



WARNING: PROPER USE

Any unauthorized modifications to or use of this engine outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the engine. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.



CAUTION: POSSIBLE DAMAGE TO ENGINE OR PROPERTY



CAUTION: BATTERY CHARGING

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.



CAUTION: ELECTROSTATIC DISCHARGE

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts.

- Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).
- Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.
- Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.

IMPORTANT DEFINITIONS

A **WARNING** indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

A **CAUTION** indicates a potentially hazardous situation that, if not avoided, could result in damage to engine or property.

A **NOTE** provides other helpful information that does not fall under the warning or caution categories.



WARNING: Engine Damage may occur: All Generation V GM engines must be vacuum filled with coolant. If you need assistance or have questions call your local service dealer. Failure to vacuum fill this engine with the recommended coolant may void all warranty (See page 58)



CAUTION: WELDING When welding on the vessel, disconnect the battery switch along with the connectors for the Engine Control Module (ECM). If left connected there is a chance of permanent damage to the ECM.



WARNING: CARBON MONOXIDE EXPOSURE
Carbon Monoxide is an odorless, colorless and tasteless gas that cannot be smelled, seen or tasted. Over exposure to carbon monoxide gas may lead to brain damage, unconsciousness or even death.

Carbon Monoxide

Carbon Monoxide is a poisonous hazardous gas that is produced when items containing carbon are burned. Items such as wood, charcoal, gasoline, natural gas, propane and petroleum products such as oil all produce carbon monoxide when burned.

Carbon Monoxide is found in many areas and is produced by all types of internal combustion engines, heaters, charcoal grills, and any other open flame appliances. There are many possible situations for the accumulation of carbon monoxide to occur in your vessel. Wind direction, boat speed, being close to other vessels are just a few of the possible ways that would permit exposure to carbon monoxide gases. It is important that regular inspections of the exhaust system and engine fresh air vents are clean and free of obstructions.

Check that all maintenance is properly performed by a qualified technician. Adequate air ventilation in all of the areas of your boat are necessary in order to prevent the build-up of carbon monoxide gas.

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INTRODUCTION

KEM Equipment, Inc. is pleased that you have selected a **Kodiak** engine for your requirements. KEM Equipment, Inc. takes great pride in our tradition of quality products produced from the **GM Powertrain** line of marine gasoline engines.

KEM Equipment, Inc. engines are inspected and tested before leaving the factory. However, certain checks should be made before placing the engine into regular service. **Please read the initial start-up inspection requirements in the Maintenance section of this manual.**

This Marine Operators Manual covers the 4.3L, 5.3L, AND THE 6.2L SIDI Direct Fuel Injected Marine Engines.

In this manual we have included tables for General Engine Specifications and tables for General Maintenance. Using this Manual will help you get acquainted with your engine and its functions, as well as help with routine service and maintenance to keep your Kodiak Marine Engine performing to its full potential. General engine specifications and quick reference guides starts on page 21.

KEM Equipment Inc. reserves the right to discontinue models or accessories at any time or to change specifications or designs without notice and without incurring obligation.

Please read and follow any and all specific warnings, cautions and notations contained in this text.

KEM Equipment, Inc., / Kodiak Marine reserves the right to request any pertinent maintenance information of your engine prior to authorization of warranties. Overall safety and equipment reliability depend on continuous observation of sound operating practices. Always observe required scheduled maintenance activities as outlined. Never attempt to correct problems or repairs for which you are not qualified. At the end of this manual, you will find a list of qualified Kodiak Marine service dealers to assist you in your area.



WARNING:

- Always STOP the engine before refueling.**
 - Always STOP the engine prior to any inspection / check or repair work.**
 - Always maintain proper ventilation when working around gas or oil.**
 - Always run the bilge blower for a minimum of 10 minutes prior to starting the engine.**
 - Do not stand close or hover over the engine prior to starting.**
- Ensure all safety guards are in place prior to starting the engine.**

How to Use this Manual

This manual is designed to help you get to know your engine and become familiar with the engine's various controls. During instruction, you will learn how to take care of your engine and what services need to be performed to keep it in excellent running condition. The table of contents will assist you in locating a specific subject. Please contact a service dealer if you have reached a point of needing further instruction. Any un-authorized work can void any potential warranties. We urge you to read this manual prior to startup of the engine.

KEM Equipment, Inc. engines are built with a variety of standard and/or optional components to suit a broad range of customer requirements. This manual **does not** identify equipment as standard or optional. All the equipment described in this manual may or may not be found on your engine. The description and specifications contained in this manual were in effect at the time of publication.

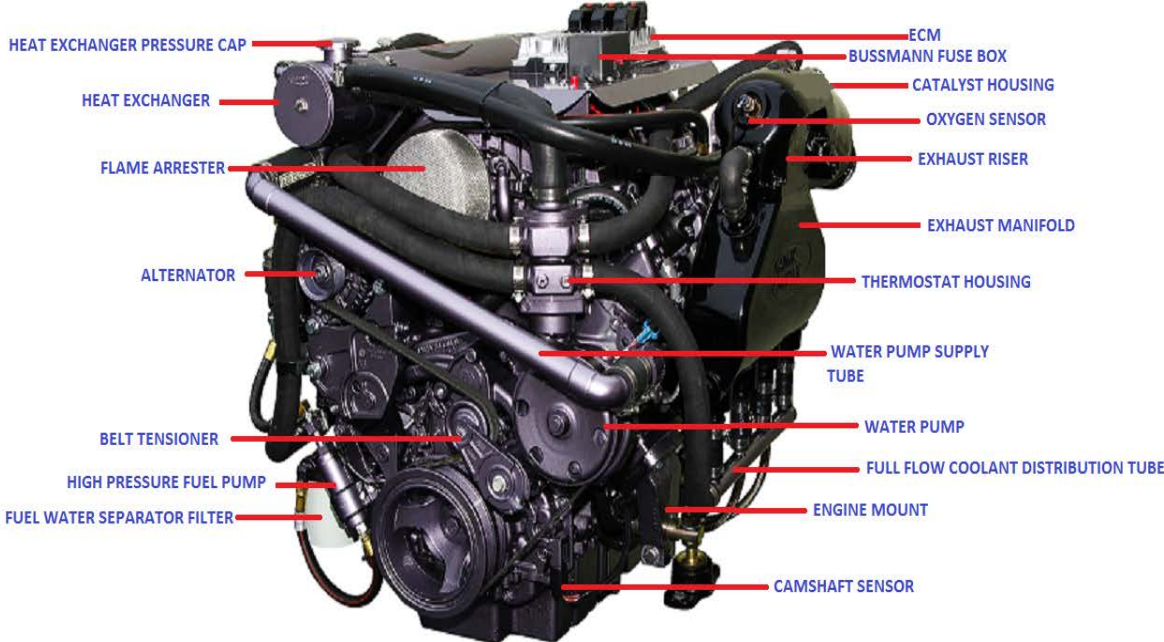
SIDI Fuel Injection

Direct injection moves the location of fuel entering the combustion chamber closer to the point of ignition within the combustion chamber, this creates more combustion efficiency. This moves to create a cleaner burn of fuel within the air fuel ratio mixture during the combustion cycle. The results of this burn is lower exhaust port temperatures and a leaner mixture, meaning that a considerable less amount of fuel is required to produce the same horsepower as a conventional port fuel injection system.

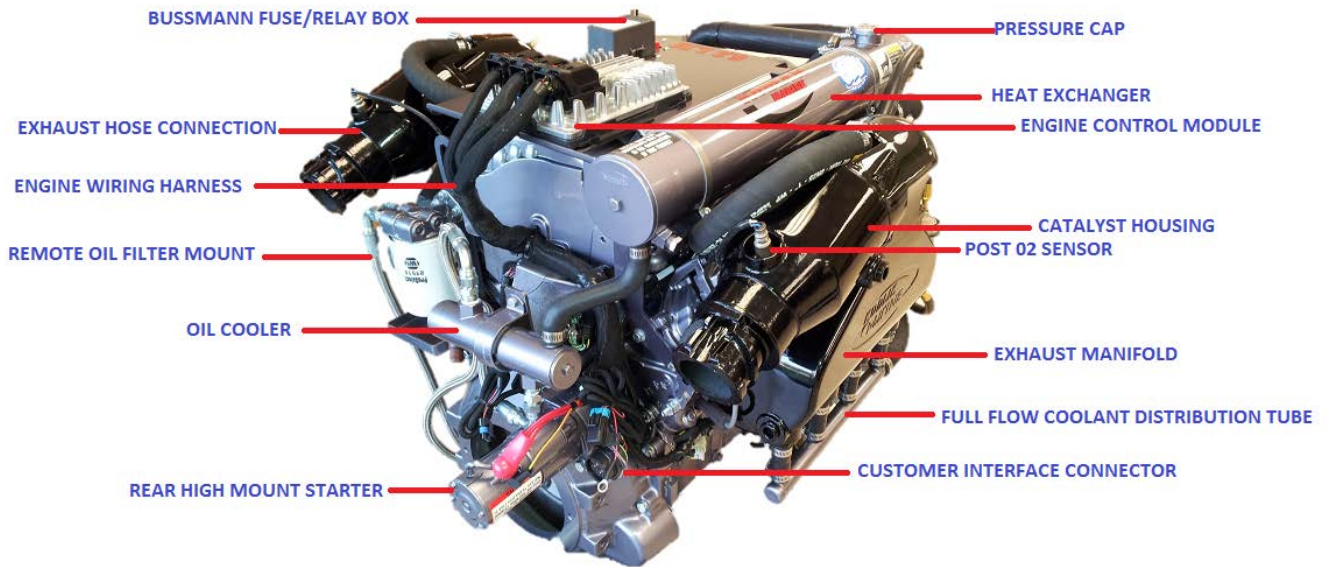


WARNING: Engine Damage may occur: All Generation V GM engines must be vacuum filled with coolant. If you need assistance or have questions call your local service dealer. Failure to vacuum fill this engine with the recommended coolant may void all warranty. (See page 58)

Component Identification



Component Identification



The illustrations above show the general location of engine controls, engine components and their functions. These illustrations will help identify where these parts are located on the engine. Locations will vary from engine to engine.

