending under 49CFR232.717(d)).

Although the standards contained within this document have been proven to be safe and suitable for most operators of discontinued brake systems, some operators may find it desirable to deviate from these standards.

Any requests for deviation from the standards in this document should take into consideration the information and process described in 49 CFR Part 232.307.

3. Single Car Test Devices

3.1 Device Development and Modifications

The single car test device was developed in the early 1900's as a method by which to test the air brake system of a single freight or passenger car. The device is essentially a modified and somewhat simplified version of the automatic or independent rotary brake valves used by the engineer in the cab of a locomotive. Standards were established by the air brake companies, and approved by the Association of American Railroads, to set limits for the crucial performance aspects of the brake system on a car when being tested by the device – including brake application, brake set, brake release, and system leakage, among other features that were added with more modern braking systems. The single car test device is equipped with precise porting to affect the test procedures and ensure the control valve and system adhere to the test standards put forth. This method of testing a single car brake system thereby provided insurance that the car's system would perform its due part when included in a lengthy consist of an over the road train.

Two devices were developed that are similar in appearance but had distinctly different porting; one device is to be used for freight equipment, and the other device for passenger equipment. The freight device is generally equipped with smaller release and application porting than the passenger device, to reflect the slower brake pipe pressure increase and decrease brought about by the larger brake pipe volume on long freight trains.

Concurrent with the publication of the January 1956 single car test code, the freight device was equipped with a brake pipe air flow measuring device termed a Flowrator. The Flowrator consisted of a plastic ball inside a clear tube with graduations, the graduations representing various levels of air flow in cubic inches

per minute. The Flowrator could be cut into the brake pipe to show precisely the amount of air that was flowing into the brake pipe, even at low rates that may not readily be detected by a rise or drop in pressure gage readings. This allowed leakage to be detected that was not likely, or possible, to be detected with a device that was not so equipped, and therefore allowed/forced mechanics to find brake system leaks that – though minor on a single car – had a significant effect on long trains, especially in cold weather.

The Flowrator immediately became standard equipment on the freight device when introduced. It was subsequently introduced on the passenger device, as well, with the Flowrator-equipped and non-Flowrator-equipped passenger devices both allowed by the single car test code and termed the “Standard” device and “Alternate Standard” device. This allowance existed for many years, until finally the Flowrator became required equipment on the passenger device, as well.

Over the years, a brake pipe strainer and double pressure regulating valve was added to the device, to improve reliability, to make the device more self-contained, and to provide for a method by which to supply a higher or lower brake pipe pressure as the newer single car test codes require.

As of present day, computer controlled single car test devices are used to test many modern freight and passenger cars. Programmable and automated, they are capable of recording test results while in operation. The older, rotary valve operated devices are still approved by the AAR, however, and certainly have their place when testing older brake equipment. The computer-controlled devices are now known as the “Automated Single Car Test Device”, and the rotary valve operated devices are known as the “Manual Single Car Test Device”.

3.2 Correct Test Device/Brake Valve Application

When considering performing a single car test on a given piece of equipment, the question naturally arises as to what the proper device is for a particular valve/system. The overarching category of the freight versus passenger device as described above is the first choice to be made and is generally straightforward as determined by the type of rolling stock and/or valve being tested. However, there were some minor changes made to the porting in the rotary valves of both devices over the years, as standards tightened and greater insurance of reliability of safety was demanded as time went on. As a general rule, AAR, manufacturer, and government air brake standards demand that the most recent revision of a respective device for a given brake valve/system is the proper one to be used for the single car test. Overall, this is what is reflected in the description below, though there are exceptions to every rule, and these exceptions will be called out as applicable. This information is summarized in Table No. 1 for Freight Equipment and Table 2 for Passenger Equipment.

