

UNITED STATES MARINE CORPS
Logistics Operations School
Marine Corps Combat Service Support Schools
Training Command
PSC Box 20041
Camp Lejeune, North Carolina 28542-0041

LVSM 7105

STUDENT OUTLINE

OPERATE THE MK17A1

LEARNING OBJECTIVES:

1. Terminal Learning Objective: Given an MK48/MK17 combination, TM 2320-10/11A, tools and equipment, perform an operational check on the crane, per the reference. (3521.13.03)
2. Enabling Learning Objectives:
 - a. Given an MK48/MK17A1 combination, TM 2320-10/11A, tools, and equipment, prepare the MK48/17A1 for operation, per the reference. (3521.13.03o)
 - b. Given an MK48/MK17A1 combination, TM 2320-10/11A, tools, and equipment, deploy the outrigger beams and stabilizers, per the reference. (3521.13.03p)
 - c. Given an MK48/MK17A1 combination, TM 2320-10/11A, tools, and equipment, unstow the crane, per the reference. (3521.13.03q)
 - d. Given an MK48/MK17A1 combination, TM 2320-10/11A, tools, and equipment, operate the crane, using manual controls, per the reference. (3521.13.03r)
 - e. Given an MK48/MK17A1 combination, TM 2320-10/11A, tools, and equipment, operate the crane, using the remote control unit, per the reference. (3521.13.03s)
 - f. Given an MK48/MK17A1 combination, TM 2320-10/11A, tools, and equipment, stow the crane, per the reference. (3521.13.03t)
 - g. Given an MK48/MK17A1 combination, TM 2320-10/11A, tools, and equipment, stow the outrigger beams and jack cylinders, per the reference. (3521.13.03u)

OUTLINE

1. INTRODUCTION TO THE MK17A1

a. The MK17A1 rear body unit (RBU), operating with the MK48/A1 front power unit, forms a Logistics Vehicle System (LVS). The MK17A1 is designed to transport palletized cargo and ISO/ANSI containers. However, from a mechanic's perspective, we will concentrate on the operation of the material handling crane and the outriggers/jack cylinders. Also, the MK17A1 is equipped with a new crane, which is manufactured by Grove Crane.

b. The MK17A1 crane is capable of lifting 11,000 pounds at a radius of up to 10 feet. Beyond that distance, the crane is limited to lighter loads by an overload shutdown system. The MK17A1 material handling crane has four major functions:

- (1) Boom up/down
- (2) Boom telescope in/out
- (3) Boom swing clockwise/counterclockwise
- (4) Hoist up/down (reeling in/playing out hoist cable)

c. The main boom column can rotate 318 degrees with a 42-degree dead spot at the main control panel. The dead spot prevents the operator from swinging the load over his head when the operator is standing at the main control panel.

d. The crane, with the outrigger jack cylinders in position, can lift 9,000 pounds with a boom angle of 45 degrees and boom length of 15 feet.

e. The crane is operated by hydraulics supplied by the MK48/MK48A1 through the main control panel. The main control panel provides the controls to manually operate all the functions of the crane and the outrigger jack cylinders.

f. Each control is proportional. The farther the control is moved, the faster the movement of the selected crane function or outrigger jack cylinder. Left and right outrigger jack cylinders are provided to stabilize, support, and level the vehicle while the crane is operating. Additional outrigger controls are provided, separate from the main control panel, on the right side of the vehicle. A remote control unit with the same operating functions, except for outrigger controls, and the mast may also operate the crane.

g. Several safety features are built into the crane's hydraulic system to protect equipment and personnel.

(1) Holding valves will prevent the load from falling in the event of pressure loss due to a hydraulic line failure.

(2) Should a hydraulic failure occur, adjusting the cylinder-holding valve can lower the suspended load.

(3) A suspended load on the crane can be lowered when hydraulic pressure is lost on the MK48/MK48A1 if external hydraulic lines from a MK48/15A1 Wrecker/Recovery Vehicle are attached to the quick disconnect couplings at the front of the crane trailer.

(4) The crane is also equipped with an overload protection system that prevents lifting of loads greater than the crane can handle.

(5) When an overload occurs, the crane can still operate, but only those functions, which decrease the overload condition. For example, during an overload situation, the operator can still retract the boom, and pay out cable to lower the load to the ground.

