UNITED STATES MARINE CORPS
ENGINEER EQUIPMENT INSTRUCTION COMPANY
MARINE CORPS DETACHMENT
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LESSON PLAN

850JR MEDIUM CRAWLER TRACTOR, MCT

LESSON ID: BEEO-B06

BASIC ENGINEER EQUIPMENT OPERATOR COURSE

CID A1613F1

REVISED 12/22/2011

APPROVED BY_____ **DATE**_____

(ON SLIDE #1)

INTRODUCTION **(10 MIN)**

1. **GAIN ATTENTION**. Show Video or use Other Technique

(ON SLIDE #2)

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 an 850JR Medium Crawler Tractor (MCT) in support of engineer operations. I will be doing this by covering the characteristics, capabilities and limitations, outside views, instruments and controls, starting, operating and shut-down procedures and operating techniques. This lesson relates to the Marine Corps engineer mission and you receiving your 850JR MCT license.

3. **LEARNING OBJECTIVES**.

INSTRUCTOR NOTE
Introduce learning objectives.

(ON SLIDE #3)

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 Actions/ deficiencies/ discrepancies are recorded per TM 4700-15/1H.(1345-MAINT-1011)

(2) Provided an MCT, an engineer equipment requirement, and engineer records and forms, operate the Medium Crawler Tractor (MCT) to safely meet operational requirements with no injury to personnel or damage to the equipment. (1345-XENG-1004)

(ON SLIDE #4)

b. **ENABLING LEARNING OBJECTIVE**.

(1) Given the description and characteristics of the Medium Crawler Tractor (MCT), and without the aid of references, identify the characteristics per the TM 11503A-OR. (1345-XENG-1004)

(2) Provided a (MCT), engineer equipment records and forms, and with the aid of references, initiate operator forms and records per the TM 4700-15/1_. (1345-XENG-1004c)

(3) Provided a (MCT), engineer equipment records and forms, technical manuals and lubrication orders, perform technical manual research per the TM 11503A-OR. (1345-XENG-1004c)

(ON SLIDE #5)

(4) Provided a (MCT), engineer equipment records and forms, tools, and with the aid of references, demonstrate correct use of tools per the TM 10209-10/1. (1345-XENG-1004d)

(5) Provided a (MCT), engineer equipment records and forms, tools, petroleum, oils, and lubricants and with the aid of references, demonstrate correct use of petroleum, oils, and lubricants per the TM 11503A-OR. (1345-XENG-1004e)

(6) Provided a (MCT), engineer equipment records and forms, tools, petroleum, oils, and lubricants, and with the aid of references, perform operation checks (before, during, and after) per the TM 11503A-OR. (1345-XENG-1004f)

(ON SLIDE #6)

(7) Provided a (MCT), an operator, and without the aid of reference, perform hand and arm signals per the FM 21-60. (1345-XENG-1004h)

(8) Provided a (MCT), engineer equipment records and forms, and references, perform berming operations per the TM 11503A-OR. (1345-XENG-1002j)

(9) Provided a (MCT), engineer equipment records and forms, and references, perform rough leveling per the TM 11503A-OR. (1345-XENG-1104i)

(ON SLIDE #7)

(10) Provided a (MCT), engineer equipment records and forms, and references, perform ripper operations per the TM 11503A-OR. (1345-XENG-1004j)

(11) Provided a (MCT), engineer equipment records and forms, and references, perform ditching operations per the TM 11503A-OR. (1345-XENG-1104k)

(12) Provided a (MCT), engineer equipment records and forms, and without references, identify winching operations per the TM 11503A-OR. (1345-XENG-10041)

(ON SLIDE #8)

(13) Provided a (MCT), engineer equipment records and forms, and with the aid of references, complete operator forms and records per the TM 4700-15/1_. (1345-XENG-1004m)

(14) Provided a (MCT), tools, petroleum, oils, and lubricants, equipment records, and references, conduct preventive maintenance per the TM 11503A-OR. (1345-MAINT-1001f)

(ON SLIDE #9)

4. **METHOD/MEDIA**. This lesson will be taught utilizing the informal lecture, demonstration, and practical application methods. I will be aided by computer-generated graphics, the student outline, and the actual end item of equipment.

