SECTION 24: LUBRICATION

CONTENTS

ILLUSTRATIONS

1. LUBRICATION

The efficiency and life expectancy of mechanical equipment is largely dependent upon proper lubrication and servicing. All mechanical components rely on a lubricating film between moving parts to reduce friction, prevent wear and oxidation. Proper lubrication also helps cool the parts and keep dirt particles away from mating surfaces. Efficient lubrication depends upon using the right type of lubricant, at specified intervals and by filling to correct capacities. Past experience shows that many service problems can be traced to an improper lubricant or to incorrect lubrication procedures.

A comprehensive maintenance and lubrication program is important to ensure the long service life this vehicle was designed for and to avoid costly repairs and associated downtime caused by premature part failure.

A lubrication schedule is included in this section to give the location of key service points on the vehicle as well as the lubricant specifications for each component to be serviced. Specific instructions on how to check and service different components are covered in their respective sections in this maintenance manual.

The recommended lubrication intervals are based on normal operating conditions and mileage accumulation.

Shorten the intervals if your vehicle operates in more severe conditions. Severe conditions include heavy towing, high vehicle weight or operation in mountainous areas. Some parts and equipment referred to in this section may not be installed on your vehicle. Check your vehicle's "Coach Final Record" for equipment list.

Dispose of used lubricants and filters in an environmentally safe manner, according to federal and/or local recommendations.

1.1 FIRST SERVICE ON NEW VEHICLE

Perform the following maintenance procedures after the first 3,000 miles (4 800 km) of operation (unless otherwise specified). Once initial maintenance is performed, refer to recommended intervals in the lubrication schedule.

Repeat a component's initial maintenance procedure when it has undergone a major repair.

1.1.1 Differential

No initial oil or filter change necessary. Refer to regular lubrication and servicing schedule.

1.1.2 Hot Water Filter

The hot water filter is designed to recover the soldering residues trapped inside the coolant lines during their initial assembly; perform initial cleaning once vehicle has run approximately 3,000 miles (4 800 km), then according to the lubrication and servicing schedule.

NOTE
If additional soldering has been performed on any point of coolant piping, clean coolant system strainer as outlined for a new vehicle at 3,000 miles (4 800 km).

1.1.3 Allison Transmission

Your Allison transmission is equipped with High Capacity filters, eliminating the requirement of an initial fluid and filter change. Refer to regular lubrication and servicing schedule.

1.1.4 ZF-ASTRONICTransmission

No initial oil or filter change necessary. Refer to regular lubrication and servicing schedule.

1.1.5 Engine

Since engine break-in has been done in factory, there is no special break-in, so oil should be changed according to the lubrication and servicing schedule intervals. Since some oil consumption by engine is normal, check oil level daily with engine stopped and add to FULL mark on dipstick if necessary (refer to Section 01: Engine of this manual for complete procedure). Furthermore, the engine oil filter should be replaced each time the engine oil is changed.

2. LUBRICATION AND SERVICE SCHEDULE

Following this service schedule is the most economical and easiest way to ensure your vehicle performs at its best, safest and longest.

Also, unscheduled maintenance will be minimized since inspection should expose potential problems before they become major ones.

2.1 FLEXIBLE HOSE MAINTENANCE

The performance of engine and equipment are greatly related to the ability of flexible hoses to supply lubricating oil, air, coolant, and fuel oil. Maintenance of hoses is an important step to ensure efficient, economical, and safe operation of the engine and related equipment.

2.1.1 Pre-Starting Inspection

Check hoses daily as part of the pre-starting inspection. Examine hose for leaks, and check all fittings, clamps, and ties carefully. Ensure that hoses are not resting on or touching shafts, couplings, heated surfaces including exhaust manifolds, any sharp edges, or other obviously damaging areas. Since all machinery vibrates and moves to a certain extent, clamps and ties can fatigue with time. To ensure proper support, inspect fasteners frequently and tighten or replace them as necessary.

