

CLARKE®

MAINTENANCE SCHEDULE

MAINTENANCE SCHEDULE RESOURCES

The following routine maintenance schedule is based on an engine usage rate not exceeding 2 hours per month. The **Operation and Maintenance Instructions Manual**, provided with the engine, outlines the maintenance requirements.

For UL/FM engine models also refer to **NFPA 25** for further maintenance requirements.

Operation and Maintenance Instructions Manual

JU/JW/JX MODELS
ELECTRONIC ENGINES
FOR
FIRE PUMP APPLICATIONS

This manual covers John Deere Engines
Prepared by Clarke
for fire pump service

Clarke UK, Ltd.
Unit 1, Grange Works
Lonsdale Road
Coatbridge
M15 2NN

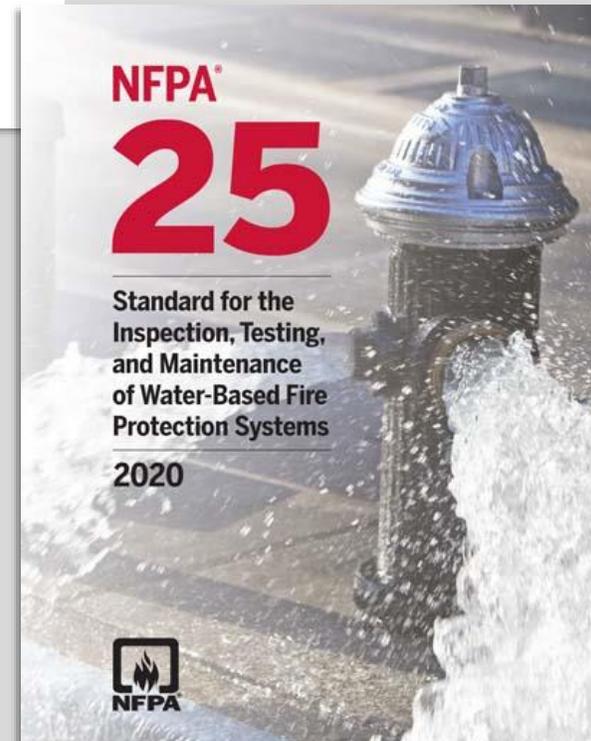
United Kingdom
TELE: +44(0)1236 429946
FAX: +44(0)1236 427274

Clarke Fire Protection Products, Inc.
100 Progress Place
Cincinnati, OH 45246
U.S.A.

TELE: +1.513.771.2200 Ext. 427
FAX: +1.513.771.5375

www.clarkefire.com

C132678 RevAF
4/19/2021



MAINTENANCE SCHEDULE CHECKLIST

The **Maintenance Schedule Checklist** is an optional document to record Clarke Fire specific maintenance items.

The PDF document can be downloaded from ClarkeFire.com

CLARKE®

MAINTENANCE SCHEDULE CHECKLIST

Facility Identification (Name):				
Address:	City :	State/Province:	Postal Code:	Country:
S.U.I. Test Date:	Clarke Engine Model:	Engine Serial Number:		
Maintenance Date:	Work Performed By:		Final hour meter reading:	
Work Performed:	<input type="checkbox"/> Weekly	<input type="checkbox"/> 6 Month	<input type="checkbox"/> 1 Year	<input type="checkbox"/> 2 Year <input type="checkbox"/> Other:

Check and Correct as Necessary

WEEKLY MAINTENANCE:

Static Checks

- Check the Air Filter for rips, crushed elements or extreme dirt.
- Check the Battery electrolyte level and cable connections.
- Check the Coolant Hoses for rips, splitting, collapses or bulges.
- Check the Coolant Level (Use ASTM D6210)
- Check the Fuel Tank for leaks and minimum two-thirds full.
- Check the Governor Run-Stop Solenoid
- Check the Jacket Water Heater
- Check the Lubrication Oil Level
- Remove Water from Fuel Filter
- Check the Mode Selector Not In Automatic Warning Light
- Check the Manual Cooling Loop Valves.
- Check and Clean the Cooling Water Y-strainers.

Running Checks

- Run the Engine
- Check the Operating Gauges
- Check the Cooling Water Solenoid (N/A for vertical turbine)
- Check the Heat Exchanger Discharge for free flow of water.
- Check the Exhaust System for leaks, support and rain cap.
- General Inspection for excessive noise, adequate ventilation, missing items or fluid leaks.

6 MONTH MAINTENANCE:

- Clean the Batteries
- Check the Battery Charging Alternator
- Check the Belts for proper alignment, signs of fraying or cracks.
- Clean the Cooling Water Strainers
- Check the Driveshaft U-joints or Coupling Set Screws
- Check the Fuel Lines

1 YEAR MAINTENANCE:

- Clean or Replace the Air Filter
- Clean the Fuel Lift Pump Strainer
- Check the Crank Case Vent System
- Lubricate the Driveshaft U-Joints
- Replace the Fuel and Oil Filters
- Check the Heat Exchanger Electrode
- Test the Fuel for degradation
- Replace the Lubricating Oil
- Replace the Coolant
- Check the Mounting Isolators (if applicable)
- Check the Wiring System

2 YEAR MAINTENANCE:

- Replace the Air Filter
- Replace the Batteries
- Replace the Belts
- Replace the Coolant Hoses
- Replace the Thermostat
- Check the Water Pump Impeller and Seal

5 YEAR MAINTENANCE:

- Replace the Torsional Coupling (if applicable)

Comments:

Serviced By:	Company:			
Address:				
City:	Postal Code:	Country:		

WEEKLY MAINTENANCE

Weekly Maintenance Items are routine tasks based on an engine usage rate not exceeding 2 hours per month. For UL/FM engine models, also refer to NFPA 25.

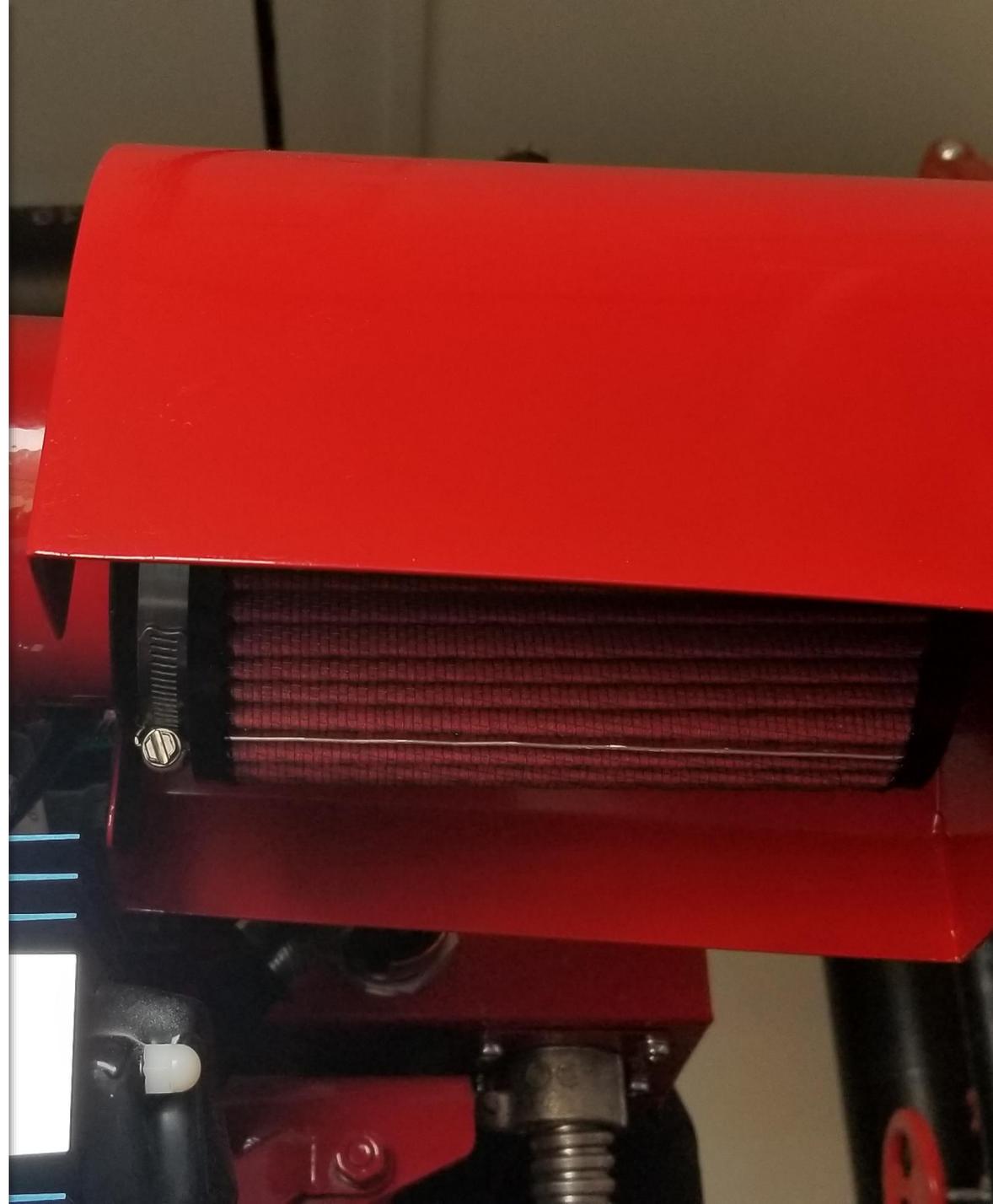
Static Checks are tasks that are to be completed before starting the engine.



WEEKLY MAINTENANCE

Check the Air Filter for rips, crushed elements or extreme dirt.

A dirty filter can make it more difficult for the engine to draw in air and effect the power output.



WEEKLY MAINTENANCE

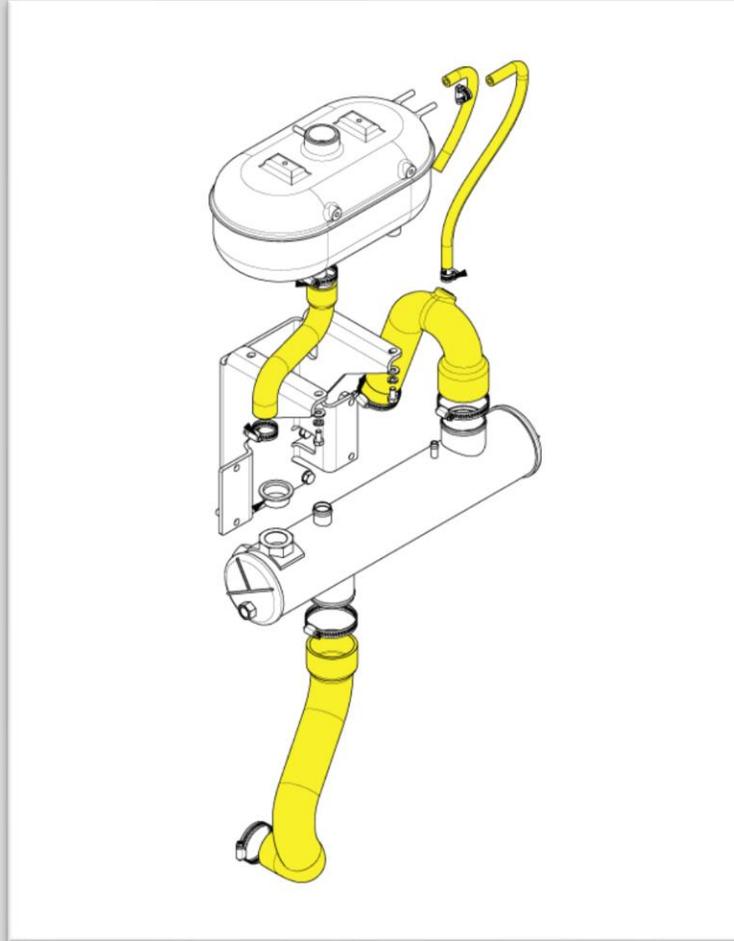
Check the Battery electrolyte level and cable connections.