Table 1 Freight Equipment

Valve Type	Test Code		Test Device	
	Standard	Alternate	Standard	Alternate
K, H, and all earlier types	Pamphlet 5039-4 Sup. 1, January 1956	Pamphlet 5039-4 Sup. 1, January 1950 OR Test Device per RP-002-21	OEM Freight Device, January 1956 revision (Flowrator equipped)	OEM Freight Device, January 1950 revision (non-Flowrator equipped) OR Test Device per RP-002-21
AB	Pamphlet 5039-4 Sup. 1, April 1987	Pamphlet 5039-4 Sup. 1, January 1950 OR Test Device per RP-002-21	OEM Freight Device, April 1987 revision	OEM Freight Device, January 1950 revision (non-Flowrator equipped) OR Test Device per RP-002-21
ABD, and all newer types	AAR S-486, most recent revision	N/A	OEM Freight Device Compliant with AAR S-486, most recent revision	N/A

Freight Equipment

K, H, and all earlier types of freight triple valves

Pamphlet 5039-4 Sup. 1, January 1956 –

The freight device and test code in this pamphlet is the most recent revision for the brake valves called out in the heading above. Further revisions of the freight single car test code omitted all reference to K and older triple valves, as these valves were last approved by the AAR for routine interchange service in 1948.

AB control valves

Pamphlet 5039-4 Sup. 1, April 1987 –

This is the latest revision of the test code and test device that are directly suited to test the AB control valve. The last year the AB control valve was approved by the AAR for routine interchange service was 1994.

**Note: For an alternate code and device for testing the triple/control valves noted above, see Section 3.3, below.*

ABD and newer control valves

AAR S-486, most up to date edition –

ABD and all newer freight control valves are currently approved for AAR interchange service. The latest revision of AAR standard S-486 should be used to test these valves.

Table 2 Passenger Equipment

Valve Type	Test Code	Test Device
U-12, 3-E, L, P, and all older valve types	Pamphlet 5039-4 Sup. 1, November 1980	OEM Standard Device OR OEM Alternate Device, as compliant with Pamphlet 5039-4 Sup. 1, November 1980
U-12 B/C/D, D-22	Pamphlet 5039-4 Sup. 1, April 1991	OEM Standard Device OR OEM Alternate Device, as compliant with Pamphlet 5039-4 Sup. 1, April 1991
26-C, or equivalent variation	APTA-PR-M-S-005-98, Revision 4	OEM Device, as compliant with APTA-PR-M-S-005-98, Revision 4

Passenger Equipment

U-12, 3-E, L, P, and all older valve types

Pamphlet 5039-4, Sup. 1, November 1980 –

This is the most recent revision of the single car test code and device suited to testing all passenger valves U-12 and older. Both “Standard” (non-Flowrator equipped) and “Alternate Standard” (Flowrator equipped) passenger devices are called out and approved for use in this code.

U-12-B/C/D, D-22

Pamphlet 5039-4, Sup. 1, April 1991 –

This is the most recent revision of the single car test code and device suited to testing U-12-B, U-12-BC, U-12-BD, and D-22 type passenger control valves. Note that by the time of the publication of this code the “Standard” and “Alternate Standard” devices were still approved for use, however the terminology applied to each device had reversed – the “Standard” device was now that which was Flowrator equipped, and the “Alternate Standard” device was now non-Flowrator equipped.

26-C, or equivalent variation

APTA-PR-M-S-005-98, Revision 4

This code is the most recent revision for modern passenger control valves – 26-C or equivalent diaphragm operated valves. Note that as of the

publication of this code only one passenger device was approved – that which is integral strainer, regulating valve, and Flowrator equipped.

3.2.1 Test Device Porting

The porting of the single car test device, particularly the rotary valve which comprises the main portion of the device, has undergone changes over the years that reflects more sensitive and flexible valve performance, increased valve and system features, increased train lengths and speeds, and a greater demand for safety and reliability brought about by modern transportation requirements.

Freight Device Porting

The porting as called out in the freight brake equipment test codes referenced in this standard is as shown Table 3.

Table 3 Freight Device Porting

Single Car Test Code Date	Flowrator Equipped	Position 1	Position 2	Position 3	Position 4	Position 5	Position 6	3/8" Emergency Cock
January 1950	No	.250"	.0225"	Lap	.035"	.078"	.147"	.250"
January 1956	Yes	---	---	---	---	---	---	---
April 1987	Yes	---	---	---	---	---	---	.266"
AAR S-486, Current Edition (*Note: Most recent revisions to device made circa 2013)	Yes	---	---	---	---	.136"	.1875"	.3125"

Notes: 1. Symbol --- indicates porting remained unchanged from the previous version of the device.
2. Not all changes to porting are shown; only those that are applicable to the codes called out in this standard and as listed in Table 1.

