Metro

P3010
Los Angeles LRV

TRACK BRAKES

Section 1000
RUNNING MAINTENANCE & SERVICING MANUAL

LIST OF EFFECTIVE PAGES

Insert latest changed pages; dispose of superseded pages in accordance with applicable regulations.

NOTE: On a changed page, the portion of the text affected by the latest change is indicated by a vertical line.

Total number of pages in this section (1000) is **48** consisting of the following:

Draft	Draft	June 2015
Draft	Final Draft	November 2015
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SAFETY SUMMARY

Some of the procedures in this section are preceded by warnings/cautions regarding potential hazards in handling this equipment. These warnings/cautions should be carefully read and understood before proceeding. Failure to observe these precautions may result in serious injury to personnel performing the work and/or bystanders. The key warnings for this equipment are as follows:

Electrical - The electrical equipment described in this section operates at voltages and currents that are extremely dangerous to life. Personnel should closely observe all generally prescribed cautions and warnings before performing any work on the LRV.

Chemicals – Follow safety precautions for handling hazardous chemicals as provided by the manufacturer. The manufacturer's warnings should be closely heeded to avoid personal injury.

Location – Special caution should be taken when accessing or servicing equipment located on the roof and under the car.

Weight – To prevent possible personal injury when attempting to remove or install equipment on the vehicle, adequate support of a lifting device must be used to prevent the equipment from falling. Personnel's failure to heed these warnings could result in severe injury or death and or damage to the equipment.

Contact – Some components in this equipment attain temperatures that can cause severe burns. Closely follow all warnings and recommended procedures for handling these components.

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CHAPTER 1.0

GENERAL DESCRIPTION

1.1 Introduction

This chapter provides a general description and overview of the LACMTA Light Rail Vehicle (LRV) track brake.

1.2 System Summary

The track brakes are used during emergency brake applications, maximum braking, and when commanded by the vehicle operator. The track brake assembly, see Figure 1-1, consists of a spring suspension and articulated magnetic track brake suspended above the rail between the wheels of a truck.

The track brake system comprises two electromagnet track brake assemblies mounted on each truck to improve adhesion to the rail that is independent of the dynamic/friction braking force on the vehicle. A magnetic field generated by the track brake causes the track brake assembly to be pulled down to the rail.

The track brake assemblies on each truck are wired in parallel. The track brake spring suspension units are slightly preloaded to reduce bounce of the track brake magnets under dynamic operation conditions of the vehicle. The spring suspension units are adjustable to account for vehicle wheel wear and track brake intermediate elements (rail shoe) wear. The track brake includes a sealed coil form, carrier stops, and external cable connections.

The carrier stops are used to attach the track brake to the spring suspensions and also to transmit the braking force generated by the track brake to the truck sideframe.

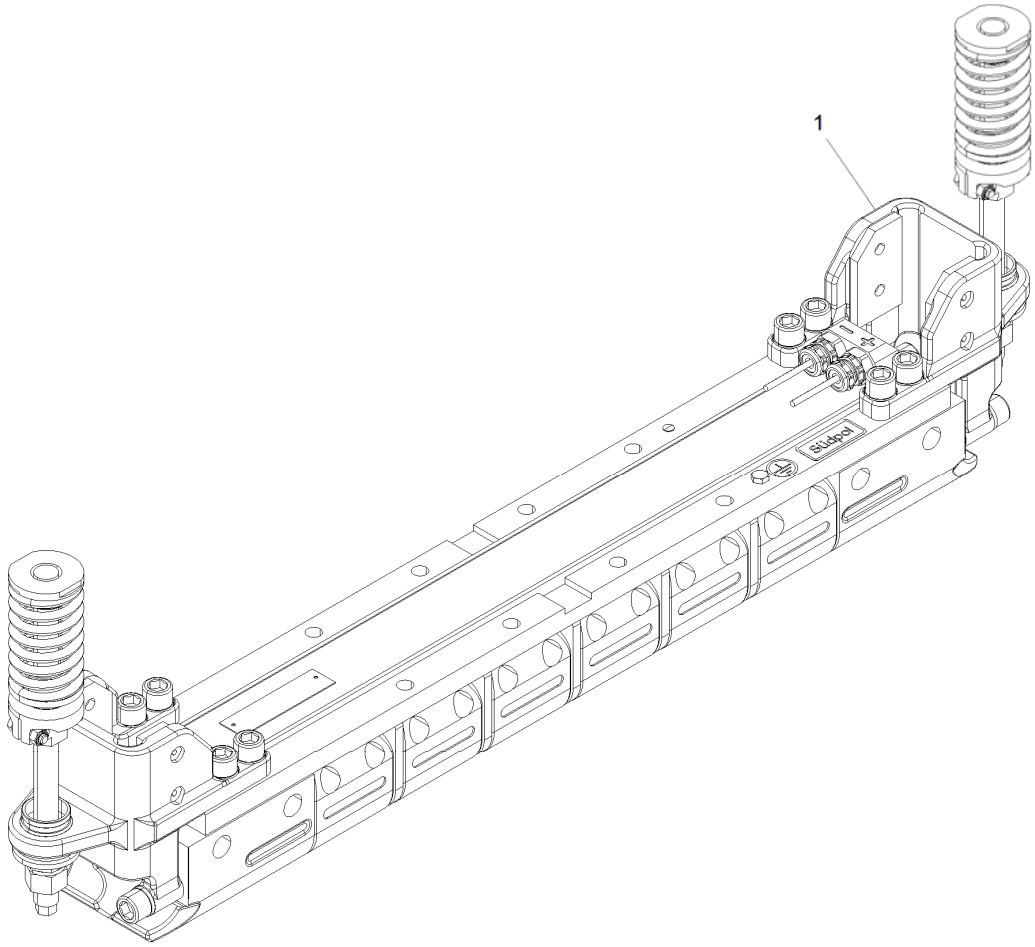

Figure 1-1: Track Brake Assembly

1.3 Reference Data

The reference data for the track brakes is listed in Table 1-1.

Table 1-1. Reference Data

Characteristic	Specification
OPERATING POWER:	28.0 vdc
DE-ENERGIZED POSITION:	Approximately 8MM above the rail
TRACK BRAKE MAGNET: • COIL RESISTANCE • CURRENT DRAWN • CONTACT FORCE	 0.61 ohms ± 5% at 68 °F (20 °C) 46 Amperes 14,837 lbs. (63kN)
SPRING SUSPENSION ASSEMBLY: • PRELOAD SPRING SUSPENSION	 394 ± 59 lbs (534 ± 80 N) when compressed to 3.88 inches (98.5 mm)
WEIGHT:	246 lbs. (112 kg)
LENGTH: Distance of suspensions	41.97 ± 0.11 in. (1066 ± 3 mm)

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CHAPTER 2.0

FUNCTIONAL DESCRIPTION

2.1 Introduction

This chapter provides a functional description of the track brake.

2.2 Equipment Description

The track brake assembly, (1) Figure 1-1 consists of a spring suspension and articulated magnetic track brake suspended above the rail between the wheels of a truck. Force transfer members connect the track brakes on each side of the truck to the truck side frame to maintain the track brake magnets over the top of the rail. The force transfer members also provide stops to transmit the braking force generated by the electro-magnetic track brake to the truck side frame.

The track brake assembly is suspended, nominally, at 8 mm above the rail head when in the de-energized mode.

