CONTENTS

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 SERVICING

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 vibrate and move to a certain extent, clamps and ties can fatigue over 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.

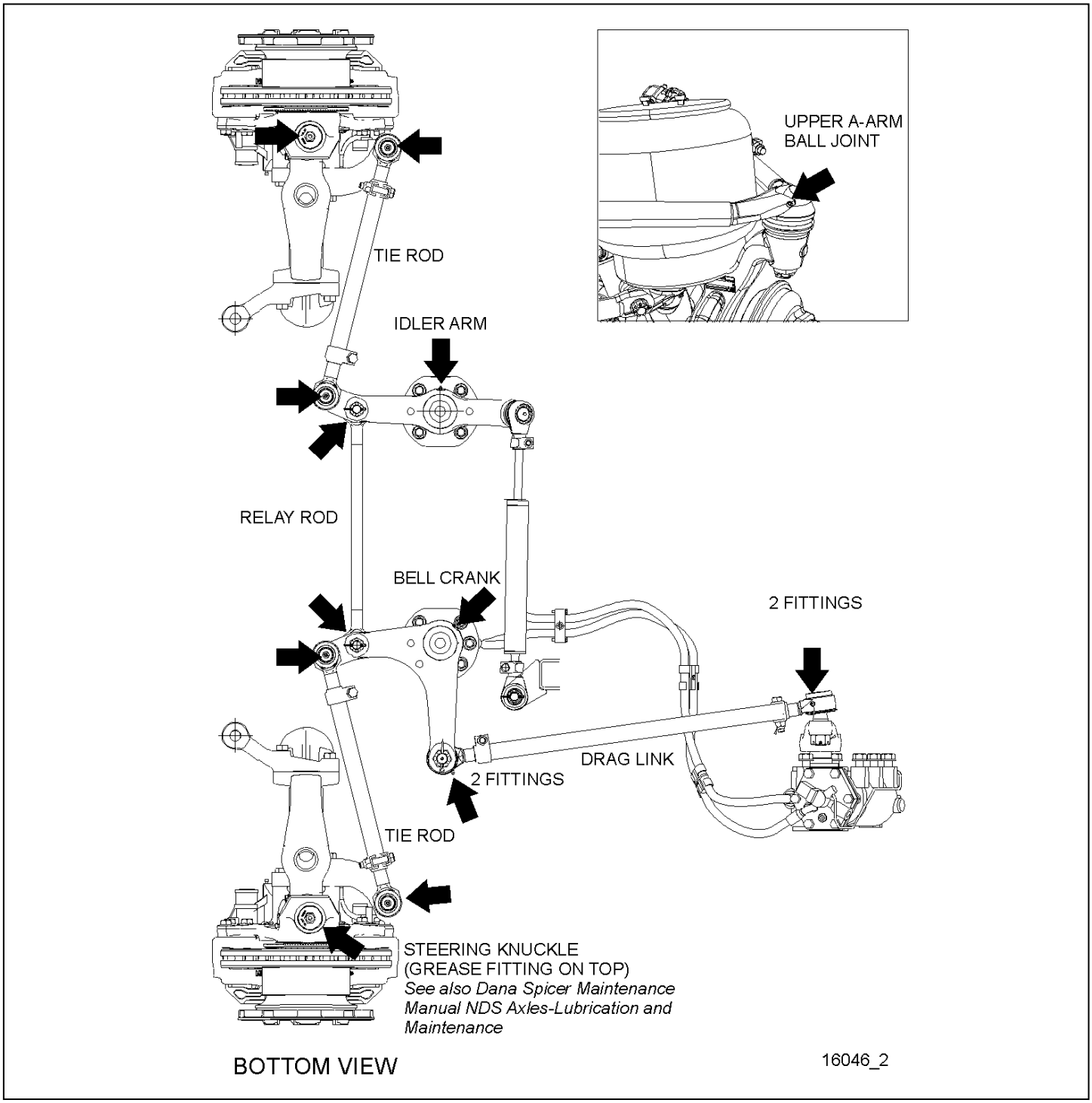

FIGURE 1: LUBRICATION FITTING LOCATIONS - INDEPENDENT FRONT SUSPENSION VEHICLES (TYPICAL)

FIGURE 2: LUBRICATION AND SERVICING POINTS (I-BEAM FRONT AXLE SHOWN) TYPICAL

1 Accessories air tank drain cock
2 Accessories air filter
3 Drag link
4 Height control valve (front)
5 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 Drive Axle
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 3: X3 SERIES COMPONENTS IDENTIFICATION (COMPONENTS REPRESENTATION MAY DIFFER SLIGHTLY FROM ACTUAL VEHICLE)

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 Alternators
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 Cooling assembly (radiator & CAC)

