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ENGINEER EQUIPMENT INSTRUCTION COMPANY
MARINE CORPS DETACHMENT
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LESSON PLAN

EXTENDED BOOM FORKLIFT - MILITARY MILLENNIUM VEHICLE
SKY-TRAK

LESSON ID: BEE0-B02

BASIC ENGINEER EQUIPMENT OPERATOR COURSE

CID A1613F1

REVISED 10/02/2013

APPROVED BY _____

DATE _____

(ON SLIDE #1)

INTRODUCTION

(10 MIN)

1. **GAIN ATTENTION**. Watch the video. In the video you will see how an inexperienced operator caused thousands of dollars of damage to buildings and equipment. (ON SLIDE #2-VIDEO "EBFL/MMV ACCIDENT" .:54) Did you notice that the operators disregarded any safety concerns? Nor did he utilize the proper load charts. Because of the lack of training this operators caused thousands of dollars of damage. By paying close attention to this lesson you will understand the proper procedures associated with load charts and will not be like the civilian operators causing thousands of dollars of damage.

(ON SLIDE #3)

2. **OVERVIEW**. Good morning, my name is _____, the purpose of this lesson is to give you the tools, knowledge, and skills to safely and effectively operate the Extended Boom Forklift in support of Engineer operations. (ON SLIDE #4) I will cover operator safety and symbols, characteristics and capabilities, operator controls, operator indicators, starting procedures, Stabil-TRAK systems, changing attachments, and load charts.

(ON SLIDE #5)

3. **LEARNING OBJECTIVES**.

INSTRUCTOR NOTE

Introduce the learning objectives. Have students read the Enabling Learning Objective out of their student handout.

a. **TERMINAL LEARNING OBJECTIVE**.

(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 action/deficiencies are recorded per TM 4700-15/1H. (1345-MANT-1001)

(2) Provided an MMV, an engineer requirement, and engineer equipment records and forms, operate the Military

Millennia Vehicle (MMV) extended boom forklift to safely meet operational requirements with no injury to personnel or damage to the equipment. (1345-HEOP-1002)

b. **ENABLING LEARNING OBJECTIVES.**

(1) Given the description and characteristics of the (EBFL-MMV), with the aid of references, identify the characteristics per the TM 10794B-OR/A. (1345-HEOP-1002a)

(2) Provided an (EBFL-MMV), engineer equipment record and forms, tools, petroleum, oils, and lubricants, and with the aid of references, perform operations checks (before during and after) per the TM 10794B-OR/A. (1345-HEOP-1002b)

(3) Provided an (EBFL-MMV), engineer equipment records an forms, and references, perform material handling operations per TM 10794B-OR/A. (1345-HEOP-1002c)

(4) Provided an (EBFL-MMV), attachments, tools, engineer equipment records and forms, and references, change attachments per the TM 10794B-OR/A (1345-HEOP-1002d)

(5) Provided an (EBFL-MMV), tools, petroleum, oils, and lubricants, equipment records, and references, conduct preventive maintenance per the TM 10794B-OR/A. (1345-MANT-1001b)

(ON SLIDE #6)

4. **METHOD/MEDIA.** This lesson will be taught utilizing the lecture, demonstration, and practical application methods. I will be aided with the use of video, computer-aided graphics, your outline and actual end item of equipment.

INSTRUCTOR NOTE

Explain Instructional Rating Forms to Students

(ON SLIDE #7)

5. **EVALUATION.** You will be evaluated with a 25 question written examination on training day 4, at 0800, as well as a performance examination on training day 5 at 0800 at training area 244, Material Handler Phase.

(ON SLIDE #8)

6. **SAFETY/CEASE TRAINING (CT) BRIEF.** If at any time, you the student see any unsafe act, react immediately to let the Primary Instructor know. Safety is paramount and is everyone's responsibility. Every morning the (EBFL-MMV) Operational Risk Management (ORM) worksheet will be briefed prior to any operation of the equipment.

(ON SLIDE #9)

TRANSITION: Are there any questions on what we will be covering today, how we will cover it, or how you will be evaluated. If not, then let's move into our first topic Operator safety and Alert Symbols.

BODY

(34HRS 45MIN)

(ON SLIDE #10)

1. **OPERATOR SAFETY AND ALERT SYMBOLS.** (10 MIN)

a. **Description.** The safety alert symbol is used with signal words to attract the operator's attention towards messages found within the manual and on hazard decals located on the vehicle. The safety classifications, in order of severity are as follows:

(ON SLIDE #11)

(1) **Danger:** The signal word "Danger" indicates an imminently, hazardous situation. Which, if not avoided, will result in death or serious personal injury.

(ON SLIDE #12)

(2) **Warning:** The signal word "Warning" indicates a potentially hazardous situation. Which, if not avoided, could result in death or serious personal injury.

(ON SLIDE #13)

(3) **Caution:** The signal word "Caution" indicates a

potentially hazardous situation. Which, if not avoided, may result in minor or moderate injury.

(ON SLIDE #14)

(4) Caution: The signal word "Caution" used without the safety alert symbol indicates a potentially hazardous situation. Which, if not avoided, may result in property damage.

(ON SLIDE #15)

b. **Operator Safety.** When operating the (EBFL-MMV), there are certain guidelines one must follow to ensure his/her own safety, the equipment, and of the others working around the same area.

(1) Fasten Seat Belts. The fastening of seat belts will occur prior to the operator starting the machine or operating any of the control within the confines of the operators cab.

(2) Controls are in Neutral. Ensure that prior to starting the forklift that the machine is in neutral, neutral lock lever is engaged and the multifunction joystick is in a neutral position. This is done to ensure that no unexpected movements of vehicle occur.

(3) Parking Brake and Neutral Lock Lever. It is important to double check to ensure that the parking brake and neutral lock lever are engaged prior to starting the machine. If not, the machine will not start.

(ON SLIDE #16)

(4) No Passengers. The (EBFL-MMV) is not equipped with a personnel carrier. No passengers are permitted to be transported on the machine.

(5) Pinch Points. Operators must stay clear of pinch points. The Two most obvious pinch points are the wheels and boom assembly. If for any reason you need to check these areas extreme caution must be taken. Ensure the machine has been shut down and there is not an operator present in the cab.

(6) Cab Security. The (EBFL-MMV) is equipped with a Rollover Protective Structure (ROPS) and Falling Object Protective Structure (FOPS). These two devices provide the operator with protection in case of a rollover or a falling

object. The (EBFL-MMV) cab is rated to with stand 33,000lbs of pressure.

(ON SLIDE #17)

(7) 360-Degree Walk-Around. The Operator will conduct a 360-degree walk-around of the machine prior to mounting and after dismounting the machine. Any and all discrepancies will be annotated on the trip ticket (NAVMC 10523). All discrepancies of serious nature will be reported to the Primary Instructor immediately.

(8) Three Points of Contact. Operators will ensure that when mounting or dismounting the machine, they maintain three points of contact, facing the machine. Two hands, one foot, one hand, two feet.

(9) Ground all Attachments. The operator will ensure that fork attachment is placed level on deck prior to dismounting the machine.

(10) Caution on Slopes. The operator must ensure that **extreme caution is taken when operating the (EBFL-MMV) on sloped terrain**. Utilizing the frame sway feature is not recommended while on sloped terrain.

(ON SLIDE #18)

(11) Direction of Travel. Often times the area allotted for equipment to work in is small and enclosed or shared by other equipment. Therefore, the operator must ensure he/she looks in the direction of travel.

(12) Hearing Protection. Hearing protection will be worn prior to operating the (EBFL-MMV). Hearing protection must be worn within 50 feet of an operating (EBFL-MMV).

(13) Bulky Loads. Bulky loads will be **carried in reverse direction, travel speed will be slow, and the carry height of 12-18 inches slightly tilted back**.

(ON SLIDE #19)

TRANSITION: Thus far, we have talked about Operator safety and Alert symbols. Are there any questions, thus far? If not than I have a question for you. **Question:** What does the signal word "Warning" indicate and the result of failing to comply? **Answer:**

Warning indicates a potentially hazardous situation, which death or serious personal injury may occur by failing to comply.

(ON SLIDE #20)

2. CHARACTERISTICS AND CAPABILITIES. (15 MIN)

a. **Dimensions.** The height of the MMV at its highest point with the boom in the lowered and stowed position is 93" (7'9"). It is 101" (8'5") wide and 248" (20'8") long without any attachments. Knowing the dimensions is necessary for transporting the tractor as cargo to allow for maximum use of space and ensuring it can clear obstacle enroute.

b. **Weight.** The gross vehicle weight is 26,900lbs. This is without attachments on the machine. Type 1 carriage (11K Forks) weights is 1,300 lbs and Type 2 carriage (7K forks) weights is 2,300 lbs.

(ON SLIDE #21)

c. **Lift Capacity.**

(1) **Type I Fork Carriage.** The (EBFL-MMV) equipped with a type I fork carriage, which can lift a maximum weight of 11,000 lbs.