2. IDENTIFICATION OF THE CONTROLS AND COMPONENTS USED IN THE OPERATION OF THE CRANE AND STABILIZERS MOUNTED ON THE MK17A1

a. Remote Control Unit This unit allows operation of the crane remotely from the Main control panel. The remote unit control contains the following items:

(1) The BOOM lever raises or lowers the boom.

(2) The TELESCOPE lever retracts or extends the crane's telescoping boom sections.

(3) The SWING lever rotates the crane clockwise or counterclockwise.

(4) The HOIST lever pays out or reels in the crane's hoist cable.

(5) The EMERGENCY STOP switch is a two-position toggle switch, used to turn power on/off to the remote control unit.

(6) The outrigger jack cylinders and the mast cannot be operated with the remote control.

b. Remote Control Stowage Box The stowage box is used to store the remote control unit and its cable.

c. Material Handling Crane The crane consists of a mast, an extendable boom, and a winch.

d. Boom Angle Indicator The boom angle indicator reads out in degrees to indicate boom angle. The maximum lifting capacity of the crane is calculated by using the boom angle.

e. Crane Hook The crane hook is used to attach a load to the crane.

f. Main Junction Box Located on the crane's main body platform, the main junction box contains the following switches:

(1) The MAIN POWER is a two-position on/off switch used to control the crane's electrical power supply.

(2) The TILT ALARM turns the crane's tilt alarm system ON or OFF.

g. Outrigger Jack Extension Pads The outrigger jack extension pads are used as support platforms for the outrigger jack extension cylinders. When not in use, the outrigger jack extension pads are stowed in brackets located on the underside of the MK17A1 right hand and left hand stowage compartments.

h. Main Control Panel The main control panel contains the following controls:

(1) The BOOM lever raises and lowers the boom.

(2) The TELESCOPE lever retracts or extends the crane's telescoping boom sections.

(3) The SWING lever rotates the crane clockwise or counterclockwise.

(4) The HOIST lever pays out or reels in the crane's hoist cable.

(5) The LH O/R (outrigger) JACK lever raises or lowers the LH outrigger jack cylinder.

(6) The MAST lever raises or lowers the mast. The mast can only be raised or lowered from the crane's main control panel.

(7) The O/R (outrigger) EXT lever extends or retracts the right and left side outrigger jack beams.

(8) The RH O/R (outrigger) JACK lever raises or lowers the RH outrigger jack cylinder.

(9) The MANUAL OVERRIDE switch is a push-button switch used to override the overload system in an emergency.

(10) The remote control receptacle for the crane remote control cable.

i. Passenger Side Outrigger Jack Cylinder Control Panel The passenger side outrigger jack cylinder control panel is an auxiliary set of controls, which allow the operator the flexibility of deploying the outriggers from either side of the MK17A1. The passenger side outrigger jack cylinder control panel contains three controls:

(1) The RH O/R (outrigger) JACK lever raises or lowers RH outrigger jack cylinder.

(2) The O/R (outrigger) EXT lever extends or retracts right and left side outrigger beams.

(3) The LH O/R (outrigger) JACK lever raises or lowers LH outrigger jack cylinder.

(4) These controls are also located on the crane's main control panel.

j. Tilt Alarm Located on the main control panel, the tilt alarm sounds a warning when the crane is out of balance during operation. 4.5 degrees out of level will sound the alarm.

3. HOW TO DETERMINE CRANE SETTINGS FROM RANGE DIAGRAM

a. Earlier we discussed the new MK17A1 crane's maximum lifting capacity of 11,000 pounds. It is important to know, however, that the crane's lifting capacity decreases the farther the crane boom is extended, the more acute its angle, and how high it is raised.

b. The crane's boom length, angle, and height, as well as the load's weight, must be determined before crane operation. Too much weight at the wrong boom length, angle, or height will overload the crane, causing a shutdown. To calculate these factors and to avoid crane overload shutdown, we must use the information on the data plate mounted on the crane's main control panel. This data plate contains three diagrams to help the operators determine the crane's lifting capacity:

(1) The range diagram contains boom length, angle, height, and load weight information.