Passenger Device Porting

The porting as called out in the passenger brake equipment test codes referenced in this standard is as shown in Table 4 (see page 12).

3.3 Alternative Device

This maintenance standard was written in response to changes made to 49 CFR Part 232 as of December 2020. A significant change made to this regulation at this time is the requirement for heritage railroads to develop a written maintenance program for all their operable "obsolete" valves – those valves whose maintenance schedules are no longer covered by currently published AAR standards.

Table 4 Passenger Device Porting

Single Car Test Code Date	Flowrator Equipped (Std./Alt. Std.)	Position 1	Position 2	Position 3	Position 4	Position 5	Position 6	3/8" Emergency Cock
November 1980	Standard Device (non-Flowrator equipped)	.250"	.038"	Lap	.0465"	.093"	.1875"	.375"
	Alternate Standard Device (Flowrator equipped)	---	.0225"	---	---	---	---	---
April 1991	Standard Device (Flowrator equipped)	---	.0225"	---	---	---	---	---
	Alternate Standard Device (non-Flowrator equipped)	---	.038"	---	---	---	---	---
APTA 1998, Revision 4	Standard Device (Flowrator equipped)	---	.0225"	---	---	---	---	---

Notes: 1. Symbol --- indicates porting remained unchanged from the previous version of the device.
2. Not all changes to porting are shown; only those that are applicable to the codes called out in this standard and as listed in Table 2.

A key component for any modern air brake maintenance standard is the requirement for a periodic single car test. Manual, OEM single car test devices manufactured by an air brake company are still available to some extent, but they are not inexpensive nor easy to come by. It is to help alleviate this burden that this standard incorporates and allows the use of a test device that can be constructed with simple, off-the-shelf pipe fittings. This device was constructed to meet the critical dimensions of the manual freight device as called out in the January 1950 Single Car Test Code. This device and code were chosen as they offered the latest revision of the simplest freight device possible – this was the last code in which the freight device lacked a Flowrator, and integral supply air regulating valve and inlet strainer. As the most modern “obsolete” freight control valve – the AB – had proven reliable in AAR interchange service for 17 years by 1950, it is believed that this edition of the test code and test device offers a sufficient level of safety and reliability for the level of service a control valve will need to provide on a heritage railroad.

The original January 1950 edition of the manufacturer and AAR approved freight device test code has been adapted to mate with the ball valve construction by which the pipe fitting device functions. Though the code was rewritten to accommodate the alternate construction of the pipe fitting device, the standards and end results meet the specifications of the original test code in every way. See the Recommended Practice RP-002-21 for more information and for proper test device procedure.

Additionally, as the January 1950 code is deemed acceptable as it applies to the Alternate Device for all freight control valves AB or older, the 1950 code and Factory Device is also considered acceptable to test AB or older control valves – though the January 1956 code and Flowrator-equipped device is preferable if available.

3.4 Test Device Maintenance and Certification

As the single car test device is relied upon to ensure control valve and brake system performance and reliability, it stands to reason that the test device must be checked occasionally to insure that it is maintained properly, performing reliably, and that the porting continues to meet the specifications set forth for increasing and exhausting brake pipe pressure.

Older single car test standards required that the device be tested once every 30 days. Current AAR S-486 standard requires the device be tested once every 92 days. This extension in test device testing frequency was likely made as air compressing and filtering equipment improved, and brake systems and test devices were exposed to less dirt and grime. Additionally, it is understood that heritage railroads will not be using their device(s) to test near as many cars, and therefore not using their devices near as frequently as Class 1 railroads. As a result, the 92 day service and testing interval is sufficient for all devices, regardless of age and type.

Air gauges must be calibrated with the same frequency as the test device is serviced and tested. Gauges must be checked against a master gauge, or a calibrated deadweight tester.

