



Inspections of Belts and Restraints

Best Practices

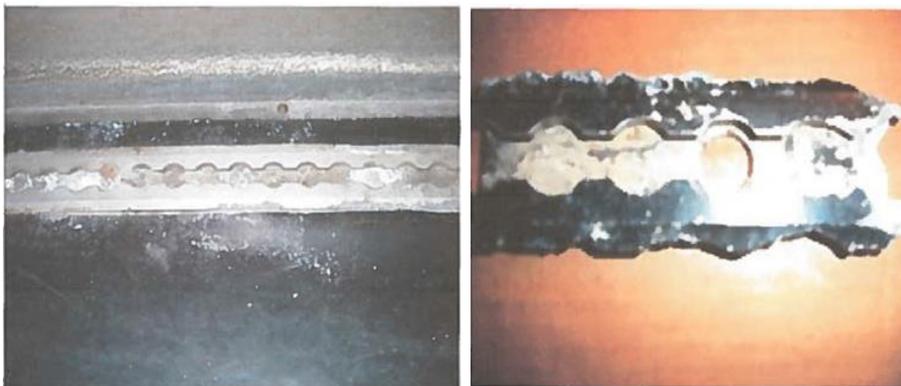
TRACK CORROSION

When we speak about track corrosion, we are not referring to surface oxidation that we often see on non-anodized aluminum track, rather, when we speak about corrosion in track; we are referring to an electrochemical process of galvanic corrosion in which dissimilar metals react in a manner in which one metal gives up its molecules to another. For galvanic corrosion to occur, three elements are required:

1. *Dissimilar metals - All metals are not created equal nor do they equally react to each other. (*When metals react to each other, one metal gives up its properties to another and this is called electro-chemical process)
2. Metal to metal contact
3. Add conductive solution (catalyst) water, cleaning solutions, road salts

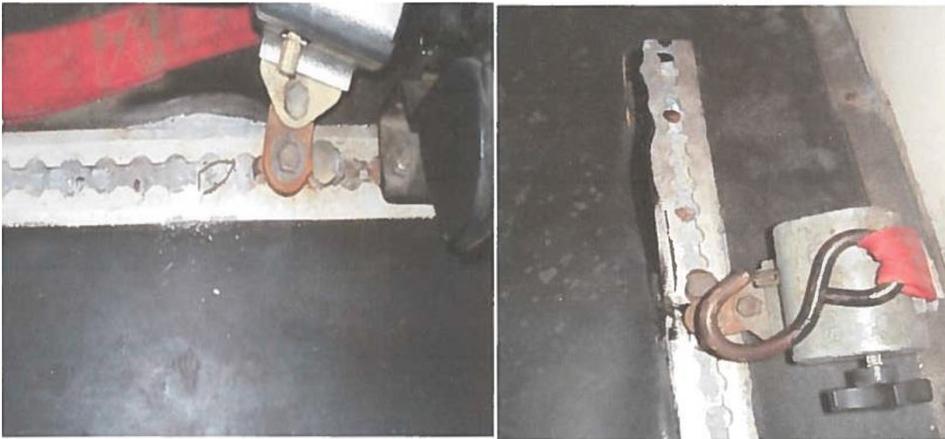
If any elements are missing, corrosion cannot occur:

Once a bus is in service, it becomes an agent for the various electrolytes or catalysts (listed above) and the process of galvanic corrosion begins. In the case of aluminum track (in contact w/the bus floor (steel) or a frame through a carbon (steel) bolt (typically used), the more steel used in construction of bus floor and it's framing, the greater the pace of corrosion. Since the mass of steel is greater than the mass of aluminum, the steel wins, the aluminum loses.



1. One of the first visible signs of galvanic corrosion in aluminum track is the appearance of white scaly deposits around the heads of the countersunk bolts holding down the track. By the time you see this, the bolt holes are already enlarged and the track is unsafe.