Instructor Note
Explain Instructional Rating Forms to students

(ON SLIDE #10)

5. **EVALUATION**. You will be evaluated on this period of instruction on the morning of the fifth training day. This will be in the form of a written exam, multiple-choice, test. That same afternoon you will be evaluated on your practical evaluations.

(ON SLIDE #11)

6. **SAFETY/CEASE TRAINING (CT) BRIEF**. Ensure seat belt is fastened at all times. All controls will remain in the neutral position until utilized. Apply Service and Parking Brakes when stationary. No passengers are allowed at any time. Be aware of all pinch points when servicing or around equipment. Keep hands and feet in the cab at all times. Before and during operation, check all clearances to power lines or other obstructions and

keep all pedestrians/ground guides at a safe distance. Wear hardhat at all times. Every Marine is responsible for safety. If you witness an unsafe act you will call cease training and report it to your Instructor. Dress appropriate for the weather.

(ON SLIDE #12)

TRANSITION. Are there any questions on what you will be taught, how you will be taught, or how you will be evaluated? If not, let's start by discussing the general characteristics of the MCT.

BODY **(33 HRS 45 MIN)**

(ON SLIDE 13)

1. **CHARACTERISTICS**. **(15 MIN)**

a. **Dozer Classification**. Dozers are classified by Weight and Drawbar Pull.

(1) There are three types of weight classification categories for dozers.

(a) Light 0 to 39,000 lbs (MC 1150E)

(b) Medium 39,001 lbs to 88,999 lbs (850JR MCT and D7G).

(c) Heavy 89,000 lbs and up. (D9 and D11).

(ON SLIDE #14)

b. **Description**. The MEDIUM CRAWLER TRACTOR or MCT is an 850JR crawler dozer that is manufactured by John Deere Company®.

c. **Nomenclature**. Tractor, full tracked, low speed, diesel engine driven, medium drawbar pull.

(ON SLIDE #15)

d. **Dimensions**.

Length 212" inches, (17.66ft)

Width 140" inches (11.66ft)

Height 130” inches (10.83ft)

e. **Weight**. The MCT has a gross vehicle weight of 45,420 pounds. The armored cab has a weight of 5,700 pounds which gives the MCT a gross vehicle weight of 51,120 pounds when the armored cab is installed.

(ON SLIDE #16)

f. **Engine**. The MCT is powered by a John Deere® PowerTech Plus, Model 6090HT, turbocharged, 6 cylinder diesel engine that produces 200 hp at 1800 rpm’s.

(1) Oil Capacity 7 gallons 15w40

(2) Cooling System 11.5 gallons 50/50 ethylene glycol water mix

(3) Fuel Consumption 3.8 - 5.5gallons per hour

(4) Fuel Tank Capacity 78 gallons JP8 or Diesel

(ON SLIDE #17)

g. **Transmission**. The MCT is equipped with a Dual Path Hydrostatic Transmission which gives the tractor functions such as Infinite speed control, power management, live power turns, counter rotation, dynamic braking, and auto-trac (automatic tracking control).

(1) Speed 0 – 6.3 miles per hour

(2) Capacity 26.5 gallons of 15w40

h. **Hydraulic System** The MCT hydraulic pump is capable of pumping 59gpm @ 3625psi.

(1) Capacity 27 gallons of 15w40

(ON SLIDE #18)

TRANSITION: Are there any questions on the characteristics of the MCT? I have a question for you: **Q** How are dozers classified? **A** By weight and drawbar pull. We have covered the characteristics of the MCT, now we will go over the capabilities and limitations.

