RPM DIESEL ENGINE CO. INC.
2555 STATE RD 84
FT. LAUDERDALE FLORIDA 33312
BROWARD: 954-587-1620 FAX: 954-587-0367

DATE: December 10, 2024

HULL# TUIY16554K910

DOC# ON 742366

WO# 72622

TO: ANDREW SQUIRE
1515 SW 20 STREET
FORT LAUDERDALE, FL 33315

Survey on the M/V SAPPHIRE

The 165 TRINITY was inspected on 12-10-2024 while at PALM BEACH, FL. and during a trial run on the Atlantic Ocean. This was requested by the prospective owner, buyer, or broker/agent for the vessel.

The vessel was equipped with MTU 16V4000CR Main Engines and Twin 145 KW Northern Lights generator sets.

The following inspections and tests were conducted by external methods only. If major dismantling of the engines is required, it will be conducted at a later date at an agreed upon rate at which time an addendum to this report will be issued. The type of inspections conducted at this time are intended to relay the present operating condition of the engines, transmissions, and generators as of this date. Latent defects and internal failures will not be covered in this report.

A bore scope test was not conducted at this time, as per customer request Customer Initial. See attached addendum.

Oil samples were taken and sent to laboratory for analysis. The results should be sent to us in four or five days.

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TERMS, CONDITIONS & LIMITATIONS

This engine survey report is issued by the undersigned, who has exercised reasonable care in conducting a visual inspection of the accessible areas, in connection with a marine diesel engine survey of the subject vessel. All details and particulars in this report are believed to be true, but are not guaranteed accurate. All judgements, conclusions and recommendations are expressions of opinion of the undersigned based on his skill, training and experience. After a routine examination of the vessel's engines, and after discussions with owners or others familiar with the vessel.

No part of this report is issued as an expressed or implied warranty of the condition or life expectancy of the vessel's engines, reverse gears and generators, or of the cost of repairs. Unless specifically stated otherwise in this report, the undersigned has not disassembled or removed any components, covers, or accessories for inspection or testing; therefore this report does not cover latent defects not readily discovered without such removal or disassembly. **The undersigned has conducted his survey and issued this report for the sole use of the specified requesting party. For an agreed fee based on the intended use of the report and legal liability of the undersigned; accordingly. Others are not to use this report and not to rely upon the contents of this report without payment to the undersigned of an additional agreed fee based upon reevaluation of the same factors.** Further, the undersigned shall have no liability for property loss damages, and no liability for punitive damages, all of which shall be deemed to have knowingly and voluntarily waived upon use of this report; further, in no event shall the legal liability of the undersigned for this report ever exceed the fee paid by the requesting party for issuance of this report, regardless of the number of claims or suits and regardless of whether under theory of tort, contract, warranty, outrage, or otherwise.

THIS SURVEY IS PREPARED EXCLUSIVELY FOR A POTENTIAL BUYER AND IS NOT IN ANY CIRCUMSTANCES TRANSFERRABLE.

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TRIAL RUN DATA

	IDLE	PORT FULL LOAD	IDLE	STBD FULL LOAD
RPM	550	2074	620	2070
NO LOAD		2100		2100
LOAD PERCENT	34%	100%	32%	100%
OIL PRESSURE (psi)	36	97	36	93
FUEL PRESSURE (psi)	85	90	79	84
ALTERNATOR OUTPUT	27.4	27.3	27.6	27.4
TURBO PRESSURE PSI	14.8	59	15.0	59
CRANKCASE PRESSURE Mb	-.5	-11.7	-1.4	-8.9
WATER TEMP (deg F)	167	193	164	192
DRIVE OIL PRESSURE	266	276	266	274
DRIVE OIL TEMP	94	114	94	111

Notes:

1. Sea trial went well. Seas were 3 to 5 feet.
2. Port and Starboard engines came up to proper full Load RPMs.
3. Port and starboard engines and transmissions temperatures and pressures are within spec.

GEAR PRESSURE GEAR TEMPERATURE

GEAR TEMP	GEAR PSI	Engine RPMs	GEAR PSI	GEAR TEMP	BOAT SPEED
94	266	Idle	266	94	6.8
102	275	1200	270	100	13.7
110	276	1600	272	110	17.8
114	276	1900	274	111	19
114	276	Full	274	111	21.5

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ENGINES: PORT

PORT ENGINE	**MTU**	**HOURS**	**1897**
MODEL NUMBER	**16V4000M90**	**SERIAL NUMBER**	**527104599**
NO. OF CYLINDER	**16**	**RATED H.P**	**3650 KW 2720**
		RATED RPM	**2100 YEAR 2007**
TRANSMISSION	**ZF**		
MODEL NUMBER	**ZF 7640**	**SERIAL#**	**50024180**
RATIO	**3.826:1**		