When the electromagnetic track brakes are energized, an attractive force is generated between the track brakes and the rails causing the track brakes to be pulled down to the rail head, thereby generating a retarding force due to the friction between the intermediate elements (rail shoes) and the rail. This retarding force is transmitted from the track brake to the truck mounted force transfer members and results in car deceleration. When the electromagnetic track brakes are de-energized 28 VDC is removed from the track brake contactor control circuit. The track brake relay drops out to de-energize the track brakes, therefore the attractive force ceases and the spring suspension returns the track brake to its suspended position over the rail.

Three Track Brake Contactors (TBC) are provided to energize the track brakes. Each Track Brake Panel contains a single 24 Vdc relay used to apply power to the track brakes. The contactor comes with a remote diode which is used to absorb the energy generated when the inductive load is interrupted. This diode is installed by the carbuilder in an environmentally protected location. Refer to Sections 3.6.1 and 3.6.2 of Section 1000, Track Brake of the Heavy Repair Maintenance Manual.

2.2.1 Track Brake Magnet

The articulated track brake magnet components include end pieces, intermediate elements (rail shoes), and coil form, see Figure 2-1.

Intermediate elements are secured to the coil form in pairs. Each intermediate element moves freely during brake application allowing it to better adapt to the rail head. The end pieces are joined rigidly to the coil form and guide the track brake magnet over rail points and rail joints. Non-magnetic bars are between the elements and the brake shoes to stop magnetic shorts.

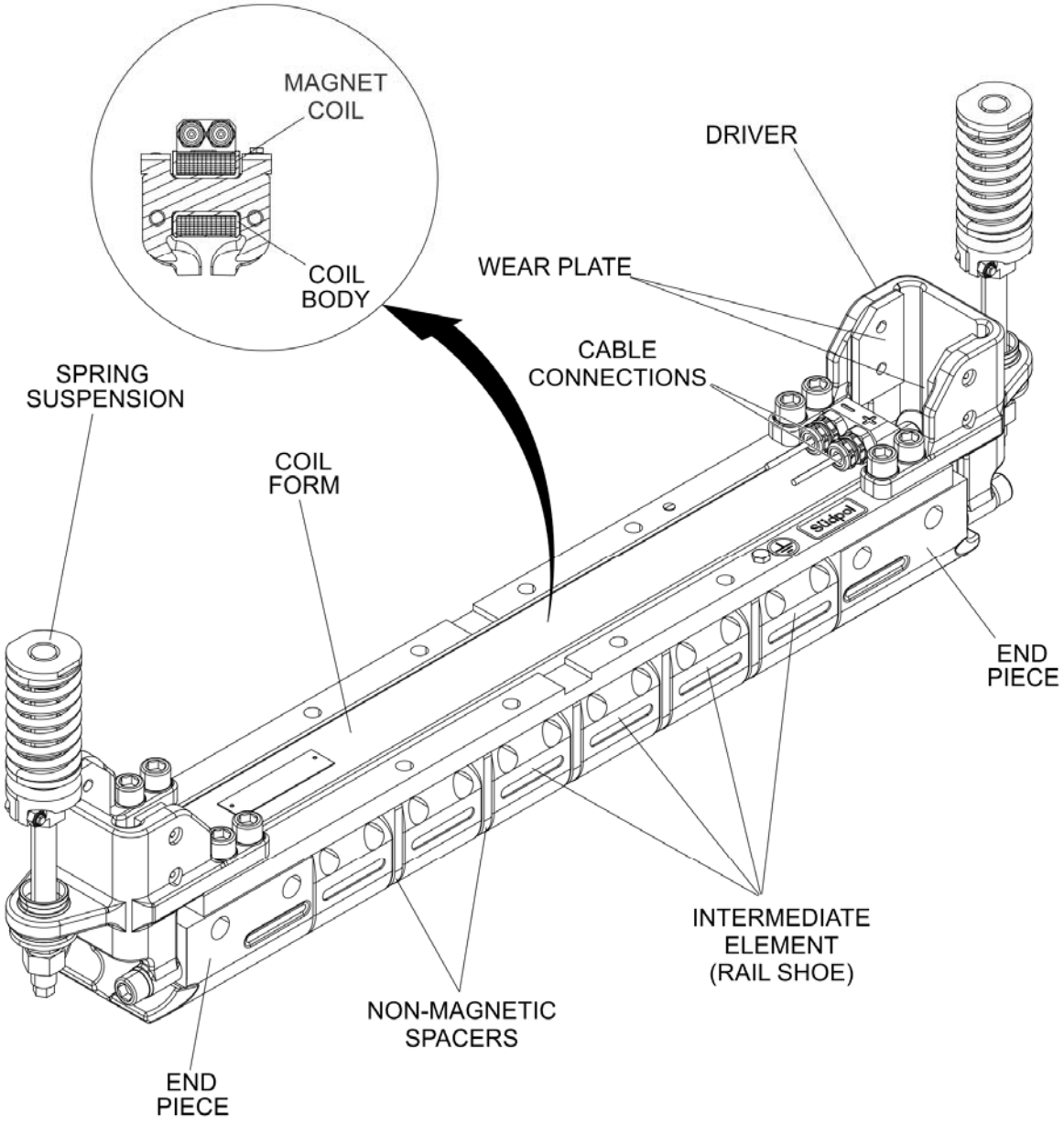

Figure 2-1: Track Brake Components

The track brake magnet is used to generate an electromagnet attractive force between the car independent of wheel to rail adhesion and the running rails to provide an adhesion independent braking force for the car. The magnet consists of a coil form with a hermetically sealed coil, non-articulated replaceable intermediate elements (rail shoes), non-magnetic spacers, drivers to connect with the spring suspension, and external cable connections. The track brake magnet is suspended over the rails by means of a spring suspension unit at each end of the magnet, and is maintained in position over the rails by means of end drivers which interlock with force transfer members on the truck.

The track brake coil form is an insulated welded box core with a coil made of windings of fiberglass insulated copper wire wound directly to the coil body. The coil windings themselves are insulated from the coil body by a sealed welded cover plate. The coil body is subjected to a partial vacuum before the cable leads leaving the coil are sealed. In addition to sealing the coil, a 2mm thick cover plate protects the coil from external objects and shock loading.

End pieces are mounted to the side of the coil body. When energized, the magnetic flux of the track brake coil is transmitted through the end pieces and intermediate elements (rail shoes) into the rail. Magnetic short circuiting is prevented by use of non-magnetic spacers between the portions of the intermediate elements (rail shoes) that touch the rail. The external cable leads provide a water tight connection of the 28 Vdc power applied to track brake magnet.

2.2.2 Operation

When the electromagnetic track brake is energized, it contacts the rail by its own magnetic pull. Transmission links attached firmly to the car or bogie draw the brake magnet over the rail head in the running direction. The braking action is obtained by the kinetic energy of the moving vehicle being dissipated through the friction between the magnetized intermediate elements (rail shoes) and the rail.

2.2.3 Wear

The braking action is produced by the intermediate elements (rail shoes) (pole pieces) rubbing on the rails. The rail shoes wear down gradually owning to the combination of hard steel rails and soft pole shoes (of magnetically favorable steel).

2.2.4 Specific Safety Precautions

Some of the procedures in this section are preceded by warnings, cautions and notes regarding potential hazards in handling this equipment. All of these warnings should be carefully read and understood before proceeding, and then be followed closely while performing related tasks. The prominent warnings for this equipment are:

WARNING

THE TRACK BRAKES ARE INDEPENDENTLY CONTROLLED BY THE VEHICLE. USE CARE TO PREVENT INJURY WHEN WORKING NEAR THE TRACK BRAKES.

WARNING

BECAUSE THIS EQUIPMENT OPERATES AT LETHAL POWER LEVELS, WARNINGS AND REMINDERS ABOUT REMOVAL OF POWER, IN ACCORDANCE WITH LACMTA REGULATIONS SHOULD BE COMPLETELY UNDERSTOOD BEFORE ANY WORK IS BEGUN.