See the applicable single car test code for more detail on test device testing procedures and test requirements.

4. Related Standards

CODE OF AIR BRAKE SYSTEM TESTS FOR FREIGHT EQUIPMENT—SINGLE CAR TEST
- AAR Standard S-486, latest revision.

CODE OF TESTS FOR PASSENGER CAR EQUIPMENT USING SINGLE CAR TESTING -
APTA PR-M-S-005-98, Rev 4, or latest revision.

PASSENGER EQUIPMENT CAR MAINTENANCE REQUIREMENTS - AAR Standard S-4045, latest revision.

4.1 References

Legacy Test Code Pamphlets Issued by TRAIN in 2001 including:

5039-4, Sup.3 Standard S-044 April 1, 1991

5039-4, Sup.1 January 1974, Revised January 1980

5039-4, Sup.1 January 1956

2377-2, July 1942-Test Code for Car Air Signal Testing Device

Pamphlet 5039-4 Sup.2 April 1, 1987 - Single Car Test Code

HeritageRail Alliance Recommended Practice RP-002-21, Single Car Testing Device, Code of Tests; Freight Device; Pamphlet No. 5039-4 Sup. 1, January 1950; Adapted to Pipe Fitting Single Car Test Device; Equivalent to Freight Device of 1/1950

4.2 Definitions

- Air Date – The date when the air brake system last received cleaning, lubrication and testing of the brake valves COT&S.
- Revenue service – Any use of a piece of rolling equipment other than positioning for storage, repair, or disposition.
- Single Car Test – An air test done on a single car isolated from any other car, performed using a specific test device appropriate for the type of brake equipment being tested.
- Single Car Test Device (SCT) – An arrangement of piping, gauges and valves combined in a portable unit to be used in performing a single car test.
- Service Month – Any calendar month in which a piece of rolling equipment is operated in any revenue service.
- Test Code – A written instruction or procedure for the testing of brake equipment.

4.3 Abbreviations and Acronyms

AAR Association of American Railroads

APTA American Public Transportation Association

COT&S Clean, Oil, Test and Stencil of the brake equipment as it refers to an Air Date

FRA Federal Railroad Administration

HRA Heritage Rail Alliance

OEM Original Equipment Manufacturer

RPCA Railroad Passenger Car Alliance

4.4 Document history

Document Version	Publication Date	Summary of Changes
0	December 31, 2021	Initial Release
1	June 10, 2022	Corrected typographical error in Section 1.3: D-22 to UC
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APPENDIX A Extended Attention Periods and Requirements

The HRA Mechanical Committee has developed the following extension times for obsolete brake valves based on the conditions of extension noted:

Valve Family	COT&S Period*	Packing Cup & Cylinder Period**	Conditions of Extension
K, L, P, PS and all older types of Triple Valves	24 Service Months	60 Calendar Months	Single Car Test is required prior to the first revenue service the piece of rolling equipment sees following 12 calendar months after most recent previous Single Car Test.
U-Type	24 Service Months	60 Calendar Months	Single Car Test is required prior to the first revenue service the piece of rolling equipment sees following 12 calendar months after most recent previous Single Car Test.
AB	120 Calendar Months	120 Calendar Months	Single Car test is required 24 calendar months after the last Periodic Single Car Test or prior to being placed in service. Note: 49CFR232.717 (a)(2)(i) applies to all freight equipment.
AB In Passenger Service	72 Calendar Month	72 Calendar Months	Single Car test is required 12 calendar months after the last Periodic Single Car Test or prior to the next season of operation.

* For COT&S Period given in Service Months with the potential of extension of COT&S period up to 60 calendar months based on type of service and out of service credits (e.g., 24 service months with a 60 calendar month period).

**Cylinder arrangements utilizing modern rubber packing cups and lubricants may be continued in service for a period of not more that the number of months shown.

APPENDIX B Sample Forms for Extended COT&S Qualification

Document to list the vehicles to which it applies along with the extended time and justification for applying it to those vehicles.