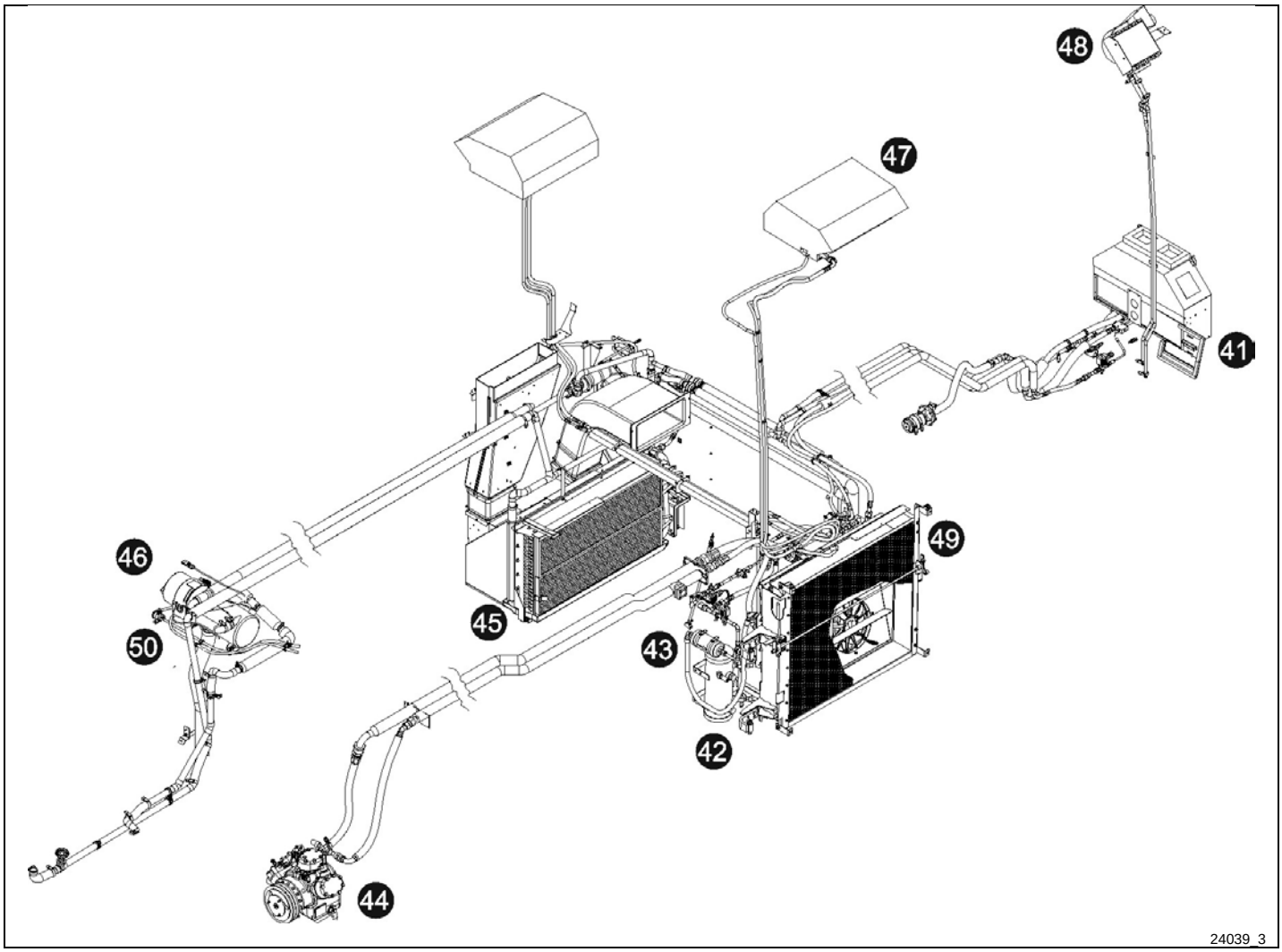

FIGURE 4: LUBRICATION AND SERVICING POINTS – HVAC UNIT

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

3 LUBRICATION AND SERVICING SCHEDULE - COACHES

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

OPERATING CONDITION

Use the information that follows to determine the operating condition and usage applicable to your vehicle

Heavy	**Normal**
Between 5 and 6 mpg Between 39 and 50 L/100km	Greater than 6 mpg Less than 39 L/100km

LUBRICATION AND SERVICING SCHEDULE

H3 Series coaches

X3 Series coaches

H3 VIP commercial use

X3 VIP commercial use

A red stripe in the left margin of the schedule highlights the latest changes

PROCEED TO MAINTENANCE OPERATION EVERY

Proceed to maintenance operation at mileage indicated on odometer or specified number of month, whichever comes first

