

MARINE DIESEL SURVEYORS, LLC.

13294 Lakeside Ter.  
Cooper City, FL 33330  
(954) 252-0707

MARINEDIESELSURVEYS@GMAIL.COM

ENGINE SURVEY REPORT

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FILE NUMBER: MDS6920  
VESSEL: "MORNING STAR"

DATE: February 17, 2020

ENGINE SPECIFICATIONS:

	PORT	STARBOARD
Engine Manufacturer	<u>MAN</u>	<u>MAN</u>
Engine Model	<u>V12-1800</u>	<u>V12-1800</u>
Engine Serial No.	<u>71047828174780</u>	<u>71021978212200</u>
Engine Hours	<u>141 Posted</u>	<u>1857 Posted</u>
Transmission Manufacturer	<u>Z.F.</u>	<u>Z.F.</u>
Transmission Model	<u>ZF3050</u>	<u>ZF3050</u>
Transmission Serial No.	<u>50028980</u>	<u>50028940</u>

TRIAL RUN DATA:

Engine RPM'S	<u>2318 RPM'S</u>	<u>2315 RPM'S</u>
Engine Water Temp.	<u>189 Degrees</u>	<u>288 Degrees</u>
Engine Oil Temp.	<u>207 Degrees</u>	<u>208 Degrees</u>
Drive Oil Temp.	<u>167 Degrees</u>	<u>165 Degrees</u>
Engine Oil Pressure	<u>101 PSI</u>	<u>75 PSI</u>
Drive Oil Pressure	<u>265 PSI</u>	<u>266 PSI</u>
Fuel Pressure	<u>87 PSI</u>	<u>88 PSI</u>
Crankcase Pressure	<u>155 CFPH</u>	<u>575 CFPH</u>
Turbo Boost	<u>51 PSI</u>	<u>51 PSI</u>

COOLING SYSTEMS:

Fresh Water System	<u>Clean</u>	<u>Clean</u>
Caps	<u>Held pressure</u>	<u>Held pressure</u>
Pump	<u>No leaks</u>	<u>No leaks</u>
Hoses	<u>Serviceable</u>	<u>Serviceable</u>
Hose Clamps	<u>Serviceable</u>	<u>Serviceable</u>
Heat Exchanger	<u>No leaks</u>	<u>No leaks</u>
Raw Water System	<u>Operational</u>	<u>Operational</u>
Pump	<u>No leaks</u>	<u>No leaks</u>
Hoses	<u>Serviceable</u>	<u>Serviceable</u>
Hose Clamps	<u>Serviceable</u>	<u>Serviceable</u>

ELECTRICAL:

Electronic Monitoring Unit	<u>Serviceable</u>	<u>Serviceable</u>
Computerized Monitoring System	<u>Serviceable</u>	<u>Serviceable</u>
Engine Monitoring System	<u>Operational</u>	<u>Operational</u>
Electronic Control Modulator	<u>Operational</u>	<u>Operational</u>
Alarms-Ignition Test	<u>Operational</u>	<u>Operational</u>
Alternator Output	<u>Normal</u>	<u>Normal</u>

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**FILTERS:**

Engine Oil Filters  
Primary Fuel Filters  
Secondary Fuel Filters  
Transmission Oil Filter

**PORT**

Serviceable  
Serviceable  
Serviceable  
See note

**STARBOARD**

Serviceable  
Serviceable  
Serviceable  
See note

**OIL/FUEL LINES:**

Turbo Oil Lines  
Engine Oil Lines  
Engine Fuel Lines  
Transmission Oil Lines

Serviceable  
Serviceable  
Serviceable  
Serviceable

Serviceable  
Serviceable  
Serviceable  
Serviceable

**AIR SYSTEM:**

Turbos  
Air Filters  
Intercoolers

Operational  
Clean  
Serviceable

Operational  
Clean  
Serviceable

**EXHAUST SYSTEM:**

Hoses  
Risers  
Elbows  
Mufflers  
Manifolds  
Crossover  
Hose Clamps

Serviceable  
See note  
Serviceable  
Serviceable  
Serviceable  
Serviceable  
Serviceable

