

UNITED STATES MARINE CORPS
ENGINEER EQUIPMENT INSTRUCTION COMPANY
MARINE CORPS DETACHMENT
686 MINNESOTA AVE
FORT LEONARD WOOD, MISSOURI 65473-8963

LESSON PLAN

LIGHT CAPABILITY ROUGH TERRAIN FORKLIFT (LCRTF)
TEREX TX 51-19MD

LESSON ID: BEE0-B01

BASIC ENGINEER EQUIPMENT OPERATOR COURSE

CID A1613F1

REVISED 12/15/2011

APPROVED BY _____

DATE _____

INTRODUCTION

(10 MIN)

(ON SLIDE #1)

1. **GAIN ATTENTION.** Picture this: You are currently stationed at Combat Out Post X-Ray, Afghanistan, which is located 100km away from the nearest FOB. Resupply comes every two weeks via convoy, and you are the only Heavy Equipment Operator stationed at the COP. It's 0200, and a convoy consisting of 15 7-ton MTRVs roll into the COP. All 15 trucks need to be off loaded within two hours so the convoy can leave under the cover of darkness. And the only piece of heavy equipment is your LCRTF Terex 5K. This kind of press is common place for a heavy equipment operator. 15 trucks, 2 hours, and only you and your forklift. Makes you question if you have what it takes. After this period of instruction, I am more than confident that you will be able to accomplish any operational mission the LCRTF 5K is capable of performing.

(ON SLIDE #2)

2. **OVERVIEW.** Good _____ (morning, afternoon, evening) Marines, my name is _____, the following period of instruction is "TX 51-19MD, Light Capability Rough Terrain Forklift." The purpose of this period of instruction is to give you the tools, knowledge, and skills to safely and effectively operate the Light Capability Rough Terrain Forklift in accordance with its engineer mission. **(ON SLIDE #3)** How I will be doing this is by covering safety and operator responsibilities of a heavy equipment operator, the characteristics and major components of the LCRTF 5K, the operator controls and instruments of the tractor, how to perform starting and stopping procedures, and the basic operation of the LCRTF. This lesson relates to the Marine Corps need for material handling operations.

| |
|------------------------|
| INSTRUCTOR NOTE |
|------------------------|

| |
|--------------------------------|
| Introduce learning objectives. |
|--------------------------------|

(ON SLIDE #4)

3. **LEARNING OBJECTIVES.**

a. **TERMINAL LEARNING OBJECTIVES**

(1) Provided engineer equipment, tools, equipment records and references, conduct engineer equipment preventive maintenance so that equipment is checked and serviced per the appropriate technical manual and actions/ deficiencies/ discrepancies are recorded per TM 4700-15/1H. (1345-MAINT-1001)

(2) Provided a Light Capability Rough Terrain Forklift(LCRTF), an engineer equipment requirement, and engineer records and forms, operate the Terex Light Capability Rough Terrain Forklift(LCRTF) to safely meet operational requirements with no injury to personnel or damage to the equipment. (1345-XENG-1007)

b. **ENABLING LEARNING OBJECTIVES.**

(1) Given the description and characteristics of the LCRTF, and with aid of references, identify the characteristics per TM-09135C-OR/A. (1345-XENG-1007a)

(2) Provided a LCRTF, engineer records and forms, with the aid of references, initiate operator forms and records per TM 4700-15/1_. (1345-XENG-1007b)

(3) Provided a LCRTF, engineer records and forms, technical manuals and lubrication orders, perform technical manual research per TM-09135C-OR/A. (1345-XENG-1007c)

(4) Provided a LCRTF, engineer records and forms, tools, and with the aid of references, demonstrate correct use of tools per TM 10209-10/1. (1345-XENG-1007d)

(5) Provided a LCRTF, engineer records and forms, tools, petroleum, oils lubricants, and with the aid of references, demonstrate correct use of petroleum, oils lubricants per TM-09135C-OR/A. (1345-XENG-1007e)

(6) Provided a LCRTF, engineer records and forms, tools, petroleum, oils lubricants, and with the aid of references, perform operation checks (before, during, and after) per TM-09135C-OR/A. (1345-XENG-1007f)

(7) Provided a LCRTF, an operator, and without the aid of references, perform hand and arm signals per FM 21-60. (1345-XENG-1007g)

(8) Provided a LCRTF, engineer records and forms, and references, perform material handling operations per TM-09135C-OR/A. (1345-XENG-1007h)

(9) Provided a LCRTF, engineer records and forms, tools, and with the aid of references, complete operator forms and records per TM 4700-15/1_. (1345-XENG-1007i)

(10) Provided a LCRTF, tools, petroleum, oils lubricants, equipment records, and references, conduct preventive maintenance per TM-09135C-OR/A. (1345-MAINT-1001a)

(ON SLIDE #5)

4. **METHOD/MEDIA**. This period of instruction will be taught utilizing the informal lecture method, followed by demonstration and practical application. I will be aided by the use of computer generated graphics, the student outline, the LCRTF, and training loads of various weights.

INSTRUCTOR NOTE

Explain Instructional Rating Forms to the students.

(ON SLIDE #6)

5. **EVALUATION**. You will be evaluated by a 25 question multiple-choice written evaluation at 0800 on the fifth training, at Bldg 5075, TA-244. Following the review of your written evaluation, you will receive a performance-based evaluation of your operational ability at the MHE phase, which is located next to bldg 5075, TA-244.

(ON SLIDE #7)

6. **SAFETY/CEASE TRAINING (CT) BRIEF**. Every Marine is responsible for safety and can call cease training any time they see an unsafe act occurring. During the operation of any heavy equipment, all personnel in the work area must maintain a high level of situational awareness.

INSTRUCTOR NOTE

Review the ORAW for LCRTF operations with the class.

(ON SLIDE #8)

TRANSITION: Now that you know what will be taught, how it will be taught and how you will be evaluated, are there any questions

on what has been covered to this point? If not, let's move on to Safety and Operator Responsibilities of the heavy equipment operator.