Item			Item	Month	6 250 mi / 10 000 km	12 500 mi / 20 000 km	31 250 mi / 50 000 km	50 000 mi / 80 000 km	100 000 mi / 160 000 km	106 000 mi / 170 000 km	125 000 mi / 200 000 km	150 000 mi / 240 000 km	185 000 mi / 300 000 km	250 000 mi / 400 000 km	300 000 mi / 500 000 km	500 000 mi / 800 000 km	600 000 mi / 960 000 km	Lubricant / Fluid [1]
GENERAL																		
1	Flexible hoses – thoroughly inspect all hoses			12				●										
01 ENGINE																		
1	regular drains	Engine oil & filter – heavy operating condition, change every 35 000mi / 60 000km	24															C
2		Engine oil & filter – normal operating condition, change every 45 000mi / 75 000km	24															C
3	extended drains B	Engine oil & filter – heavy operating condition, change every 40 000mi / 65 000km	24															B
4		Engine oil & filter –normal operating condition, change every 55 000mi / 90 000km	24															B
5	extended drains A	Engine oil & filter – heavy operating condition, change every 45 000mi / 70 000km	24															A
6	(factory filled)	Engine oil & filter – normal operating condition, change every 60 000mi / 95 000km	24															A
7	Air cleaner – change filter element when indicated by restriction indicator or after a maximum of 2 years		30	24														
8	Drive belt (water pump) – inspect for cracks or frayed material, change belt that display obvious wear or defects			12			●											★
9	Valve & injector clearance – initial adjustment		24	12								●						★
10	Valve & injector clearance – check & adjust		24	24											●			★
11	Drive belt tensioners & idlers (water pump, fan, alternators) – remove belts, check for noisy bearings, play, bushing play			3														★
12	Drive belt tensioners & idlers (water pump, fan, alternators) – change proactively											●						★
03 FUEL																		
1	Primary & secondary fuel filters – change at every engine oil change		21 22															
2	Preheater fuel filter – change		50	12				●										
04 EXHAUST AND AFTERTREATMENT SYSTEM																		
1	Diffuser assembly, rain cap & drain tube – check proper functioning, clean		34	12														
2	DEF pump filter – change		32	36								●						

★= Specialty tool required. You will find the SPECIALTY TOOLS REQUIRED FOR REGULAR MAINTENANCE table and the LUBRICANTS SPECIFICATIONS table following this Lubrication and Servicing Schedule.

[1] See paragraph 6.0 FLUIDS AND LUBRICANTS SPECIFICATIONS of this section for lubricant specifications.

LUBRICATION AND SERVICING SCHEDULE H3 Series coaches X3 Series coaches H3 VIP commercial use X3 VIP commercial use A red stripe in the left margin of the schedule highlights the latest changes		PROCEED TO MAINTENANCE OPERATION EVERY Proceed to maintenance operation at mileage indicated on odometer or specified number of month, whichever comes first															
		Item	Month	6 250 mi / 10 000 km	12 500 mi / 20 000 km	31 250 mi / 50 000 km	50 000 mi / 80 000 km	100 000 mi / 160 000 km	106 000 mi / 170 000 km	125 000 mi / 200 000 km	150 000 mi / 240 000 km	185 000 mi / 300 000 km	250 000 mi / 400 000 km	300 000 mi / 500 000 km	500 000 mi / 800 000 km	600 000 mi / 960 000 km	Lubricant / Fluid [1]
3	DEF tank – drain, clean with water, clean filler neck strainer	32	12								●						
4	Aftertreatment Hydrocarbon Injector (AHI) nuzzle – change										●						
5	DPF filter – either clean or change filter cartridge every 400 000mi / 650 000km																★
	05 COOLING																
1	Coolant surge tank – test coolant solution	27	12		●												★
2	**H3 only:** Radiator fan gearbox – check oil level	25	6		●												
3	**H3 only:** Radiator fan drive belt – inspect for cracks or frayed material, change belt that display obvious wear or defects		12			●											
4	Radiator – inspect exterior core & clean with low pressure water jet if necessary								●								
5	**H3 only:** Radiator fan gearbox – change oil	25	12						●								K
6	Coolant filter – change (Long-Life Filter without additives to be used with Extended Life Coolant)	28	12								●						
7	Cooling system – drain, flush & refill (Extended Life Coolant) every 750 000mi / 1 200 000km	27	96														E ★
	06 ELECTRICAL																
1	Power cables inspection – Perform MI15-24		3														
2	Battery terminals – clean & coat terminals with Nyogel		12														
3	HD10 Bosch alternators drive belt – inspect for cracks or frayed material, change belt that display obvious wear or defects		3			●											
	07 TRANSMISSION [2]																
1	**Allison transmission filled with TES389 approved fluid and Prognostics mode disabled** – change transmission fluid, Main & Lube filter (Refer to TABLE 1 in Section 07: Transmission for Main & Lube filter change intervals)	20															M
2	**Allison transmission filled with TranSynd or TES295 synthetic fluid only, no mixture[3,4] and Prognostics mode disabled** – change transmission fluid, Main & Lube filter (Refer to TABLE 2 in Section 07: Transmission for Main & Lube filter change intervals)	20															L
3	**Allison transmission filled with TranSynd or TES295 synthetic fluid only, no mixture[3,4] and Prognostics mode enabled** – change fluid & filters when indicated by TRANSMISSION SERVICE indicator or 60 months whichever occurs first. In addition, change filters with every fluid change	20	60														L
4	**Allison transmission filled with TES389 approved fluid with Prognostics mode enabled** – change fluid & filters when indicated by TRANSMISSION SERVICE indicator or 24 months whichever occurs first.	20	24														M

[2] In the absence of a fluid analysis program, the fluid change interval listed in Table 1, Table 2 & Table 3 should be used. Change filters according to Table 1, Table 2 & Table 3 even if a fluid analysis shows that the fluid doesn't need to be changed.