WARNING

SOME COMPONENTS MAY CONTAIN HAZARDOUS CHEMICALS, OR THEIR USE MAY BE REQUIRED IN CLEANING OR SERVICING SUCH COMPONENTS. IN THESE CASES, THE MANUFACTURER'S WARNINGS SHOULD BE CLOSELY HEEDED, AND ONLY THOSE ITEMS SPECIFICALLY AND CURRENTLY APPROVED FOR USE BY LACMTA SHOULD BE EMPLOYED, REGARDLESS OF ANY RECOMMENDED USE IN THE PROCEDURE.

WARNING

MUCH OF THE EQUIPMENT ON THIS VEHICLE IS LOCATED UNDER THE FLOOR. SPECIAL CAUTION SHOULD BE TAKEN WHEN ACCESSING OR SERVICING ITEMS IN THIS LOCATION.

WARNING

SOME COMPONENTS IN THIS EQUIPMENT ATTAIN TEMPERATURES THAT CAN CAUSE SEVERE BURNS, AND OTHERS, IF MISHANDLED, MAY CAUSE SERIOUS CUTS OR PRODUCE TOXIC FUMES OR RESIDUES. CLOSELY FOLLOWS MANUFACTURER'S WARNINGS AND RECOMMENDED PROCEDURES FOR HANDLING THESE COMPONENTS.

WARNING

SOME OF THE EQUIPMENT CONTAINS COMPONENTS UNDER SPRING TENSION THAT CAN BE HAZARDOUS IN AN UNCONTROLLED RELEASE. OTHER COMPONENTS CONTAIN FLUIDS OR GASSES UNDER PRESSURE THAT CAN READILY CAUSE PERSONAL INJURY IF IMPROPERLY RELEASED. WARNINGS AND SPECIFIC INSTRUCTIONS FOR HANDLING SUCH COMPONENTS SHOULD BE CLOSELY ADHERED TO.

WARNING

MANY EQUIPMENT ITEMS AND COMPONENTS ARE QUITE HEAVY AND MAY REQUIRE LIFTING DEVICES OR ASSISTANCE FOR THEIR SAFE HANDLING, AND ARE GENERALLY NOTED. HOWEVER, ALL EQUIPMENT THAT LOOKS HEAVY, PROBABLY IS, AND SHOULD BE TREATED ACCORDINGLY.

NOTE: The use of WARNING statements is necessarily limited to significant cases, so that effectiveness will not be reduced by too frequent usage. The absence of such statements does not, in any way, imply the absence of hazards which may be present anytime electrical or refrigeration equipment is activated, or when working on items with inherent hazards, such as those cited above.

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CHAPTER 3.0

SPECIAL TOOLS AND MATERIALS

3.1 Introduction

There are no special tools or test equipment required.

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CHAPTER 4.0

SCHEDULED MAINTENANCE TASKS

4.1 Introduction

This chapter provides the inspection and servicing procedures and schedules required to maintain the track brake system components. Inspection and service procedures range from 30,000 to 600,000 miles and are performed at scheduled intervals.

Table 4-1 identifies the maintenance task to be performed and the related LRU, when recommended frequency maintenance is performed and where the maintenance procedure can be found in this document.

Table 4-1. Scheduled Maintenance Task

Maintenance Interval	Part Description	Scheduled Maintenance Task	Section 1000, Track Brakes Running Maintenance Manual Section Reference
Daily	Track Brake	Inspect track brake operation	5.3.1
30,000	Track Brake	Inspect track brake	5.3.2
30,000	Track Brake Compression Spring	Inspect track brake compression spring	5.3.3
30,000	Track Brake Intermediate Element/End Piece	Inspect track brake intermediate element/end piece	5.3.4
60,000	Track Brake Panel	Visually inspect Track Brake Panel for loose components and secure panel mounting hardware	5.3.5
120,000	Track Brake	Minor Service Lubrication	Heavy Repair Maintenance Manual Section 1000
600,000	Track Brake	Overhaul Track Brake	Heavy Repair Maintenance Manual Section 1000

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CHAPTER 5.0

CORRECTIVE MAINTENANCE

5.1 Introduction

This chapter provides inspection and adjustment procedures identified in Section 4.0, Scheduled Maintenance Tasks.

5.2 Safety Information

Some of the procedures in this section are preceded by warnings, cautions and notes regarding potential hazards in handling this equipment. All of these warnings should be carefully read and understood before proceeding, and then be followed closely while performing related tasks. The prominent warnings for this equipment are:

WARNING

BECAUSE THIS EQUIPMENT OPERATES AT LETHAL POWER LEVELS, WARNINGS AND REMINDERS ABOUT REMOVAL OF POWER, IN ACCORDANCE WITH LACMTA REGULATIONS SHOULD BE COMPLETELY UNDERSTOOD BEFORE ANY WORK IS BEGUN.

WARNING

SOME COMPONENTS MAY CONTAIN HAZARDOUS CHEMICALS, OR THEIR USE MAY BE REQUIRED IN CLEANING OR SERVICING SUCH COMPONENTS. IN THESE CASES, THE MANUFACTURER'S WARNINGS SHOULD BE CLOSELY HEEDED, AND ONLY THOSE ITEMS SPECIFICALLY AND CURRENTLY APPROVED FOR USE BY LACMTA SHOULD BE EMPLOYED, REGARDLESS OF ANY RECOMMENDED USE IN THE PROCEDURE.

WARNING

MUCH OF THE EQUIPMENT ON THIS VEHICLE IS LOCATED UNDER THE FLOOR. SPECIAL CAUTION SHOULD BE TAKEN WHEN ACCESSING OR SERVICING ITEMS IN THIS LOCATION.

WARNING

SOME COMPONENTS IN THIS EQUIPMENT ATTAIN TEMPERATURES THAT CAN CAUSE SEVERE BURNS, AND OTHERS, IF MISHANDLED, MAY CAUSE SERIOUS CUTS OR PRODUCE TOXIC FUMES OR RESIDUES. CLOSELY FOLLOWS MANUFACTURER'S WARNINGS AND RECOMMENDED PROCEDURES FOR HANDLING THESE COMPONENTS.

WARNING

SOME OF THE EQUIPMENT CONTAINS COMPONENTS UNDER SPRING TENSION THAT CAN BE HAZARDOUS IN AN UNCONTROLLED RELEASE. OTHER COMPONENTS CONTAIN FLUIDS OR GASSES UNDER PRESSURE THAT CAN READILY CAUSE PERSONAL INJURY IF IMPROPERLY RELEASED. WARNINGS AND SPECIFIC INSTRUCTIONS FOR HANDLING SUCH COMPONENTS SHOULD BE CLOSELY ADHERED TO.

WARNING

MANY EQUIPMENT ITEMS AND COMPONENTS ARE QUITE HEAVY AND MAY REQUIRE LIFTING DEVICES OR ASSISTANCE FOR THEIR SAFE HANDLING, AND ARE GENERALLY NOTED. HOWEVER, ALL EQUIPMENT THAT LOOKS HEAVY, PROBABLY IS, AND SHOULD BE TREATED ACCORDINGLY.

NOTE: The use of WARNING statements is necessarily limited to significant cases, so that effectiveness will not be reduced by too frequent usage. The absence of such statements does not, in any way, imply the absence of hazards which may be present anytime electrical or refrigeration equipment is activated, or when working on items with inherent hazards, such as those cited above.