(2) **Type II Fork Carriage.** The (EBFL-MMV) equipped with a type II fork carriage, which can lift a maximum weight of 7,000lbs.



(ON SLIDE #22)

d. **Lifting Height.** The maximum lifting height of the (MMV-EBFL) is 42 feet 4 inches. This measurement is measured

from the ground to the bottom of the fork tines.

e. **Maximum Reach.** The maximum reach forward is 30 feet. This measurement is taken from the front of the tires to the front of the fork carriage.

f. **Fuel Capacity.** The (EBFL-MMV) fuel capacity is a total 50 gallons of JP* of diesel. The fuel tank is located directly behind of the operators cab.

(ON SLIDE #23)

g. **Electrical System.** The (EBFL-MMV) is equipped with a 24-volt negative ground electrical system. There is a NATO slave receptacle located in the engine compartment and utilized in slave starting a downed tractor.

h. **Engine.** The (EBFL-MMV) is equipped with a Cummins 4.5L Diesel engine that produces 110Hp@2500 RPM and 305 Ft-lbs of torque at 2500 RPM. The (EBFL-MMV) uses a Cummins electric grid engine heater to warm the engine block for cold starting.

(1) **Engine Oil.** The (EBFL-MMV)'s engine can utilize multiple engine lubricants based climate temperature. The most common fluid utilized is 15w/40 oil.

(ON SLIDE #24)

i. **Transmission.** The (EBFL-MMV) is equipped with a hydromantic transmission that provides four gears forward and three gears in reverse. However while in reverse the forth gear may be selected on the travel selector lever but the transmission will only reach third gear.

(1) **Maximum Speed.** The (EBFL-MMV) can travel at a maximum speed of 20 MPH.

(2) **Transmission Oil.** Unlike your previous forklift lesson, the (EBFL-MMV) transmission has a dipstick check that should be checked only when **HOT** to receive an accurate reading. The (EBFL-MMV) transmission requires 10w oil.

j. **Hydraulic System.** The (EBFL-MMV) hydraulic system has a 41.3 gallon capacity and incorporates a hydraulic site glass check located behind the hydraulic tank in the engine compartment.

(1) Hydraulic Oil. The (EBFL-MMV) hydraulic system requires 10w oil.

k. **Fording**. The (EBFL-MMV) has fording capability with a maximum fording depth of 36 inches.

(ON SLIDE #25)

TRANSITION: We have just finished covering characteristics and capabilities are there any questions? If not, then I have a couple of questions for you. **Question:** What is the maximum lifting height of the (EBFL-MMV)? **Answer:** 42 feet 4 inches
(ON SLIDE #26)**Question:** What kind of check is the (EBFL-MMV) transmission? **Answer:** Hot check

(ON SLIDE #27)

3. OPERATOR CONTROLS. (15 MIN)

(ON SLIDE #28)

a. Operators Cab.

(1) Accelerator Pedal. Pressing down the pedal increases **engine and hydraulic** speed of the vehicle. The pedal is spring loaded and when released, the engine will return to idle speed.

(2) Service Brake Pedal. Pressing down on the pedal decreases the speed of the vehicle by applying the service brakes to the axels. In the event of engine power loss, the service brakes can still be applied for braking.

(3) Steering Wheel. Turning the steering to the left or right steers the machine in the corresponding direction. Anyone of the three steering modes are selectable. However it is important to know that as the machine turns the attachment will extend beyond the machine's turning radius.

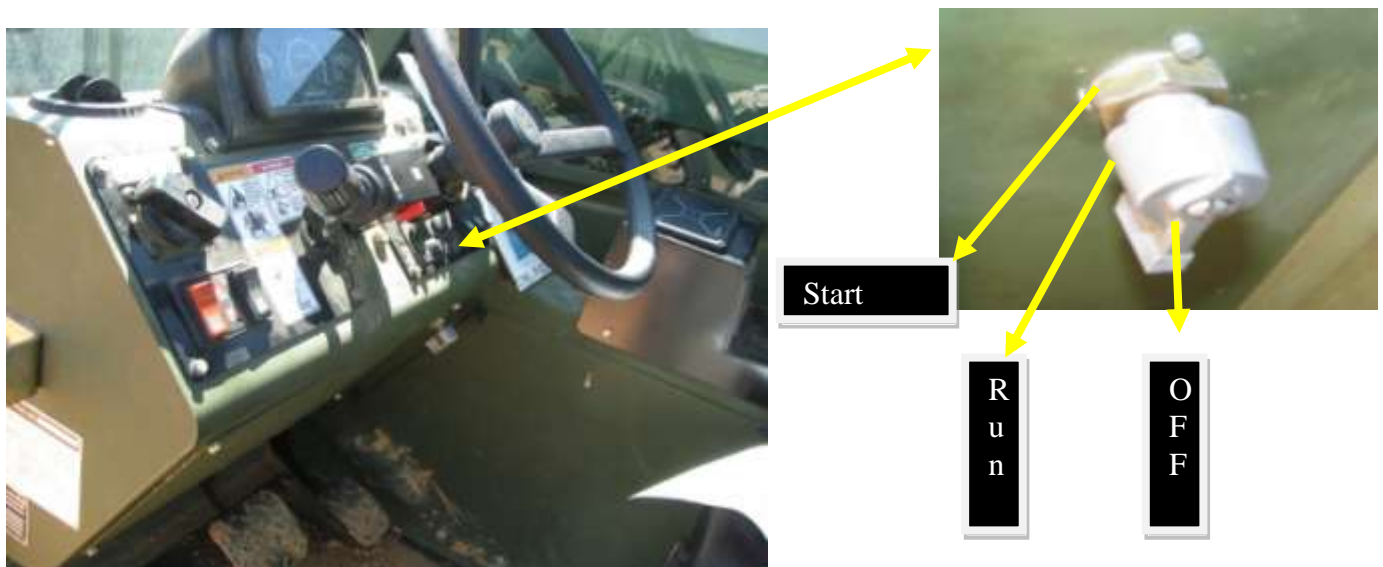
(4) Horn Button. The horn button is located in the center of the steering wheel. The horn will not function when the blackout lights are activated.



CAUTION: Allow for adequate clearance between the attachment and other objects when turning. The attachment extends beyond the end of the vehicle. The operator must be aware of the maximum sweep (1) of the attachment when turning in order to avoid hitting personnel and other objects in the area.

(ON SLIDE #29)

(5) Ignition Switch. The ignition switch has three positions off, run, and start. The off position shuts down the engine as well as the entire electrical system. The run position allows switches and indicators to be powered on. The start position engages the engine and starts the machine.



INSTRUCTOR NOTE

To engage the start position, the ignition switch must first be placed in the run position. After this is done the ignition switch must be pushed in and twisted at the same time for the engine to crank.

(ON SLIDE #30)

b. **Left side of Dash.**

(1) Steering Selector Switch. The switch will be utilized to engage the (EBFL-MMV) into one of three steering modes, front wheel, four wheel, and crab steering.

INSTRUCTOR NOTE

Briefly explain the differences of the three steering modes. The class should already be familiar with these modes, as they were taught in their previous forklift lesson.

(2) Parking Brake Switch. The Parking Break Switch must be engaged to permit engine starting. A red LED on the parking brake switch will indicate the rake is engaged. The parking brake engaged light will illuminate on the front dash panel any time the parking brake is engaged.

(3) Transmission Disconnect Switch. The transmission disconnect switch is utilized to increase operator productivity. With the switch engaged, when an operator pulls into a load and depresses the service brake, the machines transmission will be disengaged and placed into the neutral position automatically. For the function to activate, not only must the switch be engaged but the service brake pedal must be depressed at least one inch. **IMPORTANT!** With the disconnect feature active and the service pedal being released, the transmission will be reconnected in the same gear and direction of travel as when it was originally disconnected. The service brakes must remain fully applied for this feature to be functional.



INSTRUCTOR NOTE

Explain to students that utilizing this function will require operating with both feet. By engaging the machines transmission into neutral automatically, allows for the operator to increase engine and hydraulic speed without placing excessive wear on the service brake or engine stall.

(ON SLIDE #31)

(4) Neutral Lock Lever. The Travel Select Lever is equipped with a neutral lock. The Neutral Lock Lever locks the Travel Select Lever in NEUTRAL or unlocks the Travel Select Lever so that it can be moved into the FORWARD or REVERSE drive position.



(ON SLIDE #32)

(5) Travel Selector Lever. This lever determines if the Machine will travel forward, neutral, or reverse.

(a) Gear Selection. The travel selector lever also incorporates transmission gear selection through its twistable grip. Each twist or click of the lever up will shift the transmission into the next higher gear. Up to three twists or clicks up are allowed ending in forth gear. By twisting in the reverse order will down shift the transmission. All transmission gear shifts must be down manually.

(ON SLIDE #33)

c. Right Side of Dash.

(1) Attachment Tilt Mode Switch. This switch has two settings, which allow the operator to choose between lift/lower and extend/retract with attachment tilt.



