FLEET ASSET MANAGEMENT AND MAINTENANCE PLAN

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Table of Contents

PLAN GOALS AND OBJECTIVES

This plan presents the responsibilities and procedures followed by the Gunnison Valley Regional Transportation Authority (GVRTA) for ground transportation fleet maintenance. GVRTA strives to maintain its transit rolling stock in a manner that ensures the safety of the riding public. Plan procedures will assist GVRTA in achieving an effective and consistent level of maintenance performance, and to identify information necessary for asset acquisition and replacement planning.

Section 1: Agency, Service, and Fleet Overview

GVRTA Structure

GVRTA was formed in 2002 via a sales tax initiative to fund transportation and is supported by the City of Gunnison, Gunnison County and the Towns of Crested Butte and Mt. Crested Butte.

The goal of GVRTA is to provide a viable air service program to the Gunnison airport and to fund ground transportation in the Gunnison Valley.

GVRTA has no employees, but indirectly employs five (5) full time and twenty (20) part time positions.

For ground transportation, Alpine Express (AEX, Inc.) is the current service provider under contract through November 2025. All ground transportation service is within Gunnison County.

The sales tax to support GVRTA was reauthorized by the voters in 2008 with over 79% voting in favor of continuing the sales tax. The sales tax was also increased by the voters in 2015 and has no sunset.

Ground Transportation Service Description

GVRTA provides free, deviated fixed route, open-door general public transit service between Gunnison and Mt. Crested Butte by contracting with a private provider (currently Alpine Express). The service provided is one route, 34 miles in each direction, which circles the City of Gunnison before continuing north on Hwy 135 to the towns of Crested Butte and Mt. Crested Butte with a stop at the Crested Butte South subdivision. The route connects to the free Mountain Express transit service in both the towns of Crested Butte and Mt. Crested Butte. All buses are ADA accessible. Much of the ridership is generated by employees who live in Gunnison and work at the north end of the valley.

Service is provided seven days a week, 365 days per year. Service levels vary seasonally, operating 34 one-way trips daily in the winter, 22 one-way trips daily in the summer, and 16 one-way trips daily in the spring and fall seasons. Service hours are from 6:30 AM – 12:00 AM. The deviated fixed route system is 100% wheelchair and mobility aid accessible and all vehicles are lift-equipped. Buses will deviate from the route up to 3/4 mile in the City of Gunnison for passengers requesting the service as long as they are on a paved road with a place for the bus to access.

The number of one-way service trips GVRTA provides has varied significantly since the start of the service (2007) due to fluctuating economic conditions and sales tax revenue. To illustrate, 2008 one-way service trips provided were 5,650 but only 3,154 one-way service trips were provided in 2011. This reflects a significant decrease in sales tax revenue starting in 2010.

Since 2011 though, GVRTA has been able to grow service levels due to the economic recovery and increased sales tax rate. In 2015, GVRTA provided 5,657 one-way service trips and GVRTA will provide over 8,900 one-way service trips in 2017, which is a 282% increase from the lowest point of service provided in 2011.

As service levels increase, annual ridership is also anticipated to increase. 2013 ridership was 70,072 one-way trips; 2014 ridership was 89,836 one-way trips; 2015 ridership was 114,414 one-way trips; and 2016 ridership was 144,494 one-way trips. 2017 projected ridership is 175,000 trips.

Fleet Profile

Currently GVRTA has four 40-foot ADA accessible transit buses and three 45-foot ADA accessible commuter coaches in the daily service fleet. These vehicles can carry 45-57 ambulatory passengers and up to two (2) wheelchairs.

To start the ground transportation service, in 2007, GVRTA was provided a state funded grant (80% state share / 20% local share) to purchase four (4) Nabi/Bluebird model buses, which GVRTA is now slowly retiring out of the fleet. It should be noted that this model of bus is no longer produced.

A fifth bus was acquired in the fall of 2014 (purchased with local funds for $25,000) and was a used 2002 Nova bus. This bus was disposed of in the summer of 2017.

In 2016, GVRTA purchased two 45-foot commuter coaches from Motor Coach Industries (MCI). One bus purchase was funded with a Federal Transit Administration (FTA) Section 5311 grant from the Colorado Department of Transportation (CDOT) (80% state share / 20% local share) as a fleet expansion project and the other was purchased with 100% local funding.

In 2017, GVRTA purchased an additional 45-foot commuter coach from MCI (CNG fueled) with local and DOLA funding (for the CNG engine cost increase) as a replacement for the 2002 Nova bus. Also in 2017, GVRTA was awarded a FTA Section 5339 grant from CDOT to purchase a 45-foot CNG-fueled commuter coach from MCI as a replacement for one of the four Nabi/Bluebird buses. That order will be placed in early 2018 for receipt in the fall of next year.

One Nabi/Bluebird bus unit originally purchased in 2007 is currently out of service and being used for parts primarily to keep the others running until replacement, but still kept as part of the active fleet. This is the unit that will be replaced the FTA Section 5339 grant MCI order in 2018.

The Nabi/Bluebird buses and MCI coaches are used full time during peak winter service. The MCI commuter coaches (which have a higher ambulatory passenger capacity) were acquired to support the substantial increase in service GVRTA has provided since 2011 and to support the three remaining Nabi/Bluebird buses that are out for service regularly (on average one bus is down at least weekly for several days in a given week) due to severe maintenance issues.

Due to service demand and frequent major maintenance needs, GVRTA has no true “spare” vehicle in the service fleet and has a 0% spare ratio.

See **Appendix A** for a full vehicle roster and replacement schedule.

Fleet Maintenance

While GVRTA owns and retains title to all buses provided for ground transportation contract service, the service contractor is required to conduct all scheduled preventive maintenance and as needed repair. The contractual requirements for vehicle maintenance follow manufacturers' minimum requirements and vary based on the two types of vehicles in the fleet.

Alpine Express has one maintenance shop location in Gunnison with six staff members that maintain GVRTA vehicles, one lead mechanic, two maintenance technicians and three detail technicians.

The primary objectives of the service contractor on behalf of GVRTA include:

1. Maintaining all transit vehicle rolling stock in safe, clean, and efficient working condition;
2. Providing a preventative maintenance (PM) program with scheduled services for all types of rolling stock;
3. Documenting and maintaining organized records of all maintenance work performed; and
4. Supporting a well-trained maintenance work force proficient in most aspects of vehicle maintenance.

Federal, State and Local Vehicle Insurance and Disposal Requirements

Insurance

All GVRTA transit service vehicles are properly insured to meet CDOT insurance requirements per the FTA/CDOT grant agreement, Section 13. All state insurance requirements include liability coverage requirements per the Colorado Governmental Immunity Act, CRS §24-10-101, et seq.

Fleet Status Change / Total Loss

GVRTA must notify CDOT of service changes that may affect fleet use or performance. GVRTA must also notify CDOT if an active service fleet vehicle has been out of service for 90 consecutive calendar days due to maintenance or service issues.

If a FTA or State funded vehicle is either stolen or in an accident and deemed a total loss by the insurance company, GVRTA will notify appropriate CDOT staff. GVRTA will also file the appropriate insurance claims and the insurance company will determine the vehicle's fair market value at the time of incident. CDOT will be copied on all insurance claim documents as well as any subsequent correspondence between GVRTA and the insurance agent.

When an insurance settlement is received (either by CDOT if listed as loss payee and lien holder, or GVRTA), the funds will be returned to GVRTA to purchase a replacement vehicle, as required by CDOT. CDOT will determine the remaining proportionate federal/state and local share from the insurance proceeds and assign continuing federal/state interest based on that proportionate share.

GVRTA is to then request the damaged or loss vehicle's title from CDOT. Upon receipt of the replacement vehicle, CDOT must be listed as the lienholder on the title of the new vehicle for the remaining federal or state interest period defined.

FTA/State Funded Vehicle Disposal Procedures

For vehicles to be disposed of by GVRTA that have passed FTA and State defined minimum useful life requirements **(Appendix B),** GVRTA first contacts CDOT to notify appropriate staff that the vehicle(s) will be disposed of and to request a lien release of the title if this has not already occurred. GVRTA then advertises in various newspapers and online to post notice of the pending disposal of the vehicle(s). General information about the vehicle(s) is documented in the advertisement and additional information and inspection of the vehicle(s) is allowed upon request. Sealed bids are requested from interested parties by a specific date and time. Once the closing date and time for bid submission has passed, bids are opened and the vehicle awarded to the highest bidder.

CDOT and FTA are entitled to the remaining Federal and/or State interest proceeds of any disposed vehicle originally purchased with FTA or State grant funds with a sale price above $5,000. If above $5,000, FTA and CDOT are to be reimbursed the original grant contract defined proportionate federal/state share of either the fair market value or the net proceeds of the sale. Net proceeds are proceeds generated less any expense GVRTA has used to sell the vehicle, which includes any associated repairs required ahead of sale. GVRTA must be able to document any associated repair costs affecting the net proceeds above $500.

GVRTA is to issue a check to CDOT's Division of Transit and Rail for the pre-determined federal/state share of the disposition proceeds as soon as the funds have been received, allowing no more than 30 days to pass after the transaction has concluded.

The proportionate local share proceeds may be retained by GVRTA and must be used for transit related purposes. CDOT prefers the local share proceeds to be used as match for a future capital grant purchase. Vehicle sale proceeds that yield $5,000 or less do not require any proportionate payment back to CDOT or FTA. All sale proceeds, regardless of dollar amount, are to be recorded in COTRAMS with the vehicle's inventory disposition record.

GVRTA retains on file for a period of three years after disposition all advertisement notices, bid responses, and sales receipts.

Section 2: Maintenance Capacity, Fleet Condition, and Replacement Plan

Preventive Maintenance and Asset Management Capabilities

Maintenance and Storage Facilities, Equipment, and Staff

The contractor, Alpine Express, operates a bus only maintenance facility in Gunnison. The facility is a six-bay shop with 8,750 square feet and two industrial wheel lifts that are capable of lifting transit buses from the floor, enabling maintenance technicians to raise either the front or rear of the bus. Heavy-duty jack stands are used to compliment the wheel lifts if elevating the entire bus is necessary. The contractor also has a storage bay in the north end of the valley (Riverland) to store one bus inside.

Alpine Express performs all vehicle preventative maintenance required under contract with GVRTA in-house. Alpine Express maintenance staff dedicated to work on GVRTA buses includes six staff members, one lead mechanic, two maintenance technicians and three detail technicians.

The maintenance staff ensures that all vehicles are maintained according to the manufacturer recommended procedures documented in this plan and are required to comply with state, federal, safety, and EPA regulations.

Vehicle Maintenance

Every Alpine Express vehicle operator (driver) is responsible for performing a daily pre-and post-trip inspection of their assigned vehicle. Operators must fill out a daily vehicle inspection record (DVIR) and present any issues discovered during the inspection to the maintenance staff for correction. Issues encountered on route or during the required post trip inspection are reported on the DVIR and submitted to maintenance staff.

The maintenance staff is responsible for addressing any issues that are reported by vehicle operators on the DVIR, pulling vehicles from service, and updating the vehicle repair list accordingly. Vehicles on the repair list are logged by ID number and evaluated for scheduling of repairs and inspections.

A preventive maintenance program is followed requiring each vehicle in the fleet to be rotated through the shop for varying levels of inspection and service at regular intervals. All inspections and service intervals have been designed to meet or exceed manufacturers' requirements.

Vehicle Storage and Loss, Damage, and Theft Prevention

A minimum of three (3) GVRTA buses are stored inside overnight at the Gunnison maintenance facility and a minimum of one (1) GVRTA bus is stored inside overnight at the Riverland facility. Keys for all applicable parked buses are secured in a lockbox within the maintenance and/or storage facility.

Existing Fleet Age and Condition

According to useful life standards provided by the Federal Transit Administration (FTA), the fleet is considered large, heavy-duty transit buses with a maximum useful life of 12 years or 500,000 miles.

Currently the bus fleet averages six years in age (median age is 10 years old) and 230,000 miles in use. Of the seven (7) buses in the fleet, the four Nabi/Bluebird buses have required 12 combined engine rebuilds and two of those buses have required four engine rebuilds. Each engine rebuild lasts an average of

100,000 miles before failure and costs about $28,000 to complete. This trend is anticipated to continue for the remaining life span of these units.

In comparison to FTA useful life standards for the fleet type, (12 years and 500,000 miles), the fleet is in line with useful life standards, as GVRTA vehicles average at least 40,000 miles of use per year. FTA considers 41,700 miles per year proper usage based on a 12 year/500,000 useful life designation.

Unfortunately, while the age and mileage of the four Nabi/Bluebird buses would indicate a "fair" condition assessment at this stage of life, the three buses in service now are rated in "marginal" condition. This is primarily due to the service conditions the buses are used for. Using the buses at highway speeds in extreme winter weather conditions has caused premature failure of the following major components.

- As discussed above, engines. Engines are replaced at 100,000 mile intervals and last approximately 2.5 years. Cost to replace an engine is currently $28,000.

- Fuel injectors on the buses are replaced at roughly 80,000 -100,000 mile intervals. Most diesel engines require injector replacement at 100,000 - 200,000 miles. Cost to replace injectors is approximately $5,000-$6,000 per bus.

- Multiple turbo charger failure, with a cost of $2,000 each.

- Lift maintenance time and expense has been significant. The lifts are prone to collecting road grime, magnesium chloride, and dust due to their location. It has been extremely difficult to procure ordered parts from the ADA lift manufacturer in a timely fashion.

- Electrical wiring of the buses has also been extremely problematic. The manufacturer has never been able to provide accurate schematics for each bus. Some fuse box locations are not marked on wiring diagrams. Actual wire color used varies from bus to bus for the same systems. In the event of an electrical fault, the contractor often "reverse engineers" the affected system in order to repair it. As a result, there is a steep learning curve required for electrical troubleshooting that has added to maintenance costs and downtime.

In should be noted that Nabi/Bluebird parts are increasing difficult to locate in a timely manner or have been discontinued. While lights, windshields, switches, and most base electronic parts are easy to come by, parts such as power steering pumps, fan drive pumps/solenoids, windshield wiper motors, ADA cassette parts, radiators, and interior panels/bezels are very difficult, if not impossible to acquire.

*Vehicle years, mileage, engine hours, and condition ratings provided in **APPENDIX A**.

Vehicle Replacement and Acquisition Strategy

GVRTA uses age, mileage and condition as a basis for replacement.

For the age and mileage determinants, GVRTA uses FTA recommendations for vehicle age and mileage, which is every 12 years or 500,000 miles. As stated previously, FTA defines useful life as 12 years for large size, heavy-duty transit buses.

For the condition determinant, GVRTA uses FTA condition ratings and real time data based on maintenance costs. See **Appendix C** for the eight year comparison of maintenance and repair costs that helps determine condition.

The average condition of the majority of GVRTA's fleet is marginal, (Nabi/Bluebird buses) which is defined as defective or deteriorated components in need of replacement. GVRTA rates the condition of their vehicles based on the number of major bus maintenance issues documented in the fleet condition section of this document.

Based on the useful life and condition determinants, GVRTA has had to plan and seek financial assistance for replacement of buses slightly ahead of the 12-year useful life qualifier (scheduled for 2019) for the four Nabi/Bluebird buses currently in the fleet. Therefore, FTA Section 5339 funds were sought and received to replace one Nabi/Bluebird bus in 2018. Additional federal/state grant funds will be sought in 2017 to replace two more Nabi/Bluebird buses, with an expected delivery timeframe of 2019. The final Nabi/Bluebird bus replacement will be sought in 2018 (2019 calendar year grant funding) for delivery in 2020.

Given the tremendous amount of maintenance issues, cost, and downtime required to service the 2007 Nabi/Bluebird vehicles, along with ever increasing service levels required for winter peak service, GVRTA is changing the fleet acquisition strategy to include a 1) bus model change; 2) fuel change; and 3) an expansion of the fleet to allow for a spare ratio.

1. GVRTA will no longer purchase standard or low floor transit buses given the highway speeds and service requirements. Instead, all purchases for the fleet will be heavy duty, over the road commuter style coaches, which provide better quality components that hold up at highway speeds and increased passenger seating capacity.