5.3 Inspection

5.3.1 Inspect Track Brake Operation

Equipment Conditions:

- Wheels chocked
- Holding Brakes applied

Materials Needed

- None

1. Power up the vehicle and key up one of the cabs.
2. Press and hold down the Track Brake push button on the cab console.
3. Verify that the track brake assemblies on all three trucks are drawn downward and contact the rails.
4. Release the Track Brake push button.
5. If track brakes do not make contact with the rails, troubleshoot at the vehicle level.

5.3.2 Inspect Track Brake

1. Inspect track brake coil form, see Figure 5-4 and magnet for wear, cracks or damage. If excessive wear, cracking or damage is found replace components per the Section 1000, Track Brakes of the Heavy Repair Maintenance Manual (HRM). Remove coil form for inspection per the Heavy Repair Maintenance Manual.

WARNING

WEAR SAFETY GOGGLES AND GLOVES WHILE USING EXTREME CAUTION REMOVING SLAG OR DEBRIS FROM THE TRACK BRAKE. FAILURE TO COMPLY MAY RESULT IN INJURY.

2. Inspect and remove all metal slag or any other debris between the track brake and the rail. Remove slag using wire brush, file, or a hammer and chisel for larger slag pieces. Remove debris with pliers.
3. Inspect track brake drivers, see Figure 2-1 and driver wear plates for wear and damage. If worn or damaged replace drivers and wear plates per Section 1000, Track Brakes of the Heavy Repair Maintenance Manual.
4. Inspect track brake attaching screws for tightness, see Figure 5-1. If screws are loose and need tightened, torque per the values in the following table. If any screws need re-torqued, install new protective stoppers after completing the work.

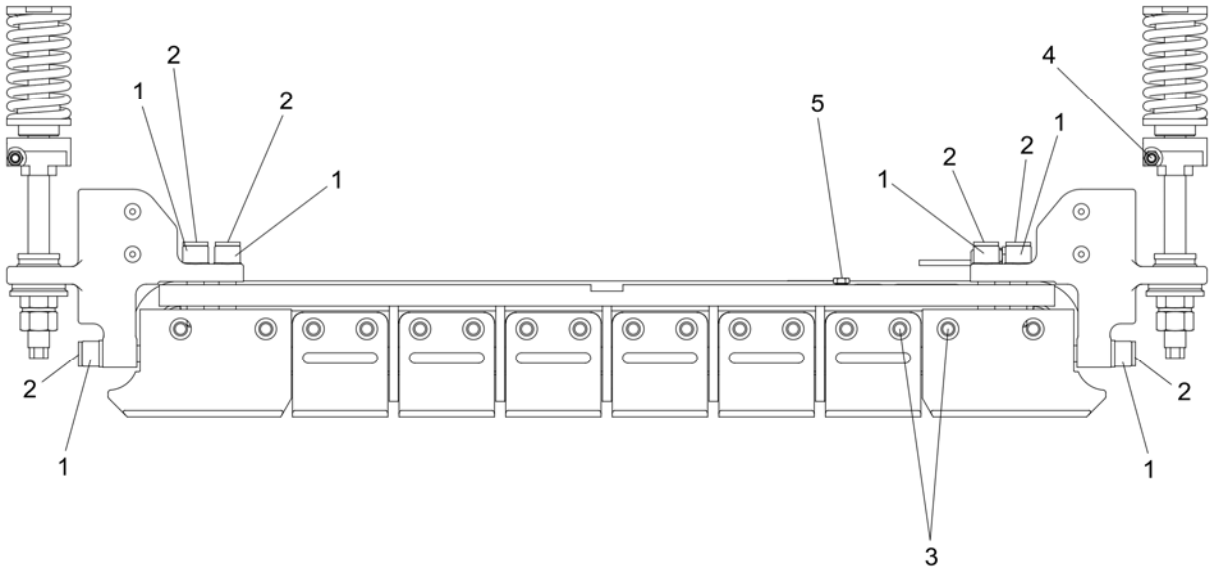

Figure 5-1: Track Brake Torque

Table 5-1. Track Brake Torque Values

Item Number	Description	Qty.	Torque Value
1	M16 Screw	12	133 ft-lbs. (180 Nm)
2	Protective Stoppers	12	N/A
3	M12 Screw, Intermediate Element and End Piece	32	59 ft-lbs. (80 Nm)
4	M8 Screw, Compression Spring	2	17 +/- 1.5 ft-lbs. (23 +2 Nm)
5	M8 Screw	1	10 ft-lbs. (13 Nm)

5.3.3 Inspect Track Brake Compression Spring

Equipment Conditions:

- Wheels chocked
- Parking Brakes applied

Materials Needed:

- None

1. Check the compression spring for wear or any sign of rust. If compression spring is worn or shows any sign of rust replace per Section 1000, Track Brakes of the Heavy Repair Maintenance Manual.

INSPECT COMPRESSION SPRING HEIGHT

See Figure 5-2.

1. De-energize the track brake system by setting electric breaker to the OFF position.
2. Using an 8 mm feeler gauge, measure the space between the track brake and rail throughout the length of the track brake. If the space is not 8 mm, adjust per the following instructions.

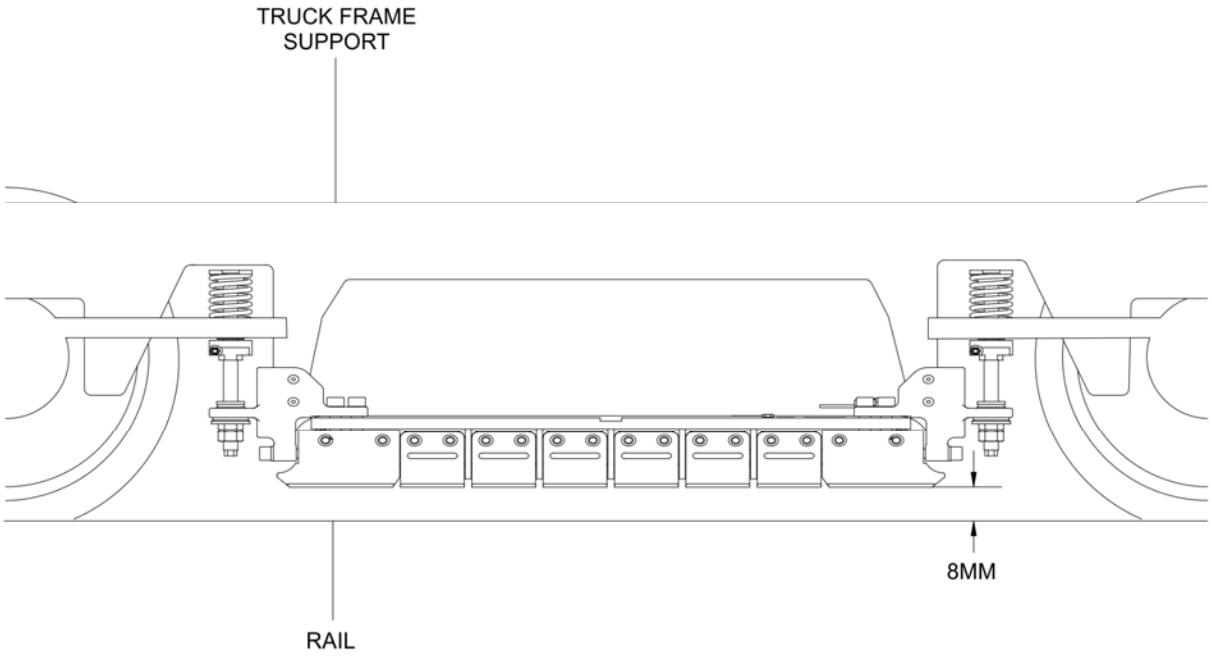

Figure 5-2: Track Brake Height

ADJUST TRACK BRAKE HEIGHT

WARNING

IMPROPER TORQUE TO THE TRACK SUSPENSION CAN CAUSE DERAILMENT.

