

Caterpillar Engine Seminar

Frequently Asked Questions & Answers

(Updated 06/08/07)

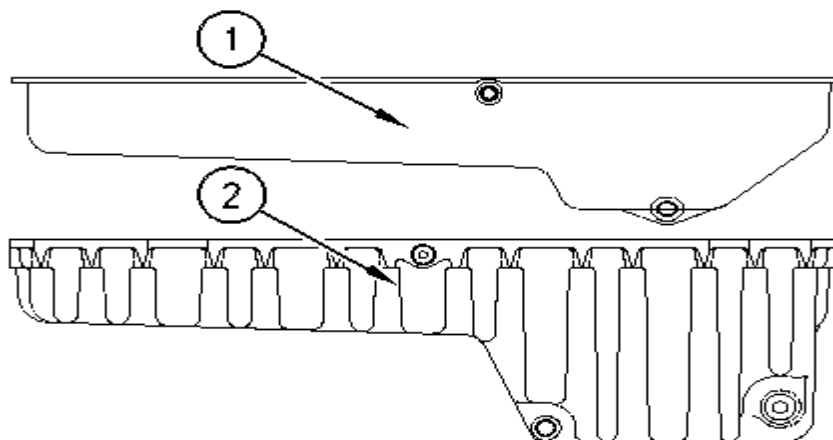
- Lubrication System Maintenance**

- What is the proper amount of oil to put in the engine at oil change?**
What should my oil change intervals be?

3116 / 3126 / 3126B / 3126E / C7 Oil Fill Capacity

<u>Serial Number Prefix</u>	<u>Oil Pan</u>	<u>Sump</u>	<u>Miles/Years</u>
1WM	19 Quarts (18L)	Shallow	6,000 Miles / 1 Year
1WM	29 Quarts (27L)	Deep	10,000 Miles / 1 Year
7AS, 8YL, CKM, HEP	22 Quarts (21L)	Shallow	11,000 Miles / 1 Year
7AS, 8YL, CKM, HEP	30 Quarts (28L)	Deep	15,000 Miles / 1 Year
KAL, SAP, WAX*	19 Quarts (18L)	Shallow	11,000 Miles / 1 Year
KAL, SAP, WAX*	27 Quarts (25L)	Deep	15,000 Miles / 1 Year

* Fill volumes changed due to side mounted breather



(1) Shallow oil sump

(2) Deep oil sump

C9/3176B/C-10/C-12/C13/C-15/C15
Oil Fill Capacity

<u>Engine Model</u>	<u>Oil Pan</u>	<u>Miles/Years</u>
C9	34 Quarts (32L)	20,000 Miles/ 1 Year
3176	30 Quarts (28 L)	15,000 Miles / 1 Year
C-10	36 Quarts (34L)	15,000 Miles/ 1 Year
C-12	36 Quarts (34L)	15,000 Miles/ 1 Year
C13	36 Quarts (34L)	20,000 Miles/ 1 Year (Shallow)
C13	42 Quarts (40L)	20,000 Miles / 1 Year (Deep)
C15	42 Quarts (40L)	20,000 Miles / 1 Year
C-15	40 Quarts (38L)	20,000 Miles/ 1 Year

2. Should I check the engine oil while my engine is running or off? Cold or Hot?

Check your oil when your engine is OFF...

If HOT – wait at least 10 min. from shut down of the engine

If COLD – check it before you start the engine

3. Should I install my oil filters dry?

YES – Always install the oil filters DRY. This ensures the oil in your engine is always filtered before it is used to clean, cool, and lubricate the internal components of your engine.

4. How do I recalibrate the dipstick on my C7 engine?

19-Quart Shallow Pan

Drain ALL the Oil

Add 14 Quarts

Mark stick as “ADD”

Add 3 More Quarts

(17 Quarts Total)

Mark stick as “FULL”

Start Engine for One Minute

Wait 10 Minutes

*Refill to Full Mark (2 Qts for filters)

28 Quart Deep Pan

Drain ALL the Oil

Add 23 Quarts

Mark stick as “ADD”

Add 3 More Quarts

(26 Quarts Total)

Mark stick as “FULL”

Start Engine for One Minute

Wait 10 Minutes

*Refill to Full Mark (2 Qts for filters)

*Depending on what filters you have, amount will vary. Fill to FULL mark

Should I do it or should I have it done?

Depends on your comfort level. If you want to do it, the procedure is above, or you can take it to your local dealer; customer's choice.

5. I have a FCCC, which oil pan do I have?

Shallow Oil Pan. See next question for fill capacities & oil pan sizes

6. Will too much oil hurt the engine? What will it do?

Yes, too much oil can harm the engine. Excessive oil might allow the crankshaft counter weights to “dip” into the oil. This might cause air to form in the oil. “aeration”

7. Do I have to use Cat Filters? Does an after-market filter void my warranty?

We recommend using Cat filters because they are superior. Using another brand doesn’t automatically void the engine warranty. Your “Caterpillar Warranty” covers defects in material or workmanship.

