SECTION 24: LUBRICATION

CONTENTS

ILLUSTRATIONS

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.

⚠ WARNING

Personal injury and property damage may result from fire caused by leaking flammable fluids.

2.1.2 Leaks

Hoses have a limited service life. Thoroughly inspect hoses annually. Look for surface damage or indications of twisted, worn, crimped, cracked or leaking lines. Replace damaged hoses immediately.

Hoses should be replaced during major overhaul or after a maximum of seven years service. Be certain that replacement hoses match the original equipment manufacturer's specifications.

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.

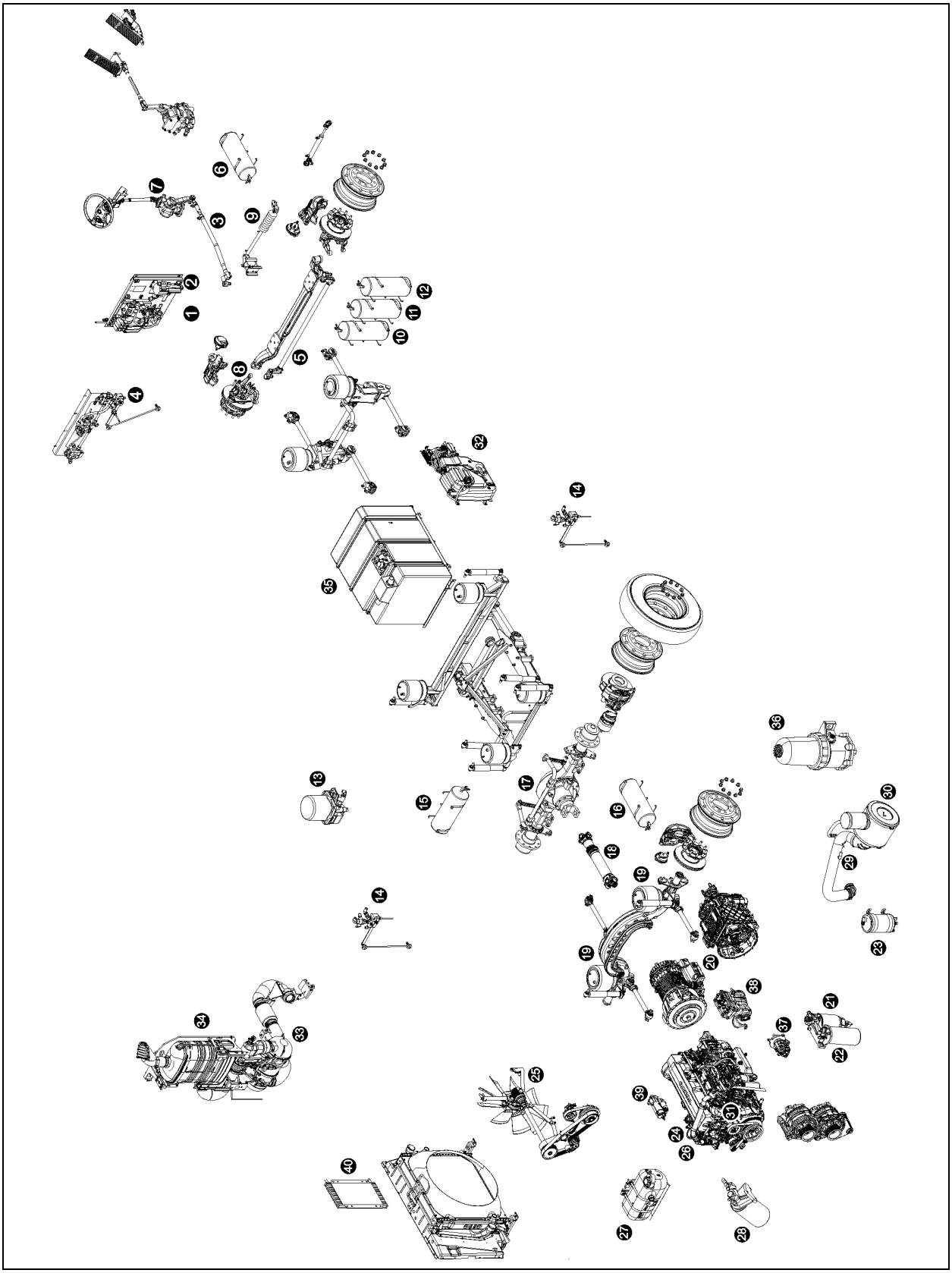

FIGURE 1: LUBRICATION AND SERVICING POINTS ON H3 SERIES VEHICLES (TYPICAL) 24039

1 Accessories air tank drain cock
2 Accessories air filter
3 Steering drag link
4 Height control valve (front)
5 Steering tie rod
6 Accessories air tank
7 Steering column U-joints
8 Steering knuckle pins
9 Steering damper cylinder
10 Emergency / parking brake overrule tank
11 Secondary air tank
12 Kneeling air tank
13 Air dryer
14 Height control valve (rear)
15 Wet air tank
16 Primary air tank
17 Differential
18 Propeller shaft
19 Tag axle lever pivot
20 Transmission
21 Primary fuel filter
22 Secondary fuel filter
23 Power steering fluid tank
24 Engine oil filter
25 Cooling fan gearbox
26 Allison transmission oil dipstick
27 Engine coolant surge tank
28 Coolant filter & conditioner
29 Engine air filter restriction indicator
30 Engine air filter
31 Engine oil dipstick and filler tube
32 DEF tank
33 Diesel particulate filter
34 SCR catalytic converter
35 Diesel fuel tank
36 Davco Fuel Pro 382 fuel filter
37 Power steering pump
38 Air compressor
39 Starter
40 Fuel cooler