2. Gunnison County has placed a strong emphasis on fuel economy and independence and is converting its fleet to Compressed Natural Gas (CNG) between 2016 and 2019. Therefore, the County has requested all RTA bus purchases from 2017 forward be CNG.

Funding and Procurement Strategy

GVRTA's budget is primarily earmarked to purchase service from a contractor. While GVRTA carries a reserve balance, this is predominantly available to fund emergency operating expenses and local match for capital grants. GVRTA does not normally carry a sizeable capital replacement reserve, although out of sheer necessity it should be noted that reserve funds are currently being prioritized to help with local match costs for bus purchases through 2020.

To fund the bulk of capital replacement purchases, the most likely funding sources available to assist are federal and state capital grants. Currently available are federal capital grants under Sections 5311: Formula Grants for Rural Areas and 5339: Bus and Bus Facilities federal grant programs and state capital grants under the FASTER program.

In pursuing FTA and State grant funding, GVRTA is aware there are extensive procurement procedures required to meet all federal and state requirements. In an effort to reduce staff effort, time and training, GVRTA joined a small purchasing consortium led by the Roaring Fork Transportation Authority (RFTA) to purchase 45 commuter coaches (awarded to MCI). RFTA is currently under contract with MCI, on behalf of the consortium, for the purchase of buses through the year 2020, which supports GVRTA's current replacement strategy highlighted in the previous section. The purchasing consortium procurement method and contracting process meets all FTA requirements and was approved by CDOT prior to finalizing.

Section 3: Fleet Maintenance Program

Vehicle Maintenance Staff Training

Consistent vehicle safety standards require all Alpine Express employees involved in vehicle maintenance to be appropriately trained. Mechanics, technicians and vehicle operators are instructed in the appropriate use and inspection of equipment required by their respective positions to ensure that vehicles are in a safe condition and all employees are able to work together to identify and correct maintenance issues as they arise.

Inspections and Preventative Maintenance (PM)

GVRTA and Alpine Express's preventive maintenance and inspection program is critical to keeping vehicles in a safe, reliable, and functioning condition. The activities of the PM and inspection program include:

- New bus delivery inspections;
- Annual DOT inspections;
- Bus operator pre-and post-trip inspections;
- ADA equipment preventive maintenance program;
- Periodic preventive maintenance inspection activities as recommended by the vehicle manufacturers and/or industry best practices for the operating environment; and
- Vehicle component, destination sign, and surveillance equipment inspections.

Vehicle and component manufacturers prepare manuals that recommend maintenance practices and instructions for inspection, troubleshooting, overhaul, and repair and replacement of components. These manuals also define specific service intervals. Alpine Express and GVRTA preventive maintenance inspections and services are designed to meet or exceed the minimum requirements recommended by the manufacturers, as services performed outside recommended guidelines may void warranty coverage and limit the useful service life of equipment.

*Manufacturers' PM Requirements are provided in **APPENDIX E**.

New Bus Delivery Inspections

All vehicles are inspected at the factory before delivery to GVRTA. Once on site, GVRTA must perform an additional inspection to verify:

- VIN, make, model, and manufacturer of vehicle;
- Visual check for any damage sustained en route, such as cracks and dents;
- Visual check of interior for any damage;
- Operational performance of all systems such as windshield wipers, mirror, lighting, driver controls, windows;
- Labeling for ADA;
- Lift operation; and
- Road test for braking, acceleration, and climate control.

Annual DOT Inspections

Each year a certified mechanic conducts an annual DOT safety inspection of every vehicle in the fleet as required by federal and Colorado state law. Per the contract requirements with GVRTA, Alpine Express is to perform the Annual Vehicle Inspection Report required by 49 CFR 396 every 15,000 miles of operation, or annually, whichever occurs first.

An inspection record is completed and signed by the Alpine Express maintenance staff as verification the vehicle has passed the inspection. The DOT safety inspection record and sticker are placed in the vehicle as evidence the inspection has occurred. The original hard copy of the DOT inspection report is filed in the vehicle maintenance file folder.

Pre/Post Trip Inspections

Alpine Express vehicle operators (bus driver) are thoroughly trained to perform vehicle pre-trip inspections, which they must complete each day before taking any bus on route. An Alpine Express vehicle operator arrives prior to the start of their shift to inspect their assigned vehicle and complete a Bus Driver's Vehicle Inspection Report (DVIR) documenting the process. Operators present any issues discovered during the pre-trip inspection to maintenance staff.

At the end of usage cycle for a bus, the vehicle operator performs a post-trip inspection that includes, but is not limited to, the following items:

- Ensure correct operation of interior switches and gauges.
- Remove from interior of bus loose trash and lost & found items.
- Ensure there is enough fuel for bus to complete next usage cycle.
- Perform exterior walk-around and check for:
    1. Tires with uneven wear, damage, or low pressure
    2. Fluid leaks
    3. Air leaks
    4. Cosmetic damage
    5. Inoperable lights

Alpine Express maintenance staff confirms any issues identified during the pre or post-trip inspection and classifies them as follows:

- Safety Defect – a defect in vehicle systems or ADA equipment that creates a safety-critical situation. Vehicle cannot be released until repairs are completed;
- Mechanical Defect – a defect that may worsen and threaten safety or increase cost of repairs. Vehicle cannot be released until repairs are completed;
- Elective Mechanical Defect – a defect that does not compromise safety and will not cause further damage if operated but needs to be corrected prior to next PM cycle. Vehicle is safe to operate but will be scheduled for as-needed repairs; or
- Elective Cosmetic Defect – a defect that does not compromise safety and will not cause further damage or cost as it is an aesthetic defect. Repairs may be scheduled as determined by the shop supervisor.

Vehicles with critical (Safety or Mechanical) defects that cannot be immediately corrected are removed from service and the operator is assigned another vehicle. Safety-related and mechanical defects are noted on the DVIR, whereas elective defects are noted on the Maintenance Request Form (MRF). Issues encountered on route or during the required post-trip inspection are also reported on the DVIR or MRF.

The white copy of the DVIR Report or MRF is submitted to maintenance staff at the end of each usage cycle.

The maintenance staff reviews and addresses any issues reported on the white copies of the DVIRs or MRFs on a daily basis. Vehicles with critical defects are removed from service and scheduled for required repairs. Once repairs are complete, the mechanic signs and dates the yellow copy of the DVIR. Once the repaired bus is reassigned, the operator confirms the issue is corrected and also signs and dates the yellow copy of the DVIR.

ADA Equipment Preventive Maintenance Program

As mandated by law, Alpine Express maintenance staff follow an ADA accessibility features PM program that checks items such as wheelchair lift, tie-downs, interlock, safety alarms, straps, barriers, P.A. system, and destination sign. The intent of this program is to assure that accessibility features are maintained to the specifications prescribed by the manufacturers. The maintenance of lifts is performed by certified technicians during the vehicles' regularly scheduled PM services in accordance with the manufacturer's recommendations. Daily safety checks are performed by Alpine Express vehicle operators and documented on the DVIR.

*Wheelchair manufacturers' PM inspection and service requirements are provided in **APPENDIX D**.

PM Inspection Types and Intervals

PM inspections are routinely performed on all vehicles, components, and equipment to detect and repair damage or wear conditions before a failure occurs and creates the potential for an in-service breakdown or accident.

The contractor is tasked with keeping written records of all maintenance procedures and inspections and copies are provided to GVRTA upon request and at the end of the contract term.

Per contractual guidelines with GVRTA, Alpine Express provides the following services for PMs of various vehicles and equipment.

2007 Nabi/Bluebird XCEL Transit Buses

Follow All Manufacturer recommendations and exceed as described below:

- Change oil, oil filters, and fuel filters every 7,500 miles;
- Change transmission fluid and filters every six months or 60,000 miles, whichever occurs first;
- Change air filters every six months;
- Replace light bulbs and lenses, wiper blades, and belts as necessary;
- Keep all fluids (washer, coolant, oil, transmission, and power steering) full as needed;
- Repair fluid or air leaks which take four hours or less in labor and $200.00 or less in cost of parts to repair;
- Replace heater fans as needed; and
- Perform other minor repairs that cost $200.00 or less in labor and parts.

2017 & 2018 MCI D4500 Diesel & CNG Coaches

The diesel coaches will be maintained according to the MCI D-Series Maintenance Manual schedule in **Appendix E** and the CNG coaches will be maintained according to the CNG version of the same manual.

Video Surveillance Systems

Systems are to be inspected monthly to ensure all cameras, wires, and recording devices are working properly.

Communications Devices (Radios and PA systems)

Systems are to be checked daily as part of the pre-trip inspection to ensure 2-way and PA communication systems are working properly. Repair is to be completed as necessary.

Scheduled and As-Needed Vehicle Repair

All major bus maintenance is the financial responsibility of GVRTA. GVRTA has the sole discretion to determine what repairs are to be made and who shall perform such repairs.

If GVRTA elects to have Alpine Express perform any such repairs, the contractor is paid its mechanic labor rate and the cost of parts. If the bus needs to be delivered to and/or retrieved from a location other than a contractor owned or leased facility for repair, the contractor is compensated at the rate of $50.00 per hour of driving time for the delivery and retrieval of the bus. If the bus needs to be delivered to and retrieved from a location outside of Gunnison County, in addition to the hourly rate specified above, the contractor is reimbursed the costs of any necessary driver transportation, meals, and lodging.

Repairs may be needed for the following reasons:

- Failures/defects found during pre-or post-trip inspections such as brake system, lighting/signal system, bad tires, or radio system;
- Failures/defects found during PM inspections such as cracks in structure, failures detected in lighting/signals, wheelchair lift, or suspension system;
- Vehicle in-service breakdown;
- Collision occurring during service operations; or
- Scheduled repairs/overhauls based on service intervals recommended by the vehicle manufacturer and/or industry best practices for the operating environment of the transit system, such as scheduled overhauls of the brake system, suspension system, steering system, or driveline system.

As-needed repairs are also required when a vehicle encounters a failure that is discovered between scheduled PM maintenance cycles. All safety-critical repairs must be performed before allowing any bus to enter passenger service. Safety-critical repairs may be noted in the remarks section of the DVIR. A driver may refuse an assigned vehicle or trade out a vehicle should they feel that the vehicle is unsafe or unsuitable for service. In the interest of public safety, all such requests will be handled immediately.

No vehicle shall be placed in service that:

- Fails to meet the minimum requirements of the Federal Motor Carrier Safety Regulations;
- Has a defect that would result in a breakdown;
- Has an operating condition that renders the vehicle unsuitable for service;
- Displays service indicator lights that may cause the vehicle to become inoperable; or
- Has a lack of cleanliness that may pose a safety or health risk to drivers and/or passengers.

Maintenance Activity Record Keeping

Alpine Express maintenance staff keep a record of the date inspections have been performed on vehicles as well as a list of ongoing repairs and maintenance issues. If reoccurring issues involving vehicle safety are observed and documented, staff can review vehicle records to determine the causal factors of the problem and adapt the maintenance program to address such issues across the fleet.

All transit vehicles have a complete file history that includes documentation of repairs, inspections, and other related vehicle maintenance activities, including:

- DVIRs noting defects;
- Records of annual DOT inspection forms; and
- Work-order records for repairs resulting from PM inspections.

Alpine Express creates and keeps a current maintenance file folder and maintenance history binder for each fleet vehicle, held for the entire life of the vehicle. Documents from the file folders are used to update the binders on an annual basis.

Vehicle records must be retained for at least three years beyond vehicle disposal.

Warranty Tracking and Claim Recovery

Pursuing warranty claims can limit maintenance costs by providing restitution for repairs covered by the manufacturer's warranty policy. Warranty policies vary in scope and the vehicle manufacturer, dealer or individual warranty providers are contacted by Alpine Express prior to repairing any components still covered under the policy.

The in-service date and mileage of each vehicle is recorded along with associated component warranty periods and contact information for warranty providers at time of vehicle delivery. Each time a repair order is generated, the vehicle age and mileage is checked against the applicable warranty period to determine if parts and/or labor may be covered. If repairs are covered, Alpine Express maintenance staff contacts the manufacturer, dealer or warranty provider for authorization. The warranty provider advises Alpine Express as to whether parts will be supplied and labor reimbursed for in-house repairs, or whether the vehicle must be taken to an authorized service center.

In the case that a vehicle must be taken off site, GVRTA and Alpine Express determine whether warranty coverage at an outside service center is cost-effective, or not. If the time and mileage cost of transporting a vehicle to a distant location is comparably excessive, Alpine Express may choose to complete the repairs in-house and not seek warranty reimbursement for that specific repair or part. In such a situation, care is taken to ensure that performing such in-house repair does not void the warranty entirely.

Vehicle Operations Safety and Cleaning Program

Each bus is cleaned at regular intervals or more frequent, as necessary. Detail Technicians are responsible for cleaning each bus either before or after the usage cycle. Detail Technicians follow a checklist of inspection and maintenance items during each bus cleaning, assisting operators and the maintenance department by identifying and reporting any issues that arise before or after each usage cycle.

The duties required during bus cleaning include:

- Wash vehicle exterior;
- Sweep or vacuum seats, shampoo as necessary;
- Sweep & mop floor;
- Clean all interior windows;
- Clean driver area (seat, dash, gauges, windshield, steering wheel, side panel, switches);
- Clean grab rails and stanchions;
- Check for trash in seat areas;
- Check for lost and found;
- Verify DEF level and fill, as necessary;
- Check oil, coolant, power steering, and transmission fluid;
- Check tire pressure;
- Check fire extinguisher; and
- Check safety equipment such as first aid and body fluid kit.

Operational or repair issues noted during cleaning and inspection procedures are submitted to the maintenance staff for evaluation and repair scheduling.

Appendix A: Vehicle Roster and Replacement Schedule

Capital Management and Maintenance Plan Appendix A: Fleet Roster and Replacement Schedule

Last updated 12/15/17

Bus ID	VIN	Year	Vehicle Age	Make	Model	Fuel	Ambulatory Seats	Wheelchair Positions	Mileage*	Engine Miles*	Current Engine Rebuild Date	Status in Service	Condition	CDOT Condition Rating	Life Expect.	Earliest Repl.	Desired Repl.	Notes
81	1BAGNGXA67F255067	2007	10	NABI/Bluebird	XCEL 102	Diesel	45	2	365,266	740	Sep-17	FT	Marginal	3	12	2019	2020	New Engine 9/17 (3 rebuilds)
82	1BAGNBXA87F255068	2007	10	NABI/Bluebird	XCEL 102	Diesel	45	2	305,380	92,589	Jan-14	Spare	Failure*	1	12	2019	2018	sed as a Parts Bus with CDOT permission
83	1BAGNBXA77F255069	2007	10	NABI/Bluebird	XCEL 102	Diesel	45	2	369,009	32,451	Nov-16	FT	Marginal	3	12	2019	2019	New Engine 11/16 (4 rebuilds)
84	1BAGNBXA67F255070	2007	10	NABI/Bluebird	XCEL 102	Diesel	45	2	330,304	111,567	Apr-15	FT	Marginal	3	12	2019	2019	New Engine 4/15 (4 rebuilds)
87	1M8PDMBA7HPO14322	2017	1	MCI	D4500	Diesel	57	2	118,906	118,906	N/A	FT	Excellent	5	12	2029	2029	
88	1M8PDMBA9HPO14323	2017	1	MCI	D4500	Diesel	57	2	114,889	114,889	N/A	FT	Excellent	5	12	2029	2029	
89	1M8PDM3AXHP014569	2017	1	MCI	D4500	CNG	57	2	5,975	5,975	N/A	FT	Excellent	5	12	2029	2029	
* Mileage as of 11/1/17			#########	Average Life in years					229,961	Average Life in miles								

Retired Buses

Bus ID	VIN	Year	Make	Model	Fuel	Ambulatory Seats	Wheelchair Positions	Month Retired
86	4RKEWTGA82R835629	2002	NOVA	Transit Bus	Diesel	45	2	Jul-17

Five Year Capital Plan	2017	2018	2019	2020	2021
Revenues					
Local Funds	$ 615,159	$ 382,800	$ 418,600	$ 276,200	$ 125,000
Grant Revenues	$ 170,000	$ 571,200	$ 1,174,400	$ 604,800	$ -
Total Revenues	$ 785,159	$ 954,000	$ 1,593,000	$ 881,000	$ 125,000
Planned Capital Expenditures					
Bus # for Replacement:	86	82	83 & 84	81	
Bus Replacement	$ 695,159	$ 714,000	$ 1,468,000	$ 756,000	$ -
Bus Stop Improvements	$ -	$ 240,000	$ 125,000	$ 125,000	$ 125,000
Total Expenditures	$ 695,159	$ 954,000	$ 1,593,000	$ 881,000	$ 125,000

Appendix B: FTA and CDOT Useful Life Requirements

The following table defines the useful life of several typical FTA-funded items based on FTA Circular 5010 1.E. For items not listed by FTA, useful life definitions may be obtained from other reasonable sources, including the Department of Defense (DOD) and Internal Revenue Service (IRS), based on acceptable accounting principles. It should be noted that the Altoona bus test reports for individual bus models do not define the useful life of rolling stock.