Attachment Tilt Mode Switch

INSTRUCTOR NOTE

Inform students the (EBFL-MMV) also has a rear windshield wiper. The switch to activate the rear windshield wiper is located on the rear windshield wiper motor, attached to the rear windshield.

(ON SLIDE #34)

d. Multifunction Joystick.

(1) Controls. The multifunction joystick is equipped with four buttons that enable the joystick to operate in three specific modes. The joystick controls three specific functions, boom movement, attachment tilt, and frame sway. The multifunction joystick also has three modes

controlled by the position of the attachment tilt mode switch. The multifunction joystick modes are as follows:

(a) Mode 1/Default Mode. In this mode the joystick has two functions the boom can extend/retract and raise/lower. This mode is accomplished without depressing any buttons.

Mode 1

Boom Control (Default)

(No buttons depressed)

This mode is accomplished by using the multi-function joystick (3) without depressing any of the buttons. All four function lights will illuminate on the logic panel (4).



Boom Lift..... move handle backward



Boom Lower..... move handle forward

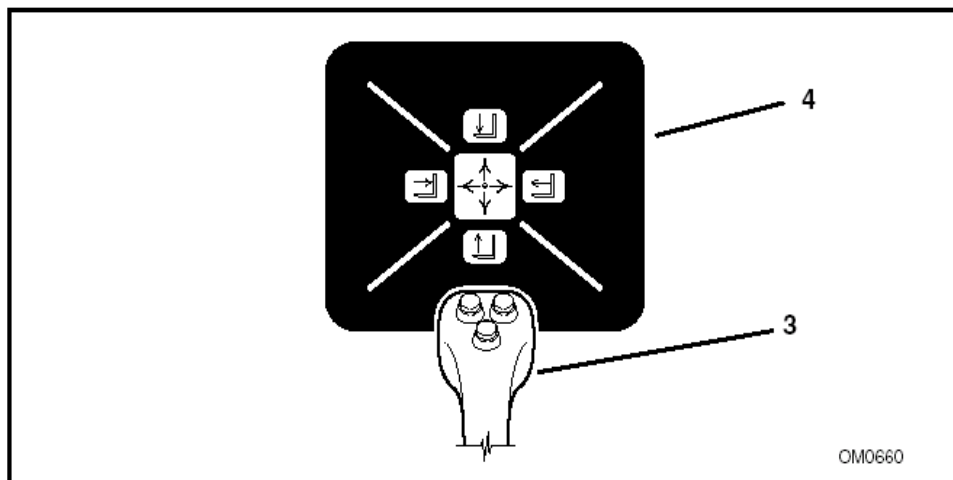


Boom Extendmove handle to the right



Boom Retract.....move handle to the left

OS0600



(b) Mode 2A. To accomplish this mode the right button is depressed and the top of the attachment tilt mode switch is in. Attachment tilt with extend and retract will illuminate on the operators display panel or referred to as the logic panel. Press and hold the right button on the topside of the multifunction joystick. Therefore, the operator can extend/retract and tilt attachment at the same time.

Mode 2A

Attachment Tilt Up/Down & Boom Extend/Retract
(Right button depressed)

Press the top of the attachment tilt mode switch in.



OM0670

Press and hold the right button (2) on the top side of the multi-function joystick (3). As the mode is activated the corresponding lights will illuminate on the logic panel (4).



Attachment Tilt Up move handle backward



Attachment Tilt Down move handle forward

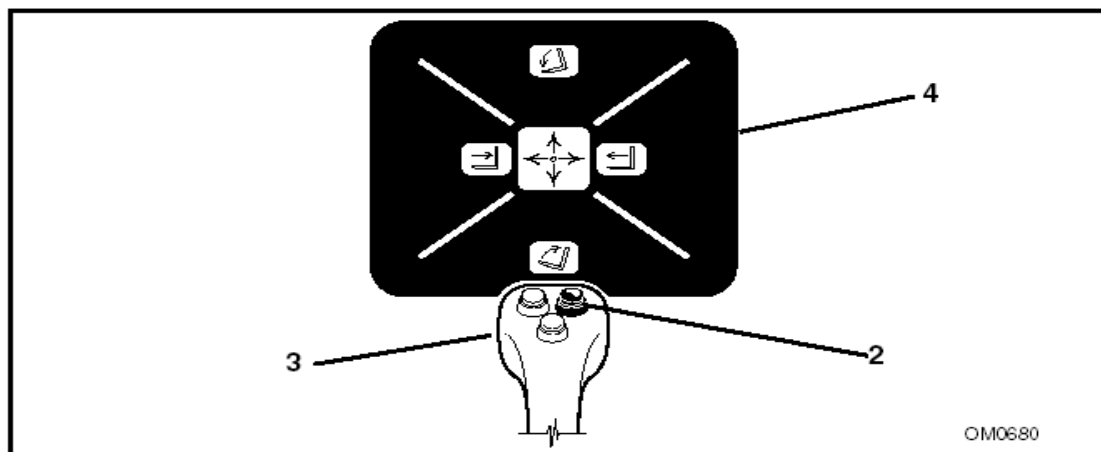


Boom Extendmove handle to the right



Boom Retractmove handle to the left

OS0671



OM0680

(c) Mode 2B. To accomplish this mode the right button is depressed and the bottom of the attachment tilt mode switch is in. The attachment tilt with left and lower will illuminate on the logic panel. Press and hold the right button on the topside of the multifunction joystick. Therefore, the operator can lift/lower and tilt fork attachment at the same time.

Mode 2B

Boom Lift/Lower & Attachment Tilt Up/Down

(Right button depressed)

Press the bottom of the attachment tilt mode switch in.



OM0690

Press and hold the right button (1) on the top side of the multi-function joystick (2). As the mode is activated the corresponding lights will illuminate on the logic panel (3).



Boom Liftmove handle backward



Boom Lowermove handle forward

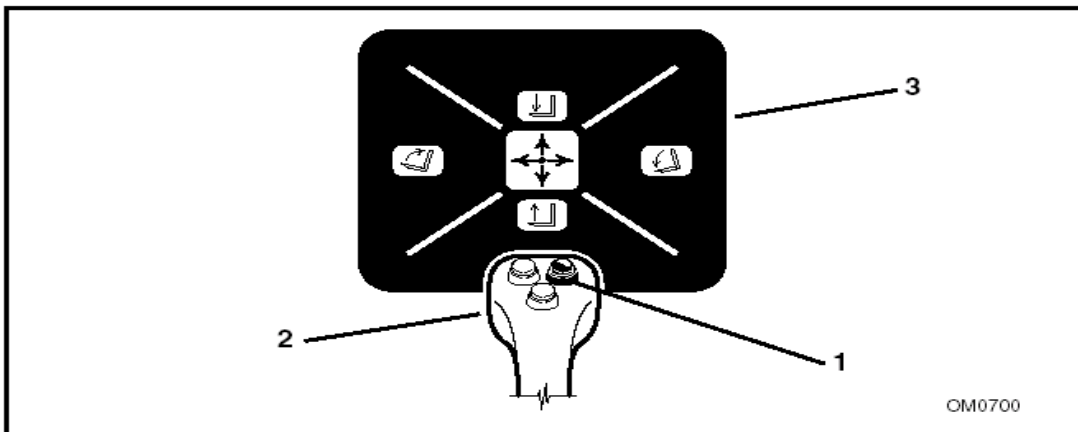


Attachment Tilt Down move handle to the right



Attachment Tilt Up move handle to the left

OS0610



OM0700

(d) Mode 3. To accomplish this mode the left and front buttons are depressed simultaneously and then held. Then while holding the buttons depressed, move the joystick left or right. This will allow for the frame sway capability

Mode 3

Boom Lift/Lower & Frame Sway Right/Left

(Depress left & front buttons simultaneously, then hold either button)

This mode is accomplished by using the multi-function joystick (4) and depressing the front (5) and left (6) buttons simultaneously, then while holding either button, move the joystick to the required function. As the mode is activated the corresponding lights will illuminate on the logic panel (7).