	CONDITION
GENERAL APPEARANCE	Good
PRIMARY FUEL FILTER 2000/40UMS	Twin Seapar
SECONDARY FUEL FILTER	Twin Spin On
AIR CLEANER	Twin Dry Type
FUEL LINES	Not Leaking
LUBE OIL LINES	Not Leaking
TRANSMISSION OIL LINES	Not Leaking
TRANSMISSION WATER COOLING LINES	Not Leaking
RAW WATER SYSTEM	Serviceable
RAW WATER HOSES	Not Leaking
RAW WATER CLAMPS	Serviceable
RAW WATER PUMP	Not Leaking
RAW WATER SEA VALVE	Moves Freely
RAW WATER STRAINER	Sealed
HEAT EXCHANGER	Serviceable
FRESH WATER SYSTEM	Serviceable
FRESH WATER CIRCULATING PUMP	Not Leaking
FRESH WATER HOSES	Not Leaking
FRESH WATER CLAMPS	Serviceable
COOLING FLUID CONDITION	Serviceable
PRESSURE CAP	Not Leaking
EXHAUST SYSTEM RISER	No External leaks
EXHAUST SYSTEM HOSES	Not Leaking

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PORT ENGINE (Continued)

EXHAUST SYSTEM	Serviceable
TURBO	Spins Freely
SHAFT COUPLER	True
CLUTCH AND THROTTLE CONTROL 4 Sturdy	See Note #2
MOTOR MOUNTS	Secure
EMERGENCY ENGINE STOPS	Electric
GAUGES 1 Sturdy Plus Servo watch monitor	Normal Operation
WIRING	Serviceable
BELTS	None
TRANSMISSION SEAL	Not Leaking
ENGINE FRONT SEAL	Not Leaking
ENGINE REAR SEAL	Not Leaking

REMARKS AND RECOMMENDATIONS:

1. MTU display in the engine room has a burnt screen.
2. Back-up and local control panel throttles do not work and needs to be repaired.

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ENGINES: STARBOARD

STBD ENGINE	**MTU**	**HOURS**	**1894**
MODEL NUMBER	**16V4000M90**	**SERIAL NUMBER**	**527104598**
NO. OF CYLINDER	**16**	**RATED H.P**	**3650 KW 2720**
TRANSMISSION	**ZF**	**RATED RPM**	**2100 YEAR 2007**
MODEL NUMBER	**ZF 7640**	**SERIAL#**	**50024179**
RATIO	**3.826:1**		

	CONDITION
GENERAL APPEARANCE	Good
PRIMARY FUEL FILTER 2000/40UMS	Twin SeaPar
SECONDARY FUEL FILTER	Twin Spin On
AIR CLEANER	Twin Dry Type
FUEL LINES	Not Leaking
LUBE OIL LINES	Not Leaking
TRANSMISSION OIL LINES	Not Leaking
TRANSMISSION WATER COOLING LINES	Not Leaking
RAW WATER SYSTEM	Serviceable
RAW WATER HOSES	Not Leaking
RAW WATER CLAMPS	Serviceable
RAW WATER PUMP	Not Leaking
RAW WATER SEA VALVE	Moves Freely
RAW WATER STRAINERS	Sealed
HEAT EXCHANGER	Serviceable
FRESH WATER SYSTEM	Serviceable
FRESH WATER CIRCULATING PUMP	Not Leaking
FRESH WATER HOSES	Not Leaking
FRESH WATER CLAMPS	Serviceable
COOLING FLUID CONDITION	Serviceable
PRESSURE CAP	Not Leaking
EXHAUST SYSTEM RISER	No external leaks
EXHAUST SYSTEM HOSES	Not leaking

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STARBOARD ENGINE (Continued)

EXHAUST SYSTEM	Serviceable
TURBO	Spins Freely
SHAFT COUPLER	True
CLUTCH AND THROTTLE CONTROLS 4 Sturdy	Normal operation
MOTOR MOUNTS	Secure
EMERGENCY ENGINE STOPS	Electric
GAUGES 1 Sturdy Plus Servo watch monitor	Normal operation
WIRING	Serviceable
BELTS	Serviceable
TRANSMISSION SEAL	Not Leaking
ENGINE FRONT SEAL	Not Leaking
ENGINE REAR SEAL	Not Leaking

REMARKS AND RECOMMENDATIONS:

1. MTU display in the engine room has a burnt screen.

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GENERATOR: PORT

GENERATOR	**Northern Lights**	**HOURS**	**6605**
MODEL NUMBER	**M1066A2.1BT**	**SERIAL#**	**0662-58746**
KILOWATTS	**145**	**VOLTS**	**120/208**
NO. OF CYLINDERS	**6**	**RPM**	**1800**

	CONDITION
GENERAL APPEARANCE	Good
FILTERS	Single Racor 1000 Sealed
LIFT PUMP	Not Leaking
FRESH WATER PUMP	Not Leaking
RAW WATER PUMP	Not Leaking
RAW WATER HOSES	Not Leaking
FRESH WATER HOSES	Not Leaking
BELT(S)	Serviceable
MUFFLER	Not Leaking
EXHAUST HOSES	Not Leaking
INJECTORS	Serviceable
INJECTION LINES	Not Leaking
ZINCS	See Note #3
HEAT EXCHANGER	Serviceable
MIXING ELBOW	Not Leaking

OPERATIONAL DATA

WATER TEMPERATURE	190 F°
OIL PRESSURE	50 Psi

REMARKS AND RECOMMENDATIONS:

1. Forward motor mounts have collapsed and need to be replaced.
2. Engine room volt meter is not working and needs to be repaired.
3. Check and replace zincs as necessary.
4. Unit ran well and held load.