See Figure 5-3.

NOTE: Adjustment must always be made on both suspensions of a magnet.

Always use a correctly calibrated torque wrench.

Ensure proper functionality (thread undamaged, free from corrosion and dirt). If necessary replace or clean parts.

1. Loosen nut (5) and adjusting nut (3).
2. Inspect adjusting nut (3), nut (5) and locking device washer (4) for any signs of damage such as cracking, corrosion, or wear.
3. Replace adjusting nut (3), nut (5) or locking device washer (4) if signs of damage are visible. When replacing adjusting nut (3) flanged bushing (7) must also be replaced.

NOTE: To ensure the proper functionality of the locking device washer (4) be sure it is correctly assembled with wedge surface against wedge surface.

If Track brake height has been adjusted 50 times or more, replace the locking device washer (4).

4. Turn the adjusting nut (3) until the correct distance between the magnet and top of rail is reached.
5. Tighten the nut (5) with a torque of 88.5 ft-lbs. (120 Nm). Take care not to change the distance between track brake and rail.

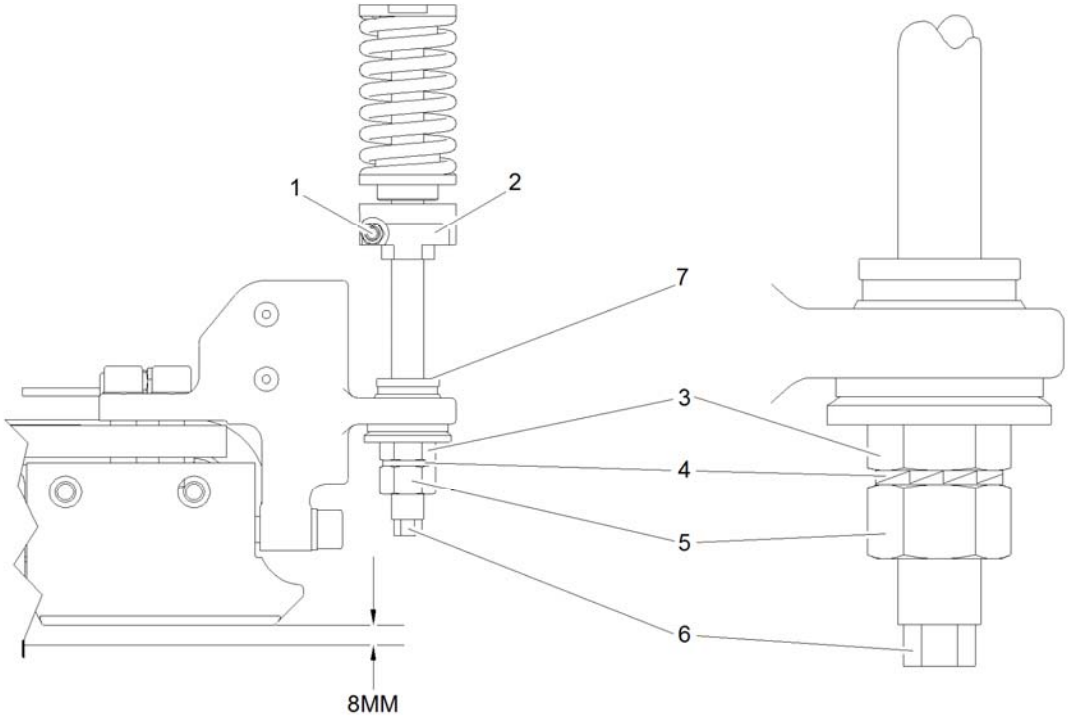

Figure 5-3: Suspension Height Adjustment

5.3.4 Inspect Track Brake Intermediate Element, End Piece

Equipment Conditions:

- Wheels chocked
- Holding Brakes applied

Materials Needed:

- None

1. Inspect track brake intermediate element, end piece rail shoes for wear. See Figure 5-4.

2. If wear limit (10 mm) is reached on the intermediate elements (rail shoes), remove the track brake and overhaul per Section 1000, Track Brakes of the Heavy Repair Maintenance Manual.

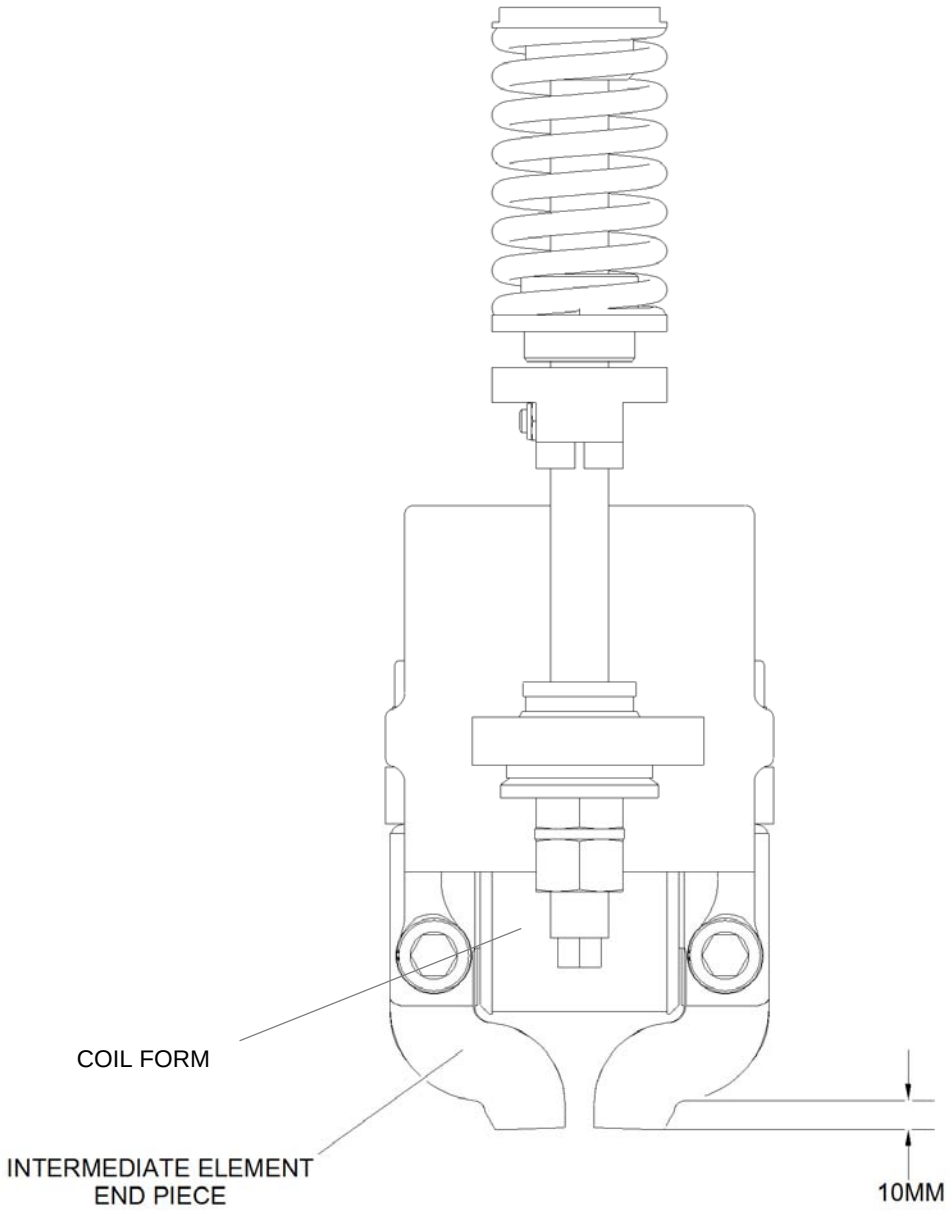

Figure 5-4: Intermediate Element/End Piece Wear Criteria

5.3.5 Inspect Track Brake Panels

Equipment Conditions:

- Wheels chocked
- Parking Brakes applied

Materials Needed:

- None

See Figure 7-1.