Boom Lift..... move handle backward



Boom Lower move handle forward

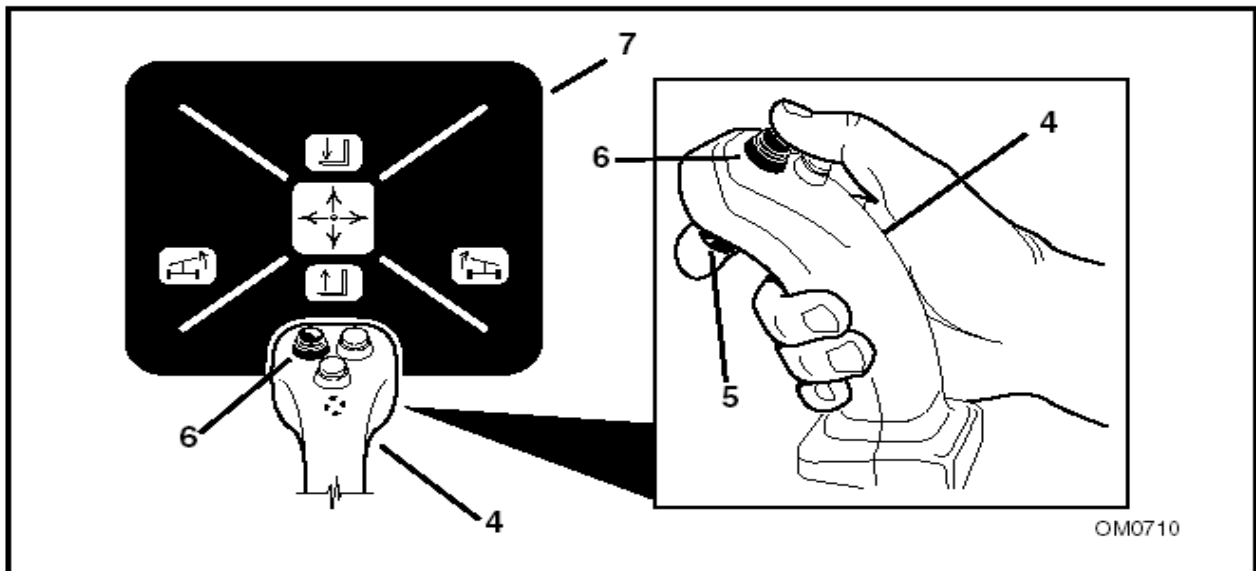


Frame Sway Right.....move handle to the right



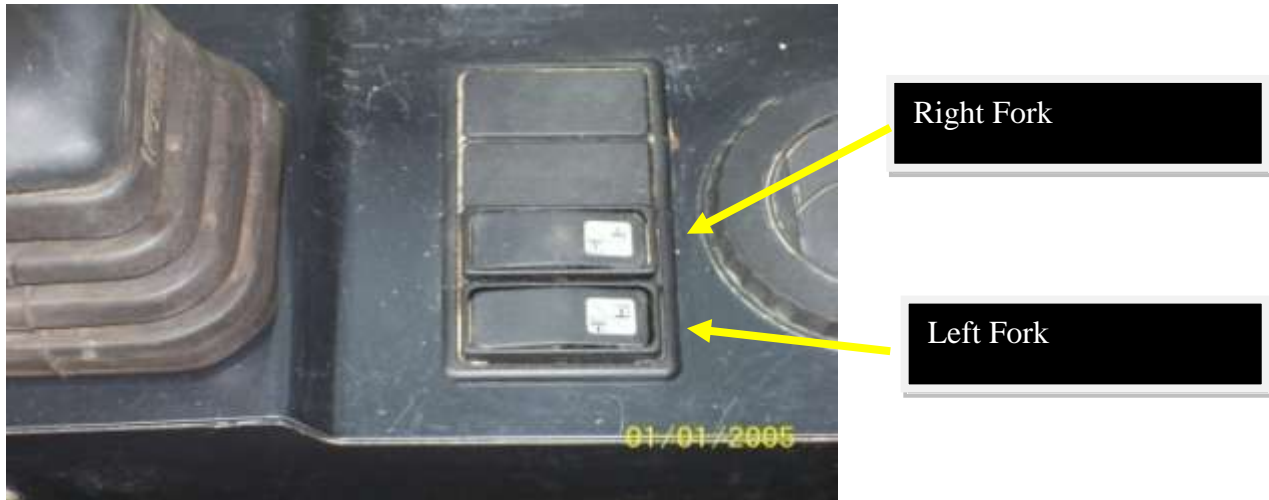
Frame Sway Leftmove handle to the left

OS0611



(ON SLIDE #35)

e. **Forks Shift Control Switches.** The left and right fork switches shift the individual forks on the carriage to the left or right. The left switch operates the left fork and the right switch operates the right fork. These switches are spring loaded and will return to the neutral position once released.



INSTRUCTOR NOTE

Explain to students that both the left and right fork shift switches can be depressed at the same time.

(ON SLIDE #36)

f. **Right Side Dash Cont..**

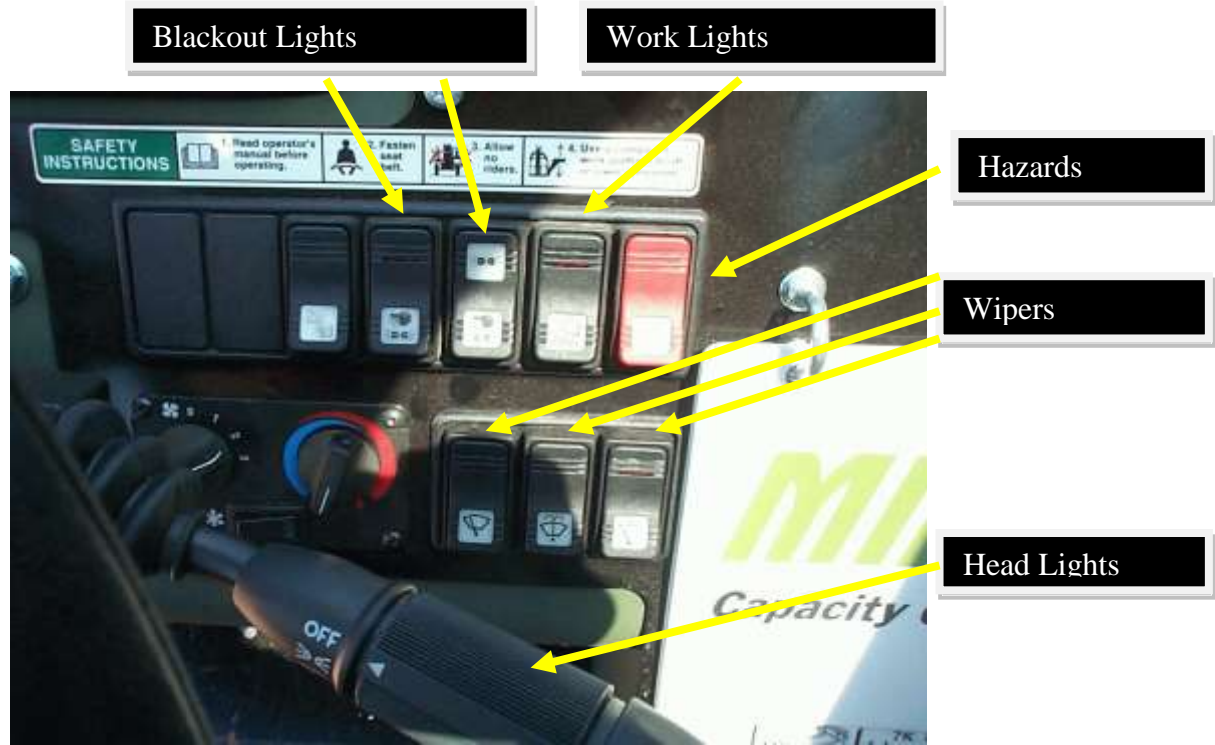
(1) **Blackout Lights.** Controls both the blackout drive and marker lights. This switch has two positions and must be in the on position in order for the marker/drive lights to function.

(2) **Work Lights.** There are three positions, off, boom work light and rear boom work lights.

(3) **Hazards.** This toggle switch controls the flashers for the machine.

(4) **Wiper Controls.** These switches control the front and skylight windshield wiper and washers.

(5) Parking Lights Lever. The twistable switch controls the front headlights and parking lights. By pushing the lever up, the left turn signal will flash. By pushing the lever down the left turn signal will flash. Headlights, parking lights and turn signal lights are disabled when blackout mode is enabled.



(ON SLIDE #37)

g. Operators Display Panel.

(1) Fuel Level Indicator. Graduated in increments of 1/4 and when tractor reaches 1/8 the fuel level indicator will illuminate an intense orange light to warn the operator.

(2) Tachometer. The tachometer gives the operator a current reading of the tractor's RPM's and mileage.

(3) Stabil-TRAK Indicators. This illuminates when the Stabil-TRAK system has been activated. The indicator located on the left side of the panel will illuminate once the system is in the final positioning mode. The indicator on the right side will illuminate once the system is in the locked mode.

(4) Engine Coolant Temperature Warning Indicator. This light illuminates when temperatures rise above 210 degrees and an alarm will sound. Shut the vehicle off as soon as

practical.

(5) Hydraulic Filter Restriction Warning Indicator. This light illuminates when a restriction is detected in the hydraulic system, service hydraulic oil filter as soon as possible.

(6) Hydraulic Oil Temperature Warning Indicator. This light illuminates when temperatures rise above 195 degrees, stop tractor and leave at idle speed, allow five minutes for cool down if the light does not go out shut the tractor down.

(7) Low Brake Pressure Indicator. This indicator lamp will illuminate when hydraulic brake pressure drops below normal operating range. Do not operate the vehicle when this light is displayed.

(8) Air Restriction Indicator. Light is displayed when there is a restriction detected in the air system.

(9) Transmission Temperature Warning Indicator. This light illuminates when temperatures rise above 250 degrees and an alarm will sound. Place tractor in neutral and allow two minutes for the tractor to cool down if the light does not go out shut the tractor down.

