

Summary Report for Individual Task
551-88L-3055
Troubleshoot a Fire Extinguishing System
Status: Approved

Distribution Restriction: Approved for public release; distribution is unlimited.

Destruction Notice: None

Foreign Disclosure: FD5 - This product/publication has been reviewed by the product developers in coordination with the [installation/activity name] foreign disclosure authority. This product is releasable to students from all requesting foreign countries without restrictions.

Condition: Given a fire extinguishing system 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.), with a lock out tag out kit and a marine rail tool box.

Standard: The Soldier correctly conducts troubleshooting procedures pertaining to a fire extinguishing system aboard an Army vessel, IAW the appropriate Technical Manual and local SOPs, without injury to self or others and without damage to equipment.

Special Condition: None

Safety Risk: Low

MOPP 4:

Task Statements

Cue: None

DANGER
None

WARNING
None

CAUTION
None

Remarks: None

Notes: None

Performance Steps

1. Demonstrate troubleshooting procedures for the diesel engine driven auxiliary fire pump assembly.

a. No Pump Discharge.

(1) Possible cause.

- (a) Clogged sea strainer or sea chest.
- (b) Loss of prime.
- (c) Air leak in suction piping.
- (d) Auxiliary fire pump assembly is not up to operating speed.
- (e) Discharge head pressure is too high.
- (f) Impeller passage restricted or impeller damaged.
- (g) Air leak between shaft and shaft sleeve.

(2) Corrective action.

- (a) Clean strainer or clear sea chest.
- (b) Open petcock at top of Auxiliary Fire Pump; bleed until a steady flow of water is present.
- (c) Tighten loose suction piping and plugs, open petcock at top of Auxiliary Fire Pump; bleed until a steady flow of water is present.
- (d) Increase speed of Prime Mover.
- (e) Check for proper Valve alignment.
- (f) Impeller problems;
 - _1_ Clear restriction.
 - _2_ Replace auxiliary fire pump assembly.
- (g) Disassemble auxiliary fire pump assembly, inspect, clean and repair.

b. Pump operates normally for a short time, then stops pumping.

(1) Possible cause.

- (a) Air leak on suction side of system.
- (b) Partially closed valve on suction side of system.

(2) Corrective action.

(a) Tighten loose suction piping and plugs, open petcock at top of Auxiliary Fire Pump assembly; bleed until a steady flow of water is present.

(b) Check valve alignment.

c. Prime mover overload.

(1) Possible cause.

(a) Fire pump speed too high.

(b) Excessive head pressure.

(c) Mechanical failure of the Auxiliary Fire Pump assembly.

(d) Power Take Off (PTO) bearing failure.

(2) Corrective action.

(a) Reduce speed of prime mover.

(b) Check for proper valve alignment.

(c) Replace Auxiliary Fire Pump assembly.

(d) Disassemble PTO; inspect, repair and replace bearings.

d. Unusual noise or vibration.

(1) Possible cause.

(a) Loose foundation bolts.

(b) Fouled pump impeller.

(c) Pump coupling misalignment.

(d) Loose flexible shaft coupling components.

(e) Pump bearing temperature exceeds 180° F.

(f) Auxiliary Fire Pump assembly bearing failure.

(2) Corrective action.

(a) Tighten foundation bolts.

(b) Fouled pump impeller.

1 Reduce speed of prime mover; note at what speed noise or vibration goes away.

2 If noise continues, secure engine.

3 Disassemble Auxiliary Fire Pump assembly and remove obstruction.

(c) Realign Auxiliary Fire Pump assembly.

(d) Check alignment; tighten coupling hardware / fasteners.

(e) Check lubricant for proper grade.

(f) Repair Auxiliary Fire Pump assembly.

2. Demonstrate troubleshooting procedures for a fire pump with a centrifugal pump assembly.

a. No Pump Discharge.

(1) Possible cause.

(a) Clogged sea strainer or sea chest.

(b) Loss of prime.

(c) Air leak in suction piping.

(d) Discharge head pressure is too high.

(e) Impeller passage restricted or impeller and wear ring damaged.

(f) Alternating current motor rotating in the wrong direction.

(2) Corrective action.

(a) Clean strainer or clear sea chest.

(b) Fill centrifugal pump and suction piping completely with water allowing all trapped air to escape.

(c) Correct leaks in suction pipe joints and fittings, vent casing to remove accumulated air.