Serviceable  
Monitor  
Serviceable  
Serviceable  
Serviceable  
Serviceable  
Serviceable

**MISCELLANEOUS:**

Engine Mounts  
Engine Paint  
Vibration Dampener  
Engine Oil Level  
Engine Oil Condition  
Transmission Oil Level  
Transmission Oil Condition  
Generator Oil Level  
Generator Oil Condition

Firm  
Serviceable  
Serviceable  
Full  
Service  
Full  
See oil sample  
Full  
See oil sample

Firm  
Some corrosion  
Serviceable  
Full  
Service  
Full  
See oil sample  
Full  
See oil sample

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This is to certify that the undersigned diesel engine surveyor did perform an engine and generator survey to the above captioned vessel while afloat and during the trial run on February 17 and 25, 2019. Survey performed in order to ascertain the general condition of the engines and generators.

All observations and conditions contained in this Diesel Evaluation were derived from "EXTERNAL INSPECTIONS ONLY", no internal inspections were ordered or performed but are recommended. The findings are the results of facts and conditions presented before and during the trial run, with no guarantees or warranties specified or implied by Marine Diesel Surveyors, LLC., any employee, surveyor, representative or agent of the corporation.

**ENGINE TYPE:**

The main engines are MAN V12-1800 high performance diesels, which are, V-12 cylinder four cycle-stroke turbocharged intercooled common rail electronic controlled diesels with fresh water cooling.

**TRANSMISSION TYPE:**

The transmissions are Z.F. 3050 gears with 2.750:1 ratios.

**EXHAUST SYSTEMS:**

The exhaust risers are manufactured of stainless steel. The exhaust elbows are manufactured of stainless steel. The exhaust mufflers are manufactured of fiberglass. Normal life (safe) expectancy for risers is five to seven years. This life expectancy would be subject to the operating conditions to which the vessel was subjected. The only positive means of attesting to the internal condition of the risers is to have them removed and pressure tested.

The exhaust hoses were inspected and appear to be in serviceable condition.

The exhaust hose clamps were inspected and appear to be in serviceable condition.

The exhaust risers were inspected externally. Porosity was noted at the port riser hose elbow. Starboard riser showed no external leaks.

The exhaust manifolds were inspected and appear to be in serviceable condition.

The exhaust elbows were inspected and appear to be in serviceable condition.

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**FUEL SYSTEMS:**

The fuel systems consist of MAN water/fuel separators, primary filters and spin-on secondary filters. A sample of the fuel showed the fuel to contain some bacteria and sediment. The fuel lines were inspected and appear to be in serviceable condition.

**AIR INTAKE SYSTEM:**

The air filters were inspected and found to be in serviceable condition.

**FRESH WATER SYSTEMS:**

The fresh water systems were pressure checked with a Stant Pressure Tester at operational pressure.

The port system showed no leaks. The starboard system showed no leaks. The fresh water caps held pressure port and starboard. The fresh water pumps showed no leakage during pressure testing port or starboard. The fresh water hoses appear to be in serviceable condition. The fresh water hose clamps appear to be in serviceable condition. The systems were clean and had antifreeze protection.

**RAW WATER SYSTEMS:**

The raw water systems were visually inspected before and during the trial run. The heat exchangers were inspected and no leaks were found. The raw water pumps showed no leakage during the trial run. The raw water hoses were inspected and appear to be in serviceable condition. The raw water hose clamps were inspected and appear to be in serviceable condition.

**ALARM SYSTEMS IGNITION TEST:**

The engine alarm systems were tested and found to be operational. Engine overheat and/or low oil pressure testing of the alarm systems cannot be performed.