Vehicle	FTA-Defined Useful Life
35'-40' heavy duty bus and articulated transit buses	12 years or 500,000 miles
30' heavy duty transit bus	10 years or 350,000 miles
30' medium-duty transit bus	7 years or 200,000 miles
25'-35' light duty transit bus (body on chassis vehicles)	5 years or 150,000 miles
Other vehicles (small buses, vans, sedans)	4 years or 100,000 miles
Rail vehicles	25 years
Fixed guideway steel-wheeled trolley	25 years
Fixed guideway electric trolleybus	15 years
Passenger ferry	25 years
Other ferries without refurbishment	30 years
Other ferries with refurbishment	60 years
Note: A heavy duty transit bus is built as a bus whereas a medium duty bus is built on a truck chassis.	

TABLE 1: VEHICLE MINIMUM USEFUL LIFE STANDARDS

CDOT Category	Length	Approx. Weight	Price Range	Useful Life Minimum
Heavy-Duty Large Bus 	35-48 feet	26,000-40,000 lbs.	$400,000-$575,000	12 years or 500,000 miles
Heavy-Duty Small Bus 	30 feet	26,000-33,000 lbs.	$230,000-$375,000	10 years or 350,000 miles
Medium-Duty and Purpose-Built Bus 	30 feet	16,000-26,000 lbs.	$85,000-$200,000	7 years or 200,000 miles
Light-Duty Mid-Sized Bus (Cutaway van chassis with dual rear wheels) 	25-35 feet	10,000-16,000 lbs.	$60,000-$75,000	5 years or 150,000 miles
Light-Duty Vehicles 	8-16 feet	6,000-14,000 lbs.	$20,000-$65,000	4 years or 100,000 miles
Vehicle Rebuild: A recondition near the end of useful life that results in additional useful life.				Case-by-case basis. Generally a minimum of 50,000 miles

Appendix C: Eight Year Maintenance Budget Comparison

Appendix C: GVRTA Eight Year Maintenance Budget vs Actual

	Budget	Acutal	
2010	$ 40,000	$ 26,320	
2011	$ 80,000	$ 67,839	
2012	$ 80,240	$ 69,932	
2013	$ 84,707	$ 33,171	
2014	$ 90,530	$ 104,127	
2015	$ 104,378	$ 110,393	
2016	$ 160,000	$ 209,464	
2017	$ 220,000	$ 132,000	*estimate ($114,116 through October)

Repairs Per Bus - Last Three Years:

	Diesel 2007 NABI #81	Diesel 2007 NABI #82	Diesel 2007 NABI #83	Diesel 2007 NABI #84	Diesel 2002 Nova #86	Diesel 2017 MCI #87	Diesel 2017 MCI #88	CNG 2017 MCI #89	All Vehicles	Total	
					retired summer 17			in service 11/17			
2015	$ 16,311	$ 13,813	$ 30,718	$ 31,339	$ 17,605				$ 606	$ 110,393	
2016	$ 38,695	$ 17,943	$ 70,066	$ 46,883	$ 6,771	$ 111	$ -		$ 28,995	$ 209,464	
2017	$ 44,016	retired	$ 8,384	$ 20,712	$ 2,347	$ 6,275	$ 16,822		$ 15,560	$ 114,116	*through Oct.
Total	$ 99,022	$ 31,756	$ 109,168	$ 98,934	$ 26,723	$ 6,386	$ 16,822	$ -			

Miles Per Bus - Last Three Years:

	Diesel 2007 NABI #81	Diesel 2007 NABI #82	Diesel 2007 NABI #83	Diesel 2007 NABI #84	Diesel 2002 Nova #86	Diesel 2017 MCI #87	Diesel 2017 MCI #88	CNG 2017 MCI #89	Total	
					retired summer 17			in service 11/17		
2015	44,376	33,145	46,467	44,205	16,968				185,161	
2016	51,138	48,630	44,881	66,902	22,761	25,896	22,242		282,450	
2017	25,133	retired	26,426	21,022	3,761	91,599	91,276		259,217	*through Oct.
Total	120,647	81,775	117,774	132,129	43,490	117,495	113,518	-		

Maintenance Cost Per Mile - Last Three Years:

	Diesel 2007 NABI #81	Diesel 2007 NABI #82	Diesel 2007 NABI #83	Diesel 2007 NABI #84	Diesel 2002 Nova #86	Diesel 2017 MCI #87	Diesel 2017 MCI #88	CNG 2017 MCI #89	Total	
					retired summer 17			in service 11/17		
2015	$ 0.37	$ 0.42	$ 0.66	$ 0.71	$ 1.04				$ 0.60	
2016	$ 0.76	$ 0.37	$ 1.56	$ 0.70	$ 0.30	$ 0.00	$ -		$ 0.74	
2017	$ 1.75	retired	$ 0.32	$ 0.99	$ 0.62	$ 0.07	$ 0.18		$ 0.44	*through Oct.
Total	$ 2.88	$ 0.79	$ 2.54	$ 2.39	$ 1.96	$ 0.07	$ 0.18			

*In the first 10 months of 2017, we have run 71% of our miles on the new MCI coaches and 28% on the NABI buses.

*During that time, the NABI buses have made up 64% of our maintenance costs while the MCI coaches have made up only 20%.

Appendix D: Ricon Wheelchair Lift PM Requirements

III. MAINTENANCE AND REPAIR

Regular maintenance of the RICON Titanium S-Series and K-Series Public Use wheelchair lift will help optimize its performance and reduce the need for repairs. This chapter contains cleaning and lubrication instructions, maintenance schedule, troubleshooting section, and maintenance diagrams.

⚠ CAUTION

This Ricon product is highly specialized. Maintenance and repairs must be performed by a Ricon dealer or qualified service technician using Ricon replacement parts. Modifying or failing to properly maintain this product will void warranty and may result in unsafe operating conditions.

A. LUBRICATION

⚠ CAUTION

Do not lubricate motor or other electrical components. Lubrication of electrical components may create unintentional short circuits.

Lubrication should be performed at least every six months, or sooner depending on usage. Refer to **Figure 3-1** and the following Maintenance Schedule. Lubricate lift at points specified.

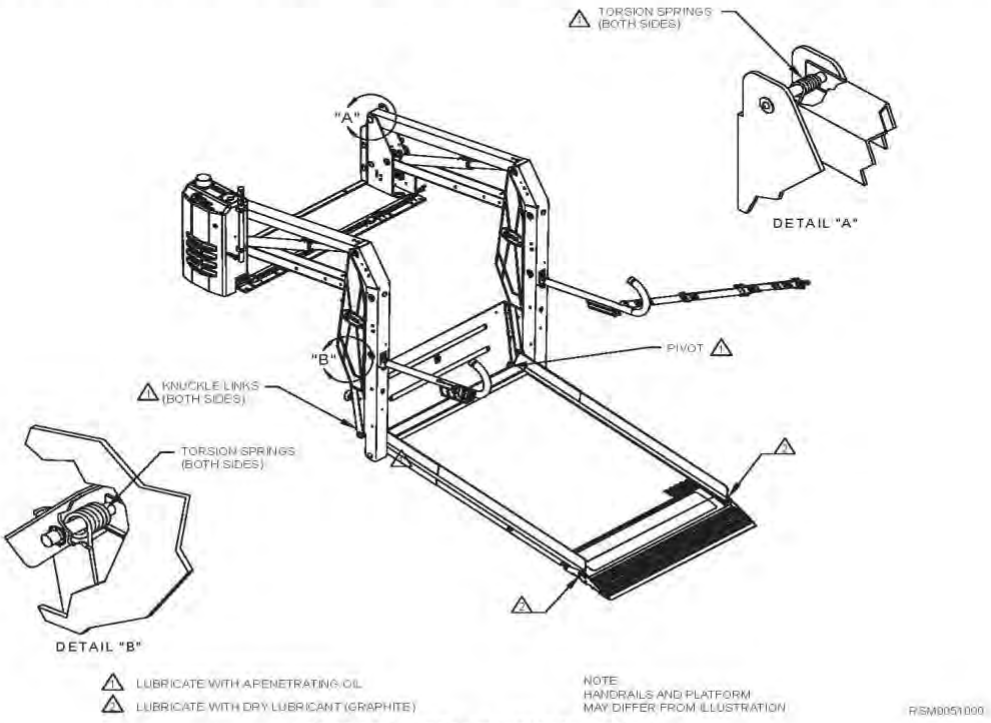

FIGURE 3-1: LIFT LUBRICATION POINTS

B. CLEANING

Regular cleaning with mild soap (i.e. dish soap, car wash liquid) and drying thoroughly will protect lift painted surfaces. Cleaning is especially important in areas where roads are salted in winter. Make sure that lift pivot points remain clear and clean prior to lubrication.

C. MAINTENANCE SCHEDULE

Under normal operating conditions, maintenance inspections are required at least every six months (1750 cycles) and a thorough inspection should be performed at service intervals referenced in **Table 3-1**. Service should be increased under conditions of heavier use (more than 10 cycles per day).

TABLE 3-1: MAINTENANCE SCHEDULE

SERVICE POINT	ACTION TO PERFORM
10 CYCLES	
Overall condition	Listen for abnormal noises as lift operates (i.e. grinding or binding noises.)
Control pendant	Verify that control pendant is undamaged and cable connector is tight.
Threshold warning system	Verify that system properly detects objects in threshold area and actuates the audible alarm.
Bridgeplate load sensor	Verify that sensor inhibits downward movement of platform when a weight is present on lowered bridgeplate.
150 CYCLES	
Electrical wiring	Inspect electrical wiring for frayed wires, loose connectors, etc.
Vehicle interlock	Place vehicle in non-interlock mode and verify that lift does not operate.
Decals	Verify that lift decals are properly affixed, clearly visible, and legible. Replace, if necessary.
Armrests	Verify that armrest fasteners are properly tightened.
Lift mounting points	▪ Verify that vehicle mounting and support points are undamaged. ▪ Verify that mounting bolts are sufficiently tight and free of corrosion.
Main lifting pivots	Verify that link pins on arms are properly installed, free from damage, and locked in position.
Platform pivot points	Verify that platform moves freely, without binding, and does not wobble.
Bridgeplate	▪ Verify that bridgeplate operates without binding during lift functions. ▪ Verify that bridgeplate deploys fully when platform stops at floor level. ▪ Verify bridgeplate rests flat against baseplate.
Front rollstop	▪ Verify that rollstop is opened completely when platform is at ground level. ▪ Verify that rollstop closes and locks when platform leaves ground.
Hydraulic power unit	**⚠ CAUTION**
	Check and add fluid when platform is at ground level. Fluid that is added when platform is raised will overflow when platform is lowered.
	▪ Verify that pump hydraulic fluid level is at FULL mark when platform is at ground level. Add Texaco 01554 Aircraft Hydraulic Oil or equivalent U.S. mil spec H5606G fluid. ▪ Verify there are no hydraulic fluid leaks. ▪ Verify that manual backup pump operates properly.
1800 CYCLES	
Cleaning and lubrication	1. Clean lift with mild soap and water and wipe dry. Prevent rust by coating all surfaces with a light weight oil. Remove excess oil. 2. Spray penetrating oil (Curtisol® Red Grease 88167 or WD-40®) where specified following directions on container. Remove excess grease from surrounding areas.
⚠ CAUTION	
A Ricon dealer or qualified service technician must perform the following safety check.	
3600 CYCLES	
Hydraulic cylinder, hoses and fittings	▪ Check hydraulic cylinder for evidence of leaks. ▪ Inspect hydraulic hoses for damage. ▪ Verify that all fittings are tight.
END OF TABLE	

Appendix E: MCI PM Requirements

GENERAL DESCRIPTION

This section will discuss the specific lubrication requirements for most of the coach components. Several different schedules are provided in this section for reference. However, intervals specified may not be appropriate for all applications.

The LUBRICATION SCHEDULE is provided as a minimum requirement guide for most lubricated components. A location key chart is included to give approximate location of service points. Where cleaning, removal, or disassembly are required for lubrication purposes, procedures will be found in the applicable sections of this maintenance manual.

A PREVENTIVE MAINTENANCE SCHEDULE is also included at the end of this section. It includes most lubrication, cleaning, and inspection intervals required for coach components.

High lube maintenance items, such as engine crankcase oil, transmission fluid, and other components shown in the INSPECTION SCHEDULE should be checked daily or before the start of each run. Add oil as needed to bring the level to the Full mark on the dipstick.

The DAILY CHECKLIST at the end of the section should serve as the final guide before putting the coach into service.

PREVENTIVE MAINTENANCE SCHEDULE

The following preventive maintenance schedule is a compilation of suggested maintenance operations contained in this maintenance manual.

Service intervals may be given as regular intervals (Reg. Int.) months and/or miles. Regular intervals must be determined by shop personnel based on operating conditions, component failure history, and previous experience. In cases when both time (in months) and miles (in thousands) are given for a particular operation, maintenance should be performed at whichever interval first occurs.

PROBALIZERS

The coach is equipped with both an engine and transmission oil probalizer. To pull an oil sample, push the hose of the hose/bottle sampler onto the probalizer valve until the bottle is full (approximately one pint). Check the oil level to ensure the transmission or engine oil is still at the proper level; add oil if necessary.