(10) Park Brake Indicator. Light is displayed when the park brake is engaged.

(11) Alternator Charging Warning Indicator. Alerts the operator if the charging system is not working properly or the batteries have low charge.

(12) Engine Oil Pressure Warning Indicator. If this light comes on during operation it indicates low engine oil pressure, shut down the machine immediately.

(13) Engine Air-Intake Heater Indicator. This light illuminates when ignition switch is placed in the run position and the outside ambient temperature is below 40 degrees. The engine grid heater becomes active and the engine should not be cranked until the light goes off.

(14) Hour Meter. This tracks the amount of operational hours that are accumulated when the machine is running.

(ON SLIDE #38)

INTERIM TRANSITION: We have just covered Operator Controls, are there any questions? If not let's go ahead and take a 10 minute break.

(BREAK - 10 Min)

(ON SLIDE #39)

TRANSITION: Since going on break are there any questions on Operator Controls? If not, Then I a few a question s for you before we move on to Operator Indicators. **Question:** What are the three functions of the multifunction joystick? **Answer:** boom movement, attachment tilt, and frame sway.

(ON SLIDE #40)

4. OPERATOR INDICATORS. (15 MIN)

a. **Frame level Indicator.** Mounted on the inside of the operator's cab, at the top of the front windshield, center, the operator uses this device to level the equipment prior to picking up a load. The indicator displays degrees of sway reading a maximum of 10 degrees left or right from center or zero degrees.



(ON SLIDE #41)

b. **Boom Angle Indicator**. Located on the left side of the boom, determines the boom angle to assist the operator in reading the load chart. The boom angle indicator is a plumb arrow with angular graduations from -10 degrees to +80 degrees.



(ON SLIDE #42)

c. **Load Moment Indicator (LMI)**. The (LMI) is used to measure the load on the rear axle as loads are lifted and extended. It Alerts the operator when ground pressure on the rear of the machine decreased to a point that the rear of the machine could raise up off the ground. The indicator is also used to determine the level of forward stability. **WARNING:** The Load Moment Indicator (LMI) system is not intended to be an absolute replacement for the capacity charts. **DO NOT** exceed rated capacities! Any attempt to lift or carry loads in excess of those shown on the capacity chart may cause vehicle tipover, loss of load or structural damage which could result in death or serious personal injury.



(ON SLIDE #43)

(1) Lights. The (LMI) displays three green lights, one amber or yellow light, and one red light.

(2) Reading the (LMI). As a load reaches 100 percent three green lights and a flashing amber or yellow light will be displayed. Once a load surpasses 100 percent all lights including the red light will be displayed. In addition to the lights, with a load reaching over 100 percent, the operator may or may not hear an audible alarm, based off the (LMI) setting.

(3) Test Procedures for the (LMI). The (LMI) incorporates a yellow test button. The test button is used by the operator to determine if the (LMI) is functioning properly and tell the operator which setting the (LMI) is on.

(ON SLIDE #44)

(4) (LMI) Settings. The (LMI) can be placed on four different settings. By depressing and holding in the yellow test button, the (LMI) will cycle through settings. The operator will release the test button once the desired setting is obtained. The four settings are as follows: Full brightness with full volume, full brightness with muted volume, dim brightness with full volume, and dim brightness with muted volume.

(ON SLIDE #45)

TRANSITION. We have just covered Operator Indicators are there any questions? If not, then I have a couple of questions for you before we move on into Starting Procedures. **Question:** How many degrees left or right can the (EBFL-MMV) frame sway from center? **Answer:** The (EBFL-MMV) can frame sway a total of 10 degrees left or right from center. **(ON SLIDE #46) Question:** How many display settings does the (LMI) have? **Answer:** The (LMI) has four display settings.

(ON SLIDE #47)

5. STARTING PROCEDURES. (10 MIN)

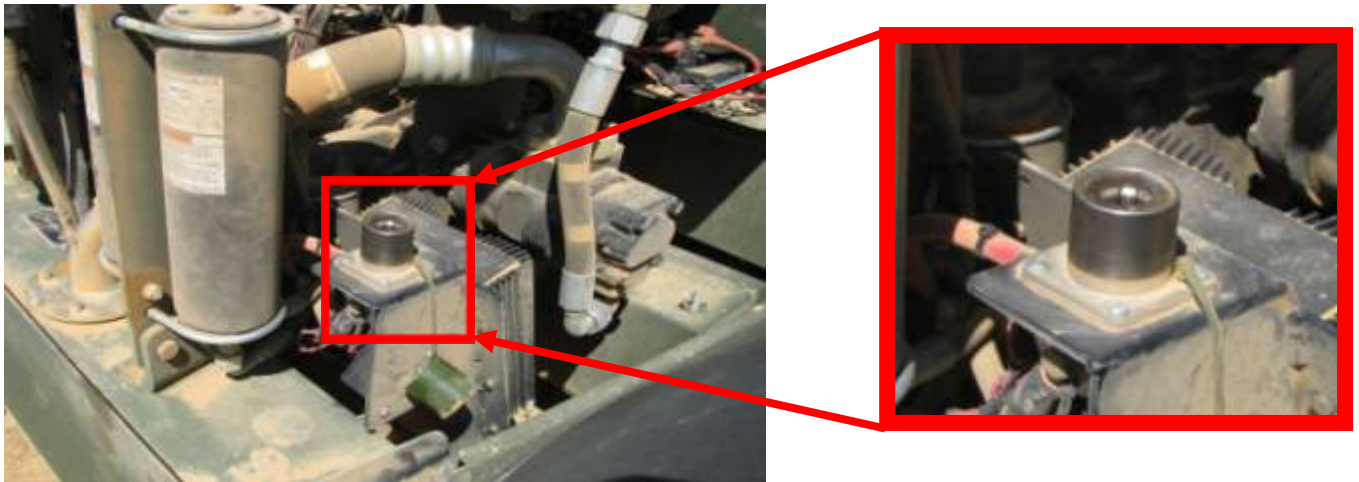
a. **Normal Starting Procedures**. Starting. Ensure the parking brake is engaged, the transmission selector lever is in neutral, and the neutral lock lever is in the locked position. Push in and twist the ignition switch to the run position. The engine air intake grid heater light will illuminate. When this

light goes out, push in and twist the ignition switch to the start position and the engine will crank and start. If the engine does not start after 30 seconds of cranking, stop. Wait two minutes and then continue to crank in 30 second intervals with two minute wait periods in between, until the engine starts.

(ON SLIDE #48)

b. **Slave Starting.** The operator must connect NATO Slave cables to the down machine and to a booster machine. The operator will then run the booster vehicle just above idle. Next, the operator will follow normal starting procedures.

(ON SLIDE #49)



INSTRUCTOR NOTE

On this slide it depicts the engine compartment of the (EBFL-MMV), highlighting the location of the NATO Slave receptacle. Inform students that most newly manufactured (EBFL-MMV) now incorporate a battery disconnect switch or master switch, located directly in front of the NATO Slave receptacle and is not pictured. Students should be familiar with both battery disconnect switches and NATO Slave receptacles from their previous fork lift lesson.

(ON SLIDE #50)

TRANSITION. We have just finished discussing Starting Procedures are there any questions? If not, then before we move on to Stabil-TRAK, I have a couple of questions for you.

Question: What two things along with the parking brake must be checked prior to starting the engine? **Answer:** The travel

selector lever and the neutral lock. (ON SLIDE #51)

Question: Where is the battery disconnect switch or master switch located on newly manufactured (EBFL_MMV)? **Answer:** The battery disconnect switch or master switch is located in the engine compartment directly in front of the NATO Slave receptacle.

(ON SLIDE #52)

6. STABIL-TRAK. (20 MIN)

a. General. The Stabil-TRAK system has three modes which are utilized by the machine to increase its center of balance, and load stability, when lifting heavy loads. These modes change based on how and where an operator is placing a load. The modes are as follows.

(ON SLIDE #53)

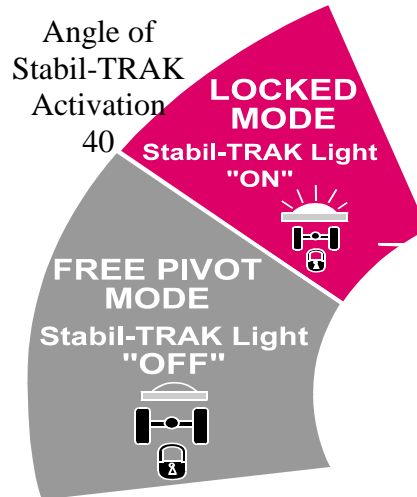
(1) Free Pivot Mode. In order for the machine to be in this mode the boom angle must be below 40 degrees. The rear axle is allowed to pivot freely as the machine travels across the terrain. Frame Sway control in Free Pivot mode will operate normally.