8. I heard about extending the oil breather tube so mist doesn’t spray on my radiator and collect dirt and dust. Should I do this?

Extending the fumes disposal tube is an option if oil mist is collecting in the radiator cores. Talk to your chassis OEM at about getting the needed parts. Caterpillar sells an aftermarket mist filtration system (269-2002) that converts an open crankcase ventilation system for 3126 / C7 to a closed crank case ventilation system. This aftermarket product can be purchased through any authorized Cat dealer. *Make sure the breather is cleaned every oil change.

9. There is oil coming from my breather tube and it gets oil all over the radiator and my tow vehicle. What should I do?

Diesel engines produce blow-by that is vented to the atmosphere. This can be drawn into the engine fan depending on location. Consult your chassis OEM about possible configuration changes to your RV. Caterpillar sells an aftermarket mist filtration system (269-2002) that converts an open crankcase ventilation system for 3126 / C7 to a closed crank case ventilation system. This aftermarket product can be purchased through any authorized Cat dealer. *Make sure the breather is cleaned every oil change.

10. Are the oil change intervals based on mileage or time? Why?

Both time and mileage. Oils will become contaminated with time and mileage. So to be on the safe side, you should change your oil on what ever occurs first. For example, on the C7 it is 11,000 miles or 1 year for the shallow oil pan. (19 quart) For the deep oil pan (28 quart) it is 15,000 miles or 1 year.

11. Will there be some kind of warning (check engine light) if oil pressure is too low?

In Medium Duty Engines – the engines are self-protecting and will shut down if the oil pressure gets too low. The HEUI pump will not allow the engine to run without engine oil.

In Heavy Duty Engines – there is an oil pressure sensor. As long as it is programmed, a warning light will be on and the engine will automatically go into a warning, de-rate, or shut down mode.

12. Does Caterpillar recommend scheduled oil sampling (SOS)?

Taking an oil sample at every oil change and sending it to your local Caterpillar dealer for analysis can help you monitor the health of your engine. SOS sampling kits are available from your local Caterpillar dealer.

13. The oil pressure gauge fluctuates and sometimes reads really low during normal operation. Is there anything wrong with my engine? How can I fix this?

On Medium Duty Engines – Caterpillar does not need to measure oil pressure. The HEUI pump will not allow an engine to run without oil.

14. I am having a problem with my oil pressure gauge fluctuating or not being accurate. Do I have a bad gauge or bad oil sending unit?

The problem could definitely be either situation. It could be as simple as a loose wire, faulty sending unit or faulty gauge. Since the gauge is not a precision or calibrated gauge, we recommend you have the oil pressure checked at a local Cat or TEPS Dealer to be on the safe side. This will also help determine what the problem is or is not.

15. On a 3126B/3126E/C7, where would I get a new oil-sending unit if I want to replace it myself?

Contact your Coach Manufacturer or Selling Dealer

16. On 3126B/3126E/C7 Engines, where is the grease fitting located on the fan accessory drive?

It is located at the twelve o'clock position behind the fan drive pulley, near the valve cover. You will likely need a grease gun extension tube to reach this grease fitting.

If your engine was built after January 2003 or your engine serial number is HEP15357 or higher, there is not a grease zerk provided, since the bearing is permanently lubricated.

17. What is the difference between a 3126 and a C7 engine?

The C7 engine has a different valve cover, cylinder head, fuel injectors, a side mounted breather, and software to meet current emissions.

18. What is Caterpillar's position regarding Synthetic oils?

Caterpillar does not recommend a different oil drain interval for synthetic oils versus mineral based oils. Oil used in Caterpillar engines should meet CI4 API classification. If add oil is necessary, Caterpillar recommends the same brand of add oil as what is currently in the engine be used.

19. How do I know if I have an engine that meets 2007 EPA requirements? What additional maintenance is required of engines meeting 2007 EPA requirements?

If you own an engine that meets 2007 EPA requirements, your engine serial number prefix will be as follows for each respective engine model:

- C7: C7S
- C9: C9S
- C13: LEE
- C15: SDP

The following chart compares the general maintenance requirements for engines meeting 2004 EPA requirements versus those for engines meeting 2007 EPA requirements:

Maintenance Item	2004 EPA Engines	2007 EPA Engines
Oil	CI-4 (EC-1)	CJ-4 (EC-3)
Oil Change	Base	No Change
Oil Filter	Base	No Change
Fuel Filter	Base	No Change
CCV Tube (C7 / C9)	N/A	1500 hours
OCV Filter (C13 / C15)	N/A	1500 hours
CRS Nozzle / Spark Plug	N/A	1500 hours
Coolant	Base	No Change
DPF	N/A	150,000 miles minimum

• Cooling System Maintenance

1. What kind of coolant do I have?

If you are the first owner and your coolant has never been changed, you most likely have low silicate type antifreeze that should meet TMC RP329, ASTM D5345, or D4985 specifications. Low silicate type antifreeze is formulated for diesel engines and requires you to maintain SCA's between 3 – 6% at every oil change.

