

UNITED STATES MARINE CORPS
Logistics Operations School
Marine Corps Combat Service Support Schools
Training Command
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LVSM 7107

STUDENT OUTLINE

OPERATE THE MK18A1

LEARNING OBJECTIVES

1. Terminal Learning Objective: Given an MK48/18, TM 2320-10/11A, and TM 09470B-10/1, operate the MK18 in the container and bridge modes in conjunction with maintenance related operational check, per the references. (3521.13.25)

2. Enabling Learning Objectives:

a. Given an MK48/18A1, TM 2320-10/11A, and TM 09470B-10/1, prepare the MK48/18A1 for operation, per the references. (3521.13.25a)

b. Given an MK48/18A1, TM 2320-10/11A, and TM 09470B-10/1, operate the MK18A1 components, using the remote control unit per the references. (3521.13.25b)

c. Given an MK48/18A1, TM 2320-10/11A, and TM 09470B-10/1, operate the MK18A1 components, using the manual control unit per the references. (3521.13.25c)

OUTLINE

1. **INTRODUCTION TO THE MK18A1**

a. The MK18A1 rear body unit (RBU), operating with the MK48 front power unit, forms one variation of the Logistics Vehicle System (LVS). The MK48/18A1 is designed to self-load, transport, and self-unload standardized containers, flatracks, and ribbon bridge sections. Additionally, the MK18A1 can be utilized to self-load/unload a bridge erection boat and cradle assembly, as well as high-bank launch operations of ribbon bridge sections.

b. The MK18A1 load handling system (LHS) is capable of lifting 44,200 lb. through hydraulic power. The LHS is designed to lift ISO/ANSI

containers, flatracks or, with the help of the winch system, a ribbon bridge section or bridge erection boat and cradle assembly.

c. LHS Components. The MK18A1 LHS consists of the following components:

(1) Two hook arm lift cylinders - tilt the hook arm from horizontal to vertical position.

(2) Two main cylinders - extend and retract the mainframe. The mainframe in turn positions the FLA for loading and unloading.

(3) Front lift adapter (FLA) - attaches the hook arm to containers and flatracks. It is also used to anchor the winch cable pulley and tensioner during ribbon bridge or boat and cradle loading and unloading.

(4) Adapters, rollers and locks - assure proper loading, unloading, and securing of containers, flatracks, ribbon bridge, or boat and cradle.

(5) Boat pulley assembly - mounted on the hook arm and used during boat loading operation.

d. All MK18A1 load handling and winch systems are powered by hydraulic fluid supplied to the MK18A1 by the MK48.

e. In normal operation, the MK18A1 lifting components and winch system are controlled through the remote control unit, which receives electrical power from the MK48 through an electrical harness.

f. There are two personnel and equipment safety features incorporated into the MK18A1 electrical system.

(1) The first safety feature is an EMERGENCY STOP SWITCH located on the remote control unit (RCU). When the emergency stop switch is activated, all hydraulic functions cease and engine rpm decreases from high idle to normal idle speed. When the emergency stop switch is reset, normal hydraulic operations are restored.

(2) The second safety feature is PROXIMITY SWITCHES attached to the load handling system hook arm on the MK18A1. These proximity switches control the automatic operation of the LHS during container operation and relief of system hydraulic pressure during over the road (transit) operation.

2. IDENTIFICATION, LOCATION, AND FUNCTION OF MANUAL/REMOTE CONTROLS

a. Manual Control Panel

(1) Controls on this panel are used to manually operate the MK18A1 during pre-operation and in the event of a remote control unit (RCU) malfunction. All controls are spring-loaded to the neutral position. The panel consists of four control levers.

(2) SAFETY VALVE ON/OFF- acts as a "dead man safety". It must be operated and held in the ON position for the other controls to function.

(3) MAIN FRAME LOAD/UNLOAD CONTROL- extends and retracts the mainframe cylinders, moving the mainframe and the hook arm forward or aft.