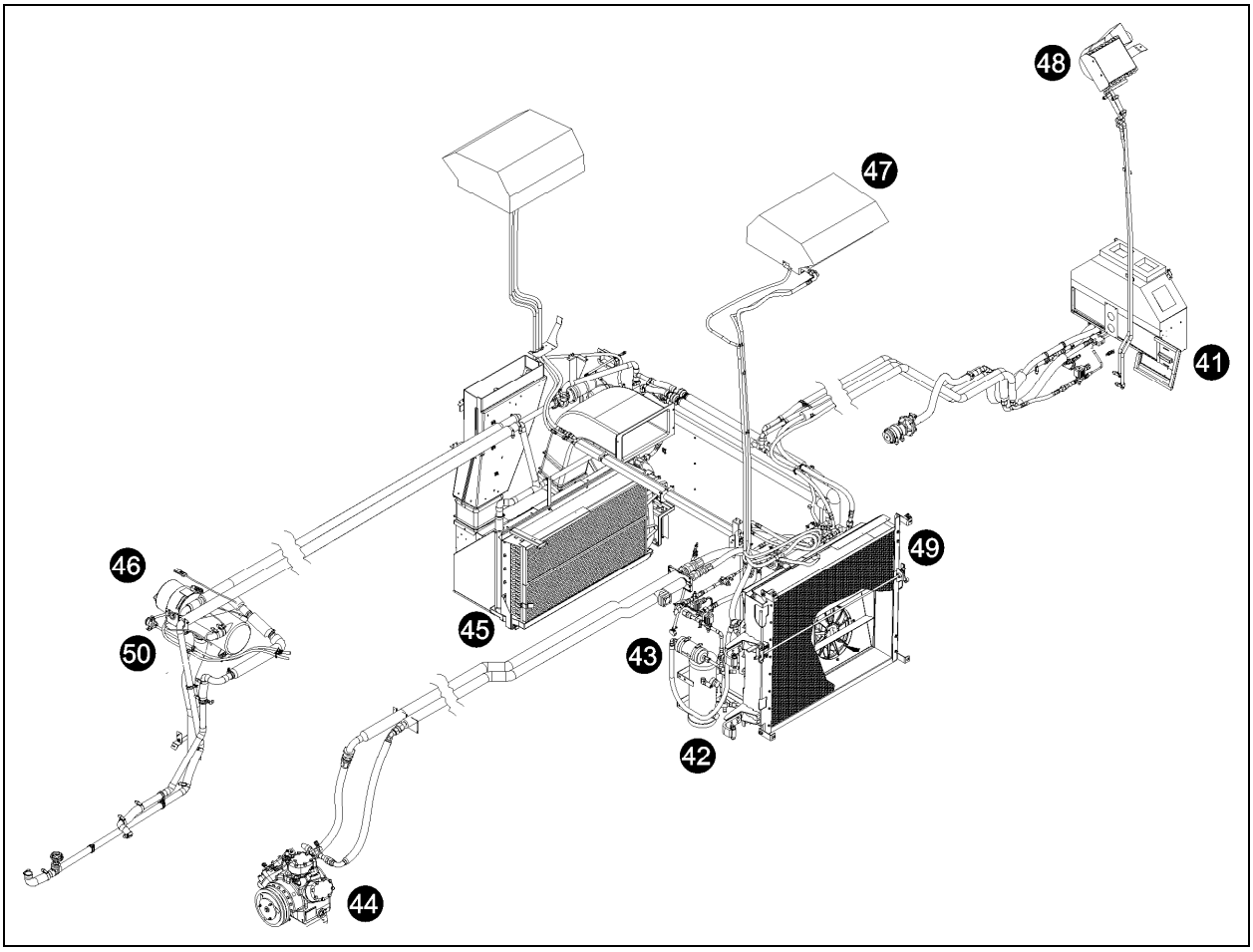

FIGURE 2: LUBRICATION AND SERVICING POINTS – HVAC UNIT

41	HVAC air filter – driver's unit	46	Coolant preheater
42	A/C receiver tank	47	A/C system – passenger's overhead console
43	Refrigerant moisture indicator	48	Upper windshield defrost unit
44	A/C compressor	49	Condenser coil
45	HVAC air filter – passenger's unit	50	Preheater fuel filter