2. What are the proper cooling system maintenance practices?

For regular low silicate type coolant – SCA should be checked at every PM service. Coolant conditioner should be maintained between 3% - 6%. Add SCA's if tests report less than 3% SCA's present. Extended Life Coolant – Add extender at 3 year/ 300,000 miles. If you need to top off your coolant, make sure you use the same type of coolant and wait until the engine is cool before removing the radiator cap.

*Contact Chassis OEM for which type of coolant you have.

3. Do I need to flush and fill every year?

NO!!

Regular low silicate type coolant - flush and fill every 3 years or 200,000 miles.

Extended Life Coolant – flush & fill at 6 year interval/600,000 miles.

4. What are the benefits of Extended Life Coolant?

Extended Life Coolant (ELC) requires a flush and fill every 6 years/600,000 miles with an Extender added at the 3 year/300,000 mile mark. SCA's Do Not need to be checked or added at every PM service. Make sure you top off with ELC premix only.

5. What is a maintenance kit?

A Preventative Maintenance Kit contains all the needed materials to perform a PM service.

Basic PM Kit – oil filter, fuel filters, & coolant conditioners – (regular coolant)

SOS PM Kit – oil filter, fuel filters, coolant conditioners, and SOS bottle

6. How do I perform the cooling system test?

Only perform a cooling system test if you have Regular Coolant.

1. Purchase test strips from the Cat Dealer, dip into your coolant and check color of strip with side of bottle.
2. Take a Sample of your coolant to your Cat Dealer
3. Purchase an SCA Kit from the Cat Dealer, gives you directions and bottles for mixing the chemicals to check the SCA's.

7. What are SCAs? What do they do? How do I check their status?

SCA's – Supplemental Coolant Additives

- used to prevent corrosion, formation of mineral deposits, cavitation erosion of the cylinder liners and foaming of the coolant.
- SCA's are not required with Extended Life Coolant (ELC).

8. Where do I get the test strips?

At any Caterpillar Dealer or TEPS Dealer.

9. Why do I have to buy 50 test strips at a time when they have such a short shelf life?

Effective June 2006 you can buy packages of ten coolant test strips through any authorized Cat dealer. The part number to order these is 286-2578.

10. Can an engine run too cool?

Yes!! The operating temperature of a Caterpillar engine should be at a minimum 180 degrees F.

11. What might cause my RV to overheat under a hard pull?

- If the temperature remains normal under other conditions of driving, this is probably inadequate air flow across radiator, or inadequate coolant flow in to the radiator.
- Ensure the radiator is clean (see below) then consult with your chassis OEM about possible configuration problems.
- It may be feasible to downshift when climbing a steep hill.
- The recommended R.P.M.'s when climbing a hill for a C7 is 2,000 R.P.M. This provides adequate fan speed and provides better coolant flow.

12. What is the proper method to clean my radiator?

- Clean from both sides with pressurized air or low-pressure water.
- Use a degreaser and steam for removal of oil & grease. (High pressure water could bend the fins on the radiator).
- Your local Cat Dealer or TEPS dealer will also be able to clean your radiator.

• **Engine Start-up /Storage**

1. What is the proper procedure to cold start an engine, or start an engine in high elevation?

3126/C7 engines are standard with an Air Inlet Heater. The heater will pre-heat inlet air to help start engines that are cold or at high elevation.

- Turn the ignition key On
- Wait for the Check Engine Light to Go OFF or Stop Flashing
- Cycle the Key Again & Repeat 2 – 3 times
- Finally – start the Engine

If it does not start – repeat the procedure.

2. Do I have to wait for the Air Inlet Heater to turn off before starting the engine?

NO – it really depends on the temperature and your altitude. You should wait for it to turn off to be on the safe side, but if you are not in extremely cold temperatures or a very high altitude you can start the engine with out the air inlet heater off.

It is possible you will get white smoke if you don't wait. The air inlet heater will cycle on and off until the coolant reaches 103 degrees F/ 60 degrees C.

3. Should I use a block heater?

Block heaters are very good if the coach is used predominately in cold climates.