To maintain battery performance and reliability, it's very important to check the water levels in the battery on a routine basis. The level of the water should be enough so that the cell plates are submerged. If the batteries require fluid while in service, add water, never add acid.

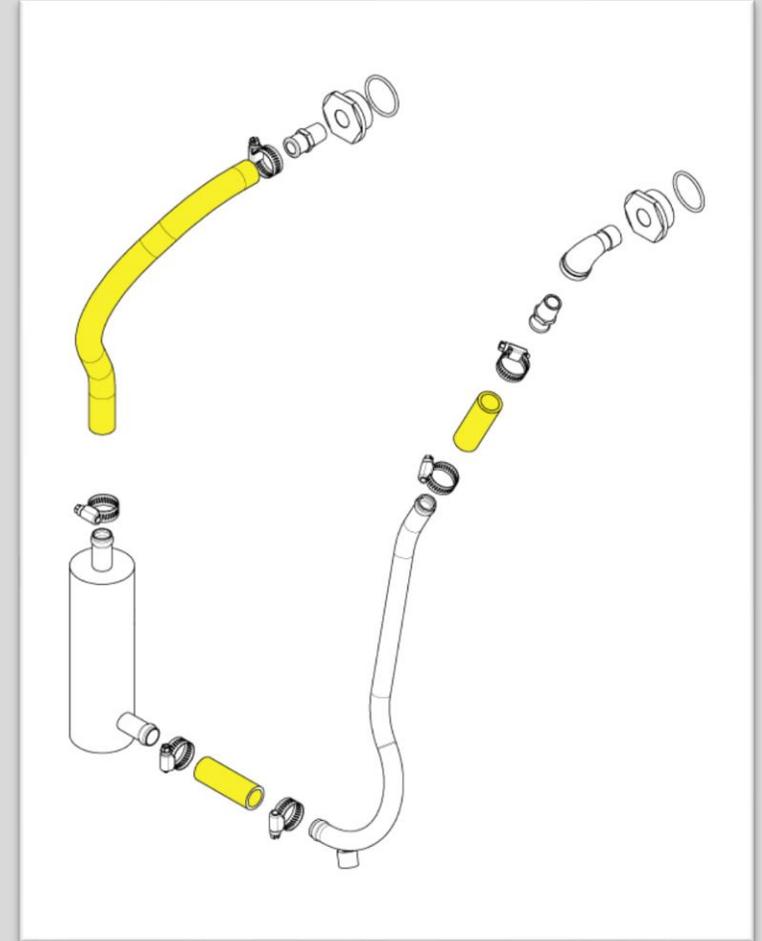


WEEKLY MAINTENANCE

Check the Coolant Hoses for rips, splitting, collapses or bulges.



Heat
Exchanger



Jacket-Water
Heater

WEEKLY MAINTENANCE

Check the Coolant Level.

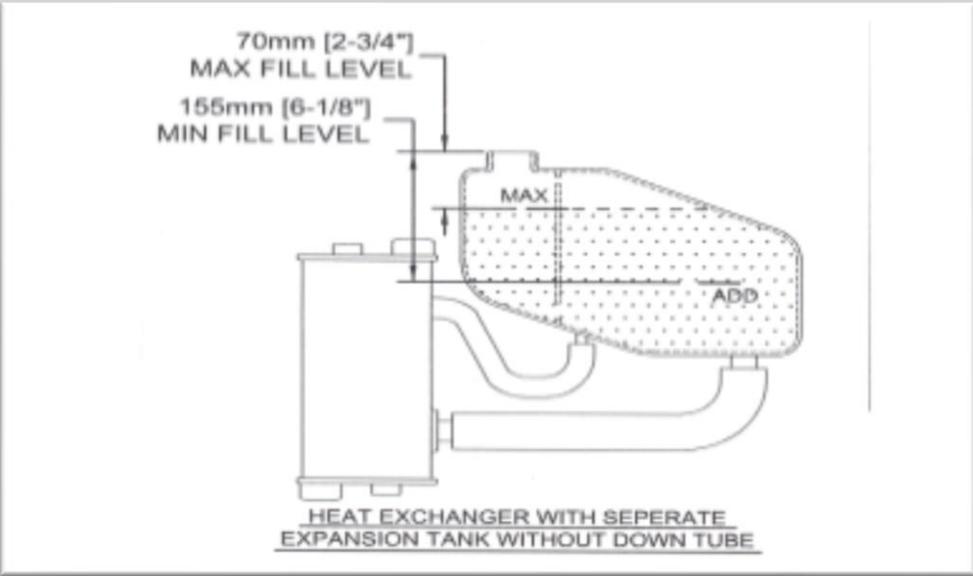
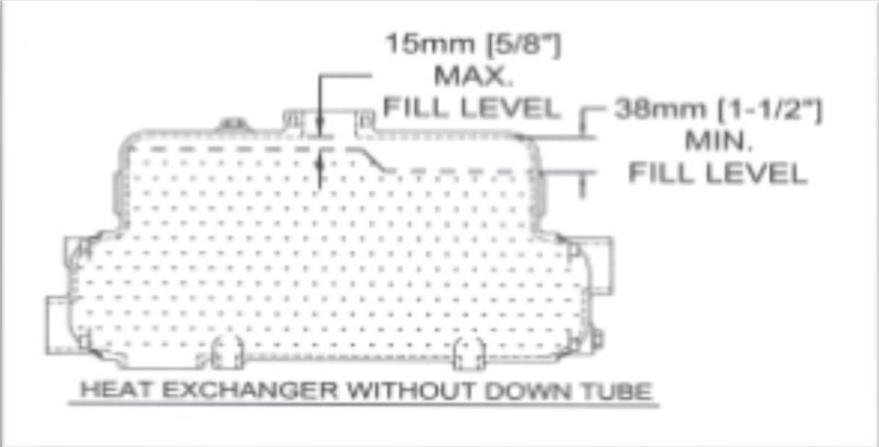
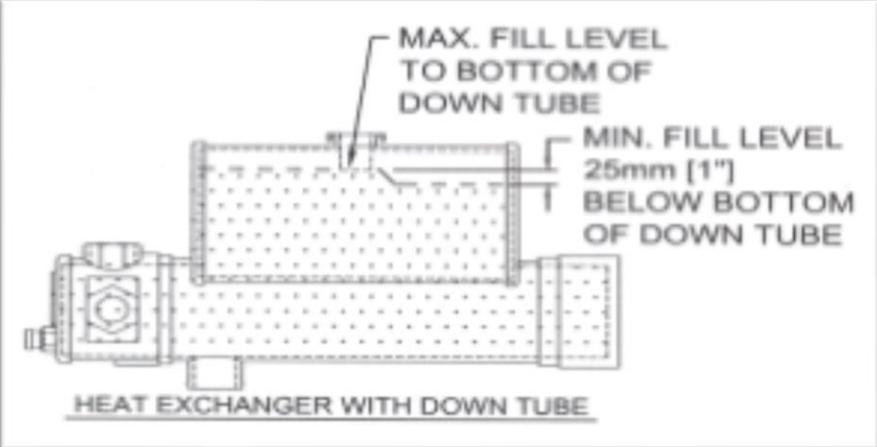
During filling of the cooling system, air pockets may form. The system must be purged of air prior to being put in service.

Caution: Do not overfill cooling system. A pressurized system needs space for heat expansion without overflowing.



WEEKLY MAINTENANCE

Check the Coolant Level.



WEEKLY MAINTENANCE

Check the Fuel Tank for leaks and minimum two-thirds full.

Inspect the outside of the container for signs of deterioration or leaks. This visual inspection is intended to be a routine walk-around and includes the tank's piped connections, supports and foundations.



WEEKLY MAINTENANCE

Check the governor run-stop solenoid.

On mechanical engines make sure the speed adjustment jam nuts are tight and the Manual Stop is in the Automatic Run position, if equipped.



WEEKLY MAINTENANCE

Check the Jacket Water Heater.

The heater should be warm to the touch.

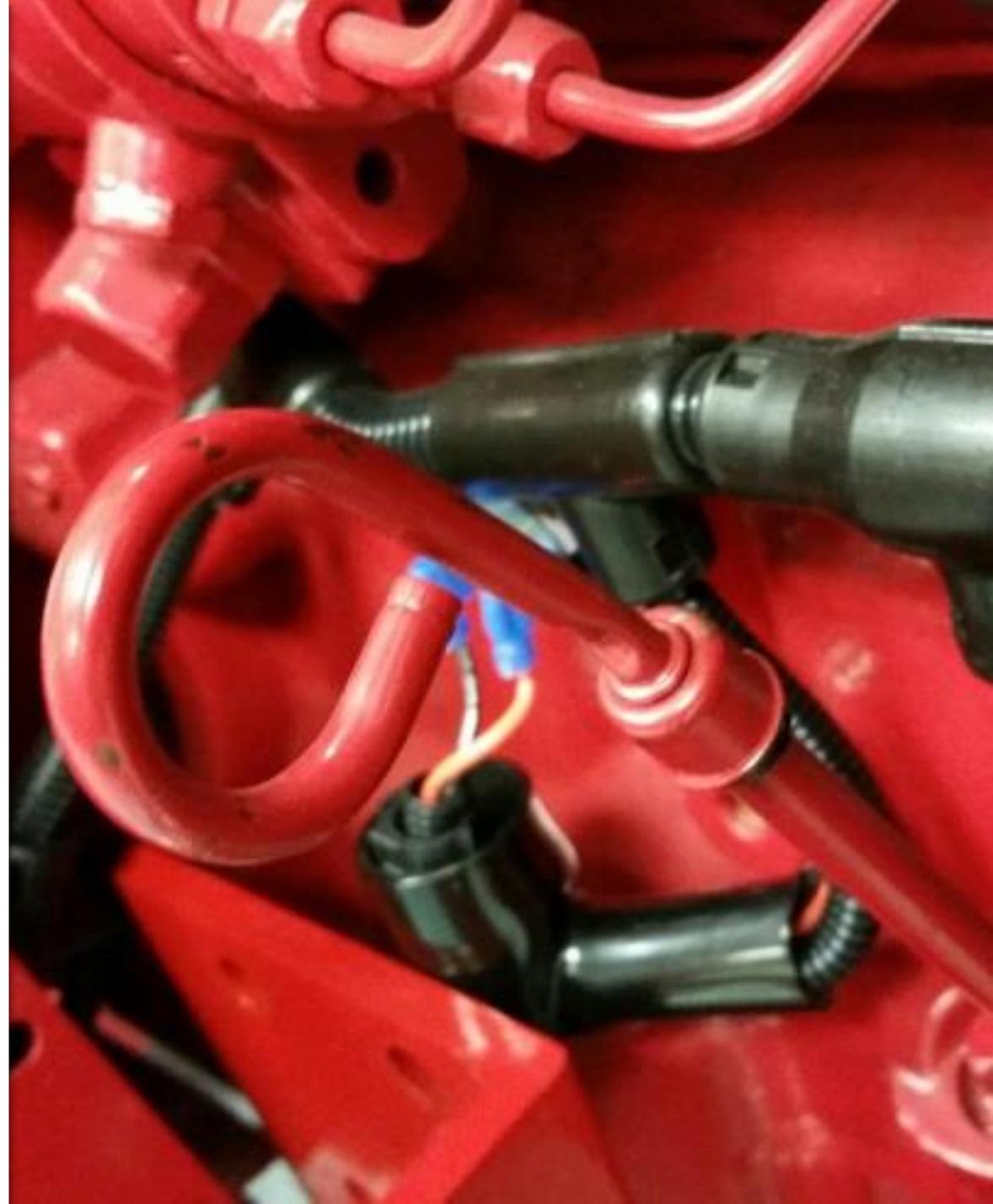
Confirm there is no discoloration to the outside of the heater assembly.



