



Return to Service Plan

Re-introduction of 7000-series railcars into passenger service

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Contents

1. Purpose of Document.....	2
2. Coordination with Washington Metrorail Safety Commission (WMSC).....	2
3. Lessons Learned.....	2
3.1. Tooling Limitations.....	2
3.2. Process Improvements Introduced by New and Revised Documents.....	2
4. Inspection Interval.....	3
4.1. Phase 1 Inspection Interval.....	3
4.2. Phase 2 Inspection Interval.....	3
5. Control of Cars.....	3
6. Phases of Return to Service.....	3
6.1. Phase 1.....	4
6.1.1. Release of 7000-series Railcars.....	4
6.1.2. Operating Lines and Shops.....	5
6.1.3. Track and Structure (TRST) Mitigations.....	5
6.1.4. Training Requirements.....	5
6.1.5. Data Collection and Communication.....	5
6.2. Phase 2.....	5
7. References.....	6
8. Appendices.....	6

1. PURPOSE OF DOCUMENT

This document explains Metro's process for safe re-introduction of 7000-series railcars into passenger service using new technologies and procedures. The plan consists of lessons learned, details on inspection intervals, explanation of processes for controlling cars, and criteria to enter service in a phased approach.

2. COORDINATION WITH WASHINGTON METRORAIL SAFETY COMMISSION (WMSC)

Any changes to this document will be submitted to WMSC. WMSC will review and respond no later than 14 days after submission.

To move forward into the next phase, listed in [Section 6](#), Metro will submit notice and all supporting materials to WMSC. Metro will not enter the next phase without satisfying phase requirements and receipt of no technical objection from WMSC.

3. LESSONS LEARNED

3.1. Tooling Limitations

Metro has been using a back-to-back gauge with a graduated scale (1/16" increments), in the same manner as a ruler. An exact measurement can be only achieved with this incremental gauge when the gauge sleeve is directly on a graduated line. If the gauge sleeve lies between graduated lines, 1/32" is added to the value from the next visible line.

It is now understood that the incremental gauge is insufficient in accuracy for the required tolerance on the back-to-back distance. Data from the reported failures per MSI 140026, Rev. 01 and 02 were remeasured utilizing the calibrated ORX dial gauge. An average difference of 0.022" was found between the distance measured via the incremental gauge versus the dial gauge. Relative to the pass/fail criteria, this observed difference is significant and indicates that use of the incremental gauge may have resulted in incorrect reporting of wheel movement.

3.2. Process Improvements Introduced by New and Revised Documents

Use of a new digital indicator gauge has been introduced in [MSI 140026 Rev. 03, Appendix A](#). The digital indicator gauge was qualified under Data Collection, Measurement and Validation (DCMV) 000011 Rev. 05. The digital indicator gauge provides a numerical display of the measurement which eliminates the need to interpret a graduated scale. The digital indicator gauge assembly is accurate to ± 0.003 ".

The revised MSI establishes a baseline for each wheelset by measuring four back-to-back dimensions around the wheel perimeter. The number of measurements required exceeds that defined in industry standard American Public Transportation Association (APTA) PR-M-S-019-17, Passenger Wheel Set Assembly, and best practices of wheelset assembly suppliers, including ORX. The maximum wheelset back-to-back dimension is then used to compare all subsequent periodic measurements.

Periodic measurements are performed at defined intervals at two locations on each wheelset. A maximum acceptable back-to-back dimension (Specified Wheelset Limit) is established for each wheelset, in consideration of the combination of tolerances that affect the back-to-back measurement. Wheelsets that exceed either the Specified Wheelset Limit or OEM defined back-to-back dimension must be replaced.

In addition, the journal bearing gaps are measured for each wheel. The sum of the journal bearing gaps must be less than 0.020" to maintain compliance. Wheelsets with non-compliant journal bearing gaps must be replaced.

Metro has developed an improved quality process to provide oversight of the back-to-back measurement process. Office of Car Maintenance (CMNT) and Office of Railcar Quality Assurance and Warranty Compliance (RQAW) work together to ensure wheelset compliance. CMNT executes the back-to-back measurements in

accordance with the MSI procedure. RQAW inspectors provide independent observation and recording of the measurement process and maintain all inspection records.

Metro has also developed a process that removes a 7000-series railcar from service if the back-to-back measurements are out of tolerance. This process is documented in [SBF 110 Rev. 04, Removing a 7K Car from Service Due to Back-To-Back Failures, Appendix B](#).

4. INSPECTION INTERVAL

4.1. Phase 1 Inspection Interval

Metro reiterates its commitment for a safe return to service of the 7000-series railcar fleet. Metro understands the root cause of the wheel migration has not been identified and resolved and is wholly committed to the safe and reliable return to service of the 7000-series through carefully controlled operation of the vehicles within the specified criteria for the wheelsets.

Therefore, Metro proposes that return to service of the 7000-series railcars be accomplished with a phased approach which institutes requiring daily (single-service) inspection, increased periodic inspection intervals and scope of the inspection, and additional RAIL policies and training. These requirements are detailed in the following sections as well as the appendices.