2.1.2 Leaks

Investigate leaks immediately to determine if fittings have loosened or cracked, and also if hoses have ruptured or worn through. Take corrective action immediately. Leaks are not only potentially detrimental to machine operation, but can also result in added expenses caused by the need to replace lost fluids.

WARNING

Personal injury and/or property damage may result from fire due to the leakage of flammable fluids, such as fuel or lube oil.

2.1.3 Service life

The limited service life of a hose is determined by the temperature and pressure of the gas or fluid within it, the time in service, its installation, the ambient temperatures, amount of flexing, and the vibration it is subjected to. With this in mind, it is recommended that all hoses be thoroughly inspected at least every 500 operating hours or after 15,000 miles (24 000 km). Look for surface damage or indications of damaged, twisted, worn, crimped, brittle, cracked, or leaking lines. Hoses having a worn outer surface or hoses with a damaged metal reinforcement should be considered unfit for further service.

It is also recommended that all hoses in this vehicle be replaced during major overhaul and/or after a maximum of five service years. Quality of replacement hose assemblies should always be equal to or superior to those supplied by the Original Equipment Manufacturer.

2.2 WALK-AROUND INSPECTION

It is good practice to make a basic visual inspection of key areas on the vehicle every day and to correct any problem found.

OUTSIDE THE VEHICLE	
ITEM [1]	DESCRIPTION
---	Check for leaks under vehicle and in engine compartment.
---	Check that baggage and service compartment doors close properly.
---	Inspect tires and wheels for correct tire pressure, wear or damage and for missing wheel studs and nuts.
1	Check windshield washer fluid level and add if necessary.
---	Check condition of windshield wiper blades.
---	Verify proper operation of all road lights, signal lights, brake lights, marker lights and back-up lights; Replace light bulbs as required.
2, 26	Drain accumulated water in accessory and wet air tanks.

ENGINE COMPARTMENT	
ITEM [1]	DESCRIPTION
24	Check engine crankcase oil level; Add if necessary.
19	Check Allison transmission oil level (can be checked from push-button shift selector); Add if necessary.
29	Check power steering reservoir fluid level; Add if necessary.
21	Check coolant surge tank fluid level; Add if necessary.
28	Drain accumulated water in primary fuel filter/water separator (if equipped). Visually check fuel filter cartridge (Fuel-Pro 382 equipped vehicles only).
22, 27	Check air cleaner restriction indicator; Replace air cleaner when red signals locks in full view.

INSIDE THE VEHICLE	
ITEM [1]	DESCRIPTION
---	Check for proper operation of the entrance door.
---	Check that emergency exit windows and roof escape hatches can be opened then close all windows and hatches securely.
---	Verify proper operation of windshield wiper/washer.
---	Adjust and clean mirrors as needed for adequate rear-view vision.
---	Start engine and check for proper operation of all gauges and indicator lights.
---	Check for proper operation of electric and air horns and back-up alarm.
---	Perform a brake test. Check both primary and secondary pressure gauges.