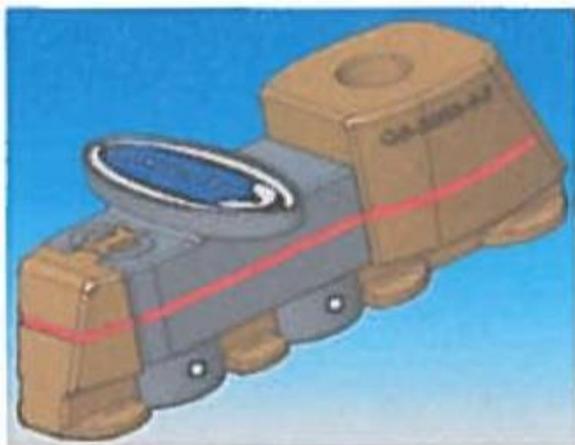
2. Mechanics test the holding power of the track anchor bolts by pulling on a belt or retractor to see if the track rises up. This is a simple way test the strength of the track installation but only gives a partial insight into the severity of corrosion as most of the decay takes place on the bottom surface of the track next to the floor, spreading out far beyond the bolt holes.
3. This more extensive hidden corrosion is the reason why it is not advisable to attempt to repair or re-fasten loose track by using a hex bolt and washer in place of a countersunk bolt.
Track Fitting Free Movement Test: Insert a track fitting into one end of the track and with the plunger of the fitting raised, push the fitting the entire length of the track. If fitting becomes stuck at any point, check and inspect to determine the cause.
 - Three ways to reduce corrosion
 1. Buy track with the correct chemical make-up or least corrosive
 2. Type of bolts used- plated w/zinc or galvanized coating.
Suggestion: when installing, silicon down the hole of floor (or some OEM's are using tape), anything to break the barrier/insulate between the two metals.
 3. Remove the retractors from the floor (below) fitting track (or steel / aluminum) create corrosion



Floor Anchorage Maintenance/Inspection

L Track Fittings (Inspection)

- Lift the plunger (ensuring there is spring tension) place the fitting into the track, release the plunger then move forward or backwards to lock in place.
- You should feel adequate spring tension when pulling up on the plunger, fittings that are *difficult to release* or "*catch*" in the up or down position due to dirt and debris can be cleaned in a parts washing solution, blow dry (i.e. compressed air) and a (dry) silicone lubricant can be used by maintenance personnel.
- There should be adequate spring tension to lock the plungers into the track, if at any time the spring tension feels weak or the plungers do not return completely, contact your supervisor/maintenance.
- Check fittings (i.e. washers, bolts) to ensure it is securely attached to the retractor. After some use, the fitting will move more freely than when it was new; however, at no time should it be loose enough to wobble on the retractor. If found, check manufacturer's instructions for proper torque.



PLI with Rust Coating

Below shows that the retractors have become wet with road debris, wiping or brushing with WD-40 may remove and clean rust coating.



Slide N Click Anchorage Inspection/Maintenance

Checking the Plunger Release



- Top Fitting Securement: Insert an upper fitting over the bottom anchorage to ensure it locks properly.
- Fastener Corrosion: Remove the plastic cap in the center of the anchorage and observe the bolt head for signs of corrosion.
- Fastener Torque: Place an 8 inch wrench on the bolt head to check the securement of the bolt. If the bolt moves freely, it will be necessary to re-torque the bolt to the proper torque. Note: See manufacturer's installation instructions for proper S-N-C anchorage installation.

Two Types of Retractors

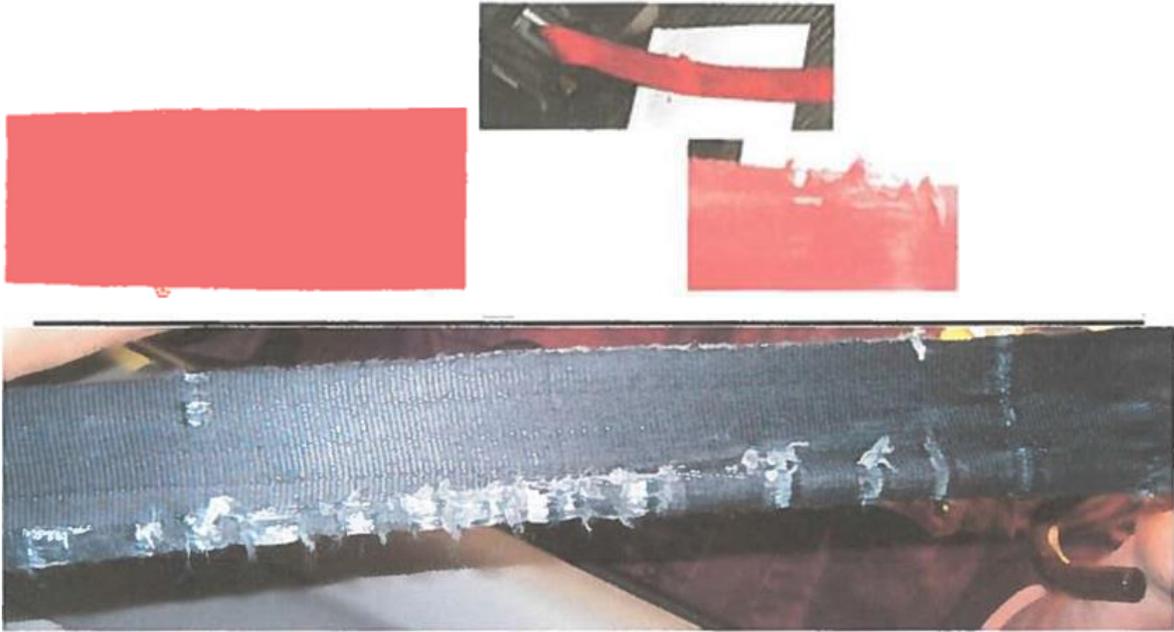
- ALR- Automatic Locking Retractor.
This type adjusts by means of self-locking mechanism (automatically self-tensions and/or takes up the slack) and when locked is capable of withstanding restraint forces (i.e. auto "floor" retractors).
- ELR- Emergency Locking Retractor.
- This type engages by means of vehicle acceleration or webbing movement (same as in your own personal automobile) it locks when you give it a jerk, but moves with body (i.e. combination lap/shoulder belt systems).