EXAMPLES

XYZ Railroad, Rolling Equipment Air Brake Inspection Record Pursuant to 49 CFR Part 232, Subpart H, Section 232.717										
Car Initials and Number	Car Type	Control Valve Type	Safety Valve Type (If Applicable)	Cylinder Size (Diameter X Stroke)	Type of Brake Cylinder Packing Cup	COT&S and Single Car Test Done	Single Car Test Due (See Note)	COT&S Due (See Note)	Packing Cup and Cylinder Inspection Done	Packing Cup and Cylinder Inspection Due
ABC 1234	Boxcar	K-2	N/A	10" X 12"	Rubber	3/15/21	3/15/22	3/15/23	3/15/21	3/15/26
XYZ 5678	Gondola	AB	N/A	10" X 12"	Rubber	4/10/21	4/10/23	4/10/31	4/10/21	4/10/31
DEF 9012	Passenger Coach	AB	Type A	12" X 12", truck mounted (qty. 4)	Rubber	4/15/21	4/15/22	4/15/27	4/15/21	4/15/27

Note	Application	Justification for Extended Period
1	ABC 1234	Car is stored and on display in a temperature controlled roundhouse structure unless removed for specific operation of no more than 0 days per year.
2	XYZ 5678 DEF 9102	Cars with this brake schedule were subjected to a long-term test in the XYZ Railroad's service, with periodic tests and tear-downs to demonstrate stability of operation. The test results were documented in Report # 0000 furnished to FRA on 00/00/0000.

APPENDIX B Sample Forms for Extended COT&S Qualification

XYZ Railroad Rolling Stock Service Month Record				
Year: 2021	Car Initials and Number			
Number = cumulative month in service since most recent COT&S OOS = Out of Service	ABC 1234	DEF 5678	XYZ 9102	
January	5	6	1	
February	OOS	7	2	
March	OOS	8	OOS	
April	OOS	OOS	3	
May	6	9	4	
June	OOS	10	5	
July	OOS	11	OOS	
August	OOS	12	OOS	
September	7	13	OOS	
October	8	OOS	OOS	
November	OOS	OOS	OOS	
December	OOS	OOS	6	

APPENDIX C Sample Forms for Air Brake Test Recording

Examples of forms to record test results.

Air Test Results		26-C Equipment	SS-M-005-98rev2		
Car Init.-	Serv.port. Id #		Date-	/ /	
Car #	Emerg.port. Id #		Location-		
SCTD id #	Relay port. Id #		Inspector-		
SCTD date	Wheel Slide Id #		Signature-		
Test Gauges id# & dates-			ID#		
form updated-4/1/05					
test #	test name	description	actual	pass.fail	Notes
7.0	Leakage tests				
7.1	System Leakage Test	ball below line			
7.2	Main Reservoir Leakage	(if not equipped, go to 8.0)			
		(if pass-through, test in 14.3)			
		<3# inc.BP			
		5#min dec MR			
8.0	Functionality Testing				
8.2	Service Stability Test	BC>3#min.inc			
		Record BC Pressure			
8.3	Release Testing				
8.3.1	Release test	DIR-full release, GRA-partial			
8.4	Application Test	5#red,cont.to 10#			
		BC 3#min.inc/dec.			
8.5	Release Sensitivity Test	BC.rel>90sec			
9.0	Emergency Brake Application Tests				
9.1	Emergency Test (aux.venting Portions)	(control valve c.o.)			
		valve type			
		valve type			
9.2	Emergency Test(Control Valve/Op.Unit)	(control valve c.i.)			
		Record BC Pressure			
9.3	Brake Cylinder Cut-out cocks	(test each for operation)			
9.4	Release Test after Emergency	(2 min. no BP increase)			
10.0	Leakage Tests-control and brake cyl				
10.1	Control Valve	#10port closed,>2#min dec			
10.2	Brake Cylinder Leakage	Relay Valve type			
		Rel.exhaust > 3# min dec			
11.0	Emerg.Brake-Conductors Valve Test	Cond. Valve # 1			
		Cond. Valve # 2			
		Additional Cond.Valves (#)			
12.0	Variable Load Control	(not equip. go to 13.0)			
12.1	Empty (light) Car				
12.2	Loaded (heavy) Car				
13.0	Graduated Release Test	(at least 3 grad.obtained)			
14.0	Miscellaneous Devices				
14.1	Hand Brake				
14.2	Wheel Slide Protection Equipment				
14.3	Main Reservoir Pipe Pass-through				
14.4	Conductor's Signal System				
14.5	Electropneumatic Operation				
14.6	Ancillary Pneumatic Equipment				
15.0	Completion of Testing	remove all gages			
		replace all vent protectors			
		remove all dummy couplings			
15.2	Final Car Preparation	set hand brake			
		operating configuration			
		record test information			

