Report Date: 30 Jun 2014

Summary Report for Individual Task
551-88L-2061
Maintain a Refrigeration Unit
Status: Approved

Condition: Given an operational refrigeration unit aboard a vessel, at sea, at anchor or moored alongside a pier, day or night, under all sea and weather conditions, while wearing appropriate PPE, (i.e. hearing protection, Nitrile gloves, eye protection, etc.), a lock out tag out kit, marine rail tool box, wet/dry vacuum, Refrigeration Tool Kit and refrigeration gauge manifold.

Standard: The Soldier correctly maintains a refrigeration unit aboard an Army vessel, IAW the appropriate Technical Manual and local SOPs, without injury to self or others and without damage to equipment. The refrigeration unit was fully mission capable at task completion.

Special Condition: None

Safety Risk: Medium

MOPP 4:

Task Statements

Cue: None

DANGER

None

WARNING

None

CAUTION

None

Remarks: None

Notes: None

Performance Steps

1. Conduct daily maintenance on a reach-in type Marine Refrigerator/Freezer.

    a. Check the freezer temperature gauge to ensure the interior temperature is -10°F.

    b. Check the refrigerator temperature gauge to ensure the interior temperature is 35°F.

2. Conduct weekly maintenance on a reach-in type Marine Refrigerator/Freezer.

    a. Check condenser coil.

        (1) Inspect condenser coil to make certain that air flow is not hampered and that it is clear of dust and debris, (refer to Figure 551-88L-2061_01).

        (2) If required, clean coil with wet/dry vacuum.

Figure 551-88L-2061_01
Condenser coil

    b. Check the drain line.

        (1) Inspect and check that drain line is not clogged.

        (2) Check drain pan to insure that drain is clear of debris, or obstructions and is free draining.

3. Conduct monthly maintenance on a reach-in type Marine Refrigerator/Freezer, (refer to Figure 551-88L-2061_02).

    a. Check interior liner.

        (1) Check that interior liner is clean and dry.

        (2) If required, clean with baking soda and water.

    b. Check condenser and evaporator fan motors.

(1) Check both the condenser fan motor and the evaporator fan motor to make certain that they are operational.

(2) Check to make certain that the fans are tight and secure.

c. Check doors.

(1) Check that door gaskets are clean and serviceable, visually check for:

(a) Tears.

(b) Loose mounting.

(c) Wear.

(d) Aging.

(2) Check latch and strike assembly for cracks, breaks, excessive wear and loose or missing hardware.

(3) Check hinges for cracks, breaks, excessive wear and loose or missing hardware.

(4) Lubricate latch and hinges with low viscosity SAE oil.

(5) Check door trim (sill, head and door jambs) for cracks, warps, deterioration or damage.

d. Check exterior surfaces.

(1) Check that exterior surfaces are clean and dry.

(2) If required, clean with an approved stainless steel cleaner.

Figure 551-88L-2061_02
Reach-in refer/freezer

4. Conduct semi-annual maintenance on a reach-in type Marine Refrigerator/Freezer.

a. Check the operation of all fans and ensure airflow is unobstructed, (refer to Figure 551-88L-2061_03).

(1) Check that each fan rotates freely and quietly. Replace any fan motor that does not rotate smoothly or makes an unusual noise.

(2) Check all fan set screws and tighten if needed.

(3) Check all fan blades for signs of stress or wear. Replace any blades that are worn, cracked or bent.

(4) Verify that all fan motors are securely fastened to the motor rail.

(5) Lubricate motors if applicable.

Figure 551-88L-2061_03
Evaporator

b. Inspect electrical wiring and components.

(1) Visually inspect all wiring for wear, kinks, bare areas and discoloration. Replace any wiring found to be damaged.

(2) Verify that all electrical and ground connections are secure, tighten if necessary.

CAUTION

Do NOT use ammonia or other cleaning chemicals that are corrosive to copper or aluminum.

c. Clean evaporator coils.

(1) Periodic cleaning can be accomplished by using a brush, pressurized water or a commercially available evaporator coil cleaner or mild detergent. Never use an acid based cleaner. Follow label directions for appropriate use. Be sure the product you use is approved for use in your particular application.

(2) Flush and rinse coil until no residue remains.

(3) Pay close attention to drain pan, drain line and trap.

WARNING

Work carefully around the unit when the unit is running. Parts that are hot or moving can cause personal injury

5. Conduct daily maintenance on a walk-in type Marine Refrigerator/Freezer.

a. Check the operation of the refrigeration plant.