2. **Capabilities and Limitations** **(15 MIN)**

(ON SLIDE #19)

a. **Capabilities**

(1) The MCT is standard for most earth moving operations. The four primary uses for the MCT are:

(a) Clearing

(b) Stripping

(c) Grubbing

(d) Push load scrapers

(ON SLIDE #20-21)

(2) The MCT with the ripper attachment is designed for dozing and ripping soil, rock, and concrete.

(a) Weight 4480 lbs

INSTRUCTOR NOTE
Explain even distributing of the ripper shanks if fewer than 3 are used.

(b) Do not turn or back up with the shanks in the ground. Raise ripper before normal operations.

(ON SLIDE #22-23)

(3) The MCT with the winch attachment can winch loads up to 60,000lbs. The primary uses for the winch attachment are for increasing the pulling power of the tractor and to reach into an area where a tractor cannot go.

(a) Weight 2600 lbs

(b) Cable The winch is equipped with 150 ft of 1 1/8" diameter cable.

(c) Personnel must remain 1 times the distance of the cable being used for safety.

INSTRUCTOR NOTE

Warning: The wire rope may disengage from the ferrule pocket if there is a load on the wire with fewer than 3 complete wraps on the drum. This will cause a loss of load and possible injury. When spooling cable from the drum, it is very difficult for the operator to know when nearing the end of the cable. It is recommended that the last 5 wraps of wire be painted a contrasting color to alert the operator that the end of the usable wire has been reached.

Warning: During operation of the winch, the operator must know or estimate the line pull and make sure that the line pull is within the capacity of the winch and the specifications of the cable installed on the drum. A broken cable under high tension can return suddenly in the direction of the winch and cause injury and damage.

(ON SLIDE #24)

(4) The MCT can be equipped with a drawbar attachment capable of pulling 35,000lbs.

(ON SLIDE #25)

(5) The MCT is capable of operating in all types of weather and terrain due primarily to their low ground bearing pressure of 6.26 psi.

(ON SLIDE #26)

(6) The Dual path hydrostatic transmissions gives the tractor functions such as Infinite speed control, power management, live power turns, counter rotation, dynamic braking, and Auto-Trac (automatic tracking control).

(ON SLIDE #27)

(a) Power management system allows the operator to concentrate on controlling the blade rather than controlling the transmission. The operator simply chooses the maximum speed that they are comfortable operating at and the power management system will automatically slow the machine as loads are encountered. The machine will increase back to the maximum speed the operator has selected when the load decreases.

(ON SLIDE #28)

(b) Live power turns allows full power to be applied to both tracks even while making a turn. This allows the operator to carry more material in front of the blade adding to the machines productivity. To turn the machine, the operator simply slows the track in the direction he wants to turn. Because the tracks have infinite speed control, the turning radius in the power turn can be anything from very gradual to a very tight turn. When the track is slowed to a stop, the machine will make a pivot turn.

(ON SLIDE #29)

(c) Since the tracks are controlled independently, one track can operate in the forward direction while the other track operates in the reverse direction. This condition is called counter-rotation. The ability to counter-rotate the machine can aid the operator to increase the machines productivity. By counter-rotating, the machine can be positioned quickly especially in conditions where space is limited. To counter act side draft when loading one side of the blade, the operator can also use counter-rotation to quickly position the machine in a cut.

(ON SLIDE #30)

(d) Since the dual path hydrostatic drive has a hydrostatic pump and motor combination on each track, the machines have the ability to provide dynamic braking. Dynamic braking results from the pump and the motor being directly connected together. When the machine is working vertical on a slope the weight of the machine will try to force down the slope. As the machine tries to increase in speed the engine will slow the speed of the machine. On traditional torque converter drive machines the machine could over-speed when working on a vertical slope. The dual path hydrostatic drive provides the operator with excellent control when working in these conditions. Hill-Hold is designed to prevent track movement when the machine is placed in neutral while on a hillside. If the transmission controller detects track movement when the machine is in neutral, the brakes will be automatically applied.

