

SECTION 24: LUBRICATION

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Section 24: LUBRICATION

1. LUBRICATION

The efficiency and life expectancy of mechanical equipment is largely dependant 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

Factory-filled oil in differential on new vehicle should be replaced after 3,000 miles (4 800 km) of initial operation or after major servicing.

1.1.2 Coolant Strainer

The coolant strainer 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 World Automatic Transmission

Change oil and filter cartridges after first 5,000 miles (8000 km) of initial operation, then according to the lubrication and servicing schedule.

1.1.4 ZF-ASTRONIC Transmission

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. 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 ENGINE OIL CHANGE INTERVALS

The engine oil change intervals are related to the operating conditions, such as vehicle load, speed, etc., and may vary. It is recommended however, that the oil change be performed after every 10,000 miles (16 000 km).

The drain intervals may then be gradually increased or decreased with experience on a specific lubricant, considering the recommendations of the oil supplier (analysis of drained oil can be helpful), until the most practical service condition has been established.

Solvents should not be used as flushing oils. Dilution of the fresh refill oil supply can occur, which may be detrimental for the engine.

Engine oil temperature should be checked every 25,000 miles (40 000 km) to determine oil cooler efficiency. This check should be made by inserting a steel jacketed thermometer in the dipstick opening, immediately after stopping a hot, loaded engine. If the oil temperature exceeds the coolant temperature by more than 60 °F (33 °C), the oil cooler may be clogged.

For detailed oil specifications, refer to *"Detroit Diesel Series 60 Service Manual"* under heading *"Lubricating Oil for Detroit Diesel Engines"*.

2.1.1 Engine Oil Reserve Tank

An oil reserve tank with a capacity of 2.2 US gallons (8,3 liters) is connected to the crankcase by a hose with a shutoff valve, allowing oil to be added to crankcase by opening valve.

Comparison of oil levels in sight gauge, before and after adding oil to crankcase, shows approximately how much oil has been added.

Filling of this tank can be made by opening the rear engine door. The tank is mounted on R.H. side of engine compartment, over the A/C compressor.

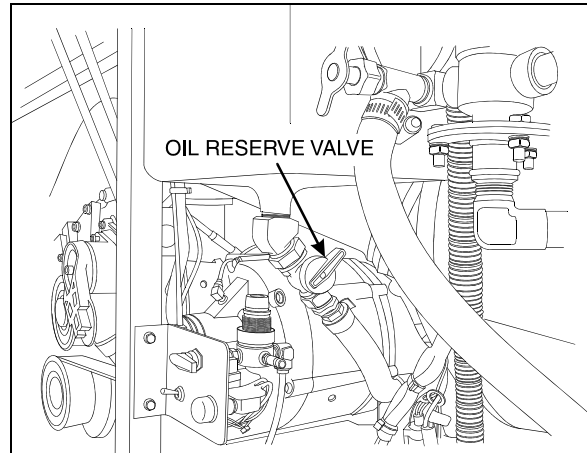


FIGURE 1: ENGINE OIL RESERVE TANK 01050

2.2 COLD WEATHER OPERATION

The proper selection of the engine oil grade will ease cold weather starting (refer to the lubrication and servicing schedule for the engine oil grade recommendation). Other practical considerations, such as the use of batteries, cables and connectors of adequate size, proper setting of voltage regulator, ether starting aid, oil and coolant heater systems, and proper fuel selection will ease cold weather starting.

2.3 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.

2.3.1 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,

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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.

2.3.2 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.

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

2.3.3 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.

2.4 WALK-AROUND INSPECTION

It is good practice to make a basic visual inspection of key areas on the vehicle every day (or before every trip for private coaches) and to correct any problem found.

OUTSIDE THE VEHICLE	
ITEM*	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, 28	Drain accumulated water in accessory and wet air tanks.