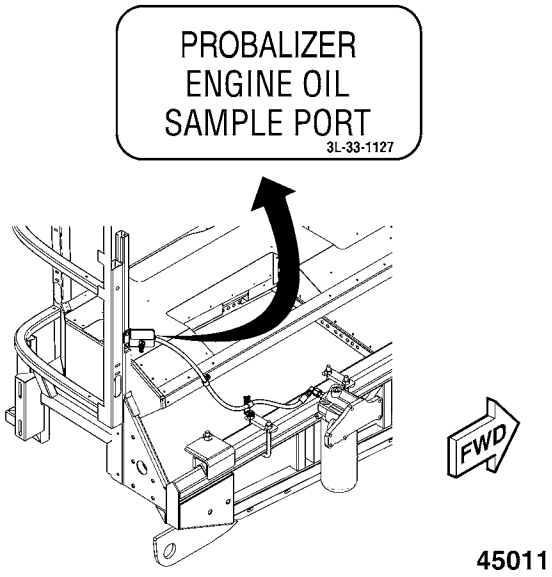

Figure 1. Engine Oil Probalizer

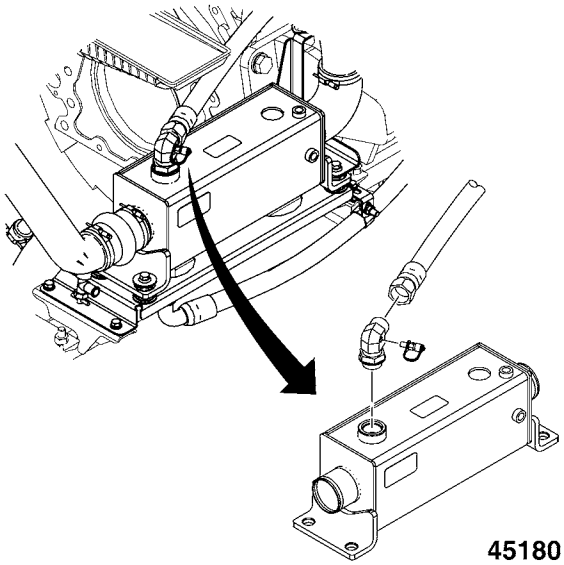

Figure 2. Transmission Oil Probalizer

1-FRONT AXLE Maintenance Operation	Location Key	Months	Service Interval (Miles)										Specification Code
			Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	
LUBRICATE FRONT AXLE KING PINS & BUSHINGS	24							■					S-16
LUBRICATE FRONT AXLE TIE RODS	25							■					S-16
LUBRICATE FRONT AXLE STEERING ARM	21							■					S-16
LUBRICATE FRONT AXLE SWAY BAR BUSHINGS	22							■					S-16
PERFORM FRONT AXLE INSPECTION			■						■				
CHECK FRONT AXLE WHEEL ALIGNMENT			■										
CHECK FRONT AXLE KING PIN PLAY – REMOVE WEIGHT FROM THE AXLE								■					
INSPECT RADIUS ROD BUSHINGS – REPLACE IF REQUIRED								■					

2-DRIVE AND TAG AXLES Maintenance Operation	Location Key	Months	Service Interval (Miles)										Specification Code
			Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	
CHECK DIFFERENTIAL OIL LEVEL	26		■				■						S-12
CHANGE BREAK-IN DIFFERENTIAL OIL	26			■									S-12
CHANGE DIFFERENTIAL OIL (SYNTHETIC)	26											■	S-12
LUBRICATE TAG AXLE TIE RODS								■					S-16
LUBRICATE TAG AXLE KNG PINS								■					S-16
INSPECT DRIVE AXLE			■	■					■				
CHECK AND ADJUST TOE-IN IF REQUIRED					■								
INSPECT TAG AXLE	27		■										
CHECK TAG AXLE KING PIN PLAY – REMOVE WEIGHT FROM THE AXLE								■					

3-BODY Maintenance Operation	Location Key	Months	Service Interval (Miles)										Specification Code
			Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	
LUBRICATE FRONT BUMPER HINGES	14						■						S-16
LUBRICATE BAGGAGE DOOR LATCHES	2				■								S-31
LUBRICATE SERVICE AND BAGGAGE DOOR HINGES	2						■						S-18

3-BODY Maintenance Operation	Location Key	Months	Service Interval (Miles)										Specification Code
			Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	
LUBRICATE ENTRANCE DOOR LATCH MECHANISM	1				■								S-31
LUBRICATE ENTRANCE DOOR HINGES	1			■									S-16
LUBRICATE ENTRANCE DOOR CYLINDER ROD ENDS	1			■									S-16
LUBRICATE FRONT BUMPER LATCH	14				■								S-31
LUBRICATE FUEL DOOR LATCH AND HINGE	3				■								S-31
LUBRICATE DEF DOOR LATCH AND HINGE	5				■								S-31
LUBRICATE ENGINE RH AND LH SIDE SERVICE DOORS	8				■								S-31
LUBRICATE ENGINE UPPER AND LOWER DOORS AND HINGES	13				■								S-31
LUBRICATE EXTERIOR REARVIEW MIRRORS	17			■									S-21
LUBRICATE ENTRANCE DOOR MECHANISM	1			■									S-17
LUBRICATE CONDENSER DOOR HINGES	10						■						S-31
LUBRICATE WHEELCHAIR CASSETTE DOOR	6						■						S-31
INSPECT WINDSHIELD WIPERS	16		■	■									
CLEAN THE FILTER BOWL AND REPLACE THE ELEMENT ON THE SLIDING DOOR	7	6	■		■								
CHECK OPERATION OF WINDSHIELD WASHERS				■									
CHECK REAR VIEW MIRRORS				■									
INSPECT DRIVER'S SEAT OPERATION				■									
INSPECT DRIVER'S SEAT BELT OPERATION				■									
INSPECT BODY FOR DAMAGE AND RECORD				■									
INSPECT EXTERIOR & UNDERBODY FOR CORROSION – Before and after every winter season				■									
INSPECT ENTRANCE DOOR OPERATION				■									
INSPECT WHEELCHAIR PASSENGER DOOR OPERATION				■									
INSPECT BAGGAGE AND SERVICE COMPARTMENT DOOR				■									
VERIFY THAT SPARE TIRE IS SECURE				■									
INSPECT WHEELCHAIR ACCESS DOOR FRAMELESS WINDOW				■									
PERFORM EMERGENCY WINDOW PUSH-OUT TEST				■									
PERFORM EMERGENCY ROOF ESCAPE TEST				■									
INSPECT ALL GLASS AND REPLACE IF DAMAGED				■									
INSPECT AND RECLINE ALL PASSENGER SEATS				■									
INSPECT AND RAISE ALL FOOTRESTS				■									
INSPECT PARCEL RACK DOORS AND RETAINING CORDS				■									
INSPECT ALL VISIBLE FASTENERS				■									
INSPECT ALL PULLEYS FOR PLAY				■									

4-BRAKES & AIR SYSTEM Maintenance Operation	Location Key	Months	Service Interval (Miles)										Specification Code
			Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	
CLEAN AND LUBRICATE PARK BRAKE (PUSH/PULL) VALVE									■				S-26
CLEAN AND LUBRICATE EMERGENCY RELEASE VALVE									■				S-26
CLEAN AND LUBRICATE SYNCHRO VALVE									■				S-26
CLEAN AND LUBRICATE DUAL BRAKE VALVE									■				S-26
CLEAN AND LUBRICATE PRESSURE PROTECTION VALVE									■				S-26
CLEAN AND LUBRICATE SPRING BRAKE VALVE									■				S-26
CLEAN AND LUBRICATE PARKING BRAKE CONTROL VALVE									■				S-26
REPLACE AIR DRYER DESICCANT CARTRIDGE	38	12					■						
INSPECT AIR RESERVOIR, VALVES, SWITCHES, AND LINES				■									
INSPECT AIR DRYER DESICCANT CARTRIDGE AND PURGE VALVE						■							
CHECK AIR COMPRESSOR INTAKE				■									
DRAIN PURGE TANK		W	■										
ENSURE AIR DRYER PURGES WHEN COMPRESSOR UNLOADS		W	■										
INSPECT BRAKE COMPONENT FASTENERS		W	■										
REPLACE FILTER ELEMENT		12								■			
PERFORM OPERATION AND LEAKAGE TEST				■									
INSPECT ALL BRAKE CHAMBERS									■				
CLEAN AND INSPECT ALL BRAKE AND RELAY VALVES									■				
PERFORM OPERATIONAL AND LEAKAGE TEST ON THE RELAY VALVE, DOUBLE CHECK VALVE, AND THE PRESSURE PROTECTION VALVE		W						■					
LUBRICATE BRAKE ASSEMBLY			■										
INSPECT THE OPERATION OF THE BRAKE LIGHT SWITCHES AND THE LOW AIR PRESSURE SWITCH			■							■			
CLEAN AND INSPECT COMPRESSOR AND GOVERNOR		6				■							
CLEAN AND LUBRICATE ALL AIR CYLINDERS		24						■					
PERFORM GOVERNOR OPERATING TEST AND LEAKAGE TEST									■				
INSPECT FLOW IN ALL EXTERNAL OIL SUPPLY AND RETURN LINES FOR KINKS, BENDS, OR RESTRICTIONS									■				
INSPECT THE CLEVIS POSITION									■				

4-BRAKES & AIR SYSTEM Maintenance Operation	Location Key	Months	Service Interval (Miles)										Specification Code
			Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	
CLEAN AND LUBRICATE INVERSION VALVES		24							■				
CHECK COMPRESSOR INTAKE TUBES AND ADAPTERS				■									
PERFORM A THOROUGH INSPECTION OF THE COMPRESSOR										■			
CLEAN AND INSPECT PARK BRAKE CONTROL VALVE								■					
PERFORM AN OPERATIONAL AND LEAKAGE TEST ON THE QUICK-RELEASE VALVE, AND THE TAG AXLE UNLOADING VALVES		12	■						■				
REBUILD OR REPLACE BRAKE VALVE, QUICK RELEASE VALVE, RELAY VALVES, INVERSION VALVES, PRESSURE PROTECTION VALVES, DOUBLE CHECK VALVES, PRESSURE REGULATOR VALVE, SKINNER VALVES		12	■							■			
DISASSEMBLE, CLEAN, AND INSPECT IN-LINE FILTERS			■	■									
VISUALLY CHECK, CLEAN ALL PARTS OF THE DUAL BRAKE VALVE			■			■							
INSPECT, CLEAN, AND REPLACE ALL RUBBER PARTS AND WORN METAL PARTS OF THE DUAL BRAKE		12	■						■				
INSPECT SPRING BRAKE									■				
DISASSEMBLE, CLEAN, AND REPLACE RUBBER PARTS AND WORN METAL PARTS ON THE DOUBLE CHECK VALVE, SYNCHRO VALVE, PRESSURE PROTECTION VALVE, AND THE RELAY VALVE										■			
INSPECT SERVICE CHAMBERS		12	■							■			
PERFORM AIR SYSTEM LEAK TEST						■							
CLEAN AND INSPECT FOR PROPER PEDAL AND LINKAGE ADJUSTMENT			■			■							
LUBRICATE PEDAL AND LINKAGE ASSEMBLY			■			■							S-16
REBUILD OR REPLACE AIR COMPRESSOR												■	
INSPECT WHEEL SENSORS		3				■							
CLEAN AND CHECK AIR HORNS				■									
INSPECT AND REPLACE (IF NECESSARY) THE TAG AXLE CASTER CONROL VALVE								■					
PERFORM OPERATIONS AND LEAKAGE TESTS ON THE MODULATOR VALVES				■									
PERFORM OPERATION AND LEAKAGE TEST ON THE ABS SYSTEM COMPONENTS		12								■			

6-COOLING SYSTEM Maintenance Operation	Location Key	Months	Service Interval (Miles) Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	Specification Code
CHECK COOLANT LEVEL, ADD COOLANT IF NEEDED	37	D	■										S-30
CHANGE COOLANT FILTER		6	■	■									
DRAIN, CLEAN, AND FILL THE COOLING SYSTEM											■		S-30
INSPECT CAC INLET, OUTLET, AIR SEALS, MOUNTS, AND FASTENERS				■									
INSPECT THE LINNIG FAN CLUTCH						■							
REPLACE THE LINNIG FAN CLUTCH											■		
LUBRICATE THE PIVOT PIN							■						
REMOVE, CLEAN, AND TEST THE CAC										■			
CHECK THE THERMOSTAT AND HOUSING SEALS												■	
INSPECT AND REPAIR ALL FLUID LEAKS		D	■	■									
INSPECT WATER PUMP OPERATION					■								
TEST ANTIFREEZE		6	■										

7-ELECTRICAL SYSTEM Maintenance Operation	Location Key	Months	Service Interval (Miles) Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	Specification Code
CLEAN BATTERY CONNECTIONS	4		■	■									S-32
CHECK BATTERY ELECTROLYTE				■									
BATTERY TRAY, LATCH AND HANDLE	4						■						
INSPECT STARTER AND ALTERNATOR			■	■									
INSPECT STARTER CABLE				■									
TEST ALTERNATOR OUTPUT			■	■									
CHECK VOLTAGE SETTING AND RECORD				■									
INSPECT AND REPAIR ALL EXTERIOR, INTERIOR, BAGGAGE BAY, AND SERVICE COMPARTMENT LIGHTS				■									
INSPECT ALL VISIBLE HARNESS CONNECTORS AND JUNCTIONS				■									

8-ENGINE Refer to OEM Maintenance Manual for intervals and Requirements Maintenance Operation	Location Key	Months	Service Interval (Miles)										Specification Code
			Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	
TAKE OIL SAMPLE AND PERFORM OIL ANALYSIS	31			■									S-6
CHECK DIESEL EXHAUST FLUID (DEF) LEVEL	36	D	■										
CHECK ENGINE OIL LEVEL	31	D	■										S-6
CHANGE ENGINE OIL AND OIL FILTER	31	6		■									S-6
CLEAN OR REPLACE DIESEL PARTICULATE FILTER	32										■		
REPLACE DIESEL EXHAUST FLUID FILTER (DEF)	36										■		
CLEAN BLUE DEF TANK CAP	36				■								
INSPECT TURBOCHARGER			■										
INSPECT EXHAUST SYSTEM, INSULATION, AND ADJACENT COMPONENTS FOR SOOT AND HEAT RELATED DAMAGE				■									
CHECK OIL TEMPERATURE AGAINST COOLANT TEMPERATURE						■							
INSPECT RUBBER ENGINE MOUNTS		24							■				
RECORD ENGINE OIL PRESSURE AT IDLE AND FULL FUEL				■									
REPLACE ALL DRIVE BELTS										■			
INSPECT ALTERNATOR AND A/C COMPRESSOR BELTS		D	■	■									
PRINT ENGINE DATA FROM ECM				■									
INSPECT ENGINE FOR UNUSUAL NOISE AND BLOW-BY				■									
STEAM CLEAN ENGINE COMPARTMENT				■									
CHECK ENGINE OIL COOLER FOR LEAKS						■							
PERFORM VALVE ADJUSTMENT		24						■					
REPLACE AMEREX CONTROL BATTERY (or if Backup Battery Trouble is indicated on the System Service LED)		24											

NOTE: Refer to the engine manufacturer's specific requirements and conditions.

Values shown are specific to Cummins ISX 12 L engine.

9-FUEL SYSTEM Maintenance Operation	Location Key	Months	Service Interval (Miles)										Specification Code
			Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	
REPLACE SECONDARY FUEL FILTER	31		■		■								
DRAIN PRIMARY FUEL FILTER		W	■										
REPLACE PRIMARY FUEL FILTER			■										
DRAIN SECONDARY FUEL FILTER	31		■										
CHECK AIR FILTER RESTRICTION INDICATOR (REPLACE FILTER IF REQUIRED)	33	D		■									
INSPECT PEDAL ASSEMBLY FOR WEAR OR DAMAGE	20								■				
INSPECT AIR CLEANER ASSEMBLY				■									
INSPECT FUEL GAUGE AND LOW FUEL LIGHT				■									
INSPECT FUEL SYSTEM COMPONENTS		1	■										

11-STEERING Maintenance Operation	Location Key	Months	Service Interval (Miles)										Specification Code
			Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	
CHECK AND FILL POWER STEERING RESERVOIR	29	D	■										S-7
LUBRICATE DRAG LINK ENDS	21							■					S-16
CHANGE POWER STEERING FILTER AND FLUID	29								■				S-7
LUBRICATE STEERING COLUMN AND TILT LOCK	20								■				S-17
TURN WHEEL FROM RH TO LH AND BACK AND CHECK FOR FREE TRAVEL				■									
INSPECT ALL STEERING COMPONENTS FOR TIGHTNESS				■									
INSPECT TIE ROD END BOOT	25								■				
INSPECT STEERING LINKAGE	21											■	

12-SUSPENSION Maintenance Operation	Location Key	Months	Service Interval (Miles)										Specification Code
			Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	
DISASSEMBLE, CLEAN, AND INSPECT IN-LINE FILTERS	23		■										
CHECK RIDE HEIGHT			■										
INSPECT RADIUS ROD BUSHINGS AND SHOCK ABSORBER MOUNTS								■					
INSPECT AND REPLACE SHOCK ABSORBERS IF REQUIRED								■					
INSPECT AND REPLACE SWAY BAR BUSHINGS IF REQUIRED	22							■					
REBUILD OR REPLACE ALL LEVELING VALVES								■					
PERFORM OPERATION AND LEAKAGE TEST ON THE TAG AXLE UNLOADING VALVE									■				
INSPECT SUSPENSION AIR SPRING BELLOWS ASSEMBLIES			■										
PERFORM OPERATION AND LEAKAGE TEST ON THE RELAY VALVE R-12 AND THE PRESSURE PROTECTION VALVE		6					■						
DISASSEMBLE, CLEAN, AND INSPECT THE RELAY VALVE										■			
DISASSEMBLE, CLEAN, AND INSPECT THE PRESSURE PROTECTION VALVE										■			

13-TRANSMISSION Maintenance Operation	Location Key	Months	Service Interval (Miles)										Specification Code
			Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	
CHANGE TRANSMISSION FLUID	30	48									■		S-15
CHANGE MAIN CONTROL FILTER – INITIAL CHANGE AT 5,000 MILES	30	24	■						■				
CHANGE LUBE FILTER	30	48							■				
CHECK TRANSMISSION FLUID LEVEL		D	■										S-15
CHECK FOR LOOSE FASTENERS AND MOUNTING COMPONENTS									■				
PRINT TRANSMISSION DATA FROM ECM			■										
CHANGE SUMP/INTERNAL FILTER AT TRANSMISSION OVERHAUL			■										
ALLISON GEN V (4000 Product Family) (TES 295 Fluid)													