(ON SLIDE #54)

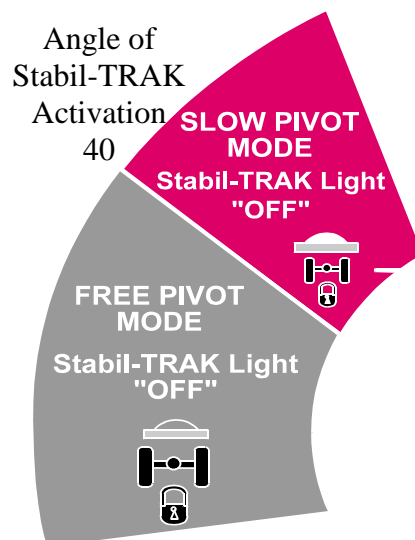
(2) Locked Mode. In order for the machine to be in this mode the boom angle must be over 40 degrees. At this time the rear axle becomes locked rigidly mounted to the frame unable

to pivot. Frame Sway control will operate slowly. With the boom above 40 degrees Locked Mode will only be activated when one of the three following things occur. One the service brake is depressed, two the parking brake is engaged, or the transmission selector lever is placed in the neutral position. For Locked Mode to be activated the machine is at a halt, not moving forwards or backwards.



(ON SLIDE #55)

(3) Slow/Final Positioning Mode. In order for the machine to be in this mode the boom angles are above 40 degrees with the vehicle traveling, meaning moving toward it desired position to safely place a load. The rear has tension applied to grant stability on the machine but will respond or pivot slowly to changes in terrain. The frame sway control will operate normally.



(ON SLIDE #56)

INTERIM TRANSITION: We have just covered the Stabil-TRAK, are there any questions? If not let's go ahead and take a 15 minute break.

(BREAK - 10 Min)

(ON SLIDE #57)

TRANSITION: Since going on break are there any questions on the Stabil-TRAK? If not, then I have a question for you.

Question: When operating the (EBFL-MMV), if the boom is below 40 degrees what Stabil-TRAK mode is active? **Answer:** Free Pivot Mode

(ON SLIDE #58)

7. **CHANGING ATTACHMENTS.** (20 MIN)

a. **General.** As shown previously the (EBFL-MMV) has two different attachments, the type I fork carriage and the type II fork carriage. The steps required to change attachments are as listed below.

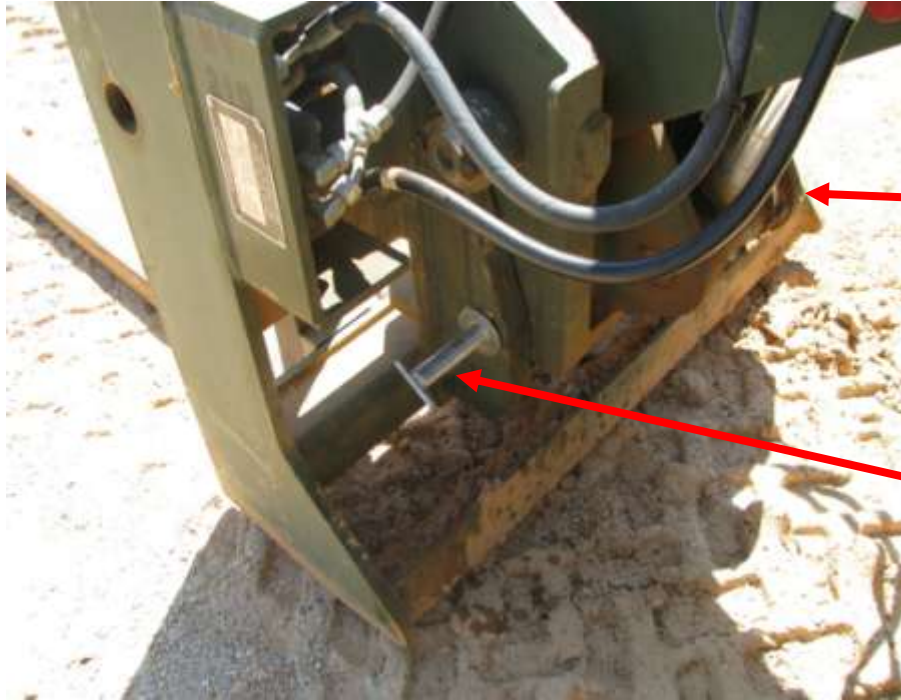
- (1) Parkline the vehicle
- (2) Extend the boom out 10 feet and lower it until the attachment is at least $\frac{1}{2}$ inch from the deck.

INSTRUCTOR NOTE

Explain to students that the purpose for leaving the attachment $\frac{1}{2}$ inch from the deck, to alleviate unwanted tension or binding between the attachment and the end of the boom. By doing so will simplify the next two steps.

- (3) Shut down and exit the machine.
- (4) Remove the sword and the Pin.

(ON SLIDE #59)



Pin

Sword

(ON SLIDE #60)

- (5) Remove four Hydraulic quick disconnect lines.
- (6) Install "male and female" protective covers.
- (7) Enter and restart the machine, tilt the fork attachment down.
- (8) Lower and retract the boom.
- (9) Perform in reverse order to apply new attachment.

(ON SLIDE #61)



Left Side



Right Side

(ON SLIDE #62)

TRANSITION. We have just finished covering Changing Attachments before we move on to Load Charts, are there any questions. If not then I have a questions for you. **Question:** When changing attachments on the (EBFL-MMV), why is it important to leave the attachment $\frac{1}{2}$ inch off the deck? **Answer:** It is important to leave the attachment $\frac{1}{2}$ inch off the deck to alleviate unwanted tension or binding between the attachment and the end of the boom.

(ON SLIDE #63)

8. LOAD CHARTS. (30 MIN)

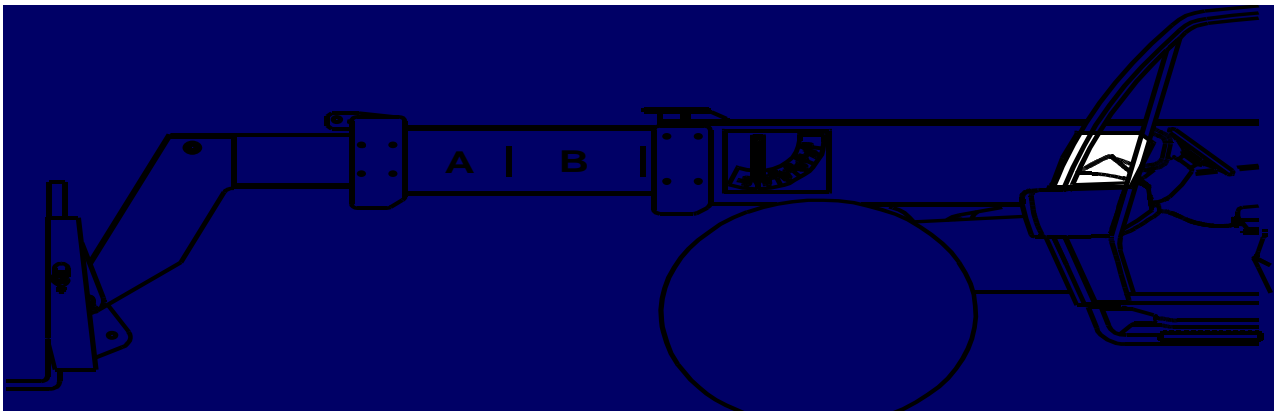
a. Indicators Cont.

(1) General. The (EBFL-MMV) is equipped with two indicators that are used to assist the operator in determining how to accurately utilize the load chart.

(ON SLIDE #64)

(a) Boom Extension Letters and Vertical Lines. As the boom is extended, boom extension letters and vertical lines become visible on the left side of the second boom section. These letters and vertical lines indicate the point/zone of boom extension that correspond with the load chart to determine distance.

(b) Boom Angle Indicator. A boom angle indicator is located on the left side of the boom in front of the operators cab. It will be used in conjunction with extension letters and vertical lines to assist the operator in determining boom height, which in turn will let the operator know how much weight can be lifted.



(ON SLIDE #65)

(c) Capacity Chart. The (EBFL-MMV) is equipped with six load charts that can be utilized depending on the type of terrain the machine will be operating in. These load charts are broken down by attachment type and tire PSI. The 87 PSI chart are utilized for paved or improved conditions, the 60 PSI load charts are utilized in loose terrain condition (sand, loose gravel), and the 45 PSI chart will also be utilized in loose terrain conditions but grant even more tire surface area from improved traction.