(ON SLIDE #9)

BODY

(35 HRS 45 MIN)

1. **SAFETY AND OPERATOR RESPONSIBILITIES.** (5 Min)

a. **Safety.** When operating heavy equipment there are certain guidelines one must follow to ensure his/her safety and the safety of others working in the same area.

(1) Ensure that you are operating in a safe manner (keep speed appropriate to terrain, "Slow is Smooth, Smooth is Fast").

(2) Practice safe work habits (situational awareness, looking in your direction of travel, etc.).

(3) Be aware of any hazardous operating conditions (poor weather conditions, unsafe terrain).

(4) Ensure that you are familiar with the operation and controls of the tractor that you plan to operate.

(5) Ensure that you abide by all safety rules and practices that govern your training area.

(ON SLIDE #10)

b. **Operator Responsibilities.**

(1) Always fasten your seat belt prior to any and all operation of the tractor.

(2) Ensure all controls are in their neutral position prior to, and after operation.

(3) Apply the parking brake and service brake prior to starting the tractor.

(4) No passengers are allowed on heavy equipment at any time.

(5) Be aware of all pinch points and ensure they are kept clear prior to, and during operation and maintenance of equipment. This includes keeping your head and all body parts inside the cab while operating.

(6) Check and maintain a clearance from any and all physical obstacles (i.e. barriers, power lines, buildings, trailers, vehicles, etc...) prior to and during operation.

(7) Safeguard any and all pedestrians that you may come in contact with.

(ON SLIDE #11)

TRANSITION: Thus far, we've discussed safety and operator responsibilities for heavy equipment, are there any questions on what we've covered to this point? If not I have a question for you. **QUESTION:** Are passengers allowed on the LCRTF? **ANSWER:** No, any tractor may only carry as many personnel as it has seats and seatbelts for. Let's move on to the Characteristics and Major Components of the 5K.

(ON SLIDE #12)

2. **CHARACTERISTICS AND MAJOR COMPONENTS.** (30 Min)

a. **Characteristics.**

(1) Make and Model. The Light Capability Rough Terrain Forklift is manufactured by Terex Lift Company. Its model designator is TX 51-19MD, but is commonly referred to in the Marine Corps as the 5K (which comes from its approximate maximum lifting capacity), the Terex (coming from the company name written on the tractor), or the LCRTF (the official military nomenclature).

(ON SLIDE #13)

(2) Mission. The mission of the LCRTF is to load and unload palletized cargo from trucks, trailers, aircrafts, ships, and ISO containers; and utilizing the removable pintle hook, to

perform precision maneuvering of artillery pieces and equipment into position.

(ON SLIDE #14)

(3) Specifications.

(a) Dimensions. The height of the LCRTF at its highest point is 7'6". The 5k is 6'6" wide and 14'8" long. Knowing the dimensions is necessary for transporting the tractor as cargo; to allow for maximum use of space, and ensure it can clear obstacles en route.

(b) Weight. The weight of the LCRTF in running order is 13,450 LBS.

(ON SLIDE #15)

(c) Reach. The maximum lifting height is 18'9" measured from the deck to the bottom of the forks. The maximum reach forward is 10'9" from the front fender to the front of the fork carriage.

(d) Lifting Capacity. The maximum lifting capacity of the LCRTF is 5070 LBS. This is only capable with the boom fully retracted, up to a 50° boom angle. As the boom is telescoped out, the lifting capacity will incrementally decrease. The exact lift capacity at certain distances telescoped out can be found on the load chart.

INSTRUCTOR NOTE

Explain to the students that the load chart will be covered in detail later in the class.

(ON SLIDE #16)

(e) Speed. The maximum speed forward and reverse is 20 MPH. It has full time 4-wheel drive with a limited slip front axle and locked differential rear axle. The LCRTF has an outside turning radius of 26'8".

(f) Fording Depth. The LCRTF has a maximum fording depth of 36". The operator should always do a dismounted reconnaissance before attempting to ford in order to assess the current, actual depth, and the driving surface (I.E. river bed, sandy beach, etc.). This will help prevent damage to or loss of the tractor from the fording operation.

(g) Slopes. The LCRTF can negotiate a maximum slope of up to 45 degrees fore (forward) and aft (reverse), with a full load on its forks.

(ON SLIDE #17)

b. Major Components.

(1) Engine. The LCRTF has a Deutz BFM 2011 engine. It is a 4-cylinder, 4-stroke, diesel with direct injection and the 2-3-4 cylinders in line. It puts out 81.6 horsepower at 2500 RPM. The engine is located on the right side of the tractor. The Deutz engine has an oil cooling system that utilizes crankcase oil to flow around the cylinders and cylinder head, before passing through a thermostat to the oil cooling radiator. No antifreeze is used with this engine.

(ON SLIDE #18)

(2) Electrical System.

(a) Batteries. The LCRTF has two 12 volt batteries in series which gives the tractor a 24 volt negative ground system. The battery box is located on the right rear fender directly behind the engine compartment.

(b) Solargizer. The solargizer is a small solar panel that helps the battery maintain a charge over long periods of time by capturing the sun's energy and converting it to an electrical charge. It is located in between the NATO SLAVE connection and the battery cut off switch on the rear of the battery box.

(c) NATO SLAVE Connection. The NATO SLAVE Connection is nothing more than a very simplified way for any NATO piece of equipment to jump-start another piece of NATO equipment. The connection itself is a male end, and the SLAVE cables have two female ends. The SLAVE receptacle is located on the rear of the battery box to the right of the solargizer.

(d) Battery Disconnect Switch. The battery disconnect switch allows the operator to disconnect the batteries to prevent loss of the electrical charge in the batteries.

(ON SLIDE #19)

(3) Hydraulic Pump.

(a) Hydraulic Pump. The hydraulic pump is a variable displacement pump that drives the hydraulic motor and controls the hydraulic circuit.