14-DRIVESHAFT Maintenance Operation	Location Key	Months	Service Interval (Miles)										Specification Code
			Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	
LUBRICATE DRIVESHAFT U-JOINTS AND SLIP-JOINTS	34	1		■									S-17
INSPECT DRIVESHAFT ASSEMBLY			■	■									
CHECK MOUNTING BOLTS FOR PROPER TORQUE			■	■									
INSPECT YOKES FOR CRACKS, WEAR, OR DISTORTION			■	■									

15-WHEELS, HUBS & TIRES Maintenance Operation	Location Key	Months	Service Interval (Miles)										Specification Code
			Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	
CHECK FRONT AXLE WHEEL BEARING OIL LEVEL	24	D	■										
CHECK TAG AXLE WHEEL BEARING OIL LEVEL	27	D	■										
DRAIN AND FILL FRONT AXLE WHEEL BEARING OIL	24	12								■			S-12
DRAIN AND FILL TAG AXLE WHEEL BEARING OIL	27	12								■			S-12
CHECK FRONT AXLE WHEEL BEARING END PLAY	24									■			
CHECK TAG AXLE WHEEL BEARING END PLAY	27									■			
CHECK TIRE PRESSURE AND RECORD			■										
CHECK TIRE TREAD DEPTH AND RECORD			■										
INSPECT WHEEL END COMPONENTS										■			
INSPECT TIRES, TIRE PRESSURE AND WHEEL NUTS			■										
RETORQUE WHEELS AFTER INSTALLATION (50-100 miles)			■										
TEST FRONT AND TAG AXLE WHEEL BEARING OIL FOR TRACES OF METAL								■					

16-HEATING AND A/C Maintenance Operation	Location Key	Months	Service Interval (Miles) Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	Specification Code
LUBRICATE A/C COMPRESSOR BASE PIVOT ASSEMBLY	28			■									S-17
CHANGE A/C COMPRESSOR OIL	28											■	S-28
CLEAN, OR REPLACE, MAIN EVAPORATOR FILTER			■		■								
CLEAN, OR REPLACE, DRIVER'S EVAPORATOR FILTER			■		■								
INSPECT AND CLEAN, OR REPLACE, HVAC AIR FILTER			■	■									
INSPECT AND CLEAN ALL VENTS AND HEAT DUCTS		6	■										
INSPECT AND CLEAN CONDENSER AND EVAPORATOR MOTOR ASSEMBLIES			■	■									
INSPECT CONDENSER FAN AND MOTOR				■									
INSPECT DRIVER'S HVAC BLOWER MOTOR ASSEMBLY						■							
CLEAN MAIN HEATER WATER VALVE AIR FILTER		6						■					
INSPECT PARCEL RACK EVAPORATOR MODULE						■							
CHECK COMPRESSOR OIL LEVEL	28	D											
CHECK REFRIGERANT LEVEL		D											
CLEAN EVAPORATOR COMPARTMENT DRAIN PAN AND HOSES		1											

17-LAVATORY Maintenance Operation	Location Key	Months	Service Interval (Miles) Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	Specification Code
LUBRICATE LAVATORY DOOR HANDLE							■						
INSPECT RETENTION TANKS				■									
INSPECT THERMAL DRAIN VALVE FOR LEAKAGE		12											

22-WHEELCHAIR LIFT Maintenance Operation	Location Key	Months	Service Interval (Miles)										Specification Code
			Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	
LUBRICATE AND SERVICE WHEELCHAIR LIFT	6						■						
CYCLE WHEELCHAIR LIFT		W	■										
INSPECT WHEELCHAIR LIFT OPERATION				■									

GENERAL MAINTENANCE Maintenance Operation	Location Key	Months	Service Interval (Miles)										Specification Code
			Reg Int	6,000	12,000	18,000	24,000	30,000	48,000	96,000	150,000	200,000	
CHECK REGISTRATION AND LICENSE			■	■									
CHECK FIRE EXTINGUISHER			■	■									
INSPECT AND REFILL FIRST AID KIT			■	■									
INSPECT FOR EMERGENCY EQUIPMENT (SAFETY TRIANGLE, TIRE TOOL, JACK, EXTRA BELTS)			■	■									

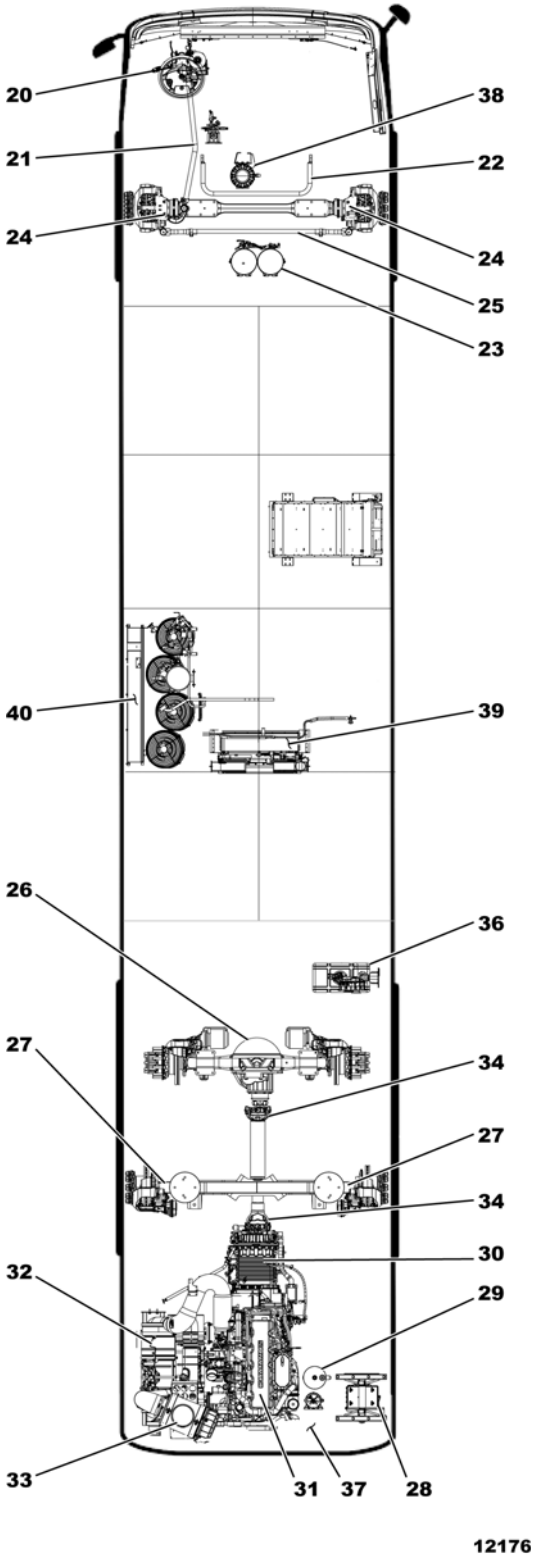

Figure 3. Location Keys - Lubricated Items

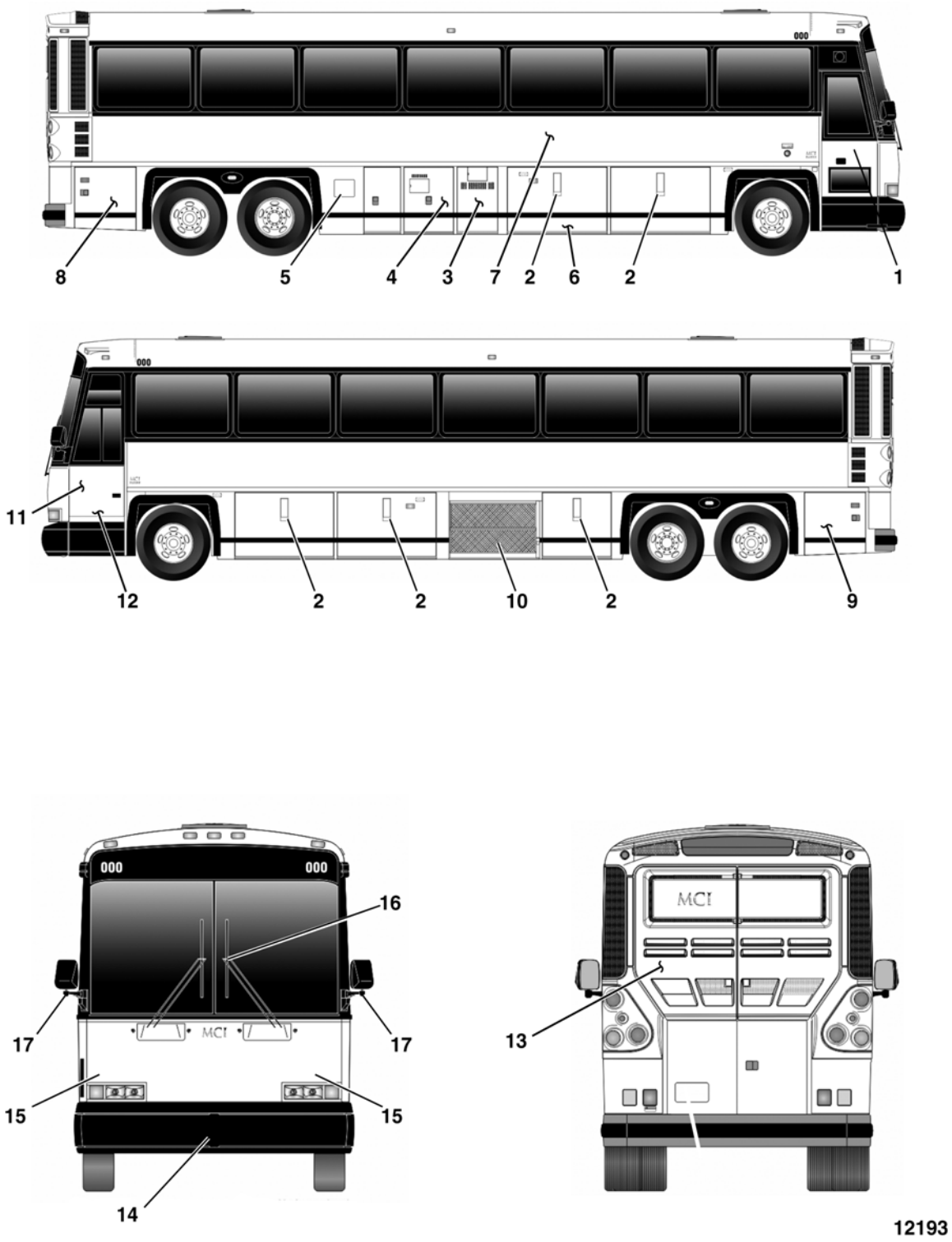

Figure 4. Location Keys - Lubricated Items

REGULAR SERVICE INTERVAL

Description
Check Differential Oil
Inspect Alternator and A/C Compressor Belts
Drain Primary Fuel Filter
Drain Secondary Fuel Filter
Check Ride Height
Inspect Driveshaft Assembly

LUBRICATION SCHEDULE

SERVICE INTERVAL - A – Every 6,000 miles (9,500 km)

Location Key	Description	Method	Specification Code
26	Change Break-in Differential Oil	Fill	S-12
1	Lubricate Entrance Door Hinges	Zerk	S-16
1	Lubricate Entrance Door Cylinder Rod Ends	Apply	S-17
17	Lubricate Exterior Rearview Mirrors	Apply	S-17
1	Lubricate Entrance Door Bearings	Apply	S-17
31	Change Engine Oil and Oil Filter	Fill	S-6
34	Lubricate Driveshaft U-Joints and Slip-Joints	Zerk	S-17
28	Lubricate A/C Compressor Base Pivot Assembly	Zerk	S-17

SERVICE INTERVAL - B – Every 12,000 miles (19,000 km)

Location Key	Description	Method	Specification Code
2	Lubricate Baggage Door Latches	Apply	S-31
1	Lubricate Entrance Door Latch Mechanism	Apply	S-31
14	Lubricate Front Bumper Latch	Apply	S-31
4	Lubricate Battery Door Latches and Hinges	Apply	S-31
3	Lubricate Fuel Door Latch and Hinge	Apply	S-31
5	Lubricate DEF Door Latch and Hinge	Apply	S-31
8 and 9	Lubricate Engine L/R Side Service Doors	Apply	S-31
13	Lubricate Engine Upper/Lower Doors and Hinges	Apply	S-31

SERVICE INTERVAL - C – Every 24,000 miles (39,000 km)

Location Key	Description	Method	Specification Code
14	Lubricate Front Bumper Hinges	Apply	S-16
2	Lubricate Service and Baggage Door Hinges	Apply	S-18
10	Lubricate Condenser Door Hinges	Apply	S-31
6	Lubricate Wheelchair Cassette Door	Apply	S-31
6	Lubricate and Service Wheelchair Lift	Apply	S-31
4	Lubricate Battery Tray, Latch, and Handle	Apply	S-31
	Lubricate Pivot Pin	Zerk	S-16
	Lubricate Lavatory Door Handle	Apply	S-16

SERVICE INTERVAL - D – Every 30,000 miles (48,000 km)

Location Key	Description	Method	Specification Code
24	Lubricate Front Axle King Pins and Bushings	Zerk	S-16
25	Lubricate Front Axle Tie Rods	Zerk	S-16
21	Lubricate Front Axle Steering Arm	Zerk	S-16
22	Lubricate Front Axle Sway Bar Bushings	Zerk	S-16
21	Lubricate Drag Link Ends	Zerk	S-16
27	Lubricate Tag Axle Tie Rods	Zerk	S-16
27	Lubricate Tag Axle King Pins	Zerk	S-16

SERVICE INTERVAL - E – Every 48,000 miles (77,000 km)

Location Key	Description	Method	Specification Code
	Clean and Lubricate Park Brake (Push/Pull) Valve	Apply	S-26
	Clean and Lubricate Emergency Release Valve	Apply	S-26
	Clean and Lubricate Synchro Valve	Apply	S-26
	Clean and Lubricate Dual Brake Valve	Apply	S-26
	Clean and Lubricate Pressure Protection Valve	Apply	S-26
	Clean and Lubricate Spring Brake Valve	Apply	S-26
	Clean and Lubricate Parking Brake Control Valve	Apply	S-26
	Clean and Lubricate Inversion Valves	Apply	S-26
29	Change Power Steering Filter and Fluid	Fill	S-7
20	Lubricate Steering Column and Tilt Lock	Apply	S-17

SERVICE INTERVAL - F – Every 96,000 miles (150,000 km)

Location Key	Description	Method	Specification Code
30	Change Transmission Fluid	Fill	S-15
30	Change Transmission Lube Filter		S-15
24	Drain and Fill Front Axle Wheel Bearing Oil	Fill	S-12
24	Drain and Fill Tag Axle Wheel Bearing Oil	Fill	S-12

SERVICE INTERVAL - G – Every 150,000 miles (240,000 km)

Location Key	Description	Method	Specification Code
37	Drain, Clean, and Fill the Cooling System	Fill	S-30
32	Clean or Replace Diesel Particulate Filter		
36	Replace Diesel Exhaust Fluid Filter (DEF)		

SERVICE INTERVAL - H – Every 200,000 miles (320,000 km)

Location Key	Description	Method	Specification Code
26	Change Differential Oil (Synthetic)	Fill	S-12
28	Change A/C Compressor Oil	Fill	S-28

CAPACITY SCHEDULE

Engine Oil

ISX	Initial Factory Fill: 12.0 gallons U.S. (41.6 L)
	Note: Capacities are approximate only. Please check dipstick levels with the proper Fluid Level Check procedure.

Transmission Fluid

B-500	Initial Factory Fill: 10.0 gallons U.S. (38 L)
	Note: Capacities are approximate only. Please check shift pad or dipstick for proper fluid levels.

Drive Axle Oil

Meritor	Initial Factory Fill: 5.1 gallons U.S. (19.4 L)
	Note: Capacities are approximate only.