4.2. Phase 2 Inspection Interval

For Phase 2, Metro proposes a four-day inspection interval for MSI 140026. This proposal is a data-driven approach based on six weeks of data. Metro has over 56,000 data points for back-to-back and journal bearing gap which show no measured failures or observable movement over 550,000 miles on the mainline. See [Data Analysis Supporting Four-Day Inspection Interval, Appendix A](#) for more documentation.

5. CONTROL OF CARS

In addition to Periodic Inspection (PI) requirements, active 7000-series railcars are required to maintain ongoing compliance with wheelset requirements. Wheelsets are inspected manually per MSI 140026, Rev. 03. Wheelsets must successfully complete inspection within the specified interval to remain compliant. The CMNT Service Delivery Team actively monitors and responds to wheelset inspection results, ensuring that non-compliant cars are prevented from service use.

Car status is controlled through MAXIMO, where Preventive Maintenance (PM) work orders cause an automatic trigger for wheelset inspection to be performed per the specified interval. Failing inspection results require removal of the car from service per [SBF 110 Rev. 04, Removing a 7K Car from Service Due to Back-To-Back Failures, Appendix B](#).

The standard operating procedure for this can be found in [CMOR SOP 102.07 Rev. 1.0, Control of 7K Vehicles for Compliance with Wheelset Requirements, Appendix E](#).

6. PHASES OF RETURN TO SERVICE

Metro is proposing a multi-phase plan for the return of 7000-series railcars to passenger service. Metro shall submit to WMSC for approval a request for transitioning to each phase, including supporting documentation as necessary.

The phases of the plan and the documentation that will be provided before entering the phase are listed in [Table 1](#).

Table 1: Summary of Phases of Return to Service

Phase	Manual Inspection Interval	Maximum Trains in Service	Criteria to Enter Phase
Phase 1	Single service-day manual inspection	8	MSI 140026, Rev. 03, approved and implemented MSI 000002, Rev. 00, approved and implemented MSI 000003, Rev. 01, approved and implemented SOP 102.07, Rev. 1.0, approved and implemented System changes to MAXIMO and RPM implemented Training materials, approved Required thresholds for persons to be trained Training records for persons associated with car inspection, control, and operations All tools and equipment readily available at required inspection shops Proactive use of Vehicle Track Interaction (VTI)
Phase 2	Four service-day manual inspection	20	Data analysis showing safety of four service-day manual inspection interval Officially chartered multi-disciplinary group and proof group has held first meeting
Phase 3	To be determined by WMATA and approved by WMSC	TBD	To be determined by WMATA and approved by WMSC

6.1. Phase 1

Single service day is defined as a single day of mainline operation in passenger service for operating hours, open to close.

If a car qualified for service has entered the mainline, the car will be qualified for passenger service for one single service day.

Cars qualified for service which have not entered mainline shall be considered qualified for passenger service for a maximum period of seven (7) days.

Cars that have entered the mainline for yard-to-yard movement/non-revenue operations may continue to be used for yard-to-yard movement/non-revenue operations for seven (7) days before needing another inspection. These cars may not be used for passenger service until they are qualified per MSI 140026.

6.1.1. Release of 7000-series Railcars

During Phase 1, WMATA will have a limited release of up to eight (8) 7000 series railcar consists per service day. Per **Section 2**, any proposed increase to the number of cars in service shall be submitted to WMSC.

Acceptable car numbers are 7500-7747 (248 cars). If these car numbers change, the revised list will be provided to all relevant Metrorail personnel and the WMSC. From this railcar population, WMATA will select railcars with mileage less than 350,000 as of May 17, 2022.

Out of the acceptable car numbers, WMATA will qualify two groups of eight consists. WMATA will assign the consists to A/B groups and operate on alternate days to allow time for completion of required back to back measurement and quality control processes. Additional cars required to replace cars in these groups shall be used from the acceptable car numbers.

There will not be a daily mileage limit. The proposed inspection intervals limit the mileage between inspections.

6.1.2. Operating Lines and Shops

WMATA will operate 7000-series cars on any of the operational lines.

WMATA may utilize all service & inspection (S&I) shops for single service-day manual inspections as long as they meet the criteria mentioned in **Table 1** and have the appropriate facilities to perform the MSIs.

Yards without an available pit (e.g., Branch Avenue) cannot be used to perform baseline inspections.

6.1.3. Track and Structure (TRST) Mitigations

Rail Infrastructure Maintenance and Engineering (RIME) is continuing current mitigation efforts, defined in **Table 2**, that supports better wheel-rail interaction. These efforts will continue to address rail geometry defects, rail profile mismatches on the mainline, curves, interlockings, and special track work.

RIME will also review VTI data as an input for work planning.

