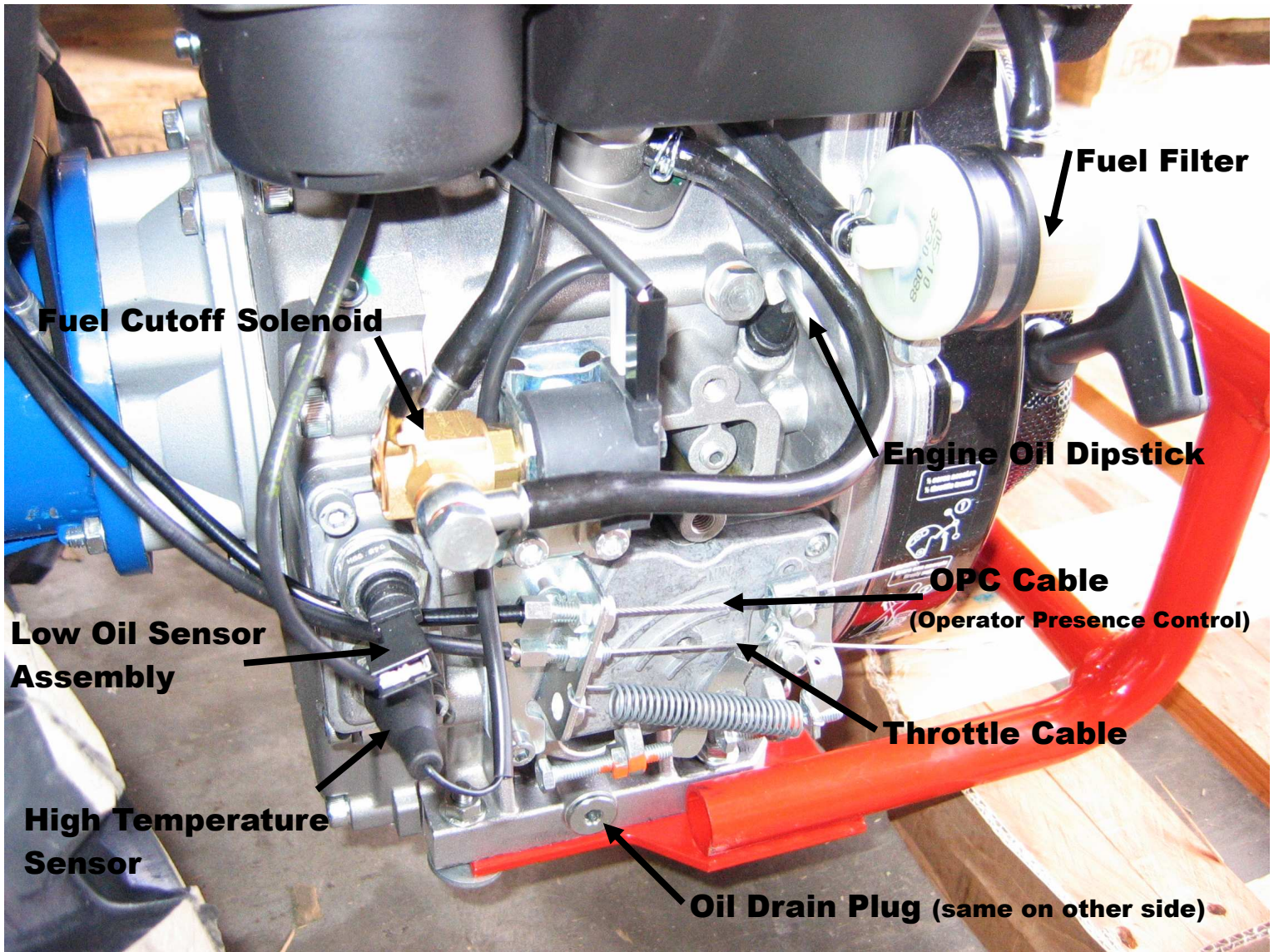


EARTH TOOLS TWO WHEEL TRACTOR DIESEL ENGINE PARTS IDENTIFICATION



The fuel cutoff solenoid is “active” on the KD400 and the 15LD400 engines when the rubber tipped lever is down. When the fuel cutoff solenoid is active, fuel will be cut from the engine if the oil pressure drops or if the engine temperature reaches unsafe levels.

The solenoid is overridden when the lever is up: This means the engine will run when the key is turned “OFF,” and also that the low-oil sensor will not shut the engine off.

The fuel cutoff solenoid on the KD420 is active when the rubber tipped lever is away from the engine and overridden when toward the engine.