(1) Observe and record refrigerant and water pressures.

(2) Check the plant for water or oil leaks. Oil leak could indicate that there is a refrigerant leak. If Class III leakage is observed, report to supervisor or unit maintenance.

(3) Check and record the pressure drop across the condenser. An increase in pressure drop indicates that the condenser is clogged.

(4) Check the refrigeration gas detection system (Yellow Jacket) for any warning lights/alarms.

(5) Check compressor sight glass (if equipped) for proper oil level.

b. Check moisture indicator/sight glass.

(1) Check condition of moisture indicator/sight glass in the liquid line sight glass if so equipped, (refer to Figure 551-88L-2061_04).

(a) Replace liquid line drier if there is indication of slight presence of moisture.

(b) Replace refrigerant, oil and drier if moisture concentration is indicated to be high.

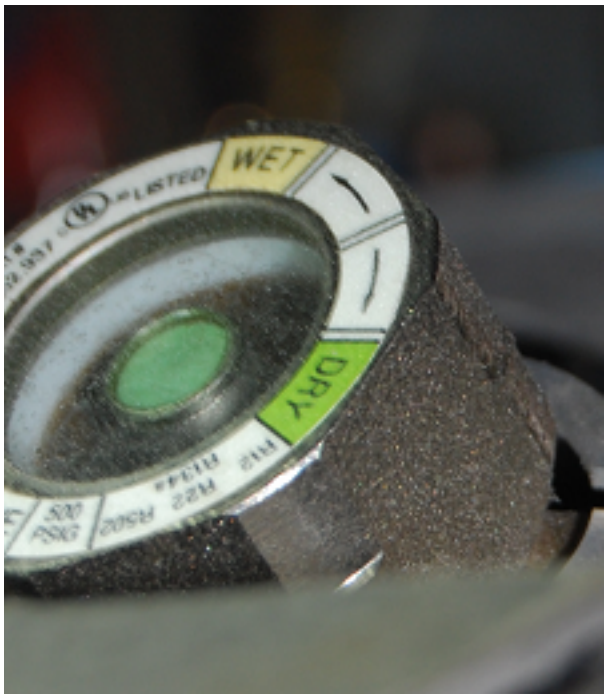

Figure 551-88L-2061_04
Moisture indicator

(2) Check moisture indicator/sight glass for bubbles, (refer to Figure 551-88L-2061_05).

(a) If found check entire system for refrigerant leaks.

(b) Add refrigerant as needed after repairing any leaks.

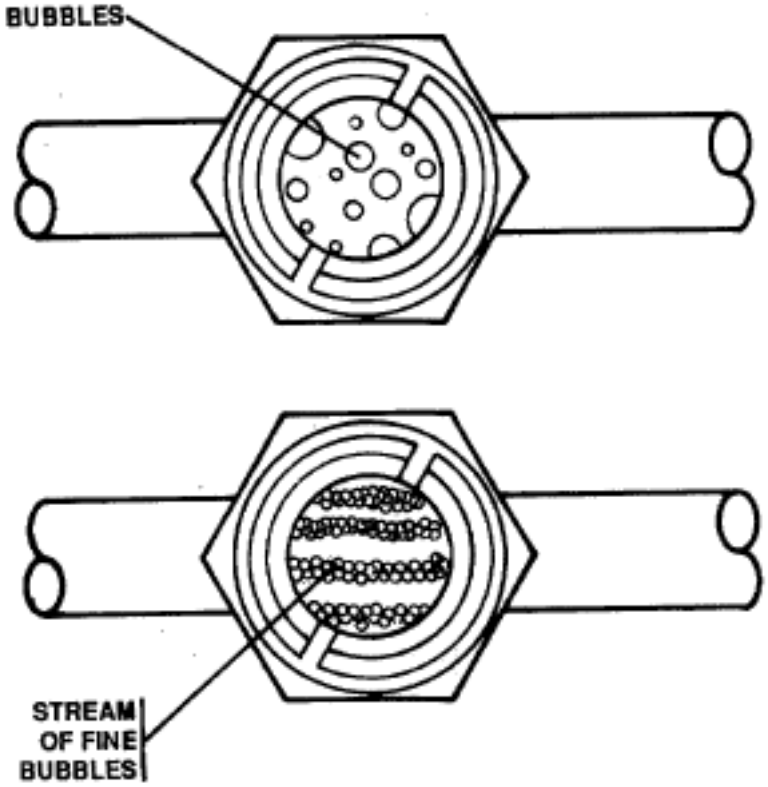

Figure 551-88L-2061_05
Refrigerant sight glass

6. Conduct weekly maintenance on a walk-in type Marine Refrigerator/Freezer.

a. Flush the 2 way water regulator, (refer to Figure 551-88L-2061_06).