[1] Item numbers refer to figures 1 and 2

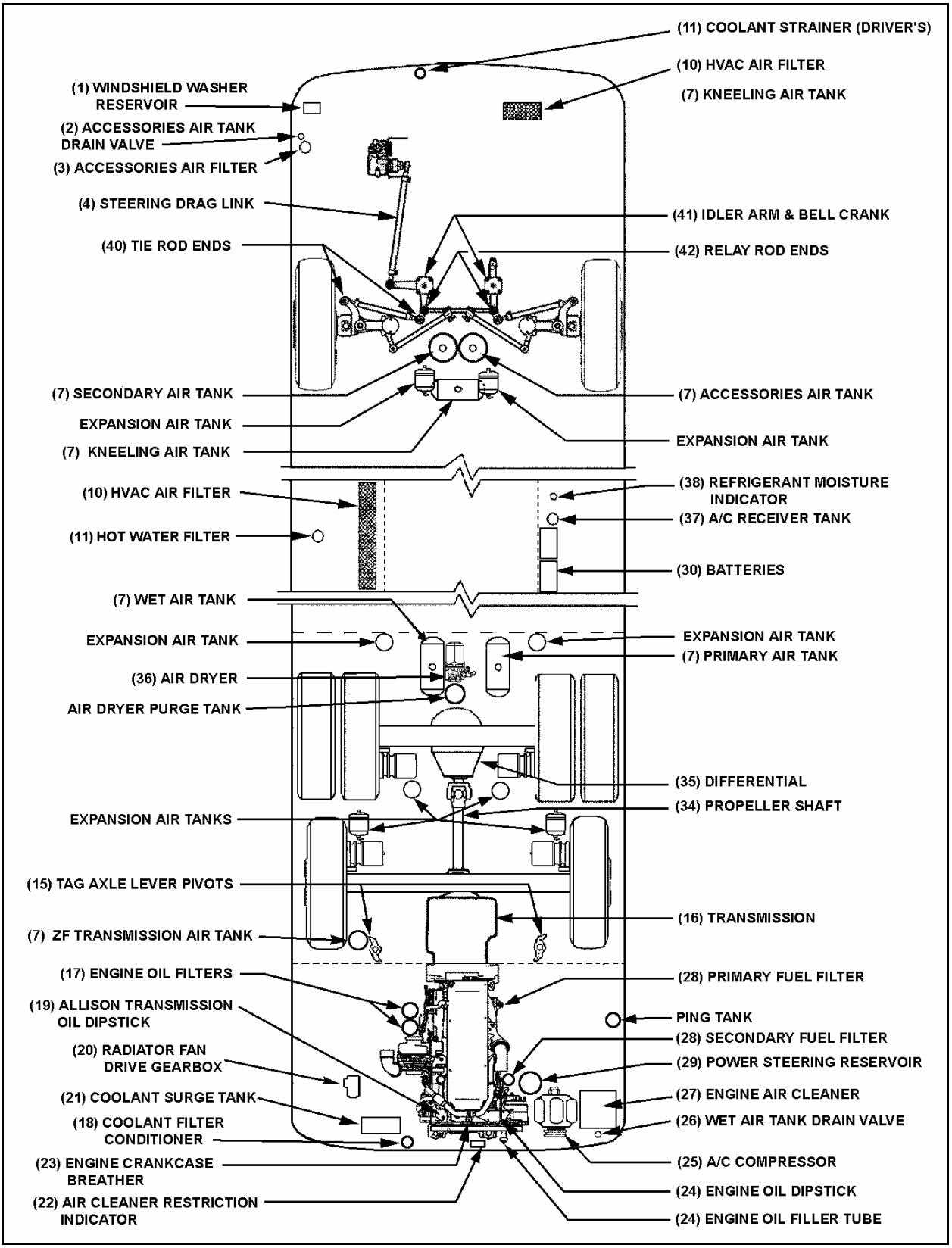

FIGURE 1: LUBRICATION AND SERVICING POINTS ON INDEPENDENT FRONT SUSPENSION VEHICLES 24031_1

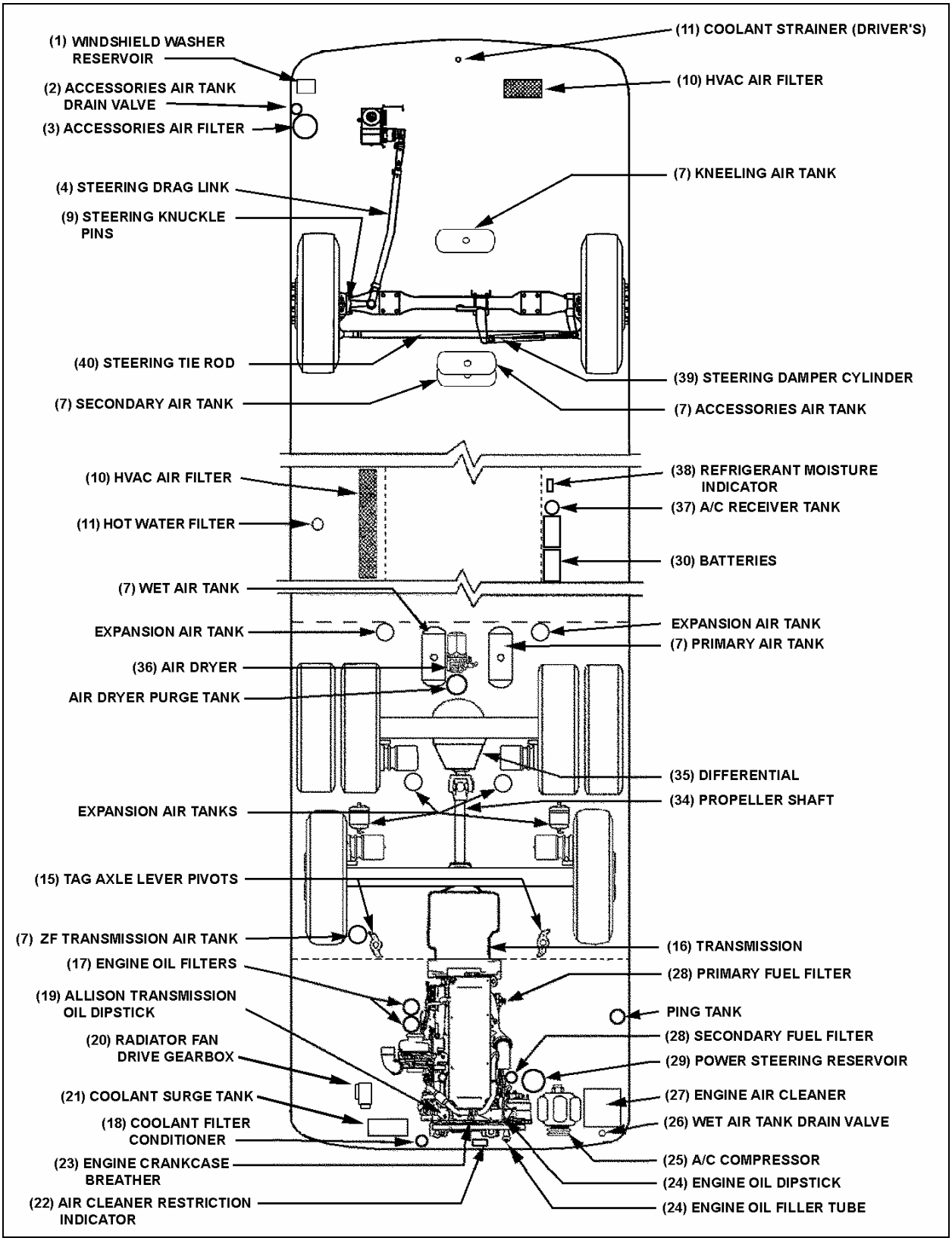

FIGURE 2: LUBRICATION AND SERVICING POINTS ON I-BEAM AXLE FRONT SUSPENSION VEHICLES 24030_1

2.3 LUBRICANT AND COOLANT SPECIFICATIONS

REF	DESCRIPTION	SPECIFICATIONS
A	Engine Oil	SAE Viscosity Grade: 15W-40 API Classification: CJ-4
B	Power Steering Oil	Automatic Transmission Oil, Dexron-III
C	Engine Coolant	Low silicate, ethylene glycol coolant 50% antifreeze/water solution is normally used Antifreeze concentration should be between 30% and 67%
D	A/C Compressor Oil	Central HVAC system: Polyolester oil, HFC 134a compatible; Castrol SW-68 (POE) or equivalent Small HVAC system: PAG oil
E	Differential Oil	Multigrade gear oil meeting MIL-L-2105-D: 85W140. If temperature drops below 10°F (-12°C), 80W90 should be used. Below -15°F (-26°C), 75W90 should be used. (In extreme conditions or for better performance, full synthetic gear oil can be used.)
F	Differential Oil (Full Synthetic)	Multigrade gear oil meeting MIL-L-2105-D: 85W140. If temperature drops below 10°F (-12°C), 80W90 should be used. Below -15°F (-26°C), 75W90 should be used.
G	Cooling Fan Gearbox Oil	Synthetic gear lubricant 75W-90
H	Allison Automatic Transmission Oil	Castrol TranSynd™ Synthetic Transmission Fluid for Allison or TES 295 approved equivalent
I	Allison Automatic Transmission Oil	Dexron-VI® or approved equivalent 1 Schedule 1 TES-389 fluids;
J	ZF-ASTronic Transmission Oil	Castrol Syntrans Grade SAE 75W-85 (Synthetic)
K	Multi Purpose Grease	Good quality lithium-base grease: NLGI No.2 Grade is suitable for most temperatures NLGI No.1 Grade is suitable for extremely low temperatures
L	Multi Purpose Grease	Molykote longterm 2/78 grease

