MARINE DIESEL SPECIALISTS, INC

February 25, 2026

Jay Kimmal/Star Diamond LLC
1901 N. Market St.
Wilmington, DE. 19801

MAIN ENGINES M/Y "STAR DIAMOND" 1998 47 M/154' ADMIRAL YACHT
MMSI-339002000 IMO-9093861

CAT 3512B 1289 KW (1729 HP) at 1600 RPM
Port Engine Number : 4TN00053 Hours: 9,227 + 9,364
Stbd. Engine Number : 4TN00054 Hours : 9,444 + 9,377
Marine Gear: ZF BW 465 Port: 1532 Stbd: 1533
Reduction: 3.037/1A

DESCRIPTION

The CAT 3512B is a twelve-cylinder V configuration engine. The cylinder bore diameter is 170 mm (6.7") with a stroke of 190 mm (7.48"). The engine displacement is 4.31 liters per cylinder with a total displacement of 51.75 liters (3,158 cubic inches). The engine is of a four-cycle design with Hydraulic Electronic Unit Injection, closed circuit liquid cooling, charge air cooling and exhaust turbochargers. Single cylinder heads with two exhaust valves and two intake valves per cylinder are some of the design features of this engine.

Charge air cooling is accomplished through the large cooler that is mounted in the valley of the engine. Charge air cooling serves to make the combustion air more dense which enables the engine to efficiently burn more fuel and therefore, increasing the horsepower output when combined with exhaust gas driven turbochargers. The turbochargers are mounted at the end of each exhaust manifold, and they pressurize and deliver combustion air to the engine. Both the exhaust manifolds and turbochargers are dry systems with heat shield in the V of motor and heat blankets.

The cooling system consists of titanium plate type heat exchangers which are supplied with seawater by an engine mounted, gear driven raw water pump. The fuel injection system is electronically controlled, and fuel is delivered via high pressure through the injectors and into the combustion chamber. This serves to reduce smoke and noise commonly associated with other direct injection engines.

Engine starting is accomplished through two 24-volt Delco MT 50 starters and batteries are charged by an engine belt driven 24-volt CAT alternator. This engine application is typical for full displacement yachts, trawlers, towboats, crew and supply boats. Typical operation ranges from 1000-1200 hours a year. Cruise speed should be approximately 1500 RPM according to Caterpillar.

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MAIN ENGINE PERFORMANCE

A sea trial was performed, and the engines were slowly brought up to 1200 RPM in order to allow pressures and temperatures to stabilize. All temperatures and pressures were within normal parameters for this engine application at that speed. The engines were next brought up to 1200 and 1400 RPM, again all temperatures and pressures were within manufacturers specifications. The engines were then brought up to maximum RPM of 1617 on the port and 1617 on the starboard with all readings being normal. Maximum full load RPM should be 1600. The engines did reach full load RPM of 1600. It is necessary to bring the engines to maximum RPM on occasion in order to check performance and to check for problems that otherwise may not be evident at lower engine speeds.

FUEL SYSTEM

Fuel is supplied to the engines from the tanks through triple Racor model 75/1000 MAX primary filter assemblies that act as primary filters and water separators. The fuel is routed from the primary filters to the engine supply pump then through engine mounted cartridge type secondary fuel filters and on to the electronically controlled unit injector nozzles. The Racor fuel filter assemblies are in fine condition at this time there were no external leaks noted. There was air bubbles noted in the filter bowls at high RPM's. The vessel is also equipped with an Alfa Laval fuel centrifuge assembly.

COOLING SYSTEM

The engine cooling system consists of a split-circuit titanium plate type heat exchanger mounted off engine above the decking. Seawater is supplied to the heat exchangers through a bronze impeller gear driven pump mounted at the front of the engine. The after coolers are freshwater cooled. Zinc anodes are used in the CAT cooling system. Periodic inspection of sea strainers, water pump impellers, zinc anodes, and heat exchangers is recommended. The engines also feature an iron impeller freshwater pump also mounted to the front of the engine. The coolant temperatures and pressures were within specification during the sea trial. The starboard raw water pump is leaking water from the water seal. The port raw water pump is rust stained at the seal, but no leaks were present.

TURBOCHARGERS

The compressor wheels were inspected and appear to be in good condition. There was no excessive axial or radial play noted on any of the port and starboard turbochargers. The charge air temperatures and charge air pressures were within manufacturers specifications during the sea trial.

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ELECTRONICS

The vessel is equipped with CAT 6" display units in the wheelhouse and the engine control room station that features engine parameters such as engine RPM, engine oil pressure, engine coolant temperature, gear oil pressure, and gear oil temperature, etc. There is also MFD displays that feature parallel information to the CAT displays. The engines feature analog displays located on the inboard side of each engine with manometers, pyrometers, and alarm indicators with a digital tach. EGT readings are not functioning on both main engines.

STARTER / ALTERNATOR

The engines are equipped with 24-volt starters and alternators. The engines have two Delco MT 50 starters per unit and a single CAT 24-volt belt driven alternator. The drive belts on both the port and starboard are in good condition at this time. The output voltage on the alternators is 27.2 on both port and starboard. Both the alternators and starters are functioning properly at this time.

AIR FILTRATION

The combustion air is supplied to the engines through CAT supplied air filter elements mounted directly to the air inlet elbow of the turbocharger. This application utilizes engine room air supply. The filters are in good condition at this time.

CONTROLS

The vessel is equipped with fly by wire electronic controls. The controls feature single lever control for port and starboard and are manufactured by Kobelt Corp. The vessel is equipped with three control stations, a helm station along with port and starboard wing stations. The control heads feature push button functions for synchronization and command. The control stations also feature push buttons for start and stop of the engines. All three control stations are functioning properly at this time.

MOUNTS

The engines are mounted on vibration isolator mounts manufactured by Lo Rez Corp. They are spring isolated. There are six mounts per engine/transmission. The mounts are bolted directly to the stringers. The mounts appear to be in good condition as there was no movement noted during sea trials or maneuvering.

OIL SAMPLES

Oil samples were taken from the main engines, transmissions, and generators. Results indicate the port generator has severe levels of lead with all other samples falling within normal wear limits with no external contamination. Recommend changing oil and resample after 10 hours.

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EXHAUST SYSTEM

The vessel is equipped with a marine exhaust system that consists of a single riser per engine. The hot sections of the risers are shielded with hard coat fiberglass wraps on the main pipes with soft fiberglass wraps at flex compensators and flanges. The exhaust stream exits the hull bottom in the engine room after meeting a raw water inducted collector and spray ring for cooling mounted over the gears. The exhaust bypasses exit the hull on the port and starboard hull sides at the waterline this is designed to prevent back pressure. There were no leaks noted and the stanchions are solid fixed with no issues.

MARINE TRANSMISSION Zahnradfabrik Friedrichshafen (ZF) BW 465

The marine transmissions are manufactured in Germany. The housing is made of a light aluminum alloy, and the internal parts include an input shaft, output shaft, gears, and forward and reverse clutch packs. The gear is hydraulically operated and is a reduction and a reversing unit. The selector valve serves to direct oil flow to provide neutral, forward or reverse. The transmissions operated normally during sea trials and there was no slippage noted during operation. The transmissions are equipped with a ratchet type filter assembly and a seawater cooled oil cooler, both of which should be removed and cleaned periodically. The transmissions are flange mounted to the engine's setup in a conventional propulsion configuration. The transmissions have a reduction ratio of 3.037/1A. All temperatures and pressures were within manufacturer's specifications. Noted leaks are listed in discrepancies.

MANUFACTURERS' RECOMMENDATIONS

CAT recommends that the engines be serviced at 500-hour intervals changing engine oil, filters, primary and secondary fuel filters. In addition, a maintenance service that includes additional items should be performed at 1000-hour intervals. A maintenance schedule is on board the vessel for review.

DISCREPANCIES MAIN ENGINES

PORT MAIN ENGINE

1. Fuel leak at plug on inboard side of fuel filter housing.
2. Oil seep on inboard side of front housing.
3. T3 EGT after turbo monitoring not functioning.
4. EGT individual cylinder temp not functioning.
5. Oil drip from gear cooler oil lines.
6. Oil seep from sensor banjo fitting on top of gearbox.
7. Raw water intake hose clamps are rusty.
8. Engine oil cooler pipe gasket is seeping oil.
9. T3 monitoring system is not reading boost.

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DISCREPANCIES MAIN ENGINES (continued)

STARBOARD MAIN ENGINE

1. Oil seep on inboard side of front housing.
2. T3 EGT after turbo monitoring not functioning.
3. EGT individual cylinder temp not functioning.
4. Inboard side crankcase breather drain is seeping oil.
5. Raw water Gilkes pump is leaking sea water.
6. Cover plate above raw water pump is seeping oil.
7. Indeterminate oil pan gasket seeping.
8. Outboard crankcase breather drain is seeping oil.
9. Gear filter ratchet handle is frozen.
10. Oil leak on top cover of gearbox.
11. Engine oil cooler gasket is seeping oil at pipe.

GENERAL COMMENTS

The main engines and gears were found to be in good condition at this time. An external visual inspection was performed the outward appearance of the main engines, marine gears, and generators is satisfactory. The sea trial data shows that the engines are performing within the manufacturer's specifications.

GENERATORS

JOHN DEERE 99KW

PORT		**STARBOARD**	
Model:	4045 AMF85	Model:	4045 AMF85
Serial:	PE4045N03496	Serial:	PE4045N034970
Hours:	3386/6554	Hours:	3340/3342
KW:	99	KW:	99
KVA:	124	KVA:	124
Volts:	120/208	Volts:	120/208/
Amps:	595/343	Amps:	595/343
RPM:	1800	RPM:	1800
Freq:	60 htz.	Freq:	60 htz.
Oil press:	59 PSI	Oil press:	58 PSI
Temp:	162 F^0	Temp:	165 F^0
Batt. V:	24	Batt. V:	24

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GENERATORS (Continued)

The generators are resiliently mounted to their frames all mounts appear to be in good condition. The generators have a monitoring system at the T3 MFD in the control room with Murphy displays. The generators are equipped with dual Racor primary fuel filter assembles model 500. The port and starboard generators performed well and carried the vessels electronic load.