Parts and Service

Replacement parts can be obtained through your local Kodiak engine dealer.

Kodiak dealers are equipped to perform major and minor repairs. They are anxious to see that all of your maintenance and service needs are quickly and courteously completed. Please contact KEM Equipment Inc./Kodiak Marine regarding any favorable or un-favorable experiences with our service dealers.

The engine model number and serial number will be required when seeking information and/or ordering parts. There is a list of service dealers located at the very end of this manual.

Technical support for Kodiak Marine engines can be obtained by contacting KEM Equipment Inc.

Service Literature

By contacting our Parts Department you can purchase parts and service manuals for Kodiak Marine engines. **503-692-5012**



WARNING: The bilge can accumulate explosive fumes. The bilge blower will evacuate the fumes. The bilge blower must be run for a minimum of 10 minutes prior to cranking the engine.



WARNING: Do not start or run the engine in a closed or poorly ventilated area where exhaust gases may accumulate. All internal combustion engines give off various fumes and gases while running. Avoid breathing these gases as they may contain poisonous carbon monoxide and other gases, which can endanger your health or life if inhaled steadily for a few minutes.



CAUTION: If the engine stalls or falters during starting, wait 3 to 4 seconds before reengaging the starter. This will prevent possible damage to the starter or the engine. Do NOT operate the starter for periods longer than 5-8 seconds at a time. An interval of at least 1 minute should be observed between cranking periods to protect the starter from overheating.

PRE-OPERATIONAL INSPECTION



WARNING: Remove the key from the ignition prior to any engine check or operation. Do not energize any engine prior to performing any of the following.

Your KODIAK Marine Engine was inspected and test run before leaving the factory. Before operating a new engine, you must follow any pre-operational instruction.

1. Open the engine hatch cover to let the compartment air out for at least ten minutes.
2. Always make sure you are working in a well-ventilated area when around gasoline.
3. Check engine oil level, remove dipstick wiping clean and recheck your oil level.
4. Inspect the oil and fuel filters for tightness and making sure there are no leaks around these filters.
5. Check coolant level – refill to the appropriate levels.
6. Check for any oil, coolant or fuel leaks.



CAUTION: Follow any leaks and repair any abnormal leakage before continuing.

7. Inspect the battery connections for corrosion, clean as necessary
8. Check the battery fluid level and state of charge, fill as needed.
9. Inspect the spark arrester for any obstructions (Bugs, leaves etc.,) clean or replace as needed.
10. Check coolant Hoses for Leaks (follow any leaks and repair)

NOTE: It is suggested to use Baking Soda and water to safely clean any corrosion around the Battery connections.

NOTE: If the engine is equipped with a stern or jet drive it must be in neutral prior to starting the engine. Starting the engine with the drive engaged imposes unnecessary strain on the battery, starter and driven components.

Inspect the spark arrester for any obstructions (Bugs, leaves etc.,) clean or Replace as needed.

11. Check the exterior of the heat exchanger. Follow and fix any leaks before continuing.
12. Check the alternator belt for any extra play; adjust as necessary. Does not apply to all engines.
13. Tighten all loose nuts and bolts. Check for any loose pieces and tighten as necessary.
14. Start and run the bilge blower for at least 10 minutes.
15. Replace the engine cover.



CAUTION: All water must be drained from the raw water side of the heat exchanger when surrounding environment temperature is below 32°F/0°C.

MALFUNCTION INDICATOR LIGHT



Caution- Notice to Builder/Installer This engine requires use of a MIL. A MIL (Malfunction Indicator Lamp) must be installed with this engine to be in compliance with EPA and CARB regulations.

There are two lights on the dash to indicate engine related problems. The operator is responsible to acknowledge any illuminated check engine or check gauges lights during the course of engine operation.

The first indicator is the Check Engine Light. The MIL conveys to the operator that a fault exists that is related to the engine's control system. When this light is illuminated a fault code has been set that requires immediate attention or engine component damage could conceivably occur.

Please stop operation of engine as soon as safely possible. Request that a technician inspect the fault code setting, he or she will connect a scan tool to determine the cause of the MIL illuminating, repair the problem and clear the codes. The MIL related codes are caused by sensor output and/or conditions that adversely affect the operational output of the engine. Some of the components that can cause problems are: crank sensor, cam sensor, fuel injectors, fuel pressure regulators, ignition system and Manifold Air Pressure (MAP) sensor or low fuel pressure.

NOTE: If the Check Engine light is illuminated, it will remain on until the problem is corrected and the engine has gone through three consecutive warm up cycles, or if the light has been cleared by a service technician with a scan tool. A warm up cycle is a starting temperature close to ambient increasing to normal operating temperature.

The second indicator is the Check Gauges light. This bulb will illuminate when a non-emissions related issue occurs. Items that can cause these codes are high or low oil pressure and coolant temperature and various power relay operation, system voltage etc. The lighting of this fault indicator would indicate to the operator that the gauges for oil pressure and coolant temperature should be checked immediately and action taken to eliminate engine damage. There are safeties in the calibration that will reduce engine speed if the sensor output is out of the normal range (low oil pressure when the engine is at rated speed for instance). If the engine should turn off for no apparent reason check this lamp. This light will clear on it's own if the fault clears and the ignition switch is turned off then back on. If this light turns off on it's own, the issue will stay in memory for 40 warm up cycles or until a technician clears it manually with a scan tool.

NOTE: The lamps will not flash the error codes. To retrieve and reset the error codes a diagnostic scan tool is required. Some vessel manufacturers are using CAN-BUS displays that can retrieve the error codes, but cannot clear them. See the vessel manufacturer's instructions to retrieve the error codes with their device.

STARTING THE ENGINE

Prior to starting the engine the following must be performed.

1. Check engine oil level.
2. Check for fuel leaks.
3. Run bilge blower for a minimum of 10 minutes
4. Check Coolant level
5. Check bilge for excess water before starting engine



WARNING: The bilge can accumulate explosive fumes. The bilge blower will evacuate the fumes. The bilge blower must be run for a minimum of 10 minutes prior to cranking the engine.



WARNING: Do not start or run the engine in a closed or poorly ventilated area where exhaust gases may accumulate. All internal combustion engines give off various fumes and gases while running. Avoid breathing these gases as they may contain poisonous carbon monoxide and other gases, which can endanger your health or life if inhaled steadily for a few minutes.



CAUTION: The bilge should be checked for excess water prior to starting the engine. Excess water can cause premature starter failure and damage to other engine components.

NOTE: This engine is equipped with a computer controlled starter circuit. It is not necessary to hold the ignition switch in start mode until the engine starts, although holding the key on will not cause any issues.



CAUTION: If the engine stalls or falters during starting, wait 3 to 4 seconds before re-engaging the starter. This will prevent possible damage to the starter or the engine. Do NOT operate the starter for periods longer than 5-8 seconds at a time. An interval of at least 1 minute should be observed between cranking periods to protect the starter from overheating.



WARNING: Extreme High Fuel Rail Pressure. The SIDI Fuel Injectors and fuel rail have extreme high fuel pressures. Do not attempt to remove or service these parts. This poses a potentially hazardous situation that if not avoided, could result in severe personal injury or death, damage to engine and or property.

STARTING MODE–FUEL INJECTION

With the ignition switch in the ON position, before engaging the starter, the ECM energizes the fuel pump relay for 10 seconds allowing the fuel pump to build pressure. The ECM uses the engine coolant temperature (ECT), the throttle position (TPS) and the manifold absolute pressure (MAP) sensors to determine the proper air/fuel ratio for starting. The ECM controls the amount of fuel delivered in the starting mode by changing the pulse width of the injectors.

CLEAR FLOOD–FUEL INJECTION

If the engine becomes flooded, clear the engine by opening the throttle to 100 percent. When the pedal position sensor (PPS) is at wide-open throttle, the ECM reduces the injector pulse width in order to increase the air to fuel ratio. The ECM holds this injector rate as long as the throttle stays wide open and the engine speed is below a predetermined RPM. If the throttle is not held wide open, the ECM returns to the starting mode.

COLD ENGINE START

On a cold engine start, the engine idle speed will be elevated until the coolant temperature reaches operating temperature. As the engine temperature increases the idle speed will gradually decrease, this is a normal engine control function.

STOPPING THE ENGINE

NORMAL CONDITIONS

Let the engine idle for at least one minute prior to stopping the engine to reduce residual heat in engine components. Not doing this will not harm anything, but gives the engine a chance to reduce the temperature of many components.

STOPPING THE ENGINE UNDER ABNORMAL CONDITIONS (Overheating)

1. Put engine in NEUTRAL
2. Place gearshift or bucket control lever in Neutral.
3. Turn key to the OFF position and remove the key from the ignition.
4. If the engine is overheating due to loss of coolant, it is best to stop the engine immediately.
5. Check and adjust the oil and coolant levels.
6. Once the engine has cooled considerably, add your coolant slowly until the heat exchanger is full.



WARNING: Allow the engine to cool at least a few minutes before attempting to remove the heat exchanger cap. Cover the cap with a thick cloth and slowly turn counterclockwise allowing the pressure to release **SLOWLY**. When pressure has been completely released, push down on the cap, turn and remove.



CAUTION: Do not add coolant until the engine has returned to normal temperature. (When you can place your hand on the engine without burning is usually a good indication).

MAINTENANCE INSTRUCTIONS



WARNING: Extreme High Fuel Rail Pressure. The SIDI Fuel Injectors and fuel rail have extreme high fuel pressures. Do not attempt to remove or service these parts. This poses a potentially hazardous situation that if not avoided, could result in severe personal injury or death, damage to engine and or property.



CAUTION: Neglecting proper maintenance can cause premature component failures.