Do not overfill the engine with oil! Oil capacity for the 15LD400, KD400/420/440 is 1.6 quarts. Oil capacity for the KD350/15LD315 is 1.3 quarts. Overfilling can cause the engine to start running on its own lubricating oil, making it run faster and almost impossible to stop without completely choking the air intake. Use high quality 15W-40 motor oil (synthetic is okay after the engine is fully broken in) and fill crankcase so the level is between the marks on the dipstick, with the engine LEVEL! Always check the oil before starting.

To change the oil filter, remove the low oil/high temp sensor assembly (held on by two Allen head bolts). The wires and sensors do not have to be removed, just push the cover out of the way to access the oil filter. The oil filter is a cylindrical super fine steel mesh filter. Grab the rubber disk attached to the filter, pull it out, wash it out in some gasoline or diesel fuel, let it dry, and reinstall.

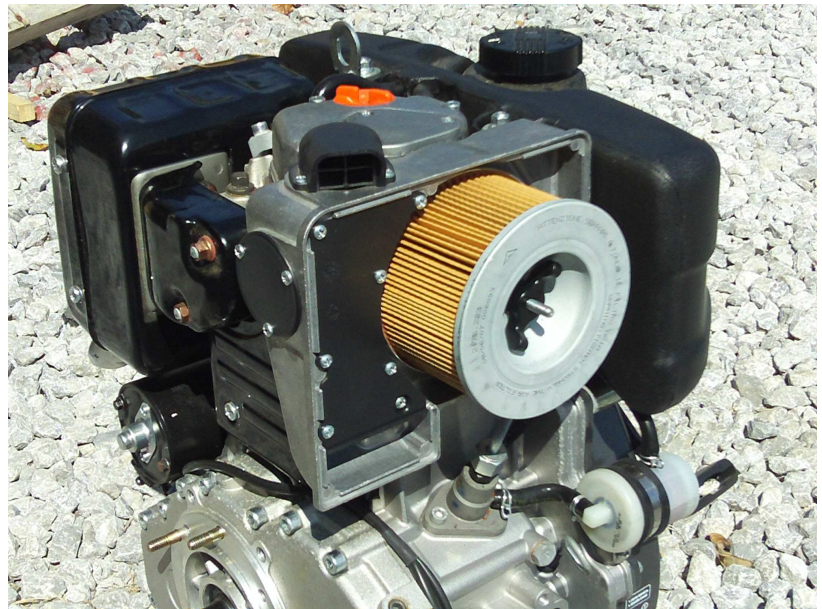
The part number for replacement fuel filters for Kohler diesel engines is 3730.096. Keep an eye on the fuel filter. It is translucent so it is easy to see if water is present. Change the filter if more than a tablespoon of water is present. Water will ruin an injector system, resulting in an expensive (~\$400) repair.

The part number for replacement air filters for the KD400, KD440, and the 15LD400 is 2175.306. The part number for the replacement air filters for the 15LD315/KD350 is 2175.176