(ON SLIDE #31)

(e) Auto-Trac maintains equal speeds of both tracks when the machine is operating with no steering input. This minimizes the need for the operator to make steering inputs to keep the machine on course. It also provides for smoother steering control while turning the machine.

(ON SLIDE #32)

b. **Limitations**

(1) The MCT is slow moving. (0 - 6.3 mph forward or reverse).

(2) Optimum operating range for the MCT is 50-300 ft. Any earth moving operations over 300 ft requires the use of other equipment.

(ON SLIDE #33)

(3) When crossing improved surfaces, dunnage (tires, wood, and fuel hoses) is required to keep from damaging surfaces.

(4)d. Dozers must be transported long distances due to slow speed, weight, and wear on the tracks.

(ON SLIDE #34)

Transition: Are there any questions on the capabilities and limitations of the MCT? I have a question for you. **Q** What is the optimum operating range for the MCT? **A** 50-300'. Now that you know the capabilities and limitations of the MCT, let's move on to the outside view's of the MCT.

3. **OUTSIDE VIEW (20 MIN)**

(ON SLIDE #35)

a. **Left Side View**. View of the Left Side and labeling of components:

(1) Blade lift cylinders
(2) Blade pitch adjust
(3) Outside Dozer Frame
(4) Track sag adjustment
(5) Left Side Service Door
(6) Fuel fill

(ON SLIDE #36)

b. **Left Side Service Door**.

(1) Hydraulic Integrated Control Valve (HIC)
(2) Hydrostatic Charge Filter
(3) Windshield Washer Bottle
(4) Hydrostatic oil sight gauge
(5) Hydrostatic Reservoir Fill Cap
(6) Fan Oil Filter
(7) Cab Tilt Jack

(ON SLIDE #37)

c. **Right Side View**

(1) Right Side Service Door
(2) Lift Chart
(3) Blade Tilt Cylinder (tilts blade 29.6 in left or right of center)
(4) Data Plate
(5) Engine Service Door

(ON SLIDE #38)

d. **Right Side Service Door**.

(1) Hydraulic Reservoir Fill Cap
(2) Hydraulic Oil Sampling Port
(3) Hydraulic Oil Sight Gauge
(4) Hydraulic Oil Filter
(5) Batteries
(6) Battery Disconnect Switch
(7) NATO Slave Receptacle

(ON SLIDE #39)

e. **Right Side Engine Access**.

(1) Ether Starting Aid Bottle
(2) Primary Fuel Filter and Water Separator
(3) Final Fuel Filter
(4) Engine Oil Filter
(5) Engine Oil Check and Fill
(6) Air Cleaner
(7) Dust Un-Loader Valve

(ON SLIDE #40)

f. **Top View**.

(1) Coolant Surge Tank

(ON SLIDE #41)

TRANSITION: Are there any questions on the outside views of the MCT? I have a question for you: **Q** Where is the hydraulic tank located? **A** The right side service door. Take a 10 minute break and when we get back we will cover the instruments and controls of the MCT.

(ON SLIDE #42)

(10-minute break)

4. **INSTRUMENTS AND CONTROLS (55 MIN)**

(ON SLIDE #43)

a. **Dash Switches and Monitor Guages**

(1) Fan Reversing Switch- Push switch to manually reverse fan for 30 seconds

(2) Decelerator Mode Switch-Push upper half of switch to engine mode. When the decel/brake pedal is pushed with the switch in engine mode, the engine speed will be decreased and effectively decrease ground speed. Push lower half of the switch to transmission mode. When the decel/brake pedal is pushed with the switch in transmission mode, the transmission speed will decrease, but the engine speed will remain constant.