Initial Start-Up Maintenance

The initial start-up checks must be made before entering the engine into service. Please refer to the Maintenance Schedule on page 24 and perform the initial start-up operations in the sequence shown in column 1.

Routine Maintenance

Routine maintenance provides the best solution for making sure that the engine is ready when you are. The following are some routine service points:

- Keep the fuel tank filled. A full tank of fuel reduces the possibility of condensation forming in the fuel tank and moisture entering the fuel system.
- Make frequent checks for engine oil, fuel and coolant leaks
- Repair any oil, fuel or coolant leaks
- Check battery condition and cables frequently clean as necessary
- Keep the engine air filter and/or spark arrestor clean
- Monitor engine coolant temperature
- Monitor engine oil pressure and fuel pressure.
- Check voltmeter and charging system
- Lubricate Drive Shaft universal joints as described in the scheduled preventive maintenance section (some applications)

Knowing normal gauge values will help you determine any abnormal operating conditions.

Maintenance Schedule

Refer to the Maintenance Schedule on page 24 to ensure that all of the maintenance items listed are checked and replaced at the recommended hours.

4.3L SIDI GENERAL ENGINE SPECIFICATIONS

ENGINE TYPE	GM LV1 V6 OHV
COOLANT CAPACITY	4 US GALLONS
RECOMMENDED COOLANT	DEXCOOL 50/50 MIX
HIGH PRESSURE FUEL FILTER/REGULATOR	NAPA #3737
SPARK PLUGS	AC DELCO #41-114 GM #12622441
SPARK PLUG GAP	1.025 mm .040 +/- .002
SPARK ARRESTOR	A7600ESV38
OIL PAN CAPACITY	8 QUARTS W/REMOTE FILTER
OIL FILTER REMOTE LOCATION	NAPA # 1515
WATER SEPERATOR FILTER	NAPA # 3225
SERPENTINE BELT	NAPA #25-060716
FUEL PRESSURE BEFORE FUEL RAIL	4 BAR 58 PSI
FUEL TYPE	REGULAR UNLEADED
RECOMMENDED ENGINE OIL	0w/20 DEXOS 1 GM SPEC #15827

4.3L VVT DIRECT INJECTED MARINE ENGINE SPECIFICATIONS

DISPLACEMENT	4301cc 262 ci
ENGINE ORIENTATION	LONGITUDINAL
COMPRESSION RATIO	11.0:1
VALVE CONFIGURATION	OVERHEAD VALVE
VALVES PER CYLINDER	2
VALVE LIFTERS	HYDRAULIC ROLLER
FIRING ORDER	1-6-5-4-3-2
BORE AND STROKE	99.6mm X 92mm
FUEL SYSTEM	DIRECT INJECTED
PCV SYSTEM	PCV VALVE
ENGINE ROTATION	CCW FROM FLYWHEEL END

5.3L SIDI GENERAL ENGINE SPECIFICATIONS	
ENGINE TYPE	GM L83 V8 OHV
COOLANT CAPACITY	5 US GALLONS
RECOMMENDED COOLANT	DEXCOOL 50/50 MIX
HIGH PRESSURE FUEL FILTER/REGULATOR	NAPA #3737
SPARK PLUGS	AC DELCO #41-114 GM #12622441
SPARK PLUG GAP	1.025 mm .040 +/- .002
SPARK ARRESTOR	A7600ESV38
OIL PAN CAPACITY	9 QUARTS W/ REMOTE FILTER
OIL FILTER REMOTE LOCATION	NAPA # 1515
WATER SEPERATOR FILTER	NAPA # 3225
SERPENTINE BELT	NAPA #25-060716
FUEL PRESSURE BEFORE FUEL RAIL	4 BAR 58 PSI
FUEL TYPE	REGULAR UNLEADED
RECOMMENDED ENGINE OIL	0w/20 DEXOS 1 GM SPEC #15827
5.3L VVT DIRECT INJECTED MARINE ENGINE SPECIFICATIONS	
DISPLACEMENT	5328cc 325 ci
ENGINE ORIENTATION	LONGITUDINAL
COMPRESSION RATIO	11.0:1
VALVE CONFIGURATION	OVERHEAD VALVE
VALVES PER CYLINDER	2
VALVE LIFTERS	HYDRAULIC ROLLER
FIRING ORDER	1-8-7-2-6-5-4-3
BORE AND STROKE	96.01 mm X 92mm
FUEL SYSTEM	SIDI DIRECT INJECTED
PCV SYSTEM	PCV VALVE
ENGINE ROTATION	CCW FROM FLYWHEEL END

MAINTENANCE SCHEDULE									
ENGINE CHECK POINTS	SERVICE INTERVAL								
	DAILY	EVERY 25 HOURS	EVERY 50 HOURS	EVERY 75 HOURS	EVERY 100 HOURS	EVERY 150 HOURS	EVERY 200 HOURS	EVERY 300 HOURS	EVERY 400 HOURS
GENERAL MAINTENANCE									
Inspect fuel system for leaks	PRIOR TO ANY SERVICE OR MAINTENANCE ACTIVITY								
Inspect engine for fluid leaks	X								
Check engine oil	X								
Replace engine oil and filter			X						
Inspect accessory drive belts	X				X				X
Inspect ECM isolation mounts for cracks and wear; replace as necessary			X						
Inspect throttle control function	X								
Check for MIL at key on. If MIL remains illuminated after starting (it is indicating a fault), refer to page 16	X								
Check engine compression									X
ENGINE COOLANT									
Check engine coolant level	X								
Replace coolant									X
Inspect coolant hoses for leaks, cracks, swelling, or deterioration	X				X				X
ENGINE ELECTRICAL SYSTEM									
Inspect battery for case damage and corroded cables	X								X
Inspect electrical and ignition system					X				X
Replace spark plugs									X
FUEL SYSTEM									
Replace fuel/water separator filter					X				
Check fuel pressure						Service Dealer			
Inspect all fuel hoses and fittings for leaks	X								X
AIR INTAKE									
Check for leaks in air intake and filtration system	X				X				
Inspect spark arrestor element			X						
Clean flame arrestor element	Clean or replace flame arrestor element as conditions require or every 100 hours								
Inspect throttle body for loose bolts or vacuum leaks	X				X				
ENGINE EXHAUST SYSTEM									
Inspect engine for exhaust leaks	X								
Inspect exhaust system for cracks, leaks, gaskets, and loose bolts					X				

CHANGING ENGINE OIL AND FILTER

Under normal operating conditions, the engine oil and filter must be changed every 100 hours or every 12 months whichever occurs first. Use of premium quality oil and filters is recommended. The oil and filter should be changed more often if the engine is operating in severe conditions, such as dirty areas, or during cold weather. No oil additives or break-in oil are recommended.

Engine Oil Level Check



CAUTION: Do not operate the engine with the oil level below the bottom of the dipstick or 'Add' mark on the dipstick, or above the top or 'Full' mark on the dipstick.

The engine oil level should be checked daily. It is recommended that the oil be checked just before the engine is started for the first time for the day. The oil level should be between the 'ADD' and the 'FULL' marks on the dipstick.

Adding Engine Oil

It is normal to add some oil in the period of time between oil changes. The amount will vary with the severity of operation. When adding or replacing engine oil, be sure the oil meets or exceeds the recommended specification.

Engine Oil Quality

To achieve proper engine performance and durability, it is important that you use only engine lubricating oils of the correct type in your engine. Quality oil also provides maximum efficiency for crankcase ventilation systems, which reduces pollution.

Engine Oil Recommendation

GM recommends motor oils meeting the Dexos 1 standard. The GM spec for this oil is #15827. Motor oils meeting this spec receive the green Dexos 1 symbol below.



Oil Filter

NOTE: Ensure the old filter gasket is removed prior to installing the new filter.

The Kodiak **GM Powertrain** engines use an AC Delco (or equivalent) oil filter as original equipment. An equivalent oil filter must be used when servicing the engine (see Engine Specifications starting on page 21 for the recommended oil filter for your engine).

The filter protects your engine from harmful, abrasive, or sludgy particles without blocking the flow of oil to vital engine parts.

To replace the filter, use a proper filter wrench to remove the filter. Clean the filter-mounting base and lightly coat the gasket surface of the new filter with engine oil. Hand tighten the filter until the gasket contacts the base, then tighten another ½ turn. Fill the engine with the correct amount of oil, run the engine and check for oil leaks at the drain plug and filter gasket. Tighten as necessary to stop any oil leakage.

Flame Arrester

The purpose of the flame arrester is to contain any possible flame that gets into the intake manifold due to an engine failure, but also serves other purposes.



CAUTION: Service the flame arrester more frequently under severely dusty or dirty conditions.

Your flame arrester filters air entering the engine induction system and acts as a silencer. Air that contains dirt and grit produces an abrasive fuel mixture and can cause severe damage to the cylinder walls and piston rings. Damage to the cylinder walls and piston rings will cause high oil consumption and short engine life. A restricted or dirty flame arrester can cause a low power situation. Therefore it is extremely important that the flame arrester be serviced at the recommended intervals.

1. Clean screen by washing with solvent.
2. Blow dry or allow dripping dry prior to installation
3. Remove all dust and foreign matter from spark arrester

Make sure the flame arrester is seated properly on the throttle body when reinstalled. Do not operate engine without flame arrester.

COOLING SYSTEM

KEM Equipment and GM Powertrain recommends the use of DEX COOL coolant in all GM engines. A 50/50 mixture is recommended.



WARNING: Engine Damage may occur: All Generation V GM engines must be vacuum filled with coolant. If you need assistance or have questions call your local service dealer. Failure to vacuum fill this engine with the recommended coolant may void all warranty.



WARNING: Never remove the heat exchanger cap under any condition while the engine is operating. Failure to follow these instructions could result in damage to the cooling system, engine, or cause personal injury.



CAUTION: DO NOT add coolant or water to any engine that has become overheated until the engine cools. Adding coolant or water to an extremely hot engine can result in a cracked block or cylinder head.