WEEKLY MAINTENANCE

Check the Lubrication Oil Level.

The level must always be between the dipstick marks Min. and Max. with the engine not running.



WEEKLY MAINTENANCE

Remove water from the fuel filter by opening the valve under the filter and let water and sediment flow until fuel comes out.

MAINTENANCE SCHEDULE



WEEKLY MAINTENANCE

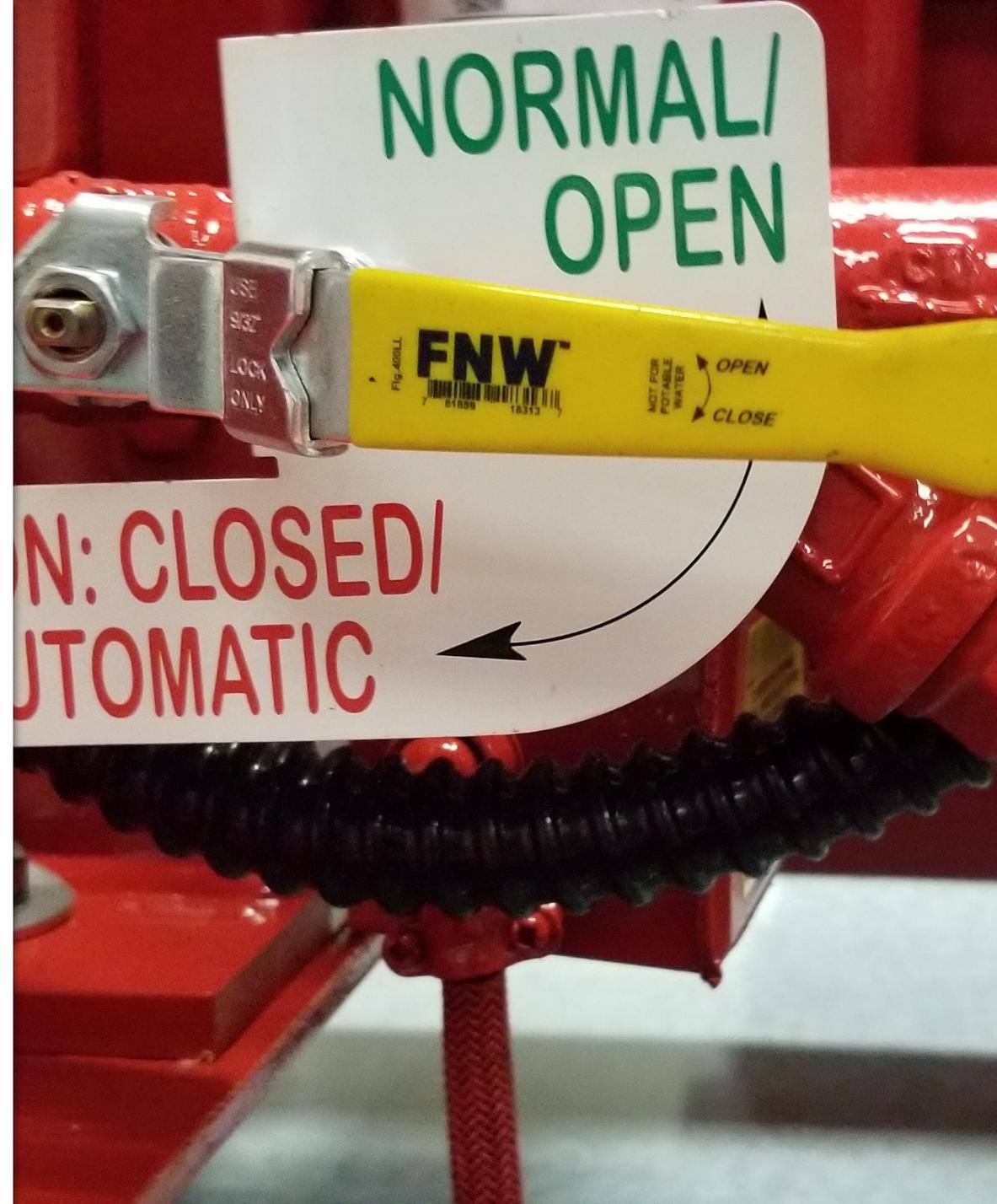
Check the Not In Auto Warning Light.

Ensure the warning bulb is functional by changing the mode selector switch to the manual mode position.



WEEKLY MAINTENANCE

Check the **Manual Valves** on the cooling loop. The bypass line manual valves should be normally closed, and the automatic line manual valves should be normally open.



WEEKLY MAINTENANCE

Check and Clean the Y-strainer screens.

With the engine off, close the manual valves to restrict flow to the cooling loop. Remove the endcaps on the y-strainer assembly and pull the screens. Clean the screens and ensure there is no containments or restrictions inside the y-strainer. Replace the screens, install the endcaps and return the manual valves to the normal position.



WEEKLY MAINTENANCE

Run the engine for no more than 30 minutes per week.

Starting Method: From the Fire Pump Controller using test feature or actual pressure drop.



WEEKLY MAINTENANCE

Run the engine

The engine is designed to operate at rated load conditions. For testing purposes, the engine can run at lower load (lower flow) conditions. Running times in any one period should not exceed **30 minutes maximum**.



WEEKLY MAINTENANCE

Before starting the engine make sure of the following:

- The operator has free access to the stop the engine in an emergency.
- The ventilation ducts are open, and the engine has good access for air
- All guards are in position
- Battery covers are in place and nothing on top of or touching the engine.
- The raw water supply for cooling is available without restriction.



WEEKLY MAINTENANCE

Run the engine

When the engine is running make sure that the coolant temperature, oil pressure and raw water flow are within limits specified on the relevant Installation & Operation Data Sheet.

Basic Engine Description

Engine Manufacturer	John Deere Co.
Ignition Type	Compression (Diesel)
Number of Cylinders	6
Bore and Stroke - in (mm)	4.19 (106) X 5 (127)
Displacement - in ³ (L)	415 (6.8)
Compression Ratio	17:0.1
Valves per cylinder	1
Intake	1
Exhaust	1
Combustion System	Direct Injection
Engine Type	In-Line, 4 Stroke Cycle
Fuel Management Control	Electronic, High Pressure Common Rail
Firing Order (CW Rotation)	1-5-3-6-2-4
Aspiration	Turbocharged
Charge Air Cooling Type	Raw Water
Rotation, viewed from front of engine, Clockwise (CW)	Standard
Engine Crankcase Vent System	Open
Installation Drawing	D628
Weight - lb (kg)	1747 (792)

Power Rating

Nameplate Power - HP (kW) *	1760	2100	2350	2400
	220 (164)	209 (156)	211 (157)	211 (157)

Cooling System

Engine Coolant Heat - Btu/sec (kW)	1760	2100	2350	2400
Engine Radiated Heat - Btu/sec (kW)	163 (172)	135 (142)	129 (136)	129 (136)
Heat Exchanger Minimum Flow - [C051386]	16 (16.9)	15.5 (16.4)	15.6 (16.5)	15.6 (16.5)
60°F (15°C) Raw H ₂ O - gal/min (L/min)	15 (56.8)	22 (83.3)	21 (79.5)	21 (79.5)
100°F (37°C) Raw H ₂ O - gal/min (L/min)	22 (83.3)	34 (129)	34 (129)	34 (129)
Heat Exchanger Maximum Cooling Raw Water - [C051386]				
Inlet Pressure - psi (bar)	60 (4.1)			
Flow - gal/min (L/min)	40 (151)			
Typical Engine H ₂ O Operating Temp - °F (°C)	180 (82.2) - 195 (90.6)			
Thermostat				
Start to Open - °F (°C)	180 (82.2)			
Fully Opened - °F (°C)	203 (95)			
Engine Coolant Capacity - qt (L)	21.6 (20.4)			
Coolant Pressure Cap - lb/in ² (kPa)	15 (103)			
Maximum Engine Coolant Temperature - °F (°C)	230 (110)			
Minimum Engine Coolant Temperature - °F (°C)	160 (71.1)			
High Coolant Temp Alarm Switch - °F (°C)	235 (113) - 241 (116)			

Electric System - DC

System Voltage (Nominal)	Standard	Optional
Battery Capacity for Ambients Above 32°F (0°C)	12	24
Voltage (Nominal)	12	12
Qty. Per Battery Bank	1	2
SAE size per J537	8D	8D
CCA @ 0°F (-18°C) per J537	1200	1200
Reserve Capacity - Minutes per J537	430	430
Battery Cable Circuit, Max Resistance - ohm	0.0012	0.0012
Battery Cable Minimum Size		
0-120 in. Circuit Length *	00	00
121-160 in. Circuit Length *	000	000
161-200 in. Circuit Length *	0000	0000
Charging Alternator Maximum Output - Amps	40	55
Starter Cranking Amps, Rolling - @60°F (15°C)	440	250

H-UFADPO
OPERATION DATA (I&O)

	1760	2100	2350	2400
991 (28.1)	1511 (42.8)	1540 (43.6)	1540 (43.6)	1540 (43.6)
223 (384)	848 (453)	873 (467)	873 (467)	873 (467)
30 (7.5)	30 (7.5)	30 (7.5)	30 (7.5)	30 (7.5)
16 (4)	16 (4)	16 (4)	16 (4)	16 (4)
6 (152)	6 (152)	6 (152)	6 (152)	6 (152)
	1760	2100	2350	2400
	11.1 (42)	10.3 (39)	10.7 (40.5)	10.7 (40.5)
	24.9 (94.2)	25 (94.6)	25.1 (95)	25.1 (95)
	36.0 (136)	35.3 (134)	35.8 (136)	35.8 (136)
	3 (20.7) - 6 (41.4)			
	50 Schedule 40 Steel Pipe			
	0.848 (21.5)			
	375 Schedule 40 Steel Pipe			
	0.675 (17.1)			
	80 (2)			
	6.4 (2)			
	2 (Secondary)			
	Standard	Optional		
	1360	1360		
	115 (+5% -10%)	230 (+5% -10%)		
	(C123640)	(C123644)		
	1760	2100	2350	2400
	450 (12.7)	520 (14.7)	540 (15.3)	540 (15.3)
	Standard	Optional		
	(C03244)	(C03327)		
	Indoor Service Only,	Canister,		
	with Shield	Single-Stage		
	Washable	Disposable		
	14 (3.5)	14 (3.5)		
	7 (1.7)	5 (1.2)		
	130 (54.4)			

Lubrication System

Oil Pressure - normal - lb/in ² (kPa)	40 (276) - 60 (414)
Low Oil Pressure Alarm Switch - lb/in ² (kPa) to	30 (207) - 35 (241)
In Pan Oil Temperature - °F (°C)	220 (104) - 245 (118)
Total Oil Capacity with Filter - qt (L)	31.7 (30)

Lube Oil Heater

Wattage (Nominal)	Optional	Optional
Voltage	150	150
Part Number	120V (+5%, -10%)	240V (+5%, -10%)
	(C04430)	(C04431)

Performance

	1760	2100	2350	2400
BMEP - lb/in ² (kPa)	239 (1650)	190 (1310)	171 (1180)	168 (1160)
Piston Speed - ft/min (m/min)	1467 (447)	1750 (533)	1958 (597)	2000 (610)
Mechanical Noise - dB(A) @ 1m	C133071	RefSource: Noise Data on Engine Page at www.clarke-fire.com		
Power Curve	C132962	RefSource: Power Curve on Engine Page at www.clarke-fire.com		

NOTE: This engine is intended for indoor installation or in a weatherproof enclosure. * Derate 3% per every 1000 ft. 304.8m above 300 ft. 91.4m and derate 1% for every 10'P 3.05 m above 37'P 25°C. † Positive and Negative Cables Combined Length. ‡ Minimum Exhaust Pipe Diameter is based on: 15 feet of pipe, one 90° elbow, and one Industrial silencer. A back-pressure flow analysis must be performed on the actual field installed exhaust system to assure engine maximum allowable back pressure is not exceeded. See Exhaust Sizing Calculator on www.clarkefire.com. () indicates component reference part number.