GENERATOR DISCREPANCIES

PORT GENERATOR

1. Severe levels of lead in the oil sample.

STARBOARD GENERATOR

1. Bolt missing on alternator bracket.
2. Muffler has some rusty hose clamps. Change as needed

NOTE:

The comments as stated in this report are based on engine inspections that were performed to the best of our ability and with as much attention to detail as possible. The results are believed to be an accurate evaluation as to the general condition of the engines at this time.

However, Marine Diesel Specialists, Inc. offers no warranty either express or implied on the engines of **M/Y "STAR DIAMOND"**. Survey results are intended to represent the physical condition of the vessel only on the day of the survey, based on the facts presented and discovered, in the opinion of the surveyor. This report will not specify or imply any type of warranty of the vessel or the vessel's machinery.

This report is issued subject to the condition that it is understood and agreed that neither this office, nor any surveyor or employee thereof is under any circumstances whatsoever to be held responsible in any way for any error in judgment, default or negligence, nor for any inaccuracy, omission, misrepresentation or misstatement in this report, and that the use of this report shall be construed to be an acceptance of the foregoing conditions. This report is issued without prejudice to the rights of whom it may concern.

Thank you for the opportunity to be of service and if you have any questions, please call.

Sincerely,

Peter Angel
President

Cat Electronic Technician 2025C v1.0

Top Engine Speed Data Summary

2/23/2026 11:02 AM

Captured Parameters	650 RPM	782 RPM	1001 RPM	1202 RPM	1394 RPM	1586 RPM	1605 RPM	1603 RPM
Engine Speed [rpm]								
Port (4TN00053)	650	782	1006	1206	1399	1590	1600	1614
Starboard (4TN00054)	651	800	1009	1203	1405	1600	1584	1614
Active Codes Present During Capture								
Port (4TN00053)	No	No	No	No	No	No	No	No
Starboard (4TN00054)	No	No	No	No	No	No	No	No
Engine Speed within +/- 20 RPM								
Port (4TN00053)	Yes	Yes	Yes	Yes	Yes	No	No	No
Starboard (4TN00054)	Yes	Yes	Yes	Yes	Yes	No	No	No
Fuel Pressure [psi]								
Port (4TN00053)	44	48	59	63	65	64	64	64
Starboard (4TN00054)	45	52	62	66	68	63	62	62
Boost Pressure [psi]								
Port (4TN00053)	0	0	2	7	18	31	31	32
Starboard (4TN00054)	0	0	1	4	11	21	20	22
Engine Oil Pressure [psi]								
Port (4TN00053)	61	54	56	56	56	55	55	55
Starboard (4TN00054)	55	48	50	51	51	50	50	50
Engine Coolant Temperature [Deg F]								
Port (4TN00053)	142	183	185	187	189	190	190	189
Starboard (4TN00054)	140	185	185	187	189	190	190	189
Fuel Temperature [Deg F]								
Port (4TN00053)	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
Starboard (4TN00054)	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
Engine Load Factor [%]								
Port (4TN00053)	1	16	28	38	62	93	94	92
Starboard (4TN00054)	1	14	22	33	56	84	81	81
Aftercooler Temperature [Deg F]								
Port (4TN00053)	79	75	75	77	82	90	91	91
Starboard (4TN00054)	79	75	75	77	82	90	90	90
Crankcase Pressure [" H2O]								
Port (4TN00053)	2.1	3.6	4.0	3.5	3.0	2.1	2.5	2.4
Starboard (4TN00054)	0.8	2.1	2.0	2.0	1.2	0.4	0.2	0.3
Right Exhaust Temperature [Deg F]								
Port (4TN00053)	203	555	801	982	1032	1009	1013	1015
Starboard (4TN00054)	204	537	760	957	1037	1013	1020	1028
Left Exhaust Temperature [Deg F]								
Port (4TN00053)	236	549	829	1007	1026	992	995	991
Starboard (4TN00054)	234	544	782	971	1032	1010	1014	1015
Fuel Consumption Rate [gal/h]								
Port (4TN00053)	8.7	9.5	20.1	33.0	52.7	75.4	75.5	77.7
Starboard (4TN00054)	8.7	9.7	16.7	28.9	48.0	69.5	66.4	70.0
Transmission Oil Temperature [Deg F]								
Port (4TN00053)	91	97	98	98	100	104	104	107
Starboard (4TN00054)	91	96	98	97	99	104	104	107
Transmission Oil Pressure [psi]								
Port (4TN00053)	61	274	278	275	277	278	279	280
Starboard (4TN00054)	63	274	278	275	277	279	279	279
Left Air Filter Restriction [" H2O]								

Captured Parameters	650 RPM	782 RPM	1001 RPM	1202 RPM	1394 RPM	1586 RPM	1605 RPM	1603 RPM
Port (4TN00053)	1.2	1.2	1.4	1.8	4.0	7.5	7.8	7.8
Starboard (4TN00054)	0.2	0.5	0.6	1.1	3.1	6.1	6.0	6.5
Right Air Filter Restriction [" H2O]								
Port (4TN00053)	0.0	0.0	0.4	1.1	3.0	6.5	7.0	7.5
Starboard (4TN00054)	0.7	1.0	1.1	1.6	3.5	6.5	6.5	6.9
901 JW Outlet Temperature (Before Reg) [Deg F]								
Port (4TN00053)	142	183	185	187	189	190	190	189
Starboard (4TN00054)	140	185	185	187	189	190	190	189
902 Jacket Water Engine Inlet Temperature [Deg F]								
Port (4TN00053)								
Starboard (4TN00054)								
903 Aftercooler Water Inlet Temperature to Engine [Deg F]								
Port (4TN00053)	79	75	75	77	82	90	91	91
Starboard (4TN00054)	79	75	75	77	82	90	90	90
903A Aftercooler Water Outlet Temperature from Engine [Deg F]								
Port (4TN00053)								
Starboard (4TN00054)								
906 Intake Air Manifold Temperature [Deg F]								
Port (4TN00053)								
Starboard (4TN00054)								
907 Air Cleaner Inlet Restriction (Single or RH) [" H2O]								
Port (4TN00053)	0.0	0.0	0.4	1.1	3.0	6.5	7.0	7.5
Starboard (4TN00054)	0.7	1.0	1.1	1.6	3.5	6.5	6.5	6.9
907A Air Cleaner Inlet Restriction (LH) [" H2O]								
Port (4TN00053)	1.2	1.2	1.4	1.8	4.0	7.5	7.8	7.8
Starboard (4TN00054)	0.2	0.5	0.6	1.1	3.1	6.1	6.0	6.5
908 Exhaust Engine Outlet Stack Pressure [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
910 Engine Speed [rpm]								
Port (4TN00053)	650	782	1006	1206	1399	1590	1600	1614
Starboard (4TN00054)	651	800	1009	1203	1405	1600	1584	1614
911 Intake Air Manifold Pressure [psi]								
Port (4TN00053)	0	0	2	7	18	31	31	32
Starboard (4TN00054)	0	0	1	4	11	21	20	22
912 Exhaust Engine Outlet Stack Temperature [Deg F]								
Port (4TN00053)								
Starboard (4TN00054)								
912B Exhaust Manifold Right Rear Turbo Temp [Deg F]								
Port (4TN00053)	203	555	801	982	1032	1009	1013	1015
Starboard (4TN00054)	204	537	760	957	1037	1013	1020	1028
912D Exhaust Manifold Left Rear Turbo Temp (or Low Pressure Turbo) [Deg F]								
Port (4TN00053)	236	549	829	1007	1026	992	995	991
Starboard (4TN00054)	234	544	782	971	1032	1010	1014	1015
913 Engine Oil to Bearings Temperature [Deg F]								
Port (4TN00053)								
Starboard (4TN00054)								
914 Engine Oil to Bearings Pressure [psi]								
Port (4TN00053)	61	54	56	56	56	55	55	55
Starboard (4TN00054)	55	48	50	51	51	50	50	50
917 Engine Fuel Pressure (After Filters) [psi]								
Port (4TN00053)	44	48	59	63	65	64	64	64
Starboard (4TN00054)	45	52	62	66	68	63	62	62
922 Jacket Water Temperature From Hex Outlet [Deg F]								
Port (4TN00053)								
Starboard (4TN00054)								
923 Aftercooler Core Water Inlet Pressure [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
924 Aftercooler Core Water Outlet Pressure [psi]								
Port (4TN00053)								
Starboard (4TN00054)								

Captured Parameters	650 RPM	782 RPM	1001 RPM	1202 RPM	1394 RPM	1586 RPM	1605 RPM	1603 RPM
930 Air Cleaner Outlet Temperature [Deg F]								
Port (4TN00053)								
Starboard (4TN00054)								
932 Crankcase Pressure [" H2O]								
Port (4TN00053)								
Starboard (4TN00054)								
935 Fuel Inlet Temperature [Deg F]								
Port (4TN00053)	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
Starboard (4TN00054)	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
936 Fuel Return Line Restriction (Engine Outlet Pressure) [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
954 Raw/Sea Water Temperature to HEX Inlet (Low Temperature or Parallel) [Deg F]								
Port (4TN00053)								
Starboard (4TN00054)								
957 Raw/Sea Water Temperature from HEX Outlet (High Temperature or Parallel) [Deg F]								
Port (4TN00053)								
Starboard (4TN00054)								
961 Fuel Supply Line Restriction (Engine Inlet Pressure) [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
964 Raw/Sea Water Pressure from HEX Outlet (High Temperature or Parallel) [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
965 Raw/Sea Water Pump Inlet Pressure [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
966 Raw/Sea Water Pump Inlet Temperature [Deg F]								
Port (4TN00053)								
Starboard (4TN00054)								
969 Fuel Consumption from ECM [gal/h]								
Port (4TN00053)	8.7	9.5	20.1	33.0	52.7	75.4	75.5	77.7
Starboard (4TN00054)	8.7	9.7	16.7	28.9	48.0	69.5	66.4	70.0
991 Engine Load from ECM [%]								
Port (4TN00053)	1	16	28	38	62	93	94	92
Starboard (4TN00054)	1	14	22	33	56	84	81	81
992 Fuel Flow Meter Consumption (Manual Entry) [gal/h]								
Port (4TN00053)								
Starboard (4TN00054)								
********** OPTIONAL PARAMETERS **********								
Port (4TN00053)								
Starboard (4TN00054)								
904 Aftercooler/Auxiliary Low Temperature Pump Inlet Pressure (treated water) [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
905 Aftercooler/Auxiliary Low Temperature Pump Outlet Pressure (treated water) [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
915 Marine Gear Oil Temperature [Deg F]								
Port (4TN00053)	91	97	98	98	100	104	104	107
Starboard (4TN00054)	91	96	98	97	99	104	104	107
916 Marine Gear Oil Pressure [psi]								
Port (4TN00053)	61	274	278	275	277	278	279	280
Starboard (4TN00054)	63	274	278	275	277	279	279	279
918 Jacket Water Engine Outlet Pressure (Before Regulators) [psi]								
Port (4TN00053)								
Starboard (4TN00054)								