(b) Hydraulic Circuit. The hydraulic circuit consists of a gear pump connected to the engine which, through a steering valve, dispenses oil to the distributor for the following: Boom lifting/lowering, telescopic boom sections extension/retraction, fork rotation, fork locking, fork tilting, fork side shift, steering valve and control valve.

(ON SLIDE #20)

(4) Transmission.

(a) Hydraulic Motor. The hydraulic motor adjusts to give maximum torque when under heavy loads, or maximum flow under light loads. The hydraulic motor is attached to the front axle in which it drives. The hydraulic motor is equipped with a hydraulic motor disconnect which is utilized for towing operations.

INSTRUCTOR NOTE

Failure to disconnect the hydraulic drive motor before towing will result in damage to the hydraulic drive motor and the hydraulic system.

(b) Steering Axles. The front axle, limited slip differential, drives the rear axle, locked differential, thru a drive shaft to provide 4-wheel drive at all times.

(ON SLIDE #21)

(5) Boom. Fully hydraulic two section-telescoping boom consisting of a boom base section and a second boom section.

(ON SLIDE #22)

(6) Fork Carriage. The fork carriage is hydraulically controlled with manual forktine adjustment.

(ON SLIDE #23)

(7) Operator's Cab. The operators cab is equipped with a Rollover Protective Structure(ROPS) and a Falling Object

Protective Structure(FOPS) for the operators protection during operations.

(ON SLIDE #24)

(8) Pintle Hooks. Equipped with a detachable pintle hook located on the left rear fender, and a permanent pintle hook mounted on the counter weight, to the rear of the machine. The detachable pintle hook utilized on the fork carriage for maneuvering and placing equipment. Rear permanent pintle hook utilized for towing equipment.

(ON SLIDE #25)

TRANSITION: We've just discussed the characteristics and major components of the LCRTF. Are there any questions on what we've covered to this point? If not, I have a question for you.

QUESTION: How many pintle hooks does the LCRTF have? **ANSWER:** Two, one permanently attached to the counter weight and one that can be attached to the fork carriage.

(BREAK - 10 Min)

INTERIM TRANSITION: Are there questions on any of the material we have covered to this point? If not, let's move on to the instruments and controls of the tractor.

(ON SLIDE #26)

3. INSTRUMENTS AND JOYSTICK CONTROLS. (45 Min)

a. Instruments.

(1) Gauge Cluster.

(a) Hour Meter. This indicates the running time of the engine in hours(used for servicing).

(ON SLIDE #27)

(b) Fuel Gauge. Indicates the amount of fuel remaining in the fuel tank. Fuel tank capacity is 13 gallons. Always verify gauge by checking level in fuel tank prior to operation.

(ON SLIDE #28)

(c) High Temperature Warning. Illuminates to alert the operator that engine is overheated and must be shut down to cool.

(ON SLIDE #29)

(d) Low Charge Warning. Indicates that a 'Low' or 'No Charge' condition exists.

(ON SLIDE #30)

(e) Low Engine Oil Pressure Warning. This indicator will light up when engine oil pressure is too low. Stop the engine immediately when lit. Lights when engine oil pressure is below 12 psi.

(ON SLIDE #31)

(f) Parking Brake Applied Indicator. Indicates the parking brake is engaged. Parking brake must be engaged in order to start the engine.

(ON SLIDE #32)

(g) Low Brake Pressure Warning. Warns the operator the service brake pressure is low. Stop and check the brake reservoir for sufficient fluid and signs of leaks.

(ON SLIDE #33)

(2) Air Filter Condition Indicator. Orange light illuminates when the air filter is restricted and requires cleaning or replacement.

(3) Glow Plug Warning Lamp. Indicates the activation of engine glow plugs for preheating the cylinders.

(ON SLIDE #34)

(4) Hydraulic Temperature Indicator Gauge. Indicates the hydraulic oil temperature within the reservoir.

(ON SLIDE #35)

(5) Engine Coolant Temperature Gauge. Indicates engine coolant temperature.

(ON SLIDE #36)

(6) Filter Indicator. Indicates condition of hydraulic drive system oil filter:

(a) Green. Normal Operating Condition: 0-18 psi

(b) Yellow. Caution, prepare to change the filter:
18-22 psi

(c) Red. Shut down immediately; notify maintenance to change hydraulic oil filter: 22-60 psi

(ON SLIDE #37)

(7) Ignition Switch. This switch is used to energize the electrical system, and to start the engine. It has 3 positions:

(a) Off

(b) Power on

(c) Start

INSTRUCTOR NOTE

Do not operate the starter motor for more than 20 seconds at a time. If the engine fails to start on the first attempt, turn the ignition switch off and wait 2 minutes before trying again. Doing so prevents damage to the starter and draining of the electrical system.

(ON SLIDE #38)

(8) Steering Selection Switch. Three-position switch used to select the steering mode.

(a) Two-Wheel Steering. Center position; steering is accomplished with front wheels only.

(b) Four-Wheel Steering. Right position; front and rear wheels steer in opposite directions for a tighter turning radius.

(c) Crab Steering. Left position; all four wheels steer in the same direction for sideways, or "crab", movement.

INSTRUCTOR NOTE

Before changing steering modes, ensure the wheels are straight. If steering comes out of alignment, follow these steps to re-align steering: first, turn the rear wheels until they are straight. Then select two-wheel steer on the steering selector switch, ensuring you straighten the front wheels. Then select your desired mode of steer.

(ON SLIDE #39)

(9) Forward, Neutral, Reverse Control. Three-position control lever with a center position neutral lock. Raise and move lever forward to the "F" position to engage forward direction of travel. Raise and move lever rearward to the "R" position to engage reverse direction of travel.

INSTRUCTOR NOTE

The engine cannot be started unless selector is locked in neutral, with the parking brake engaged, and the operator properly seated.

(ON SLIDE #40)

(10) Load Moment Indicator (LMI). The LMI is a LED warning display. The unit display indicates the stability and safety of the load through the use of GREEN, YELLOW, and RED LEDs. At 'POWER ON' position of the ignition switch, the display conducts a diagnostic self check of the LEDs, and then illuminates the first GREEN LED, indicating proper operation. GREEN, YELLOW, and RED LEDs are used to show the current load percentage.