(3) Optional light Switch-Push upper half of switch to turn optional lights on. Push lower half of switch to turn optional lights off

(4) Start Aid Switch-Press and hold button when engine is cold while cranking to inject starting fluid into the engine during cold weather start-up. 40 Degrees or colder

(5) Ignition Switch

(6) CAN Monitor Unit (CMU)-

(a) Engine Coolant Temperature Gauge
(b) Transmission Oil Temperature Gauge
(c) Hydraulic Oil Temperature Gauge
(d) Engine Oil Pressure Gauge
(e) Display Window will display P or FNR, Transmission Speed, Hour Meter, Battery Voltage, Transmission Charge Pressure
(f) Level Gauge

INSTRUCTOR NOTE

Open 750J-850J_Monitor.exe on power point by clicking the link in the center of the CAN picture. Navigate through the functions to show the students how to use it. At the same time mow you will be able to cover the status and warning lights. To exit you might have to press the esc button on the keyboard.

(7) Status and Warning Lights

(a) Fan Oil Filter Restriction Indicator-Indicator will light and caution indicator will illuminate when engine is running and oil filter becomes restricted. Replace fan oil filter as necessary.

(b) Transmission Oil Charge Filter Restriction Indicator-Indicator will light and caution indicator will illuminate when engine is running and transmission oil charge filter becomes restricted. Replace oil charge filter as necessary.

(c) Not Used

(d) Park Brake Indicator-Indicator will light when machine is in park.

(e) Transmission Oil Charge Pressure Indicator-Indicator will light, Stop indicator will light, and audible alarm will sound when charge pressure is too high or too low. Stop engine immediately.

(f) STOP Indicator-Stop engine indicator flashes and alarm sounds when:

- Transmission charge pressure is too high or too low
- Water is in fuel system
- Hydraulic oil temperature is high
- Engine coolant temperature is high

- Engine oil pressure is low

Instructor Note

If STOP engine indicator flashes and alarm sounds for more than 10 seconds, stop machine immediately and investigate cause of problem.

(g) Fasten Seat Belt Indicator-Indicator will light and stay on for five seconds when the machine is started.

(h) Engine Air Filter Restriction Indicator-Indicator will light and caution indicator will illuminate when engine is running with air filter restricted. Park Machine in a safe area and shut engine off immediately. Check air filters for restrictions.

(i) Engine Alternator Voltage Indicator-Indicator will light when alternator voltage drops below 25 volts and when key switch is on and engine is not running.

(j) Hydraulic Oil Filter Restriction Indicator-Indicator will light and caution indicator will illuminate when engine is running and hydraulic oil filter becomes restricted. Replace hydraulic oil filter as necessary.

Instructor Note

Restriction indicator may stay on for several minutes until hydraulic oil is warm

(k) No Engine Decel Indicator-Indicator will light when no engine deceleration feature is activated

(l) Return to Neutral Indicator-With park lock levers in up position (locked) and transmission control lever out of neutral position, turning key switch ON will cause the return to neutral indicator to light. Transmission control lever must be moved back to neutral position for machine to start.

(m) Not Used

(n) Water in Fuel Indicator- Indicator will light, STOP indicator will flash, and audible alarm will sound when water is detected in the fuel system. Stop engine immediately.

(o) Not Used

(p) Caution Indicator-If the caution indicator signal comes on, a problem is developing. It is not necessary to stop engine immediately, but the cause should be investigated as soon as possible.

(q) Calibration/Service Mode indicator-Indicator will light when machine is in a service mode or calibration.

(r) Check Service Code Indicator- Indicator will light when a problem is detected in the monitor, transmission, or engine controller electrical systems.

(s) Not Used

(8) Monitor Navigation Buttons

(ON SLIDE #44)

b. **Overhead Controls**

(1) Front windshield wiper/washer switch

(2) Door Wiper/washer switch

(3) Air conditioning switch

(4) Fan speed control

(5) Air temperature control

(ON SLIDE #45)

c. **Left Hand Operator Controls**

(1) Transmission oil warm-up Indicator- The warm-up indicator will light when the transmission oil temperature is too low for normal machine operation.

(2) Engine Speed Control Knob- Controls the engine rpm's.

(3) Horn- Sounds the machines horn.