(1) Manually flush the valve by inserting a screwdriver in openings at opposite sides of the spring housing.

(2) Lift the lower spring plate to open and flush the valve.

b. Check compressor motor.
Note: Valve adjustment is not affected by manual flushing.

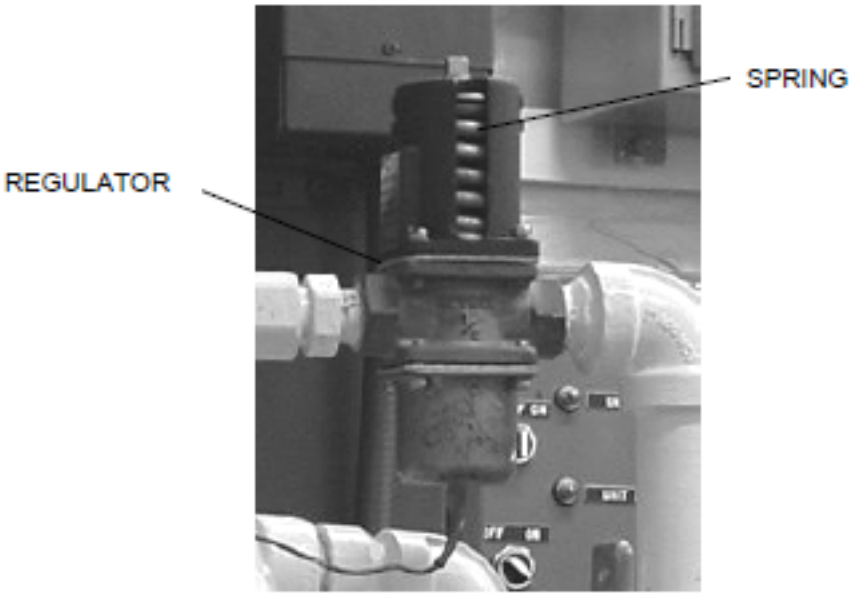

Figure 551-88L-2061_06
Water regulator

(1) Check that the compressor motor is running within normal ambient operating temperature, 104-131ºF (40-55ºC).

(2) Check the compressor motor frame and bearings, where possible, for excessive noise, or vibration.

7. Conduct monthly maintenance on a walk-in type Marine Refrigerator/Freezer.

a. Check door.

(1) Check that door gaskets are clean and serviceable, (refer to Figure 551-88L-2061_07).

(a) With inside vapor proof light switched on, close door.

(b) There shall be no light visible around door.

(c) Visually check gasket for tears, loose mounting, wear or aging.

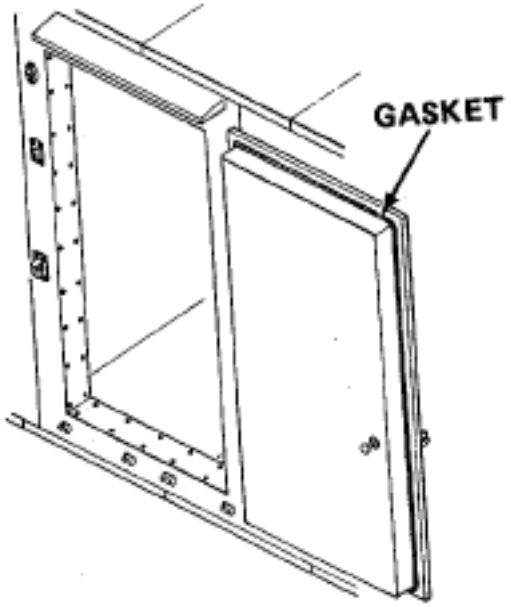

Figure 551-88L-2061-07
Door gasket

(2) Check latch and strike assembly for cracks, breaks, excessive wear and loose or missing hardware, (refer to Figure 551-88L-2061-08).