(a) GREEN. 0% to 89% of lifting capacity. Indicates normal operating range.

(b) YELLOW. 90% to 100% of lifting capacity. Indicates high limit of operating range, pre-warning of a possible overload condition. Reduce the load as soon as possible.

(c) RED. Over 100% of the rated capacity, or a hazardous condition. Stop operations IMMEDIATELY, and, using extreme caution, reduce the load.

INSTRUCTOR NOTE

When tractor LMI LED's are in the RED and tractor is overloaded all boom handling functions are disabled.

(d) RED Override Button. Use the RED override button to activate the boom controls. Retract and lower the boom to bring the load into safer limits and increase stability.

INSTRUCTOR NOTE

RED Override Button must be pressed in and held while maneuvering the boom to a safe and stable operating range.

(ON SLIDE #41)

(11) Emergency Stop Button. Pressing this button stops and shuts down all engine and operational functions of the tractor. Rotate clockwise to reset the button.

(ON SLIDE #42)

(12) Side Shift/Rotate Function Switch. Works in conjunction with rocker switch located on joystick control lever to control attachment functions.

(a) Forward position. Enables fork side shift function.

(b) Rear position. Enables fork rotate and attachment lock and unlock functions.

(ON SLIDE #43)

(13) Work/Travel Switch.

(a) Forward position. "Work setting" enables all fork attachment functions and all steering modes.

(b) Rear position. "Travel setting" disables all fork attachment functions in order to prevent accidental operation while traveling; as well as disabling four-wheel and crab steer modes.

(ON SLIDE #44)

(14) NATO Light Switch.

(a) Mechanical Lockout Lever. Prevents accidental movement of lighting control lever. Move in a counterclockwise direction to operate lighting control lever.

(b) Lighting Control Lever. This switch has five positions:

1 OFF. All lights, back-up alarm, horn, and blackout lights are inoperable.

2 STOP LIGHT. Operates taillights, horn and backup alarm.

3 SER DRIVE. All lights, horn, back-up alarm and tail lights will operate, but all blackout lights are not operable.

4 B.O. MARKER. Operates front and rear blackout markers, but all service lights, horn, backup alarm, taillights and internal lights are rendered inoperative.

5 B.O. DRIVE. Operates blackout headlight, blackout stop/tail light, and all blackout marker lights, however all other internal and external alarms, horns, and indicators are not operational.

(ON SLIDE #45)

(c) Panel Light Control. This switch has four positions:

(1) OFF. Indicator lights on dash are inop.

(2) PARK. Dims indicator lights on dash.

(3) DIM. Also dims indicator lights.

(4) PANEL BRT. Sets dash lights and indicators to brightest intensity.

ON SLIDE #46)

(15) Parking Brake Lever. Located to the left of the operators seat. The parking brake unit contains a proximity

switch that prevents engine from starting or drive motor from engaging unless the brake is engaged.

(16) Seat Switch. Located on bottom of the seat. Disables engine from starting unless the operator is properly seated.

(ON SLIDE #47)

(17) Joystick Control Lever. The joystick control lever enables the operator to control all forklift handling operations, including boom extend and retract, boom raising and lowering, load tilt, load side shift, and load rotation (oscillation).

(a) Boom Control.

1 Boom Hoist (up/down). Accomplished by moving joystick forward to lower the load, or rearward to raise the load, in either travel or work mode.

2 Boom Reach (telescoping). Accomplished by moving joystick to right to extend the boom, or left to retract the boom, in either travel or work mode.

(ON SLIDE #48)

(b) Fork Tilt.

1 Depress work/travel switch to Work position. Forklift truck movement is restricted to low-speed operations only.

2 Depress and hold top rocker switch on joystick to enable fork tilt functions.

3 Move joystick lever forward to tilt forks forward, or rearward to tilt forks back.

4 Release rocker switch on joystick when tilting functions are completed.

(ON SLIDE #49)

(c) Fork Side Shift.

1 Depress work/travel switch to Work position. Forklift truck movement is restricted to low-speed operations only.

2 Depress side shift/rotate function switch to Side Shift position.

3 Depress rocker switch on joystick rearward to Side Shift position and hold.

4 Move joystick lever forward to side shift forks left, or rearward to side shift forks right.

5 Release rocker switch on joystick when side shift functions are complete.

(ON SLIDE #50)

(d) Fork Oscillation (Rotate).

1 Depress work/travel switch to the Work position. Forklift truck movement is restricted to low-speed operations only.

2 Depress side shift/rotate switch to the rear, illuminating the LED, to engage Oscillation function.

3 Depress rocker switch on the joystick rearward to Rotate position and hold.

4 Move joystick forward to oscillate the forks/load counterclockwise, or rearward to oscillate the forks/load clockwise.

5 Release rocker switch on joystick when rotating functions are completed.

(ON SLIDE #51)

TRANSITION: We've just discussed instruments and controls. Are there any questions on what we've covered to this point? If not, I have a question for you. **QUESTION:** What does the hour meter do? **ANSWER:** It indicates the running time of the engine in hours (used for servicing).

(BREAK - 10 Min)

INTERIM TRANSITION: Are there questions on any of the material we have covered to this point? If not, let's move on to performing basic operations of the tractor.

(ON SLIDE #52)

4. BASIC OPERATIONS. (55 Min)

a. **Pre-Operation Checks**

(1) Perform the following before-operation checks and services before the daily initial start of the engine as follows:

- (a) Fluid Leaks
- (b) All Windows and Light Clean
- (c) All lights clean
- (d) Tire and Wheels
- (e) Guards in Place
- (f) Operators Manual and
- (d) Rating Chart in Cab
- (g) Boom Slide Pads
- (h) Engine Air Cleaner
- (i) Engine Oil Level
- (j) Hydraulic Oil Level
- (k) Brake Oil
- (l) Engine Coolant Level

(2) Before operating the machine, verify the controls and functions are functioning properly.

