

**TECHNICAL SPECIFICATIONS
(TECHNICAL PROVISIONS)**

SECTION TP05M1

**CONTRACT MODIFICATION #1 FOR
TRUCKS AND SUSPENSION SYSTEMS**

March 1, 2014
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TRUCK AND SUSPENSION SYSTEMS

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TP05M1: TRUCKS AND SUSPENSION SYSTEMS

TP05M1.01 GENERAL

The work described in this section shall apply only to 112 LRVs and shall be in addition to the work required in Section TP05 – Truck Assemblies of the original Contract.

TP05M1.02 SCOPE OF WORK

The Contractor shall remove, disassemble, inspect, repair, replace, overhaul, reassemble, test and reinstall the components of the trucks and suspension systems of the LRVs as specified herein. These specifications apply to both motored and non-motored trucks of the LRV.

TP05M1.03 OVERHAUL REQUIREMENTS

A. Terminology

Whenever the term “overhaul” is used herein, it shall mean the level of effort designated for a component or assembly, including, but not limited to, cleaning, refinishing, repair, or replacement.

Whenever the term “replace in kind” is used herein, it shall mean replacement with identical OEM parts, or SFMTA-approved equal. The SFMTA is not obligated to accept other than OEM parts, unless the OEM part is obsolete, and may require the Contractor to perform whatever reasonable verification activities as needed in order to demonstrate that the alternative is acceptable based on its being equivalent or superior to the OEM part per Section 1.04.C.1 of these Technical Provisions.

The costs associated with proving that an alternative is equivalent or superior to an OEM part shall be borne by the Contractor.

Whenever the term “replace” is used herein, it shall mean replacement with components compliant with applicable material and workmanship standards. This term is utilized primarily for hardware, where compliance with applicable standards is sufficient to demonstrate equivalence to the OEM part.

Whenever the term “reuse” is used herein, it shall mean disassemble, clean, inspect, verify, refinish and lubricate as needed, reassemble, and reinstall onto the overhauled assemblies; this term reflects estimation that none will require replacement, unless otherwise specified.

B. Hardware/Fasteners

All hardware and fasteners, including, but not limited to, screws, bolts, nuts, clips, washers, lock-washers, shrink wrap, c-clips, tie straps, shaft-keys, springs, shrinkable tubing, cotter pins, retaining rings, bushings, roll pins, clips, gaskets, and etc., on, or in, overhauled assemblies, components, or parts, shall be replaced unless identified for reuse herein.

C. Labels

The Contractor shall apply labels to the truck, gearbox and traction motor to indicate when it was overhauled. The labels shall be of the same type as the OEM labels currently installed on the equipment. The quantity and locations of labels shall be similar to the original labeling arrangement, per the labeling requirement in TP1.07.O of these Technical Specifications.

D. Overhaul Criteria

The Contractor shall follow the truck repair and overhaul criteria of the San Francisco Muni LRV2 Heavy Repair and Workshop Manual, Section 3 "Trucks and Suspension."

The Contractor shall follow the traction motor overhaul criteria of section 4, "Propulsion and Electronic Controls."

The Contractor shall follow the track brake overhaul criteria of section 16 "Brakes."

E. Disassembly, Cleaning & Storage

The Contractor shall disassemble the truck and clean all reusable components. Non reusable components shall be properly disposed of.

Parts waiting reassembly shall be tagged and properly stored.

F. Structural Inspection and Repair

The Contractor shall strip/clean down to clean paint and visually inspect the truck frame, bolster beam, connecting rods, axles and hubs for dimensional accuracy and inspect for cracks. All cracks found shall be documented in the truck history book and repaired as provided below.

The Contractor shall inspect all mating surfaces of the truck frame, threaded attachment points, and permanently affixed brackets for damage. All damage found shall be documented in the truck history book and repaired as provided below.

The Contractor shall notify and obtain SFMTA approval prior to performing any repairs under this Section. Such repairs shall be deemed as extra work under Section 48.2 of the Agreement.

TP05M1.04 New Components and/or Assemblies

The Contractor shall remove, replace in-kind, and install the following components or assemblies on all LRVs under Amendment Nos. One and Two to the Agreement.

A. 100% Replacement

1. Journal axle bearings
2. Shock absorbers
3. Grounding cables
4. Primary suspension (latest configuration)
5. Secondary suspension (air bags)

6. Brake caliper suspension bushings
7. Pilot bar/antenna bar mounts (latest configuration)
8. Leveling valve and hardware
9. Air hoses (Knorr)
10. Knorr test fittings (cut-out cock)
11. Wiring harnesses
12. Traction rod rubber element
13. Flexible pads (GE)
14. Connecting rod rubber elements GE
15. Miscellaneous rubber components
16. Lateral bump stop
17. Slewing Ring
18. Lubrication
19. Truck cleaning and waste disposal
20. Transom joint pin, spherical bearing, retaining flanges, seal, shims, hardware retainers, and hardware.

B. As- Needed Replacement

The Contractor shall remove, replace in-kind, and install the following components and assemblies. The number in parenthesis (##) indicates the percentage of vehicles the components or assemblies of which are estimated to be replaced under this Amendment. If the quantity of components replaced is less than the estimated quantity, Contractor shall deliver the unused quantity to SFMTA, and title to those components shall pass to the SFMTA. If the quantity of components replaced is more than the estimated quantity, the SFMTA will provide those components to the Contractor or compensate Contractor for the additional cost of the components.