2.4 PART NUMBER SPECIFICATIONS

REF	DESCRIPTION	PREVOST NO
P1	Engine oil filters	#510458
P2	Power steering oil reservoir filter element	#660987
P3	Engine air filter	#530197
P4	Refrigerant filter dryer unit	#950332 Central A/C syst. #950370 Small A/C syst.
P5	Primary fuel filter/water separator	#032700 #541407
P6	Racor primary fuel filter and water separator (optional)	#531390
P7	Secondary fuel filter	#510794
P8	Engine coolant precharge element filter	#550629
P9	Engine coolant maintenance element filter	#550630
P10	HVAC driver's air filter	#871147-871144
P11	HVAC cabin air filter	#874272
P12	Allison transmission High Capacity fluid filter kit	#571709
P13	Hot water filter	#871029
P14	Accessories air filter element	#641340
P15	Air dryer cartridge	#3097369
P16	Fuel Pro 382 filter element	#510795
P17	Overhead compartment fan air filters	#871159
P18	Engine coolant	#685125
P19	Bosch T1 alternators, voltage regulator	#562981
P20	Bosch T1 alternators, brush set	#562983
P21	Bosch T1 alternators, ball bearing	#562972
P22	Bosch T1 alternators, roller bearing	#562976
---	Alternator drive belt, 85-1/2 in. (2 alternators)	#5060088
---	Alternator drive belt, 72 in. (1 alternator, limp home)	#5060056
	Small A/C compressor drive belt (set of 2 belts: V-belt AX41)	#5060080
---	Cooling fan gearbox drive belt	#550926
---	Compressor (Carrier) drive belt BX100	#506864
---	Windshield wiper blade	#800360

2.5 LUBRICATION AND SERVICING SCHEDULE

For lubrication and servicing schedule, refer to table A.

IMPORTANT NOTE
Refer to the manufacturers documentation included in this maintenance manual for specific manufacturer's maintenance requirements.

LUBRICATION AND SERVICING SCHEDULE	Item	Months	DISTANCE TRAVELED[1] (miles / km)																																LUBRICANT /PART[2]
			6 250 / 10 000	12 500 / 20 000	18 750 / 30 000	25 000 / 40 000	31 250 / 50 000	37 500 / 60 000	43 750 / 70 000	50 000 / 80 000	56 250 / 90 000	62 500 / 100 000	68 750 / 110 000	75 000 / 120 000	81 250 / 130 000	87 500 / 140 000	93 750 / 150 000	100 000 / 160 000	106 250 / 170 000	112 500 / 180 000	118 750 / 190 000	125 000 / 200 000	131 250 / 210 000	137 500 / 220 000	143 750 / 230 000	150 000 / 240 000	156250 / 250 000	162 500 / 260 000	168 750 / 270 000	175 000 / 280 000	181 250 / 290 000	187 500 / 300 000	193 750 / 310 000	200 000 / 320 000	
GENERAL																																			
Flexible hoses, thoroughly inspect all hoses	-	12								●								●								●								●	
Front discharge tube, qty:2, check to see if clogged [3]	-	3																																	
01 ENGINE																																			
Air cleaner, inspect, clean, replace element if required	27	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	P3
Air pre-cleaner, check discharge tube	-	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Replace crankshaft pulley's rubber damper, See Linnig Repair instruction 142.219 in Section 01																									●										
Engine, change oil and filters	17	12		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●	A, P1
03 FUEL																																			
Change primary & secondary fuel filters	17	12		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●	P5, P7
05 COOLING																																			
Cooling fan gearbox, check oil level, add if necessary	20	6		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●	G
Cooling fan gearbox, change oil	20	12								●								●								●								●	G
Coolant filter/conditioner, replace element [4]	18	12		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●	P8, P9
Coolant surge tank, test coolant solution	21	12		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●	
Cooling system, drain, flush and refill	21	24																																●	C
06 ELECTRICAL																																			
Battery terminals, clean and coat terminals	30	12																																	
Bosh alternators, replace brushes and voltage regulator		24																●																●	P19,P20
Bosh alternators, replace bearings		48																																●	