(4) HOOK ARM LOAD/UNLOAD CONTROL- extends and retracts the hook arm cylinders, moving the hook arm up or down.

(5) WINCH IN/OUT CONTROL- plays the winch cable and hook in and out.

(6) When operating with the manual controls, the engine will remain at low idle. Also, it is recommended to have the RCU disconnected for manual control operation. However, if the RCU is connected during manual control operation, the RCU emergency stop switch should be OFF so the manual safety valve can be used.

(7) An hour meter is provided to record the hours of operation for the hydraulic system. The meter is connected to an electrical pressure switch that is part of the hydraulic system. It starts operation only when the auxiliary hydraulic control on the MK48 power unit is activated.

b. Remote Control Unit (RCU)

(1) The primary control for the MK18A1 is the remote control unit (RCU). The RCU and cable are stowed in the stowage box. The remote control cable connects the RCU to the MK18A1 at the electrical receptacle in the stowage box. Electrical power is provided by the MK48; therefore, it is important to have a good connection between the MK48 and MK18A1. A cable support arm is used to keep the cable from being caught under the MK48/18A1 tires.

(2) Most operations on the MK18A1 are done with the RCU. It provides remote operation for loading and unloading containers, flatracks, ribbon bridge sections, and bridge erection boat and cradle assemblies.

(3) The RCU contains the following controls:

(a) EMERGENCY STOP SWITCH - The two-position toggle switch is covered with a red safety cover. The cover prevents unintentional activation

of the MK18A1 load handling system. When the switch is positioned to OFF, the RCU is disabled.

(b) LEFT JOYSTICK - The left joystick is a dual-axis (forward/aft and left/right) mechanism for manually positioning the hook arm or playing out/retracting the winch cable and hook during manual operations. The joystick is active only when the AUTO/MANUAL switch is positioned to MANUAL. The joystick is spring loaded to the neutral position. Applying forward or backward pressure to the joystick causes the LHS hook arm cylinders to retract (LOAD) or extend (UNLOAD). Applying left or right pressure to the joystick causes the winch to play in (WINCH IN) or play out (WINCH OUT) the winch cable and hook.

(c) AUTO/MANUAL SWITCH - The two-position toggle switch selects load handling system operation. When the switch is positioned to AUTO, the MK18A1 electronics is programmed to automatically sequence the load handling system for container and flatrack loading/unloading operations, also when using the right joystick. When the switch is positioned to MANUAL, it programs the MK18A1 electronics for manual sequencing of the load/handling system when using either the left and right joysticks. It is important to understand the AUTO/MANUAL switch has nothing to do with the manual control levers previously discussed.

(d) HIGH IDLE SWITCH - This two-position toggle switch selects engine idle condition. When the switch is positioned to OFF, the MK48 engine operates at low idle. When the switch is positioned to ON and the parking brakes are applied, the MK48 engine operates at high idle when either joystick is activated.

(e) RIGHT JOYSTICK - This joystick is a single-axis (forward/aft) mechanism. The function of this joystick depends on the position of the AUTO/MANUAL switch. The joystick is spring loaded to the neutral position. With the AUTO/MANUAL switch positioned to AUTO, forward pressure to the joystick (LOAD) causes the load handling system to automatically sequence to the fully retracted position. Backward pressure to the joystick (UNLOAD) causes the load handling system to automatically sequence to the fully extended position. With the AUTO/MANUAL switch positioned to MANUAL, forward pressure to the joystick (LOAD) causes the LHS mainframe cylinders to retract. Backward pressure to the joystick (UNLOAD) causes the LHS mainframe cylinders to extend. Most operations would be done in the AUTO mode, but at times the right or left joystick is used to control the hook arm or mainframe in a non-sequenced manner.