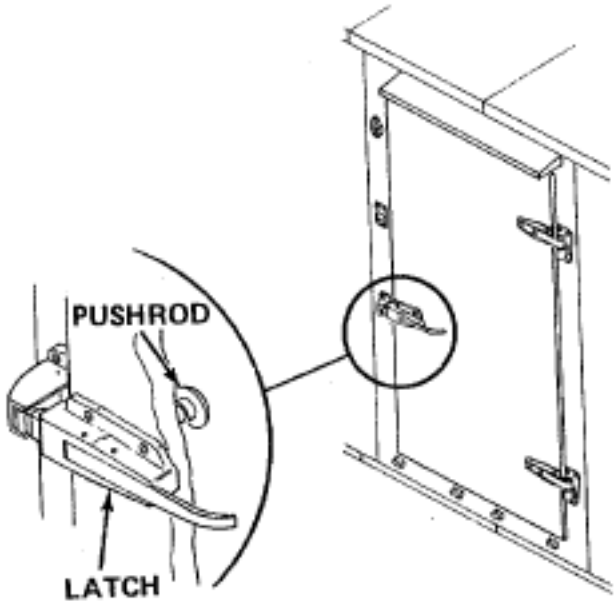

Figure 551-88L-2061-08
Door latch

(3) Check hinges for cracks, breaks, excessive wear and loose or missing hardware, (refer to Figure 551-88L-2061-09).

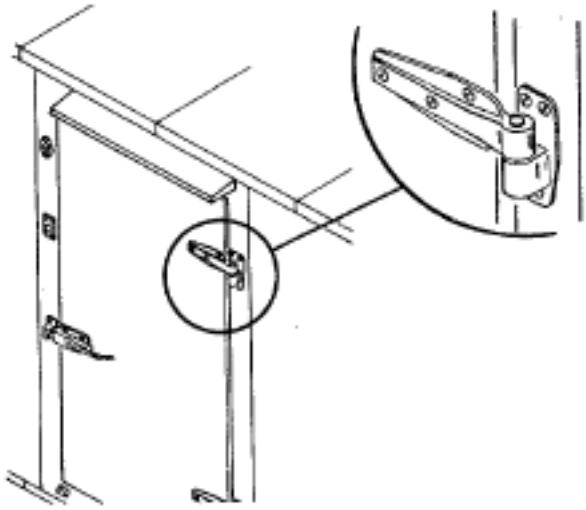

Figure 551-88L-2061-09
Door hinges

(4) Lubricate latch and hinges with low viscosity SAE oil.

(5) Check door trim (sill, head and door jambs) for cracks, warps, deterioration or damage, (refer to Figure 551-88L-2061_10).

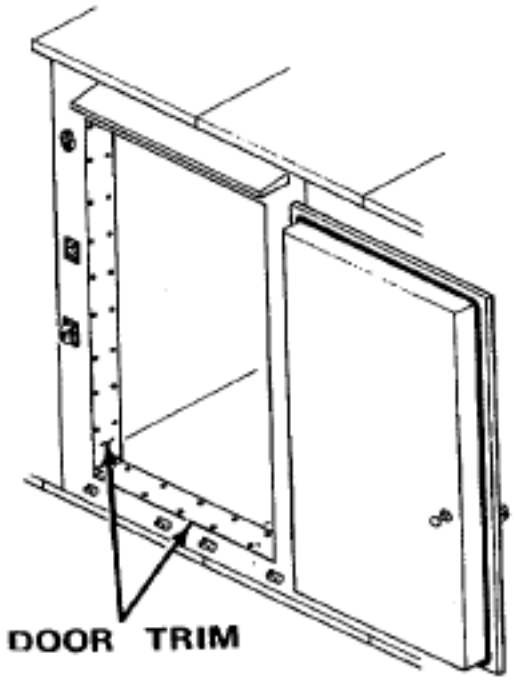

Figure 551-88L-2061-10
Door trim

b. Check interior of walk-in.

(1) Check interior walls, floor and ceiling for cracking or visible holes.

(2) Wash interior with baking soda and water. Rinse and dry thoroughly.

(3) Inspect floor racks for deterioration, damage or loose slots.

(4) Remove floor racks from refrigerator, (refer to Figure 551-88L-2061-11).

(a) Scrub with soap and water solution.

(b) Rinse and reinstall racks after scrubbing.