(d) Check for proper valve alignment.

(e) Impeller problem;

1 Clear restriction.

2 Replace fire pump impeller and wear ring.

(f) Properly wire alternating current motor.

b. Low pump discharge.

(1) Possible cause.

- (a) Clogged sea strainer or sea chest.
- (b) Air leak in suction piping.
- (c) Discharge head pressure is too high.
- (d) Partially plugged impeller.
- (e) Defective impeller, wear ring or mechanical seal.
- (f) Alternating current motor wired incorrectly.

(2) Corrective action.

- (a) Clean strainer or clear sea chest.
- (b) Correct leaks in suction pipe joints and fittings; vent casing to remove accumulated air.
- (c) Check for proper valve alignment.
- (d) Disassemble centrifugal pump and clear impeller.
- (e) Repair centrifugal pump unit.
- (f) Properly wire alternating current motor

c. Low Pump Discharge Pressure.

(1) Possible cause.

- (a) Clogged sea strainer or sea chest.
- (b) Leaks in suction piping.
- (c) Worn impeller and wear ring.

(2) Corrective action.

- (a) Clean strainer or clear sea chest.
- (b) Secure pump and check for suction side leaks and correct.
- (c) Repair centrifugal pump.

d. Pump operates normally for a short time, then stops pumping.

(1) Possible cause.

- (a) Incomplete system prime.

(b) Air leak in suction piping, drop in suction pressure.

(c) Alternating current motor thermal overload tripped.

(2) Corrective action.

(a) Purge pump, piping of air.

(b) Locate and correct suction leak.

(c) Motor thermal overload trip.

1 Allow alternating current motor sufficient time to cool.

2 Inspect for restricted cooling air flow to alternating current motor.

3 Refer to "Pump draws excessive amperage" troubleshooting symptom/malfunction section.

e. Pump draws excessive amperage.

(1) Possible cause.

(a) Electrical problems.

(b) Bent pump motor shaft.

(c) Impeller and wear rings damage.

(d) Defective mechanical seal.

(e) Alternating current motor bearing failure.

(f) Distorted centrifugal pump casing.

(2) Corrective action.

(a) Test centrifugal pump alternating current motor.

(b) Replace alternating current motor.

(c) Repair centrifugal pump.

(d) Repair centrifugal pump.

(e) Repair alternating current motor.

(f) Disassemble centrifugal pump and replace all defective parts.

f. Unusual noise or vibration.

(1) Possible cause.

(a) Loose foundation bolts.

(b) Bent pump motor shaft.

(2) Corrective action.

(a) Tighten foundation bolts.

(b) Replace alternating current motor.

3. Demonstrate troubleshooting procedures for bilge/ballast and firemain piping system.

a. Low discharge pressure.

(1) Possible cause.

(a) Partially closed suction valve.

(b) Open suction valve to empty bilge well.

(c) Partially closed discharge valve.

(d) Dirty or clogged suction strainers.

(e) Sticking valves.

(f) Leaking valves.

(g) Leaking flange joints or loose flange connections.

(h) Piping failure.

(i) Leaking piping fitting.

(j) Check valve jammed by foreign matter.

(k) Defective relief valve.

(l) Leakage in firemain connections.

(m) Leaking valve at fire station.

(n) Defective fire pump.

(o) Malfunctioning pressure gauge.

(p) Worn or defective bilge pump.

(2) Corrective action.

- (a) Ensure suction valve is fully open.
- (b) Align all suction valves on bilge manifold.
- (c) Ensure discharge valve is fully open.
- (d) Clean or replace strainers.
- (e) Sticking valve.

- _1_ Loosen stem by slackening valve packing gland.
- _2_ Check that the packing gland is not binding the stem.
- _3_ Remove paint or foreign matter on the valve stem causing sticking.
- _4_ If the valve sticking cannot be corrected, replace the valve.
- _5_ If the valve stem is bent or the threads are burred/stripped, repair or replace the valve.

- (f) Leaking valve.

- _1_ Leakage through stuffing-box packing.
 - _a_ Tighten the gland.
 - _b_ If the gland has entered the stuffing-box to an extent that there is no remaining adjustment. Repack packing gland.
- _2_ Leakage across valve seats.
 - Note: Leakage across the valve seats may be due to foreign matter lodged in the seats.
 - _a_ Occasionally foreign matter can be flushed away by allowing normal flow of water through the valve.
 - _b_ If the leakage continues. Repair valve.