[1] Proceed to maintenance operation at distance indicated on odometer or specified number of month, whichever comes first.
[2] See paragraph 2.3 & 2.4 of this section for lubricant specifications and part numbers.
[3] Discharge tubes are rubber tubes located under vehicle
[4] The need for maintenance elements is determined by the results of the inhibitor concentration test. Do not automatically install maintenance elements at maintenance intervals. Refer to Detroit Diesel 2007 Engine Operator's Guide.

TABLE A

LUBRICATION AND SERVICING SCHEDULE	Item	Months	DISTANCE TRAVELED[1] (miles / km)																																	LUBRICANT /PART[2]
			6 250 / 10 000	12 500 / 20 000	18 750 / 30 000	25 000 / 40 000	31 250 / 50 000	37 500 / 60 000	43 750 / 70 000	50 000 / 80 000	56 250 / 90 000	62 500 / 100 000	68 750 / 110 000	75 000 / 120 000	81 250 / 130 000	87 500 / 140 000	93 750 / 150 000	100 000 / 160 000	106 250 / 170 000	112 500 / 180 000	118 750 / 190 000	125 000 / 200 000	131 250 / 210 000	137 500 / 220 000	143 750 / 230 000	150 000 / 240 000	156250 / 250 000	162 500 / 260 000	168 750 / 270 000	175 000 / 280 000	181 250 / 290 000	187 500 / 300 000	193 750 / 310 000	200 000 / 320 000	250 000 / 400 000	300 000 / 480 000	
07 TRANSMISSION[3]																																				
Allison transmission **equipped with retarder**, change fluid and filters (if filled with non-TranSynd or non-TES 295 fluid)	16	6		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		I, P12
Allison transmission **equipped with retarder**, change fluid (if filled with TranSynd™ or TES295 synthetic fluid only, no mixture)[4]	16	48																						●												H
Allison transmission **without retarder**, change fluid and filters (if filled with non-TranSynd or non-TES 295 fluid)	16	12				●				●				●				●				●				●				●				●		I, P12
Allison transmission **without retarder**, change fluid (if filled with TranSynd™ synthetic fluid only) [3, 5]	16	48																																	●	H
Allison transmission **with or without retarder**, change filters (if filled with TranSynd or TES295 synthetic fluid only, no mixture)	16	12												●												●										P12
Transmission oil cooler, replace unit if vehicle is equipped with transmission retarder		24																																		
ZF-Astronic Automatic Transmission, change fluid & filter after 185 000 miles (300 000 km)	16	24																													●					J
09 PROPELLER SHAFT																																				
Grease one fitting on each universal joint and slip joint	34	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			K
10 FRONT AXLE																																				
Hub unit and swivel assembly, Maintenance Manual sec.10 See GKN AXLE LTD Service Manual paragraph 1-Lubrication	-	12								●								●								●								●		
11 REAR AXLE																																				
Differential, check oil level, add if necessary	35	6				●				●				●				●				●				●				●				●		E
Differential, change oil, clean breathers	35	12																●																●		E
Differential, change oil, clean breathers (with full synthetic oil)	35	48																																	●	E
Tag axle lever pivot, grease one fitting on each pivot	15	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			K

[1] Proceed to maintenance operation at distance indicated on odometer or specified number of month, whichever comes first.