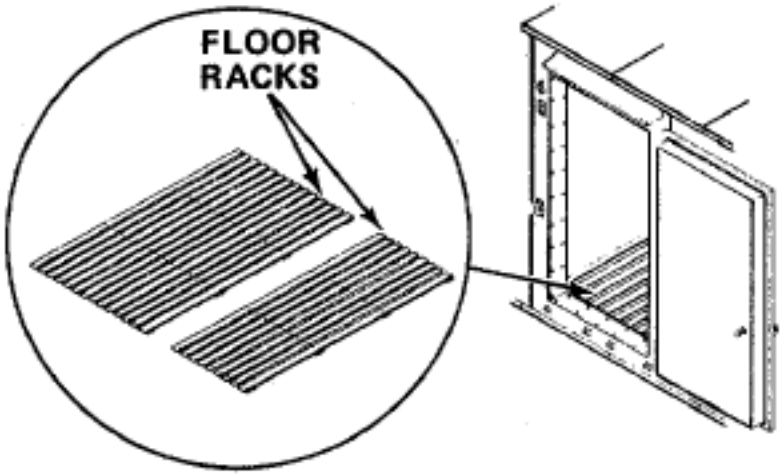

Figure 551-88L-2061-11
Floor racks

(5) Check light assembly and globe for cracks, breaks and loose or missing hardware, (refer to Figure 551-88L-2061-12).

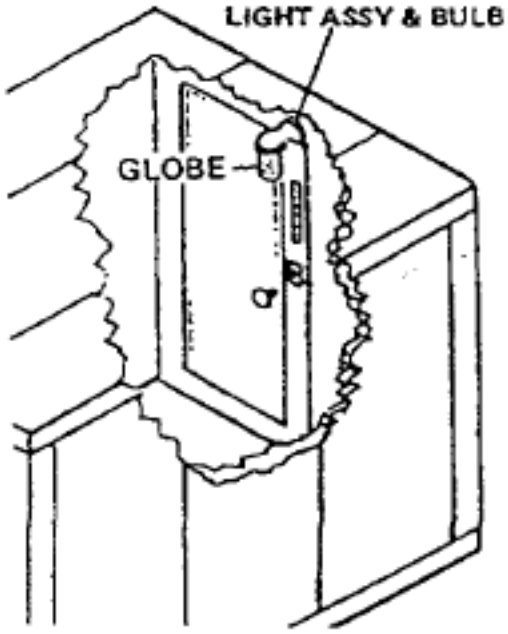

Figure 551-88L-2061-12
Globe and bulb assembly

(6) Unscrew globe and inspect bulb for serviceability and scorching.

c. Check the Cooler/Freezer evaporator unit.

(1) Check the evaporators to ensure the coil is clean and free of debris.

(2) Visually inspect the evaporator fan motors to make certain that they are operational, and that the fans are tight and secure.

d. Check for proper V-belt tension, (refer to Figure 551-88L-2064_13).

(1) Proper tension is achieved when the belt may be deflected 1/2 inch at its midpoint when applying approximately 4 to 5 pounds of force to the belt.

(2) A new belt should be tensioned to approximately 3/8 inch deflection.

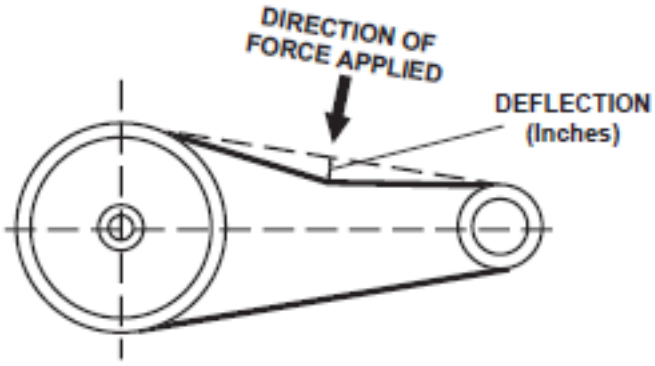

Figure 551-88L-2064_13
Belt Tension

8. Conduct semi-annual maintenance on a walk-in type Marine Refrigerator/Freezer.

a. Visually inspect the Cooler/Freezer evaporator unit.

(1) Look for signs of corrosion on fins, cabinet, copper tubing and solder joints.

(2) Look for excessive or unusual vibration of fan blades or sheet metal panels when in operation.

(3) Identify fan cell(s) causing vibration and check motor and blade carefully.

(4) Look for oil stains on headers, return bends, and coil fins. Check any suspect areas with an electronic leak detector.

(5) Check drain pan to insure that drain is clear of debris, obstructions or ice buildup and is free draining.