3. IDENTIFICATION, LOCATION, AND FUNCTION OF THE LOAD HANDLING SYSTEM

a. LHS Components

(1) MAINFRAME - The major component of the LHS is the mainframe. This is a hydraulically operated assembly that can be raised from horizontal to vertical with the mainframe cylinders. The hook arm is mounted to the mainframe; therefore, any movement of the mainframe results in simultaneous movement of the hook arm.

(2) HOOK ARM - The hook arm assembly pivots off the mainframe, using the hook arm hydraulic cylinders connected to the mainframe. The FLA is attached to the hook on the hook arm.

(3) FRONT LIFT ADAPTER (FLA) - The front lift adapter attaches to the LHS hook arm. It can be configured to perform container or flatrack loading/unloading operations, ribbon bridge section loading/unloading operations, or bridge erection boat and cradle assembly loading/unloading operations. The FLA free-floats on the hook arm during container and flatrack operations and is rigidly locked to the hook arm for ribbon bridge section and bridge erection boat and boat cradle assembly operations.

(4) WINCH - The winch is used to load and unload the ribbon bridge sections or bridge erection boat and cradle assemblies. The winch is hydraulically operated and includes a self-actuating brake to hold the load. For winch operations, the FLA is fixed to the hook arm so the hook arm does not pivot.

4. PREPARING THE MK48/18A1 FOR OPERATION

- a. Apply the parking brake by pulling the parking brake valve out.
- b. Place the transmission range selector in the neutral (N) position.
- c. Turn the engine start switch to the START position and release it when the engine starts, allowing the switch to return to the ON position.
- d. Observe the dashboard indicators and gages (air, oil, water, and battery) for proper operation.
- e. Pull the selector valve out to the AUXILIARY HYDRAULICS position. When the valve is pulled out to provide hydraulics to the MK18A1, it eliminates the yaw steering between the power unit and rear body unit. In this condition, the vehicle's ability to turn is greatly reduced; therefore, the vehicle should not be driven. However, maneuvering the vehicle forward and rearward in the loading or unloading operation is acceptable with the selector valve in the auxiliary position.

5. OPERATE THE MK18A1 USING THE REMOTE CONTROL UNIT (RCU)

a. RCU Preparation

- (1) Open the RCU stowage box and remove the RCU.
- (2) Check the cable to ensure it is properly connected to the receptacle in the RCU stowage box and at the RCU.
- (3) Thread the cable through the cable support coil to keep it from being caught under the tires.
- (4) Place the neck strap around the neck of the outside operator and adjust the strap for comfortable operation.
- (5) The RCU is to be set as follows:
 - (a) The MANUAL/AUTO switch is set in the MANUAL position.
 - (b) The cover on the emergency stop switch is in the UP or ON position.
 - (c) The HIGH IDLE switch is in the ON position.
 - (d) The emergency stop switch is ON - but only when ready to operate. Remember, for safety, the RCU EMERGENCY STOP switch should be in the ON position only when required to actuate the LHS or winch. The switch should be in the OFF position during all other times. The switch must be in the OFF position whenever the RCU is left unattended. Failure to comply may result in an inadvertent operation of the MK18A1.
- (6) The engine high idle will operate only when the parking brake on the MK48 is applied, the EMERGENCY STOP and HIGH IDLE switches are in the ON position, and either joystick is moved from its neutral position.

b. RCU MANUAL MODE-LEFT JOYSTICK

- (1) The left joystick is a dual-axis (forward/aft and left/right) mechanism. This joystick is active only when the AUTO/MANUAL switch is positioned to MANUAL. The joystick is spring-loaded to the neutral position.
- (2) Applying forward or backward pressure to the joystick causes the LHS hook arm cylinders to extend (unload) or retract (load).
- (3) Applying left or right pressure to the joystick causes the winch to play in (winch in) or play out (winch out) the winch cable and hook.

c. RCU MANUAL MODE--RIGHT JOYSTICK

(1) The right joystick is a single-axis (forward/aft) mechanism. The right joystick is spring-loaded to the neutral position.