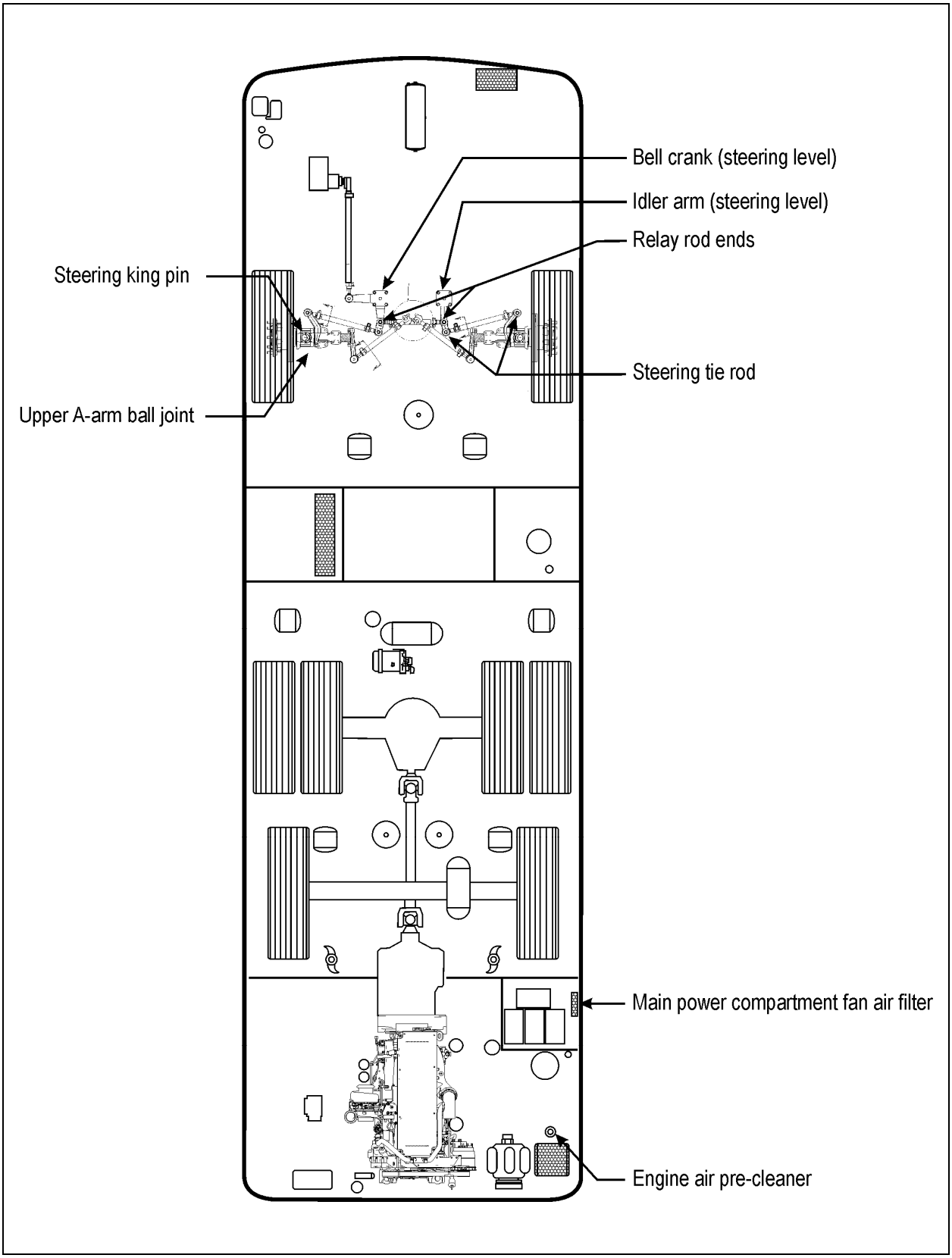

FIGURE 3: LUBRICATION AND SERVICING POINTS ON INDEPENDENT FRONT SUSPENSION VEHICLES (TYPICAL) 24038

2.2 FLUIDS AND LUBRICANTS SPECIFICATIONS

FLUIDS & LUBRICANTS		
REF	**DESCRIPTION**	**SPECIFICATIONS**
A	Engine Oil	VOLVO D13 SAE Viscosity Grade: 10W-30 API Classification CJ-4 meeting Volvo specification **VDS-4**
B	Power Steering Oil	Automatic Transmission Oil, Dexron-III
C	Engine Coolant	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	Volvo I-Shift Transmission	Castrol Syntrans Grade SAE 75W-85 synthetic oil
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 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	Odometer reading [1] (miles / km) For higher odometer readings, repeat at the frequency interval established																																LUBRICANT /FLUID [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 / 960 000	
			proceed to maintenance operation at																								each								
GENERAL																																			
Flexible hoses, thoroughly inspect all hoses	-	12								●								●								●									
01 ENGINE																																			
Air cleaner, change as per mileage or according to restriction indicator	30	24																								●									
Engine oil and filter, change (normal[3] operation condition) **Volvo recommends 35,000miles/55,000km**	24						●					●					●					●													A
Engine oil and filter, change (heavy[3] operation condition)	24					●				●				●				●				●				●									A
Valves and injectors, initial adjust	-	12																				●													