COOLANT LEVEL



CAUTION: DO NOT mix DEX-COOL (pink/orange colored) with traditional (green) ethylene glycol. Refer to the mixture chart on the container for additional antifreeze protection information. DO NOT use alcohol or methanol antifreeze, or mix them with the specified coolant. Plain water may be used in an emergency (except in freezing temperatures), replace water with the specified coolant as quickly as possible to avoid damage to the system.

Check the coolant level of the heat exchanger daily and only when the engine is cool. Generally a good time to do this is just prior to starting the engine for the first time each day.

Plain water may be used in an emergency, but replace it with the specified coolant as quickly as possible to avoid damage to the system. Do not let the engine run hot with only water acting as the primary coolant.

Heat Exchanger

1. Check the coolant level in the heat exchanger daily (prior to operation)
2. Make sure the coolant level is within $\frac{3}{4}$ to 1- $\frac{1}{2}$ inches below the filler neck seat
3. Check the condition of the rubber seal on the coolant filler cap
4. Make sure the rubber seal is clean and free of any dirt particles.
5. Make sure the filler neck is clean then replace cap.
6. Check all hoses and connections for leaks.
7. Check coolant overflow tank level, fill to cold line (prior to operation)
8. Check all hoses for cracks, frayed points, or spongy areas (replace as necessary).

Serpentine Belt

NOTE: Make sure the belt tensioner is within the proper operating range.

Kodiak Marine engines utilize serpentine belts on the front of the engine. This type of belt system incorporates a belt-tensioning device that keeps the belt at the proper tension. This belt should be checked routinely for cracks or 'checking' on the grooved side of the belt. If cracks or 'checking' are apparent, the belt must be changed.

FUEL INJECTION SYSTEM



WARNING: Extreme High Fuel Rail Pressure. The SIDI Fuel Injectors and fuel rail have extreme high fuel pressures. Do not attempt to remove or service these parts. This poses a potentially hazardous situation that if not avoided, could result in severe personal injury or death, or damage to engine and or property.



CAUTION: Failure to change the fuel system filter as recommended can result in premature failure of fuel injection system components.



WARNING: Use extreme care when changing the fuel filter. Gasoline is highly flammable and under pressure. It should not be exposed to open flame, sparks, or hot engine components. Allow the engine to cool to ambient temperature prior to changing fuel filters.



WARNING: Fuel is under Extreme HIGH Pressure, consult equipment service dealer before servicing any part of the fuel system.



WARNING: The bilge can accumulate explosive fumes. The bilge blower will evacuate the fumes. The bilge blower must be run for a minimum of 10 minutes prior to cranking the engine.

Fuel Water Separator Filter

A fuel/water separator filter is used in the fuel supply line to the engine. The fuel filter is located in the supply line between the fuel tank, fuel pump and the engine. This filter helps to protect the fuel injectors and other fuel system components from any harmful debris that may be present in the fuel tank. This filter must be changed every 500 hours or every 6 months whichever occurs first.

Fuel Recommendation



WARNING: Use extreme care when changing the fuel filter. Gasoline is highly flammable and under pressure. It should not be exposed to open flame, sparks, or hot engine components. Allow the engine to cool to ambient temperature prior to changing fuel filters.



WARNING: The bilge can accumulate explosive fumes. The bilge blower will evacuate the fumes. The bilge blower must be run for a minimum of 10 minutes prior to cranking the engine.

Fuel Type

4.3L and 5.3L SIDI ENGINES

Unleaded **87 Octane** or better fuel is recommended. Lower octane fuels will reduce overall engine performance. Maximum Ethanol content is 10%.

6.2L ENGINE USE PREMIUM 91 MINIMUM OCTANE Lower octane fuels will reduce overall engine performance. Maximum Ethanol content is 10%.

Fuel Quality Changes

NOTE: Sudden changes in fuel quality, including geographical regions may effect engine operation.

Power Loss at Higher Elevations

Fuel injected engines will lose 3.5% power for every 1000 feet the engine is operated above sea level. All fuel injection systems installed by KEM Equipment, Inc. are equipped with a “manifold absolute pressure sensor” (MAP Sensor). The MAP sensor senses barometric pressure and automatically corrects the fuel system calibration for changes in altitude. This means the air/fuel mixture will always be optimized, regardless of elevation (or barometric pressure); however, the engine will still lose 3.5% power for every 1000 ft. increase in elevation. All engines will experience power loss when operated at elevations above sea level, unless they are turbocharged or supercharged. Turbochargers and superchargers are mechanical pumps that put extra air into the engine to make up for the lower air density at higher elevations.

TROUBLESHOOTING



WARNING: The bilge can accumulate explosive fumes. The bilge blower will evacuate the fumes. The bilge blower must be run for a minimum of 10 minutes prior to cranking the engine.

NOTE: A Malfunction Indicator Light must be installed with this engine to be compliant with EPA and CARB regulations. Proper connections will be covered in the wiring section of this manual. Contact your engine installer if this MIL has not been installed. Operating without a MIL installed, may affect your warranty.

The largest percentage of all malfunctioning equipment will be due to simple or small problems. Most operating troubles that might be encountered with a new or well-maintained unit will be of a minor nature. Consequently, if you experience any problems starting or operating your engine, look for a simple cause rather than failure of a major component. The following list should cover the most common problems.

- Loose or corroded battery connections are more common than battery failure.
- Loose ignition wire connection – more common than distributor, coil or ignition.
- Severe weather conditions – temps below 32°F/0°C - can cause condensation on the inside of the engine.
- Operating conditions (load changes).
- Change of periodic servicing.
- Change of grade or purity of fuel. Contaminated fuel will often foul engine components.
- Change of operator.

Engine troubles that develop as a result of normal use and wear usually give plenty of advance notice or warning. These problems usually develop as a result of neglected periodic maintenance. Whenever engine performance appears less than normal in any area, you should consult with your KODIAK service dealer immediately. Do not wait for a problem to develop. Careful attention to periodic/regular maintenance will prevent most problems. Refer to the periodic maintenance section for checklists.

If you need assistance, refer to the list of Kodiak Approved service dealers on pages 58-59 in this manual.

GENERAL EMISSIONS WARRANTY COVERAGE

KEM Equipment, Inc. / Kodiak Marine warrants to the ultimate purchaser and each subsequent purchaser that this engine is:

(1) Designed, built and equipped so as to conform with all applicable regulations adopted by the Air Resources Board pursuant to its authority in Chapters 1 and 2, Part 5, Division 26 of the Health and Safety Code; and,

(2) Free from defects in materials and workmanship that cause the failure of a warranted part to be identical in all material respects to that part as described in KEM Equipment Inc. / Kodiak Marine's application for certification.

The warranty period begins on the date the engine or equipment is delivered to an ultimate purchaser or first placed into service. For model year 2011 and later spark-ignition inboard and stern drive marine engines, a period of 3 years.

Subject to certain conditions and exclusions as stated below, the warranty period on your engine's emission-related parts (identified below) is as follows:

(1) Any warranted part that is not scheduled for replacement as required maintenance in the written instructions supplied, is warranted for the warranty period stated above. If the part fails during the period of warranty coverage, the part will be repaired or replaced by KEM Equipment, Inc. / Kodiak Marine according to Subsection (4) below. Any such part repaired or replaced under warranty will be warranted for the remainder of the period.

(2) Any warranted part that is scheduled only for regular inspection in the written instructions supplied is warranted for the warranty period stated above. Any such part repaired or replaced under warranty will be warranted for the remaining warranty period.

(3) Any warranted part that is scheduled for replacement as required maintenance in the written instructions supplied is warranted for the period of time before the first scheduled replacement date for that part. If the part fails before the first scheduled replacement, the part will be repaired or replaced by KEM Equipment Inc. / Kodiak Marine according to Subsection (4) below. Any such part repaired or replaced under warranty will be warranted for the remainder of the period prior to the first scheduled replacement point for the part.

(4) Repair or replacement of any warranted part under the warranty provisions herein must be performed at a warranty station at no charge to the owner.

(5) Notwithstanding the provisions herein, warranty services or repairs will be provided at all KEM Equipment, Inc. / Kodiak Marine distribution centers that are franchised to service the subject engines.

(6) The engine owner will not be charged for diagnostic labor that is directly associated with diagnosis of a defective, emission-related warranted part, provided that such diagnostic work is performed at a warranty station.

(7) KEM Equipment, Inc. / Kodiak Marine is liable for damages to other engine components proximately caused by a failure under warranty of any warranted part.

(8) Throughout the engine's warranty period defined above, KEM Equipment, Inc. / Kodiak Marine will maintain a supply of warranted parts sufficient to meet the expected demand for such parts.

(9) Any replacement part may be used in the performance of any warranty maintenance or repairs and must be provided without charge to the owner. Such use will not reduce the warranty obligations of KEM Equipment, Inc. / Kodiak Marine.

(10) Add-on or modified parts, as defined in Section 1900(b)(1) and (b)(10), Title 13, that are not exempted by the Air Resources Board may not be used. The use of any non-exempted add-on or modified parts by the ultimate purchaser will be grounds for disallowing a warranty claim made in accordance with these warranty procedures and Policies. KEM Equipment, Inc. / Kodiak Marine will not be liable under these warranty procedures and policies to warrant failures of warranted parts caused by the use of a non-exempted add-on or modified part. Following is a list of those critical emission related parts that are covered under the provisions of this emission warranty.

(1) Fuel Metering System

Fuel injection system
Air/fuel ratio feedback and control system
Intake valve(s)

(2) Air Induction System

Intake manifold
Air filter

(3) Ignition System

Spark plugs
Electronic ignition system
Ignition control module
Ignition wires

(4) Lubrication System

Oil pump and internal parts

(5) Positive Crankcase Ventilation (PCV) System

PCV valve
Oil filler cap

(6) Exhaust System

Exhaust Catalyst
Oxygen Sensors

(7) Miscellaneous Items Used in Above Systems

Hoses, clamps, fittings, tubing, sealing gaskets or devices, and mounting hardware.
Pulleys, belts and idlers.
Vacuum, temperature, check, and time sensitive valves and switches
Electronic Controls

(11) All incidental and/or consequential damages are excluded from this warranty. Implied warranties are limited to the life of this warranty. All implied warranties including merchantability fitness for a particular purpose or otherwise are disclaimed in their entirety after expirations of the appropriate three (3) year warranty period. This warranty gives you specific rights, and you may also have other rights, which may vary from state to state.