- (g) Leaking flange joint.

- _1_ Inspect and tighten connection.
- _2_ If uniform tightening does not stop the leak;
 - _a_ Isolate the joint and release line pressure.
 - _b_ Check for leaking pipe fitting, locate leak, isolate, repair or replace the fitting.
 - _c_ Restore seating surfaces by polishing with crocus cloth.
 - _d_ Install a new gasket and tighten bolts uniformly.

e If leakage continues, repair valve.

(h) Locate leak, isolate, repair or replace affected piping.

(i) Locate leak, isolate, repair or replace affected fitting.

(j) Jammed check valve.

1 Remove valve.

2 Inspect and clean as necessary.

3 Replace valve.

(k) Isolate, repair or replace valve.

(l) Isolate, repair or replace connection.

(m) Locate station, isolate, repair or replace valve.

(n) Repair or replace fire pump.

(o) Malfunctioning pressure gauge.

1 Remove gauge from system.

2 Install a gauge of known accuracy to check system.

3 Replace faulty gauge.

(p) Repair or replace bilge pump.

b. No discharge pressure.

(1) Possible cause.

(a) Closed suction valve.

(b) Closed discharge valve.

(c) Pump not primed.

(d) Closed discharge pressure gauge cutout valve.

(e) Check valve installed backwards or jammed.

(f) Open BILGE PUMP MOTOR circuit breaker at main switchboard.

(g) Defective motor controller.

(h) Worn or defective bilge pump.

(2) Corrective action.

(a) Ensure suction valve is fully open.

(b) Ensure discharge valve is fully opened.

(c) Prime pump.

(d) Open discharge pressure gauge cutout valve.

(e) Check valve problem.

1 Ensure check valve is installed in correct direction with stem in the upright position.

2 Remove valve.

3 Inspect and clean as necessary.

4 Replace valve.

(f) Reset circuit breaker.

(g) Motor controller problem.

1 Check for open fuse, replace as necessary.

2 Check circuit breaker with multimeter, replace breaker as necessary.

3 Check for loose or broken electrical power cables.

(h) Repair or replace bilge pump.

4. Demonstrate troubleshooting procedures for foam proportioner (AFFF) piping system.

a. AFFF system fails to energize when manual control valve is opened.

(1) Possible cause.

(a) Inoperative manual control valve.

(b) Plugged manual control valve drain line.

(c) Bent, crimped, or plugged piping between manual control valve and butterfly valve.

(d) Plugged or damaged 3-way valve plug.

(e) Closed firemain supply to AFFF gate valve.

(f) Plugged or damaged firemain.

(g) Inoperative butterfly valve.

(2) Corrective action.

(a) Replace manual control valve.

(b) Clean drain valve.

(c) Repair or replace fault piping.

(d) Repair or replace valve.

(e) Open gate valve.

(f) Flush firemain.

(g) Repair or replace butterfly valve.

b. AFFF system is energized but only water is discharged.

(1) Possible cause.

(a) Inoperative butterfly valve.

(b) Depleted AFFF concentrate supply.

(c) Plugged, bent, or crimped AFFF concentrate line.

(d) Closed firemain supply to AFFF gate valve.

(e) Plugged or damaged firemain.

(f) Inoperative butterfly valve.

(2) Corrective action.

(a) Repair or replace butterfly valve.

(b) Replenish AFFF concentrate supply.

(c) Repair faulty line.

(d) Open gate valve.

(e) Flush firemain.

(f) Repair or replace butterfly valve.

c. No supply of AFFF concentrate.

(1) Possible cause.

(a) Empty concentrate tank.

(b) Closed concentrate supply line gate valve.

(2) Corrective action.

(a) Replenish AFFF supply.

(b) Open gate valve.

(Asterisks indicates a leader performance step.)

Evaluation Guidance: None

Evaluation Preparation: None

PERFORMANCE MEASURES	GO	NO-GO	N/A
1. Demonstrated troubleshooting procedures for the diesel engine driven auxiliary fire pump assembly.			
a. No Pump Discharge.			
b. Pump operates normally for a short time, then stops pumping.			
c. Prime mover overload.			
d. Unusual noise or vibration.			
2. Demonstrated troubleshooting procedures for a fire pump with a centrifugal pump assembly.			
a. No Pump Discharge.			
b. Low pump discharge.			
c. Low Pump Discharge Pressure.			
d. Pump operates normally for a short time, then stops pumping.			
e. Pump draws excessive amperage.			
f. Unusual noise or vibration.			
3. Demonstrated troubleshooting procedures for bilge/ballast and firemain piping system.			
a. Low discharge pressure.			
b. No discharge pressure.			
4. Demonstrated troubleshooting procedures for foam proportioner (AFFF) piping system.			
a. AFFF system fails to energize when manual control valve is opened.			
b. AFFF system is energized but only water is discharged.			
c. No supply of AFFF concentrate.			