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GENERATOR: STARBOARD

GENERATOR	**Northern Lights**	**HOURS**	**6227**
MODEL NUMBER	**M1066A2.1BT**	**SERIAL #**	**0662-58747**
KILOWATTS	**145**	**VOLTS**	**120/208**
NO. OF CYLINDERS	**6**	**RPM**	**1800**

	CONDITION
GENERAL APPEARANCE	Good
FILTERS	Twin Racor 1000 Sealed
LIFT PUMP	Not Leaking
FRESH WATER PUMP	Not Leaking
RAW WATER PUMP	Not Leaking
RAW WATER HOSES	Not Leaking
FRESH WATER HOSES	Not Leaking
BELT(S)	Serviceable
MUFFLER	Not Leaking
EXHAUST HOSES	Not Leaking
INJECTORS	Serviceable
INJECTION LINES	Not Leaking
ZINCS	See Note #3
HEAT EXCHANGER	Serviceable
MIXING ELBOW	Not Leaking

OPERATIONAL DATA

WATER TEMPERATURE	185° F
OIL PRESSURE	Psi See Note#2

REMARKS AND RECOMMENDATIONS:

1. Forward motor mounts are bad and need to be replaced.
2. Engine room volt meter and oil pressure gauge are not working and needs to be repaired, or replaced.
3. Check and replace zincs as necessary.
4. Unit ran well and held load.

MTU (PLEASURE CRAFT) MAINTENANCE RECOMMENDATIONS (2000 SERIES)

1) **Lubricating System**

*Check oil level daily. Replace oil and filters every 500 hours.

Crankshaft Ventilation- clean wire meshes for: Crankcase ventilation system, every 500 hours, and 250 Hours to fit new paper or woven insert (if fitted) for Line separator for oil mist. Centrifugal oil filter (If fitted), Check thickness of oil residue layer, 500 Hours.

2) **Fuel System**

*Change fuel filters every 500 hours or annually.

*Fuel hoses should be inspected every 500 hours and Replaced at 1000 hours. Fire resistant fuel hoses do not require automatic replacement at 1000 hours, but should be inspected and replaced as necessary.

*M-90 Series Engines- Bayonets & Injectors should be changed every 3000 hours. Fuel Injection Pumps (E.U.P's) every 6000 hours.

*M-91 Series Engines Bayonets, Injectors and Injection Pumps (E.U.P.'s) should be replaced every 2000 hours.

3) **Cooling System**

*Check coolant level daily. A cooling system properly maintained and protected with antifreeze and supplemental inhibitors can be operated up to 2 years or 4000 hours, whichever comes first.

*Cooling hoses should be inspected every 500 hours and replaced at 1000 hours of service.

*Check engine zincs initially every 60 days, then as required or annually.

*Raw water pump (flexible impeller) should be replaced annually.

*All marine tube & bundle type heat exchangers should be replaced after 4 years or 4000 hours, whichever comes first.

4) **Air System**

*Air separator filter elements and vacuum limiters must be cleaned and re-oiled every 250 hours of engine operation.

*Filter elements must be replaced every year or every 500 hours of engine operation, whichever comes first. Vacuum limiters must be replaced every two years or 1000 hours of operation, whichever comes first.

*Air box collectors should be drained every 150 hours.

*Air silencers - clean or replace polyurethane foam elements (socks) 3 years or 2000 hours. Should be cleaned though.

4**)** **Drive belts**

*Drive belt tension should be checked every 150 hours, adjust if necessary and inspect for splits, cracks, and glazing. Replace belts after 2000 hours of service for M-91 series, and 3000 hours on M-90 Series, regardless of apparent conditions.

MTU (PLEASURE CRAFT) MAINTENANCE RECOMMENDATIONS (2000 SERIES

5) **Marine Gear**
*Check marine gear oil level daily. Replace marine Gear oil coolers every 4 years or 4000 hours.

FUEL SYSTEM-

1) M-90 Series Engines- Bayonets & Injectors should be changed every 3000 hours. Fuel Injection Pumps (E.U.P's) every 6000 hours.

2) M-91 Series Engines Bayonets, Injectors and Injection Pumps (E.U.P.'s) should be replaced every 2000 hours.

3) Combustion Chambers- Inspect cylinder chambers using the Bore scope.

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