Captured Parameters	650 RPM	782 RPM	1001 RPM	1202 RPM	1394 RPM	1586 RPM	1605 RPM	1603 RPM
919 JW Pump Outlet Pressure [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
920 JW Pump Inlet Pressure [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
921 Jacket Water Pressure to Engine from Cooling System HEX Outlet [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
923A Aftercooler Core Water Inlet Pressure (Intermediate/JW Stage) [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
924A Aftercooler Core Water Outlet Pressure (Intermediate/JW Stage) [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
925 Marine Gear Cooler Water Inlet Temperature [Deg F]								
Port (4TN00053)								
Starboard (4TN00054)								
926 Marine Gear Cooler Water Outlet Temperature [Deg F]								
Port (4TN00053)								
Starboard (4TN00054)								
927 Oil Filter Inlet Pressure [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
928 Oil Filter Outlet Pressure [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
931 Turbocharger (or High Pressure Turbo) Compressor Outlet Temperature [Deg F]								
Port (4TN00053)								
Starboard (4TN00054)								
934 Fuel Cooler Outlet Fuel Temperature [Deg F]								
Port (4TN00053)								
Starboard (4TN00054)								
938 Oil Cooler Water Outlet Temperature [Deg F]								
Port (4TN00053)								
Starboard (4TN00054)								
939 Oil Cooler Water Outlet Pressure [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
948 Jacket Water Pressure To Cooling System from Engine (HEX Inlet) [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
960 Turbocharger (or High Pressure Turbo) Compressor Outlet Pressure [psi]								
Port (4TN00053)								
Starboard (4TN00054)								
962 Fuel Engine Outlet Temperature (Before Fuel Cooler) [Deg F]								
Port (4TN00053)								
Starboard (4TN00054)								
963 Raw/Sea Water Pump Outlet Pressure [psi]								
Port (4TN00053)								
Starboard (4TN00054)								

Cat Electronic Technician 2025C v1.0
Product Status Report

2/23/2026 9:12 AM

Product Status Report

Parameter	Value
Engine Serial Number	4TN00053
Equipment ID	Star Diamond PME
Comments	

3512B Port (4TN00053)

Parameter	Value
Equipment ID	Star Diamond PME
Engine Serial Number	4TN00053
ECM Serial Number	1104B159CD
Personality Module Part Number	2243078-00
Personality Module Release Date	Nov01
Personality Module Description	MAR 3512

Logged Diagnostic Codes [Diagnostic Clock = 9427 hours] - 3512B Port (4TN00053)

Code	Description	Occ.	First	Last
91- 8	Throttle Position Sensor : Abnormal Frequency, Pulse Width, or Period	2	9372	9425

Logged Event Codes [Diagnostic Clock = 9427 hours] - 3512B Port (4TN00053)

Code	Description	Occ.	First	Last
E046	Low Transmission Oil Pressure Warning	1	9380	9380
E021	High Exhaust Temperature Derate	1	9126	9126
E173	High Exhaust Temperature Warning	1	9126	9126

Active Diagnostic Codes - 3512B Port (4TN00053)

Code	Description
No Active Diagnostic Codes	

Current Totals - 3512B Port (4TN00053)

Description	Value	Unit
Total Time	9427	hours
Total Fuel	288086	gal

Configuration - 3512B Port (4TN00053)

Description	Value	Unit
Equipment ID	Star Diamond PME	
Engine Serial Number	4TN00053	
ECM Serial Number	1104B159CD	
Personality Module Part Number	2243078-00	
Personality Module Release Date	Nov01	
FLS	0	
FTS	0	
Engine Rotation	Standard	
Engine Location	Port	
Fuel Ratio Control Offset	0	
Rated Engine Speed	1600	rpm
Rated Fuel Position	22.400	mm
Low Idle Speed	650	rpm
High Idle Speed	1728	rpm
Fuel Correction Factor	0	%
Engine Cooling System Config	SCAC (Separate Circuit Aftercooled)	
Cold Cylinder Cutout	Disabled	
Cooldown Speed	550	rpm
Cooldown Duration	1	min
Engine Pre-Lube Duration	0	sec
Crank Duration	10	sec
Maximum Number of Crank Cycles	5	
Crank Terminate RPM	400	rpm

Programmable Engine Operator Switch	Overspeed Verify Switch	
Maximum Engine Torque Limit	Unavailable	lb-ft
Coolant Warning Engine Load Enable Threshold	40	%
Engine Speed Droop	Unavailable	%
Total Tattletale	13	
Overspeed Verify	Off	
Trq Limit Min	Unavailable	lb-ft

Lifetime: Time vs Engine Speed - 3512B Port (4TN00053)

Engine Speed(rpm)	hours	%
<400.0	0.20	0.06
400.0-499.0	0.00	0.00
500.0-599.0	0.50	0.16
600.0-699.0	101.70	33.02
700.0-799.0	4.80	1.56
800.0-899.0	5.90	1.92
900.0-999.0	18.35	5.96
1000.0-1099.0	40.05	13.00
1100.0-1199.0	40.80	13.25
1200.0-1299.0	58.00	18.83
1300.0-1399.0	31.85	10.34
1400.0-1499.0	5.50	1.79
1500.0-1599.0	0.25	0.08
1600.0-1699.0	0.10	0.03
1700.0-1799.0	0.00	0.00
1800.0-1899.0	0.00	0.00
1900.0-1999.0	0.00	0.00
>2000.0	0.00	0.00

Lifetime: Time vs Engine Load Factor - 3512B Port (4TN00053)

Engine Load Factor(%)	hours	%
0.0-4.0	90.55	29.41
5.0-9.0	0.80	0.26
10.0-14.0	6.15	2.00
15.0-19.0	5.45	1.77
20.0-24.0	4.20	1.36

25.0-29.0	26.25	8.53
30.0-34.0	31.80	10.33
35.0-39.0	30.90	10.04
40.0-44.0	29.10	9.45
45.0-49.0	30.45	9.89
50.0-54.0	32.15	10.44
55.0-59.0	10.05	3.26
60.0-64.0	2.10	0.68
65.0-69.0	3.90	1.27
70.0-74.0	2.15	0.70
75.0-79.0	1.45	0.47
80.0-84.0	0.25	0.08
85.0-89.0	0.05	0.02
90.0-94.0	0.00	0.00
95.0-99.0	0.15	0.05
>100.0	0.00	0.00

Lifetime: Time vs Left Exhaust Temperature - 3512B Port (4TN00053)

Left Exhaust Temperature(Deg F)	**hours**	**%**
<842.0	123.65	40.16
842.0-868.0	3.35	1.09
869.0-895.0	2.60	0.84
896.0-922.0	2.90	0.94
923.0-949.0	4.15	1.35
950.0-976.0	4.60	1.49
977.0-1003.0	11.15	3.62
1004.0-1030.0	9.00	2.92
1031.0-1057.0	11.20	3.64
1058.0-1084.0	34.60	11.24
1085.0-1111.0	30.20	9.81
1112.0-1138.0	41.25	13.40
1139.0-1165.0	27.60	8.96
1166.0-1192.0	1.55	0.50
1193.0-1219.0	0.10	0.03
1220.0-1246.0	0.00	0.00
1247.0-1273.0	0.00	0.00
1274.0-1300.0	0.00	0.00

1301.0-1327.0	0.00	0.00
1328.0-1354.0	0.00	0.00
1355.0-1381.0	0.00	0.00
1382.0-1408.0	0.00	0.00
>1409.0	0.00	0.00

Lifetime: Time vs Right Exhaust Temperature - 3512B Port (4TN00053)

Right Exhaust Temperature(Deg F)	hours	%
<842.0	125.35	40.72
842.0-868.0	3.30	1.07
869.0-895.0	3.45	1.12
896.0-922.0	4.00	1.30
923.0-949.0	9.00	2.92
950.0-976.0	9.20	2.99
977.0-1003.0	10.25	3.33
1004.0-1030.0	9.20	2.99
1031.0-1057.0	12.05	3.91
1058.0-1084.0	26.45	8.59
1085.0-1111.0	23.40	7.60
1112.0-1138.0	42.30	13.74
1139.0-1165.0	28.65	9.31
1166.0-1192.0	1.10	0.36
1193.0-1219.0	0.10	0.03
1220.0-1246.0	0.00	0.00
1247.0-1273.0	0.00	0.00
1274.0-1300.0	0.00	0.00
1301.0-1327.0	0.05	0.02
1328.0-1354.0	0.00	0.00
1355.0-1381.0	0.00	0.00
1382.0-1408.0	0.00	0.00
>1409.0	0.00	0.00

Monitoring System - 3512B Port (4TN00053)

Description	State	Trip Point	Delay Time
Altitude (atmospheric pressure)			
Moderate Severity (2)	On	13.4 psi	0 sec