CAUTION

Do NOT use ammonia or other cleaning chemicals that are corrosive to copper or aluminum.

b. Clean evaporator coils.

(1) Periodic cleaning can be accomplished by using a brush, pressurized water or a commercially available evaporator coil cleaner or mild detergent. Never use an acid based cleaner. Follow label directions for appropriate use. Be sure the product you use is approved for use in your particular application.

(2) Flush and rinse coil until no residue remains.

(3) Pay close attention to drain pan, drain line and trap.

c. Check the operation of all fans and ensure airflow is unobstructed.

(1) Check that each fan rotates freely and quietly. Replace any fan motor that does not rotate smoothly or makes an unusual noise.

(2) Check all fan set screws and tighten if needed.

(3) Check all fan blades for signs of stress or wear. Replace any blades that are worn, cracked or bent.

(4) Verify that all fan motors are securely fastened to the motor rail.

(5) Lubricate motors if applicable.

d. Inspect electrical wiring and components.

(1) Visually inspect all wiring for wear, kinks, bare areas and discoloration. Replace any wiring found to be damaged.

(2) Verify that all electrical and ground connections are secure, tighten if necessary.

(3) Check operation/calibration of all fan cycle and defrost controls when used.

(4) Look for abnormal accumulation of ice patterns and adjust defrost cycles accordingly.

(5) Compare actual defrost heater amp draw against unit data plate.

(6) Visually inspect heaters to ensure even surface contact with the coil. If heaters have crept, decrease defrost termination temperature and be sure you have even coil frost patterns. Re-align heaters as needed.

(7) Check drain line heat tape for proper operation.

e. Check condenser zinc anodes.

(1) Shut off cooling water supply to condenser.

(2) Open condenser vent valves and drain valves and drain condenser.

(3) Remove the zinc anode holders and anodes.

(a) Clean the anode by hitting it against a hard surface or striking it with a hammer, (refer to Figure 551-88L-2061-14).

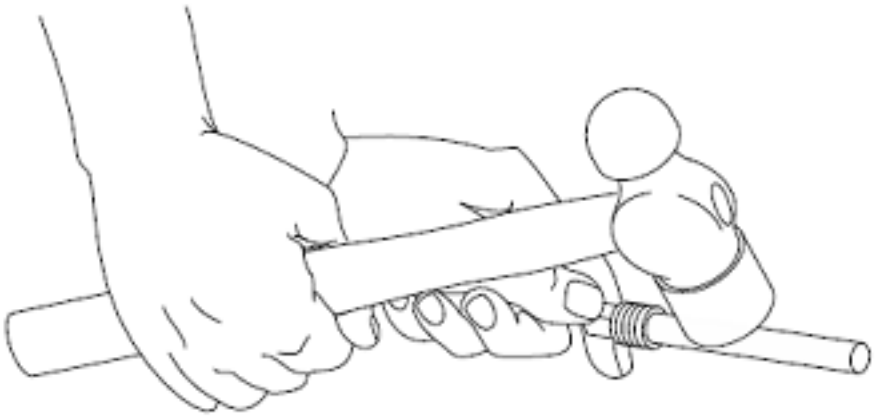

Figure 551-88L-2061-14
Checking zinc anode

(b) If the zinc rod breaks, install a new zinc rod.

(c) If more than 60 % of the original material has been consumed, renew anodes.

(d) If the zinc rod is to be reused, scrape the layer of oxidation from the zinc rod before installation. The layer of oxidation reduces the effectiveness of the zinc rod.

(4) If a new zinc rod is to be installed, (refer to Figure 551-88L-2061-15).

(a) Use pliers to unscrew the old zinc rod from the plug.

(b) If not enough material remains or the zinc rod has broken off, drill the zinc from the plug.

(c) Clean the plug.

(d) Apply thread lock compound to the threaded shoulder of a new zinc rod. Apply the compound ONLY to the threaded shoulder of the zinc rod.

(e) Install the zinc rod onto the plug.

(f) Coat the external threads of the plug with pipe sealant.

(g) Install the zinc rod.