WEEKLY MAINTENANCE

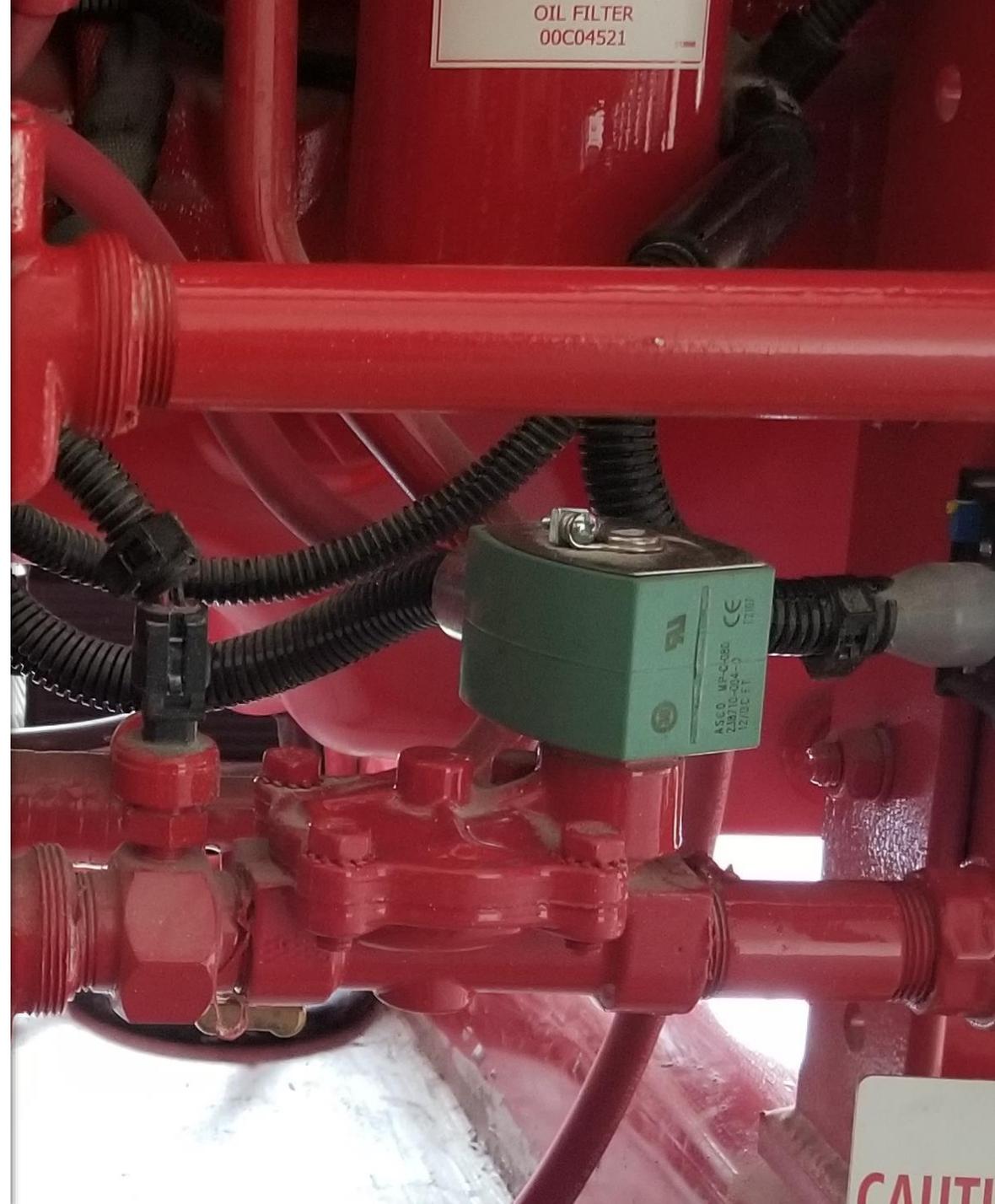
Check the Operating Gauges on the engine instrument panel.



WEEKLY MAINTENANCE

Check the Cooling Loop Raw Water Solenoid for operation while the engine is running.

The Solenoid is closed when de-energized. A start signal from the pump controller or changing the engine instrument panel mode selector to manual mode will energize the solenoid, allowing raw water to flow to the heat exchanger.



WEEKLY MAINTENANCE

Check the Heat Exchanger Discharge for free flow of water.

Raw water flow is crucial for cooling the engine. The engine's heat exchanger transfers heat from the engine coolant to the raw water.



WEEKLY MAINTENANCE

Check the Exhaust System for leaks, proper support and operational rain cap.

Unsupported exhaust systems will vibrate excessively and lead to broken pipe connections or welds.

Exhaust rain-protection is crucial to preventing water from entering the engine.



WEEKLY MAINTENANCE

General Inspection for excessive noise, adequate ventilation, missing items, fluid leaks or anything broken.



6 MONTH MAINTENANCE

6 MONTH Maintenance Items are routine tasks to be completed twice a year in addition to the **Weekly Maintenance** items.

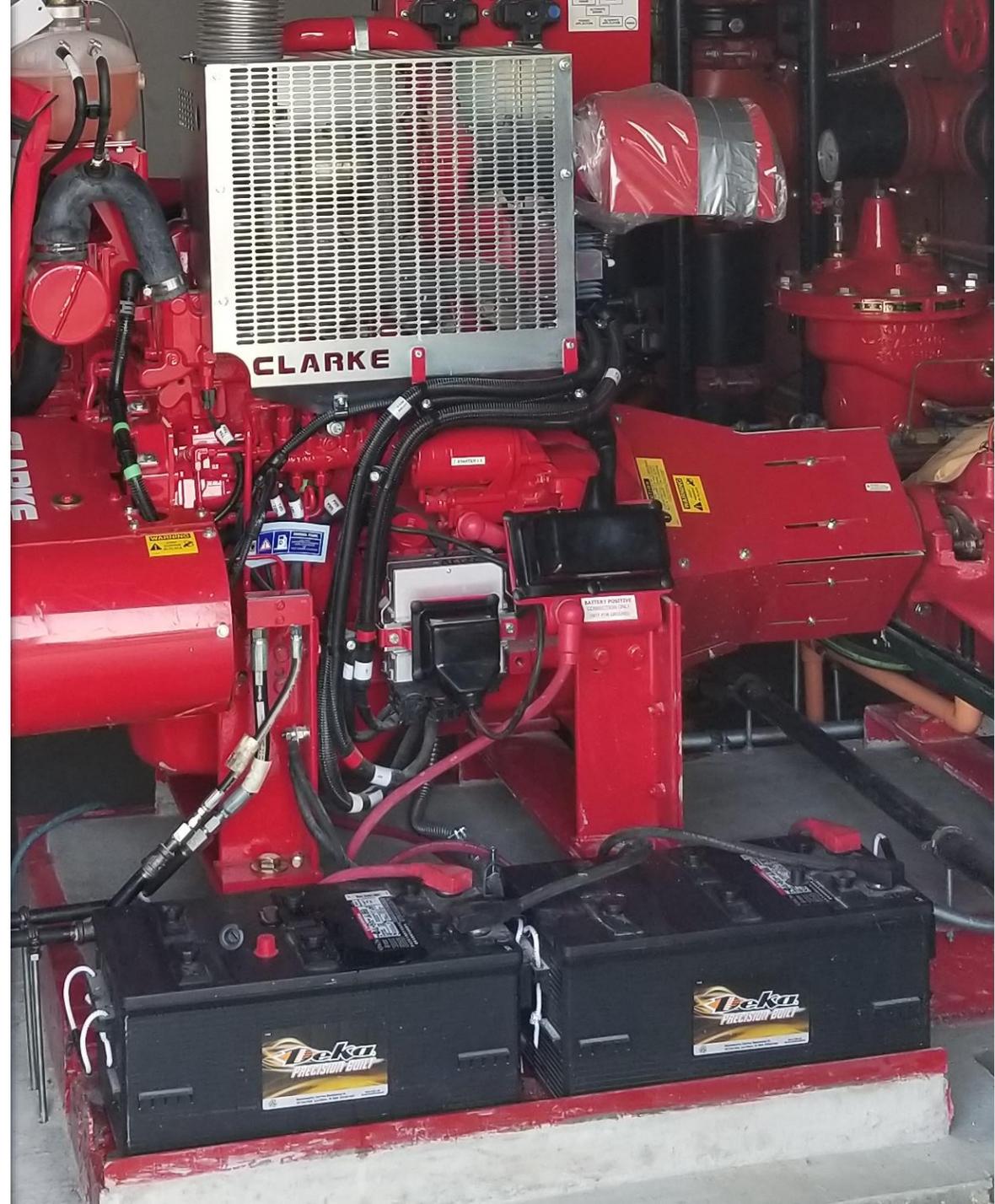


6 MONTH MAINTENANCE

Clean the Battery posts and cable connectors.

Use baking soda and water or battery cleaner to clean the terminals and battery surfaces.

Use terminal spray or Vaseline on the terminals to minimize corrosion.



6 MONTH MAINTENANCE

Check the Battery Charging Alternator for proper operation.