Engine Overspeed			
Least Severe (1)	On	1840 rpm	0 sec
Most Severe (3)	On	1840 rpm	0 sec
High Aftercooler Coolant Temperature			
Least Severe (1)	On	126 Deg F	5 sec
Moderate Severity (2)	On	151 Deg F	20 sec
Most Severe (3)	On	199 Deg F	20 sec
High Air Filter Restriction Pressure			
Least Severe (1)	On	24.1 " H2O	20 sec
Moderate Severity (2)	On	26.1 " H2O	20 sec
High Crankcase Pressure			
Least Severe (1)	On	8.0 " H2O	3 sec
Moderate Severity (2)	On	14.1 " H2O	10 sec
Most Severe (3)	On	24.1 " H2O	3 sec
High Engine Coolant Temperature			
Least Severe (1)	On	210 Deg F	15 sec
Moderate Severity (2)	On	214 Deg F	30 sec
Most Severe (3)	On	225 Deg F	5 sec
High Engine Oil Filter Restriction Pressure			
Least Severe (1)	On	15 psi	5 sec
High Exhaust Temperature			
Least Severe (1)	On	1279 Deg F	20 sec
Moderate Severity (2)	On	1382 Deg F	5 sec
High Fuel Filter Restriction Pressure			
Least Severe (1)	On	15 psi	5 sec
High Transmission Oil Temperature			
Least Severe (1)	On	210 Deg F	5 sec
Low Engine Coolant Temperature			
Least Severe (1)	On	176 Deg F	5 sec
Low Engine Oil Pressure			
Least Severe (1)	On	None	4 sec
Most Severe (3)	On	None	9 sec
Low System Voltage			
Least Severe (1)	On	20 Volts	11 sec
Low Transmission Oil Pressure			
Least Severe (1)	On	218 psi	5 sec

Injector Codes Calibration - 3512B Port (4TN00053)

Injector	Code
Injector 1	4744
Injector 2	1990
Injector 3	1666
Injector 4	9817
Injector 5	1327
Injector 6	9910
Injector 7	7822
Injector 8	1222
Injector 9	2972
Injector 10	7927
Injector 11	6721
Injector 12	2437

3512B Starboard (4TN00054)

Parameter	Value
Equipment ID	
Engine Serial Number	4TN00054
ECM Serial Number	1104B227CD
Personality Module Part Number	2243078-00
Personality Module Release Date	Nov01
Personality Module Description	MAR 3512

Logged Diagnostic Codes [Diagnostic Clock = 9444 hours] - 3512B Starboard (4TN00054)

Code	Description	Occ.	First	Last
91- 8	Throttle Position Sensor : Abnormal Frequency, Pulse Width, or Period	2	9385	9442

Logged Event Codes [Diagnostic Clock = 9444 hours] - 3512B Starboard (4TN00054)

Code	Description	Occ.	First	Last
No Logged Event Codes				

Active Diagnostic Codes - 3512B Starboard (4TN00054)

Code	Description
No Active Diagnostic Codes	

Current Totals - 3512B Starboard (4TN00054)

Description	Value	Unit
Total Time	9444	hours
Total Fuel	292157	gal

Configuration - 3512B Starboard (4TN00054)

Description	Value	Unit
Equipment ID		
Engine Serial Number	4TN00054	
ECM Serial Number	1104B227CD	
Personality Module Part Number	2243078-00	
Personality Module Release Date	Nov01	
FLS	0	
FTS	0	
Engine Rotation	Standard	
Engine Location	Starboard	
Fuel Ratio Control Offset	0	
Rated Engine Speed	1600	rpm
Rated Fuel Position	22.400	mm
Low Idle Speed	650	rpm
High Idle Speed	1728	rpm
Fuel Correction Factor	0	%
Engine Cooling System Config	SCAC (Separate Circuit Aftercooled)	
Cold Cylinder Cutout	Disabled	
Cooldown Speed	550	rpm
Cooldown Duration	1	min
Engine Pre-Lube Duration	0	sec
Crank Duration	10	sec
Maximum Number of Crank Cycles	5	

Crank Terminate RPM	400	rpm
Programmable Engine Operator Switch	Overspeed Verify Switch	
Maximum Engine Torque Limit	Unavailable	lb-ft
Coolant Warning Engine Load Enable Threshold	40	%
Engine Speed Droop	Unavailable	%
Total Tattletale	12	
Overspeed Verify	Off	
Trq Limit Min	Unavailable	lb-ft

Lifetime: Time vs Engine Speed - 3512B Starboard (4TN00054)

Engine Speed(rpm)	hours	%
<400.0	0.05	0.02
400.0-499.0	0.05	0.02
500.0-599.0	0.55	0.18
600.0-699.0	88.45	28.24
700.0-799.0	2.65	0.85
800.0-899.0	6.15	1.96
900.0-999.0	20.70	6.61
1000.0-1099.0	42.20	13.47
1100.0-1199.0	48.85	15.59
1200.0-1299.0	58.95	18.82
1300.0-1399.0	38.55	12.31
1400.0-1499.0	5.80	1.85
1500.0-1599.0	0.20	0.06
1600.0-1699.0	0.10	0.03
1700.0-1799.0	0.00	0.00
1800.0-1899.0	0.00	0.00
1900.0-1999.0	0.00	0.00
>2000.0	0.00	0.00

Lifetime: Time vs Engine Load Factor - 3512B Starboard (4TN00054)

Engine Load Factor(%)	hours	%
0.0-4.0	75.40	24.06
5.0-9.0	5.00	1.60
10.0-14.0	4.40	1.40
15.0-19.0	6.35	2.03

20.0-24.0	10.55	3.37
25.0-29.0	33.95	10.83
30.0-34.0	40.60	12.96
35.0-39.0	39.10	12.48
40.0-44.0	31.15	9.94
45.0-49.0	33.80	10.79
50.0-54.0	21.60	6.89
55.0-59.0	4.10	1.31
60.0-64.0	3.20	1.02
65.0-69.0	2.80	0.89
70.0-74.0	0.80	0.26
75.0-79.0	0.20	0.06
80.0-84.0	0.10	0.03
85.0-89.0	0.20	0.06
90.0-94.0	0.05	0.02
95.0-99.0	0.00	0.00
>100.0	0.00	0.00

Lifetime: Time vs Left Exhaust Temperature - 3512B Starboard (4TN00054)

Left Exhaust Temperature(Deg F)	**hours**	**%**
<842.0	111.30	35.55
842.0-868.0	3.95	1.26
869.0-895.0	3.60	1.15
896.0-922.0	4.15	1.33
923.0-949.0	4.35	1.39
950.0-976.0	5.35	1.71
977.0-1003.0	9.75	3.11
1004.0-1030.0	7.85	2.51
1031.0-1057.0	17.75	5.67
1058.0-1084.0	47.65	15.22
1085.0-1111.0	30.60	9.77
1112.0-1138.0	35.05	11.19
1139.0-1165.0	20.35	6.50
1166.0-1192.0	5.75	1.84
1193.0-1219.0	4.65	1.49
1220.0-1246.0	1.00	0.32
1247.0-1273.0	0.00	0.00

1274.0-1300.0	0.00	0.00
1301.0-1327.0	0.00	0.00
1328.0-1354.0	0.00	0.00
1355.0-1381.0	0.00	0.00
1382.0-1408.0	0.00	0.00
>1409.0	0.00	0.00

Lifetime: Time vs Right Exhaust Temperature - 3512B Starboard (4TN00054)

Right Exhaust Temperature(Deg F)	hours	%
<842.0	116.95	37.35
842.0-868.0	4.80	1.53
869.0-895.0	4.35	1.39
896.0-922.0	4.60	1.47
923.0-949.0	9.65	3.08
950.0-976.0	6.55	2.09
977.0-1003.0	18.35	5.86
1004.0-1030.0	18.75	5.99
1031.0-1057.0	18.95	6.05
1058.0-1084.0	45.35	14.48
1085.0-1111.0	25.40	8.11
1112.0-1138.0	21.15	6.75
1139.0-1165.0	11.00	3.51
1166.0-1192.0	5.90	1.88
1193.0-1219.0	1.40	0.45
1220.0-1246.0	0.00	0.00
1247.0-1273.0	0.00	0.00
1274.0-1300.0	0.00	0.00
1301.0-1327.0	0.00	0.00
1328.0-1354.0	0.00	0.00
1355.0-1381.0	0.00	0.00
1382.0-1408.0	0.00	0.00
>1409.0	0.00	0.00

Monitoring System - 3512B Starboard (4TN00054)

Description	State	Trip Point	Delay Time
Altitude (atmospheric pressure)			

Moderate Severity (2)	On	13.4 psi	0 sec
Engine Overspeed			
Least Severe (1)	On	1840 rpm	0 sec
Most Severe (3)	On	1840 rpm	0 sec
High Aftercooler Coolant Temperature			
Least Severe (1)	On	126 Deg F	5 sec
Moderate Severity (2)	On	151 Deg F	20 sec
Most Severe (3)	On	199 Deg F	20 sec
High Air Filter Restriction Pressure			
Least Severe (1)	On	24.1 " H2O	20 sec
Moderate Severity (2)	On	26.1 " H2O	20 sec
High Crankcase Pressure			
Least Severe (1)	On	8.0 " H2O	3 sec
Moderate Severity (2)	On	14.1 " H2O	10 sec
Most Severe (3)	On	24.1 " H2O	3 sec
High Engine Coolant Temperature			
Least Severe (1)	On	210 Deg F	15 sec
Moderate Severity (2)	On	214 Deg F	30 sec
Most Severe (3)	On	225 Deg F	5 sec
High Engine Oil Filter Restriction Pressure			
Least Severe (1)	On	15 psi	5 sec
High Exhaust Temperature			
Least Severe (1)	On	1279 Deg F	20 sec
Moderate Severity (2)	On	1382 Deg F	5 sec
High Fuel Filter Restriction Pressure			
Least Severe (1)	On	15 psi	5 sec
High Transmission Oil Temperature			
Least Severe (1)	On	210 Deg F	5 sec
Low Engine Coolant Temperature			
Least Severe (1)	On	176 Deg F	5 sec
Low Engine Oil Pressure			
Least Severe (1)	On	None	4 sec
Most Severe (3)	On	None	9 sec
Low System Voltage			
Least Severe (1)	On	20 Volts	10 sec
Low Transmission Oil Pressure			
Least Severe (1)	On	218 psi	5 sec

Injector Codes Calibration - 3512B Starboard (4TN00054)

Injector	Code
Injector 1	8502
Injector 2	5952
Injector 3	9805
Injector 4	2566
Injector 5	6507
Injector 6	2210
Injector 7	2647
Injector 8	4732
Injector 9	1997
Injector 10	5745
Injector 11	5959
Injector 12	7707