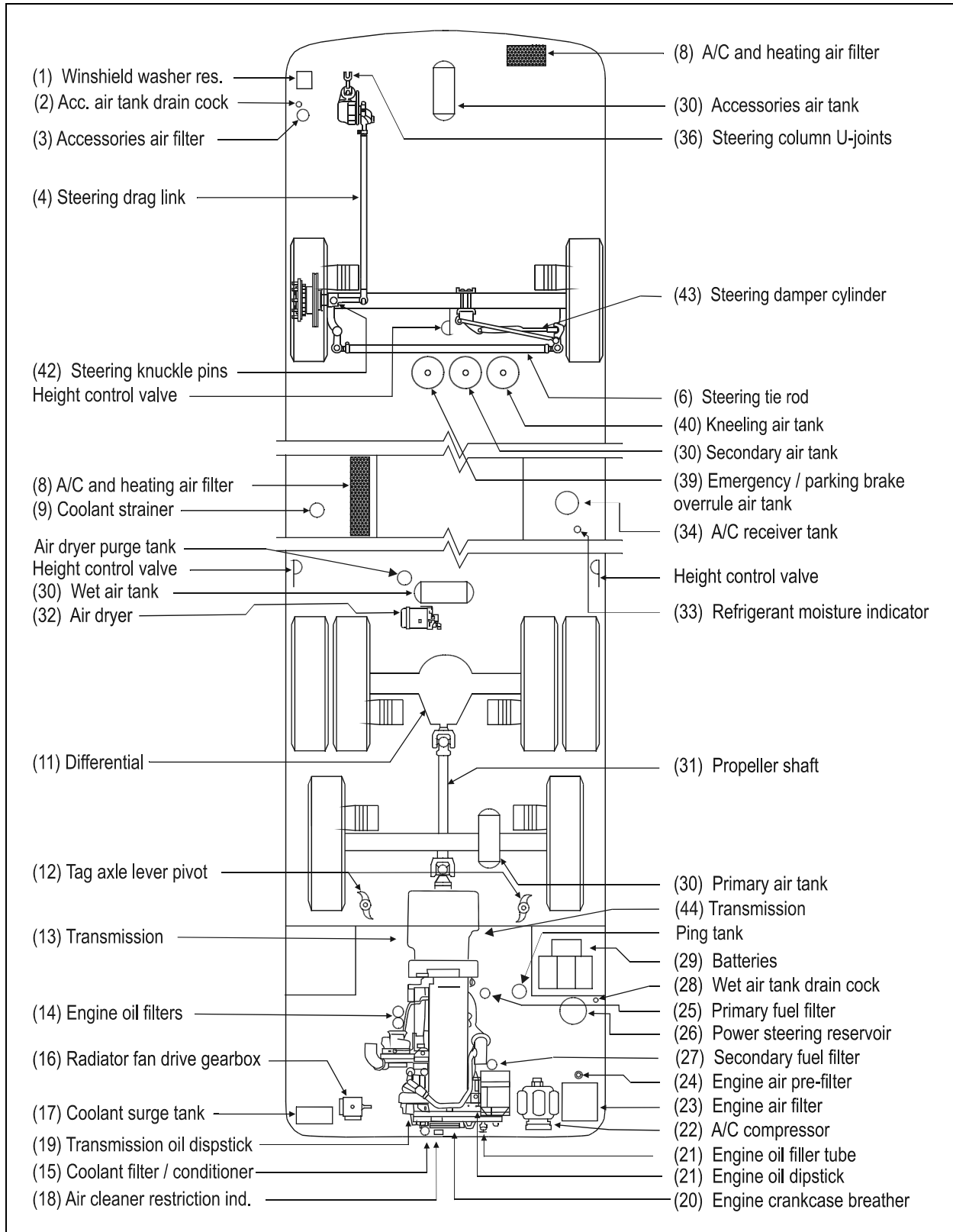


FIGURE 2: LUBRICATION AND SERVICING POINTS ON I-BEAM FRONT SUSPENSION VEHICLES (TYPICAL)