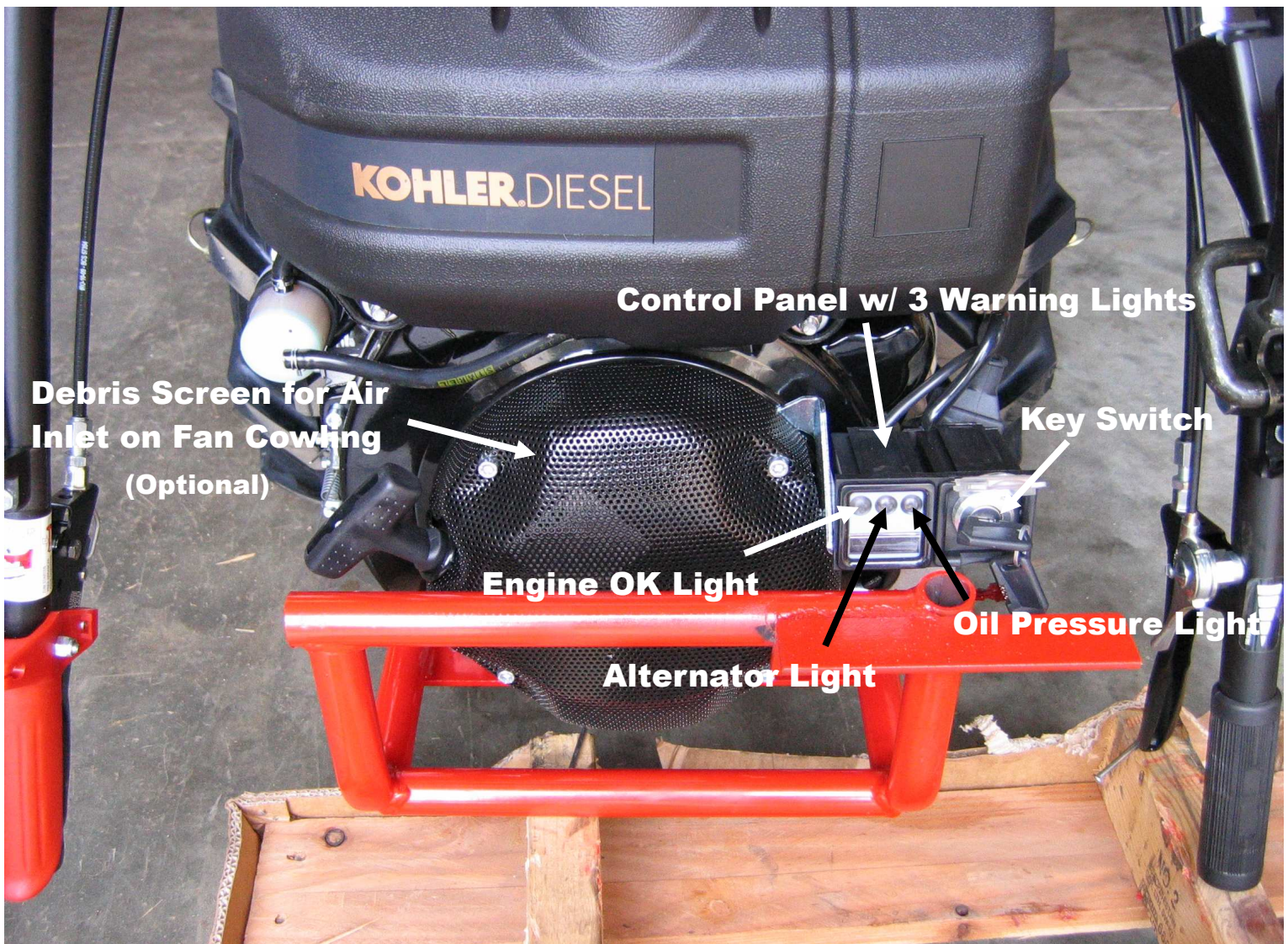


Diesel engine oil filter. Part number: 2175.155. Remember, it is cleanable/ reusable.

Air filter side of engine with box cover removed.



Engine on tractor with battery.