(2) Applying backward pressure to the right joystick causes the LHS mainframe cylinders to extend (unload). While operating the mainframe joystick until it reaches full extension, the mechanic MUST pay attention to the white line depicting maximum extension of the mainframe. The white line is painted on the operator's side of the mainframe; however, there is no reference to this mark or any type of warning to the operator of over extension in the technical manuals. All operations should cease when the white line is horizontal to the deck. Should the operator be unaware of this mark or reason for it, the over extension of the mainframe will cause pinching or severing of the hydraulic lines mounted to the mainframe.

(3) Forward pressure to the right joystick causes the LHS mainframe cylinders to retract (load).

d. RCU in AUTO MODE

(1) To automatically sequence the load handling system for loading/unloading operation, the AUTO/MANUAL switch is placed in the AUTO position. The RCU is to be set as shown:

(2) The AUTO/MANUAL switch is set in the AUTO position.

(3) The cover on the EMERGENCY STOP switch is UP or in the ON position.

NOTE: The EMERGENCY STOP switch should be ON only when required to actuate the system. The switch should be OFF at all other times.

(4) The HIGH IDLE switch is in the ON position. The HIGH IDLE will operate when the parking brakes are applied, the EMERGENCY STOP and HIGH IDLE switches are ON, and a joystick is moved.

(5) The left joystick is inactive when the RCU is placed in the AUTO position.

e. RCU AUTO POSITION - RIGHT JOYSTICK

(1) With the AUTO/MANUAL switch positioned to AUTO, backward pressure to the joystick (unload) causes the load handling system to automatically sequence to the fully extended position.

(2) During the AUTO sequence, the hook arm cylinders will extend to a specified point. When that point is reached, the mainframe cylinders will start to extend automatically. The mainframe cylinders will extend until the joystick is released or the cylinders reach the end of their travel.

(3) If the hook arm cylinders are extended to the specified point and the joystick is again moved to the UNLOAD position, the mainframe cylinders will extend.

(4) Forward pressure on the joystick (load) will reverse the automatic sequence. The mainframe cylinders will retract fully and be followed by the hook arm cylinders.

6. OPERATING THE MK18A1 USING THE MANUAL CONTROLS

a. Manual Control. There are four MANUAL CONTROL levers. The MANUAL controls are used to operate the MK18A1 for configuring or in the event of a remote control unit (RCU) malfunction. All controls are spring-loaded to the neutral position.

b. Safety Valve On/Off

(1) This control acts as a "dead man safety." It must be operated and held to the ON position for the other controls to function.

(2) When operating with the MANUAL controls, the engine will remain at low idle. Also, it is recommended to have the RCU disconnected for MANUAL control operation.

c. Main Frame Load/Unload Control

(1) With the SAFETY VALVE held in the ON position, and the mainframe control pulled DOWN, the mainframe cylinders will extend. While operating the mainframe control in the unload position remember to observed the white line painted on the mainframe, and to cease operations when the white line is horizontal to the deck.

(2) With the mainframe control pushed upwards, the mainframe cylinders will retract.

(3) When the cylinders are fully extended or retracted, release the control. Failure to release the control will increase oil pressure to the relief valve setting and could cause a problem.

d. Hook Arm Load/Unload Control

(1) This control extends and retracts the hook arm cylinders when the safety valve is activated.

(2) Moving the control down will extend the hook arm cylinder.

(3) With the control pushed upward, the hook arm cylinder will retract.

(4) Do not hold the control in the activated position when the cylinders are fully extended or retracted. Failure to release the control could cause damage to the equipment.

e. Winch Control

(1) When activated, this control plays in or out the winch cable and hook.

(2) Moving the control lever to the OUT position releases the winch brake and allows the cable and hook to play out. The operator must be assisted to keep tension on the cable.

(3) With the control moved to the IN position, the cable and hook will be positioned on the drum spool.

(4) Be cautious when cabling IN or OUT, to prevent damage to the cable assembly.

REFERENCES:

TM 09470B-10/1

TM 2320-10/11A