(ON SLIDE #53)

b. **Starting Procedures**

(1) Turn the battery disconnect switch to the ON position.

(2) Ensure that the forward/neutral/reverse control is locked in neutral, and the parking brake is engaged.

(3) Turn ignition switch to POWER ON position and allow for heating of glow plugs. The glow plug lamp should illuminate. When the warning lamp goes out, turn ignition switch to spring-loaded START position to crank engine.

INSTRUCTOR NOTE

The engine starter will not operate unless the batteries are connected, the parking brake is properly engaged, the forward/neutral/reverse control is locked in neutral, and the operator is properly seated. The engine is equipped with a glow plug preheating system. The glow plugs energize automatically for a period based on the ambient temperature.

(4) If engine fails to start after 20 seconds, turn ignition switch to the OFF position and wait for two minutes before attempting again.

INSTRUCTOR NOTE

DO NOT crank the starter motor for more than 20 seconds at a time. Continuous cranking can overheat and damage the starter motor.

(5) As soon as engine starts, reduce engine rpm to idle to allow a gradual warmup and reduce engine wear.

(ON SLIDE #54)

c. **Stopping Procedures**

(1) With an empty forklift attachment, travel to a level surface. Release the accelerator pedal, allowing the engine to return to idle. Slowly apply the service brake pedal, stopping the tractor.

(2) When the forklift truck comes to a complete stop, place the transmission direction control lever in neutral and engage the parking brake to prevent accidental movement.

INSTRUCTOR NOTE

ALWAYS engage the parking brake after stopping the forklift truck to prevent accidental movement. Failure to follow this warning may result in injury or death.

(3) Level the fork carriage; then lower the fork carriage, placing it level and lightly upon the deck.

(4) Unbuckle and exit the tractor utilizing 3-points of contact facing the equipment, and perform a 360-degree walk around of the equipment.

(5) Turn the ignition switch to the OFF position.

(6) Disconnect the batteries by placing the switch in the vertical position.

(ON SLIDE #55)

d. **Load Chart**

(1) This Tractor is equipped with a load chart. If the load chart is damaged, missing, or unreadable, the forklift will be safety deadline.

(2) The load chart must be used to determine a safe boom angle and boom length with respect to the weight of the load.

(a) Boom Angle. When the boom is raised from a horizontal position this is known as the boom angle. The boom angle is a direct indicator of the height of which the boom and/or fork carriage is from the deck. The boom angle indicator, located on the left side of the boom, tells the operator the angle, in degrees, at which the boom is currently positioned.

(b) Boom Length. The distance from the center of the boom hinge pin at the base of the boom to the end of the last boom section.

(3) The angle and extension indicators must be used along with the load chart instructions to determine the correct boom lifting capacities.

(ON SLIDE #56)

(4) For any lifts made, all corresponding load charts are read the same way.

(a) Boom lengths are shown along the bottom, and listed as ZONE (-) through ZONE (E).

(b) Above each boom length gives a complete range of boom angles.

(c) Each ZONE, shown on the bottom right hand corner, will give a specific weight that can be safely lifted for that ZONE.

(5) ZONE (-)

(a) Below 50 degree boom angle

(b) Fully retracted, no letters visible, 5070 lbs. capacity

(6) ZONE (A)

(a) Below 50 degree boom angle

(b) 5 feet from front of tire, letter (A) visible, 4410 lbs capacity.

(7) ZONE (B)

(a) Below 50 degree boom angle

(b) 6 feet from front tire, letter (B) visible, 3305 lbs capacity

(8) ZONE (C)

(a) Below 50 degree boom angle

(b) 7 feet from front tire, letter (c) visible, 2755 lbs capacity

(9) ZONE (D)

(a) Below 50 degree boom angle
(b) 9 feet from front tire letter (D) visible, 2205 lbs capacity

(10) ZONE (E)

(a) Below 50 degree boom angle
(b) 10 feet from front of tire, letter (E) visible, 1765 lbs capacity

(11) ZONE (F)

(a) Above 50 degree boom angle
(b) 500 lbs capacity

(ON SLIDE #57)

e. **Adjusting the Forks**

(1) Lift and rotate the clamping lever on the top of fork to be moved 180-degrees.

(2) Slide fork to the desired position.

(3) Rotate the clamping lever back 180-degrees and lower it to lock the fork into place. If the lever does not lower completely, slide fork slightly until the lever drops and clicks into place.

(ON SLIDE #58)

f. **Hoisting Loads**

(1) Set work/travel switch to Work position to enable fork tilt, fork side shift, and fork oscillation capabilities.

(2) Approach load slowly with forks raised slightly off the deck, but lower than the load. Insert forks level and evenly under load until it reaches the rear of the carriage, seating square.

INSTRUCTOR NOTE

Approach the load perpendicular to ensure it is square on forks.

(3) Lift the entire load a few inches off the deck to check stability of load.

(4) Utilizing side shift and oscillation, maneuver the load as necessary.

(5) Slightly tilt the load back, ensuring overload warning system LEDs are within limits.

(6) Retract boom completely before traveling with the load.

(ON SLIDE #59)

g. **Transferring Loads**

(1) Set work/travel switch to Travel position. Fork tilting, side shifting, oscillation, and four-wheel and crab steering are all disabled.

INSTRUCTOR NOTE

Traveling with loads raised high in the air can cause the forklift to become dangerously unstable. Travel with the load as close to the ground as possible (12-18" with a slight tilt to the rear).

(2) Drive forklift cautiously, keeping the speed appropriate to terrain conditions.

INSTRUCTOR NOTE

DO NOT stop or start quickly. The load may shift suddenly, causing instability. Failure to follow this warning may result in injury or death to operator or other personnel.

(3) Upon reaching load destination, set work/travel switch to Work position to enable tilting, side shifting, and oscillation capabilities. Speed of forklift is restricted to 5 mph.