Cat Electronic Technician 2025C v1.0
ECM Summary

2/23/2026 8:52 AM

Description	Value
3512B Port (4TN00053)	
Equipment ID	Star Diamond PME
Engine Serial Number	4TN00053
ECM Serial Number	1104B159CD
Personality Module Part Number	2243078-00
Personality Module Release Date	Nov01
Personality Module Description	MAR 3512
3512B Starboard (4TN00054)	
Equipment ID	
Engine Serial Number	4TN00054
ECM Serial Number	1104B227CD
Personality Module Part Number	2243078-00
Personality Module Release Date	Nov01
Personality Module Description	MAR 3512

Cat Electronic Technician 2025C v1.0

Product Status Report

2/23/2026 9:13 AM

Product Status Report

Parameter	Value
Engine Serial Number	4TN00053
Equipment ID	Star Diamond PME
Comments	

3512B Port (4TN00053)

Parameter	Value
Equipment ID	Star Diamond PME
Engine Serial Number	4TN00053
ECM Serial Number	1104B159CD
Personality Module Part Number	2243078-00
Personality Module Release Date	Nov01
Personality Module Description	MAR 3512

Logged Diagnostic Codes [Diagnostic Clock = 9427 hours] - 3512B Port (4TN00053)

Code	Description	Occ.	First	Last
91- 8	Throttle Position Sensor : Abnormal Frequency, Pulse Width, or Period	2	9372	9425

Logged Event Codes [Diagnostic Clock = 9427 hours] - 3512B Port (4TN00053)

Code	Description	Occ.	First	Last
E046	Low Transmission Oil Pressure Warning	1	9380	9380
E021	High Exhaust Temperature Derate	1	9126	9126
E173	High Exhaust Temperature Warning	1	9126	9126

Active Diagnostic Codes - 3512B Port (4TN00053)

Code	Description
No Active Diagnostic Codes	

Current Totals - 3512B Port (4TN00053)

Description	Value	Unit
Total Time	9427	hours
Total Fuel	288086	gal

Configuration - 3512B Port (4TN00053)

Description	Value	Unit
Equipment ID	Star Diamond PME	

Engine Serial Number	4TN00053	
ECM Serial Number	1104B159CD	
Personality Module Part Number	2243078-00	
Personality Module Release Date	Nov01	
FLS	0	
FTS	0	
Engine Rotation	Standard	
Engine Location	Port	
Fuel Ratio Control Offset	0	
Rated Engine Speed	1600	rpm
Rated Fuel Position	22.400	mm
Low Idle Speed	650	rpm
High Idle Speed	1728	rpm
Fuel Correction Factor	0	%
Engine Cooling System Config	SCAC (Separate Circuit Aftercooled)	
Cold Cylinder Cutout	Disabled	
Cooldown Speed	550	rpm
Cooldown Duration	1	min
Engine Pre-Lube Duration	0	sec
Crank Duration	10	sec
Maximum Number of Crank Cycles	5	
Crank Terminate RPM	400	rpm
Programmable Engine Operator Switch	Overspeed Verify Switch	
Maximum Engine Torque Limit	Unavailable	lb-ft
Coolant Warning Engine Load Enable Threshold	40	%
Engine Speed Droop	Unavailable	%
Total Tattletale	13	
Overspeed Verify	Off	
Trq Limit Min	Unavailable	lb-ft

Lifetime: Time vs Engine Speed - 3512B Port (4TN00053)

Engine Speed(rpm)	hours	%
<400.0	0.20	0.06
400.0-499.0	0.00	0.00
500.0-599.0	0.50	0.16
600.0-699.0	101.70	33.02
700.0-799.0	4.80	1.56
800.0-899.0	5.90	1.92
900.0-999.0	18.35	5.96
1000.0-1099.0	40.05	13.00
1100.0-1199.0	40.80	13.25
1200.0-1299.0	58.00	18.83
1300.0-1399.0	31.85	10.34
1400.0-1499.0	5.50	1.79
1500.0-1599.0	0.25	0.08
1600.0-1699.0	0.10	0.03
1700.0-1799.0	0.00	0.00

1800.0-1899.0	0.00	0.00
1900.0-1999.0	0.00	0.00
>2000.0	0.00	0.00

Lifetime: Time vs Engine Load Factor - 3512B Port (4TN00053)

Engine Load Factor(%)	hours	%
0.0-4.0	90.55	29.41
5.0-9.0	0.80	0.26
10.0-14.0	6.15	2.00
15.0-19.0	5.45	1.77
20.0-24.0	4.20	1.36
25.0-29.0	26.25	8.53
30.0-34.0	31.80	10.33
35.0-39.0	30.90	10.04
40.0-44.0	29.10	9.45
45.0-49.0	30.45	9.89
50.0-54.0	32.15	10.44
55.0-59.0	10.05	3.26
60.0-64.0	2.10	0.68
65.0-69.0	3.90	1.27
70.0-74.0	2.15	0.70
75.0-79.0	1.45	0.47
80.0-84.0	0.25	0.08
85.0-89.0	0.05	0.02
90.0-94.0	0.00	0.00
95.0-99.0	0.15	0.05
>100.0	0.00	0.00

Lifetime: Time vs Left Exhaust Temperature - 3512B Port (4TN00053)

Left Exhaust Temperature(Deg F)	hours	%
<842.0	123.65	40.16
842.0-868.0	3.35	1.09
869.0-895.0	2.60	0.84
896.0-922.0	2.90	0.94
923.0-949.0	4.15	1.35
950.0-976.0	4.60	1.49
977.0-1003.0	11.15	3.62
1004.0-1030.0	9.00	2.92
1031.0-1057.0	11.20	3.64
1058.0-1084.0	34.60	11.24
1085.0-1111.0	30.20	9.81
1112.0-1138.0	41.25	13.40
1139.0-1165.0	27.60	8.96
1166.0-1192.0	1.55	0.50
1193.0-1219.0	0.10	0.03
1220.0-1246.0	0.00	0.00
1247.0-1273.0	0.00	0.00

1274.0-1300.0	0.00	0.00
1301.0-1327.0	0.00	0.00
1328.0-1354.0	0.00	0.00
1355.0-1381.0	0.00	0.00
1382.0-1408.0	0.00	0.00
>1409.0	0.00	0.00

Lifetime: Time vs Right Exhaust Temperature - 3512B Port (4TN00053)

Right Exhaust Temperature(Deg F)	hours	%
<842.0	125.35	40.72
842.0-868.0	3.30	1.07
869.0-895.0	3.45	1.12
896.0-922.0	4.00	1.30
923.0-949.0	9.00	2.92
950.0-976.0	9.20	2.99
977.0-1003.0	10.25	3.33
1004.0-1030.0	9.20	2.99
1031.0-1057.0	12.05	3.91
1058.0-1084.0	26.45	8.59
1085.0-1111.0	23.40	7.60
1112.0-1138.0	42.30	13.74
1139.0-1165.0	28.65	9.31
1166.0-1192.0	1.10	0.36
1193.0-1219.0	0.10	0.03
1220.0-1246.0	0.00	0.00
1247.0-1273.0	0.00	0.00
1274.0-1300.0	0.00	0.00
1301.0-1327.0	0.05	0.02
1328.0-1354.0	0.00	0.00
1355.0-1381.0	0.00	0.00
1382.0-1408.0	0.00	0.00
>1409.0	0.00	0.00

Monitoring System - 3512B Port (4TN00053)

Description	State	Trip Point	Delay Time
Altitude (atmospheric pressure)			
Moderate Severity (2)	On	13.4 psi	0 sec
Engine Overspeed			
Least Severe (1)	On	1840 rpm	0 sec
Most Severe (3)	On	1840 rpm	0 sec
High Aftercooler Coolant Temperature			
Least Severe (1)	On	126 Deg F	5 sec
Moderate Severity (2)	On	151 Deg F	20 sec
Most Severe (3)	On	199 Deg F	20 sec
High Air Filter Restriction Pressure			

Least Severe (1)	On	24.1 " H2O	20 sec
Moderate Severity (2)	On	26.1 " H2O	20 sec
High Crankcase Pressure			
Least Severe (1)	On	8.0 " H2O	3 sec
Moderate Severity (2)	On	14.1 " H2O	10 sec
Most Severe (3)	On	24.1 " H2O	3 sec
High Engine Coolant Temperature			
Least Severe (1)	On	210 Deg F	15 sec
Moderate Severity (2)	On	214 Deg F	30 sec
Most Severe (3)	On	225 Deg F	5 sec
High Engine Oil Filter Restriction Pressure			
Least Severe (1)	On	15 psi	5 sec
High Exhaust Temperature			
Least Severe (1)	On	1279 Deg F	20 sec
Moderate Severity (2)	On	1382 Deg F	5 sec
High Fuel Filter Restriction Pressure			
Least Severe (1)	On	15 psi	5 sec
High Transmission Oil Temperature			
Least Severe (1)	On	210 Deg F	5 sec
Low Engine Coolant Temperature			
Least Severe (1)	On	176 Deg F	5 sec
Low Engine Oil Pressure			
Least Severe (1)	On	None	4 sec
Most Severe (3)	On	None	9 sec
Low System Voltage			
Least Severe (1)	On	20 Volts	11 sec
Low Transmission Oil Pressure			
Least Severe (1)	On	218 psi	5 sec

Injector Codes Calibration - 3512B Port (4TN00053)

Injector	Code
Injector 1	4744
Injector 2	1990
Injector 3	1666
Injector 4	9817
Injector 5	1327
Injector 6	9910
Injector 7	7822
Injector 8	1222
Injector 9	2972
Injector 10	7927

Injector 11	6721
Injector 12	2437

3512B Starboard (4TN00054)

Parameter	Value
Equipment ID	
Engine Serial Number	4TN00054
ECM Serial Number	1104B227CD
Personality Module Part Number	2243078-00
Personality Module Release Date	Nov01
Personality Module Description	MAR 3512

Logged Diagnostic Codes [Diagnostic Clock = 9444 hours] - 3512B Starboard (4TN00054)