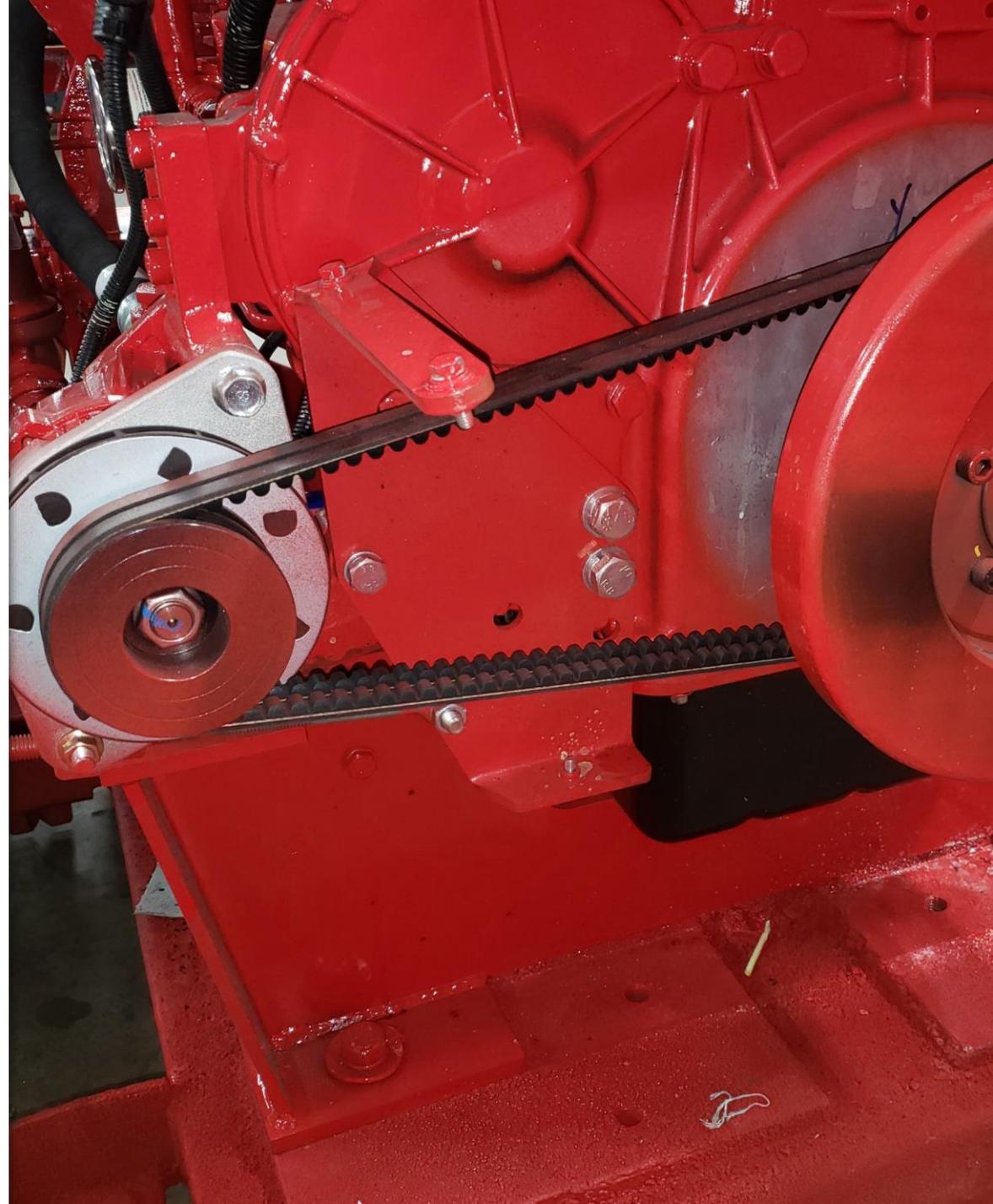
- Disable the pump controller battery chargers.
- Read the battery voltage with the engine off. (ex: 12 vdc or 24 vdc)
- Read the battery voltage with the engine running. (ex: 14-15 vdc or 27-29 vdc)
- Compare the readings to determine if the alternator is charging.
- Enable the battery chargers.



6 MONTH MAINTENANCE

Check the Belt for proper tension, alignment, signs of fraying or cracks.

All belts must be adequately tightened so that both the engine water pump and battery charging alternator are operating efficiently.



6 MONTH MAINTENANCE

Check and Clean the Y-strainer screens.

- With the engine off, close the manual valves to restrict flow to the cooling loop.
- Remove the endcaps on the y-strainer assembly and pull the screens.
- Clean the screens and ensure there is no containments or restrictions inside the y-strainer.
- Install the screens, install the endcaps and return the manual valves to the normal position.



6 MONTH MAINTENANCE

Check the Driveshaft U-joints or Coupling.
Visual inspection to ensure they are not loose and check the set screws.

Disable the pump controller battery charger and disconnect negative battery cable before removing the driveshaft guard and inspecting the driveshaft.



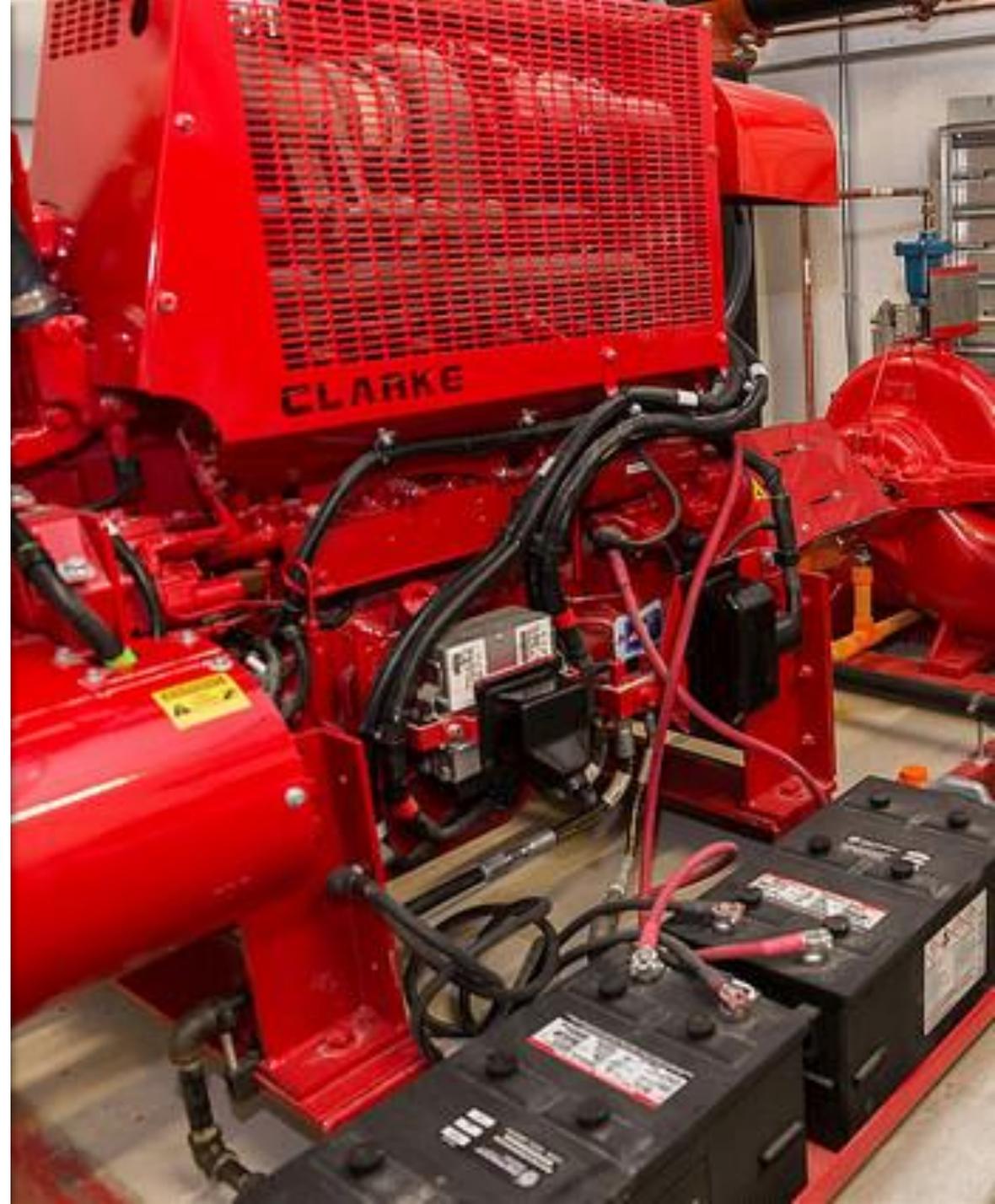
6 MONTH MAINTENANCE

Check the Fuel Lines for leaks, breaks, bends or inconsistencies.



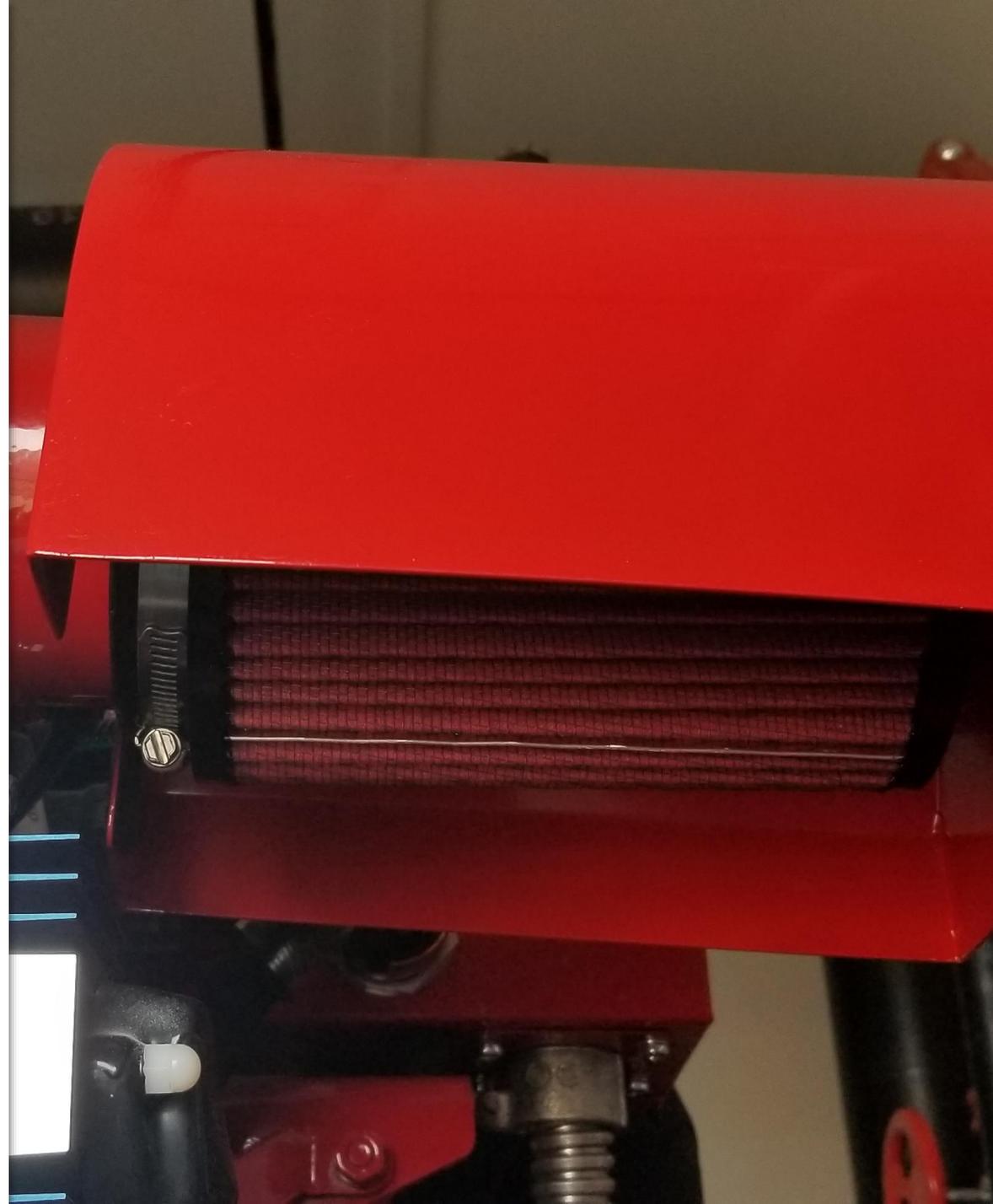
1 YEAR MAINTENANCE

1 YEAR Maintenance Items are routine tasks to be completed once a year in addition to the **Weekly** and **6 Month Maintenance** items.



1 YEAR MAINTENANCE

Clean or Replace the Air Filter.