Valves and injectors, check and adjust	-	24																												●					
Drive belts, check	-	36																													●				
Drive belt tensioners & idlers (water pump, A/C compressor, alternators) – remove belts, check for noisy bearings, play, bushing play		3																																	
03 FUEL																																			
Primary & secondary fuel filters, change at every engine oil change **Volvo recommends 35,000miles/55,000km**	21 22						●					●					●					●													
Preheater fuel filter , replace	50									●								●								●									
04 EXHAUST AND AFTERTREATMENT SYSTEM																																			
DPF filter, change	-																													●					
DEF tank, drain and clean with water, clean filler neck strainer	32	12																									●								
DEF pump, replace filter element	32	36																								●									
05 COOLING																																			
Cooling fan gearbox, check oil level and add if required	25	6		●		●		●		●		●		●		●		●		●		●		●		●									G
Cooling fan gearbox, change oil	25	12								●								●								●									G
Coolant surge tank, test coolant solution	27	12		●		●		●		●		●		●		●		●		●		●		●		●									
Coolant filter, change (with Extended Life Coolant)	28	12																								●									
Cooling system, drain, flush & refill (with Extended Life Coolant) (may require “extender”)	27	48																															●		C
06 ELECTRICAL																																			
Alternators – remove belts, check for noisy bearings, bearing play		3		●																															