Supporting Reference(s):

Step Number	Reference ID	Reference Name	Required	Primary
	TM 55-1905-217-12	Operator's and Organizational Maintenance Manual: Landing Craft, Mechanized, Steel, DED, Overall Length 74 Feet, Mod 1, Mark VIII, Navy Design LCM-8, Hull Nos. 8500-8560 and 8580-8618 (NSN 1905-00-935-6057) (Reprinted W/Basic Incl C1-3)	No	No
	TM 55-1905-219-14-1	OPERATORS, ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL FOR LANDING CRAFT UTILITY (LCU) 1667-1670 (NSN 1905-00-168-5764)	No	No
	TM 55-1905-219-14-2	OPERATORS, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL FOR LANDING CRAFT UTILITY, LCU 1667-1670 (NSN 1905-00-168-5764)	No	No
	TM 55-1905-219-34P-1	DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LISTS (INCLUDING DEPOT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS) FOR LANDING CRAFT UTILITY LCU 1667 THRU 1670 (NSN 1905-00-1)	No	No
	TM 55-1905-219-34P-2	DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST (INCLUDING DEPOT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS) FOR LANDING CRAFT UTILITY LCU 1667 THRU 1670 (NSN 1905-00-16)	No	No
	TM 55-1905-223-10	Operator's Manual for Landing Craft, Utility (LCU 2000 CLASS) (NSN 1905-01-154-1191) (Reprinted W/Basic Incl C1-9) (This item is included on EM 0273)	No	No
	TM 55-1905-223-24-12	UNIT, INTERMEDIATE DIRECT SUPPORT AND INTERMEDIATE GENERAL SUPPORT MAINTENANCE INSTRUCTIONS FIRE PUMP SUPSYSTEM FOR LANDING CRAFT UTILITY (LCU) (NSN 1905-01-154-1191) (REPRINTED W/BASIC INCL C1-2) (THIS I	No	No
	TM 55-1905-223-24-13	UNIT, INTERMEDIATE DIRECT SUPPORT AND INTERMEDIATE GENERAL SUPPORT MAINTENANCE INSTRUCTIONS BILGE/BALLAST PUMP FOR LANDING CRAFT UTILITY (LCU) (NSN 1905-01-154-1191) (REPRINTED W/BASIC INCL C1-2) (THIS IT	No	No
	TM 55-1905-223-24-18-1	UNIT, INTERMEDIATE DIRECT SUPPORT AND INTERMEDIATE GENERAL SUPPORT MAINTENANCE INSTRUCTIONS FOR LANDING CRAFT, UTILITY (LCU) BASIC CRAFT (PART 1) (NSN 1905-01-154-1191) (REPRINTED W/BASIC INCL C1-3) (THIS	No	No
	TM 55-1905-223-SDC	SHIPBOARD DAMAGE CONTROL MANUAL FOR LANDING CRAFT UTILITY (LUC) (NSN 1905-01-154-1191)	No	No

	TM 55-1905-243-24&P	UNIT, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL	No	No
	TM 55-1915-200-10	Operator's Manual for Logistic Support Vessel (LSV) (NSN 1915-01-153-8801) (Reprinted W/Basic Incl C1-6)	No	No
	TM 55-1915-251-24&P	UNIT, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST) FOR FM-200 FIREFIGHTING SYSTEM FOR LOGISTICS SUPPORT VESSEL (LSV) (NSN 1915-01-153-8801) (THIS I	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 55-1925-254-14&P	OPERATOR, UNIT, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL	No	No
	TM 55-1925-292-14&P	UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL INCLUDING	No	No
	TM 55-1925-294-14&P	OPERATOR, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL	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-2047	Maintain a Fire Extinguishing System	551 - Transportation (Individual)	Approved

Supported Individual Tasks :

Task Number	Title	Proponent	Status
551-88L-2047	Maintain a Fire Extinguishing System	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
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