Table 2: TRST Mitigations

Mitigation	Type	Description
Vehicle Track Interaction (VTI)	Expanded	MOWE-TE will continue to monitor VTI data from 7000-series railcars in passenger service operation. RIME and CMOR will coordinate on communicating all VTI exceptions generated to Maintenance of Way (MOWE-TE), Office of Rail Vehicle Engineering (CENV), and Car Maintenance (CMNT) for review. WMSC will also be on the distribution list for this data.
Track Geometry Vehicle (TGV)	Continuing	Maintenance of Way Engineering, Track Engineering (MOWE-TE) will continue to facilitate TGV mainline track and interlocking geometry testing a minimum of twice a year. Ultrasonic Testing will continue at a minimum of three times a year on mainline track and a minimum of two times a year on mainline interlockings.
Track Inspections	Continuing	TRST inspects 118 miles of mainline track twice a week. Rail defects are identified and captured by trained and certified Track Inspectors in an electronic database. TRST and MOWE-TE use this information to plan and coordinate track maintenance to ensure optimal wheel-rail interaction.

6.1.4. Training Requirements

All personnel involved in the maintenance, movement coordination, and operation of the 7000-series railcars as defined in the Return to Service plan shall be trained to the requirements defined herein. As listed in the criteria defined in **Table 1**, WMATA will determine thresholds - the count or percentage of people to train – and meet those thresholds in order to enter Phase 1. The class presentations and tests are available in **Appendix G Curricula for MSI 140026 and CMOR SOP 102.07 Rev. 1.0**.

6.1.5. Data Collection and Communication

The Car Maintenance (CMNT) Service Delivery Team shall monitor all data from MSI 140026. Any reported failure shall be communicated to RAIL and investigated by the Office of Rail Vehicle Engineering (CENV). All data analysis, including confirmed failures, shall be communicated to RAIL, SAFE, and WMSC. CMNT will use this analysis to identify, track, review, and communicate trends.

6.2. Phase 2

For Phase 2, Metro proposes to continue all items in listed in the Return to Service Plan, with the following exceptions:

- Officially charter a multi-disciplinary, Vehicle and Track Working Group. This group will include members from RAIL, SAFE, CMOR, RTRA, RIME, MOWE-TE, CENV, TRST, CMNT, and other employees or contractors as designated by the SVP of Rail Services.
- A back-to-back inspection per MSI 140026 is valid for four days. If a car qualified for service has entered the mainline, the car will be qualified for passenger service for four consecutive service days. This inspection interval is based on [Data Analysis Supporting Four-Day Inspection Interval, Appendix H](#).
- Continue to use cars produced under the higher press tonnage specification while conducting a comprehensive review of press records to determine other acceptable cars and trucks. These cars can be used for all passenger operations provided cars are compliant with MSI 140026 and all other inspections. Any cars with baseline failures will not be used.
- A maximum of twenty (20) 7000-series railcar consists can be used in passenger service per service day. Metro will meter introduction of the twelve additional trains.
- No assignment of A/B fleet.
- Trains will run on Green, Yellow, and Red Lines.

Metro will provide additional data and analysis for 30 days of passenger service under the above conditions. During this period, Metro defines a failure as not adhering to MSI 140026 or SOP 102.07. If there are failures in process, Metro will pause the introduction of additional trains and meet with WMSC to discuss next steps.

If inspections detect an exceedance based on MSI 140026, Metro will follow its established process (SBF 110) and communicate the exceedance to the WMSC, all parties in the derailment investigation, and aforementioned multi-disciplinary team.

Metro will hold a meeting with WMSC on day 15 to discuss progress.

6.2.1. Non-Compliant Car Movement

Metro may move cars out of compliance with MSI 140026 or periodic inspection under the following conditions:

- Reduced speed of 15 miles per hour in non-revenue moment
- Move to closest facility that is able to perform the inspection
- Include a CMNT Road Mechanic on all rides
- Notify the WMSC with the car numbers and the origin and destination yard prior to moving cars
- Car has not failed based on MSI 140026

7. REFERENCES

- Data Collection, Measurement and Validation (DCMV) 000011 Rev. 05
- American Public Transportation Association (APTA) PR-M-S-019-17, Passenger Wheel Set Assembly

8. APPENDICES

Appendix A MSI 140026 Rev. 03, Wheel Back-to-Back and Journal Bearing Measurements

Appendix B SBF 110 Rev. 04, Removing a 7K Car from Service Due to Back-To-Back Failures

Appendix C MSI 000002 Rev. 00, Back-to-Back Tools – CMM Calibration Procedure

Appendix D MSI 000003 Rev. 01, Procedure for Utilizing Tread Worn Hollow Gauge

Appendix E CMOR SOP 102.07 Rev. 1.0, Control of 7K Vehicles for Compliance with Wheelset Requirements

Appendix F CMOR SOP 101.02 Rev. 0.0, Procedures for Control of Non-Revenue 7K Vehicles and Release for Mainline Travel

Appendix G Curricula for MSI 140026 and CMOR SOP 102.07 Rev. 1.0

Appendix H Data Analysis Supporting Four-Day Inspection Interval