**HOOR METERS:**

Hour meters were found to be operational during the trial run. Note:, hours posted cannot be guaranteed accurate by the undersigned engine surveyor. Internal inspections would be needed to confirm hours posted. No internal inspections were ordered or performed.

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**INTERCOOLERS:**

The intercoolers were visually inspected "externally" and no leaks were noted. Note:, no internal inspection of the intercooler cores was performed.

**TURBOS:**

The turbos were inspected intake sides and appear to be in serviceable condition. Note:, exhaust sides of the turbos cannot be inspected. Exhaust pipes would need to be removed.

**TURBO OIL LINES:**

The turbo oil lines were inspected and appear to be in serviceable condition.

**ENGINE OIL LINES:**

The engine oil lines were inspected and appear to be in serviceable condition.

**ENGINE/TRANSMISSION MOUNTS:**

The engine-transmission mounts were visually inspected and found to be firm. The mounts were inspected under sea trial conditions by shifting from forward to reverse, while watching the mounts for movement (Back Down Test).

**ENGINE/TRANSMISSION ALIGNMENT:**

During the trial run, some engine/transmission movement and vibration was noted. Some amount of movement and vibration is considered normal.

**TRANSMISSIONS:**

The gear sumps were probed via magnet and found to have a slight trace of metal. A small trace of metal is considered normal. The transmission oil lines were inspected and appear to be in serviceable condition.

**BLOW BY TEST:**

A crankcase blow by test was performed using a Computerized Blow By Indicator. Port engine showed 155 CFPH and the starboard engine showed 575 CFPH. This test shows cylinder pressures are most likely but not definitely being controlled by the pistons, rings and cylinder liners at this time. Internal inspections is the only definitive way to determine cylinder condition.

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**TRIAL RUN DATA:**

Engine and transmission RPM'S were measured at full throttle. The port engine turned 2318 RPM'S, while the starboard engine turned 2315 RPM'S. The port transmission showed no slippage. The starboard transmission showed no slippage.

The following conditions were found during the trial run, using state of the art test equipment (readings were taken at full throttle sustained).

The port engine fresh water temperature was 189 degrees and starboard was 188 degrees. The port engine oil pressure was 101 PSI and starboard was 75 PSI. The port turbo boost pressure was 51 PSI and the starboard was 51 PSI. Engine fresh water temperatures, engine oil pressures and turbo boost pressures were found to be normal during the trial run.

The exhaust was clear with no sign of irregular oil consumption or fuel distribution. Some amount of smoke was noted during the cold start-up, which is normal.

The exhaust stack temperatures were uniformed port and starboard, showing a good balance between compression and fuel distribution. Port A-Bank was 1420 degrees and B-Bank was 1410 degrees. Starboard A-Bank was 1435 degrees and B-Bank was 1450 degrees.

The port engine oil sump temperature was 207 degrees and starboard was 208 degrees, which is normal.

The port engine transmission oil temperature was 167 degrees and starboard was 165 degrees, which is normal.

**ENGINE INTERNAL INSPECTIONS:**

No internal inspections were ordered or performed but are recommended. Condition of the internal parts (rods, liners, pistons, crankshafts, valves, bearings and etc.) is unknown. MAN engines cannot be internally inspected without dismantling the engines. If recommended internal inspections of the engines is requested, it will be conducted at a later date at an agreed upon rate at which time an addendum to this report will be issued.

**CYLINDER COMPRESSION TEST:**

To best determine cylinder condition, (rings and liners) a cylinder compression test would have to be performed. Cylinder compression test are recommended but performed only if requested. This test is not included in this survey and cost extra.