(12) KEM reserves the right to change or improve design of any product previously assembled without notice and without obligation.

(13) In the event that a warranty claim is required outside of the continental United States, with the exception of Alaska and Hawaii, there may be additional charges to the engine owner. KEM will not warranty any engine sold outside the continental United States, with the exception of Alaska and Hawaii, unless competent and trained personal are available to provide service to the engine.

Exclusions

The repair or replacement of any warranted part otherwise eligible for warranty coverage may be excluded from such warranty coverage if KEM Equipment, Inc. / Kodiak Marine demonstrates that the engine has been abused, neglected, or improperly maintained, and that such abuse, neglect, or improper maintenance was the direct cause of the need for repair or replacement of the part.

Except as provided in the paragraph above, any adjustment of a component that has a factory installed, and properly Operating, Adjustment limiting device (such as an idle limiter cap or plug) is eligible for warranty coverage, under General Emissions Warranty Coverage above.

Non-Commercial Applications:

Starters, Alternators, and Fuel pumps will be warranted for a period of 2 years or 200 hours, whichever occurs first.

Commercial

Applications:

Starters, Alternators, and Fuel pumps will be warranted for a period of 1 year or 150 hours, whichever occurs first.

**KODIAK MARINE ENGINE WARRANTY
3 YEAR LIMITED WARRANTY
EFFECTIVE JANUARY 1st, 2011**

Products Covered	Length of Warranty (from date of original retail purchase)	
	Non-commercial Non-rental	Commercial/Rental
Inboard Engines 2011 and newer	36 months/480 hours	12 months/480 hours

- The Kodiak Marine Inboard Engine must be purchased from an authorized Kodiak Marine dealer. This limited warranty applies to the first retail purchaser and each subsequent owner during the applicable warranty time period.
- Kodiak Marine will repair or replace, at its option, any part that is proven to be defective in material or workmanship under normal use during the applicable warranty time period. Warranty repairs and replacements will be made without charge for parts or labor. Anything replaced under warranty becomes property of Kodiak Marine. All parts replaced under warranty will be considered as part of the original product and any warranty on those parts will expire coincidentally with the original product warranty.
- **The warranty shall commence after receipt of a properly completed Warranty Registration at the factory, on the date of the first retail purchase and extends to original and subsequent purchasers.** However, in no event shall the duration of this warranty exceed three (3) years or 480 hours, whichever occurs first, measured from the original retail sale date. All subsequent purchasers must inform Kodiak in writing and with a payment of \$100.00 transfer fee to continue the warranty. If Kodiak does not receive notification and payment within 15 days of the resale the warranty will be null and void.
- Third year (3) of the warranty period is limited to defects in the materials and workmanship only. *You must have your dealer verify hours before the start of the warranty claim and a no exception \$150.00 deductible will apply to each warranty claim during the third year of the warranty period.
- Warranty service must be requested by calling Kodiak Marine to be directed to your closest authorized service center to deliver the product for inspection. A properly completed warranty registration must be on file with KEM. You must take your Kodiak Marine Inboard Engine and proof of the original purchase date, at your expense; to any a designated authorized Kodiak Marine service facility during the dealer's normal business hours. If you are unable to obtain warranty service, or are dissatisfied with the warranty service you receive, take the following steps: First, contact the manager or owner of the dealership involved; normally this should resolve the problem. However, if you should require further assistance, write or call Kodiak Marine:

Kodiak Marine
10800 SW Herman Rd.
Tualatin, OR 97062
503-692-5012

Exclusions:

THIS WARRANTY DOES NOT EXTEND TO THE FOLLOWING:

- CONDITIONS CAUSED BY LACK OF ROUTINE MAINTENANCE (AS OUTLINED IN THE OPERATOR'S MANUAL)
- CONDITIONS CAUSED BY THE USE OF AN IMPELLER OR IMPELLERS THAT DO NOT ALLOW THE INBOARD ENGINE TO RUN IN ITS RECOMMENDED FULL THROTTLE RPM RANGE
- ALL ELECTRICAL COMPONENTS FOR THE THIRD (3) YEAR
- LABOR AND FREIGHT FOR THE THIRD (3) YEAR
- OPERATION INCONSISTENT WITH THE RECOMMENDED OPERATION/DUTY CYCLE (AS OUTLINED IN THE OPERATOR'S MANUAL)
- PARTS AFFECTED OR DAMAGED BY AN ACCIDENT AND/OR COLLISION
- NORMAL WEAR AND TEAR
- FUEL CONTAMINATION AND WATER ENTERING ENGINE THROUGH THE FUEL INTAKE, AIR INTAKE, OR EXHAUST SYSTEM
- OPERATION WITH FUELS, OILS, ADDITIVES AND LUBRICANTS WHICH ARE NOT SUITABLE FOR USE IN THE PRODUCT
- USE IN AN APPLICATION FOR WHICH THE INBOARD ENGINE WAS NOT DESIGNED, SUCH AS RACING OR COMPETITIVE USE OR ANY OTHER MISUSE OR NEGLECT
- INCORPORATION OF UNSUITABLE ATTACHMENTS OR PARTS
- THE UNAUTHORIZED ALTERATION, IMPROPER INSTALLATION AND/OR RIGGING, OR ANY CAUSES OTHER THAN DEFECTS IN MATERIAL OR WORKMANSHIP
- CORROSION TO ELECTRICAL COMPONENTS, CORROSION DUE TO ELECTROLYSIS, WATER BORN FOREIGN CHEMICALS, IMPROPER SERVICE, OR CORROSION CAUSED BY DAMAGE OR ABUSE
- REIMBURSEMENT FOR TOWING CHARGES, IN AND OUT OF WATER CHARGES, OR TECHNICIAN TRAVEL TIME
- GROWTH OF MARINE ORGANISMS ON MOTOR SURFACES, EXTERNAL OR INTERNAL

DISCLAIMER OF CONSEQUENTIAL DAMAGE AND LIMITATION OF IMPLIED WARRANTIES:
Kodiak Marine DISCLAIMS ANY RESPONSIBILITY FOR LOSS OF TIME OR USE OF THE INBOARD, REVENUE, OR THE EQUIPMENT IN, WHICH THE INBOARD IS INSTALLED, TRANSPORTATION, COMMERCIAL LOSS, OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGE. ANY IMPLIED WARRANTIES ARE LIMITED TO THE DURATION OF THIS WRITTEN LIMITED WARRANTY.

Non-Commercial Applications:

Starters, Alternators, and Fuel pumps will be warranted for a period of 2 years or 200 hours, whichever occurs first.

Commercial Applications:

Starters, Alternators, and Fuel pumps will be warranted for a period of 1 year or 150 hours, whichever occurs first.

Some states do not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusions and limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights, which vary state to state.

ON BOARD DIAGNOSTIC (OBD) MEFI CONTROLLED MARINE ENGINE



WARNING: Fire, Shock, and Burn Danger: When performing any diagnostics or service work use caution. This system has extreme fuel pressures and a high voltage ignition.



CAUTION: Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts. Discharge body static: before handling the control. (Make sure power to the control is turned off, contact a grounded surface and maintain contact while, handling the control). Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards. Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.



WARNING: Extreme High Fuel Rail Pressure. The SIDI Fuel Injectors and fuel rail have extreme high fuel pressures. Do not attempt to remove or service these parts. This poses a potentially hazardous situation that if not avoided, could result in severe personal injury or death, damage to engine and or property.

1. Verify that none of the following preliminary inspections/tests reveal the cause of the vehicle concern before beginning diagnosis.
 - Ensure that the battery is fully charged.
 - Ensure that the battery cables are clean and tight.
 - Inspect for any open fuses.
 - Ensure that the grounds are clean, tight, and in the correct location.
 - Inspect the easily accessible systems or the visible system components for obvious damage or conditions that could cause the concern. This would include checking to ensure that all connections/connectors are fully seated and secured.
 - Inspect for aftermarket devices that could affect the operation of the system.
 - Search for applicable service bulletins.
2. Ensure that the battery is fully charged.
3. Ensure that the battery cables are clean and tight.
4. Inspect for any open fuses.
5. Ensure that the grounds are clean, tight, and in the correct location.
6. Inspect the easily accessible systems or the visible system components for obvious damage or conditions that could cause the concern. (This would include checking to ensure that all connections/connectors are fully seated and secured.)

7. Inspect for aftermarket devices that could affect the operation of the system.
8. Search for applicable service bulletins.
9. Install a scan tool. Verify that the scan tool powers up.
10. Ignition ON, Engine OFF, verify communication with all of the control modules on the vehicle.

11. Verify that SPN 65559 is not set; if SPN 65559 is set, refer to *SPN 65559*

ATTEMPT TO START THE ENGINE: Verify that the engine cranks.

- If the engine does not crank, refer to *SPN 66001* or *SPN 66002* (if equipped). If the engine is not equipped with an ECM controlled starter relay, repair the starting system.
- Attempt to start the engine. Verify the engine starts and idles.

Important: Do not clear any SPNs unless instructed to do so by a diagnostic procedure.

Use the appropriate scan tool selections to obtain SPNs from each of the vehicle modules.

Verify there are no SPNs reported from any module.

If any SPNs are present diagnose any current SPNs in the following order:

- Any of the following: 630, 65580, 65581, or 65582.
- SPN 627.
- Component level SPNs.
- System level SPNs.
- Any remaining SPNs.

