

SECTION 24: LUBRICATION

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Section 24: LUBRICATION

1. LUBRICATION

The efficiency and life expectancy of mechanical equipment is largely dependent on 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.

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 Hose 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.

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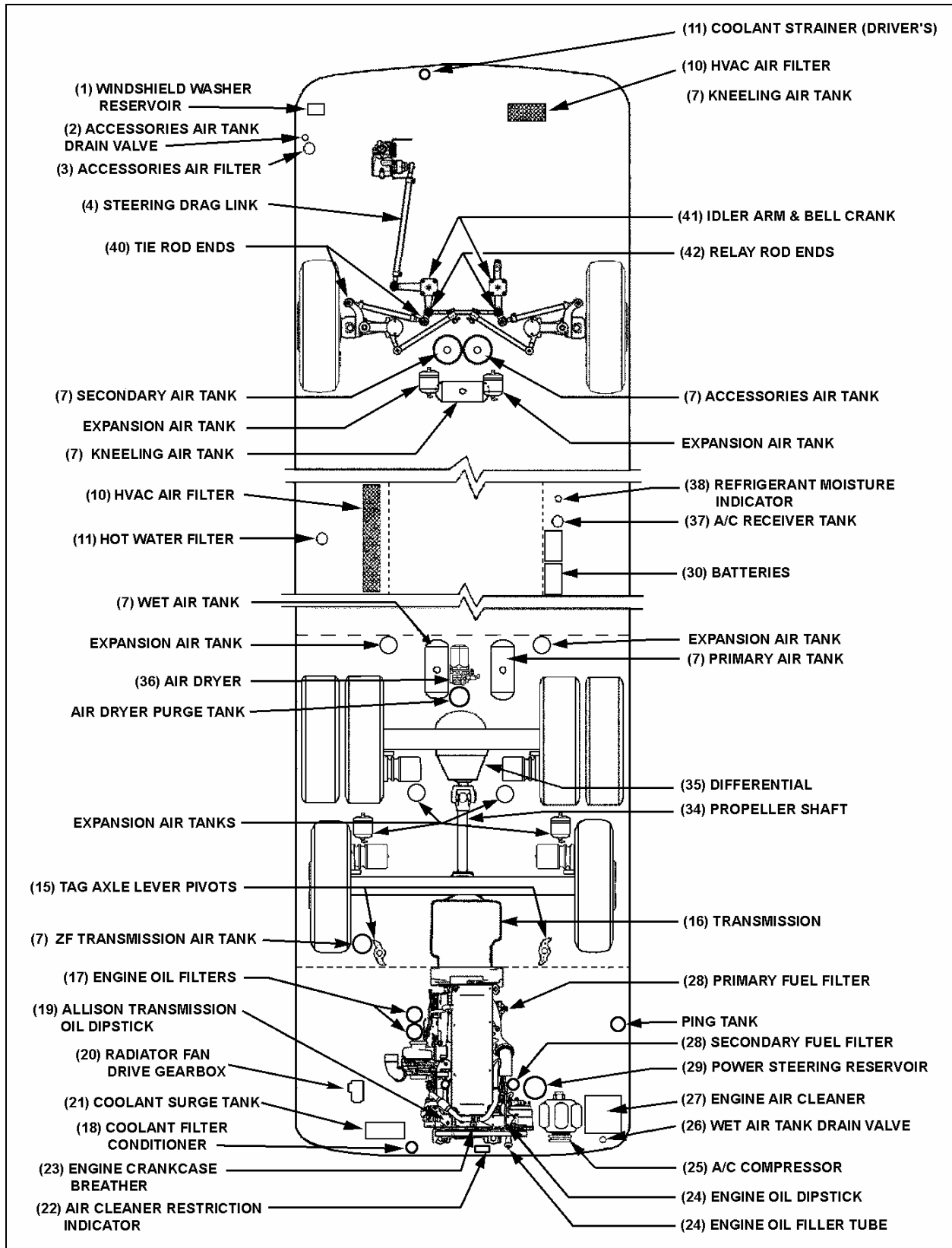