(4) Speed in Grip Button- Push the top of the transmission SIG button to increase transmission speed. Push the bottom of the switch to lower transmission speed.

(5) Transmission Control Lever- This lever controls the direction, steering, pivot turn and rotation.

(6) Park Lock Lever This lever engages the machines park brake. When the lever is in the up (LOCKED) position, the transmission control lever (TCL) can move but it will not operate the machine. When the lever is in the down (UNLOCKED) position, the TCL can move the machine.

(ON SLIDE #46)

d. **Right Hand Operator Controls**

(1) IGC Controls-Used when the Machine is equipped with Trimble gear.

(2) Blade Control Lever-This lever controls the blade. Pulling the lever to the rear lifts the blade. Moving the lever to the left or right will tilt the blade left or right. Pushing the lever forward lowers the blade and pushing the lever forward a second time puts the blade in float detent position which is used to back blade.

(3) Hydraulic Enable Switch/Hydraulic Accumulator Discharge-This switch is used to lock out the blade hydraulic control lever. Switching the position with forward half pressed down, enables all blade hydraulic control lever functions, if key switch is on and engine is running. Switching position to the rear half pressed down locks out all blade hydraulic control lever functions in all conditions.

(4) Winch Control Lever-Determines the directional travel of the winch cable. If the lever is in neutral position, the winch brake is active. Pushing the winch control lever forward unwinds the cable from the drum. The speed at which the cable unwinds is determined by how far the lever is from the neutral position. Pulling the winch control lever to the rear winds the cable on the drum.

(5) Ripper Control Lever-This lever controls the Ripper. Pushing the lever forward lowers the ripper. Pulling the lever to the rear raises the ripper.

(ON SLIDE #47)

(6) HI-Speed switch-When it is used, the line speed of the cable is doubled. The switch is equipped with a green indicator light to indicate it being active.

(7) Free spool switch-When it is used, it allows the cable to be unwound without the use of the winch control lever. The switch is equipped with a yellow indicator light to indicate it being active.

Instructor Note
Students will not use the free spool switch while in training

(8) Safety lock-Slide this to the right to activate free spool.

(ON SLIDE #48)

e. **Foot Control**

(1) Decel/Brake Pedal-This pedal slows down and stops the machine.

(2) Foot Rest

(ON SLIDE #49)

TRANSITION: Are there any questions on the instruments and controls? I have a question for you: **Q** What happens when the Hi-speed switch is used? **A** Line speed of the cable is doubled. Now that we know the instruments and controls let's take a 10 minute break and then we will go over the starting, operating and shut-down procedures for the MCT.

(ON SLIDE #50)

(10-minute break)

TRANSITION: Are there any more questions on the instruments and controls? Now we will go over the starting, operating and shut-down procedures for the MCT.

5. **Starting, Operating, and Shut-down Procedures** **(30 MIN)**

(ON SLIDE #51)

a. **Pre-Operations Check**-Check engine oil level while the engine is cold. The engine is full when oil level is in the cross-hatch area. If necessary, add oil. With the engine cold, check coolant level. Coolant level must be above the cold mark on the surge tank. If the surge tank is empty, check for leaks. If required, add proper coolant mixture to the surge tank. Check transmission oil level. The transmission oil reservoir, fill port, and sight glass are located on the left side of the machine. Oil must be within the ADD mark and FULL mark on sight glass tube. If necessary, add oil to fill port. Check O-ring on cap before installing. Check hydraulic oil level. The hydraulic reservoir, fill port and sight glass are located on the right side of the machine. Oil must be between the ADD and FULL marks in sight glass tube. If necessary remove cap and add oil to fill port. Check O-ring before installing. Grease Push Beam Dozer Linkage. Apply grease to lubrication fittings until it escapes at joints. Conduct a 360 walk around to inspect the machine for worn or frayed wires and loose or corroded connections, leaks, missing or loose clamps, kinked hoses, and lines or hoses that are making contact with each other or other machine parts. Drain fuel filter. Inspect guards, shields, ROPS, and seatbelts. Record all deficiencies and P.O.L's on the trip ticket and if there is any damage, bring it to the attention of an instructor.