Code	Description	Occ.	First	Last
91- 8	Throttle Position Sensor : Abnormal Frequency, Pulse Width, or Period	2	9385	9442

Logged Event Codes [Diagnostic Clock = 9444 hours] - 3512B Starboard (4TN00054)

Code	Description	Occ.	First	Last
No Logged Event Codes				

Active Diagnostic Codes - 3512B Starboard (4TN00054)

Code	Description
No Active Diagnostic Codes	

Current Totals - 3512B Starboard (4TN00054)

Description	Value	Unit
Total Time	9444	hours
Total Fuel	292157	gal

Configuration - 3512B Starboard (4TN00054)

Description	Value	Unit
Equipment ID		
Engine Serial Number	4TN00054	
ECM Serial Number	1104B227CD	
Personality Module Part Number	2243078-00	
Personality Module Release Date	Nov01	
FLS	0	
FTS	0	
Engine Rotation	Standard	
Engine Location	Starboard	
Fuel Ratio Control Offset	0	
Rated Engine Speed	1600	rpm
Rated Fuel Position	22.400	mm
Low Idle Speed	650	rpm
High Idle Speed	1728	rpm

Fuel Correction Factor	0	%
Engine Cooling System Config	SCAC (Separate Circuit Aftercooled)	
Cold Cylinder Cutout	Disabled	
Cooldown Speed	550	rpm
Cooldown Duration	1	min
Engine Pre-Lube Duration	0	sec
Crank Duration	10	sec
Maximum Number of Crank Cycles	5	
Crank Terminate RPM	400	rpm
Programmable Engine Operator Switch	Overspeed Verify Switch	
Maximum Engine Torque Limit	Unavailable	lb-ft
Coolant Warning Engine Load Enable Threshold	40	%
Engine Speed Droop	Unavailable	%
Total Tattletale	12	
Overspeed Verify	Off	
Trq Limit Min	Unavailable	lb-ft

Lifetime: Time vs Engine Speed - 3512B Starboard (4TN00054)

Engine Speed(rpm)	hours	%
<400.0	0.05	0.02
400.0-499.0	0.05	0.02
500.0-599.0	0.55	0.18
600.0-699.0	88.45	28.24
700.0-799.0	2.65	0.85
800.0-899.0	6.15	1.96
900.0-999.0	20.70	6.61
1000.0-1099.0	42.20	13.47
1100.0-1199.0	48.85	15.59
1200.0-1299.0	58.95	18.82
1300.0-1399.0	38.55	12.31
1400.0-1499.0	5.80	1.85
1500.0-1599.0	0.20	0.06
1600.0-1699.0	0.10	0.03
1700.0-1799.0	0.00	0.00
1800.0-1899.0	0.00	0.00
1900.0-1999.0	0.00	0.00
>2000.0	0.00	0.00

Lifetime: Time vs Engine Load Factor - 3512B Starboard (4TN00054)

Engine Load Factor(%)	hours	%
0.0-4.0	75.40	24.06
5.0-9.0	5.00	1.60
10.0-14.0	4.40	1.40
15.0-19.0	6.35	2.03
20.0-24.0	10.55	3.37
25.0-29.0	33.95	10.83
30.0-34.0	40.60	12.96

35.0-39.0	39.10	12.48
40.0-44.0	31.15	9.94
45.0-49.0	33.80	10.79
50.0-54.0	21.60	6.89
55.0-59.0	4.10	1.31
60.0-64.0	3.20	1.02
65.0-69.0	2.80	0.89
70.0-74.0	0.80	0.26
75.0-79.0	0.20	0.06
80.0-84.0	0.10	0.03
85.0-89.0	0.20	0.06
90.0-94.0	0.05	0.02
95.0-99.0	0.00	0.00
>100.0	0.00	0.00

Lifetime: Time vs Left Exhaust Temperature - 3512B Starboard (4TN00054)

Left Exhaust Temperature(Deg F)	hours	%
<842.0	111.30	35.55
842.0-868.0	3.95	1.26
869.0-895.0	3.60	1.15
896.0-922.0	4.15	1.33
923.0-949.0	4.35	1.39
950.0-976.0	5.35	1.71
977.0-1003.0	9.75	3.11
1004.0-1030.0	7.85	2.51
1031.0-1057.0	17.75	5.67
1058.0-1084.0	47.65	15.22
1085.0-1111.0	30.60	9.77
1112.0-1138.0	35.05	11.19
1139.0-1165.0	20.35	6.50
1166.0-1192.0	5.75	1.84
1193.0-1219.0	4.65	1.49
1220.0-1246.0	1.00	0.32
1247.0-1273.0	0.00	0.00
1274.0-1300.0	0.00	0.00
1301.0-1327.0	0.00	0.00
1328.0-1354.0	0.00	0.00
1355.0-1381.0	0.00	0.00
1382.0-1408.0	0.00	0.00
>1409.0	0.00	0.00

Lifetime: Time vs Right Exhaust Temperature - 3512B Starboard (4TN00054)

Right Exhaust Temperature(Deg F)	hours	%
<842.0	116.95	37.35
842.0-868.0	4.80	1.53
869.0-895.0	4.35	1.39

896.0-922.0	4.60	1.47
923.0-949.0	9.65	3.08
950.0-976.0	6.55	2.09
977.0-1003.0	18.35	5.86
1004.0-1030.0	18.75	5.99
1031.0-1057.0	18.95	6.05
1058.0-1084.0	45.35	14.48
1085.0-1111.0	25.40	8.11
1112.0-1138.0	21.15	6.75
1139.0-1165.0	11.00	3.51
1166.0-1192.0	5.90	1.88
1193.0-1219.0	1.40	0.45
1220.0-1246.0	0.00	0.00
1247.0-1273.0	0.00	0.00
1274.0-1300.0	0.00	0.00
1301.0-1327.0	0.00	0.00
1328.0-1354.0	0.00	0.00
1355.0-1381.0	0.00	0.00
1382.0-1408.0	0.00	0.00
>1409.0	0.00	0.00

Monitoring System - 3512B Starboard (4TN00054)

Description	State	Trip Point	Delay Time
Altitude (atmospheric pressure)			
Moderate Severity (2)	On	13.4 psi	0 sec
Engine Overspeed			
Least Severe (1)	On	1840 rpm	0 sec
Most Severe (3)	On	1840 rpm	0 sec
High Aftercooler Coolant Temperature			
Least Severe (1)	On	126 Deg F	5 sec
Moderate Severity (2)	On	151 Deg F	20 sec
Most Severe (3)	On	199 Deg F	20 sec
High Air Filter Restriction Pressure			
Least Severe (1)	On	24.1 " H2O	20 sec
Moderate Severity (2)	On	26.1 " H2O	20 sec
High Crankcase Pressure			
Least Severe (1)	On	8.0 " H2O	3 sec
Moderate Severity (2)	On	14.1 " H2O	10 sec
Most Severe (3)	On	24.1 " H2O	3 sec
High Engine Coolant Temperature			
Least Severe (1)	On	210 Deg F	15 sec
Moderate Severity (2)	On	214 Deg F	30 sec
Most Severe (3)	On	225 Deg F	5 sec

High Engine Oil Filter Restriction Pressure			
Least Severe (1)	On	15 psi	5 sec
High Exhaust Temperature			
Least Severe (1)	On	1279 Deg F	20 sec
Moderate Severity (2)	On	1382 Deg F	5 sec
High Fuel Filter Restriction Pressure			
Least Severe (1)	On	15 psi	5 sec
High Transmission Oil Temperature			
Least Severe (1)	On	210 Deg F	5 sec
Low Engine Coolant Temperature			
Least Severe (1)	On	176 Deg F	5 sec
Low Engine Oil Pressure			
Least Severe (1)	On	None	4 sec
Most Severe (3)	On	None	9 sec
Low System Voltage			
Least Severe (1)	On	20 Volts	10 sec
Low Transmission Oil Pressure			
Least Severe (1)	On	218 psi	5 sec

Injector Codes Calibration - 3512B Starboard (4TN00054)

Injector	Code
Injector 1	8502
Injector 2	5952
Injector 3	9805
Injector 4	2566
Injector 5	6507
Injector 6	2210
Injector 7	2647
Injector 8	4732
Injector 9	1997
Injector 10	5745
Injector 11	5959
Injector 12	7707

MARINE DIESEL SPECIALIST **Phone:** **Email:** **Fax:** ___-___-____	**Machine ID:** STAR DIAMOND **Machine Year :** NA **Component Description:**	**Component ID:** PE4045 N034969 **Component Make:** JOHN DEERE **Component Model:** 4045 AMF85 **Component Year:** NA **Component Type :** DIESEL ENGINE **Component Location:** PORT GENERATOR **Sump Capacity:** 9 Quarts	M✓C **MOTOR CHECK ANALYSIS CLINIC** **2000 N FLORIDA MANGO RD** **SUITE 104** **WEST PALM BEACH FL 33409** **561-684-7799**

Sample ID	Date Taken	Hours on Component	Hours on Oil	Oil Weight	Oil Brand	Oil Type	Oil Changed	Date Analyzed	User Sample ID
62178	2/25/2026	3386	100	15W40	UNKNOWN	UNKNOWN	No	2/25/2026	
Comments	LEAD LEVEL (BEARINGS) HIGH. SAMPLE APPEARS FREE OF EXTERNAL CONTAMINATION. ADVISE USE OF ADDITIONAL DIAGNOSTIC TOOLS TO DETERMINE COURSE OF CORRECTIVE ACTION.								