(4) Travel on inclines, slopes, ramps, and grades only as follows:

(a) Loaded forklift: Forks (and load) pointed uphill.

(b) Empty forklift: Forks pointed downhill. DO NOT stop quickly. Failure to follow this warning may result in injury or death.

(ON SLIDE #60)

h. Placing Loads

(1) Set the work/travel switch to Work position to enable tilting, side shifting, and oscillation capabilities.

(2) Approach the placement site slowly and square, leaving enough room to maneuver the load.

INSTRUCTOR NOTE

When possible, the load should be placed on level ground.

(3) Stop with the load suspended a few inches above placement site.

(4) Level the fork carriage to ensure the load will be placed flat.

(5) Use side shift and oscillation to adjust placement of the load.

(6) Lower the boom slowly, ensuring the load is safely grounded and stable.

(7) Boom down to lower the forks sufficiently to clear the load but not touch the deck. Slowly back away from load.

(ON SLIDE #61)

TRANSITION: We've just discussed how to perform basic operations of the LCRTF 5K. Are there any questions for me? If there are no questions for me, I have a question for you. **QUESTION:** How do you set your forks beneath a load? **ANSWER:** Forks raised slightly off the deck but lower than the load; inserting them level and evenly until the load seats against the rear of the carriage.

(BREAK - 5 Min)

(ON SLIDE #62)

INTERIM TRANSITION: This morning we have covered safety and operator responsibilities of the heavy equipment operator, the characteristics and major components of the LCRTF 5K, the instruments and operator controls of the tractor, starting and stopping procedures, and basic operation. Are there questions on any of the material we have covered? If not, get your hard hats, student handouts and trip tickets, and meet me at the 5K ready line.

NOTE:

Ensure that all personnel are properly wearing the correct safety equipment when performing any type of PMCS.

INSTRUCTOR NOTE

Introduce Demonstration of 360 walk around

DEMONSTRATION. (30 Min) The purpose of this demonstration is to show the students how to perform before, during and after operations checks, with the aid of a NAVMC 10523 (trip ticket). The demonstration consists of a 360 degrees walk around of the tractor. Item(s) required are: One (1) LCRTF 5K for the Instructor to utilize, and students will have trip tickets and student handouts. Have the students gather around the LCRTF 5K for a demonstration of before, during and after operations checks while conducting a 360 walk around. Normal class size is twelve (12). There are two instructors required for this demonstration.

STUDENT ROLE: Students will observe the demonstration, asking questions if they do not understand what is being covered; while learning to identify and perform the checks and services associated with the trip ticket during the 360 walk around.

INSTRUCTOR(S) ROLE: With the aid of a trip ticket, the Primary Instructor will demonstrate how to perform the before, during, and after operations checks associated with the LCRTF 5K while conducting the 360 walk around. The Assistant Instructor will assist the Primary Instructor with the demonstration and any student questions.

1. Safety Brief: No safety concerns with this class.

2. Supervision and Guidance: Instructor will show the students the following items.

LEFT SIDE

Left front tire and wheel well
Boom angle indicator
Operator's cab hatch with serial number
Operator's cab window glass latch
Removable pintle hook
Left rear tire and wheel well

REAR SIDE

Hydraulic High pressure accumulator
Removable pintle hook fork attachment bar
Brake lights and B.O. markers
Fuel tank
Boom hinge pin
Rear Boom slide pads
Counterweight with permanent pintle hook
Battery disconnect switch
Solargizer panel
NATO SLAVE receptacle
Rear work light
Rear window wiper

RIGHT SIDE

Rear tire and wheel well
Hydraulic oil sight glass
Engine Compartment cover
Primary/Secondary Air filters
Hydraulic oil distributor
Brake fluid reservoir
Hydraulic oil fill point
Fuel/water separator
Fuel priming pump
Engine oil dipstick
Engine oil fill point
Fan belt
Oil-cooled radiator
Hydraulic motor
Hydraulic motor disconnect
Front tire and wheel well

FRONT

Fenders
Headlights
Turn signals

Fork carriage attachment
Fork tines
Hydraulic Hoses
Load Moment Indicator (LMI) solenoid and wire
B.O. light
Front work light
Windshield wiper

CAB

Door strap
Seatbelt
Seat adjustment lever
Accelerator pedal
Brake pedal
Parking brake
Forward, Neutral, Reverse (FNR) lever
Multi-Function joystick
Emergency stop button
Steering column adjustment lever
Front windshield wiper/horn/turn signal button and lever
Worklight switches
Hazard switch
Steering mode selector switch
Side-shift/Oscillation switch
Work/Travel switch
Defroster/Heater switch and knob
Windshield wiper fluid fill point
Load Chart
Load Moment Indicator (LMI)

3. Debrief: Answer any student questions and review the learning points.

INTERIM TRANSITION: While conducting a 360 walk around, with the aid of a trip ticket, we have just covered how to perform before, during and after operations checks associated with the LCRTF 5k. Are there any questions? If not, let's move on to the practical application of a 360 walk around on the LCRTF 5K.

INSTRUCTOR NOTE

Introduce Practical Application of 360 walk around.

PRACTICAL APPLICATION. (1 Hr 30 Min) The purpose of this Practical Application is to allow the students to complete a 360 walk around on the LCRTF 5K. Items required are four (4) LCRTF 5K's for the students. Normal class size is twelve (12). The students are broken into groups of three (3) and assigned a tractor. One student will conduct a 360 walk around whilst the others observe. There are two (2) instructors required for this demonstration.

1. Safety Brief: Reference the ORAW

2. Supervision and Guidance: Instructors are moving around the site assisting students

PRACTICE: Students will perform the following checks.