[3] When the transmission contains a mixture of fluids (defined as the quantity of non-TranSynd or non-TES 295 fluid remaining in the transmission after a fluid change combined with the quantity of TranSynd or TES295 required to fill the transmission to the proper level), perform the fluid and filter change according to the TES389 intervals.

[4] Extended TranSynd or TES 295 fluid and filter change intervals are only allowed with Allison High-Capacity filters.

LUBRICATION AND SERVICING SCHEDULE H3 Series coaches X3 Series coaches H3 VIP commercial use X3 VIP commercial use A red stripe in the left margin of the schedule highlights the latest changes		PROCEED TO MAINTENANCE OPERATION EVERY Proceed to maintenance operation at mileage indicated on odometer or specified number of month, whichever comes first															
		Item	Month	6 250 mi / 10 000 km	12 500 mi / 20 000 km	31 250 mi / 50 000 km	50 000 mi / 80 000 km	100 000 mi / 160 000 km	106 000 mi / 170 000 km	125 000 mi / 200 000 km	150 000 mi / 240 000 km	185 000 mi / 300 000 km	250 000 mi / 400 000 km	300 000 mi / 500 000 km	500 000 mi / 800 000 km	600 000 mi / 960 000 km	Lubricant / Fluid [1]
	In addition, change filters with every fluid change.																
5	Transmission oil cooler, change unit if vehicle is equipped with transmission retarder		24														
6	**Volvo I-Shift Transmission** – change fluid & filter	20	36										●				O
7	**Volvo I-Shift Transmission extended drains** [5] – change fluid & filter	20	60												●		N
	09 PROPELLER SHAFT																
1	Perform Spicer's Driveshaft "Inspection Procedures" [6]	18				●											
2	Grease one fitting on each universal joint	18	6					●									P
	10 FRONT I-BEAM AXLE																
1	Steering knuckle kingpins – grease two fittings per knuckle	8	6	●													P
2	Steering knuckle kingpins – inspect, check permissible slackness	8	6			●											
	11 REAR AXLES																
1	Meritor drive axle – check differential oil level, add if necessary every 25 000 mi	17	6														
2	Tag axle lever pivot – grease one fitting on each pivot	19	6	●													P
3	**Meritor** drive axle – change differential oil, clean breather	17	12					●									G
4	**Meritor** drive axle – change differential oil, clean breather (with full synthetic oil)	17	48										●				H
5	**ZF** Drive axle – check differential oil level, add if necessary at every engine oil change	17															I
6	**ZF** Drive axle – change differential oil and breather	17	36						●								I
	12 BRAKE & AIR SYSTEM																
1	Check proper functioning of the adjuster, check caliper running clearance, check caliper movement along guide pins, check sealing elements, at every pad replacements or once a year whichever comes first		12														
2	ABS & Electronic Stability Control systems – check proper functioning		12														★
3	Air tanks – drain water from all tanks		6		●												
4	Brake pads – check pad wear indicator. Visually check condition of the slack adjuster cap & guide pin covers				●												
5	Accessories air filter – change filter element	2	24					●									
6	Air dryer – change cartridge	13	24					●									
	13 WHEELS, HUBS & TIRES																
1	Unitized hub bearing, front and tag axle – inspect, check end play	8	12			●											★
2	Meritor drive axle bearing – check end play	17	12					●									
3	ZF Drive axle – check compact bearing axial play	17	12					●									★
4	ZF Drive axle – change grease in compact bearing	17	72												●		J ★
	14 STEERING																

[5] For normal and heavy operating conditions using oil approved for extended drains.
[6] Refer to "Spicer Driveshafts Service Manual DSSM0100".

LUBRICATION AND SERVICING SCHEDULE

H3 Series coaches

X3 Series coaches

H3 VIP commercial use

X3 VIP commercial use

A red stripe in the left margin of the schedule highlights the latest changes

PROCEED TO MAINTENANCE OPERATION EVERY

Proceed to maintenance operation at mileage indicated on odometer or specified number of month, whichever comes first