Two Types of Floor Retractors

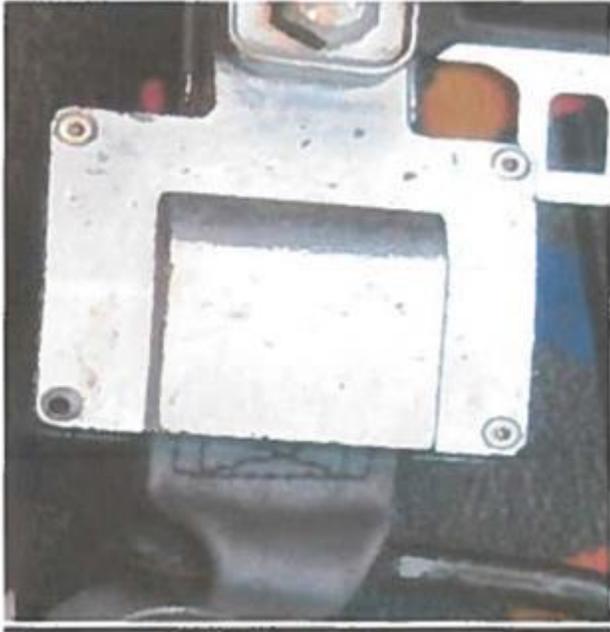
- Manual Floor Retractors.
When webbing is pulled from the retractor opening a "Knob must be turned" to tighten the retractor webbing (to release, press the red release lever).
- Automatic Floor Retractors.
When webbing is pulled from the retractor opening, these retractors will automatically "self-tension" and "self-lock" they will always get tighter (never loose) until the red release lever is pressed.

Floor Retractor Inspection

- Manual Floor Retractors
See below: Pull webbing out to the maximum and inspect for frays, cuts or contamination, and then turn knob to ensure webbing tightening, place slight tension on belt webbing. This should hold and not release until red release lever is depressed.
- Automatic Floor Retractors
See below: Pull the webbing out to the maximum, inspect for frays, cuts or contamination, and then allow it to retract in "jerky" movements to ensure the retractor is locking at each "jerk." Webbing should hold and not release, until the red release lever is depressed. Repeat test several times to ensure consistent locking.