	Wear Metals(ppm)							*Contaminant Metals (ppm)*			*Multi-Source Metals (ppm)*					*Additives (ppm)*				
Sample ID	Iron	Chromium	Aluminum	Copper	Lead	Tin	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Nickel	Manganese	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
62178	45	3	<2	15	76	<2	X	5	<2	<2	X	10	X	X	X	X	X	X	X	X

	Contaminants				*Physical Properties*								
Sample ID	Fuel	Soot	Water	Glycol	Nitration	TBN	Oxidation	V40C	V100C	VIndex	V40C Limit	V100C Limit	Visc Mode
62178	-	0.2	<0.1	-	<2.0	9.5	<2.0	108	14.4	136	92 - 124	12.5 - 16.3	C

ABNORMAL | SEVERE | D = DETECTED | - = NOT DETECTED | X = NOT TESTED / NOT APPLICABLE | NA = NOT AVAILABLE | C = CALCULATED | M = MEASURED

MARINE DIESEL SPECIALIST **Phone:** **Email:** **Fax:** ___-___-____	**Machine ID:** STAR DIAMOND **Machine Year :** NA **Component Description:**	**Component ID:** PE4045--N034970 **Component Make:** JOHN DEERE **Component Model:** 4045 AMF 85 **Component Year:** NA **Component Type :** DIESEL ENGINE **Component Location:** STARBOARD GENERATOR **Sump Capacity:** 9 Quarts	M✓C **MOTOR CHECK ANALYSIS CLINIC** **2000 N FLORIDA MANGO RD** **SUITE 104** **WEST PALM BEACH FL 33409** **561-684-7799**

Sample ID	Date Taken	Hours on Component	Hours on Oil	Oil Weight	Oil Brand	Oil Type	Oil Changed	Date Analyzed	User Sample ID
62179	2/25/2026	3342	6	15W40	UNKNOWN	UNKNOWN	No	2/25/2026	
Comments	ALL ENGINE WEAR RATES NORMAL. LOW TIME ON OIL LIMITS ACCURACY OF TEST DATA; HOWEVER, SAMPLE APPEARS FREE OF EXTERNAL CONTAMINATION. ANALYSIS INDICATES PROPER PERFORMANCE OF THE LUBRICANT AND UNIT.								

	Wear Metals(ppm)							*Contaminant Metals (ppm)*			*Multi-Source Metals (ppm)*					*Additives (ppm)*				
Sample ID	Iron	Chromium	Aluminum	Copper	Lead	Tin	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Nickel	Manganese	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
62179	5	<2	<2	2	8	<2	X	4	<2	<2	X	8	X	X	X	X	X	X	X	X

	Contaminants				*Physical Properties*								
Sample ID	Fuel	Soot	Water	Glycol	Nitration	TBN	Oxidation	V40C	V100C	VIndex	V40C Limit	V100C Limit	Visc Mode
62179	-	0.2	<0.1	-	<2.0	9.5	<2.0	108	14.4	136	92 - 124	12.5 - 16.3	C

ABNORMAL | SEVERE | D = DETECTED | - = NOT DETECTED | X = NOT TESTED / NOT APPLICABLE | NA = NOT AVAILABLE | C = CALCULATED | M = MEASURED

MARINE DIESEL SPECIALIST **Phone:** **Email:** **Fax:** ___-___-____	**Machine ID:** STAR DIAMOND **Machine Year :** NA **Component Description:**	**Component ID:** 4TN00053 **Component Make:** CATERPILLAR **Component Model:** 3512B **Component Year:** NA **Component Type :** DIESEL ENGINE **Component Location:** PORT MAIN **Sump Capacity:** 60 Gallons	M✓C **MOTOR CHECK ANALYSIS CLINIC** **2000 N FLORIDA MANGO RD** **SUITE 104** **WEST PALM BEACH FL 33409** **561-684-7799**

Sample ID	Date Taken	Hours on Component	Hours on Oil	Oil Weight	Oil Brand	Oil Type	Oil Changed	Date Analyzed	User Sample ID
62180	2/25/2026	9427	10	15W40	UNKNOWN	UNKNOWN	No	2/25/2026	
Comments	PHYSICAL DATA SUGGESTS THAT OIL IS EITHER NEW OR LIGHTLY USED. ALL ENGINE WEAR RATES NORMAL. LOW TIME ON OIL LIMITS ACCURACY OF TEST DATA; HOWEVER, SAMPLE APPEARS FREE OF EXTERNAL CONTAMINATION. ANALYSIS INDICATES PROPER PERFORMANCE OF THE LUBRICANT AND UNIT.								

	Wear Metals(ppm)							*Contaminant Metals (ppm)*			*Multi-Source Metals (ppm)*					*Additives (ppm)*				
Sample ID	Iron	Chromium	Aluminum	Copper	Lead	Tin	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Nickel	Manganese	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
62180	3	<2	<2	<2	2	<2	X	4	<2	<2	X	7	X	X	X	X	X	X	X	X

	Contaminants				*Physical Properties*								
Sample ID	Fuel	Soot	Water	Glycol	Nitration	TBN	Oxidation	V40C	V100C	VIndex	V40C Limit	V100C Limit	Visc Mode
62180	D	<0.1	<0.1	-	4.1	8.7	<2.0	109	13.0	115	92 - 124	12.5 - 16.3	C

ABNORMAL | SEVERE | D = DETECTED | - = NOT DETECTED | X = NOT TESTED / NOT APPLICABLE | NA = NOT AVAILABLE | C = CALCULATED | M = MEASURED

MARINE DIESEL SPECIALIST **Phone:** **Email:** **Fax:** ___-___-____	**Machine ID:** STAR DIAMOND **Machine Year :** NA **Component Description:**	**Component ID:** 4TN00054 **Component Make:** CATERPILLAR **Component Model:** 3512B **Component Year:** NA **Component Type :** DIESEL ENGINE **Component Location:** STARBOARD MAIN **Sump Capacity:** 60 Gallons	M✓C **MOTOR CHECK ANALYSIS CLINIC** **2000 N FLORIDA MANGO RD** **SUITE 104** **WEST PALM BEACH FL 33409** **561-684-7799**

Sample ID	Date Taken	Hours on Component	Hours on Oil	Oil Weight	Oil Brand	Oil Type	Oil Changed	Date Analyzed	User Sample ID
62181	2/25/2026	9444	10	15W40	UNKNOWN	UNKNOWN	No	2/25/2026	
Comments	PHYSICAL DATA SUGGESTS THAT OIL IS EITHER NEW OR LIGHTLY USED. ALL ENGINE WEAR RATES NORMAL. LOW TIME ON OIL LIMITS ACCURACY OF TEST DATA; HOWEVER, SAMPLE APPEARS FREE OF EXTERNAL CONTAMINATION. ANALYSIS INDICATES PROPER PERFORMANCE OF THE LUBRICANT AND UNIT.								

	Wear Metals(ppm)							*Contaminant Metals (ppm)*			*Multi-Source Metals (ppm)*					*Additives (ppm)*				
Sample ID	Iron	Chromium	Aluminum	Copper	Lead	Tin	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Nickel	Manganese	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
62181	<2	<2	<2	<2	<2	<2	X	4	<2	<2	X	6	X	X	X	X	X	X	X	X

	Contaminants				*Physical Properties*								
Sample ID	Fuel	Soot	Water	Glycol	Nitration	TBN	Oxidation	V40C	V100C	VIndex	V40C Limit	V100C Limit	Visc Mode
62181	D	<0.1	<0.1	-	3.8	8.7	<2.0	109	13.0	115	92 - 124	12.5 - 16.3	C

ABNORMAL | SEVERE | D = DETECTED | - = NOT DETECTED | X = NOT TESTED / NOT APPLICABLE | NA = NOT AVAILABLE | C = CALCULATED | M = MEASURED

MARINE DIESEL SPECIALIST **Phone:** **Email:** **Fax:** ___-___-____	**Machine ID:** STAR DIAMOND **Machine Year :** NA **Component Description:**	**Component ID:** 1532- **Component Make:** ZF **Component Model:** BW465 **Component Year:** NA **Component Type :** GEARBOX **Component Location:** PORT **Sump Capacity:** 60 Quarts	M✓C **MOTOR CHECK ANALYSIS CLINIC** **2000 N FLORIDA MANGO RD** **SUITE 104** **WEST PALM BEACH FL 33409** **561-684-7799**

Sample ID	Date Taken	Hours on Component	Hours on Oil	Oil Weight	Oil Brand	Oil Type	Oil Changed	Date Analyzed	User Sample ID
62182	2/25/2026	9427	50	SAE 40	UNKNOWN	UNKNOWN	No	2/25/2026	
Comments	GEAR UNIT WEAR RATES NORMAL. SAMPLE APPEARS FREE OF EXTERNAL CONTAMINATION. ANALYSIS INDICATES PROPER PERFORMANCE OF THE LUBRICANT AND UNIT.								

	Wear Metals(ppm)							*Contaminant Metals (ppm)*			*Multi-Source Metals (ppm)*					*Additives (ppm)*				
Sample ID	Iron	Chromium	Aluminum	Copper	Lead	Tin	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Nickel	Manganese	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
62182	<2	<2	<2	<2	<2	<2	X	6	<2	4	X	<2	X	X	X	X	X	X	X	X

	Contaminants				*Physical Properties*								
Sample ID	Fuel	Soot	Water	Glycol	Nitration	TBN	Oxidation	V40C	V100C	VIndex	V40C Limit	V100C Limit	Visc Mode
62182	X	X	0.1	-	X	X	<2.0	157	14.4	88	133 - 181	12.5 - 16.3	C

ABNORMAL | SEVERE | D = DETECTED | - = NOT DETECTED | X = NOT TESTED / NOT APPLICABLE | NA = NOT AVAILABLE | C = CALCULATED | M = MEASURED

MARINE DIESEL SPECIALIST **Phone:** **Email:** **Fax:** ___-___-____	**Machine ID:** STAR DIAMOND **Machine Year :** NA **Component Description:**	**Component ID:** 153 3 **Component Make:** ZF **Component Model:** BW465 **Component Year:** NA **Component Type :** GEARBOX **Component Location:** STARBOARD **Sump Capacity:** 60 Quarts	M✓C **MOTOR CHECK ANALYSIS CLINIC** **2000 N FLORIDA MANGO RD** **SUITE 104** **WEST PALM BEACH FL 33409** **561-684-7799**

Sample ID	Date Taken	Hours on Component	Hours on Oil	Oil Weight	Oil Brand	Oil Type	Oil Changed	Date Analyzed	User Sample ID
62183	2/25/2026	9444	50	SAE 40	UNKNOWN	UNKNOWN	No	2/25/2026	
Comments	GEAR UNIT WEAR RATES NORMAL. SAMPLE APPEARS FREE OF EXTERNAL CONTAMINATION. ANALYSIS INDICATES PROPER PERFORMANCE OF THE LUBRICANT AND UNIT.								