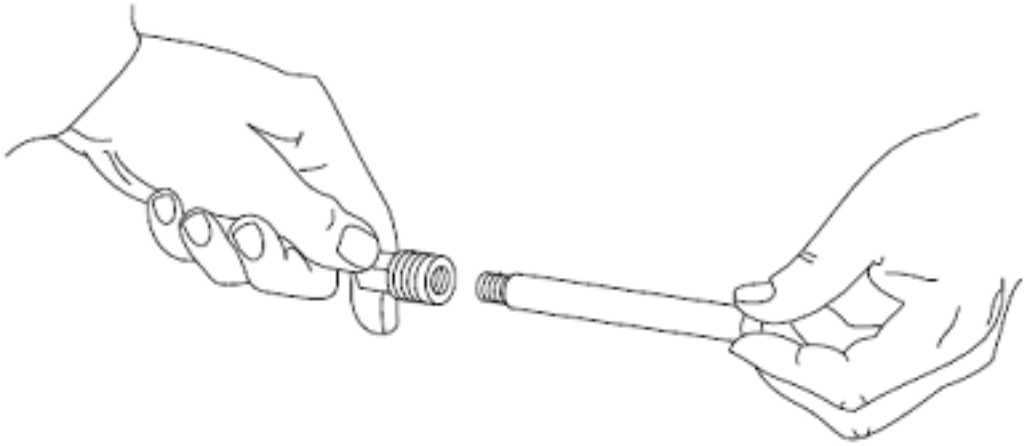

Figure 551-88L-2061-15

(5) Place condenser cooling water system back in operation in accordance with shipbuilder instructions.

9. Conduct semi-annual maintenance on a walk-in type Marine Refrigerator/Freezer.

a. The system should be checked annually for proper defrost timing because the amount of frost and pattern can vary greatly. Frost accumulation is dependant on the temperature of the space, the type of product stored, entry of a new product, etc. It may be necessary to occasionally re-adjust the defrost timing.

CAUTION

The following checks must be done quickly and for a brief time only.

b. Conduct low pressure test.

(1) Low pressure settings can be checked when the unit is running by;

(a) Connecting a gauge to the suction line service valve.

(b) Close the liquid line valve and allow the system to pump down, observing the low switch opening (or closing).

(c) Open the liquid line valve and allow the pressure to Increase, observing the high switch closing (or opening).

(2) Adjust the settings as necessary.

c. Conduct high pressure test.

(1) High pressure control settings can be checked by;

(a) Selectively disconnecting various stages of fans or by blocking the air flow on air cooled condensers.

(b) On water cooled condensers, reduce or shut off the water flow while observing the cut-out.

(2) Adjust the settings as necessary.

(Asterisks indicates a leader performance step.)

Evaluation Guidance: None

Evaluation Preparation: None

PERFORMANCE MEASURES	GO	NO-GO	N/A
1. Conducted daily maintenance on a reach-in type Marine Refrigerator/Freezer.			
a. Checked the freezer temperature gauge.			
b. Checked the refrigerator temperature gauge.			
2. Conducted weekly maintenance on a reach-in type Marine Refrigerator/Freezer.			
a. Checked condenser coil.			
b. Checked the drain line.			
3. Conducted monthly maintenance on a reach-in type Marine Refrigerator/Freezer.			
a. Checked interior liner.			
b. Checked condenser and evaporator fan motors.			
c. Checked doors.			
d. Checked exterior surfaces.			
4. Conducted semi-annual maintenance on a reach-in type Marine Refrigerator/Freezer.			
a. Checked the operation of all fans.			
b. Inspected electrical wiring and components.			
c. Cleaned evaporator coils.			
5. Conducted daily maintenance on a walk-in type Marine Refrigerator/Freezer.			
a. Checked the operation of the refrigeration plant.			
b. Checked moisture indicator/sight glass.			
6. Conducted weekly maintenance on a walk-in type Marine Refrigerator/Freezer.			
a. Flushed the 2 way water regulator.			
b. Checked compressor motor.			
7. Conducted monthly maintenance on a walk-in type Marine Refrigerator/Freezer.			
a. Checked door.			
b. Checked interior of walk-in.			
c. Checked the Cooler/Freezer evaporator unit.			
d. Checked for proper V-belt tension.			
8. Conducted semi-annual maintenance on a walk-in type Marine Refrigerator/Freezer.			
a. Visually inspected the Cooler/Freezer evaporator unit.			
b. Cleaned evaporator coils.			
c. Checked the operation of all fans and ensure airflow is unobstructed.			
d. Inspected electrical wiring and components.			
e. Checked condenser zinc anodes.			
9. Conducted semi-annual maintenance on a walk-in type Marine Refrigerator/Freezer.			
a. Checked for proper defrost timing.			
b. Conducted low pressure test.			
c. Conducted high pressure test.			