		Item	Month	6 250 mi / 10 000 km	12 500 mi / 20 000 km	31 250 mi / 50 000 km	50 000 mi / 80 000 km	100 000 mi / 160 000 km	106 000 mi / 170 000 km	125 000 mi / 200 000 km	150 000 mi / 240 000 km	185 000 mi / 300 000 km	250 000 mi / 400 000 km	300 000 mi / 500 000 km	500 000 mi / 800 000 km	600 000 mi / 960 000 km	Lubricant / Fluid [1]
1	**I-beam**: Tie rod end ball joints – inspect for corrosion	5	12														
2	**I-beam**: Tie rod ends – clean & grease one fitting at each end	5	6	●													P
3	**I-beam**: Steering damper cylinder – grease one fitting at rod end	9	6	●													P
4	**ALL:** Drag link end ball joints – inspect for corrosion	3	12														
5	**IFS** [7]: Steering knuckle (king) pins – grease fitting on top		6	●													P
6	**IFS**: Tie rod ends – grease fitting		6	●													P
7	**IFS**: Drag link ends – clean and grease two fittings at each end		6	●													P
8	**IFS**: Idler arm – grease fitting		6	●													P
9	**IFS**: Bell crank – grease fitting		6	●													P
10	**IFS**: Relay rod ends – grease one fitting at each end		6	●													P
11	**IFS**: Steering knuckle (king) pins – check play	8	6			●											
12	**ALL**: Power steering reservoir filter element – change	23	12														
13	**ALL**: Power steering fluid – check fluid condition (color) through visual inspection and change if required. Check level, add if necessary	23	12					●									D
14	**ALL**: Steering system – check play	7	12									●					
	18 BODY																
1	Structure inspection for corrosion – Perform MI15-18 every 5 years for normal duty vehicles and normal environment operation																
2	Structure inspection for corrosion – Perform MI15-18, every 2 years starting from the 5th year in service for severe duty vehicles and harsh environment operation																
	22 HEATING & AIR CONDITIONING																
1	Evaporator compartment & driver's HVAC units – clean heater core with low air pressure		12														
2	Evaporator compartment & driver's HVAC units – clean evaporator core with low air pressure		12														
3	Condenser compartment & driver's HVAC units – clean condenser core with low air pressure		12														
4	A/C compressor – check oil level, add if necessary	44	12														F
5	A/C compressor – change oil, clean oil filter and magnetic plug	44	36														F ★
6	A/C compressor – empty shaft seal oil collection tube	44	1	●													
7	A/C receiver tank – check refrigerant level, add if necessary	42	6	●													
8	Filter dryer unit – check refrigerant moisture indicator, change filter dryer unit according to moisture indicator	43	6	●													
9	Passenger's unit 2-part air filter – clean or change	45	6		●												
10	**X3 Series only**. Evaporator compartment door fresh air intake filter – clean or change		6		●												
11	Parcel rack fans air filter – clean or change	47	6		●												
12	Driver's HVAC unit return air filter – clean or change	41	6		●												
13	A/C compressor drive belt – check tension, inspect for cracks or frayed material		12			●											

[7] IFS=Independent Front Suspension

LUBRICATION AND SERVICING SCHEDULE H3 Series coaches X3 Series coaches H3 VIP commercial use X3 VIP commercial use A red stripe in the left margin of the schedule highlights the latest changes			PROCEED TO MAINTENANCE OPERATION EVERY Proceed to maintenance operation at mileage indicated on odometer or specified number of month, whichever comes first														
	Item	Month	6 250 mi / 10 000 km	12 500 mi / 20 000 km	31 250 mi / 50 000 km	50 000 mi / 80 000 km	100 000 mi / 160 000 km	106 000 mi / 170 000 km	125 000 mi / 200 000 km	150 000 mi / 240 000 km	185 000 mi / 300 000 km	250 000 mi / 400 000 km	300 000 mi / 500 000 km	500 000 mi / 800 000 km	600 000 mi / 960 000 km	Lubricant / Fluid [1]
23 ACCESSORIES																	
1 AFSS extinguisher tank – change or rebuild		72															
2 AFSS extinguisher tank – test hydrostatically		144															

3.1 COACHES LUBRICATION AND SERVICING SCHEDULE CHANGE LOG

	CHANGE LOG - LUBRICATION AND SERVICING SCHEDULE	DATE
1	ADDED: 11 REAR AXLES – Lubrication intervals for ZF drive axle. 13 REAR AXLES – ZF drive axle compact bearing maintenance	Apr.26, 2016
2	ADDED: 14 STEERING – Steering system play inspection	Aug.18, 2016
3	REMOVED: 06 ELECTRICAL – HD10 Bosch alternators brushes inspection & replacement	Nov.10, 2016
4	UPDATE: 01 ENGINE – Engine oil & filter change interval extended if using appropriate oil	Dec.15, 2016
5	REMOVED: 05 COOLING – Coolant filter – change at every engine oil change (…with Fully Formulated Coolant)	Dec.15, 2016
6	REMOVED: 05 COOLING – Cooling system – drain, flush & refill (fully formulated coolant)	Dec.15, 2016
7	UPDATE: 01 ENGINE – Drive belt tensioners & idlers – check for noisy bearings, play, bushing play, was 300 000mi, changed to 3 months	June 7, 2017
8	ADDED: 01 ENGINE – Drive belt tensioners & idlers – change proactively	June 7, 2017
9	UPDATE: 06 ELECTRICAL – HD10 Bosch alternators drive belt – inspection, was 12 months, changed to 3 months	June 7, 2017
10	UPDATE: 14 STEERING – Power steering fluid drain, was 50 000mi, changed to “check condition at 100 000mi”	Nov.15, 2017
11	UPDATE: 14 STEERING – Power steering reservoir filter element change, was 50 000mi/12 months, changed to 12 months	Nov.15, 2017
12	UPDATE: 22 HEATING & AIR CONDITIONING – change oil, clean oil filter – recommended servicing changed to a formal servicing	Nov.15, 2017
13		
14		
15		
16		
17		
18		
19		
20		