4. How long does my coach have to sit in order to require the addition of a fuel treatment additive?

New for 2006, Caterpillar diesel fuel conditioner (256-4968) is available through your local authorized Cat Dealer. Caterpillar diesel fuel conditioner provides several benefits, including enhanced lubricity (compensates for lubricity lost in the refining process for creating ultra low sulfur fuel), detergency (helps maintain injector spray pattern), stability (reduces the formation of gums, sludge and deposits that can block fuel filters), cetane improvement (provides easier starting and reduced white smoke, especially at low temperatures), water handling (keeps moisture dispersed in the fuel to prevent bacterial growth, without the need for highly toxic biocide), and corrosion protection (helps to protect fuel systems against rust and corrosion). One ounce of this conditioner treats eleven gallons of diesel fuel (one 32-ounce container will treat 350 gallons of diesel fuel). The conditioner comes in a case of six 32-ounce containers.

5. Do I need to start my coach if it sits for an extended period of time?

Not necessary, but if you do start the engine, make sure you run the engine until it reaches operating temperature in order to burn off any moisture that has formed.

- **Performance**

1. Do I need horsepower or torque? What is the difference?

BOTH – Torque gets the coach moving and up the hills. Horsepower is acceleration. For additional detailed information, "Understanding Coach (RV) Performance (LEGT5364) is available through your local Cat Dealer.

2. What does it mean when an engine de-rates?

Today's engines are very smart, so it knows when it gets too hot to operate. The engine electronics take power away (de-rate the engine) in order to help cool down.

3. If I don't think I have any problems with my engine, should I have my ECM flashed anyway?

If your coach is operating properly, and you are happy with the results, you do not need to flash new software.

4. When cruise is set, my transmission will not downshift when going up a hill?

This means you are operating in Economy Mode. Economy mode holds gears longer, about 5 or 6 mph above or below what your speed is set at in cruise.

- **Miscellaneous**

1. When should I have the initial valve adjustment done? Subsequent adjustments?

- 3126, C7, C9 – Valves adjusted between the first and fourth oil change.
- 3176, C-10, C-12, C13, 3406, C-15, C-16 –Valve adjusted between the first and fourth oil change.

2. How often should my thermostat be replaced?

Change your thermostat every three years. This device regulates coolant temperature using a mechanical spring mechanism that can wear over time.

3. How often do I have to drain my water separator?

This is part of your "Daily Checks", whenever you are operating the coach. Drain only if water is present. Since water is heavier than fuel, you'll know it's there.

4. What is the warranty on my Cat Engine?

- For RV applications the standard warranty is 5 years / 200,000 miles

5. When does the warranty start?

Warranty starts the day the coach is delivered to the first user.

6. Do I need to send in warranty information if I have already taken my coach to an authorized TEPS dealer for service?

- Warranty information needs to be sent in so that your coach is registered in the Caterpillar system as a RV.
- Trucks have the same serial number prefix and only 3 years or 150,000 mile coverage. So by sending in your information, it will get your information correct from the beginning and give you the longer warranty period. Also avoids confusion down the road when the system states you are out of warranty because it has your engine registered as a truck instead of a RV.

7. How do I add a secondary fuel filter and hand-priming pump if my RV is not equipped?

- Contact your local Caterpillar dealer with your engine serial number and they should be able to give you an estimate of the necessary parts and labor.
- Operating your Cat engine with a two filter system equipped with a hand priming pump (2 micron secondary fuel filter & 10 micron primary fuel filter) can minimize the risk of filter clogging and make starting easier while maintaining your fuel system filters.

8. What is Caterpillar's position regarding bio diesel?

If you choose to operate your Caterpillar engine using bio diesel, it must meet Caterpillar's specifications (ASTM D6751 or DIN 51606). Bio diesel fuel has limited storage life and contains less energy content (5 – 7 %) than regular #2 diesel. Caterpillar allows up to 30% blend of bio diesel fuel.

9. What is Caterpillar's position regarding ultra low sulfur diesel (ULSD)?

If you use ultra low sulfur diesel ULSD, it must meet Caterpillar's specifications (ASTM D2622 or DIN 51400). For engines meeting 2007 emissions standards, ULSD (<15 PPM sulfur) is required. ULSD is backward compatible with the existing population of Caterpillar engines. ULSD contains less energy content (1%) than today's regular #2 diesel low sulfur fuel (500 PPM sulfur).

10. What is the Cat RV Engine Owner's Club?

The Cat RV Engine Owner's Club is an FMCA chapter that was chartered in March of 2004. The club consists of 2600 members and is currently growing. The club hosts two Caterpillar sponsored rallies per year. To learn more, visit the Cat RV Engine Owner's Club website at www.catrvclub.org

If you have any further comments or questions, please stop by our booth during the show, visit our website at <https://rv.cat.com>, or call the RV Toll Free Support Line at 1-877-777-3126.