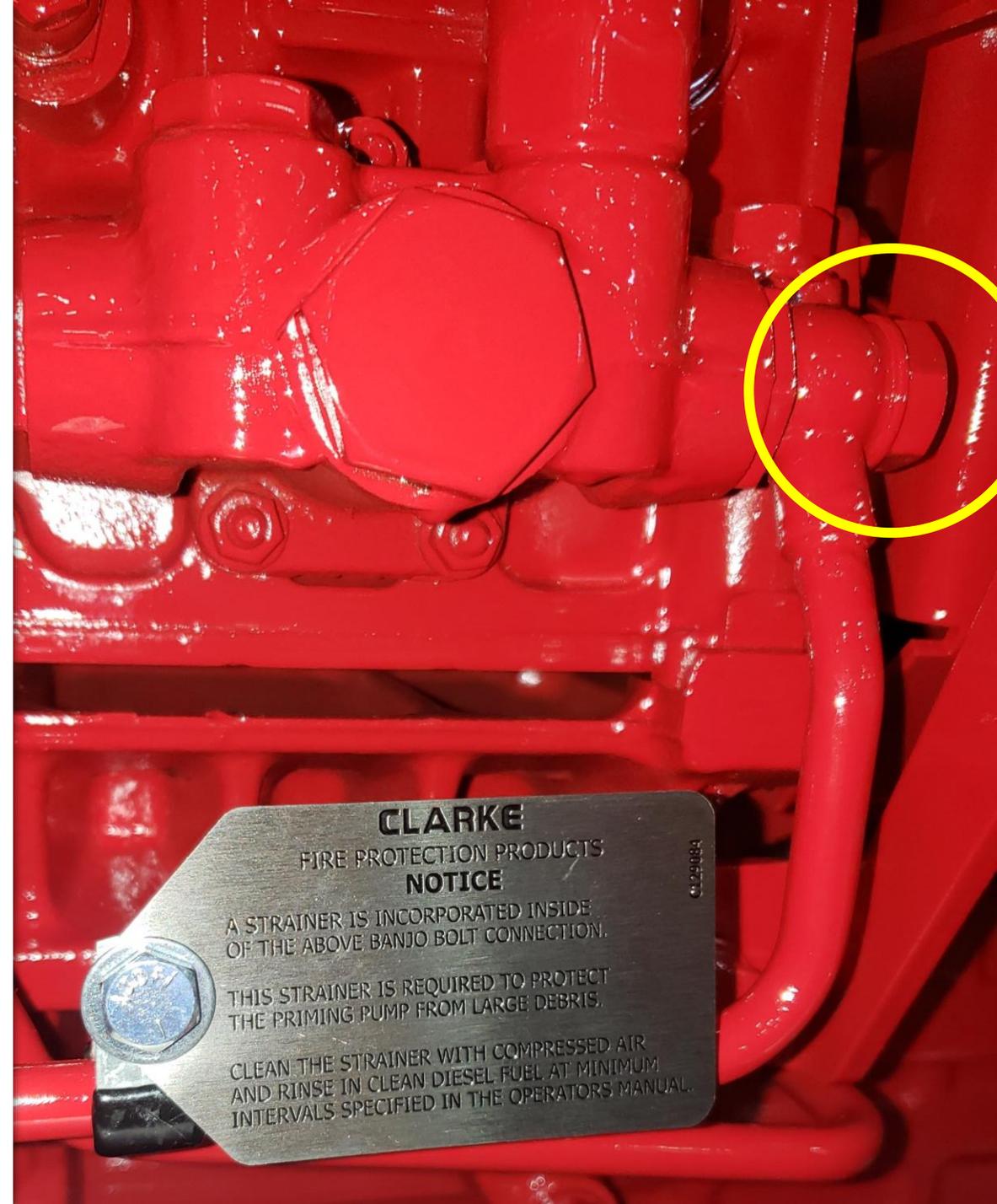
1 YEAR MAINTENANCE

Clean the Fuel Lift Pump Strainer.

DP and DQ engine models only.

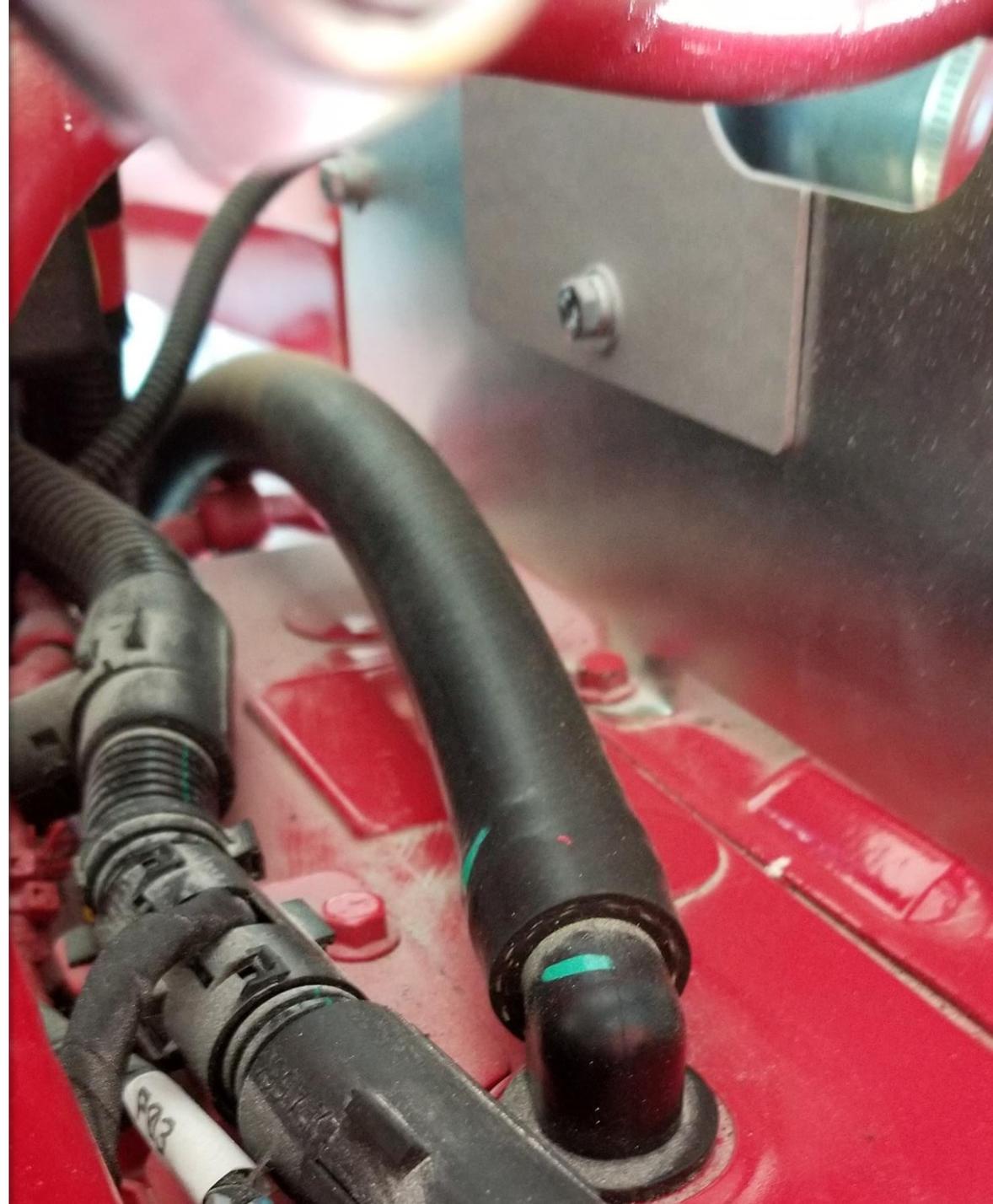


MAINTENANCE SCHEDULE



1 YEAR MAINTENANCE

Check the **Crank Case Vent System** to make sure it is open and not kinked.



1 YEAR MAINTENANCE

Lubricate the Driveshaft U-Joints and check alignment according to the operation manual instructions.

Use a handheld grease gun with NLGI grade 1 or 2 grease. Pump the driveshaft grease fittings until grease is visible at all four cap seals.



1 YEAR MAINTENANCE

Replace the Fuel and Oil Filters with OEM or Clarke branded filters.



1 YEAR MAINTENANCE

Check the Heat Exchanger Electrode. If the length is less than one inch, replace the electrode.

The heat exchanger plug, known as the Zinc Electrode or heat exchanger anode, is a 3/8" NPT zinc electrode element. The Zinc Electrode is a sacrificial element to help protect the cooling system from galvanic corrosion which eats away metal.



1 YEAR MAINTENANCE

Test the Fuel for degradation.

Testing shall comply with ASTM D975 and D6751.

If diesel fuel is found to be deficient the fuel shall be reconditioned or replaced.



1 YEAR MAINTENANCE

Replace the Lubricating Oil. Refer to the Operations Manual for oil weight and capacity.



1 YEAR MAINTENANCE

Replace the Coolant.

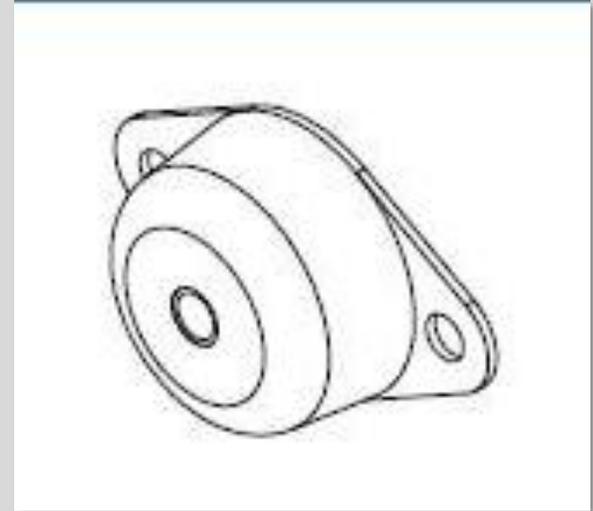
The coolant is a water and ethylene glycol, 50-50%.

Use Clarke part number 0C054129 Clarke Coolant. The only acceptable replacement is COOL-GARD II, part number TY26575.



1 YEAR MAINTENANCE

Check the Mounting Isolators and foundation nuts. (If applicable.)



1 YEAR MAINTENANCE

Check the Wiring System connections,
tighten if necessary.