DIAGNOSTIC ERROR CODES:

SPN 94

SPN Descriptors

SPN 94 FMI 3: Fuel Pressure Sensor Voltage Above Normal or Shorted High

SPN 94 FMI 4: Fuel Pressure Sensor Voltage Below Normal or Shorted Low

SPN 94 FMI 15: Fuel Pressure Data Valid But Above Normal Range-Least Severe Level

SPN 94 FMI 17: Fuel Pressure Data Valid But Below Normal Range-Least Severe Level

SPN 98

SPN Descriptor

SPN 98 FMI 17: Oil Level Switch Signal Data Valid But Below Normal Range-Least Severe Level

SPN 100

SPN Descriptors

SPN 100 FMI 3: Engine Oil Pressure (EOP) Sensor Circuit Voltage Above Normal or Shorted High

SPN 100 FMI 4: Engine Oil Pressure (EOP) Sensor Circuit Voltage Below Normal or Shorted Low

SPN 100 FMI 17: Engine Oil Pressure (EOP) Sensor Data Valid But Below Normal Range-Least Severe Level

SPN 105

SPN Descriptors

SPN 105 FMI 3: Manifold Air Temperature (MAT) Sensor Circuit Voltage Above Normal or Shorted High

SPN 105 FMI 4: Manifold Air Temperature (MAT) Sensor Circuit Voltage Below Normal or Shorted Low

SPN 106

SPN Descriptors

SPN 106 FMI 0: Manifold Absolute Pressure (MAP) Sensor Circuit Voltage Data Valid But Above Normal

SPN 106 FMI 1: Manifold Absolute Pressure (MAP) Sensor Circuit Voltage Data Valid But Below Normal

SPN 106 FMI 3: Manifold Absolute Pressure (MAP) Sensor Circuit Voltage Above Normal or Shorted High

SPN 106 FMI 4: Manifold Absolute Pressure (MAP) Sensor Circuit Voltage Below Normal or Shorted Low

SPN 108

SPN Descriptors

SPN 108 FMI 2: Barometric Pressure (BARO) Sensor Voltage Data Erratic, Intermittent or Incorrect

SPN 108 FMI 3: Barometric Pressure (BARO) Sensor Voltage Above Normal or Shorted High

SPN 108 FMI 4: Barometric Pressure (BARO) Sensor Voltage Below Normal or Shorted Low

SPN 108 FMI 10: Barometric Pressure (BARO) Sensor Abnormal Rate of Change

SPN 110

SPN Descriptors

SPN 110 FMI 3: Engine Coolant Temperature (ECT) Sensor Circuit Voltage Above Normal or Shorted High

SPN 110 FMI 4: Engine Coolant Temperature (ECT) Sensor Circuit Voltage Below Normal or Shorted Low

SPN 110 FMI 15: Engine Coolant Temperature (ECT) Sensor Circuit Voltage Data Valid But Above Normal Range-Least Severe Level

SPN 174

SPN Descriptors

SPN 174 FMI 3: Fuel Temperature (FT) Sensor Circuit Voltage Above Normal or Shorted High

SPN 174 FMI 4: Fuel Temperature (FT) Sensor Circuit Voltage Below Normal or Shorted Low

SPN 627

SPN Descriptor

SPN 627 FMI 15: System Voltage Data Valid But Above Normal Range-Least Severe Level

SPN 627 FMI 17: System Voltage Data Valid But Below Normal Range-Least Severe Level

SPN 630, 65580, 65581, or 65582

SPN Descriptors

SPN 630 FMI 13: Cal Memory Out of Calibration

SPN 65580 FMI 12: CPU Bad Intelligent Device or Component

SPN 65581 FMI 12: MHC Failure Bad Intelligent Device or Component

SPN 65582 FMI 12: NV RAM Failure Data Erratic, Intermittent or Incorrect

SPN 636

SPN Descriptors

SPN 636 FMI 2: Crankshaft Position (CKP) Sensor Circuit Data Erratic, Intermittent or Incorrect

SPN 636 FMI 8: Crankshaft Position (CKP) Sensor Signal Abnormal Frequency or Pulse Width

SPN 651, 652, 653, 654, 655, 656, 657, or 658

SPN Descriptors

SPN 651 FMI 3: Fuel Injector 1 Voltage Above Normal or Shorted High
SPN 651 FMI 5: Fuel Injector 1 Current Below Normal or Open Circuit
SPN 652 FMI 3: Fuel Injector 2 Voltage Above Normal or Shorted High
SPN 652 FMI 5: Fuel Injector 2 Current Below Normal or Open Circuit
SPN 653 FMI 3: Fuel Injector 3 Voltage Above Normal or Shorted High
SPN 653 FMI 5: Fuel Injector 3 Current Below Normal or Open Circuit
SPN 654 FMI 3: Fuel Injector 4 Voltage Above Normal or Shorted High
SPN 654 FMI 5: Fuel Injector 4 Current Below Normal or Open Circuit
SPN 655 FMI 3: Fuel Injector 5 Voltage Above Normal or Shorted High
SPN 655 FMI 5: Fuel Injector 5 Current Below Normal or Open Circuit
SPN 656 FMI 3: Fuel Injector 6 Voltage Above Normal or Shorted High
SPN 656 FMI 5: Fuel Injector 6 Current Below Normal or Open Circuit
SPN 657 FMI 3: Fuel Injector 7 Voltage Above Normal or Shorted High
SPN 657 FMI 5: Fuel Injector 7 Current Below Normal or Open Circuit
SPN 658 FMI 3: Fuel Injector 8 Voltage Above Normal or Shorted High
SPN 658 FMI 5: Fuel Injector 8 Current Below Normal or Open Circuit

SPN 65541, 65542, 65543, 65544, 65545, 65546, 65547, or 65548

SPN Descriptors

SPN 65541 FMI 4: Ignition Coil 1 Voltage Below Normal or Shorted Low
SPN 65541 FMI 5: Ignition Coil 1 Current Below Normal or Open Circuit
SPN 65542 FMI 4: Ignition Coil 2 Voltage Below Normal or Shorted Low
SPN 65542 FMI 5: Ignition Coil 2 Current Below Normal or Open Circuit
SPN 65543 FMI 4: Ignition Coil 3 Voltage Below Normal or Shorted Low
SPN 65543 FMI 5: Ignition Coil 3 Current Below Normal or Open Circuit
SPN 65544 FMI 4: Ignition Coil 4 Voltage Below Normal or Shorted Low
SPN 65544 FMI 5: Ignition Coil 4 Current Below Normal or Open Circuit
SPN 65545 FMI 4: Ignition Coil 5 Voltage Below Normal or Shorted Low
SPN 65545 FMI 5: Ignition Coil 5 Current Below Normal or Open Circuit
SPN 65546 FMI 4: Ignition Coil 6 Voltage Below Normal or Shorted Low
SPN 65546 FMI 5: Ignition Coil 6 Current Below Normal or Open Circuit
SPN 65547 FMI 4: Ignition Coil 7 Voltage Below Normal or Shorted Low
SPN 65547 FMI 5: Ignition Coil 7 Current Below Normal or Open Circuit
SPN 65548 FMI 4: Ignition Coil 8 Voltage Below Normal or Shorted Low
SPN 65548 FMI 5: Ignition Coil 8 Current Below Normal or Open Circuit

SPN 65550, 65551, or 65552

SPN Descriptor

SPN 65550 FMI 2: Knock Sensor (KS) Circuit Data Erratic, Intermittent or Incorrect
SPN 65551 FMI 2: Knock Sensor (KS) Bank 1 Circuit Data Erratic, Intermittent or Incorrect
SPN 65552 FMI 2: Knock Sensor (KS) Bank 2 Circuit Data Erratic, Intermittent or Incorrect

SPN 65559

SPN Descriptors

SPN 65559 FMI 11: CAN Bus Hardware Fault Root Cause Unknown

SPN 65560

SPN Descriptors

SPN 65560 FMI 9: CAN Bus Governor Command Abnormal Update Rate

SPN 65561, 65562, 65563, or 65564

SPN Descriptors

SPN 65561 FMI 0: Oxygen Sensor Bank A Sensor 1 Data Valid But Above Normal

SPN 65561 FMI 1: Oxygen Sensor Bank A Sensor 1 Data Valid But Below Normal

SPN 65561 FMI 3: Oxygen Sensor Bank A Sensor 1 Voltage Above Normal or Shorted High

SPN 65561 FMI 4: Oxygen Sensor Bank A Sensor 1 Voltage Below Normal or Shorted Low

SPN 65561 FMI 5: Oxygen Sensor Bank A Sensor 1 Current Below Normal or Open Circuit

SPN 65562 FMI 0: Oxygen Sensor Bank A Sensor 2 Data Valid But Above Normal

SPN 65562 FMI 1: Oxygen Sensor Bank A Sensor 2 Data Valid But Below Normal

SPN 65562 FMI 3: Oxygen Sensor Bank A Sensor 2 Voltage Above Normal or Shorted High

SPN 65562 FMI 4: Oxygen Sensor Bank A Sensor 2 Voltage Below Normal or Shorted Low

SPN 65562 FMI 5: Oxygen Sensor Bank A Sensor 2 Current Below Normal or Open Circuit

SPN 65563 FMI 0: Oxygen Sensor Bank B Sensor 1 Data Valid But Above Normal

SPN 65563 FMI 1: Oxygen Sensor Bank B Sensor 1 Data Valid But Below Normal

SPN 65563 FMI 3: Oxygen Sensor Bank B Sensor 1 Voltage Above Normal or Shorted High

SPN 65563 FMI 4: Oxygen Sensor Bank B Sensor 1 Voltage Below Normal or Shorted Low

SPN 65563 FMI 5: Oxygen Sensor Bank B Sensor 1 Current Below Normal or Open Circuit

SPN 65564 FMI 0: Oxygen Sensor Bank B Sensor 2 Data Valid But Above Normal

SPN 65564 FMI 1: Oxygen Sensor Bank B Sensor 2 Data Valid But Below Normal

SPN 65564 FMI 3: Oxygen Sensor Bank 2 Sensor 2 Voltage Above Normal or Shorted High