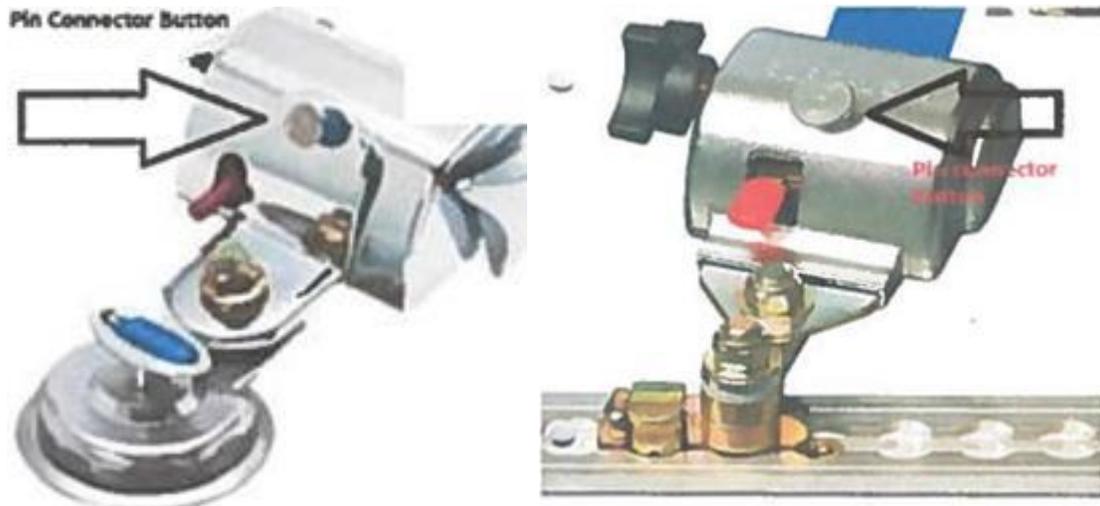


Loose screws on retractor housing can occur due to road vibration. This is something that should be checked periodically during driver and maintenance inspections. If screws are missing, contact the manufacturer and use of Loc-tite is also recommended.



Pin Connector's - On floor retractors are used for attaching the lap belts to the two rear floor retractors. On a regular (manual) lap/shoulder belt assembly, a pin connector button is also on the male portion of lap belt to connect the shoulder belt to the lap belt. The

bushing keeps a compression fit between the metal attachment point and pin connector, if bushings comes off, contact the manufacturer.



RED RELEASE LEVER - is used to disconnect the J-Hook from the attachment point on the wheelchair. Check to ensure the red release lever is functioning. Pull out and hold the floor retractor webbing. Next, press red release lever - it should release and retract the webbing back into metal housing.

Two Types - Occupant Restraint Systems (i.e. Lap/Shoulder Belts)

- Regular (manual) lap/shoulder belt system includes: 2 pieces which join together with a male and female lap belt (red) buckle and each half connects to the two rear floor retractors. The shoulder belt connects to the lap belt pin connector button (located on male lap belt) and junction of system (red buckle) is near or at the hip of occupant. This system is used for people with weak upper body strength to help keep them stay in a fixed/upright position.



- Retractable (combination) lap/shoulder belt system includes: An automatic retractor system which combines both a diagonal shoulder belt and pelvic belt, and a

single/individual lap belt (female w/red buckle). When system is in use, the lap belt connects to the two rear retractors and the junction of the system (red buckle) is near the hip of the occupant.



Shoulder Belts Mounting Heights (Paratransit/School Bus applications)

- 46" - 48" without height adjuster (from vehicle floor to anchorage point/assembly)
- 61" with retractable height adjuster (from floor to anchorage point/assembly)

If you experience problems with shoulder belt coming across the face or neck, the use of the height adjuster (within assembly) may assist with moving the shoulder belt up or down, or simply moving the chair forward or backward can also help. The use of a retractable height adjuster (below) and used only with combo retractable shoulder belt assembly at "61 inches or more from floor to anchorage point" may be required to achieve proper placement of shoulder belt, any questions contact the manufacturer.



- Check lap/shoulder belt: red (female) buckle for damage and ensure proper operation.
- Check male lap pin connector bushing to ensure it is not cracked or missing. Check shoulder belt anchorages for proper securement and operation.



Cleaning of Webbing (i.e. Floor Retractors and/or Lap/Shoulder Belts)

- Must comply with FMVSS 209 and 302 Regulations (belt assemblies and flammability), meaning we don't want to compromise the strength, endurance (209) or tamper with the flammability materials (302) with the use of chemicals.
- Remove any dirt and debris from the interior of the floor retractors by using low pressure compressed air (i.e. 15 PSI).
- If cleaning is needed, we recommend cleaning with a mild soap and water (not too hot as this may expand webbing) and allow webbing to completely dry before allowing them to retract back into the housing as this may affect locking mechanisms.
- Check any other parts of the securement system and accessories that may not be specifically indicated but are pertinent to a safe operational system.

PRODUCT SAFETY- NO MIXING of Products

- Products and systems have not been crash tested together and have not been "designed to function" together. This increases liability and decreases safety.
- Use only the same products together meaning use only automatic retractors (i.e. self-tensioning / self-locking) with automatic (same) retractors. Using an automatic retractor with a non-tensioning (manual) retractor does not work together as they function differently.
- Lap and shoulder belt systems may be designed differently and have different attachments (see below photo). This increases liability and decreases safety.
- Use only the "same" manufacturer's products together.

- Note: Below photo shows floor retractors with a pin connector button (used to attach lap belts) used with a lap belt "snap hook" that's attached to the securement hook (not proper usage).



All Products

- Meet and exceed all existing standards and regulations
- Product warranty: (See white manufacturers label on each part includes, product part number, description, and date)
- All warranty will be subject to inspection and preventive maintenance should be completed at scheduled service intervals.