LEFT SIDE

Left front tire and wheel well
Boom angle indicator
Operator's cab hatch with serial number
Operator's cab window glass latch
Removable pintle hook
Left rear tire and wheel well

REAR SIDE

Hydraulic High pressure accumulator
Removable pintle hook fork attachment bar
Brake lights and B.O. markers
Fuel tank
Boom hinge pin
Rear Boom slide pads
Counterweight with permanent pintle hook
Battery disconnect switch
Solargizer panel
NATO SLAVE receptacle
Rear work light
Rear window wiper

RIGHT SIDE

Rear tire and wheel well
Hydraulic oil sight glass
Engine Compartment cover
Primary/Secondary Air filters
Hydraulic oil distributor
Brake fluid reservoir
Hydraulic oil fill point
Fuel/water separator

Fuel priming pump
Engine oil dipstick
Engine oil fill point
Fan belt
Oil-cooled radiator
Hydraulic motor
Hydraulic motor disconnect
Front tire and wheel well

FRONT

Fenders
Headlights
Turn signals
Fork carriage attachment
Fork tines
Hydraulic Hoses
Load Moment Indicator (LMI) solenoid and wire
B.O. light
Front work light
Windshield wiper

CAB

Door strap
Seatbelt
Seat adjustment lever
Accelerator pedal
Brake pedal
Parking brake
Forward, Neutral, Reverse (FNR) lever
Multi-Function joystick
Emergency stop button
Steering column adjustment lever
Front windshield wiper/horn/turn signal button and lever
Worklight switches
Hazard switch
Steering mode selector switch
Side-shift/Oscillation switch
Work/Travel switch
Defroster/Heater switch and knob
Windshield wiper fluid fill point
Load Chart
Load Moment Indicator (LMI)

3. Debrief: Answer any student questions and review the learning points.

INTERIM TRANSITION: We've just went over the practical application of conducting a 360 walk around on the LCRTF 5K. Are there any questions at this time? If not, let's move on to a demonstration of hand and arm signals.

INSTRUCTOR NOTE

Introduce Demonstration of hand and arm signals.

DEMONSTRATION. (15 Min) The purpose of this demonstration is to instruct the students in the purpose and correct use of hand and arm signals. Items required are student handouts for students to take notes. Have the students gather around the Instructor for a demonstration of hand and arm signals. Normal class size is twelve (12). There are two (2) instructors required for this demonstration.

STUDENT ROLE: Students will observe the demonstration asking questions if they don't understand.

INSTRUCTOR(S) ROLE: Primary Instructor will demonstrate hand and arm signals. Assistant Instructor will assist and entertain the student's questions.

1. Safety Brief: Reference the ORAW

2. Supervision and Guidance: Instructor will demonstrate to the students the following Hand and Arm Signals:

Boom Up
Boom Down
Tilt Forward/Down
Tilt Back/Up
Extend Boom
Retract Boom
Side Shift Right
Side Shift Left
Oscillate Right
Oscillate Left
Parkline

3. Debrief: Answer any student questions and review the learning points.

INTERIM TRANSITION: We have just covered how to perform hand and arm signals. Are there any questions at this time? If not, let's move on to the practical application of hand and arm signals.

INSTRUCTOR NOTE

Introduce Practical Application of hand and arm signals.

PRACTICAL APPLICATION. (15 Min) The purpose of this Practical Application is to allow the students to conduct hand and arm signals. No items are required. Normal class size is twelve (12). The students are broken into groups of three (3) and will conduct hand and arm signals. Two (2) instructors are required for this demonstration.

PRACTICE: Students will perform the following Hand and Arm Signals:

Boom Up
Boom Down
Tilt Forward/Down
Tilt Back/Up
Extend Boom
Retract Boom
Side Shift Right
Side Shift Left
Oscillate Right
Oscillate Left
Parkline

- 1. Safety Brief:** Reference the ORAW
- 2. Supervision and Guidance:** Instructor is moving around the site assisting students.
- 3. Debrief:** Answer any student questions and review the learning points.

INTERIM TRANSITION: We have just covered the practical application portion of performing hand and arm signals. Are there any questions? If not, let's move on to the demonstration of attaching the removable pintle hook.

INSTRUCTOR NOTE

Introduce Demonstration of attaching removable pintle hook.

DEMONSTRATION. (15 Min) The purpose of this demonstration is to show the students how to attach the removable pintle hook. Items required are a LCTRF 5K for the Instructor to utilize. Students will have their student handouts to take notes. Have the students gather around the LCTRF 5K for a demonstration of attaching the removable pintle hook. Normal class size is twelve (12). There are two (2) instructors required for this demonstration.

STUDENT ROLE: Students will observe the demonstration, asking questions if they don't understand.

INSTRUCTOR(S) ROLE: Primary Instructor will attach the removable pintle hook to the fork carriage and then restow it. The Assistant Instructor will assist the Primary Instructor with the demonstration and answering the student(s) questions.

1. Safety Brief: Read ORAW

2. Supervision and Guidance: Instructor will show the students the following items: Procedures for attaching the removable pintle hook.

3. Debrief: Answer any student questions and review the learning points.

INTERIM TRANSITION: I have just demonstrated the procedures for attaching the removable pintle hook to the LCTRF 5K. Are there any questions? If not, let's move on to the practical application of attaching the removable pintle hook.

INSTRUCTOR NOTE

Introduce Practical Application of attach removable pintle hook.

PRACTICAL APPLICATION. (1 Hr) The purpose of this practical application is to have the students demonstrate their ability to attach the removable pintle hook to the LCRTF 5K. Items required are four (4) LCRTF 5Ks for the students to utilize. Normal class size is twelve (12). There is one instructor required for this practical application. Students will be broken into groups of three; in which one student Prac-Apps whilst the other two observe, awaiting their turn.

PRACTICE: Students will perform the following: Attach the removable pintle hook to the fork carriage, then restow it.

PROVIDE-HELP: Instructor will check to ensure students are completing all steps required for safe operation, ensuring either a "GO" or "NO GO" status at the conclusion of Prac App.

1. Safety Brief: Reference the ORAW

2. Supervision and Guidance: Instructor is moving around the site observing students.

3. Debrief: Answer any student questions and review the learning points.

INTERIM TRANSITION: We have just covered the practical application of attaching the removable pintle hook. Are there any questions at this time? If not, let's move on to the demonstration of proper LCRTF 5K operating procedures.