	Wear Metals(ppm)							*Contaminant Metals (ppm)*			*Multi-Source Metals (ppm)*					*Additives (ppm)*				
Sample ID	Iron	Chromium	Aluminum	Copper	Lead	Tin	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Nickel	Manganese	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
62183	<2	3	<2	10	<2	<2	X	5	<2	<2	X	43	X	X	X	X	X	X	X	X

	Contaminants				*Physical Properties*								
Sample ID	Fuel	Soot	Water	Glycol	Nitration	TBN	Oxidation	V40C	V100C	VIndex	V40C Limit	V100C Limit	Visc Mode
62183	X	X	<0.1	-	X	X	<2.0	157	14.4	88	133 - 181	12.5 - 16.3	C

ABNORMAL | SEVERE | D = DETECTED | - = NOT DETECTED | X = NOT TESTED / NOT APPLICABLE | NA = NOT AVAILABLE | C = CALCULATED | M = MEASURED

M✓C™ *UNDERSTANDING YOUR REPORT*

	ENGINES	TRANSMISSIONS
ALUMINUM:	PISTONS, BEARINGS, HOUSINGS, THRUST WASHERS, BUSHINGS	TORQUE CONVERTER, THE CASE, THRUST WASHERS, HOUSINGS, GEAR AND VANE PUMPS
CHROMIUM:	COMPRESSION RINGS, LOW FRICTION BEARINGS, LINERS, CHROMATE COOLING SYSTEM	BALL AND ROLLER BEARINGS, ALLOY OF STEEL PARTS
COPPER:	BEARINGS, BUSHINGS, THRUST WASHERS, OIL COOLER, CLUTCHES, AND AN OIL ADDITIVE IN SOME GASOLINE ENGINE OILS.	CLUTCH PLATES, BRONZE BUSHINGS, OIL COOLER OXIDES, BRASS FITTINGS
IRON:	CRANKSHAFT, CYLINDERS, PISTONS, LINERS, BEARINGS, VALVE TRAIN	GEARS, BEARINGS, SHAFTS, SOME CASES, CLUTCH PLATES
LEAD:	BEARINGS, CONTAMINATION FROM LEADED GASOLINE	GEARS
TIN:	PISTON SKIRTS, BEARINGS, AND BUSHINGS.	SOME BEARING CAGES
SILICON:	AIRBORN DIRT, SEAL MATERIAL, GASKETS, USED IN SOME OIL ADDITIVES, SPRAY LUBRICANTS, WHEN FOUND WITH POTASSIUM INDICATES GLYCOL ISSUE	AIRBORN DIRT, SEALERS, GASKETS, USED IN SOME OIL ADDITIVES, SPRAY LUBRICANTS, WHEN FOUND WITH POTASSIUM INDICATES GLYCOL ISSUE, SAND-CASTED PARTS
POTASSIUM:	INDICATION OF GLYCOL OR SALTWATER INTRUSION, ADDITIVE IN SOME OILS	INDICATION OF GLYCOL OR SALTWATER INTRUSION, ADDITIVE IN SOME OILS
SODIUM:	FOUND IN SOME OIL ADDITIVES, GLYCOL, ENVIRONMENTAL COMTAMINANT OR SALT WATER	FOUND IN SOME OIL ADDITIVES, GLYCOL, ENVIRONMENTAL COMTAMINANT OR SALT WATER
WATER:	MEASURED IN % VOLUME, CAN BE INDICATION OF CONDENSATION, COOLING SYSTEM LEAK, OR OUTSIDE CONTAMINATION	
GLYCOL:	MEASURED IN % VOLUME, IN THE FORMULATION OF MOST COMMERCIAL COOLANTS	
OXIDATION:	THIS IS THE RESULTS OF OXYGEN IN THE AIR REACTING WITH THE OIL AT ELEVATED TEMPERATURES. THIS IS A NORMAL PROCESS AS THE OIL AGES. IF AN ENGINE IS OPERATED CONTINUOUSLY AT A HIGH TEMPERATURE FOR EXTENDED PERIODS, OR IF DRAIN INTERVAL IS OVER EXTENDED, OIL CHANGE IS RECOMMENDED.	
NITRATION:	FORMED DURING COMBUSTION PROCESS, LEADS TO ACCELERATED OIL DETERIORATION.	
SOOT:	NORMAL COMBUSTION BY PRODUCT OF DIESEL FUEL AND APPEARS AS CONTAMINANT IN THE OIL CAUSING AN INCREASE IN VISCOSITY. INDICATE AN INPROPER AIR/FUEL RATIO, DEFECTIVE AIR INTAKE, FAULTY INJECTORS, OR BLOW-BY	
VISCOSITY:	CALCULATED MEASUREMENT OF THE OIL'S ABILITY TO FLOW AND LUBRICATE, INDICATES IF OIL IS TOO THICK OR THIN	
TBN:	MEASUREMENT OF OIL'S ALKALINE BASE RESERVE, ADDITIVE IN OIL CAPABLE OF NEUTRALIZING ACIDIC CONTAMINANTS, WHEN TBN IS BELOW 3, IT IS AN INDICATION THE OIL IS NO LONGER SERVICEABLE	
FUEL DILUTION:	MEASURED IN % VOLUME, CAN INDICATE FAULTY COMBUSTION, RICH AIR/FUEL MIXTURE WHEN PRESENT BETWEEN 2%-5%. INJECTOR PROPBLEM OR INTERNAL FUEL LINE LEAK IS TYPICALLY INDICATED WHEN FUEL IS DETECTED AT HIGH LEVELS	

ACCURACY OF RECOMMENDATIONS IS DEPENDENT ON THE REPRESENTATIVE OIL SAMPLES AND COMPLETELY CORRECT DATA ON BOTH UNIT AND OIL. THIS ANALYSIS IS INTENDED AS AN AID IN PREDICTING MECHANICAL WEAR. NO GUARANTEE, EXPRESS OR IMPLIED, IS MADE AGAINST FAILURE OF THIS COMPONENT, MOTOR CHECK(OIL LAB LLC.) LIABILITY IN ANY CASE IS LIMITED TO THE COST OF THE REPORTED ANALYSIS.

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Ensure that all safety information, warnings, and instructions are read and understood before any operation or any maintenance procedures are performed. The user is responsible for the performance of maintenance, including all adjustments, the use of proper lubricants, fluids, and filters. The user is also responsible for the replacement of components due to normal wear and aging. Failure to adhere to proper maintenance intervals and procedures may result in diminished performance of the product and/or accelerated wear of components. Use fuel consumption, service hours, or calendar time, WHICH EVER OCCURS FIRST, to determine the maintenance intervals. Products that operate in severe operating conditions may require more frequent maintenance. Before each consecutive interval is performed, all maintenance from the previous interval must be performed.

Note: The engine oil and filter change interval depend on several factors including oil sump capacity. Refer to the engine oil and filter change section for specific interval information.

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When Required

Battery - Replace
Battery or Battery Cable - Disconnect
Centrifugal Oil Filter - Inspect
Coolant - Change
Engine Air Cleaner Element (Dual Element) - Inspect/Clean/Replace
Engine Air Cleaner Element (Single Element) - Inspect/Clean/Replace
Engine Oil Level Gauge - Calibrate
Engine Oil and Filter - Change
Fuel System - Prime
Fuel System Primary Filter/Water Separator - Clean/Replace
Fuel System Primary Filter/Water Separator - Drain
Heat Exchanger - Inspect
Maintenance Recommendations
Sea Water Strainer - Clean/Inspect
Zinc Rods - Inspect/Replace

Daily

Air Starting Motor Lubricator Oil Level - Check
Air Tank Moisture and Sediment - Drain
Control Panel - Inspect/Test
Coolant Level - Check

Engine Air Cleaner Service Indicator - Inspect
Engine Oil Filter Differential Pressure - Check
Engine Oil Level - Check
Fuel Filter Differential Pressure - Check
Fuel System Primary Filter/Water Separator - Drain
Fuel Tank Water and Sediment - Drain
Transmission Oil Level - Check
Walk-Around Inspection

Initial 250 Service Hours

Engine Speed/Timing Sensor - Clean/Inspect
Engine Valve Lash - Check
Fuel Injector - Inspect/Adjust

Every 250 Service Hours

Battery Electrolyte Level - Check
Belts - Inspect/Adjust/Replace
Coolant Sample (Level 1) - Obtain
Cooling System Supplemental Coolant Additive (SCA) - Test/Add
Engine Oil Sample - Obtain
Hoses and Clamps - Inspect/Replace

Initial 500 Hours (for New Systems, Refilled Systems, and Converted Systems)

Coolant Sample (Level 2) - Obtain

Every 500 Service Hours

Air Shutoff - Test

Every 6 Months

Oil Mist Detector - Clean

Every Year

Coolant Sample (Level 2) - Obtain

Every 1000 Service Hours

Duplex Oil Filter Lever Linkage - Inspect
Engine - Clean

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Engine Crankcase Breather - Clean
Engine Protective Devices - Check
Fuel System - Prime
Fuel System Primary Filter/Water Separator - Clean/Replace
Fuel System Secondary Filter - Replace

Every 2000 Service Hours

Air Starting Motor Lubricator Bowl - Clean
Crankshaft Vibration Damper - Inspect
Driven Equipment - Check
Engine Mounts - Inspect
Turbocharger - Inspect

Every 3000 Service Hours

Air Starting Motor - Inspect

Every 3000 Service Hours or 3 Years

Cooling System Coolant Extender - Add

Every 4000 Service Hours

Auxiliary Water Pump - Inspect
Engine Valve Lash - Check
Fuel Injector - Inspect/Adjust

Every 6000 Service Hours

Air Shutoff Damper - Remove/Check

Every 6000 Service Hours or 6 Years

Air Shutoff Damper - Remove/Check
Coolant Temperature Regulator - Replace
Engine Speed/Timing Sensor - Clean/Inspect
Prelube Pump - Inspect
Starting Motor - Inspect
Water Pump - Inspect

Overhaul

Aftercooler Core - Inspect/Clean/Test
Overhaul (Major)

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Overhaul (Top End)
Overhaul Considerations

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