ANNUAL INSPECTION CHECKLIST

Bus # _____ Date _____

1. The following items should be inspected and serviced during scheduled vehicle maintenance:
 - Inspect the retractors by pulling out the webbing to the maximum and allow it to rewind into the spool.
 - Inspect the retractors to ensure they are locking properly.
 - Inspect to ensure webbing is not cut, frayed, damaged, or contaminated with polishes, oils, or chemicals.
 - Inspect all metal parts to ensure they are not worn, cracked, or broken.
 - Inspect pin connector bushings to ensure they are not cracked, broken, or missing.
 - Inspect that all mounting hardware, such as bolts, nuts, etc. are secure.
 - Inspect floor anchorages to ensure cleanliness and proper securement.
 - Inspect aluminum track and hardware for any signs of corrosion.
 - Inspect track and/or anchorage fittings for proper operation.
 - Inspect fittings for cleanliness. Periodically it may be necessary to wash the fittings in a parts washing solution and lubricate with WD-40 or similar lubricant to ensure proper operation of the positive locking features.
 - Inspect shoulder belt anchorages for proper securement and operation.
 - Inspect lap and shoulder belt webbing to ensure it is not cut, frayed, damaged, or contaminated with polishes, oils /or chemicals.
 - Inspect buckles for damage and ensure proper operation.
 - Inspect male buckle pin connector bushing to ensure it is not cracked, broken, or missing.
 - Retractable lap and/or shoulder belts should have webbing pulled out to the maximum and allowed to rewind into the spool.
 - Lap and /or shoulder belt retractors are Emergency Locking Retractors [ELR] and should be checked by giving a quick jerk on the webbing to ensure the retractor is locking properly.
 - Clean webbing periodically, as needed, with mild soap and water. After cleaning, fully extend the belts and position them to prevent water from entering the retractors until completely dry.
 - Inspect any other parts of the securement system and accessories that may not be specifically indicated in this checklist, but pertinent to a safe operational system.
2. All deficiencies should be reported to your supervisor and items either repaired or replaced prior to the vehicle being returned to service.
3. Wheelchair tie-downs and occupant restraint systems [WTORS] including anchorages that are suspected to have been in use during an impact, from which the vehicle must be towed, should be replaced.

Discrepancies noted:

Corrective Action:

Corrected By:

Date:

Please retain this page for your records.

60 DAY INSPECTION CHECKLIST

Bus # _____ Date _____

1. The following items should be inspected and serviced during scheduled vehicle maintenance:
 - Inspect the retractors by pulling out the webbing to the maximum and allow it to rewind into the spool.
 - Inspect the retractors to ensure they are locking properly.
 - Inspect to ensure webbing is not cut, frayed, damaged, or contaminated with polishes, oils, or chemicals.
 - Inspect all metal parts to ensure they are not worn, cracked, or broken.
 - Inspect pin connector bushings to ensure they are not cracked, broken, or missing.
 - Inspect that all mounting hardware, such as bolts, nuts, etc. are secure.
 - Inspect floor anchorages to ensure cleanliness and proper securement.
 - Inspect aluminum track and hardware for any signs of corrosion.
 - Inspect track and/or anchorage fittings for proper operation.
 - Inspect fittings for cleanliness. Periodically it may be necessary to wash the fittings in a parts washing solution and lubricate with WD-40 or similar lubricant to ensure proper operation of the positive locking features.
 - Inspect shoulder belt anchorages for proper securement and operation.
 - Inspect lap and shoulder belt webbing to ensure it is not cut, frayed, damaged, or contaminated with polishes, oils /or chemicals.
 - Inspect buckles for damage and ensure proper operation.
 - Inspect male buckle pin connector bushing to ensure it is not cracked, broken, or missing.
 - Retractable lap and/or shoulder belts should have webbing pulled out to the maximum and allowed to rewind into the spool.
 - Lap and /or shoulder belt retractors are Emergency Locking Retractors [ELR] and should be checked by giving a quick jerk on the webbing to ensure the retractor is locking properly.
 - Clean webbing periodically, as needed, with mild soap and water. After cleaning, fully extend the belts and position them to prevent water from entering the retractors until completely dry.
 - Inspect any other parts of the securement system and accessories that may not be specifically indicated in this checklist, but pertinent to a safe operational system.
2. All deficiencies should be reported to your supervisor and items either repaired or replaced prior to the vehicle being returned to service.
3. Wheelchair tie-downs and occupant restraint systems [WTORS] including anchorages that are suspected to have been in use during an impact, from which the vehicle must be towed, should be replaced.

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