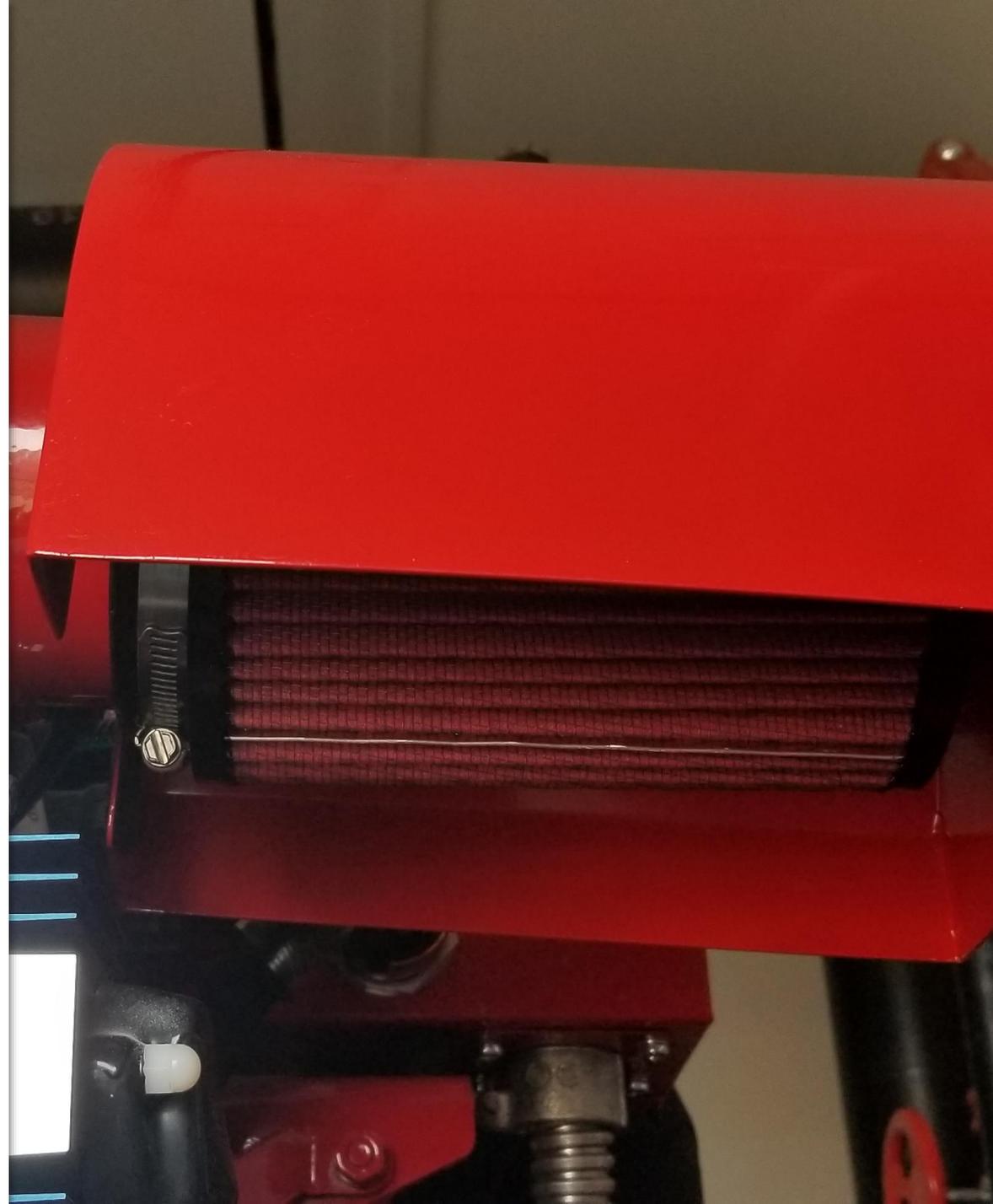
2 YEAR MAINTENANCE

2 YEAR Maintenance Items are routine tasks to be completed once every two years in addition to the **Weekly, 6 Month** and **1 Year Maintenance** items.



2 YEAR MAINTENANCE

Replace the Air Filter.



2 YEAR MAINTENANCE

Replace the Batteries.

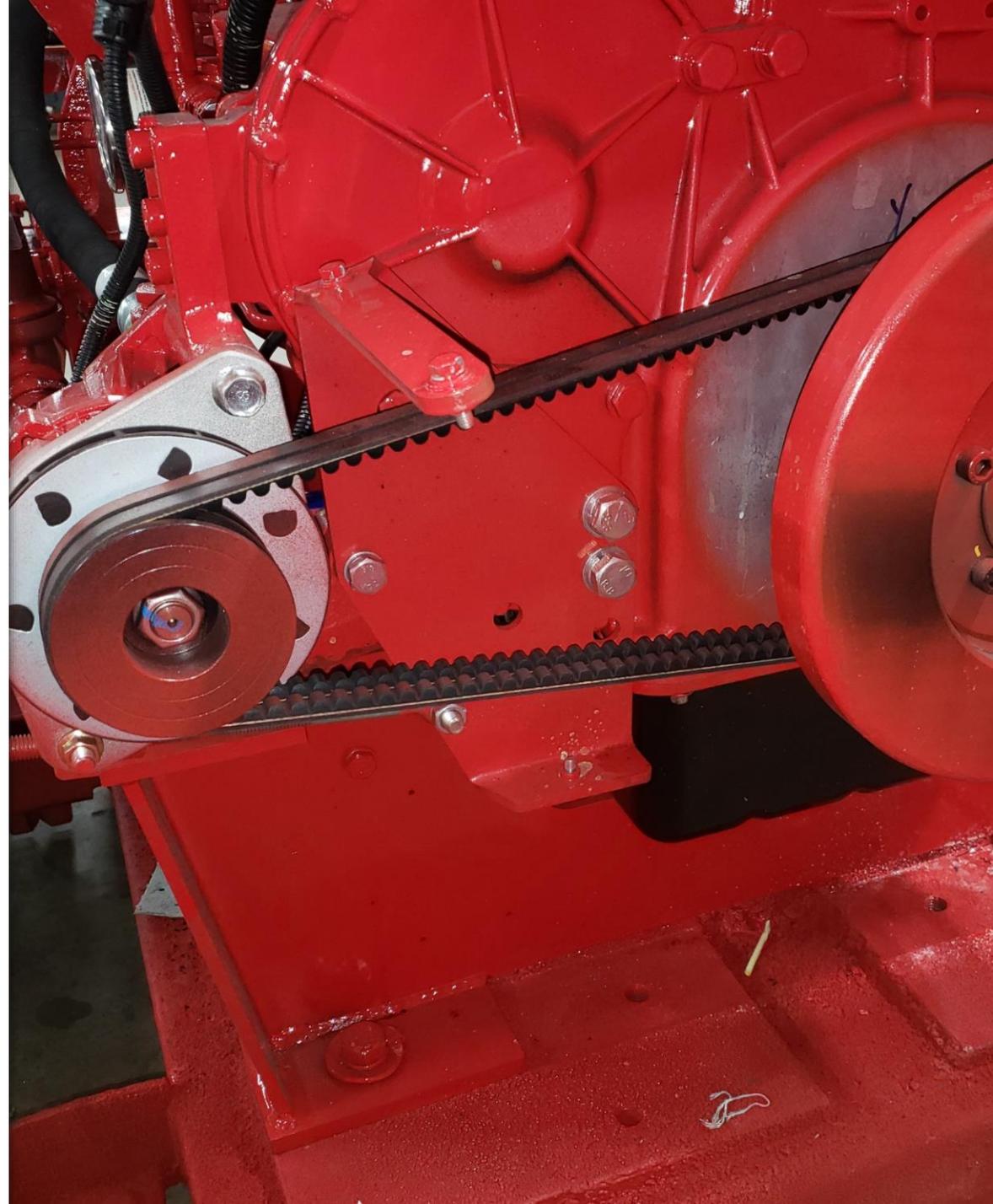
Batteries are under a constant charge and only exercised once a week. Replace all batteries at the same time. An older battery will drain power from a new battery, reducing the total amount of battery power available.

Refer to the Installation and Operations data for battery sizing requirements.



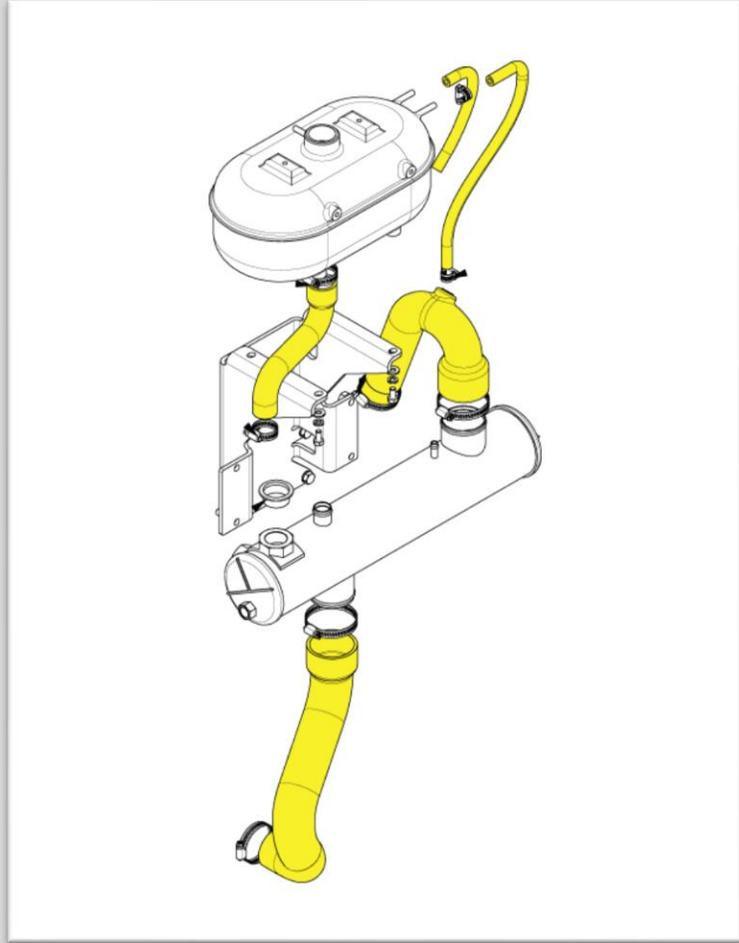
2 YEAR MAINTENANCE

Replace the Belt.

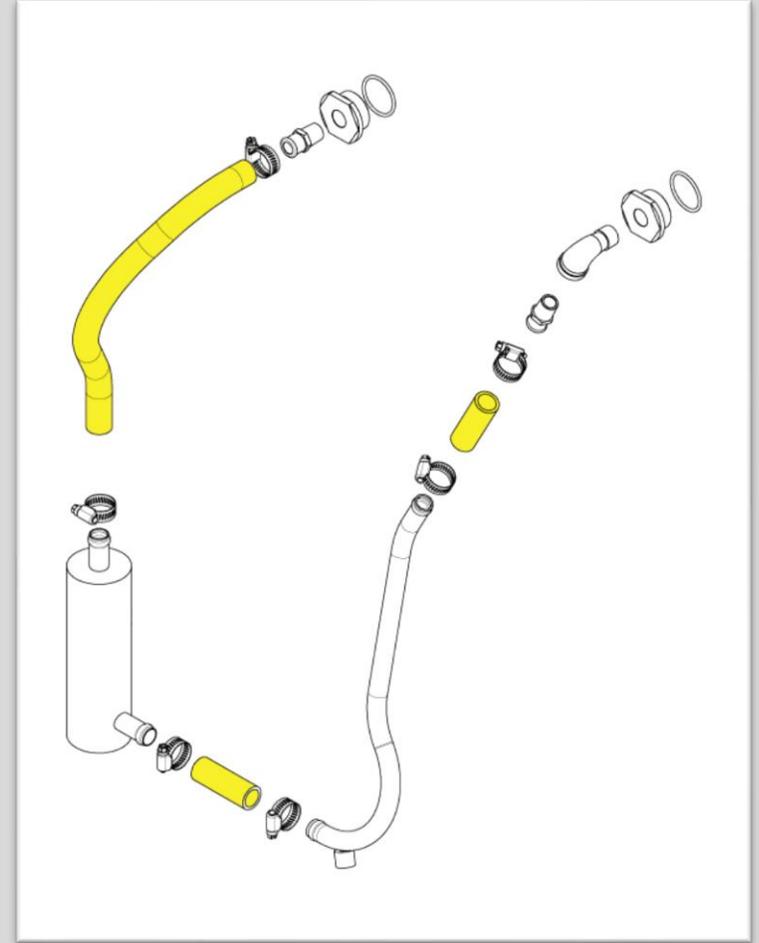


2 YEAR MAINTENANCE

Replace the coolant hoses.