WARNING

BEFORE INSPECTING ANY ELECTRICAL EQUIPMENT IN AN ELECTRICAL SYSTEM, MAKE SURE THAT THE CIRCUIT BREAKER IS SWITCHED TO THE OFF POSITION AND THERE IS NO VOLTAGE PRESENT WHERE WORK IS PERFORMED. SPECIAL ATTENTION SHOULD BE PAID TO RESERVE FEED APPLICATIONS TO ENSURE NO VOLTAGE IS PRESENT. THE VOLTAGES IN ENERGIZED EQUIPMENT CAN CAUSE INJURY OR DEATH.

WARNING

THE USE OF AN AIR JET, WHICH MUST BE LESS THAN 30 PSIG (2.1 BAR), TO BLOW PARTS CLEAN OR TO BLOW THEM DRY AFTER BEING CLEANED WITH A SOLVENT WILL CAUSE PARTICLES OF DIRT AND/OR DROPLETS OF THE CLEANING SOLVENT TO BE AIRBORNE. THESE PARTICLES AND DROPLETS MAY CAUSE SKIN AND/OR EYE IRRITATION. PERSONAL EYE PROTECTION MUST BE WORN TO PROTECT THE EYES FROM POSSIBLE INJURY. WHEN USING AN AIR JET DO NOT DIRECT IT TOWARD ANOTHER PERSON. IMPROPER USE OF AN AIR JET COULD RESULT IN BODILY INJURY.

Visually inspect connections, wires, blow out any dust or foreign matter from the enclosure using dry, low pressure (30 psig), compressed air every 60,000 miles. See Figure 7-1.

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CHAPTER 6.0

LUBRICATION

6.1 Introduction

There are no lubrication procedures for the track brake system at this level.

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CHAPTER 7.0

COMPONENT REMOVAL AND INSTALLATION

7.1 Introduction

The removal and installation procedures for the track brake panels are provided below. See Figure 7-1.

7.2 Removal

7.2.1 Track Brake Panel A/B

WARNING

BEFORE INSPECTING ANY ELECTRICAL EQUIPMENT IN AN ELECTRICAL SYSTEM, MAKE SURE THAT THE CIRCUIT BREAKER IS SWITCHED TO THE OFF POSITION AND THERE IS NO VOLTAGE PRESENT WHERE WORK IS PERFORMED. SPECIAL ATTENTION SHOULD BE PAID TO RESERVE FEED APPLICATIONS TO ENSURE NO VOLTAGE IS PRESENT. THE VOLTAGES IN ENERGIZED EQUIPMENT CAN CAUSE INJURY OR DEATH.

1. Remove the cab access panel to the left of the Operator's Seat.
2. Remove the electrical connections to the Track Brake Panel A/B (1). See Figure 7-1.
3. Remove the four M8 x 20 bolts (2), M8 lock washers (3), and M8 plain washers (4).
4. Carefully remove the Track Brake Panel A/B (1).

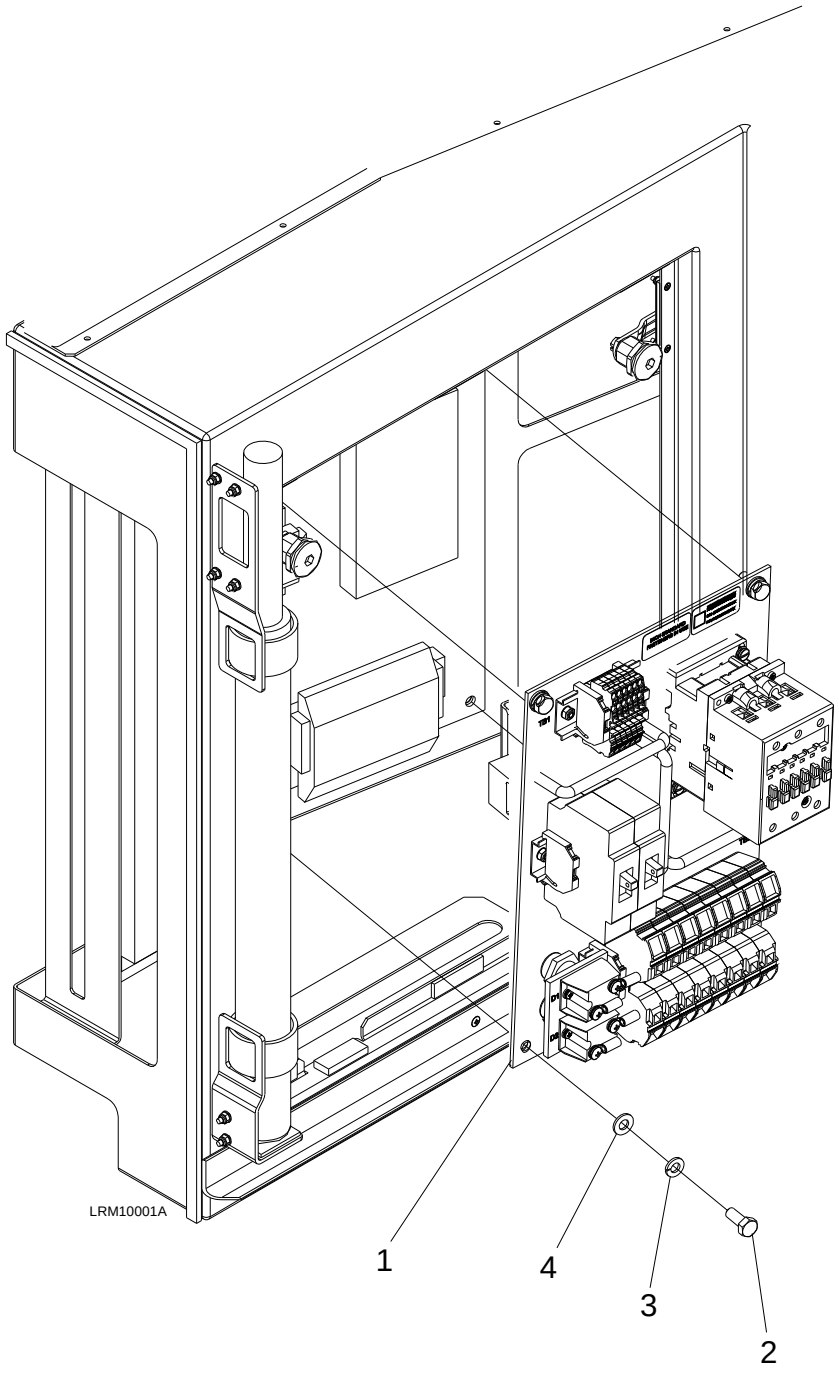

Figure 7-1: Track Brake Panel A/B

7.2.2 Track Brake Panel C

WARNING

BEFORE INSPECTING ANY ELECTRICAL EQUIPMENT IN AN ELECTRICAL SYSTEM, MAKE SURE THAT THE CIRCUIT BREAKER IS SWITCHED TO THE OFF POSITION AND THERE IS NO VOLTAGE PRESENT WHERE WORK IS PERFORMED. SPECIAL ATTENTION SHOULD BE PAID TO RESERVE FEED APPLICATIONS TO ENSURE NO VOLTAGE IS PRESENT. THE VOLTAGES IN ENERGIZED EQUIPMENT CAN CAUSE INJURY OR DEATH.