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**MAINTENANCE INTERVAL SCHEDULE:**

MAN provides, with each type engine, a "Maintenance Interval Schedule", which can be found in the "Operation and Maintenance Manual". Proper operation and maintenance are key factors in obtaining the maximum life and economy of the engines. If the directions in the Operation and Maintenance Manual are followed, cost can be minimized and engine life can be maximized. **Note:, No proof was provided showing time since last factory recommended engine service was performed. If no documentation is provided to prove service was performed, then it is imperative to perform all factory recommended engine service at this time for engine hours posted and age of the engines.**

The diesel evaluation results were derived via non disassembly type testing procedures, No internal inspections were ordered or performed but are recommended. Marine engines are subjected to a corrosive environment, which makes forecasting engine life difficult (especially inactive machinery). Diesel engines require frequent maintenance to maintain full RPM potential and safe operation. Continuous operation should not exceed 80%, while full throttle should be avoided to obtain maximum life and minimize fuel consumption. Operation at continuous full throttle will shorten engine life. Remaining engine life is unknown. Speculation of remaining engine life is not warranted. Internal inspections would be needed to estimate remaining engine life and to determine if defects are present.

Remarks and recommendations pertaining to the port and starboard engines and transmissions are repairs which require attention, due to their immediate effect on safe and proper operation. Reinspection of repairs by MARINE DIESEL SURVEYORS, LLC. should be conducted.

This report is issued to the condition that it is understood and agreed that neither this office nor any surveyor or any employee is under any circumstances whatsoever to be held responsible in any way for any error in judgement, default or negligence nor for any inaccuracy, omission or misrepresentation in this report, and that the use of this report shall be construed to be an acceptance of the foregoing conditions.

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**PORT REMARKS AND RECOMMENDATIONS:**

1. Corrosion was noted at the transmission housing and oil filter. Remove corrosion, inspect for corrosion damage, service if indicated, clean and apply protective coating. Renew the oil filter.
2. Porosity was noted at the exhaust riser raw water hose elbow welds. Service as needed.

**STARBOARD REMARKS AND RECOMMENDATIONS:**

1. Corrosion was noted at the transmission housing and oil filter. Remove corrosion, inspect for corrosion damage, service if indicated, clean and apply protective coating. Renew the oil filter.
2. A few of the engine cover support nuts are missing. Replace the missing nuts.
3. One of the belt guard support bolts is missing. Replace the missing bolt.
4. A-Bank air intake manifold bolt rear side was found to be loose. Re-tighten all intake manifold bolts to factory specifications.

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**PORT GENERATOR:**  
MODEL:29MDKDS-8124A  
SERIAL:E170192224  
HOURS:301 Posted

The Onan generator is a fresh water unit. The fresh water system was tested using a Stant pressure tester at operational pressure. The system showed no leaks. The fresh water cap held normal pressure. The system was clean and had antifreeze protection. Water temperature was tested and found to be normal. Engine oil pressure was tested and found to be normal. The fuel system is protected by a water/fuel separator and spin on secondary fuel filter. The generator was run under full load during the trial run, maintaining good voltage and phase. The exhaust showed little sign of oil or improper fuel atomization. Service to the following recommendations should be performed.

1. Raw water leakage was noted at the raw water pump.
2. Exhaust hoses are not double clamped.

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**STARBOARD GENERATOR:**

MODEL:28EFOZD

SERIAL:2272050

HOURS:5470 Posted

The Kohler generator is a fresh water unit. Water temperature was tested and found to be normal. Engine oil pressure was tested and found to be normal. The fuel system is protected by a water/fuel separator and spin on secondary fuel filter. The generator was run under full load during the trial run, maintaining good voltage and phase. The exhaust showed little sign of oil or improper fuel atomization. Service to the following recommendations should be performed.

1. Raw water leakage was noted at the raw water pump.
2. Corrosion was noted at the exhaust mixer elbow.
3. Corrosion was noted at the heat exchanger and the unit is not supported/mounted properly.
4. Signs of coolant leakage was noted at the thermostat housing.
5. Underwater exhaust thru-hull valve shows signs of leakage.

Signed without prejudice,

*Joe Stafford, Sr.*

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**JOE STAFFORD, SR.** For the corporation.