Heat
Exchanger

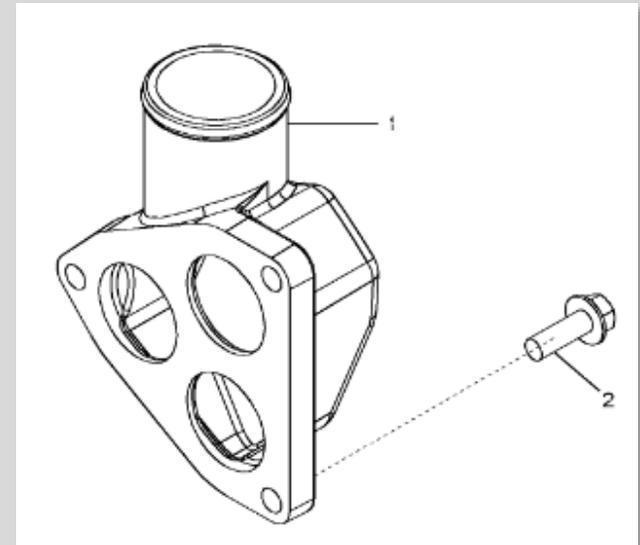
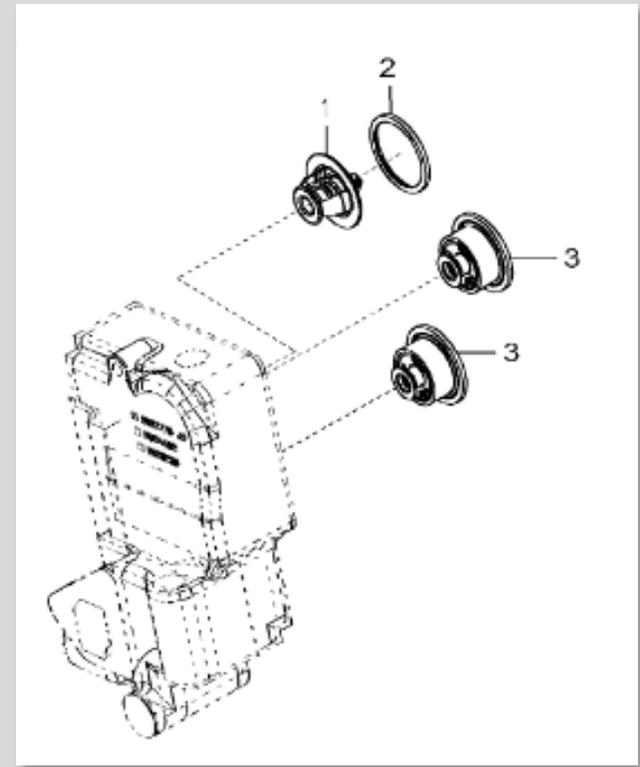


Jacket-Water
Heater

2 YEAR MAINTENANCE

Replace the engine Thermostats.

Thermostat Kits can be purchased from Clarke Fire Protection Products that include all required thermostats, gaskets and seals.



2 YEAR MAINTENANCE

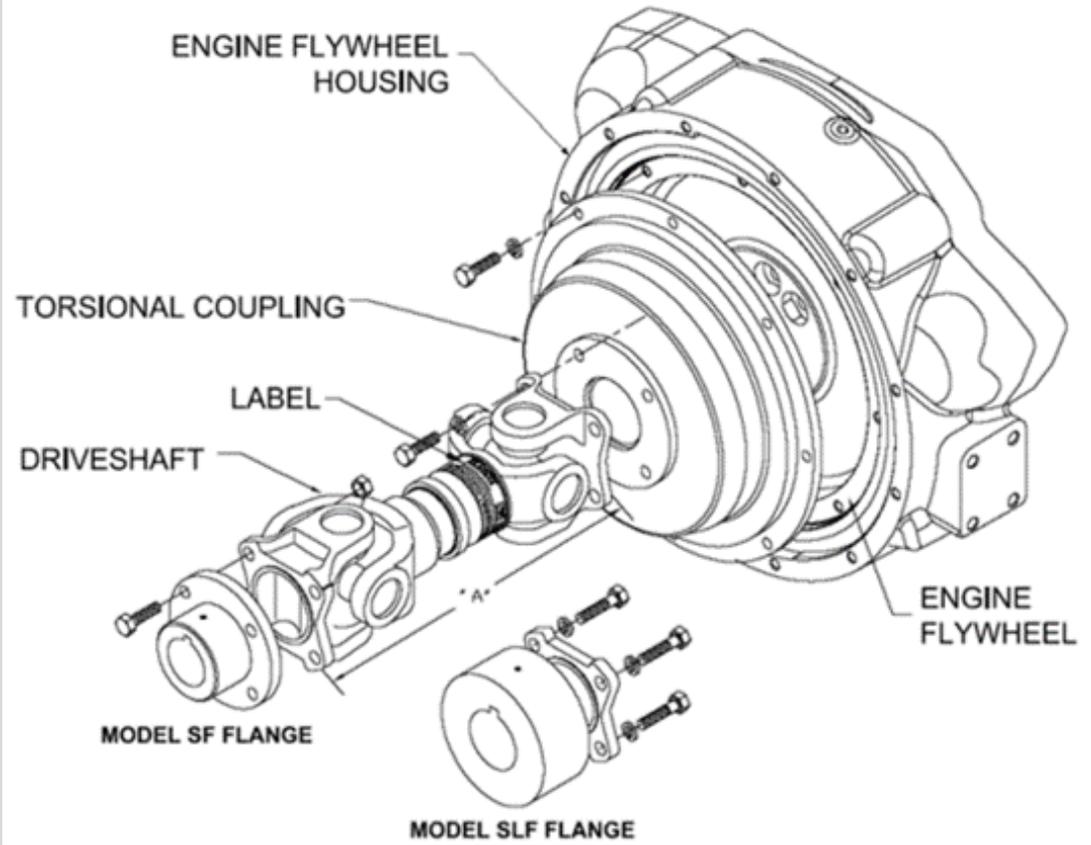
Check the Water Pump Impeller and Seal.

On **JU4** and **JU6** engine models remove the water pump to inspect the impeller and seal. Any over-heating occurrence or use of incorrect type of coolant can cause cavitation to the water pump impeller. A total loss of the impeller would prevent the engine from cooling in any capacity. Routine inspection of the impeller can prevent this situation.



5 YEAR MAINTENANCE

Replace the Torsional Coupling.



PLD MAINTENANCE

Maintenance Items for –P1 PLD engines.

Inspect the throttle linkage weekly.



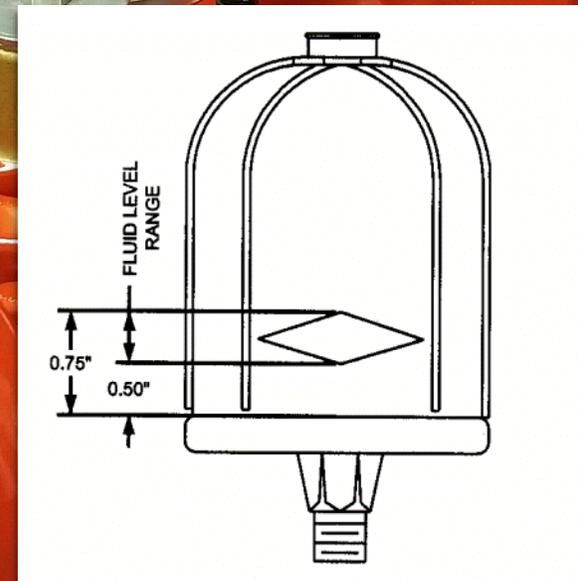
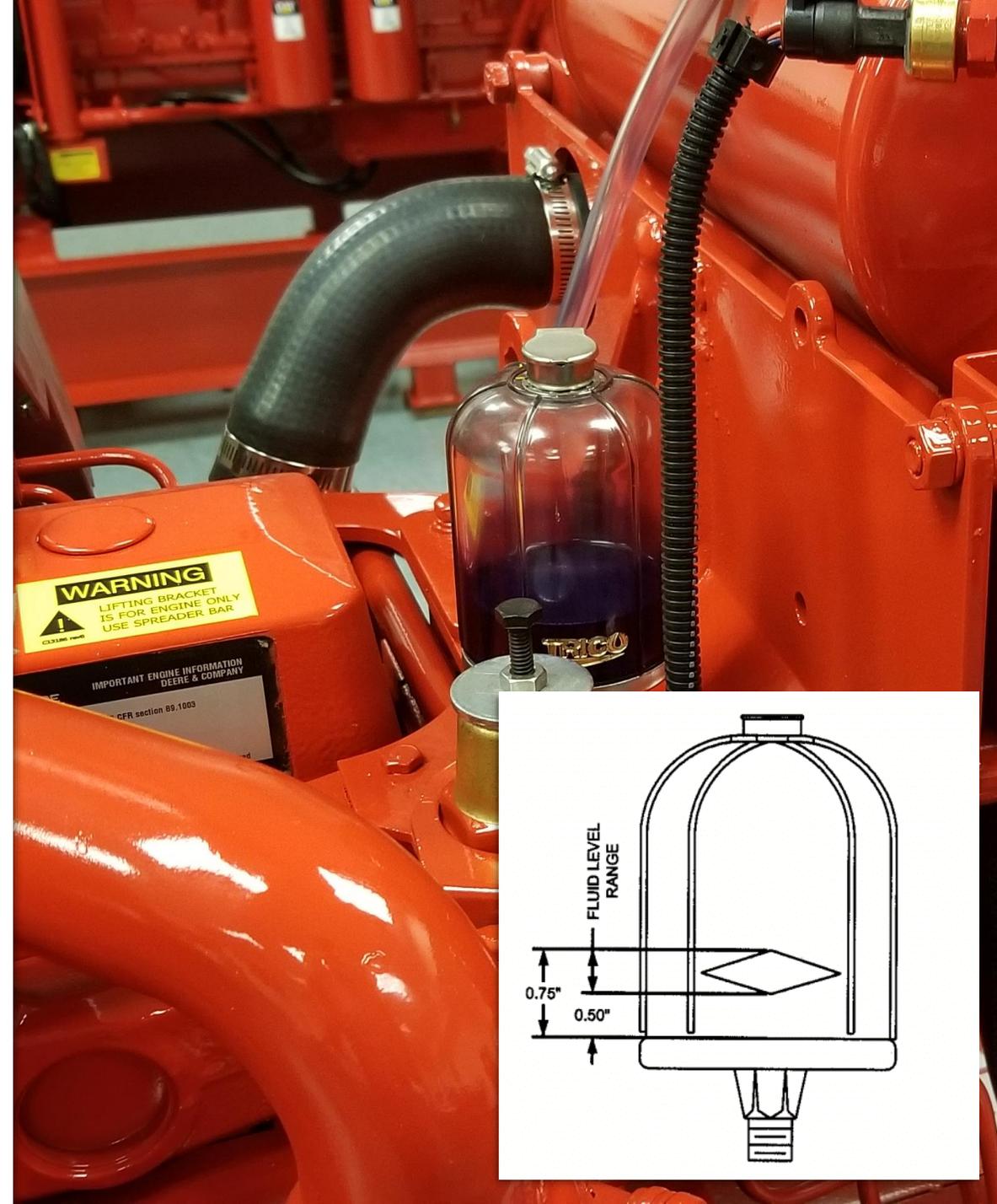
PLD MAINTENANCE

Maintenance Items for –P1 PLD engines.

Inspect the Damper Fluid weekly.

Refill damper fluid reservoir with Dot 5 Brake Fluid if the fluid level drops.

Minimum 0.50" fluid level
Maximum 0.75" fluid level



PLD MAINTENANCE

Maintenance Items for –P1 PLD engines.

Inspect the PLD strainers every 6 months.

May require more frequent inspections depending up on the quality of the sprinkler system water supply.