4 SPECIALTY TOOLS REQUIRED FOR REGULAR MAINTENANCE OF THE VEHICLES

Use this list of specialty tools in conjunction with the LUBRICATION AND SERVICING SCHEDULE

SPECIALTY TOOLS REQUIRED FOR REGULAR MAINTENANCE				
#	MAINTENANCE DESCRIPTION	TOOL #	SPECIALITY TOOL DESCRIPTION	PART #
01 ENGINE				
8,11,12	drive belts and idlers	1	belt tensioner wrench	010032
9, 10	valves & injectors	2	engine cranking adapter	88840317
		3	feeler gauge 2.45-2.55	88880052
		4	feeler gauge set	85111377
		5	setting tool 3.20, 3.85	88800232
03 FUEL				
1	Davco Fuel Pro 382 system	6	collar spanner wrench	530224
04 EXHAUST AND AFTERTREATMENT SYSTEM				
5	DPF filter – either clean or change	7	DPF removal tool	680790
05 COOLING				
1	test coolant solution	8	refractometer coolant/DEF	88890105
7	cooling system drain, flush & refill	9	coolant extractor (optional)	85112740
		10	tube with connector (optional)	9996049
06 ELECTRICAL				
		11	none	
07 TRANSMISSION				
		12	none	
09 PROPELLER SHAFT				
		13	none	
10 FRONT AXLE				
		14	none	
11 REAR AXLE				
		15	none	
12 BRAKE & AIR SYSTEM				
2	ABS & Electronic Stability Control systems – check proper functioning	16	ACOM diagnostic software available free of charge	Bendix website
13 WHEEL, HUBS & TIRES				
1	Hub bearing, front & tag axle – inspect	17	dial indicator with magnetic base	*

#	MAINTENANCE DESCRIPTION	TOOL #	SPECIALITY TOOL DESCRIPTION	PART #
3	ZF Drive Axle - check compact bearing axial play	18	14 mm hex drive socket	*
		19	E20 Torx socket (external)	*
		20	dial indicator with magnetic base	*
4	ZF Drive Axle - change grease in compact bearing	18	14 mm hex drive socket	*
		19	E20 Torx socket (external)	*
		21	spanner wrench 5870 401 146	N67817-21
		22	lifting bracket 5870 281 043	19400451
		23	driver 5870 050 007	19400449
		24	handle 5870 260 004	N67817-19
		25	driver 5870 051 053	N67817-16
		26	seal installer 5870 651 085	19400265
		27	pry bar 5870 345 071	N78017-20
14 STEERING				
		28	none	
16 SUSPENSION				
		29	none	
18 BODY				
		30	none	
22 HEATING & AIR CONDITIONING				
5	A/C compressor – change oil, clean oil filter	31	Refrigerant recovery unit	

*: Common tool. Contact your local tool supplier

5 LUBRICATION AND SERVICING SCHEDULE - MOTORHOMES

LUBRICATION AND SERVICING SCHEDULE H3-45 VIP & X3-45 VIP MOTORHOMES (Private Use) A red stripe in the left margin of the schedule highlights the latest changes	ITEM	EVERY (months)	LUBRICANT / FLUID [8]
GENERAL			
All flexible hoses **–** inspect		12	
H3 VIP Series only: Main power compartment fan air filter – inspect		12	
01 ENGINE			
Engine oil and filters – change	24	12	A B C
Air cleaner – change filter element	30	24	
Engine mounted alternators & house alternator(s) – change drive belts and intermediary drive belts		24	
Coolant pump drive belt – change		24	
Valves and injectors – initial adjustment: after 2 500 hours or 36 months whichever occurs first	24	36	
Valves and injectors – check and adjust: every 5 000 hours or 72 months whichever occurs first	24	72	
03 FUEL			
Primary fuel filter & secondary fuel filter – change at every engine oil change	21, 22		
04 EXHAUST AND AFTERTREATMENT SYSTEM			
DPF filter – either clean or change filter cartridge after 4 500 hours	33		
Aftertreatment Hydrocarbon Injector (AHI) nuzzle – change after 4 500 hours			
DEF tank – drain and clean with water, clean filler neck strainer	32	12	
Diffuser assembly, rain cap & drain tube – check proper functioning, clean	34	24	
DEF pump – change filter element	32	36	
05 COOLING			
Radiator fan gearbox – check oil level, add if required	25	12	K
Coolant surge tank – test coolant solution	27	12	
Coolant filter – change (Long-Life filter with Extended Life Coolant)	28	12	
Radiator fan drive belt – inspect for cracks or frayed material, change if required	25	24	
Radiator fan gearbox – change oil	25	48	K
Cooling system – drain, flush & refill (with Extended Life Coolant)	27	96	E
06 ELECTRICAL			
Battery terminals – clean and coat terminals		12	
Power cables inspection – Perform MI15-24		24	
07 TRANSMISSION [9]			
Filled with TES389 approved fluid, with **Prognostics mode disabled** – see TABLE 1 in *Section 07: Transmission* for fluid and filter change	20		M
Filled with TranSynd or TES295 approved fluid only, no mixture[10], with **Prognostics mode disabled** – See TABLE 2 in *Section 07: Transmission* for fluid and filter change	20		L

[8] See paragraph 6.0 of this section for lubricant specifications.
[9] In the absence of a fluid analysis program, the fluid change interval listed in Table 1, Table 1 & Table 3 should be used. Change filters according to Table 1, Table 2 & Table 3 even if a fluid analysis shows that the fluid doesn't need to be changed.