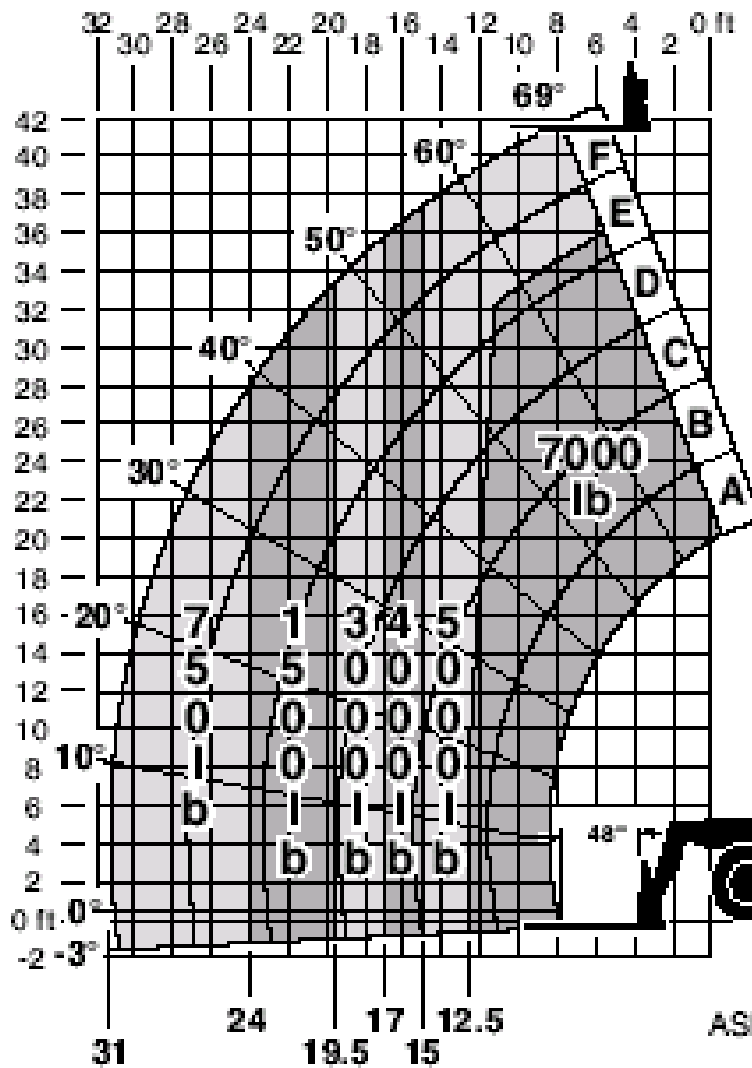
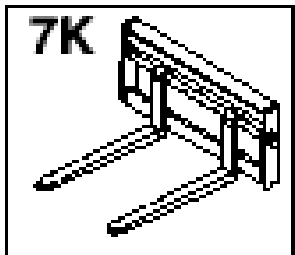
(ON SLIDE #66)

1. **WEIGHT** of the load being lifted
2. **HEIGHT** of the structure where the load is to be placed.
3. **DIATANCE** where the load will ultimately be placed in front of the front tires.

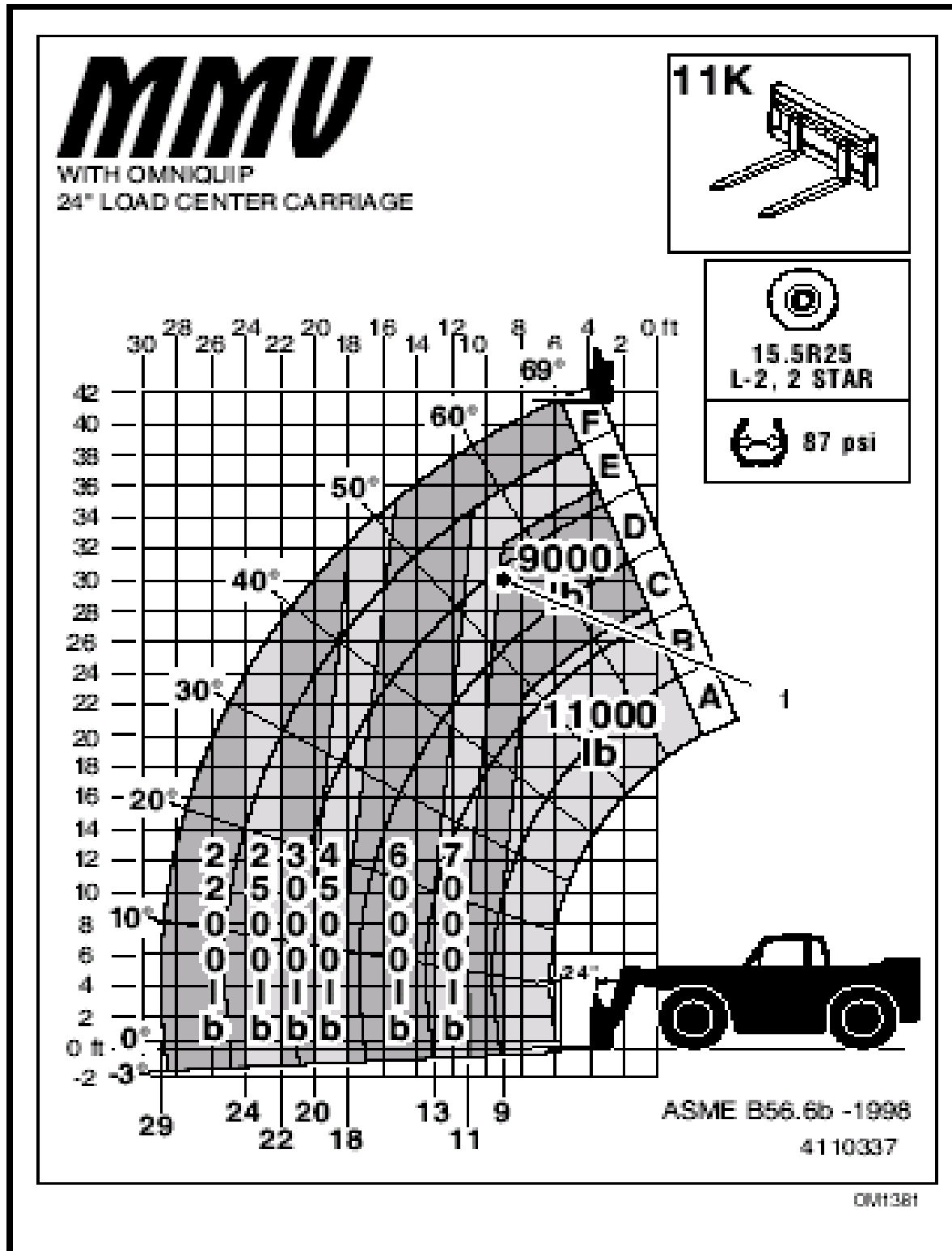
(ON SLIDE #67)

MMU

WITH OMNIQUIP
48" LOAD CENTER CARRIAGE



(ON SLIDE #68)



(d) Air Tanks. The (EBFL-MMV) is equipped with an air tank to assist the operator in adjusting tire pressures based

on terrain. The air tank is located directly underneath the operators cab, with its detachable air hose located behind the operator's in seat.

INSTRUCTOR NOTE

At this time, reference the extrapolated technical manual photo of the (EBFL-MMV) air tank, located on the front classroom wall right of the screen. Also explain to students that closing the air tank will be a part of the (EBFL-MMV) before operations check, and opening it to drain will be a a part of the (EBFL-MMV) After operations checks. This done to drain unwanted water from the tank and extend tank life.

(ON SLIDE #69)

INTERIM TRANSITION: We have just covered the Load Charts, are there any questions? If not let's go ahead and take a 10 minute break.

(BREAK - 10 Min)

(ON SLIDE #70)

TRANSITION: Since going on break are there any questions on the Load Charts? If not then I have a few questions for you.

Question: What three things must you know prior to lifting a load? **Answer:** Height, Weight, and Distance. **Question:** How many load charts does the (EBFL-MMV) have? **Answer:** Six. What I would like to do now is move on to the (EBFL-MMV) Load Chart Quiz.

(ON SLIDE #71)

INSTRUCTOR NOTE

Introduce the Load Chart Quiz, ensuring that each student has a writing utensil, and turning to the quiz in the back of their student handout. **FOR THE REMANDER OF THIS COURSE ALLOW STUDENTS TO TAKE BREAKS AS REQUIRED.**

Quiz. (30 Min) The purpose of this quiz to ensure that students acquired, retained the necessary skills to adequately use the MMV/EBFL load chart.

STUDENT ROLE: Students will answer 10 load chart questions, located in the back of their student handout. Students will have 20 minutes to complete this task. If a student is struggling or has questions he or she will ask questions to enforce better comprehension.

INSTRUCTOR(S) ROLE: The Primary Instructor will answer student questions and utilize the enlarged MMV/EBFL load charts located on the class room wall to assist students in retaining the load chart knowledge. At the last 10 minutes of the 30 minutes allotted for the quiz, the Primary Instructor will cover the each quiz question with students. For students that miss questions the Primary Instructor will conduct remediation. There are five questions the Primary Instructor can utilize for remediation to ensure knowledge retention.

Quiz Questions and Answers:

1. What is the load center of the 11K/Type I carriage?

Answer: 24 inches

2. What is the load center of the 7k/Type II carriage

Answer: 48 inches

3. You are instructed to move a load from point A to Point B. What three things must you know prior to moving a load?

Answer: Height, Weight, and Distance

4. Using the 7k carriage you have to lift 6000lbs. What portions (zone) of the load chart will you be operating in?

Answer: Zones A through E

5. What are the maximum and minimum boom angles?

Answer: -3 degrees and 69 degrees

6. Using the 11k carriage you determine:

- a. Weight of the load: 5800lbs
- b. Height of the structure: 30 feet
- c. Distance: 14 feet

What extension letter should be visible when placing the load?