1. Steel tires, rubber isolators and shunts (50% - the steel tires shall be replaced when the diameter is below 26.75 inches). The tires for the first 41 carsets of trucks under this amendment will be provided by SFMTA.
2. Ground brush assemblies (10%)
3. Gear unit coupling (both halves and sleeves) (35%)
4. Antenna receiver/transmitter (Alcatel) (10%)
5. Tachometers (10%)
6. Brake disc (15%)
7. Drive axles (10%)
8. Idler axles (10%)
9. Aluminum wheel centers (10%)
10. Miscellaneous hardware replacement (35%)
11. Air tanks (2%)
12. Air fittings and piping (25%)

The Contractor shall provide usage reports of the materials listed under paragraph B. The report shall indicate, at a minimum; material name, part number, vehicle number, truck serial numbers, amount used, and amount remaining. The Contractor shall provide a monthly report to the Engineer to satisfy this requirement [CDRL 5-002].

TP05M1.05 Overhauled Components and Assemblies

The Contractor shall remove, overhaul, and reinstall the following truck components and assemblies.

Rebuilt components shall meet the requirements for adjustment and testing of section 3, "Trucks and Suspension," of the LRV2 Heavy Repair and Workshop Manual, except for the traction motors, which shall meet the requirements of section 4, "Propulsion and Electronic Controls," and the track brake, which shall be rebuilt according to section 16 "Brakes."

- A. Motors (power truck)**
- B. Gear units and coupling (power truck)**
- C. SAV valves**
- D. Brake calipers**
- E. Track brakes springs and guides**

TP05M1.06 Piping

The Contractor shall clean, inside and out, and reuse piping that is not damaged. The Contractor shall replace damaged piping with new piping.

TP05M1.07 Paint

The Contractor shall touch-up paint, low gloss black, the truck frame, bolster beam, air tanks, vertical bump stop brackets, pilot/antenna bar brackets, derail alarm sensor bracket, and journal box caps where bare metal is exposed.

TP05M1.08 Replacement of Suspension Components

The Contractor shall replace suspension-related components with the identical original replacement component, if available, or an upgraded version that has been used in existing SFMTA trucks. If the original-type component is not available, the Contractor shall source a substitute part which still meets the suspension requirements of the LRV conformed specification # 309 for leveling, natural frequency, motion damping-ride quality, displacement criteria-body roll, and load weigh adjustment. The motor and trailer truck primary suspensions shall be replaced with the part identified on Breda drawings J19/J20 2.55.300 sheet 1 of 3, Pirelli p/n FR-201108-F (motor truck) and Pirelli p/n FR-201109-F (trailer truck). If these part numbers are no longer available, the Contractor shall source alternative parts with the approval of the SFMTA.

TP05M1.19 Assembly, Installation & Adjustment, and Testing of Equipment

Refer to TP10 Inspection and Testing for the detailed requirements for the test and inspection program, as well as the CDRLs associated with the inspection and testing of the trucks and suspension system.

A. Assembly

The overhauled equipment shall be assembled using procedures developed in accordance with the HRWM manuals. Assembly procedures shall include any intermediate testing

and/or functional verifications required to ensure that the assembled components will function properly. Each assembly shall have sign-off sheets for workers to document that their efforts were conducted in accordance with applicable procedures, and aid in failure and/or quality assurance investigations; pass/fail entries shall be required in the sign-off sheet for all required intermediate tests and/or functional verifications performed by the assembler, including the proper application of torque marks. Multiple components may be included on tabulated sign-off sheets with approval of the Authority. Sign off sheets [CDRL 5-001] shall be submitted for inclusion in the Car History Book.

B. Installation & Adjustment

The overhauled equipment shall be installed and adjusted using procedures developed in accordance with the HRWM manuals. Each installation shall have sign-off sheets for workers to document that their efforts were conducted in accordance with applicable procedures, and aid in failure and/or quality assurance investigations; pass/fail entries shall be required in the sign-off sheet for all required intermediate tests and/or functional verifications performed by the installer.

C. Testing

1. Pre-Possession Test

The Contractor shall confirm before taking possession of the vehicle that the two Automatic Train Control (ATCS) Receive Antennae, the two ATCS Transmit Antennae, the truck tachometers and the truck caliper brake release switches are functioning by conducting an ATCS Yard Departure Test on the SFMTA’s Track 1 at the Green facility. This test shall be Incorporated into the pre-overhaul test procedure and report referenced in TP10 of these Technical Provisions.

SFMTA personnel will operate the LRV during the test, and the Contractor shall conduct the test. All testing activities and documentation shall be compliant with TP10 Inspection and Testing section of these Technical Specifications.

2. Acceptance Testing

Upon redelivery of the LRV to the SFMTA, the LRV shall be subject to acceptance tests as required by Section TP10 of these Technical Specifications, including identification of CDRLs. After passing the test, the Contractor shall provide and sign an acceptance test report.

TP05M1.10 CONTRACT DELIVERABLE REQUIREMENTS LIST

CDRL #	Title	Reference Paragraph
5-001	Sign-off Sheets	TP05M1.11A
5-002	Monthly Material Usage Report	TP05M1.04B

End of Section