LUBRICATION AND SERVICING SCHEDULE H3-45 VIP & X3-45 VIP MOTORHOMES (Private Use) A red stripe in the left margin of the schedule highlights the latest changes	ITEM	EVERY (months)	LUBRICANT / FLUID [8]
Filled with TranSynd or TES295 approved fluid only, no mixture with **Prognostics mode enabled** [11] - Change fluid & filters when indicated by TRANSMISSION SERVICE indicator or 60 months whichever occurs first. In addition, change filters with every fluid change.	20	60	L
Filled with TES389 approved fluid only, no mixture with **Prognostics mode enabled** – Change fluid & filters when indicated by TRANSMISSION SERVICE indicator or 24 months whichever occurs first. In addition, change filters with every fluid change.	20	24	M
09 PROPELLER SHAFT			
Universal joint – grease on fitting on each universal joint	18	12	P
11 REAR AXLE			
Drive axle – check differential oil level, add if necessary	17	12	
Drive axle – change differential oil, clean breathers	17	12	G
Tag axle lever pivot, grease one fitting on each pivot	19	12	P
Drive axle – change differential oil, clean breathers (with full synthetic oil)	17	48	H
12 BRAKE & AIR			
Air tanks – drain water from all tanks		12	
Brake pads[12] – check pad wear indicator		12	
Check caliper running clearance, check condition of caliper cover, slack adjuster cap and guide pin assembly covers		12	
ABS & electronic stability control systems – check proper functioning		12	
Air dryer – change cartridge	13	24	
Accessories air filter – change filter element	2	48	
13 WHEELS, HUBS & TIRES			
Unitized hub bearing, front and tag axle – inspect, check end play	8	12	
14 STEERING			
Steering knuckle (king) pins – check play	8	12	
Steering knuckle (king) pins – grease fitting on top	8	12	P
Tie rod ends – clean and grease one fitting at each end		12	P
Drag link ends – clean and grease two fittings at each end		12	P
Tie rod end & drag link end ball joints – inspect for corrosion		12	
Power steering reservoir filter element – change	23	24	
Power steering fluid – check fluid condition (color) through visual inspection and change if required. Check level, add if necessary	23	12	D
Idler arm – grease fitting		12	P
Bell crank – grease fitting		12	P
Relay rod ends – grease one fitting at each end		12	P
Steering system – check play		60	
16 SUSPENSION			
Independent front suspension upper a-arm ball joint – grease fittings		12	Q

[10] 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 or TES295 required to fill the transmission to the proper level), perform the fluid and filter change according to the TES389 intervals.

[11] Extended TranSynd or TES295 fluid and filter change intervals are only allowed with Allison High-Capacity filters.

[12] At each pad replacement, check slack adjuster operation, perform caliper slide check and inspect visually all sealing elements & caps.

LUBRICATION AND SERVICING SCHEDULE H3-45 VIP & X3-45 VIP MOTORHOMES (Private Use) A red stripe in the left margin of the schedule highlights the latest changes	ITEM	EVERY (months)	LUBRICANT / FLUID [8]
22 HEATING & AIR CONDITIONING			
A/C compressor – check oil and replenish if required	44	12	F
A/C compressor (Bitzer) – empty shaft seal oil collection tube	44	1	
A/C compressor (Bitzer) – check oil level	44	12	
A/C compressor (Bitzer) – change oil, clean oil filter and magnetic plug	44	36	
A/C receiver tank – check refrigerant level, add if required	42	12	
Refrigerant moisture indicator – check filter dryer unit, change according to moisture indicator	43	12	
HVAC air filters – clean all filter elements	41, 45	12	
A/C compressor drive belt – check tension, inspect for cracks or frayed material, change if required		24	