(2) The area definition chart depicts the crane's boom swing radius. Note that there is a 42-degree "dead" area located over the main control panel. The crane will not swing into this area for the safety of the crane operator.

(3) The load chart is a table of crane load capacities in various crane boom configurations. This chart is used in conjunction with the range diagram.

4. EMERGENCY OPERATING PROCEDURES

a. In the event that an overload shut down does occur, the crane can still be partially operated. In an overload situation, the only crane functions that will work are functions that decrease the overload situation, such as lowering the hoist, retracting the boom, or rotating the crane.

b. In the event of an overload shut down or electrical system failure, the crane can also be manually overridden with the MANUAL OVERRIDE switch located on the crane's main control panel. Simply push in the MANUAL OVERRIDE switch. While holding the switch in, operate the crane to finish the desired operation. The manual override switch should be used sparingly to avoid potential damage to the crane.

c. When the load is in a secure position, the crane will automatically reset itself, allowing for normal operation.

5. PREPARING THE MK48/17A1 FOR OPERATION

a. Apply the parking brake by pulling the parking brake valve out.

b. Place the transmission shifter 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 MK17A1, 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.

6. DEPLOYMENT OF THE OUTRIGGER BEAMS AND JACK CYLINDERS

- a. Position the crane's MAIN POWER switch to ON.
- b. Position the crane's TILT ALARM switch to ON.
- c. Move O/R EXT lever to OUT position until outriggers are fully extended. The outriggers can be extended from the main control panel or the passenger side outrigger jack cylinder control panel on the right side of the vehicle.
- d. Remember to make sure that the area is clear on both sides of the vehicle before extending outrigger beams and outrigger jack cylinders. Failure to comply may result in injury to personnel or damage to equipment.
- e. Remove two outrigger jack extension pads from their brackets located under the tool stowage box.
- f. Both outrigger jack extension pads are installed on outrigger jack cylinders the same way.
- g. Remove two retaining pins from the outrigger jack extension pad.
- h. Clear all dirt and debris from the socket in the outrigger jack extension pad and from the end of the outrigger.
- i. Position the outrigger pad directly below the outrigger jack cylinder.
- j. Use the same procedure to set up the outrigger pad on the other side.
- k. Move the LH O/R JACK lever to the DOWN position and lower outrigger jack cylinder until ball end is seated in outrigger pad. Remember to keep hands and feet clear of outriggers during operation. Failure to comply may result in injury to personnel.
- l. Install the retaining pins on the outrigger jack extension pad.
- m. Move the RH O/R JACK lever to the DOWN position and lower the outrigger jack cylinder until the ball end is seated in the outrigger jack extension pad.
- n. Install retaining pins on the outrigger jack extension pad.
- o. Using both the LH O/R JACK and the RH O/R JACK levers, lower the outrigger jack cylinders until both rear springs are off their spring seats.

Lower the outrigger jack cylinders individually as necessary to level the truck side-to-side.

p. To provide greater stability, never lift any tire off the ground when leveling the vehicle.

7. OPERATING THE MK17A1 USING THE MANUAL CONTROLS

a. Unstowing Crane

(1) Move the BOOM lever to the UP position, and the HOIST lever to the DOWN position, until the boom is at a 45 degree angle as indicated on the boom angle indicator.

(2) Operate HOIST lever and BOOM lever at the same time until hook is suspended freely over the stowage ring.

(3) Remove the safety pin from the hook assembly latch and remove the hook from the stowage ring. Replace the safety pin in the hook assembly latch.

(4) From the crane's main control panel, move the BOOM lever to the UP position and the MAST lever to the UP position until the mast is fully raised. Hold the levers in the UP position for 2-3 seconds to ensure erection cylinder is fully erected. Operate BOOM lever and MAST lever at the same time to maintain boom at approximately a 30-degree angle. Remember, the mast can be raised only from the main control panel.

(5) Never telescope the boom and lift the load unless the mast is fully raised. Failure to comply may result in damage to equipment.

b. Manual Operation of the Crane Controls

(1) Operate the crane's control levers using even pressure. Moving the lever slightly will cause slow movement of the crane. Moving the lever to full travel will cause faster movement of the crane.

(2) Place the SWING lever in the clockwise position to move the boom to the right.