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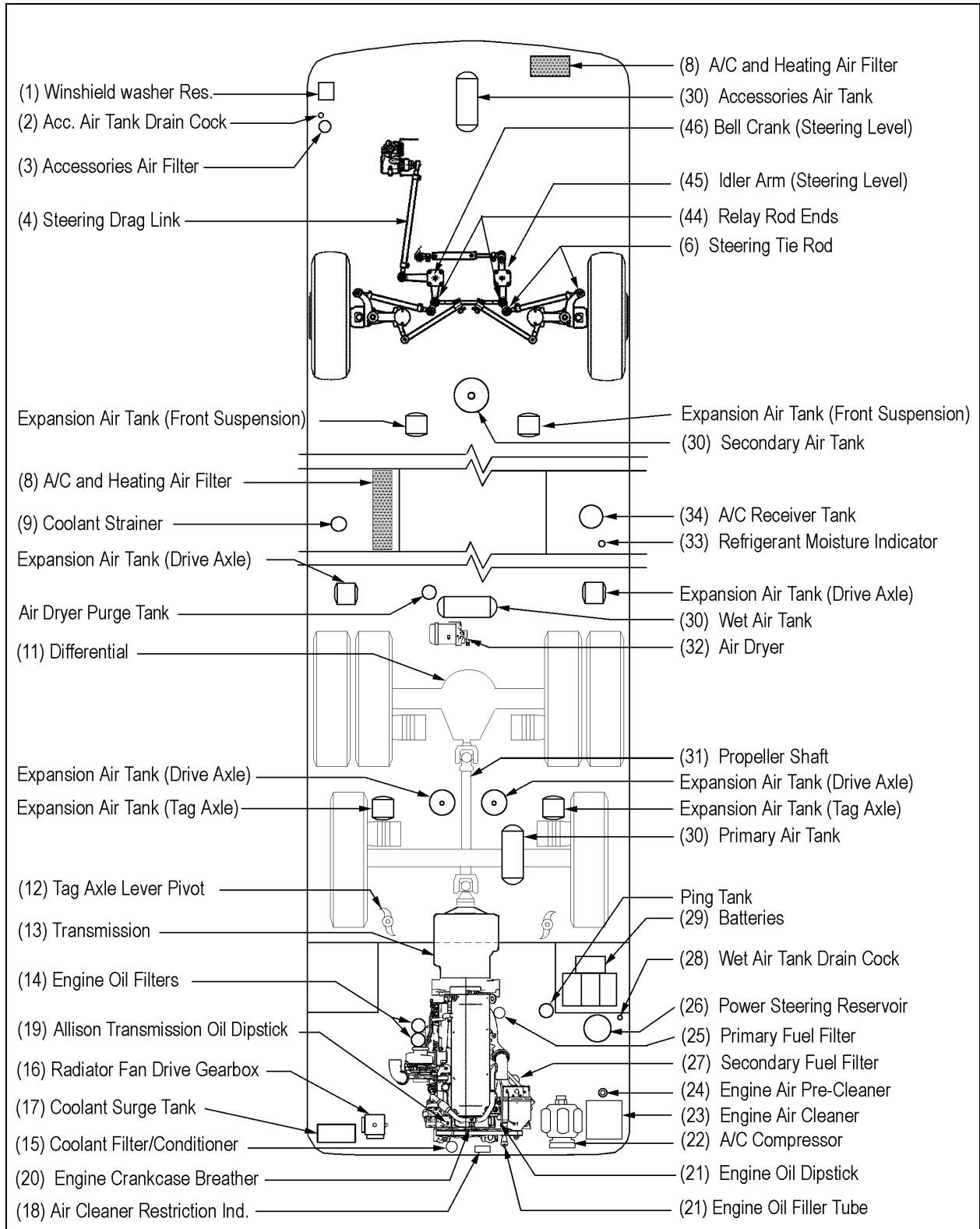


FIGURE 3: LUBRICATION AND SERVICING POINTS ON INDEPENDENT FRONT SUSPENSION VEHICLES (TYPICAL)

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

INSIDE THE VEHICLE	
ITEM*	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.

* Item numbers refer to figures 2 and 3.

2.5 LUBRICANT AND COOLANT SPECIFICATIONS

ITEM*	DESCRIPTION	SPECIFICATIONS
21	Engine Oil	SAE Viscosity Grade: 15W40 API Classification: CI-4
26	Power Steering Oil	Automatic Transmission Oil (Dexron-II or Dexron-III)
17	Engine Coolant	Low silicate, ethylene glycol coolant 50% antifreeze/water solution is normally used Antifreeze concentration should be between 30% and 67%
22	A/C Compressor Oil	Polyolester Oil, HFC 134a compatible: Castrol SW-68 (POE) or equivalent
11	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.)
16	Fan Gearbox Oil	Synthetic oil: ISO VG (viscosity grade) 460

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ITEM*	DESCRIPTION	SPECIFICATIONS
		Natural oil: Mobil SHC 630
13	Allison Automatic Transmission Oil	Dexron-IIIE or Dexron-III, Castrol "TranSynd" Synthetic Transmission Fluid for Allison, specification TES-295
13	ZF-ASTronic Transmission Oil	Castrol Syntrans Grade SAE 75W-85 (Synthetic)
---	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

* Item numbers refer to figures 2 and 3.

2.6 PART NUMBER SPECIFICATIONS

ITEM*	DESCRIPTION	PRÉVOST NO
---	Engine Oil Filters	#510458
26	Power Steering Reservoir Oil Filter	#660987
23	Engine Air Cleaner Filter	#530197
33	Refrigerant Filter Dryer Unit	#950332
25	Engine Primary Fuel Filter	#510137
25	Engine Primary Fuel Filter With Water Separator (Optional)	#531407
27	Engine Secondary Fuel Filter	#510128
27	Secondary "Racor" Fuel Filter	#531390
15	Engine Coolant Precharge Unit	#550629
15	Engine Coolant Filter/Conditioner	#550630
8	A/C And Heating Driver's Air Filter	#871147--871144
8	A/C And Heating Cabin's Air Filter	#871051
---	Parcel Rack Fan Air Filters	#871159
13	Automatic Transmission Oil Filter Kit	#571709
9	Coolant Strainer	#871029
3	Accessories Air Filter	#641340
32	Air Dryer Cartridge	#3097369

- Item numbers refer to figures 2 and 3.

2.7 LUBRICATION AND SERVICING SCHEDULE

For lubrication and servicing schedule, refer to table A.