5.1 MOTORHOMES LUBRICATION AND SERVICING SCHEDULE CHANGE LOG

	CHANGE LOG - LUBRICATION AND SERVICING SCHEDULE	DATE
1	ADDED: 04 EXHAUST & AFTERTREATMENT SYSTEM - Diffuser assembly, rain cap & drain tube – check proper functioning, clean	Sept.04, 2014
2	UPDATE: 05 COOLING – Cooling system with extended life coolant, drain flush & refill, was 48 months, changed to 96 months	Jan.08, 2015
3	ADDED: 06 ELECTRICAL – Power cables inspection	May 27, 2015
4	ADDED: 04 EXHAUST AND AFTERTREATMENT SYSTEM – AHI nuzzle replacement	Aug.12, 2015
5	ADDED: 14 STEERING – Steering system play inspection	Aug.18, 2016
6	UPDATE: 14 STEERING – Steering system play inspection, was 48 months, changed to 60 months	Sept.18, 2016
7	REMOVED: 06 ELECTRICAL –HD10 Bosch alternators brushes inspection & replacement	Nov.10, 2016
8	UPDATE: 14 STEERING – Power steering fluid drain, changed to “check condition”	Nov.15, 2017
9	UPDATE: 14 STEERING – Power steering reservoir filter element change, was 12 months, changed to 24 months	Nov.15, 2017
10	ADDED: 22 HEATING & AIR CONDITIONING – check oil level, change oil, clean oil filter and magnetic plug	Nov.15, 2017
11		
12		

6 FLUIDS AND LUBRICANTS SPECIFICATIONS

Coaches Schedule	FLUIDS & LUBRICANTS TABLE		Motorhomes Schedule
REF	**SYSTEMS**	**DESCRIPTIONS / SPECIFICATIONS**	
A	Engine Oil	Extended drains A	SAE Viscosity Grade: 10W-30 [1] Filled with "**Volvo Premium Motor Oil VDS-4.5**"
B	Engine Oil	Extended drains B	SAE Viscosity Grade: 10W-30 [1] Filled with other Volvo Approved VDS-4.5 oils
C	Engine Oil	Regular drains	SAE Viscosity Grade: 10W-30 [1] Filled with "**Volvo Premium Motor Oil VDS-4**"
D	Power Steering fluid	Automatic Transmission Fluid (ATF), Dexron-IIIF, G, H or Dexron-VI Refer to **Bosch List of lubricants TE-ML 09** for further details	
E	Engine Coolant	Texaco or Chevron Extended Life Coolant (ELC) 50% antifreeze/water solution is normally used	
F	A/C Compressor Oil	Central HVAC system: Polyolester oil, HFC 134a compatible; Castrol SW-68 (POE) or equivalent Small HVAC system: PAG oil	
G	Meritor drive axle	**Regular drains**	Refer to Meritor technical bulletin **TP-9539 Approved Rear Drive Axle Lubricants**
H	Meritor drive axle	**Extended drains with Full Synthetic**	Refer to Meritor technical bulletin **TP-9539 Approved Rear Drive Axle Lubricants**
I	ZF Drive Axle	Chevron Multigear Oil 80W-90 (ZF Lubricant Class 12M) Refer to ZF **List of lubricants TE-ML 12** for other approved lubricants. Take note that oil change intervals will differ when using other lubricant class	

FLUIDS & LUBRICANTS TABLE

Coaches Schedule | Motorhomes Schedule

REF	SYSTEMS	DESCRIPTIONS / SPECIFICATIONS	
J	ZF Drive Axle compact bearing (hub unit)	**ZF Grease Class 12H** Fuchs Europe Schmierstoffe GMBS/Renolit LXPEP-2 Lithium saponified, multipurpose grease, NLGI No. 2, Refer to ZF **List of lubricants TE-ML 12** for other approved lubricants. Take note that grease change intervals may differ when using other lubricant class	
K	Cooling Fan Gearbox Oil	Synthetic gear lubricant 75W-90 (refer to Linnig bulletin *142.377* for the list of approved oils)	
L	Allison Transmission Oil	**Extended drains**	Castrol TranSynd™ Synthetic Transmission Fluid for Allison or TES 295 approved equivalent
M	Allison Transmission Oil	**Regular drains**	Schedule1 TES-389 fluids or approved equivalent
N	Volvo I-Shift Transmission	**Extended drains**	- Volvo I-Shift Transmission Fluid 75W-80 - Mobil Delvac Synthetic Transmission Oil V30 75W-80 (Factory filled) or other Volvo approved oils [13]
O	Volvo I-Shift Transmission	**Regular drains**	Castrol Syntrans Grade SAE 75W-85 synthetic oil or other Volvo approved oils [13]
P	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	
Q	Multi Purpose Grease	Molykote longterm 2/78 grease	

[13] For the complete list of Volvo-approved oils, refer to "Approved oils Engine and I-Shift Transmission" found on your Technical Publications USB flash drive

6.1 FLUIDS AND LUBRICANTS SPECIFICATIONS CHANGE LOG

	CHANGE LOG	DATE
1	Lubricant And Coolant Specifications Table – Dexron-VI removed from Ref I. Dexron-VI is no longer recommended for use in commercial on-highway transmission. Allison Service Tip #1099revS	Nov.11, 2015
2	I-Shift transmission: Castrol Syntrans Grade SAE 75W-85 synthetic oil is no longer approved for extended drains interval	Nov.25, 2015
3	Added: Lubricants “I” & “J” for ZF drive axle	Apr.26, 2016
4	New Engine oil specification VDS-4.5 (CK-4) introduced. New oil specification compatible with former D13 engine versions	Dec.15, 2016
5	Power steering fluid, Dexron VI added	Nov.15, 2017
6		
7		
8		
9		
10		