(3) Place the SWING lever in the counterclockwise position to move the boom to the left.

(4) Place the HOIST lever in the DOWN position to pay out the cable and TELESCOPE lever to OUT to extend the boom. Operate the HOIST lever and TELESCOPE lever at the same time.

(5) Place the HOIST lever in the UP position for paying in the cable and TELESCOPE lever to IN position to retract the boom. Operate the HOIST lever and TELESCOPE lever at the same time.

(6) Place the BOOM lever in the UP position to raise the boom.

(7) Place the BOOM lever in the DOWN position to lower the boom.

8. OPERATE THE MK17A1 USING THE REMOTE CONTROL UNIT (RCU)

a. RCU Preparation

(1) Remove the crane remote control unit and cable from its stowage box.

(2) Position the MAIN POWER switch to OFF.

(3) Connect the cable to the crane remote control unit.

(4) Connect the other end of the cable to the REMOTE CONTROL HOOK UP receptacle.

(5) Position the MAIN POWER switch to ON.

(6) Place the neck strap around the neck and adjust the strap for comfortable operation.

(7) Position the EMERGENCY STOP switch on the crane remote control to ON.

b. Operation of the Crane With Remote Controls

(1) Place the SWING lever in the clockwise position to move the boom to the right.

(2) Place the SWING lever in the counterclockwise position to move the boom to the left.

(3) Place the HOIST lever in the DOWN position to pay out the cable and TELESCOPE lever to OUT to extend the boom. Operate the HOIST lever and TELESCOPE lever at the same time.

(4) Place the HOIST lever in the UP position for paying in the cable and TELESCOPE lever to IN position to retract the boom. Operate the HOIST lever and TELESCOPE lever at the same time.

- (5) Place the BOOM lever in the UP position to raise the boom.
- (6) Place the BOOM lever in the DOWN position to lower the boom.

c. Disconnect Remote Control

- (1) Position EMERGENCY STOP SWITCH on crane remote control unit to OFF.
- (2) Position MAIN POWER switch to OFF.
- (3) Remove cable from REMOTE CONTROL HOOK UP receptacle.
- (4) Remove cable from crane remote control unit.
- (5) Stow cable and crane RCU.
- (6) Position MAIN POWER switch to ON for stowing of the crane.

9. STOWING THE CRANE

a. Move the HOIST lever to the UP position to reel in the cable and the TELESCOPE lever to the IN position to retract the boom.

- (1) Operate the HOIST lever and TELESCOPE lever at the same time.
- (2) Reel in the cable until approximately 2 ft. (0.6m) of cable hangs from the boom.

(3) The boom must be positioned in line with the outrigger beam and fully retracted before lowering. Observe the boom during lowering to ensure that no contact is made with the right rear fender. Failure to comply may result in damage to equipment.

b. Operate the SWING lever to position the boom in line with the outrigger beam. Position the boom so that the cable and hook assembly are on the passenger's side of the vehicle.

c. Operate the BOOM lever so that the boom angle indicator reads approximately 30 degrees.

d. At the main control panel, move the MAST lever to the DOWN position and fully lower the mast. Operate the BOOM lever and MAST lever at the same time so that a 45-degree reading is maintained on the boom angle indicator.

e. Move the HOIST lever to the DOWN position and connect the HOOK block to the stowage ring.

f. Move HOIST lever to UP position and BOOM lever to DOWN position at same time until boom is fully lowered and all slack is removed from cable and block just touches boom nose.

10. STOWING OUTRIGGER BEAMS/JACK CYLINDERS

a. Remove two retaining pins from the outrigger jack extension pads.

b. Move the LH O/R JACK lever and the RH O/R JACK lever to the UP position until the outrigger jack cylinders are fully retracted. Operate the LH O/R JACK lever and the RH O/R lever at the same time.

c. Install the two retaining pins in the outrigger jack extension pads.

d. Stow the two outrigger jack extension pads on the brackets located on the bottom of the tool stowage boxes.

e. Move the O/R EXT lever to the IN position until the outriggers are fully retracted.

f. Position the crane's MAIN POWER switch to OFF.

g. Push the selector valve into the steering position.

h. Shut down the engine using normal shutdown procedures.

REFERENCE:

TM 2320-10/11A