Answer: Zone E

7. Using the 7k carriage you determine:
- Weight of the load: 2500lbs
 - Height of the structure: 24 feet
 - Distance: 18 feet

What extension letter should be visible when placing the load?

Answer: Zone E

8. What is the maximum distance the 7k and 11k carriage will extent to at a height of 14 feet.

Answer: 30 feet and 28 feet

9. During you shift your supervisor asks you move a pallet of sandbags into the back of a 7-ton truck. After measuring, you determine the load weighs 2800lbs, the height required to clear the bed of the truck is 10 feet, and the distance is 16 feet. Is it safe to place the load?

Answer: Yes

10. Your supervisor has asked you to move to move a load to the top of a building. He tells you the load weighs 7000lbs, the building is 24 feet tall, and the distance is 14 feet. Is it safe to move the load?

Answer: NO

Remediation Questions

1. With a 11k carriage, a lifting height of 38 feet and a distance of 8 feet, what is your maximum weight?

Answer: 6000lbs

2. At a 30 degree angle and 14 feet distance, what is you your lifting height?

Answer: 16 feet

3. With two feet of distance and 18 feet of height on a 11k carriage, what zones are in you in?

Answer: Zone A

4. In length zone "D" at 40 degrees, with a 11k carriage, what is your height and the distance?

Answer: 22 feet height and 14 feet distance

5. What is the minimum weight this tractor can pick up with a 11k carriage?

Answer: 2200lbs

INTERIUM TRANSITION. We have just answered the questions to the Load Chart Quiz and went over them together, are there any questions? If not, then let's move onto the 360 walk-around of the (EBFL-MMV).

INSTRUCTOR NOTE

For the remainder of this class students will take a break as required or as instructed to.

INSTRUCTOR NOTE

Introduce the Demonstration of the (EBFL-MMV) 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) (EBFL-MMV) for the Instructor to utilize, and students will have trip tickets and student handouts. Have the students gather around the (EBFL-MMV) 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
Left rear tire and wheel well
Air tanks
Fuel Tank

REAR SIDE

Brake lights and B.O. markers
Boom hinge pin
Rear Boom slide pads
Counterweight with permanent pintle hook
Rear work lights
Rear window wiper

RIGHT SIDE

Rear tire and wheel well
Hydraulic oil sight glass
Solargizer panel
Engine Compartment cover
Primary/Secondary Air filters
Hydraulic oil distributor
Coolant fluid over flow reservoir
Hydraulic oil fill point
Fuel/water separator
Fuel priming pump
Engine oil dipstick
Engine oil fill point
Transmission oil dipstick
Fan belts
Radiator
Hydraulic motor

NATO slave receptacle
Battery disconnect switch
Front tire and wheel well

FRONT

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

CAB

Door
Seatbelt
Seat adjustment lever
Accelerator pedal
Service brake pedal
Parking brake
Transmission Selector Lever
Multi-Function joystick
Headlights/turn signal lever
Attachment tilt mode switch
Worklight switches
Hazard switch
Steering mode selector switch
Work/Travel switch
Air-conditioning/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 (EBFL-MMV). Are there any questions? If not, let's move on to the practical application of a 360 walk around on the (EBFL-MMV).

INSTRUCTOR NOTES

Introduce the Practical Application of the (EBFL-MMV) 360 walk around. Allow students to make head calls as required.

Practical Application. (1 hr 30 Min) The purpose of this practical application is to allow the students to perform a 360 walk around on the (EBFL-MMV). Items required are four (4) (EBFL-MMV) 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 practical application.

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
Left rear tire and wheel well
Air tanks
Fuel Tank

REAR SIDE

Brake lights and B.O. markers
Boom hinge pin
Rear Boom slide pads
Counterweight with permanent pintle hook
Rear work lights
Rear window wiper

RIGHT SIDE

Rear tire and wheel well
Hydraulic oil sight glass
Solargizer panel
Engine Compartment cover
Primary/Secondary Air filters
Hydraulic oil distributor
Coolant fluid over flow reservoir

Hydraulic oil fill point
Fuel/water separator
Fuel priming pump
Engine oil dipstick
Engine oil fill point
Transmission oil dipstick
Fan belts
Radiator
Hydraulic motor
NATO slave receptacle
Battery disconnect switch
Front tire and wheel well

FRONT

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

CAB

Door
Seatbelt
Seat adjustment lever
Accelerator pedal
Service brake pedal
Parking brake
Transmission Selector Lever
Multi-Function joystick
Headlights/turn signal lever
Attachment tilt mode switch
Worklight switches
Hazard switch
Steering mode selector switch
Work/Travel switch
Air-conditioning/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 (EBFL-MMV). Are there any questions at this time? If not, let's move on to a demonstration of changing attachments.

INSTRUCTOR NOTE

Introduce Demonstration of Changing attachments.

DEMONSTRATION. (15 Min) The purpose of this demonstration is to instruct the students in the purpose of changing attachments. Items required are student handouts for students to take notes, and (1) (EBFL-MMV). Have the students gather around the Instructor for a demonstration of changing attachments. 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 changing attachments, 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 change attachments steps

Parkline the vehicle

Extend 10 feet and lower the boom to $\frac{1}{2}$ from the deck

Shut down and exit vehicle

Remove the sword and the pin

Remove (4) hydraulic disconnects

Install "male" and "Female" protective caps

Enter, start the machine, and tilt the forks down

Lower and retract the boom

Perform in reverse order to apply new attachment

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

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

INSTRUCTOR NOTE

Introduce Practical application of Changing Attachments. Allow students to make head calls as required.

PRACTICAL APPLICATION. (1 Hr 30 Min) The purpose of this Practical Application is to allow the students to change attachments on the (EBFL-MMV). Items required are student hand outs/notes and (4) (EBFL-MMV). Normal class size is twelve (12). The students are broken into groups of three (3) and will conduct Change Attachments. Two (2) instructors are required for this Practical Application.

PRACTICE: Students will change attachments on the (EBFL-MMV):

Parkline the vehicle
Extend 10 feet and lower the boom to ½ from the deck
Shut down and exit vehicle
Remove the sword and the pin
Remove (4) hydraulic disconnects
Install "male" and "Female" protective caps
Enter, start the machine, and tilt the forks down
Lower and retract the boom
Perform in reverse order to apply new attachment

- 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 changing attachments. Are there any questions? If not, let's move on to the demonstration of operating the equipment.

INSTRUCTOR NOTE

Introduce Demonstration of equipment operations

DEMONSTRATION. (45 Min) The purpose of this demonstration is to show the students how to operate the (EBFL-MMV). Items required are a (EBFL-MMV) 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 (EBFL-MMV). 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 (MMV/EBFL). Are there any questions? If not, let's move on to the practical application.

INSTRUCTOR NOTE

Introduce Practical Application of (EBFL-MMV) operations. Allow students to make head calls as required.

PRACTICAL APPLICATION. (24 Hrs 45 Min) The purpose of Practical Application is to allow the students to operate the MMV/EBFL. Item(s) required are: Four (4) (EBFL-MMV) 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 each tractor; 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 (EBFL-MMV), 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 (EBFL-MMV) 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 (EBFL-MMV).

INSTRUCTOR NOTE

Introduce practical application of conducting PMCS. Allow students to make head calls as required.

PRACTICAL APPLICATION. (2 Hrs) The purpose of this Practical Application is to allow the students to conduct PMCS. Items required are: Four (4) (EBFL-MMV) 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

TRANSITION: We've just completed the practical application for proper PMCS, are there any questions? If not then I have a couple of questions for you. Let's move into the classroom to go over what we have covered this week. **Question:** Why is it important to check tire pressure? **Answer:** The (EBFL-MMV)'s load charts are calculated for certain tire pressures. If tire pressure is not correct it affects the total lift capacity of the machine. **Question:** What are the two types of coolant that can be found in an (EBFL-MMV) and are they inter-changeable? **Answer:** green ethylene-glycol and Pink Dex-Cool (extended life) coolants and they are not inter-changeable.

(ON SLIDE #72)

SUMMARY

(5 MIN)

This week we have covered various topics dealing with the (EBFL-MMV). Specifically, we have covered operator safety and alert symbols, characteristics and capabilities, operator controls, operator indicators, starting procedures, stabil-TRAK, changing attachments, and load charts. Make sure all IRFs are given to the Instructor. This concludes this period of instruction take a 10 minute break.

REFERENCES:

Basic Operators Bag SL-3-11825A

Forklift, Extendable Boom (EBFL) TM 10794B-OR/A

Marine Corps Ground Equipment Record Procedures TM 4700-15/1

Use and Care of Hand Tools and Measuring Tools TM 10209-10/1

Visual Signals FM 21-60