SPN 65564 FMI 4: Oxygen Sensor Bank B Sensor 2 Voltage Below Normal or Shorted Low

SPN 65564 FMI 5: Oxygen Sensor Bank B Sensor 2 Current Below Normal or Open Circuit

SPN 65565 or 65566

SPN Descriptors

SPN 65565 FMI 0: Fuel Trim Bank 1 Data Valid But Above Normal

SPN 65565 FMI 1: Fuel Trim Bank 1 Data Valid But Below Normal

SPN 65566 FMI 0: Fuel Trim Bank 2 Data Valid But Above Normal

SPN 65566 FMI 1: Fuel Trim Bank 2 Data Valid But Below Normal

SPN 65567 or 65568

SPN Descriptors

SPN 65567 FMI 8: Oxygen Sensor Bank 1 Sensor 1 Abnormal Frequency or Pulse Width

SPN 65567 FMI 10: Oxygen Sensor Bank 1 Sensor 1 Abnormal Rate of Change

SPN 65568 FMI 8: Oxygen Sensor Bank 2 Sensor 1 Abnormal Frequency or Pulse Width

SPN 65568 FMI 10: Oxygen Sensor Bank 2 Sensor 1 Abnormal Rate of Change

SPN 65570

SPN Descriptors

SPN 65570 FMI 2: Cam Phaser W Data Erratic, Intermittent, or Incorrect

SPN 65570 FMI 4: Cam Phaser W Voltage Below Normal or Shorted Low

SPN 65570 FMI 5: Cam Phaser W Short High or Open

SPN 65570 FMI 7: Cam Phaser W Accuracy Mechanical System Not Responding or Out of Adjustment

SPN 65590, 65591, 65592, 65593, 65594, 65595, 65596, 65597, 65598, or 65599

SPN Descriptors

SPN 65590 FMI 7: Misfire Mechanical System Not Responding or Out of Adjustment

SPN 65591 FMI 7: Misfire Cylinder 1 Mechanical System Not Responding or Out of Adjustment

SPN 65592 FMI 7: Misfire Cylinder 2 Mechanical System Not Responding or Out of Adjustment

SPN 65593 FMI 7: Misfire Cylinder 3 Mechanical System Not Responding or Out of Adjustment

SPN 65594 FMI 7: Misfire Cylinder 4 Mechanical System Not Responding or Out of Adjustment

SPN 65595 FMI 7: Misfire Cylinder 5 Mechanical System Not Responding or Out of Adjustment

SPN 65596 FMI 7: Misfire Cylinder 6 Mechanical System Not Responding or Out of Adjustment

SPN 65597 FMI 7: Misfire Cylinder 7 Mechanical System Not Responding or Out of Adjustment

SPN 65598 FMI 7: Misfire Cylinder 8 Mechanical System Not Responding or Out of Adjustment

SPN 65599 FMI 7: Misfire Random Mechanical System Not Responding or Out of Adjustment

SPN 65601, 65602, or 65610

SPN Descriptors

SPN 65601 FMI 2: Throttle Position (TP) Sensor 2 Data Erratic, Intermittent or Incorrect

SPN 65602 FMI 2: Throttle Position (TP) Sensor 1 Data Erratic, Intermittent or Incorrect

SPN 65610 FMI 2: Throttle Position (TP) Sensor 1 and 2 Data Erratic, Intermittent or Incorrect

SPN 65604, 65605, or 65613

SPN Descriptors

SPN 65604 FMI 2: Pedal Position (PP) Sensor 2 Data Erratic, Intermittent or Incorrect

SPN 65604 FMI 12: Pedal Position (PP) Sensor 2 Bad Intelligent Device or Component

SPN 65605 FMI 2: Pedal Position (PP) Sensor 1 Data Erratic, Intermittent or Incorrect

SPN 65605 FMI 12: Pedal Position (PP) Sensor 1 Bad Intelligent Device or Component

SPN 65613 FMI 2: Pedal Position (PP) Sensor 1 and 2 Data Erratic, Intermittent or Incorrect

SPN 65615, 65616, or 65618

SPN Descriptors

SPN 65615 FMI 7: Electronic Throttle Control (ETC) Actuation Fault Mechanical System Not Responding or Out of Adjustment

SPN 65616 FMI 12: Electronic Throttle Control (ETC) Process Fault Bad Intelligent Device or Component

SPN 65618 FMI 7: Electronic Throttle Control (ETC) Return Fault Mechanical System Not Responding or Out of Adjustment

SPN 65620 or 65621

SPN Descriptors

SPN 65620 FMI 4: 5 Volt Reference A Circuit Voltage Below Normal or Shorted Low

SPN 65621 FMI 4: 5 Volt Reference B Circuit Voltage Below Normal or Shorted Low

SPN 65671 or 65672

SPN Descriptors

SPN 65671 FMI 0: Catalytic Converter A Temperature Sensor Data Valid But Above Normal

SPN 65671 FMI 1: Catalytic Converter A Temperature Sensor Data Valid But Below Normal

SPN 65671 FMI 3: Catalytic Converter A Temperature Sensor Voltage Above Normal or Shorted High

SPN 65671 FMI 4: Catalytic Converter A Temperature Sensor Voltage Below Normal or Shorted Low

SPN 65672 FMI 0: Catalytic Converter B Temperature Sensor Data Valid But Above Normal

SPN 65672 FMI 1: Catalytic Converter B Temperature Sensor Data Valid But Below Normal

SPN 65672 FMI 3: Catalytic Converter B Temperature Sensor Voltage Above Normal or Shorted High

SPN 65672 FMI 4: Catalytic Converter B Temperature Sensor Voltage Below Normal or Shorted Low

SPN 65673 or 65674

SPN Descriptors

SPN 65673 FMI 15: Catalytic Converter A Temperature Sensor Data Valid But Above Normal Range-Least Severe Level

SPN 65674 FMI 15: Catalytic Converter B Temperature Sensor Data Valid But Above Normal Range-Least Severe Level

SPN 65675 or 65676

SPN Descriptor

SPN 65675 FMI 11: Catalytic Converter A Efficiency Root Cause Unknown

SPN 65676 FMI 11: Catalytic Converter B Efficiency Root Cause Unknown

SPN 65677 or 65678

SPN Descriptor

SPN 65677 FMI 11: Catalytic Converter A Exotherm Root Cause Unknown

SPN 65678 FMI 11: Catalytic Converter B Exotherm Root Cause Unknown

SPN 65690

SPN Descriptors

SPN 65690 FMI 3: Variable Governor Control Voltage Above Normal or Shorted High

SPN 65690 FMI 4: Variable Governor Control Voltage Below Normal or Shorted Low

SPN 65701 or 65702

SPN Descriptors

SPN 65701 FMI 31: General Warning Sensor 1 Not Available

SPN 65702 FMI 31: General Warning Sensor 2 Not Available

SPN 65710

SPN Descriptors

SPN 65710 FMI 31: Emergency Stop Warning Not Available

SPN 65723

SPN Descriptors

SPN 65723 FMI 2: Camshaft Position (CMP) Sensor Circuit Data Erratic, Intermittent or Incorrect

SPN 65723 FMI 7 : Camshaft Position (CMP) Sensor Mechanical System Not Responding or Out of Adjustment

SPN 65723 FMI 8: Camshaft Position (CMP) Sensor Signal Abnormal Frequency or Pulse Width

SPN 66001

SPN Descriptor

SPN 66001 FMI 3: Starter Relay Low Side Driver Voltage Above Normal or Shorted High

SPN 66001 FMI 5: Starter Relay Low Side Driver Current Below Normal or Open Circuit

SPN 66002

SPN Descriptor

SPN 66002 FMI 4: Starter Relay High Side Driver Voltage Below Normal or Shorted Low

SPN 66002 FMI 5: Starter Relay High Side Driver Current Below Normal or Open Circuit

SPN 66003

SPN Descriptor

SPN 66003 FMI 3: Malfunction Indicator Lamp (MIL) Driver Voltage Above Normal or Shorted High

SPN 66003 FMI 5: Malfunction Indicator Lamp (MIL) Driver Current Below Normal or Open Circuit

SPN 66004

SPN Descriptor

SPN 66004 FMI 3: Service Vehicle Soon Lamp (SVS) Voltage Above Normal or Shorted High

SPN 66004 FMI 5: Service Vehicle Soon Lamp (SVS) Current Below Normal or Open Circuit

SPN 66005

SPN Descriptor

SPN 66005 FMI 3: Governor Status Lamp (GSL) Voltage Above Normal or Shorted High

SPN 66005 FMI 5: Governor Status Lamp (GSL) Current Below Normal or Open Circuit

SPN 66006

SPN Descriptor

SPN 66006 FMI 3: DTC Lamp 3 Voltage Above Normal or Shorted High

SPN 66006 FMI 5: DTC Lamp 3 Current Below Normal or Open Circuit

SPN 66007

SPN Descriptor

SPN 66007 FMI 3: Buzzer Driver Short Voltage Above Normal or Shorted High

SPN 66007 FMI 5: Buzzer Driver Current Below Normal or Open Circuit

SPN 66008

SPN Descriptor

SPN 66008 FMI 3: DTC Lamp 1 Voltage Above Normal or Shorted High

SPN 66008 FMI 5: DTC Lamp 1 Current Below Normal or Open Circuit

SPN 66009

SPN Descriptor

SPN 66009 FMI 3: DTC Lamp 2 Voltage Above Normal or Shorted High

SPN 66009 FMI 5: DTC Lamp 2 Current Below Normal or Open Circuit

SPN 66010

SPN Descriptor

SPN 66010 FMI 3: Slow Mode Lamp Voltage Above Normal or Shorted High

SPN 66010 FMI 5: Slow Mode Lamp Current Below Normal or Open Circuit

SPN 66013 or 66014

SPN Descriptor

SPN 66013 FMI 3: Powertrain Relay Voltage Above Normal or Shorted High

SPN 66013 FMI 5: Powertrain Relay Current Below Normal or Open Circuit

SPN 66014 FMI 4: Powertrain Relay Contact Voltage Below Normal or Shorted Low

SPN 66017

SPN Descriptors

SPN 66017 FMI 4: Fuel Pump Relay 1 Voltage Below Normal or Shorted Low

SPN 66017 FMI 5: Fuel Pump Relay 1 Current Below Normal or Open Circuit

SPN 66018

SPN Descriptor

SPN 66018 FMI 3: Tachometer Voltage Above Normal or Shorted High

SPN 66018 FMI 5: Tachometer Current Below Normal or Open Circuit

SPN 66019 or 66020

SPN Descriptors

SPN 66019 FMI 3: Oxygen Sensor Bank A Sensor 1 Heater Voltage Above Normal or Shorted High