[1] Proceed to maintenance operation at distance indicated on odometer or specified number of month, whichever comes first.
[2] See paragraph 2.2 of this section for lubricant specifications.
[3] 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	Odometer reading [1] (miles / km) For higher odometer readings, repeat at the frequency interval established																																				LUBRICANT /FLUID [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 / 960 000	
			proceed to maintenance operation at																							each														
Battery terminals, clean and coat terminals	-	12																																					
Bosch HD10 alternator brushes, check and replace if required (commuter application)	-	-								●								●							●														
Bosch HD10 alternator brushes, check and replace if required (for applications other than commuter)	-	-																●																					
07 TRANSMISSION [4]																																							
Allison transmission filled with non-TranSynd or non-TES 295 fluid – Refer to TABLE 1 in Section 07: Transmission for fluid and filter change	20																																						I
Allison transmission filled with TranSynd or TES295 synthetic fluid only, no mixture[5], with **Prognostics mode disabled** – Refer to TABLE 2 in Section 07: Transmission for fluid and filter change	20																																						H
Allison transmission filled with TranSynd or TES295 synthetic fluid only, no mixture with **Prognostics mode enabled** [5, 6] - 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.	20	60																																					H
Transmission oil cooler, replace unit if vehicle is equipped with transmission retarder	-	24																																					
Volvo I-Shift Transmission **(extended oil drain)**, change fluid & filter if filled with Castrol Syntrans SAE 75W85	20	60																																					J
Volvo I-Shift Transmission, change fluid & filter when not using Castrol Syntrans SAE 75W85	20	36																																					J
09 PROPELLER SHAFT																																							
Universal joint and slip joint, grease fittings	18	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●													K
10 FRONT AXLE																																							
Steering knuckle (king) pins, inspect 30,000 miles	8	6					●					●					●				●					●													

[4] 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.

[5] 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.

[6] 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	Odometer reading [1] (miles / km) For higher odometer readings, repeat at the frequency interval established																																LUBRICANT /FLUID [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 / 960 000	
			proceed to maintenance operation at																							each									
Steering knuckle (king) pins, grease two fittings per knuckle	8	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●									K
11 REAR AXLE																																			
Differential, check oil level, add if required	17	6				●				●				●				●				●				●									E
Differential, change oil, clean breathers	17	12																●																	E
Differential, change oil, clean breathers (with full synthetic oil)	17	48																											●						F
Tag axle lever pivot, grease one fitting on each pivot	19	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●										K
12 BRAKE & AIR																																			
Air tanks, drain water from all tanks	-	12		●		●		●		●		●		●		●		●		●		●		●		●									
Accessories air filter, change filter element	2	24																●																	
Air dryer, change cartridge (depending on operation conditions, may be required sooner)	13	24																●																	
Brake pads, check pad wear indicator At each pad replacement: check slack adjuster operation, perform caliper slide check, inspect visually all sealing elements and caps	-	12		●		●		●		●		●		●		●		●		●		●		●		●									
Check caliper running clearance, check condition of the caliper cover, slack adjuster cap and guide pin assembly covers	-	12																																	
13 WHEELS, HUBS & TIRES																																			
Hub bearing inspect 30, 000 miles. See Dana Spicer Service Manual NDS Axle Range	8	12					●					●					●				●					●									

TABLE A

LUBRICATION AND SERVICING SCHEDULE	Item	Months	Odometer reading [1] (miles / km) For higher odometer readings, repeat at the frequency interval established																																LUBRICANT /FLUID [2]
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			proceed to maintenance operation at																								each								
14 STEERING																																			
Steering tie rod ends, clean and grease one fitting at each end	5	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●									K
Drag link ends, clean and grease one fitting at each end	3	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●									K
Tie rod end & drag link end ball joints, inspect for corrosion		12																																
Steering damper cylinder, grease one fitting at rod end	9	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●									K
Power steering reservoir, replace oil and filter cartridges	23	12								●								●								●									B
VIP only- Idler arm, grease fitting	-	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●									K
VIP only- Bell crank, grease fitting	-	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●									K
VIP only- Relay rod ends, grease one fitting at each end	-	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●									K
16 SUSPENSION																																			
Upper A-Arm ball joint, grease fitting	6	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●									L
22 HEATING & AIR CONDITIONING																																			
A/C compressor, check oil level, add if required	44	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●									D
A/C receiver tank, check refrigerant level, add if required	42	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●									
Refrigerant moisture indicator, replace filter dryer unit according to moisture indicator (as needed)	43	6	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●									
HVAC air filters, clean or replace all elements	41 45	6		●		●		●		●		●		●		●		●		●		●		●		●									
Parcel rack fan air filters, clean or replace	47	6		●		●		●		●		●		●		●		●		●		●		●		●									
Condenser discharge tube, qty:2, check to see if clogged [7]	-	3																																	
Front discharge tube, qty:2, check to see if clogged	-	3																																	
Evaporator discharge tube, qty:6, check to see if clogged	-	3																																	
Evaporator motor, condenser motor, recirculating pump drive motor, inspect brush, replace if required	-	12								●								●								●									

[7] Discharge tubes are rubber tubes located under vehicle

TABLE A