7.2.2.1 Removal

1. Open the electric locker access door. See Figure 7-2.
2. Remove the electrical connections to the Track Brake Panel C (1).
3. Remove the four M8 x 25 bolts (2), M8 lock washers (3), and M8 plain washers (4).
4. Carefully remove the Track Brake Panel C (1).

7.2.3 Track Brake

1. Loosen locknut (5, Figure 7-3) on collar nut (6) using a 13 mm wrench.
2. Hold adjusting pin (1) to keep it from turning, using the hex portion at the base, and loosen collar nut (6) on adjusting pin (1) by turning hex portion counterclockwise with a 30 mm wrench. Loosen collar nut so that collar nut is approximately 1/2-inch above track brake magnet.
3. Repeat steps 1 and 2 for other spring suspension.
4. Support track brake magnet and place wood blocks underneath it to relieve the weight of the magnet from spring suspension.
5. Hold adjusting pin (1) to keep it from turning, using the hex portion at the base, and remove hex nut (2) and locking device washer (3). Discard locking device washer.
6. Remove adjusting nut (4) from adjusting pin (1).
7. Push adjusting pin (1) upwards until it clears the track brake.
8. Repeat steps 4 through 7 for other spring suspension.
9. Remove track brake magnet using appropriate lifting device.

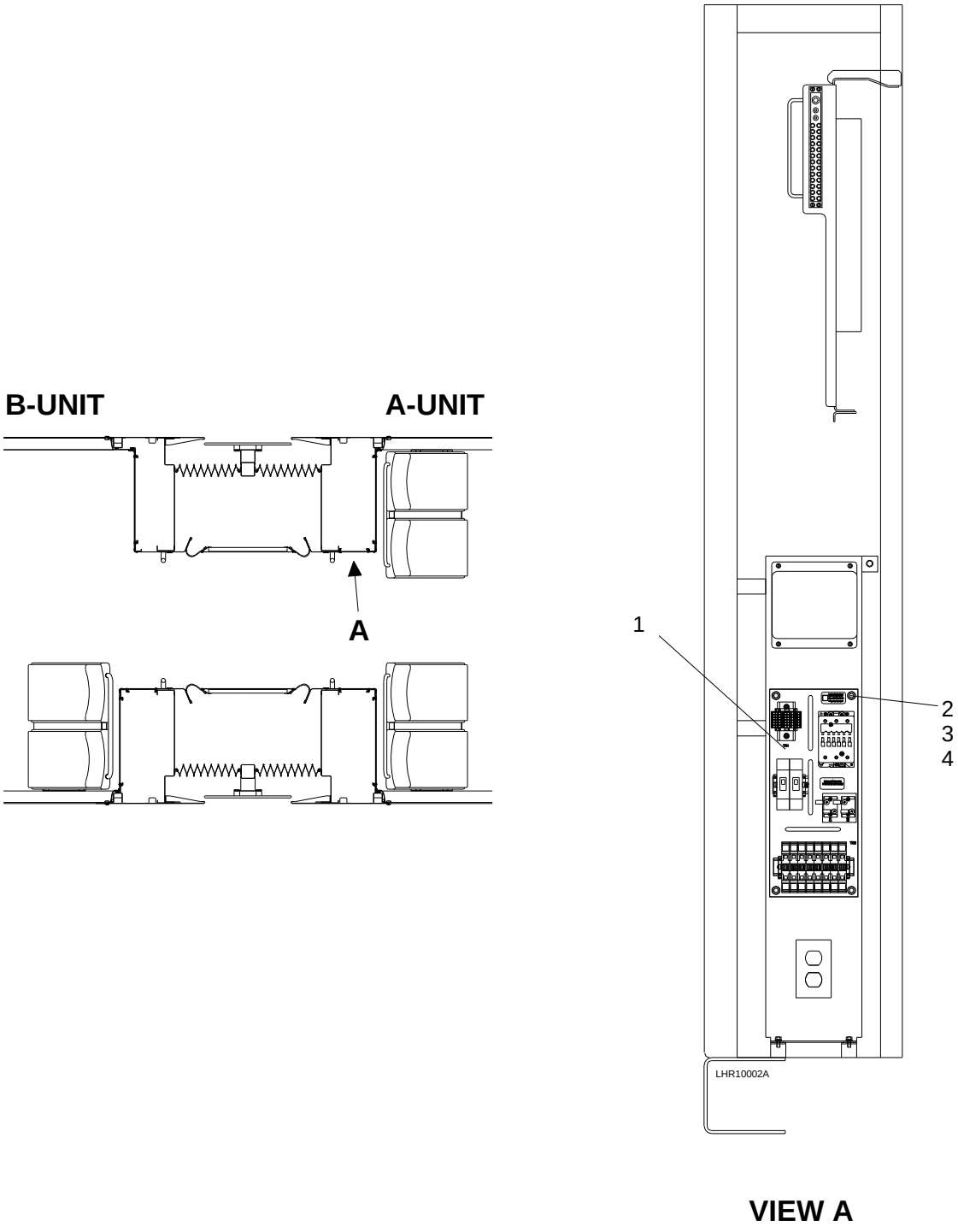

Figure 7-2: Track Brake Panel C

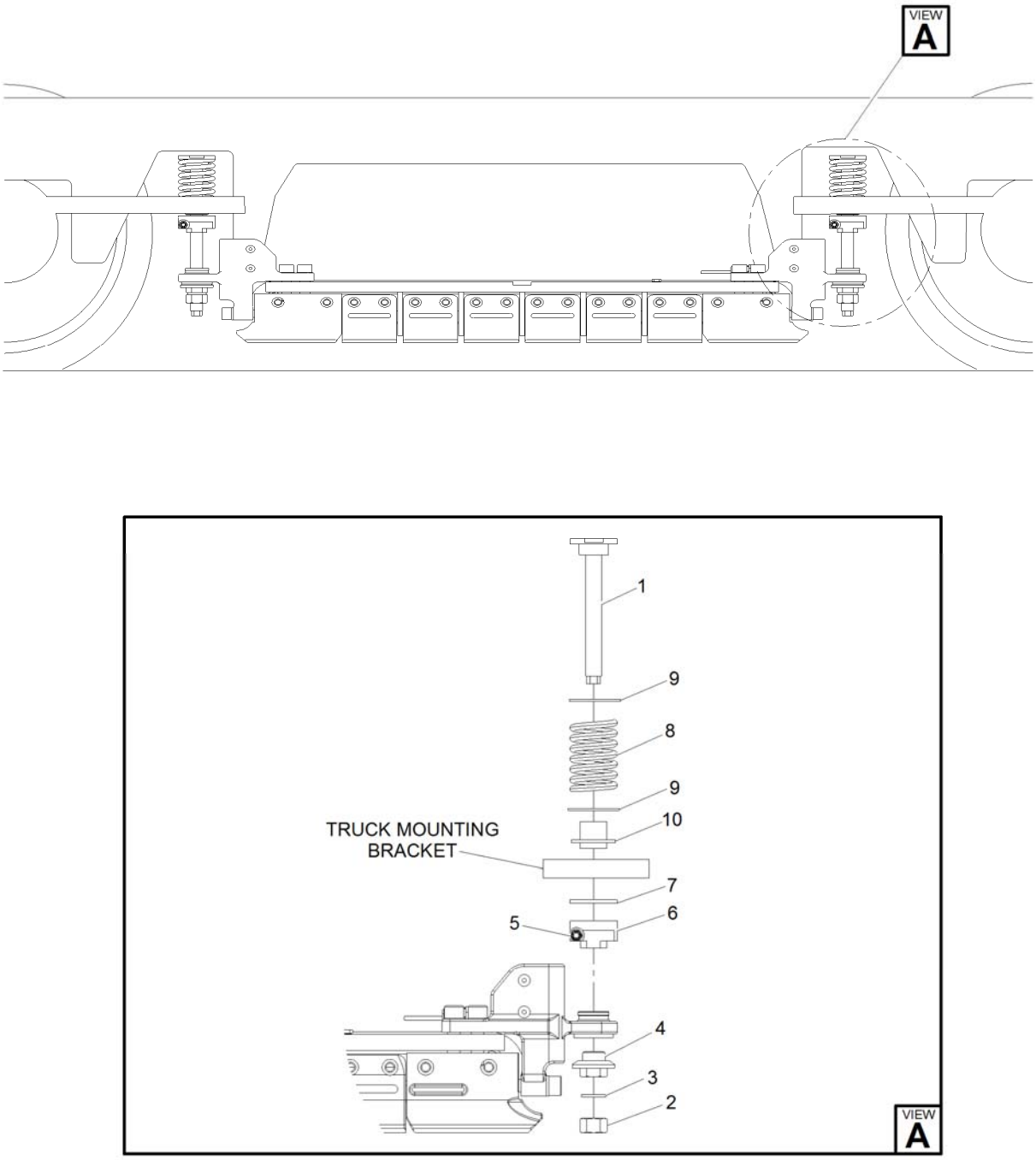

Figure 7-3: Track Brake

10. Hold adjusting pin (1) to keep it from turning, using the hex portion at the base, and remove collar nut (6) from adjusting pin (1) by turning hex portion counterclockwise with a 30 mm wrench.
11. Remove damping pad (7) and discard.
12. Push adjusting pin (1) upwards until clear of truck bracket.
13. Remove compression spring (8), two washers (9) and bushing (10).

7.3 Installation

7.3.1 Track Brake Panel A/B

1. Remove the cab access panel to the left of the Operator's Seat. See Figure 7-1.
2. Carefully install the Track Brake Panel A/B (1) aligning the mounting holes.
3. Install the four M8 x 20 bolts (2), M8 lock washers (3), and M8 plain washers (4).
4. Tighten and torque the hardware to 170 ft-lbs. (17 Nm) (dry).
5. Install the electrical connections.
6. Install the cab access panel to the left of the Operator's Seat.

7.3.2 Track Brake Panel C

1. Open the electric locker access door. See Figure 7-2.
2. Carefully install the Track Brake Panel C (1) aligning the mounting holes.
3. Install the four M8 x 25 bolts (2), M8 lock washers (3), and M8 plain washers (4).
4. Tighten and torque the hardware to 170 ft-lbs. (17 Nm) (dry).
5. Install the electrical connections.
6. Close the electric locker access door.

7.3.3 Track Brake

1. Place track brake magnet in place beneath mounting location and support with wood blocks.

2. Place bushing (10, Figure 7-3) into the mounting bracket on the truck frame. The larger diameter should face up.

3. Insert adjusting pin (1) into center of two washers (9), compression spring (8) and truck frame.

4. Place damping pad (7) on adjusting pin (1) from underside of truck frame bracket.

5. Apply Staburags NBU30 PTM to locknut (5) and finger tighten.

6. Secure compression spring (8) in place by threading collar nut (6) up adjusting pin (1). Turn hex portion of collar nut (6) clockwise using a 30 mm wrench.

7. Repeat steps 2 through 6 on other spring suspension.

8. Lift track brake magnet into place and insert tip of adjusting pin (1) into track brake magnet end bracket.

9. Secure assembly in place by threading adjusting nut (4) onto adjusting pin (1). Turn adjusting nut (4) clockwise using a 30 mm wrench.