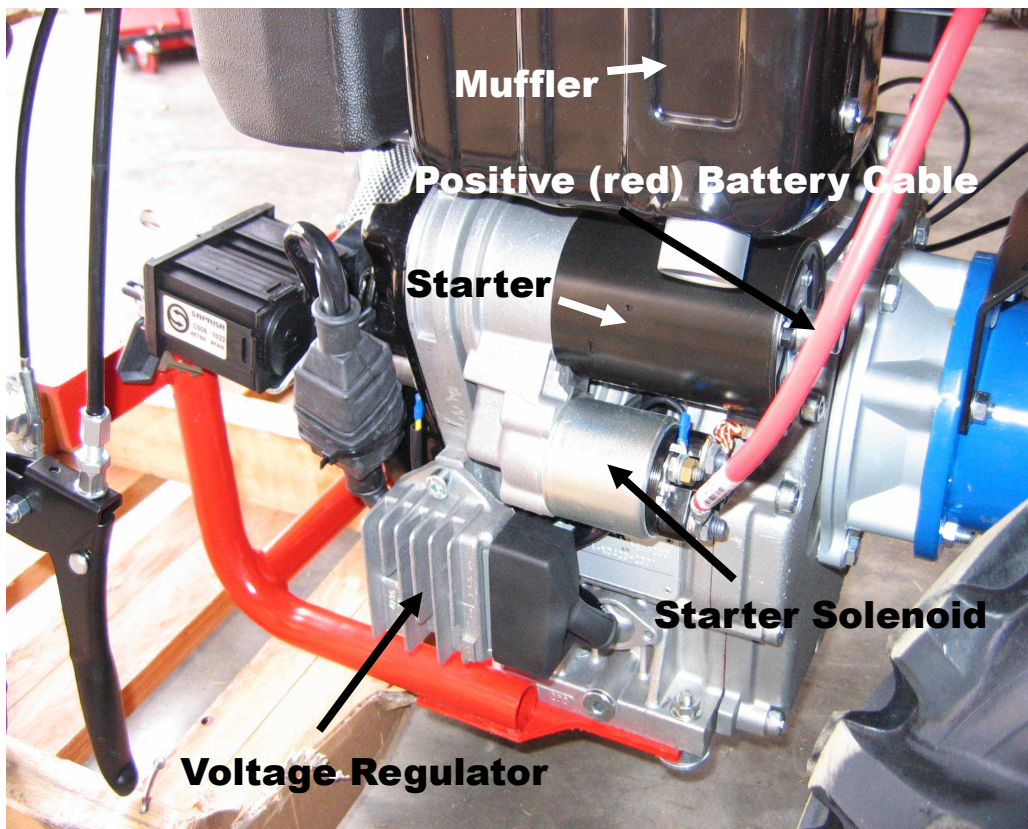
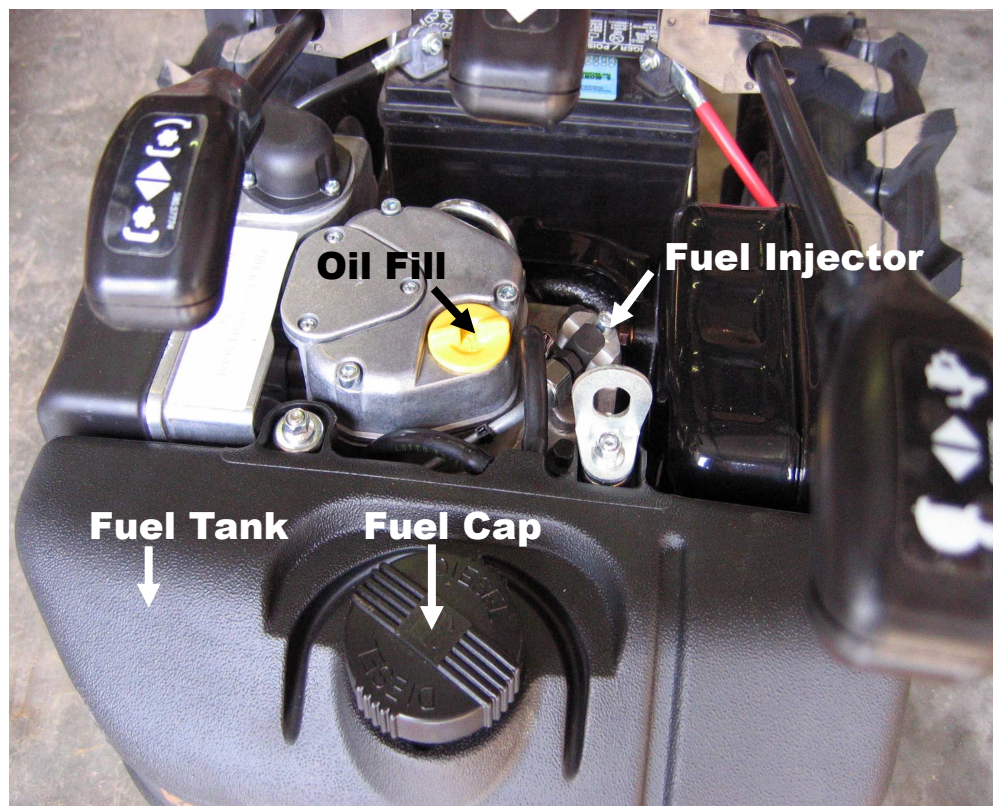
Engine OK lights green when engine is running and everything is functioning properly.

Alternator lights red when charging system is not charging the battery (if you see this light on only when the engine is on a very low idle—this is okay).

Oil Pressure lights red when there is no oil pressure.

If no lights are on, there is a bad ground or the fuse is blown inside the Control Panel. To replace the fuse, remove 4 Phillips head screws affixing panel to bracket (on bottom). Pop the plastic cover off the rear of the panel and look for a 20A blade-fuse next to the key switch body.

Both the Alternator and Oil Pressure lights will remain lit when the key is on. If the engine is not running, the battery will be drained. If you stop the engine by releasing the OPC (red safety) lever, make sure you turn the key off to conserve the battery. The key must remain in the “Run” position when the engine is running in order for the alternator to charge the battery.