[2] See paragraph 2.3 & 2.4 of this section for lubricant specifications and part numbers.

[3] Allison Transmission recommends that customers use fluid analysis as the primary method for determining fluid change intervals. In the absence of a fluid analysis program, the fluid change interval listed in the charts above and below should be used. Change filters according to the charts above and below even is a fluid analysis shows that the fluid doesn't need to be changed.

[4] When the transmission contains a mixture of fluids (defined as the quantity of non-TranSynd/ non-TES 295 fluid remaining in the transmission after a fluid change combined with the quantity of TranSynd™ required to fill the transmission to the proper level), perform the fluid and filter change according to the non-TranSynd™/non-TES 295 intervals.

[5] Extended TranSynd™/TES 295 fluid and filter change intervals are only allowed with Allison High-Capacity filters. If using Gold Series filter, refer to TABLE 3 in Section 7 of this manual for proper fluid and filter change intervals.

TABLE A

LUBRICATION AND SERVICING SCHEDULE	Item	Months	DISTANCE TRAVELED[1] (miles / km)																																LUBRICANT /PART[2]
			6 250 / 10 000	12 500 / 20 000	18 750 / 30 000	25 000 / 40 000	31 250 / 50 000	37 500 / 60 000	43 750 / 70 000	50 000 / 80 000	56 250 / 90 000	62 500 / 100 000	68 750 / 110 000	75 000 / 120 000	81 250 / 130 000	87 500 / 140 000	93 750 / 150 000	100 000 / 160 000	106 250 / 170 000	112 500 / 180 000	118 750 / 190 000	125 000 / 200 000	131 250 / 210 000	137 500 / 220 000	143 750 / 230 000	150 000 / 240 000	156250 / 250 000	162 500 / 260 000	168 750 / 270 000	175 000 / 280 000	181 250 / 290 000	187 500 / 300 000	193 750 / 310 000	200 000 / 320 000	
12 BRAKE & AIR																																			
Air tanks, drain water from all tanks		12		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●	
Accessories air filter, change filter element	3	24																●																●	P14
Air dryer, change cartridge	36	24																●																●	P15
Brake pads, check pad wear indicator and perform caliper slide check		12		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●	
14 STEERING																																			
Drag link ends, grease one fitting at each end	4	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	K
Relay rod ends, grease one fitting at each end	42	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	K
Steering tie rod ends, grease one fitting at each end	40	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	K
Idler arm, grease fitting	41	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	K
Bell crank, grease fitting	41	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	K
Steering damper cylinder, grease one fitting at rod end		6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	K
Steering knuckle pins, grease two fittings per knuckle	9	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	K
Power steering reservoir, replace oil and filter cartridges	29	12								●								●								●								●	B
16 SUSPENSION																																			
Upper A-Arm Ball Joint, grease fitting	-	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	L
22 HEATING & AIR CONDITIONING																																			
A/C compressor, check oil level, add if necessary	25	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	D
A/C receiver tank, check refrigerant level, add if necessary	37	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Refrigerant moisture indicator, replace filter dryer unit according to moisture indicator (as needed)	38	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
A/C and Heating air filters, clean or replace all elements	10	6		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●	P10,P11
Parcel rack fan air filters, clean or replace	-	6		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●		●	P17
Hot water filter, check, clean, change cartridge if required	11	12								●								●								●								●	P13
Condenser discharge tube, qty:2, check to see if clogged [3]	-	3																																	
Evaporator discharge tube, qty:6, check to see if clogged [3]	-	3																																	
Evaporator motor, condenser motor, recirculating pump drive motor, inspect brush, replace if necessary	-	12								●								●								●								●	

[1] Proceed to maintenance operation at distance indicated on odometer or specified number of month, whichever comes first.
[2] See paragraph 2.3 & 2.4 of this section for lubricant specifications and part numbers.
[3] Discharge tubes are rubber tubes located under vehicle

TABLE A

TABLE A