APPENDIX C

Sample Forms for Air Brake Test Recording

**FREIGHT CAR SINGLE CAR TEST
K, H, and all earlier types of freight triple valves
Per Instruction Pamphlet 5039, January 1950**

		Date _____	
		Car No. and Mark _____	
		Name of Inspector _____	
		Shop or Road _____	
		Location of Test _____	
		Type of Valve, and Identifying Number _____	
1.	Check in-date certification of device, and perform Daily Test	PASS	FAIL
2.	Test Device Leakage, prior to connection to car	PASS	FAIL
4.	Application Test	PASS	FAIL
5.	Brake Pipe Leakage Test	PASS	FAIL
6.	Auxiliary Reservoir and Graduating Valve Leakage – (brakes must remain applied a minimum of (1) minute)		
		PASS	FAIL
7.	Release Test – Brakes release in _____ seconds	PASS	FAIL
6.	Emergency Test	PASS	FAIL
7.	Service Stability – (Emergency application is a failure)	PASS	FAIL
8.	Brake Cylinder and Retaining Valve Test		
-	Test No. 1, Leakage _____psi/min.	PASS	FAIL
-	Test No. 2, Retaining Valve Test	PASS	FAIL
9.	Check the car's handbrake(s)	PASS	FAIL
10.	Stencil Car		

APPENDIX C

Sample Forms for Air Brake Test Recording

FREIGHT CAR SINGLE CAR TEST

AB type freight control valves

Per Instruction Pamphlet 5039, January 1950

Date _____

Car No. and Mark _____

Name of Inspector _____

Shop or Road _____

Location of Test _____

Type of Valve, and Identifying Number _____

- | | | | |
|-----|---|------|------|
| 1. | Check in-date certification of device, and perform Daily Test | PASS | FAIL |
| 2. | Test Device Leakage, prior to connection to car | PASS | FAIL |
| 3. | System Charging/Leakage Test, upon connecting device to car | | |
| | - Time to fully charge equipment _____ min. | PASS | FAIL |
| 4. | Application Test – Amount of brake pipe reduction upon control valve assumption of lap position _____ psi | | |
| | | PASS | FAIL |
| 5. | Brake Pipe Leakage Test | PASS | FAIL |
| 6. | Auxiliary Reservoir Leakage Test – (brakes must remain applied a minimum of (1) minute) | PASS | FAIL |
| 7. | Release Test – Brakes release in _____ seconds | PASS | FAIL |
| 8. | Service Stability Test | PASS | FAIL |
| 9. | Emergency Test | PASS | FAIL |
| 10. | Release Test After Emergency | PASS | FAIL |
| 11. | Brake Cylinder and Retaining Valve Test | | |
| | - Test No. 1, Leakage _____ psi/min. | PASS | FAIL |
| | - Test No. 2, Retaining Valve Test | PASS | FAIL |
| 12. | Check the car's handbrake(s) | PASS | FAIL |
| 13. | Stencil Car | | |

APPENDIX C

Sample Forms for Air Brake Test Recording

FREIGHT CAR SINGLE CAR TEST
K, H, and all earlier types of freight triple valves
Per Instruction Pamphlet 5039, January 1956