SPN 66019 FMI 5: Oxygen Sensor Bank A Sensor 1 Heater Current Below Normal or Open Circuit

SPN 66019 FMI 8: Oxygen Sensor Bank A Sensor 1 Heater Abnormal Frequency or Pulse Width

SPN 66020 FMI 3: Oxygen Sensor Bank B Sensor 1 Heater Voltage Above Normal or Shorted High

SPN 66020 FMI 5: Oxygen Sensor Bank B Sensor 1 Heater Current Below Normal or Open Circuit

SPN 66020 FMI 8: Oxygen Sensor Bank B Sensor 1 Heater Abnormal Frequency or Pulse Width

SPN 66021 or 66022

SPN Descriptors

SPN 66021 FMI 3: Oxygen Sensor Bank A Sensor 2 Heater Voltage Above Normal or Shorted High

SPN 66021 FMI 5: Oxygen Sensor Bank A Sensor 2 Heater Current Below Normal or Open Circuit

SPN 66021 FMI 8: Oxygen Sensor Bank A Sensor 2 Heater Abnormal Frequency or Pulse Width

SPN 66022 FMI 3: Oxygen Sensor Bank B Sensor 2 Heater Voltage Above Normal or Shorted High

SPN 66022 FMI 5: Oxygen Sensor Bank B Sensor 2 Heater Current Below Normal or Open Circuit

SPN 66022 FMI 8: Oxygen Sensor Bank B Sensor 2 Heater Abnormal Frequency or Pulse Width

SPN 66025

SPN Descriptor

SPN 66025 FMI 4: Fuel Pump Relay 2 Voltage Below Normal or Shorted Low

SPN 66025 FMI 5: Fuel Pump Relay 2 Current Below Normal or Open Circuit

SPN 66030

SPN Descriptor

SPN 66030 FMI 3: Intercooler Relay Voltage Above Normal or Shorted High

SPN 66030 FMI 5: Intercooler Relay Voltage Below Normal or Shorted Low

SPN 66040-66043

SPN Descriptor

SPN 66040 FMI 3: OEM Output Driver 1 Voltage Above Normal or Shorted High

SPN 66040 FMI 5: OEM Output Driver 1 Current Below Normal or Open Circuit

SPN 66041 FMI 3: OEM Output Driver 2 Voltage Above Normal or Shorted High

SPN 66041 FMI 5: OEM Output Driver 2 Current Below Normal or Open Circuit

SPN 66042 FMI 3: OEM Output Driver 3 Voltage Above Normal or Shorted High

SPN 66042 FMI 5: OEM Output Driver 3 Current Below Normal or Open Circuit

SPN 66043 FMI 3: OEM Output Driver 4 Voltage Above Normal or Shorted High

SPN 66043 FMI 5: OEM Output Driver 4 Current Below Normal or Open Circuit

Notice to Builders and Service Dealers

Generation V Engine Coolant Filling Procedure for the following GM engines:

4.3L DI

5.3L DI

6.2L DI

A heat exchanger and engine block coolant fill and air lock removal tool is necessary and must be used to purge the air lock from the new Generation V GM engines during filling or the refilling of coolant.

Procedure for filling or refilling the closed coolant system:

To fill or re-fill the engine and heat exchanger with coolant, you must be sure the coolant system is leak free at all hose and fitting locations. The filling with coolant and purging of air from the engine is done with vacuum rather than by pressure. If there is a leak present in the plumbing of the closed coolant system, the applied vacuum will not pull the coolant into the engine. Use the detailed instructions that came with the fill kit for the filling and purging of the coolant system.

Failure to fill the engine properly with a coolant air evacuation kit may void all warranty.

Listed below is an easy to use air evacuation purge kit that can be purchased from your local Kodiak Marine Dealer or order direct from KEM Equipment.

Snap On

Model #SVTSRAD262A

The above mentioned kit has easy to follow instructions included.

UNITED STATES

Alaska

Anchorage

Silver Streak 907-344-6151
Professional Marine 907-562-2471

Cordova

Harbor Hydraulics 907-424-3472

North Pole

Arctic Marine 907-488-5242

Wasilla

Valley Diesel and Marine 907-373-2613
Wasilla Arctic Cat 907-376-5845

Fairbanks

Boat shop Inc.907-479-2518

Arizona

Bullhead

Holiday RV & Marine 928-763-2322

California

Atascadero

Jet Boat Performance 805-466-4719

Bakersfield

Custom Boat Works 661-387-1523

Chico

All About Boats 530-892-0100

Davis

Delta Marine 530-750-5000

Eureka

Redwood Marine 707-443-7029

Paradise

Wilson Paradise Marine 530-872-2617

Redding

Redding Performance Marine 530-246-8889
Dave's Mobile Marine 530-515-5152
Harrison Marine 530-243-0175
Outboard Center 530-241-5430
Shasta Inboards 530-246-2343

Shasta Lake

Redding Boat Works 530-275-1495

Yuba City

Jet stream Concepts 530-674-0655
Johnson Bait and Marine 530-674-1912

Idaho

Boise

Whitewater Marine 208-377-5110

Lewiston

Riverview Marina/ Custom Weld 800-859-0356

Michigan

Marne

Camp & Cruise 616-677-1274

Montana

Billings

Jim and Tracy's Alignment 406-259-8496

Butte

Rocky Mt. RV 406-494-2555

Helena

One Way Marine 406-443-7373

Oregon

Bend

All Season RV & Marine 541-382-5009
Central Lake Marine 541-385-7791

Central Point

Rick's Boat Repair 541-664-8022

Coos Bay

Y Marina 541-888-5501

Corvallis

Southside Marine 541-753-4241

Eugene

Clemens Marine 541-688-5483
Maxxum Marine 541-686-3577
Mel's Marine Service 541-689-0136

Hermiston

High Desert Marine 541-567-8419

Gold Beach

Precision Performance 541-247-2232

Klamath Falls

American Marine 541-884-6858

Oregon (Continued)

Medford

River Marine Sales and Service 503-779-6161

Performance Marine 541-944-7060

Mulino

Squeeky's Marine 503-632-3257

Oregon City

Oregon City Marine 503-656-4276

Portland

Advanced Marine 503-762-2294

Pacific Power Boats 503-288-9350

Sigler Marine 503-252-5431

Salem

Dennis' Boat Shop 503-363-2898

South Beach

Newport Marine and RV 541-867-3704

Tigard

Steven's Marine 503-620-7023

Washington

Chinook

Chinook Marine Repair 360-777-8361

Longview

Columbia Marine Services 360-430-1010

Seattle

Coastal Marine Engine 206-784-3703

Tacoma

Harbor Services 888-627-3066

Washougal

Riverside Marina 360-835-8553

Woodinville

Doug's Boats 800-215-3684

3 Rivers Marine 425-415-1575

British Columbia

Abbotsford BC

River City Marine 604-852 8599

Chilliwack, BC

Cascade Supply & Marine 800-663-2269

Ventures River Boats 604-824-1498

Kamloops BC

River City Marine 250-828 0858

Prince George, BC

Cycle North 250-964-9091

Richmond, BC

California Marine 604-278-1880

Alberta

Leduc AB

Go RV and Marine 888-349-4507

Red Deer, AB

Outlaw Marine 403-347-4565

St Albert AB

River City Marine 780-590-7272

Sylvan Lake, AB

Bratt Jet Inc. 403-887-8895

Eagle Marine LTD 403-887-2430

Northwest Territories

Yellowknife Motors 867-766-5000

Russia

Krasnoyarsk

Ka-Hem Boats 7-902-940-12-07

New Zealand

Hartz Marine +64 3 3898130



10800 SW Herman Rd.
Tualatin, OR 97062
Ph: 503-692-5012
Fx: 503-692-1098
www.kemequipment.com
6/24/14

OEM NOTICE TO ALL BOAT BUILDERS AND RIGGERS.

KEM EQUIPMENT IS ISSUING THIS NOTICE EFFECTIVE
IMMEDIATELY 6/24/14

TO MEET EPA and CARB REQUIREMENTS:

ALL KODIAK CERTIFIED MARINE ENGINES SOLD AFTER JANUARY 2007 MUST HAVE A CHECK ENGINE AND CHECK GAUGES LAMP.

A CAN CONTROL GAUGE MAY BE SUBSTITUTED IF THIS GAUGE WILL SET A FAULT LAMP IN THE EVENT OF AN EMISSIONS RELATED, OR VITAL ENGINE COMPONENT FAILURE.

FAILURE TO INSTALL THESE MALFUNCTION INDICATOR LIGHTS WILL VOID ALL ENGINE WARRANTIES.

The wiring schematics included in the Kodiak Marine Operators Manuals show the correct wiring at the ECM and the Customer Interface Connector.

TAG PART # KM10539 IS INSTALLED AT THE STARTER ON THE BATTERY CABLE TERMINAL AS A CAUTION; NOTICE TO INSTALLER.

THANK YOU FOR YOUR IMMEDIATE ATTENTION TO THIS NOTICE.

KEM WARRANTY AND SERVICE DEPARTMENTS.