

**551-88L-2107**  
**Maintain a Starting System**  
**Status: Approved**

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**Security Classification: U** - Unclassified

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

**Destruction Notice:** None

**Foreign Disclosure: FD1** - This training product has been reviewed by the training developers in coordination with the Transportation School Fort Eustis, VA 23608 foreign disclosure officer.

This training product can be used to instruct international military students from all approved countries without restrictions.

**Conditions:** Assigned as a Marine Engineer, Soldier is required to Maintain a Starting System. Given a completed risk assessment, a vessel in port or at sea, all applicable publications, forms, and records, tools, materials, personnel, equipment in all weather conditions day or night in an operational environment. Some iterations of this task should be performed in MOPP 4.

**Standards:** On orders; Soldier will Maintain a Starting System to ensure vessel is operational and equipment functioning properly, IAW TM 55-1905-223-24-3, and procedures and specifications utilizing the task Go/ No-Go criteria. Comply with all warnings, cautions, and notes listed in all references. Soldier must perform this task with 100% compliant or without errors.

**Special Conditions:** None

**Safety Risk:** Low

**MOPP 4:** Sometimes

<b>Task Statements</b>
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**Cue:** Assigned as a Marine Engineer, Soldier is required to Maintain a Starting System.

**DANGER**

None

## WARNING

### MODIFICATION HAZARD

Unauthorized modifications, alterations or installations of or to this equipment are prohibited and are in violation of AR 750-10. Any such unauthorized modifications, alterations or installations could result in death, injury or damage to the equipment.

### HIGH PRESSURE HYDRAULIC SYSTEM HAZARDS

Hydraulic systems can cause serious injuries if high pressure lines or equipment fail. Never work on hydraulic systems or equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment, and who can give first aid. A second person should stand by controls to turn off hydraulic pumps in an emergency. When the technicians are aided by the operators, the operators must be warned about dangerous areas. MOVING

### MACHINERY HAZARDS

Be very careful when operating or working near moving machinery. Running engines, rotating shafts, and other moving machinery parts could cause personal injury or death.

### ELECTRICAL HAZARDS

Whenever possible, the power supply to the equipment must be shut off before beginning work on the equipment. Do not be misled by the term "low voltage." Potentials as low as 50 volts may cause death under adverse conditions". Be careful not to contact 115-Vac input connections when installing or operating this equipment. Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through the body.

## CAUTION

None

**Remarks:** None

**Notes:** None

## CAUTION

To prevent permanent starter motor damage, do not crank engine for more than 30 seconds continuously. If engine does not start within first 30 seconds, wait 1 to 2 minutes before cranking. Damage to starter motor will occur if pushbutton is pressed before starter motor stops rotation.

1. Conduct pre-operation checks of the air starting system to ensure cranking capacity is available to start the diesel engines.
  - a. Check alignment with air compressor.
  - b. Inspect coalescer filter for serviceability.
  - c. Check serviceability of air start bypass valve.
2. Conduct pre-operation checks on the direct current electric starting system to ensure cranking capacity is available to start the diesel engines.
  - a. Check battery connections for no breaks, tightness, and no corrosion.
  - b. Check the batteries for sufficient stored power to start a main engine.
  - c. Remove battery cell covers and check electrolyte levels.
  - d. Use hydrometer to measure the specific gravity of each cell.
3. Perform trouble shooting procedures on the engine air starter.
  - a. Perform troubleshooting steps if the engine will not crank or cranks slowly.
    - (1) Check alignment with air compressor.
    - (2) Check defective air start relay valve.
    - (3) Inspect for plugged coalescer filter.
    - (4) Check to see if external or internal conditions are affecting crankshaft rotation.
  - b. Perform troubleshooting steps if air constantly flows to the air starter.
    - (1) Check air start bypass valve.
    - (2) Check if relay valve is improperly installed, missing, or stuck.
    - (3) Check for defective air start relay valve.
  - c. Perform troubleshooting steps if there is no air flow to the starter.
    - (1) Check for proper air valve alignment.
    - (2) Checked for plugged coalescer filter.
  - d. Perform troubleshooting steps if there is reduced output power or starter runs, pinion engages, but does not crank.
    - (1) Check for insufficient air inlet pressure.

- (2) Check for plugged coalescer filter.
  - (3) Check for broken bendix drive.
  - e. Perform troubleshooting steps when engine cranks too quickly causing automatic trip valve to trip before the engine starts.
    - (1) Check if air inlet pressure is too high.
    - (2) Reduce inlet pressure in 10 psig increments until engine successfully starts.
  - f. Check for defective air start relay valve.
    - (1) Check air start bypass valve.
    - (2) Check if relay valve is sticking.
4. Perform troubleshooting procedures on the engine electric starter.
- a. Perform troubleshooting steps if the engine will not crank for cranks slowly.
    - (1) Check to see if starting circuit component is malfunctioning.

## CAUTION

If spacers or shims are used between the starter motor and the flywheel housing, mark their position, and save. Use the same spacers or shims, placed in marked positions, when installing a new or rebuilt starter.

- (2) Check to see if external or internal conditions are affecting crankshaft rotation.
  - b. Check to see if battery charge is low.
    - (1) Ensure battery is on line.
    - (2) Check electrolyte level and add water if low.
    - (3) Measure specific gravity using a hydrometer. If specific gravity is below 1.200, replace the battery.
    - (4) Determine the battery state of charge.
  - c. Check to see if battery connections are broken, loose, or corroded.
- (Asterisks indicates a leader performance step.)