Engine Coolant

Power Cool Plus	Initial Factory Fill: 24.3 gallons U.S. (92 L)
	Note: Capacities are approximate only.

ENGINE SPECIFIC MAINTENANCE - FLUIDS - LUBRICATION

Component	Initial Factory Fill
Fuel	15 ppm Sulfur Diesel Only ULSD
Diesel Exhaust Fluid (DEF)	Use only API, ISO standard 22241-1
Primary Fuel Filter	Replace every 3,000 miles (4,828 km). Note: Can be extended if fuel is clean.
Secondary Fuel Filter	Replace every 12,000 miles (19,312 km)
Engine Oil	CJ-4/SL or CK-4/SL – Only 10W-30
Coolant	Power Cool Plus
Coolant Filter	Replace every 6,000 miles (9,656 km)
Power Steering Fluid	SAE 10W-40 Engine Oil
Diesel Exhaust Fluid (DEF) Filter	Replace every 250,000 miles

SPECIFICATIONS

Code	Description	Classification	Grade	Marketer	Trade Name
S-5	Heavy Duty Engine Oil	CJ-4,CK-4	10W-30	–	–
S-6	Heavy Duty Engine Oil	CJ-4, API CJ-4	15W-40/5W-40	Mobil	–
S-7	Power Steering Fluid (Engine Oil)	CJ-4,CK-4	10W-40	–	–
S-8	Diesel Exhaust Fluid	API, ISO Standard 22241-1	–	–	–
S-11	Differential Gear Oil	Synthetic	75W-140	Mobil	–
S-12	Differential Gear Oil	Synthetic	75W-90	Mobil	–
S-15	Automatic Transmission Fluid	Synthetic	TES-295	Mobil	–
S-16	Multi-Purpose Grease	NLGI 6% Lithium/ 12-Hydroxy Stearate	EP 1	Mobil	–
S-17	Multi-Purpose Grease	NLGI 8% Lithium/ 12-Hydroxy Stearate	EP 2	Mobil	XHP 222
S-18	Multi-Purpose Grease	NLGI Neutral Lithium/Mineral Oil	EP 1	Mobil	–
S-19	Multi-Purpose Grease	NLGI Clay-Base/ Poly-Urea	EP 1	Mobil	–
S-20	Multi-Purpose Grease	NLGI Paraffinic-Base/Poly-Urea	EP 1	Mobil	–
S-20A	Barimal Grease	NLGI 2 Lithium Complex	EP 2	Mobil	–
S-23	Antiseize Compound	–	–	Witco	Corrosion Control
S-24	Silicon Spray Compound	–	–	Dow Corning	316
S-25	Silicon Fluid	–	–	Dow Corning	200
S-26	Silicon Grease	–	–	Dow Corning	55 O-Ring Lube
S-28	A/C Compressor Oil API (R-134A)	Ester-Based	–	Castrol	SW-68 (Icematic)
S-29	Hypoid Gear Oil	MIL-L-2105D/ API:GL-5	SAE 80W-90	Exxon	Gear Oil GX
S-30	Coolant	Power Cool Plus	Extended Life	Detroit Diesel	–
S-31	Petroleum Lubricating Grease	Lithium 12-Hydroxy Stearate 8%	–	Lubriplate	1200-2
S-32	Dielectric Grease	–	–	Permatex	–

NOTE: Lubricant Grade And/Or Viscosity Shown Are Manufacturer Recommended.

DAILY CHECKLIST

Use this daily checklist to inspect all the listed major items before putting the coach into service. For listing purposes only, the inspection path is established to start from the coach exterior (LOCATION) at the entrance door (ITEM) and generally go in a clockwise direction along the curbside (RH side) of the coach.

Any items found to require maintenance or repair during this inspection should be noted and reported to maintenance personnel. All Repair/Maintenance issues should be resolved before putting the coach into service.

Location	Item	Inspect or Service
Coach Exterior	Entrance Door	Inspect for condition and operation - positive latching, closing. Check emergency release valve operation.
	Wheels	Inspect rims, wheels, and stud nuts for damage or missing stud nuts. Check oil level in front and tag axle hubs.
	Tires	Check for proper inflation pressure, bulges, knots, cuts, punctures, abrasions, and separation. Check valve stems for damage or missing or loose valve caps.
	Body Fasteners	Inspect for secure fasteners.
	Exterior Panels	Inspect for condition - no dents, gouges, holes.
	Service Doors	Inspect for condition and operation.
	Fuel Filler Door	Inspect for positive latching.
	DEF Filler Door	Inspect for positive latching.
	Battery Compartment	Check that the main battery disconnect switch is ON. Inspect condition of battery, cables, and connectors. Check safety equipment.
	Windows	Inspect for condition. Glass - no chips, cracks. Frame - no dents, bends.
	Side Marker Lights & Reflectors	Inspect lenses for condition - no chips or cracks.
	Rear Lamp Cluster Lenses	Inspect for condition - no chips or cracks.
	Backup Light Lenses	Inspect for condition - no chips or cracks.
	Engine Compartment	Check hoses, harnesses, cables for proper clamping, chafing or abrasions. Check belt tension, condition and operation. Check for fluid leaks.
	Engine Crankcase	Check for oil level on dipstick, engine off.
	Engine Remote Control Switch	Set for front operation.
	Transmission	Check for fluid on dipstick. Check fluid level through diagnostics on shift pad.
	Cooling System	Check coolant level. Check coolant recovery pump.
	Power Steering	Check oil level. Check for leaks.

Location	Item	Inspect or Service
Coach Exterior (Cont.)	Air Cleaner	Check air restrictor indicator.
	Underside of Coach	Check for fluid leaks and obstructions.
	Windshield Washer Reservoir	Check fluid level.
	Front Bumper	Check that bumper is positively latched in position.
	Mirrors	Inspect for condition.
	Windshield Wipers	Inspect blades, arms, mechanism for condition and adjustment. Check fluid level.
	Headlight Lenses	Inspect for condition - no chips or cracks.
	Turn Signal Lenses	Inspect for condition - no chips or cracks.
Engine Running	Telltale Lights	Toggle the RUN switch to the ON position, then push the telltale test switch to see that all telltale lights illuminate.
	Start the Engine	Look and listen for signs of trouble.
	Transmission Diagnostics	Check diagnostics system for transmission oil level at shifter keypad.
	Drain Ping Tank	With engine running and air compressor loaded, drain ping tank.
	Gauges	Check that all gauges are operating with the engine running and are in the normal operating ranges.
	Parking Brake	Apply the parking brake and check operation by trying to move the coach with the brake applied. Use **CAUTION**. **Check park brake release**. Release park brake, apply service brake. Shift into gear, release brake and apply light throttle.
	Telltale Lamp System	Check LOW AIR lamp and buzzer.

Location	Item	Inspect or Service
Operating Controls	Headlights	Check high and low beam operation. Push on floor mounted dimmer switch to check low/high beam operation.
	Clearance, Marker & ID	Check operation.
	Directional and Hazard Lights	Check operation.
	Stepwell Lights	Check operation.
	Interior Lights	Check operation.
	Kneeling Warning Horn	Check by listening for this horn while kneeling the coach.
	Back-Up Alarm Horn	Check by listening for this horn while backing the coach.
	Climate Control System	Check operation by placing the Heat and A/C switch in the ON position and observing the operation. Run system for 15 minutes and check for output.
	Defroster	Check operation by placing the defroster switch in the ON position and observing operation.
	Fast Idle	Check operation by placing the FAST IDLE switch in fast idle position and observing engine rpm.
	Wheelchair Lift	Operate the lift to see that it is working properly. Check oil level in reservoir when fully deployed. Be sure the lift is in the fully stowed position.
	Brakes	Check to see that the air pressure gauge shows 100 psi (689.5 kPa) before moving the coach. Move the coach slowly and apply brakes to check that the brakes stop the coach and keep it from moving.
	Steering	Move the coach a short distance at a slow speed and turn the steering wheel to check that the steering feels normal. Listen for unusual noises. Check to ensure that the coach is under control and handles properly.

Location	Item	Inspect or Service
Coach Interior	General Interior	Check for damage.
	Interior Mirrors	Inspect for condition and adjust - as required.
	Sun Visor and Blinds	Check for operation and adjustment.
	Driver's Window	Check operation and inspect for damage.
	Passenger Windows/ Sash and Release Bars	Check for operation and cracks.
	Roof Escape Hatch	Check operation - open, close and latch hatch. Check for proper sealing.
	Entrance/Exit Door Step Treads	Inspect for damage.
	Front Destination Sign	Check operation and inspect for any damage.
	Dash Run Sign	Check operation and inspect for any damage.
	Side Destination Sign	Check operation and inspect for any damage.
	Side Route Sign	Check operation and inspect for any damage.
	Rear Run Sign	Check operation and inspect for any damage.
	Passenger Seats	Inspect for damage, loose seat mountings, and reclining operation.
	Parcel Racks	Passenger's - Inspect cords for frays or cuts. Driver's - Check door for operation and positive latching.
	Driver's Seat	Check adjustments, inspect for damage.
	Driver's Seat Belt	Check operation, inspect for damage.
	Steering Column	Check that the tilt lock lever secures the column in each tilt position.
	Safety Equipment	Check that all required safety equipment is in place and not damaged - fire extinguisher(s), flares, and first aid kit, or fire axe (if included).
	Fire Suppression System	Check the pressure gauges on the main agent cylinder and the actuator cylinder. The pointer should be in the green zone. The green SYSTEM OK monitor light should illuminate on power up.

General Description

This section will discuss the specific lubrication requirements for most of the coach components. Several different schedules are provided in this section for reference. However, intervals specified may not be appropriate for all applications.

The LUBRICATION SCHEDULE is provided as a minimum requirement guide for most lubricated components. A location key chart is included to give approximate location of service points. Where cleaning, removal, or disassembly are required for lubrication purposes, procedures will be found in the applicable sections of this maintenance manual.

A PREVENTIVE MAINTENANCE SCHEDULE is also included at the end of this section. It includes most lubrication, cleaning, and inspection intervals required for coach components.

High lube maintenance items, such as engine crankcase oil, transmission fluid, and other components shown in the INSPECTION SCHEDULE should be checked daily or before the start of each run. Add oil as needed to bring the level to the Full mark on the dipstick.

The DAILY CHECKLIST at the end of the section should serve as the final guide before putting the coach into service.

PREVENTIVE MAINTENANCE SCHEDULE

The following preventive maintenance schedule is a compilation of suggested maintenance operations contained in this maintenance manual.

Service intervals may be given as regular intervals (Reg. Int.) months and/or miles. Regular intervals must be determined by shop personnel based on operating conditions, component failure history, and previous experience. In cases when both time (in months) and miles (in thousands) are given for a particular operation, maintenance should be performed at whichever interval first occurs.

PROBALIZERS

The coach is equipped with both an engine and transmission oil probalizer. To pull an oil sample, push the hose of the hose/bottle sampler onto the probalizer valve until the bottle is full (approximately one pint). Check the oil level to ensure the transmission or engine oil is still at the proper level; add oil if necessary.

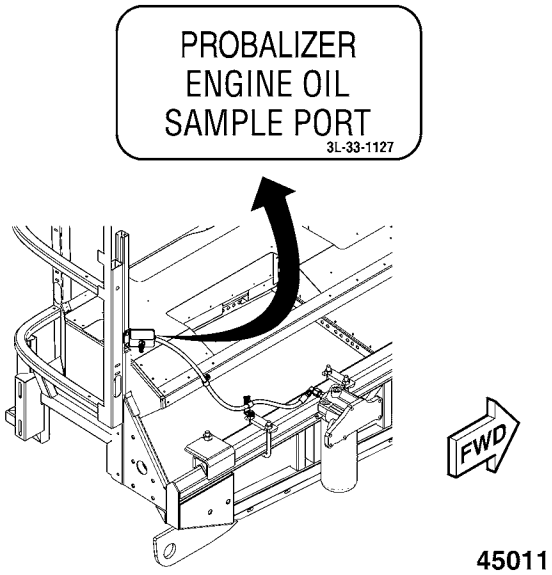

Figure 1. Engine Oil Probalizer

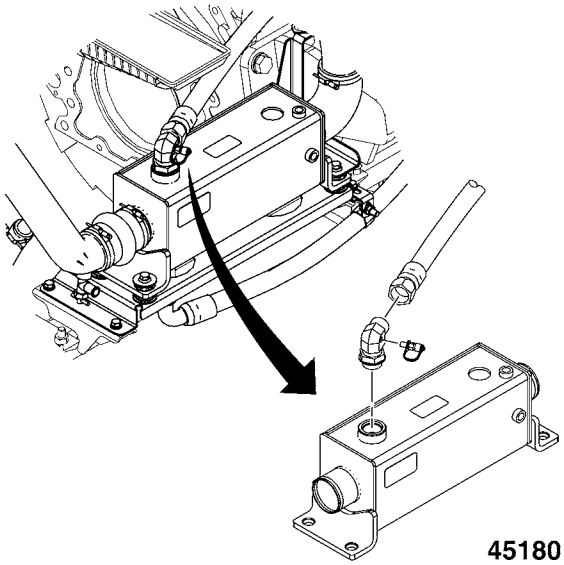

Figure 2. Transmission Oil Probalizer

1-FRONT AXLE Maintenance Operation	Location Key	Months	Service Interval (Miles)									
			Reg Int	5,000	10,000	20,000	25,000	30,000	50,000	96,000	100,000	150,000
FRONT AXLE INSPECTION			•									
CHECK FRONT AXLE WHEEL ALIGNMENT			•									
TAKE THE WEIGHT OFF THE STEERING AXLE AND CHECK KING PIN PLAY								•				
LUBRICATE FRONT AXLE KING PINS & BUSHINGS								•				
INSPECT AND REPLACE RADIUS ROD BUSHINGS IF REQUIRED								•				
LUBRICATE TIE ROD ENDS								•				
CHECK FRONT AXLE WHEEL BEARING OIL LEVEL - DAILY			•									
DRAIN AND FILL FRONT AXLE WHEEL BEARING OIL (Whichever occurs first: seals replaced, brake pads replaced, 100,000 miles or 160,000 km)											•	
CHECK FRONT AXLE WHEEL BEARING END PLAY - 100,000 miles (160,000 km), 12 months, whichever occurs first		12									•	

2-DRIVE AND TAG AXLES Maintenance Operation	Location Key	Months	Service Interval (Miles)									
			Reg Int	1,000	4,000	10,000	20,000	25,000	50,000	75,000	100,000	200,000
CHECK DIFFERENTIAL OIL LEVEL			•					•				
INSPECT DRIVE AXLE			•						•			
CHANGE BREAK-IN OIL (No later than 3,000 miles)				•								
CHECK AND ADJUST TOE-IN IF REQUIRED						•						
CHANGE DIFFERENTIAL OIL												•
INSPECT FASTENERS, AXLE AND AXLE PARTS, AND TIRES FOR WEAR AND DAMAGE (Or 6 months whichever comes first)									•			
LUBRICATE KING PINS					•							
INSPECT ALL TRAILING AXLE ARM SEALS AND BEARINGS										•		
CHECK HUB BEARING GREASE							•					
CHANGE HUB BEARING GREASE (When brakes are relined, every 12 months or every 6 months if mileage is less than 30,000 miles, and whenever seals are replaced.)		12										
CHECK TAG AXLE WHEEL BEARING OIL LEVEL - DAILY			•									
DRAIN AND FILL TAG AXLE WHEEL BEARING OIL (Whichever occurs first: seals replaced, brake pads replaced, 100,000 miles or 160,000 km)											•	

2-DRIVE AND TAG AXLES	Location Key	Months	Service Interval (Miles)									
Maintenance Operation			Reg Int	1,000	4,000	10,000	20,000	25,000	50,000	75,000	100,000	200,000
CHECK TAG AXLE WHEEL BEARING END PLAY - 100,000 miles (160,000 km), 12 months, whichever occurs first		12									•	
TEST TAG AXLE WHEEL BEARING OIL FOR TRACES OF METAL – 30,000 miles (48,000 km), 6 months, whichever occurs first		6	•									