FIGURE 1: LUBRICATION AND SERVICING POINTS ON INDEPENDENT FRONT SUSPENSION VEHICLES

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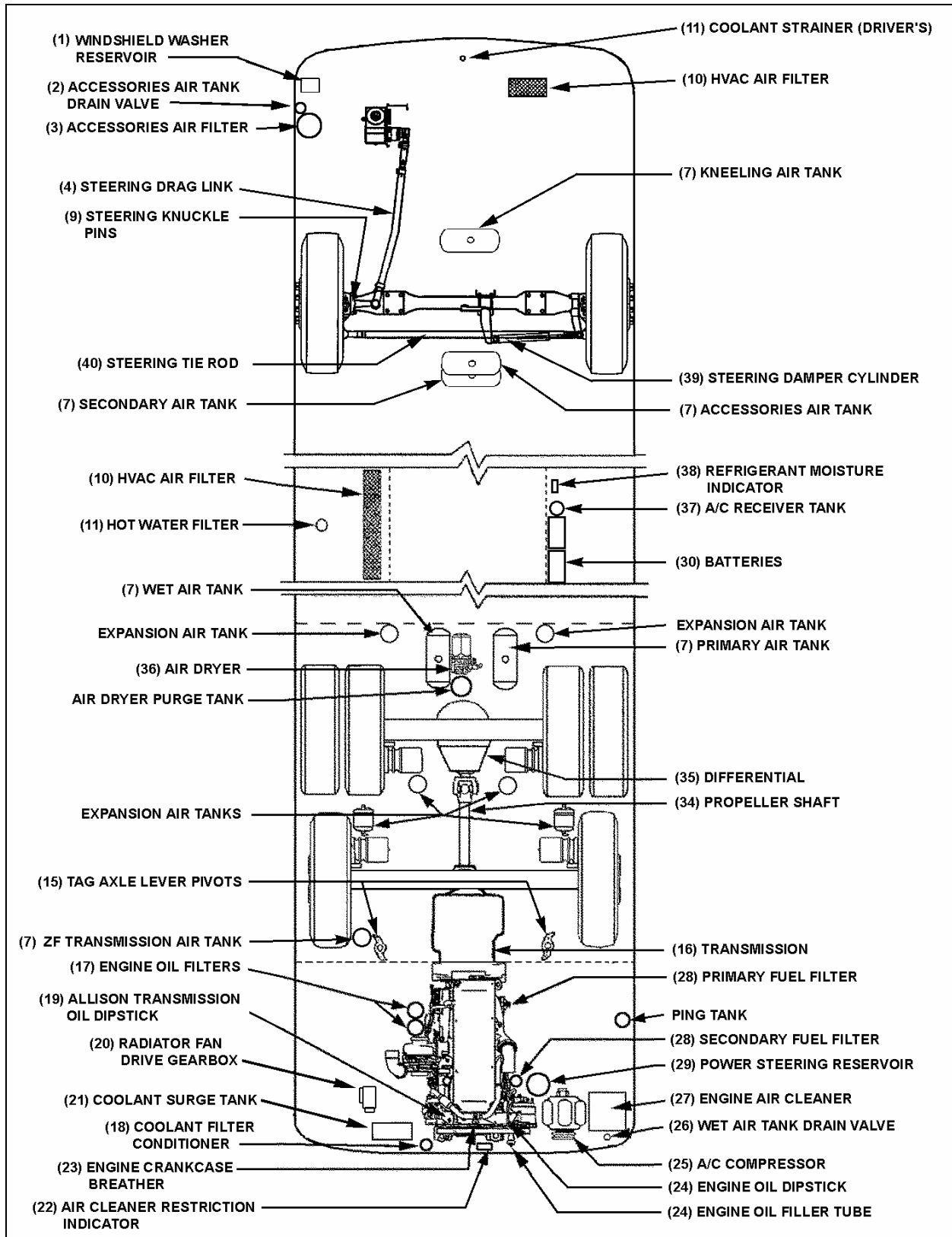


FIGURE 2: LUBRICATION AND SERVICING POINTS ON I-BEAM AXLE FRONT SUSPENSION VEHICLES

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2.2 LUBRICANT AND COOLANT SPECIFICATIONS

REF	DESCRIPTION	SPECIFICATIONS
A	Engine Oil	DETROIT DIESEL SERIES 60 SAE Viscosity Grade: 15W-40 API Classification: CJ-4
		VOLVO D13 SAE Viscosity Grade: 15W-40 API Classification: CJ-4 meeting Volvo specification VDS-4
B	Power Steering Oil	Automatic Transmission Oil, Dexron-III
C	Engine Coolant	DETROIT DIESEL SERIES 60 Low silicate, ethylene glycol coolant 50% antifreeze/water solution is normally used Antifreeze concentration should be between 30% and 67%
		VOLVO D13 Texaco or Chevron Extended Life Coolant (ELC) 50% antifreeze/water solution is normally used
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