**Evaluation Guidance:** Score the Soldier a GO if all performance measures are correctly completed/pass (P). Score the Soldier a NO-GO if any of the performance measures are missed or incorrectly performed/fail (F).

**Evaluation Preparation:** Test this task in with applicable training material. Ensure Soldier understands why this task is important to support the overall training objective.

Setup: Test this task in in accordance with prescribed references or Technical Manual (TM).

Brief Soldier: Tell the Soldiers adhere to all Safety precautions when performing the task listed.

Note: Ensure that all required equipment to perform this task is available.

PERFORMANCE MEASURES	GO	NO-GO	N/A
1. Conducted pre-operation checks of air starting system to ensure cranking capacity is available to start the diesel engines.			
2. Conducted pre-operation checks of direct current electric starting system to ensure cranking capacity is available to start the diesel engines.			
3. Performed trouble shooting procedures on the engine air starter.			
4. Performed troubleshooting procedures on the engine electric starter.			

**Supporting Reference(s):**

Step Number	Reference ID	Reference Name	Required	Primary	Source Information
	TM 55-1905-223-24-1	UNIT, INTERMEDIATE DIRECT SUPPORT AND INTERMEDIATE GENERAL SUPPORT MAINTENANCE MANUAL FOR MAIN PROPULSION ENGINE FOR LANDING CRAFT UTILITY (LCU) (NSN 1905-01-154-1191) (REPRINTED W/BASIC INCL C1-3) (THIS	Yes	No	
	TM 55-1905-223-24-3	UNIT, INTERMEDIATE DIRECT SUPPORT AND INTERMEDIATE GENERAL SUPPORT MAINTENANCE INSTRUCTION SHIPS SERVICE GENERATOR FOR LANDING CRAFT UTILITY (LCU) (NSN 1905-01-154-1191) (REPRINTED W/BASIC INCL C1-5) (TH	Yes	Yes	

**TADSS :** None

**Equipment Items (LIN):** None

**Materiel Items (NSN) :**

Step ID	NSN	LIN	Title	Qty
	1905-01-154-1191	L36989	Landing Craft Utility (LCU)	1
	5180-00-629-9783	W39032	Tool Kit, General Mechanic's, Rail and Marine Diesel Engine	1
	4310-01-298-0711		COMPRESSOR UNIT,RECIPROCATING	1
	4240-00-022-2946	HA4006	Protector, Hearing	1

**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 the current Environmental Considerations manual and the current GTA Environmental-related Risk Assessment card. It is the responsibility of all Soldiers and DA civilians to protect the environment from damage. AR 200-1 delineates TRADOC responsibilities to integrate environmental requirements across Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel and Facilities (DOTMLPF) and ensure all training procedures; materials and doctrine include sound environmental practices and considerations.

The Army's environmental vision is to be a national leader in an environmental and natural resource stewardship for present and future generations as an integral part of all Army missions. This Training Support Package meets this standard.

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 ATP-45.5 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 current Risk Management Doctrine. 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 current CBRN doctrine. In a training environment, leaders must perform risk management in accordance with ATP 5-19, Risk Management. Leaders will complete a DD Form 2977 DELIBERATE RISK ASSESSMENT WORKSHEET 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), as well as any other

variables.

All operations will be performed to protect and preserve Army personnel and property against accidental loss. Procedures will provide for public safety incidental to Army operations and activities and safe and healthful workplaces, procedures, and equipment. Observe all safety and/or environment precautions regarding electricity, cable, and lines. Provide ventilation for exhaust fumes during equipment operation and use hearing protection when required IAW AR 385-10, the Clean Air Act (CAA) and the CAA amendments, and the OSHA Hazard Communication standard.

Accidents are an unacceptable impediment to Army missions, readiness, morale, and resources. Decision makers at every level will employ risk management approaches to effectively preclude unacceptable risk to the safety of personnel and property affiliated with this task. (a) Take personal responsibility. (b) Practice safe operations. (c) Recognize unsafe acts and conditions. (d) Take action to prevent accidents. (e) Report unsafe acts and conditions.

No food or drink is allowed near or around electrical equipment (CPU, file servers, printers, projectors, etc.) due to possible electrical shock or damage to equipment. Exercise care in personal movement in and through such areas. Avoid all electrical cords and associated wiring. In event of electrical storm, you will be instructed to power down equipment.

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 ATP 3-11.32, NBC Protection, ATP 3-11.32, CBRN Decontamination.

**Prerequisite Individual Tasks :** None

**Supporting Individual Tasks :** None

**Supported Individual Tasks :** None

**Supported Collective Tasks :** None

**Knowledges :**

<b>Knowledge ID</b>	<b>Knowledge Name</b>
K-551-U-0045	Knowledge of starting engine procedures and components
K-551-P-0225	Knowledge of electrical system fundamentals

**Skills :**

<b>Skill ID</b>	<b>Skill Name</b>
S-551-P-0092	Ability to comply with safety rules
S-551-U-0017	Ability to conduct an inspection
S-551-U-0023	Ability to start engine
S-551-U-0024	Ability to check components.

**ICTL Data :** None