3-BODY	Location Key	Months	Service Interval (Miles)									
Maintenance Operation			Reg Int	5,000	10,000	20,000	25,000	30,000	100,000	200,000	250,000	300,000
CLEAN THE FILTER BOWL AND REPLACE THE ELEMENT ON THE DOOR (Replace filter before winter to prevent freezing.)					•							
INSPECT WINDSHIELD WIPERS				•								
CHECK OPERATION OF WINDSHIELD WASHERS				•								
CHECK REAR VIEW MIRRORS				•								
INSPECT DRIVER'S SEAT OPERATION				•								
INSPECT DRIVER'S SEAT BELT OPERATION				•								
INSPECT BODY FOR DAMAGE AND RECORD				•								
INSPECT EXTERIOR & UNDERBODY FOR CORROSION	Before and after every winter season											
INSPECT ENTRANCE DOOR OPERATION				•								
INSPECT WHEELCHAIR PASSENGER DOOR OPERATION				•								
INSPECT BAGGAGE AND SERVICE COMPARTMENT DOOR OPERATION				•								
CHECK & LUBRICATE ALL DOOR LOCKS			•									
LUBRICATE BAGGAGE/SERVICE DOORS	28							•				
LUBRICATE ENTRANCE DOOR HINGES	21			•								
LUBRICATE ENTRANCE DOOR MECHANISM	20			•								
VERIFY THAT SPARE TIRE IS SECURE				•								
INSPECT WHEELCHAIR DOOR WINDOW FRAMELESS WINDOW		1	•									
INSPECT SIDE SASH - FRAMELESS WINDOW		1	•									
PERFORM EMERGENCY WINDOW PUSH-OUT TEST				•								
PERFORM EMERGENCY ROOF ESCAPE PUSH-OUT TEST				•								
INSPECT ALL GLASS AND REPLACE IF DAMAGED				•								
INSPECT AND RECLINE ALL PASSENGER SEATS				•								
INSPECT AND RAISE ALL FOOTRESTS				•								
INSPECT PARCEL RACK DOORS AND RETAINING CORDS				•								
INSPECT ALL VISIBLE FASTENERS				•								
INSPECT ALL PULLEYS FOR PLAY				•								

4-BRAKES AND AIR SYSTEM Maintenance Operation	Location Key	Months	Service Interval (Miles)									
			Reg Int	5,000	10,000	20,000	30,000	50,000	75,000	100,000	200,000	300,000
INSPECT AIR RESERVOIRS, VALVES, SWITCHES, & LINES				•								
INSPECT AIR DRYER DESICCANT CARTRIDGE AND PURGE VALVE						•						
CHECK AIR COMPRESSOR INTAKE				•								
CHECK BRAKE THROW AND RECORD				•								
ENSURE AIR DRYER PURGES WHEN COMPRESSOR UNLOADS (weekly)			•									
DRAIN PURGE TANK (weekly)			•									
REPLACE AIR DRYER COALESCING CARTRIDGE		24	•									
INSPECT AND DRAIN OIL SEPARATOR (or 300 operating hours)		1		•								
INSPECT BRAKE COMPONENT FASTENERS -**Also at regular Intervals*			•									
PERFORM BRAKE CHAMBER OPERATION AND LEAKAGE TEST (or 200 operating hours)				•								
INSPECT ALL BRAKE CHAMBERS				•								
INSPECT AND REBUILD ALL BRAKE CHAMBERS									•			
CLEAN & INSPECT ALL BRAKE & RELAY VALVES									•			
PERFORM OPERATION AND LEAKAGE TEST ON THE RELAY VALVE, DOUBLE CHECK VALVE, AND THE PRESSURE PROTECTION VALVE (or 750 operating hours)							•					
INSPECT THE OPERATION OF THE BRAKE LIGHT SWITCHES AND THE LOW AIR PRESSURE SWITCH (or 3,000 operating hours)										•		
CLEAN & INSPECT COMPRESSOR & GOVERNOR		6				•						
CLEAN & LUBRICATE ENTRANCE DOOR AIR CYLINDERS	25						•					
PERFORM GOVERNOR OPERATION TEST AND LEAKAGE TEST (or 1,500 operating hours)								•				
INSPECT AIR COMPRESSOR EXTERNAL OIL SUPPLY AND RETURN LINES FOR KINKS, BENDS, OR RESTRICTIONS (or 1,500 operating hours)								•				
INSPECT AIR COMPRESSOR DISCHARGE LINE								•				
CLEAN & LUBRICATE INVERSION VALVES	27								•			
CHECK AIR COMPRESSOR INTAKE TUBE AND ADAPTERS (or 150 operating hours)				•								
PERFORM A THOROUGH INSPECTION OF THE COMPRESSOR (6,000 operating hours)		24								•		
CLEAN & INSPECT PARK BRAKE CONTROL VALVE; REBUILD OR REPLACE IF NECESSARY							•					
REBUILD OR REPLACE TAG AXLE CASTER CONTROL VALVE							•					

4-BRAKES AND AIR SYSTEM (Continued)	Location Key	Months	Service Interval (Miles)									
Maintenance Operation			Reg Int	5,000	10,000	20,000	30,000	50,000	75,000	100,000	200,000	300,000
REMOVE, DISASSEMBLE, CLEAN, AND LUBRICATE THE PARKING BRAKE CONTROL VALVE (or 1,500 miles)								•				
DISASSEMBLE, CLEAN, AND REPLACE ALL WORN PARTS ON THE EMERGENCY PARK RELEASE VALVE (or 1,500 operating hours)								•				
PERFORM AN OPERATION AND LEAKAGE TEST ON THE QUICK-RELEASE VALVE, AND THE TAG AXLE UNLOADING VALVES (or 1,500 operating hours)								•				
REBUILD OR REPLACE BRAKE VALVE, QUICK RELEASE VALVE, RELAY VALVES, INVERSION VALVES, PRESSURE PROTECTION VALVES, DOUBLE CHECK VALVES, PRESSURE REGULATOR VALVE, SKINNER VALVES (or 3,000 operating hours)										•		
INSPECT THE CLEVIS POSITION (every 48,000 miles)			•									
DISASSEMBLE, CLEAN, AND INSPECT IN-LINE FILTERS (or 300 operating hours)					•							
VISUALLY CHECK, CLEAN ALL PARTS OF THE DUAL BRAKE VALVE (or 900 operating hours)						•						
INSPECT CLEAN AND REPLACE ALL RUBBER PARTS AND WORN METAL PARTS OF THE DUAL BRAKE VALVE (or 3,600 operating hours)		12							•			
APPLY THIN LAYER OF BARIUM GREASE BETWEEN PLUNGER AND MOUNTING PLATE (Do Not over oil)						•						
INSPECT SPRING BRAKE								•				
DISASSEMBLE, CLEAN, AND REPLACE RUBBER PARTS AND WORN METAL PARTS ON THE SYNCHRO VALVE, DOUBLE CHECK VALVE, PRESSURE PROTECTION VALVE, AND THE RELAY VALVE										•		
DISASSEMBLE SERVICE CHAMBERS - CLEAN AND INSPECT ALL PARTS (or 3,000 operating hours)										•		
PERFORM AIR SYSTEM LEAK TEST						•						
CLEAN DIRT, GRAVEL, OR OTHER FOREIGN MATERIAL AWAY FROM BRAKE PEDAL AND MOUNTING PLATE. INSPECT FOR PROPER PEDAL AND LINKAGE ADJUSTMENT (or 750 operating hours)						•						
REPLACE ALL BRAKE CHAMBER DIAPHRAGMS											•	
LUBRICATE CASTER/STEERING LOCK CONTROL VALVE (or 1,500 operating hours)								•				
REBUILD OR REPLACE AIR COMPRESSOR											•	
INSPECT WHEEL SENSORS (or 900 operating hours)		3				•						
PERFORM OPERATION AND LEAKAGE TESTS ON THE MODULATOR VALVES (or 350 operating hours)					•							
PERFORM OPERATION AND LEAKAGE TEST ON THE ABS SYSTEM COMPONENTS		12								•		
CLEAN & SYSTEM CHECK AIR HORNS					•							

6-COOLING SYSTEM Maintenance Operation	Location Key	Months	Service Interval (Miles)									
			Reg Int	5,000	10,000	15,000	20,000	50,000	96,000	100,000	200,000	300,000
INSPECT CAC INLET, OUTLET, AIR SEALS, MOUNTS, AND FASTENERS				•								
INSPECT RADIATOR AIR SEALS AND FASTENERS				•								
REMOVE, CLEAN, AND TEST THE CAC										•		
CHECK THE THERMOSTAT AND HOUSING SEALS											•	
CHECK COOLANT COMPONENTS AND COOLANT LEVELS			•									
CHANGE THE LINNIG FAN CLUTCH BEARINGS (75,000 miles)			•									
CHANGE THE LINNIG FAN CLUTCH - FRONT ASSEMBLY AND BEARINGS (150,000 miles)			•									
DRAIN, CLEAN, AND FILL THE COOLING SYSTEM (250,000 miles/402,000 km)		24										
CHANGE COOLANT FILTER (75,000 miles/120,000 km 1,500 hours)		12										
INSPECT AND REPAIR ALL FLUID LEAKS (Daily)			•									
INSPECT ALL BELTS AND REPLACE IF REQUIRED			•									
INSPECT FAN CLUTCH							•					
INSPECT WATER PUMP OPERATION						•						
TEST ANTIFREEZE AND INHIBITOR (or 15 months)										•		
LUBRICATE FAN BELT TENSIONER PIVOT			•									
REQUIRED COOLANT INHIBITOR TEST INTERVALS							•					

7-ELECTRICAL SYSTEM Maintenance Operation	Location Key	Months	Service Interval (Miles)									
			Reg Int	5,000	10,000	20,000	25,000	50,000	100,000	200,000	250,000	300,000
INSPECT STARTER AND ALTERNATOR CABLES FOR DAMAGE AND CHAFING AS WELL AS P-CLIPS FOR BREAKAGE (or at every oil change whichever comes first)				•								
INSPECT STARTER CABLE				•								
TEST ALTERNATOR OUTPUT			•									
CHECK BATTERY ELECTROLYTE				•								
CHECK VOLTAGE SETTING AND RECORD					•							
INSPECT AND REPAIR ALL EXTERIOR, INTERIOR, BAGGAGE BAY, AND SERVICE COMPARTMENT LIGHTS					•							
INSPECT ALL VISIBLE HARNESS CONNECTORS AND JUNCTIONS					•							

8-ENGINE Refer to OEM Maintenance Manual for intervals and Requirements	Location Key	Months	Service Interval (Miles)									
Maintenance Operation			Reg Int	5,000	15,000	20,000	25,000	50,000	96,000	100,000	200,000	300,000
CHECK ENGINE OIL LEVEL			D									
VERIFY COOLANT ACCEPTABILITY		36										•
INSPECT TURBOCHARGER			•									
INSPECT EXHAUST SYSTEM, INSULATION, AND ADJACENT COMPONENTS FOR SOOT AND HEAT RELATED DAMAGE				•								
CHECK OIL TEMPERATURE AGAINST COOLANT TEMPERATURE						•						
INSPECT RUBBER ENGINE MOUNTS (or 24 months)									•			
RECORD ENGINE OIL PRESSURE AT IDLE AND FULL FUEL				•								
REPLACE ALL DRIVE BELTS (or 2,000 operating hours)									•			
INSPECT ALTERNATOR, A/C COMPRESSOR, AND FAN BELTS (or 100 operating hours)				•								
PRINT ENGINE DATA FROM ECM				•								
TAKE OIL SAMPLE AND PERFORM OIL ANALYSIS				•								
INSPECT ENGINE FOR UNUSUAL NOISE AND BLOW-BY				•								
STEAM CLEAN ENGINE COMPARTMENT				•								
CHECK ENGINE OIL COOLER FOR LEAKS						•						
CHECK IGNITION COIL (75,000 miles/120,000 km/1,500 hours)		12										
REPLACE SPARK PLUGS (75,000 miles/120,000 km/1,500 hours)		12										
CHANGE ENGINE OIL AND FILTER (25,000 miles/40,000 km)		6					•					
OVERHEAD CHECK (150,000 miles or 5,000 operating hours)		48										
INSPECT AND REPLACE ENGINE MOUNT ISOLATORS IF REQUIRED								•				
REPLACE AMEREX CONTROL BATTERY (or if Backup Battery Trouble is indicated on the System Service LED)		36										

NOTE: Refer to the engine manufacturer's specific requirements and conditions.

Values shown are specific to Cummins ISX G 11.9 L engine

D Series Maintenance Manual
CNG

Reliability Driven

9-FUEL SYSTEM Maintenance Operation	Location Key	Months	Service Interval (Miles)									
			Reg Int	5,000	10,000	20,000	25,000	48,000	100,000	200,000	250,000	300,000
INSPECT FUEL SYSTEM		1	•									
PERFORM LEAK TEST WITH METHANE DETECTOR		1	•									
REPLACE PRIMARY FUEL FILTER (3,000 miles/4,828 km) Note: Can be extended if fuel is clean			•									
DRAIN PRIMARY FUEL FILTER (1,500 miles/2,414 km) Note: Can be extended if fuel is clean.			•									
DRAIN DUAL FUEL FILTERS			D									
REPLACE DUAL FUEL FILTERS (50,000 miles/80,000 km 1,000 hours/ 9 months)		9	•									
DRAIN PRD VENT LINE (or immediately if blue vent cap is missing)		•	•									
DRAIN PRD LINES ON CYLINDER ENDS (30,000 miles/48,280 km or 3 months)		•	•									
INSPECT PEDAL ASSEMBLY FOR WEAR OR DAMAGE								•				
INSPECT THROTTLE DELAY			•									
INSPECT AIR CLEANER	34			•								
CHECK AIR FILTER RESTRICTION INDICATOR AND REPLACE FILTER IF REQUIRED					•							
INSPECT SYSTEM WIRING AND CONNECTORS. PERFORM SYSTEM OPERATION ROAD TEST (or 900 operating hours)		3					•					
INSPECT FUEL CYLINDERS (36,000 miles/57,937 km or 36 months, whichever occurs first).		36	•									
INSPECT ALL FUEL LINES AND SECURE IF REQUIRED					•							
INSPECT FUEL GAUGE AND LOW FUEL LIGHT					•							

11-STEERING Maintenance Operation	Location Key	Months	Service Interval (Miles)									
			Reg Int	5,000	10,000	20,000	25,000	50,000	100,000	200,000	250,000	300,000
CHECK AND FILL POWER STEERING RESERVOIR	2		•									
LUBRICATE ALL CHASSIS GREASE POINTS					•							
LUBRICATE DRAG LINK ENDS	6							•				
REPLACE POWER STEERING FILTER (RESERVOIR)	31							•				
CHANGE POWER STEERING FLUID								•				
INSPECT AND LUBRICATE STEERING COLUMN	22							•				
CLEAN AND LUBRICATE TILT LOCK								•				

11-STEERING	Location Key	Months	Service Interval (Miles)									
Maintenance Operation			Reg Int	5,000	10,000	20,000	25,000	50,000	100,000	200,000	250,000	300,000
TURN WHEEL FROM RH TO LH AND BACK AND CHECK FOR FREE TRAVEL					•							
INSPECT ALL STEERING COMPONENTS FOR TIGHTNESS					•							
INSPECT TIE-ROD END BOOT								•				
INSPECT STEERING LINKAGE												•
LUBRICATE ALL CHASSIS GREASE POINTS					•							

12-SUSPENSION	Location Key	Months	Service Interval (Miles)									
Maintenance Operation			Reg Int	10,000	25,000	30,000	50,000	60,000	100,000	200,000	250,000	300,000
CHECK RIDE HEIGHT			•									
INSPECT RADIUS RODS AND BUSHINGS, SHOCK ABSORBERS/MOUNTS, AND SWAY BAR BUSHINGS (48,000 miles/77,000 km)			•									
INSPECT AND REPLACE SHOCK ABSORBERS IF REQUIRED (48,000 miles/77,000 km)												
INSPECT AND REPLACE SWAY BAR BUSHINGS IF REQUIRED (48,000 miles/77,000 km)												
REBUILD OR REPLACE ALL LEVELING VALVES						•						
REPLACE SUSPENSION AIR FILTER	33							•				
LUBRICATE CASTER AND LOCKING CONTROL VALVES (or 1,500 operating hours)							•					
PERFORM OPERATION AND LEAKAGE TEST ON THE TAG AXLE UNLOADING VALVES (or 1,500 operating hours)							•					
LUBRICATE AIR CYLINDER (CASTERING AND LOCKING) (or 1,500 operating hours)							•					
INSPECT SUSPENSION AIR SPRING BELLOWS ASSEMBLIES			•									
PERFORM OPERATION AND LEAKAGE TEST ON THE RELAY VALVE R-12 AND THE PRESSURE PROTECTION VALVE (or 750 operating hours)					•							
DISASSEMBLE, CLEAN, AND INSPECT THE RELAY VALVE R-12 (or 3,000 operating hours)									•			
DISASSEMBLE, CLEAN, AND INSPECT THE PRESSURE PROTECTION VALVE (or 3,600 operating hours)									•			
DISASSEMBLE, CLEAN, AND INSPECT IN-LINE FILTERS (or 300 operating hours)				•								
CLEAN AND VISUALLY INSPECT TAG AXLE RADIUS RODS – 100,000 miles (160,000 km)									•			

13-TRANSMISSION Maintenance Operation	Location Key	Months	Service Interval (Miles)									
			Reg Int	5,000	10,000	25,000	48,000	50,000	96,000	100,000	145,000	300,000
PRINT TRANSMISSION DATA FROM ECM			•									
CHECK TRANSMISSION FLUID LEVEL			D									
CHECK FOR LOOSE FASTENERS AND MOUNTING COMPONENTS			•					•				
LUBRICATE PARTS										•		
ALLISON GEN V (4000 Product Family) (TES 295 Fluid)												
CHANGE TRANSMISSION FLUID[1]			•									
CHANGE MAIN FILTER[2]			•									
CHANGE LUBE/AUXILIARY FILTER[2]		36	•									
CHANGE INTERNAL FILTER AT TRANSMISSION OVERHAUL												

NOTE: Change fluid/filters after recommended mileage, months, or hours have elapsed, whichever occurs first.