Date _____

Car No. and Mark _____

Name of Inspector _____

Shop or Road _____

Location of Test _____

Type of Valve, and Identifying Number _____

- | | | | |
|-----|---|------|------|
| 1. | Check in-date certification of device, and perform Daily Test | PASS | FAIL |
| 2. | Test Device Leakage, prior to connection to car | PASS | FAIL |
| 3. | System Leakage Test, upon connecting device to car | | |
| | - Leakage _____ cu.in./min. | PASS | FAIL |
| 4. | Application Test | PASS | FAIL |
| 5. | Release Test – Brakes release in _____ seconds | PASS | FAIL |
| 6. | Emergency Test | PASS | FAIL |
| 7. | Service Stability – (Emergency application is a failure) | PASS | FAIL |
| 8. | Brake Cylinder and Retaining Valve Test | | |
| | - Test No. 1, Leakage _____ psi/min. | PASS | FAIL |
| | - Test No. 2, Retaining Valve Test | PASS | FAIL |
| 9. | Check the car's handbrake(s) | PASS | FAIL |
| 10. | Stencil Car | | |

APPENDIX C

Sample Forms for Air Brake Test Recording

**FREIGHT CAR SINGLE CAR TEST
AB type freight control valves
Per Instruction Pamphlet 5039, April 1987**

		Date _____	
		Car No. and Mark _____	
		Name of Inspector _____	
		Shop or Road _____	
		Location of Test _____	
		Type of Valve, and Identifying Number _____	
1.	Check in-date certification of device, and perform Daily Test	PASS	FAIL
2.	Test Device Leakage, prior to connection to car	PASS	FAIL
3.	Brake Pipe Leakage Test, upon connecting device to car		
	– Leakage _____ cu.in./min.	PASS	FAIL
4.	Continuous Quick Service Valve Test (if equipped)	PASS	FAIL
5.	Vent Valve Test (if equipped)		
	a. Part of reduction relay valve (if equipped) N/A	PASS	FAIL
	b. Vent valve equipped ONLY N/A	PASS	FAIL
6.	Handbrake Inspection	PASS	FAIL
7.	System Leakage Test – Leakage _____ cu.in./min.	PASS	FAIL
8.	Piston Travel and Mechanical Slack Adjuster		
	– Piston travel _____ in.	PASS	FAIL
9.	Minimum Application and Brake Cylinder Leakage Test		
	– Amount of brake pipe reduction upon control valve assumption		
	of lap position _____ psi	PASS	FAIL
10.	Slow Release Test – Brakes release in _____ seconds	PASS	FAIL
11.	Service Stability – (Emergency application is a failure)	PASS	FAIL
12.	Emergency Test	PASS	FAIL
13.	Release After Emergency and Retaining Valve Test	PASS	FAIL
14.	Stencil Car		

APPENDIX D

Sample Hybrid Brake System Test Plan

As noted in Section 2.4, a test plan similar to this example should be developed to assure that all rolling equipment with hybrid braking systems (i.e., those systems that combine different types of braking equipment into a singular system) are tested by the proper method, and at proper intervals.

TEST ELEMENT	APTA SS-M-005-98 Rev. 4	AAR S-486-13
System Leakage Test	7.1	3.5
Brake Pipe Leakage Test	N/A	3.3
Main Reservoir Leakage Test	7.2	N/A
Main Reservoir Pass-Through Test	7.2.7	Use APTA 7.2.7
Service Stability Test	8.2	3.8
Graduated Release Test	8.3.2	N/A
Direct Release Test	8.3.1	N/A
Application Test	8.4.1	3.13
Release Sensitivity Test	8.4.2	3.15
Emergency Test – Venting Devices	9.1	3.4
Emergency Test (Cont. Valve.)	9.2	3.10
Brake Cylinder Cutout Cocks (Test Each)	9.3	Use APTA 9.3
Release Test After Emergency	9.4	3.11
Control Valve Leakage Test W/ Relay	10.1	3.12.3.1
Brake Cylinder Leakage Test-W/ Relay	10.2	Use APTA 10.2
Emergency Brake/Conductor Valve Test	11.1	Use APTA 11.1
Manual Release Valve Test	N/A	3.19
Variable Load-Light Car (Use test for specific system)	12.1	3.20
Variable Load-Heavy Car	12.2	3.20
Hand Brake/Parking Brake Test	13.1	3.6
Wheel Slide Protection Equipment	13.2	Use APTA 13.2
Retaining Valve Test	Use AAR 3.11	3.12