NOTE: The hex nut (2) will be tightened during spring suspension adjustment.

10. Loosely install locking device washer (3) and hex nut (2) on adjusting pin (1).

11. Repeat steps 8 through 10 on other spring suspension.

12. Adjust spring suspension. Refer to Section 7.4.

7.4 Spring Suspension Adjustment

WARNING

THE TRACK BRAKE MAGNET WEIGHS APPROXIMATELY 246 POUNDS. USE EXTREME CARE DURING THE FOLLOWING STEP TO PREVENT PERSONAL INJURY.

1. With spring suspension loosely assembled, carefully remove the wood blocks installed underneath the track brake magnet.

2. Turn the adjusting nut (4, Figure 7-3) on both spring suspensions until the distance between the magnet and top of rail is 0.41 in. (10.5 mm).

NOTE: To ensure the proper functionality of the locking device washer (3) be sure it is correctly assembled with wedge surface against wedge surface.

3. While holding adjusting nut (4), tighten the hex nut (2) with a torque of 88.5 ft-lbs. (120 Nm). Take care not to change the distance between track brake and rail.

4. Repeat step 3 on the other spring suspension.

5. Lubricate locknut (5) with Staburags NBU30 PTM.

6. Verify that locknut (5) is loose, then turn collar nut (6) until the distance between the magnet and top of the rail is 0.32 in. (8 mm).

CAUTION

DO NOT OVERTIGHTEN LOCKNUT (5). DAMAGE TO COLLAR NUT (6) WILL RESULT.

7. Torque locknut (5) to between 17 ft-lbs (23 Nm) and 18 ft-lbs. (25 Nm).

8. Repeat steps 5 through 7 on the other spring suspension.

CHAPTER 8.0

TROUBLESHOOTING

8.1 Introduction

This chapter provides all instructions and information necessary to locate troubles and conduct tests on the track brake. Troubleshooting charts are provided for help in isolation of faults.

8.2 Troubleshooting

Typical track brake troubleshooting procedures are contained in Table 8-1. These troubleshooting and repair procedures should be followed when encountering operational problems with the track brake system.

WARNING

ALWAYS DISCONNECT POWER WHEN SERVICING TRACK BRAKE ASSEMBLY OR ANY INTERNAL COMPONENTS.

Table 8-1. Track Brake Troubleshooting

Step	Symptom	Cause	Remedy
1	Track brakes do not apply	Electrical cable connection at track brake loose.	Tighten electrical cable connection.
1.1	Track brakes do not apply	Electric power to track brake not present.	Troubleshoot vehicle electrical system.
2	Track brakes do not release	Vehicle control system.	Troubleshoot vehicle electrical system.
3	Track brake does not contact rail	Debris in spring or accumulation under track brake.	Check for and remove debris.
3.1	Track brake does not contact rail	Incorrect height.	Check height and adjust per Section 5.3.3.
3.2	Track brake does not contact rail	Track brake intermediate elements (rail shoes) worn.	Check intermediate elements (rail shoes) per Section 5.3.4, replace track brake per Section 1000 of HRM.
3.3	Track brake does not contact rail	Incorrect spring preload.	Set preload per Section 1000 of HRM.
4	Track brake drags on rail.	Broken spring.	Check spring, replace spring per Section 1000 of HRM.

Table 8-1. Track Brake Troubleshooting (cont'd.)

Step	Symptom	Cause	Remedy
5	Track Brake contactor malfunction	One or more sets of contacts do not close: 1. Damaged wire or loose connection in relay coil circuits. 2. One or more sets of contacts worn. 3. Contactor malfunction.	1. Check all wire assemblies and terminations for continuity, replace as necessary. 2. Change out contacts. 3. Overhaul or replace contactor(s).

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