[1]- Change - Severe Vocation - (whichever comes first) at 150,000 miles (240,000 km), 6,000 hours, or 48 months.
General Vocation - (whichever comes first) at 300,000 miles (480,000 km), 6,000 hours, or 48 months.

[2]- Change - Severe or General Vocation - (whichever comes first) at 75,000 miles (120,000 km), 3,000 hours, or 36 months.

Severe Vocation: Transit and Intercity coach with duty cycle greater than one (1) stop per mile.
General Vocation: Intercity Coach with duty cycle less than or equal to one (1) stop per mile and all other vocations.

Local conditions, severity of operation, or duty cycle may require more or less frequent fluid change intervals that differ from the published recommended fluid change intervals of Allison Transmission. Transmission protection and fluid change intervals can be optimized by the use of fluid analysis.
Filters must be changed at or before recommended intervals.

NOTE: Even small amounts of engine coolant in transmissions can cause clutch plates to fail.

14-DRIVESHAFT Maintenance Operation	Location Key	Months	Service Interval (Miles)									
			Reg Int	5,000	10,000	20,000	25,000	50,000	100,000	200,000	250,000	300,000
LUBRICATE DRIVESHAFT ASSEMBLY, U-JOINT AND SLIP-JOINT (or 300 operating hours)	14	1			•							
INSPECT DRIVESHAFT ASSEMBLY			•									

15-WHEELS, HUBS & TIRES Maintenance Operation	Location Key	Months	Service Interval (Miles)									
			Reg Int	5,000	10,000	20,000	30,000	50,000	75,000	100,000	200,000	500,000
INSPECT WHEEL END COMPONENTS										•		
INSPECT WHEEL BEARINGS AND SEALS									•			
INSPECT HUBS FOR BEARING ADJUSTMENT AND END PLAY										•		
VISUAL INSPECTIONS FOR DRIVE AXLE PRESET HUBS (or 12 months)										•		
FULL INSPECTION FOR DRIVE AXLE PRESET HUBS (or 5 years)												•
CHECK AND RECORD TIRE PRESSURE AND TIRE TREAD DEPTH (INCLUDING SPARE TIRE)			•									
CHECK FRONT AND TAG AXLE WHEEL BEARING OIL LEVEL - DAILY			•									
DRAIN AND FILL FRONT AND TAG AXLE WHEEL BEARING OIL (Whichever occurs first: seals replaced, brake pads replaced, 100,000 miles or 160,000 km)										•		
CHECK FRONT AND TAG AXLE WHEEL BEARING END PLAY – 100,000 miles (160,000 km), 12 months, whichever occurs first		12								•		
TEST FRONT AND TAG AXLE WHEEL BEARING OIL FOR TRACES OF METAL – 30,000 miles (48,000 km), 6 months, whichever occurs first		6					•					
INSPECT TIRES AND WHEEL NUTS			•									
RETORQUE WHEELS AFTER INSTALLATION (50–100 miles)			•									
CHECK TORQUE ON WHEEL ADAPTER FASTENERS (30,000 miles/48,280 km)			•									

16-HEATING AND A/C Maintenance Operation	Location Key	Months	Service Interval (Miles)									
			Reg Int	5,000	10,000	20,000	30,000	48,000	75,000	100,000	150,000	200,000
INSPECT/CLEAN HVAC AIR FILTER				•								
REPLACE HVAC AIR FILTER								•				
REMOVE AND CLEAN EVAPORATOR FILTER			•									
INSPECT A/C COMPRESSOR ASSEMBLY				•								
CLEAN/INSPECT CONDENSER AND EVAPORATOR MOTOR ASSEMBLIES (5,000 operating hours/more frequently in dusty environments)			•									
LUBRICATE A/C COMPRESSOR BASE ASSEMBLY PIVOT	24			•								
LUBRICATE COMPRESSOR CLUTCH	37								•			

16-HEATING AND A/C (Continued)	Location Key	Months	Service Interval (Miles)									
Maintenance Operation			Reg Int	5,000	10,000	20,000	30,000	48,000	75,000	100,000	150,000	200,000
INSPECT CONDENSER FAN AND MOTOR				•								
INSPECT DRIVER'S HVAC BLOWER MOTOR ASSEMBLY						•						
INSPECT/CLEAN PARCEL RACK EVAPORATOR MODULE						•						
CHECK COMPRESSOR OIL AND REFRIGERANT LEVELS		D										
CLEAN EVAPORATOR COMPARTMENT DRAIN PANS/HOSES		1										
INSPECT/CLEAN ALL AIR VENTS/HEAT DUCTS (seasonal)		6										
CLEAN MAIN HEAT VALVE AIR FILTER								•				
CHANGE A/C COMPRESSOR OIL (or 3 years or 12,000 operating hours)					•							
CHECK AND CLEAN A/C COMPRESSOR-EVAPORATOR AND CONDENSER									•			
INSPECT/MEASURE CLUTCH FACE WEAR								•				
REPLACE BEARING ON COMPRESSOR CLUTCH											•	

HVAC Inspection

Heating and Air Conditioning			
System		Operation	Reference Section
On	Off		
A. Daily Maintenance			
X		Pre-trip Inspection - after starting	See **Section 16 - Pre-trip inspection**
	X	Check the tension and condition of the V-belt (**not** when the engine is running)	
B. Weekly Inspection			
	X	Perform daily inspection	See **A. Daily Maintenance** above
	X	Check condenser, evaporator coils, and air filters for cleanliness	
	X	Check refrigerant hoses and compressor shaft seal for leaks	See **Section 16 - Leak Check**
X		Feel filter-dryer for excessive temperature drop across dryer	See **Section 16 - Filter-dryer**
C. Monthly Inspection and Maintenance			
	X	Perform weekly inspection and maintenance	
	X	Clean evaporator drain pans and hoses	Replace/Tighten
	X	Check the wire harnesses for chafing and loose terminals	
	X	Check the fan motor bearings	
	X	Check the compressor mounting bolts for tightness	
D. Seasonal Inspection and Maintenance			
	X	Perform a complete system inspection prior to operating the system.	

17-LAVATORY Maintenance Operation	Location Key	Months	Service Interval (Miles)									
			Reg Int	5,000	10,000	20,000	25,000	50,000	100,000	200,000	250,000	300,000
LUBRICATE DOOR LOCK AIR CYLINDER							•					
INSPECT SECONDARY RETENTION TANK			•									
INSPECT THERMAL DRAIN VALVE FOR LEAKAGE		12										

22-WHEELCHAIR LIFT Maintenance Operation	Location Key	Months	Service Interval (Miles)									
			Reg Int	5,000	10,000	24,000	30,000	50,000	100,000	200,000	250,000	300,000
INSPECT WHEELCHAIR LIFT OPERATION					•							
SERVICE WHEELCHAIR LIFT - LOW USAGE/MILD CLIMATE (or 32 weeks)						•						
SERVICE WHEELCHAIR LIFT - LOW TO NORMAL USAGE/ MILD TO AVERAGE CLIMATE (or 28 weeks)						•						
SERVICE WHEELCHAIR LIFT - NORMAL TO HIGH USAGE/ MILD TO AVERAGE CLIMATE (or 24 weeks)						•						
SERVICE WHEELCHAIR LIFT - HIGH USAGE/AVERAGE CLIMATE (or 20 weeks)						•						
SERVICE WHEELCHAIR LIFT - LOW TO HIGH USAGE/ SEVERE CLIMATE (or 6 weeks, 12,000 miles/19,000 km)			•									

GENERAL MAINTENANCE Maintenance Operation	Location Key	Months	Service Interval (Miles)									
			Reg Int	5,000	10,000	20,000	25,000	50,000	100,000	200,000	250,000	300,000
CHECK REGISTRATION AND LICENSE					•							
CHECK FIRE EXTINGUISHER(S)					•							
INSPECT AND REFILL FIRST AID KIT (IF APPLICABLE)					•							
INSPECT FOR EMERGENCY EQUIPMENT (SAFETY TRIANGLE, TIRE TOOL, JACK, EXTRA BELTS)					•							

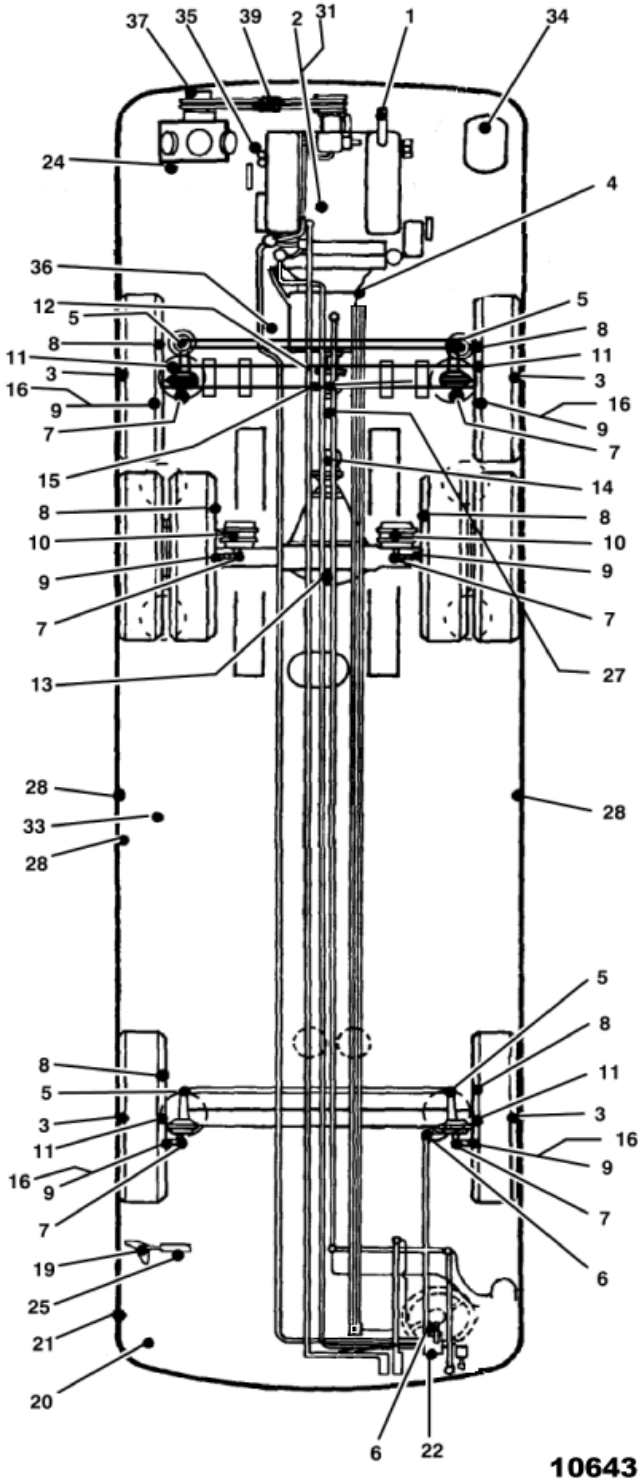

Figure 3. Location Keys - Lubricated Items

INSPECTION SCHEDULE (LUBRICATED COMPONENTS)

Location Keys*	Description	Method	Specification Code**
Inspect Daily - Service if required			
1	Oil	Inspect & Service	S-6B
2	Power Steering Reservoir	Inspect & Service	S-5
3	Wheel Bearings - All (Grease)	Inspect & Service	S-16 & S-17
4	Transmission (Automatic)	Inspect & Service	S-15
Inspect Every 48,000 Miles (77,250 km) -Service or replace if required			
10	Brake Chambers	Inspect	Do not lubricate
Inspect Every 100,000 Miles (161,000 km) -Service if required			
24	A/C Compressor Oil	Inspect & Service	S-28
3	Wheel Bearings and Seals	Inspect & Service	S-16 & S-17
INSPECT AT BRAKE RELINING -Service If required			
8	Anchor Pins	Inspect & Service	S-19

*See Location Diagram
**See Lubricant Specification Chart

LUBRICATION SCHEDULE

Service Interval A - Every 6,000 Miles (9,600 Km) or 150 Hours

Location Keys*	Description	Method	Specification Code**
16	Brake Camshaft Bushings	N/A	N/A

Service Interval B - Every 12,000 Miles (19,000 Km) or 300 Hours

14	Driveshaft Assembly	Zerks (3)	S-17
8	Anchor Pins	Apply	S-19
N/A	Brake Valve	Apply	S-25

Service Interval C - Every 24,000 Miles (39,000 Km) or 750 Hours

N/A	Brake Pedal Assembly	Apply	S-6
1	Engine Crankcase Oil	Drain & Fill	S-6B
13	Differential (Normal)	Drain & Fill	S-11A and S-12A

Service Interval D - Every 48,000 Miles (80,500 Km) or 1,500 Hours

25	Door Air Cylinder	Apply	S-6
22	Steering Column	Zerks	S-17
28	Baggage & Service Doors	Apply	S-18
11	King Pin Bushings	Zerks (4)	S-16
5	Tie Rod Ends	Zerks	S-16
6	Steering Drag Link End	Zerks (2)	S-16
N/A	Parking Brake Control Valve	Apply	S-26
15	Trailing Axle Caster Control Valve	Apply	S-25
N/A	Steering Column U-Joints	Zerks	S-17
15	Caster Locking Control Valve	Apply	S-25
15	Air Cylinders (Castering and Locking)	Apply	S-6

Brake Relining - Every 48,000 Miles (80,500 Km)

9	Brake Camshaft Splines and Rollers	N/A	N/A

Service Interval F - Every 96,000 Miles (154,000 Km) or 3,000 Hours

27	Inversion Valve	Apply	S-26
N/A	Brake Valve	Apply	S-26

Service Interval G - Regular Intervals

21	Entrance Door Hinges	Apply	S-16
20	Entrance Door Mechanism	Apply	S-17
N/A	Door Locks (Use Dry Graphite Compound, Powdered Graphite, or Graphite Oil)	Apply	N/A
28	Baggage/Service Doors	Apply	S-16
19	Seat Belt Reels	Apply	S-24 or S-26
N/A	ABS Sensors	Apply	S-18
39	Pivot Arm Assy Pivot Pin	Zerks	S-17
N/A	Starter	Saturate	S-6
24	A/C Compressor Mounting Pivot	Zerks	S-17
37	Compressor Clutch	Zerks	S-20

*See Location Diagram
**See Lubricant Specification Chart