Supporting Reference(s):

Step Number	Reference ID	Reference Name	Required	Primary
	TC 55-509	MARINE ENGINEMAN's HANDBOOK	No	No
	TC 55-509-1	Marine Electricity	No	No
	TM 55-1905-223-24-17	UNIT, INTERMEDIATE DIRECT SUPPORT AND INTERMEDIATE GENERAL SUPPORT MAINTENANCE INSTRUCTIONS FOR ENVIRONMENTAL CONTROL SUBSYSTEM FOR LANDING CRAFT UTILITY (LCU) (NSN 1905-01-154-1191) (REPRINTED W/BASIC IN	No	No
	TM 55-1915-208-24&P	UNIT INTERMEDIATE DIRECT SUPPORT AND INTERMEDIATE GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST) FOR ENVIRONMENTAL CONTROL SYSTEM P/N LM2-WC30-65, 39BA-050, 42CG, 42VF,	No	No
	TM 55-1915-218-24&P	UNIT INTERMEDIATE DIRECT SUPPORT AND INTERMEDIATE GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST) FOR SHIP STORES REFRIGERATION P/N 3RK1-030TAD, HAC-034, 6LP2-95E, LMR (	No	No
	TM 55-1915-254-10-1	OPERATOR'S MANUAL FOR LOGISTICS SUPPORT VESSEL (LSV-7 & -8)	No	No
	TM 55-1915-254-10-2	OPERATOR'S MANUAL FOR LOGISTICS SUPPORT VESSEL (LSV-7 & -8)	No	No
	TM 55-1925-224-24&P	UNIT, INTERMEDIATE DIRECT SUPPORT AND INTERMEDIATE GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST) FOR ENVIRONMENTAL CONTROL SUBSYSTEM FOR LARGE TUG (LT) (NSN 1925-01-24	No	No
	TM 55-1925-231-24&P	UNIT, INTERMEDIATE DIRECT SUPPORT AND INTERMEDIATE GENERAL SUPPORT MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST FOR REFRIGERATION MACHINERY FOR LARGE TUG (LT) (NSN 1925-01-247-7110) (T	No	No

Environment: Environmental protection is not just the law but the right thing to do. It is a continual process and starts with deliberate planning. Always be alert to ways to protect our environment during training and missions. In doing so, you will contribute to the sustainment of our training resources while protecting people and the environment from harmful effects. Refer to FM 3-34.5 Environmental Considerations and GTA 05-08-002 ENVIRONMENTAL-RELATED RISK ASSESSMENT.

Safety: In a training environment, leaders must perform a risk assessment in accordance with ATP 5-19, Risk Management. Leaders will complete the current Deliberate Risk Assessment Worksheet in accordance with the TRADOC Safety Officer during the planning and completion of each task and sub-task by assessing mission, enemy, terrain and weather, troops and support available-time available and civil considerations, (METT-TC). Note: During MOPP training, leaders must ensure personnel are monitored for potential heat injury. Local policies and procedures must be followed during times of increased heat category in order to avoid heat related injury. Consider the MOPP work/rest cycles and water replacement guidelines IAW FM 3-11.4, Multiservice Tactics, Techniques, and Procedures for Nuclear, Biological, and Chemical (NBC) Protection, FM 3-11.5, Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Decontamination.

Prerequisite Individual Tasks : None

Supporting Individual Tasks :

Task Number	Title	Proponent	Status
551-88L-3068	Troubleshoot a Refrigeration Unit	551 - Transportation (Individual)	Approved

Supported Individual Tasks :

Task Number	Title	Proponent	Status
551-88L-3068	Troubleshoot a Refrigeration Unit	551 - Transportation (Individual)	Approved
551-881-8084	Conduct Field Maintenance on a Refrigeration System	551 - Transportation (Individual)	Approved
551-88L-2039	Conduct The Engine Room Watch	551 - Transportation (Individual)	Approved

Supported Collective Tasks : None

ICTL Data :

ICTL Title	Personnel Type	MOS Data
88L30 Watercraft Engineer	Enlisted	MOS: 88L, Skill Level: SL3, Duty Pos: TFR, LIC: EN
88L40 Watercraft Engineer	Enlisted	MOS: 88L, Skill Level: SL4, Duty Pos: TGB, LIC: EN, SQI: O
88L20 Watercraft Engineer	Enlisted	MOS: 88L, Skill Level: SL2, Duty Pos: TFS, LIC: EN