2.3 PART NUMBER SPECIFICATIONS

REF	DESCRIPTION	PREVOST NO
P1	Engine oil filters	#510458
P2	Engine oil filters – Volvo D13	#510938 (one by-pass) (Volvo #477556) #478736 (two full-flow)
P3	Power steering oil reservoir filter element	#660987
P4	Engine air filter	#530197
P5	Refrigerant filter dryer unit	#950332 Central A/C syst. #950370 Small A/C syst.
P6	Primary fuel filter/water separator – DDC Series 60	#032700 #541407
P7	Racor primary fuel filter and water separator (optional) – DDC Series 60	#531390
P8	Secondary fuel filter – DDC Series 60	#510794
P9	Primary fuel filter cartridge (used with water separation bowl) - Volvo D13	#20879806
P10	Secondary fuel filter - Volvo D13	#20405160
P11	Engine coolant precharge element filter – DDC Series 60	#550629
P12	Engine coolant maintenance element filter – DDC Series 60	#550630
P13	Engine coolant filter cartridge - Volvo D13	#20458771
P14	HVAC driver's air filter	#871147-871144
P15	HVAC cabin air filter	#874272
P16	Allison transmission High Capacity fluid filter kit	#571709
P17	Accessories air filter element	#641340
P18	Air dryer cartridge	#3097369
P19	Fuel Pro 382 filter element	#510795
P20	Overhead compartment fan air filters	#871159
P21	Engine coolant	#685125
P22	Bosch T1 alternators, voltage regulator	#562981
P23	Bosch T1 alternators, brush set	#562983
P24	Bosch T1 alternators, ball bearing	#562972
P25	Bosch T1 alternators, roller bearing	#562976

2.4 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	185 000 / 300 000	200 000 / 320 000	225 000 / 360 000	250 000 / 400 000	275 000 / 440 000	300 000 / 500 000	500 000 / 800 000	600 000 / 1 000 000		
				proceed to maintenance operation at									each																									
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	27																																				
	Air cleaner, replace element according to restriction indicator	27	24																																			
	Air pre-cleaner, check discharge tube	-	6	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
	Replace crankshaft pulley's rubber damper, See Linnig Repair instruction 142.219 in Section 01																																				•	
	DDC S60 - Engine oil and filter change (DDC recommends 30K)	17	12							•											•																	
	Volvo D13 - Engine oil and filter change, normal ⁴ operation condition (Volvo recommends 35,000 miles / 55,000 km)	17																																				
	Volvo D13 - Engine oil and filter change, heavy ⁴ operation condition	17				•					•										•																•	
	Volvo D13 - Valves & injectors, initial adjust	-	12																																			
	Volvo D13 - Valves & injectors, check & adjust	-	24																																		•	
	Volvo D13 - Drive belts	-	36																																		•	
	Volvo D13 - Aftertreatment fuel injector, clean at 4500 hours or...	-																																			•	
	Volvo D13 - DPF filter, clean at 4500 hours or as per mileage	-																																			•	
03 FUEL																																						
	DDC S60 - Change primary & secondary fuel filters	28 28	12		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		
	Volvo D13 - Change primary & secondary fuel filters at every engine oil change (Volvo recommends 35,000 miles / 55,000 km)	28 28																																				
05 COOLING																																						
	Cooling fan gearbox, check oil level, add if necessary	20	6		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		
	Cooling fan gearbox, change oil	20	12																																			•
	DDC S60 - Coolant filter/conditioner, change element ⁵	18	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

⁴ Normal=fuel consumption more than 6 MPG (less than 39 L/100km) ; Heavy= fuel consumption between 4.7 MPG and 6 MPG (between 39 L/100km and 50 L/100km)

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	185 000 / 300 000	200 000 / 320 000	225 000 / 360 000	250 000 / 400 000		275 000 / 440 000	300 000 / 500 000	500 000 / 800 000	600 000 / 1 000 000							
				proceed to maintenance operation at														each																									
		Coolant surge tank, test coolant solution	21	12	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●																
		DDC S60 - Cooling system, drain, flush and refill	21	24																										●											C		
		Volvo D13 - Coolant filter, change (Extended Life Coolant)	21	12																																					P13		
		Volvo D13 - Cooling system, drain, flush & refill (Extended Life Coolant)	21	48																																			●		C		
06 ELECTRICAL																																											
		Battery terminals, clean and coat terminals	30	12																																							
		Bosh alternators, change brushes and voltage regulator		24														●																							P22,P23		
		Bosh alternators, change bearings		48																																						P24,P25	
07 TRANSMISSION ⁶																																											
		Allison transmission filled with non-TranSynd or non-TES 295 fluid – Refer to TABLE 1 in Section 07: Transmission for fluid and filter change	16																																								I, P16
		Allison transmission filled with TranSynd or TES295 synthetic fluid only, no mixture ⁷ , with Prognostics mode disabled – Refer to TABLE 2 in Section 07: Transmission for fluid and filter change	16																																							H, P16	
		Allison transmission filled with TranSynd or TES295 synthetic fluid only, no mixture with Prognostics mode enabled ^{6, 8} - Change fluid & filters when indicated by TRANSMISSION SERVICE indicator or 60 month (five years) whichever occurs first. In addition, change filters with every fluid change.	16	60																																						H, P16	
		Transmission oil cooler, replace unit if vehicle is equipped with transmission retarder		24																																							
		ZF-Astronic Automatic Transmission, change fluid & filter	16	24																																		●			J		

⁵ 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.

⁶ 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 if a fluid analysis shows that the fluid doesn't need to be changed.

⁷ 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.

⁸ 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