In high dust conditions, it is possible that the starter motor may eventually not engage properly. This is due to a dirt/dust buildup in the starter solenoid. To repair: First, remove negative (black) battery cable from the battery. Next, remove the positive (red) cable from the solenoid. Next, remove 3 torx (star shaped) head screws (replacement part number for screws: FAST 5x35 Flush Head Allen) affixing the solenoid to the starter housing. Slide the solenoid body off the plunger in the center and clean out all dirt. DO NOT remove plunger from the starter! Removing the entire starter motor will allow you to clean it out more thoroughly. The starter can be removed with a 8 mm wrench.

Performing this service at the first signs of starter trouble (failure to properly engage) is recommended, as continued use when full of dirt can ruin the solenoid.

INSTRUCTIONS FOR DIESELS

Congratulations on your purchase of a walk-behind tractor with a diesel engine! The diesel engine will give 2 to 3 times the engine life of a gasoline engine when maintained properly and will use 1/3 to 1/2 the fuel of a comparable torque gas engine. Your engine choice also gives you the option of using alternative fuels (biofuels).

OPERATION, SHUTDOWN AND MAINTENANCE

1. Always check fuel and oil levels before starting. Even though the Lombardini diesels are equipped with an automatic air bleed to aid with starting in case you run it out of fuel, it is still not a good idea to run a diesel out of fuel.
2. To start, first depress the red safety lever on the top of the left handlebar grip. Then, squeeze and latch the clutch lever (on the bottom of the same grip). When the clutch lever is latched, it holds the safety switch down.
3. Move the throttle lever (on right handlebar) to the 1/3 or 1/2 position.
4. Turn the key (key switch located on engine or on battery box) to the 'start' position and crank until engine starts. Key will return to the 'run' position when you release it.
5. Reduce throttle speed to just above idle and let engine warm up a minute before putting tractor to work.
NOTE: Until engine is fully warmed up (10-15 minutes), it may sputter a bit at three quarters to full throttle.
6. After work is done and you are ready to shut engine off, idle engine down and allow to cool down at idle for at least 20 seconds before shutting off.
7. With tractor wheels and PTO in neutral, release the red safety lever on top of left handlebar. Engine will shut down.
8. After engine has fully stopped, depress the red safety lever again and squeeze clutch lever to lock it, just like step 2. Not only does this save you from doing this the next time you start it, more importantly, storing the tractor with the clutch in the squeezed position guarantees the clutch will never 'stick' during storage.
9. ALSO IMPORTANT: Turn the key back to the 'off' position. If you forget this step and leave the key in the 'run' position, you may run down the battery. TURNING THE KEY 'OFF' WHILE THE ENGINE IS RUNNING WILL **NOT** SHUT OFF THE ENGINE, BUT **WILL** DISABLE THE AUTOMATIC BATTERY CHARGING SYSTEM BUILT INTO THE ENGINE!! Always leave the key in the 'run' position while the engine is running to the battery can re-charge.

MAINTENANCE

*** Break-in

During the first few hours of operation, do not run the engine more than 3/4 throttle.

After the first 4 hours of running, change the engine oil. A 10W40 or 15W40 diesel-rated oil (minimum API specification CC/CD) is recommended.

VERY IMPORTANT: CHECK ENGINE OIL LEVEL WITH ENGINE LEVEL; ON LOMBARDINI/KOHLER ENGINES, KEEP OIL LEVEL BETWEEN TOP & BOTTOM NOTCHES ON DIPSTICK. ON YANMAR ENGINES, FILL TO TOP OF FILLER HOLE.

DO NOT OVERFILL ENGINE OIL! SERIOUS DAMAGE CAN RESULT!

*** After Break-in

Oil changes should be every 50 hours of run time or once a year, whichever comes first.

NOTE: If you want to use synthetic or synthetic blend oils, the engine should have 40-50 running hours on it before you switch.

The Oil filter on the Lombardini engine is a cleanable stainless steel mesh and is located under small cover held on by 2 allen-head bolts on air filter side of the engine. Clean with gasoline and let air-dry before re-installing. Clean every 50 hours.

Air filter should be changed at least once a year.

You have invested a lot of money in this diesel engine and substandard air filtration will only shorten engine life. To clean filter, remove from engine and tap against a hard surface to knock dust out. NEVER PUT AN AIR COMPRESSOR NOZZLE CLOSER THAN 4 INCHES to a paper filter. Putting a compressor nozzle too close to the filter will enlarge the pores in the paper, which will then allow larger dust particles through and wear the engine out prematurely. We stock these filters here at EARTH TOOLS.

Fuel filter should be changed every 1 to 2 years. We keep these in stock as well.

This list is for quick reference -- for a more complete schedule of engine maintenance, see the engine owners manual.

Thanks for your purchase and we look forward to serving you in the future.

Joel Dufour

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