INSTRUCTOR NOTE

Introduce demonstration of proper LCRTF 5K operating procedures.

DEMONSTRATION. (30 Min) The purpose of this demonstration is to show the students how to operate the LCRTF 5K. Items required are a LCRTF 5K for the Instructor to operate. The students will have student handouts to take notes. Issue hearing protection to students. Have the students gather around the operating station for a demonstration of proper operations. Normal class size is twelve (12). There are two (2) instructors required for this demonstration.

STUDENT ROLE: Students will observe the demonstration asking questions if they don't understand.

INSTRUCTOR(S) ROLE: Primary Instructor will demonstrate proper operation of the LCRTF 5K. The assistant Instructor will assist the Primary Instructor by narrating the demonstration and answering student(s) questions.

1. Safety Brief: Read ORAW and conduct safety brief

2. Supervision and Guidance: Instructor will show the students the following items:

Proper 360 walk around

3 points of contact facing the equipment entering tractor

Wear of safety belt

Proper Carry Height

Proper Fork insertion

Proper load lift and carry

Correct fork retraction

Look in direction of travel

Proper load placement

Travel position

Proper park line position

3 points of contact facing the equipment exiting tractor

Proper 360 walk around

3. Debrief: Answer any student questions and review the learning points.

INTERIM TRANSITION: We have just covered the demonstration portion of operating the LCRTF 5K. Are there any questions? If not, let's move on to the practical application.

INSTRUCTOR NOTE

Introduce Practical Application of LCRTF 5K operations.

PRACTICAL APPLICATION. (27 Hrs) The purpose of Practical Application is to allow the students to operate the LCRTF 5K. Item(s) required are: Four (4) LCRTF 5Ks for the students to operate, hearing protection, and radios. Normal class size is twelve (12). The students divide amongst four tractors with one (1) student operating; whilst the others observe, awaiting an open tractor. There are two (2) instructors required for this portion of instruction.

PRACTICE: Students will perform the following:

Proper 360 walk around

3 points of contact facing the equipment entering tractor
Wear of safety belt
Proper Carry Height
Proper Fork insertion
Proper load lift and carry
Correct fork retraction
Look in direction of travel
Proper load placement
Travel position
Proper park line position
3 points of contact facing the equipment exiting tractor
Proper 360 walk around

- 1. Safety Brief:** Reference the ORAW
- 2. Supervision and Guidance:** Instructor is moving around the site assisting students.
- 3. Debrief:** Answer any student questions and review the learning points.

INTERIM TRANSITION: We've just went over the practical application of operating the LCRTF 5K, are there any questions? If not, let's move on to the demonstration of conducting PMCS.

INSTRUCTOR NOTE

Introduce the Demonstration of conducting PMCS.

DEMONSTRATION. (15 Min) Have the students gather around the LCRTF 5K for a demonstration of conducting PMCS. Normal class size is twelve (12). There are two(2) instructors required for this demonstration.

STUDENT ROLE: Students will observe the demonstration, asking questions if they don't understand.

INSTRUCTOR(S) ROLE: Primary Instructor will demonstrate proper PMCS and the assistant Instructor will assist the primary Instructor with the demonstration and answering of student(s) questions.

- 1. Safety Brief:** Read ORAW

2. Supervision and Guidance: Instructor will show the students the following items.

- Check fluids
- Clean air filters
- Grease points
- Tire pressure
- Clean cab

3. Debrief: Answer any student questions and review the learning points.

INTERIM TRANSITION: We've just completed the required steps for proper PMCS. Are there any questions? If not, let's move on to practical application of the PMCS associated with the LCRTF 5K.

INSTRUCTOR NOTE

Introduce practical application of conducting PMCS.

PRACTICAL APPLICATION. (2 Hrs) The purpose of this Practical Application is to allow the students to conduct PMCS. Items required are: Four (4) LCRTF 5Ks for the students, hearing protection, safety glasses and PMCS worksheets. Have the students break into groups of three (3). Normal class size is twelve (12). There are two (2) instructors required for this practical application.

PRACTICE: Students will conduct the practical application portion by checking for, and either correcting or recording equipment deficiencies and discrepancies; completing the PMCS worksheet.

PROVIDE-HELP: Instructors will move around the PMCS line, correcting students as necessary.

1. Safety Brief: Read ORAW

2. Supervision and Guidance: Instructor is moving around the ready line, assisting students, and answering questions as they arise.

3. Debrief: Answer any student questions and review the learning points.

INSTRUCTOR NOTE

Answer all questions, then go into summary.

(ON SLIDE #63)

TRANSITION: We've just completed the practical application for proper PMCS, are there any questions? If there are no questions for me, I have some questions for you, before we move into the classroom for the summary.

QUESTION: During Preventive Maintenance Checks and Services (PMCS), how much GAA do you apply to a grease insert?

ANSWER: Until it escapes the seal, or as many pumps as the LO/LI states.

QUESTION: What Hand and Arm signal is given to an operator should they begin to drive with their boom extended?

ANSWER: Retract Boom.

QUESTION: Where on the 5K is the removable pintle hook located?

ANSWER: On the left side rear fender.

QUESTION: What is the proper way to unload cargo from trailer with a forklift?

ANSWER: From the rear of the trailer to the front. Ensure you side shift and oscillate the load as necessary to avoid striking another load before tilting back and retracting the boom.

(ON SLIDE #64)

SUMMARY:

(5 MIN)

During this period of instruction we have covered safety and operator responsibilities of the heavy equipment operator, the characteristics and major components of the LCRTF 5K, instruments and operator controls of the tractor, starting and stopping procedures, and the operation, employment, and preventive maintenance of the LCRTF. With the knowledge you have gained during this period of instruction, I am more than confident that you will be able to safely and effectively

operate the 5K in support of its engineer mission. Students with the IRFs please fill out the entirety of the form at this time. This concludes the period of instruction.