(ON SLIDE #52-53)

b. **Starting the Engine**

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

(2) Sit in the seat and fasten seat belt.

(3) Place the transmission control lever in neutral position.

(4) Park lock lever must be in up (locked) position.

(5) Turn the engine speed control knob to slow idle.

(6) Turn the key switch clockwise to turn engine until it starts. With engine running, adjust engine rpm to 1600 (1/2 speed) for 2 minutes.

Instructor Note
Do not operate starter for more than 20 seconds at a time or starter may be damaged. If engine does not start, wait 2 minutes before trying again

(ON SLIDE #54)

c. **Cold weather start Procedures**: Use starting aid when temperatures are below 40oF and **ONLY** when engine is cold. While cranking engine, push start aid switch for one second. Idle at 1400 RPMS for 10 minutes until engine is warmed up. Use only when normal starting procedures fail.

(ON SLIDE #55-56)

d. **Operating Procedures**

(1) After properly starting the engine, depress decelerator/brake pedal.

(2) Move park lock lever to down (unlocked) position.

(3) Place transmission control lever in desired position.

(4) Press transmission SIG button to desired setting 1.0-3.0 as seen in display window (Machine speed can vary from 0-6.3 mph).

(5) Rotate engine speed control knob to a desired rpm setting.

(6) Slowly release decelerator pedal to move machine.

(7) Move transmission control lever in desired turning direction to steer.

(ON SLIDE #57-58)

e. **Shut-down Procedures**

(1) Park machine on a level surface.

(2) Lower all equipment to the ground.

(3) Move transmission control lever to neutral position.

(4) Move park lock lever to up (locked) position.

(5) Run engine at ½ speed (1600 rpm) without load for 2 minutes.

(6) Rotate engine speed control knob to slow idle position.

(7) Turn key switch off to stop engine.

(8) Release hydraulic pressure by moving control levers until equipment does not move.

(ON SLIDE #59)

f. **After Operations checks-** Conduct a 360 walk around. Look for leaks and damage to the machine. Record all deficiencies and P.O.L's additions on the trip ticket and if there is any damage bring it to the attention of an instructor.

(ON SLIDE #60)

Transition: Are there any questions on starting, operating, and shut-down procedures? I have a question for you. **Q** During shut-down procedures how long must you run engine at ½ speed? **A** Two minutes. Now that you know the starting, operating and shut-down procedures let's take a break and then we will go over some operating techniques.

6. **Operating Techniques (30 MIN)**

(ON SLIDE #61-62)

a. **Leveling-** The purpose of leveling is to return the work site as close to the original state as possible. You do this by cutting the highs and filling the lows.

(ON SLIDE #63)

b. **Berming** is the process of taking large amounts of material and piling them up in a line or around an area for defence. Berms can also be used for holding and protecting large fuel bladders at refuel points.

(ON SLIDE #64)

c. **Slot dozing** is the process of making three cuts in the area that you are working. In between the first and second cut you leave an area just smaller than your blade. The purpose of this is so you can increase the productivity by up to 20% on every third pass.

(ON SLIDE #65)

d. **Blade to Blade dozing** is the process of pushing a load with a partner. You will be side by side and this process will increase productivity by up to 20%.

(ON SLIDE #66)

e. **Push loading scrapers** is the process of assisting a scraper to get a full load by using your blade to push it from behind.

(ON SLIDE #67-70)

b. **Constructing a ditch and Berm-** One purpose for constructing ditches or berms is defense. You can utilize ditches and linear berms in an entry control point (ECP) and to surround a forward operating base (FOB) from enemy sight and enemy attacks. When ditch and berm are constructed together the offer a more formidable defensive structure especially around FOB's. The ditch and berm is constructed simultaneously by two dozers and run parallel to each other. This structure is also known as a tank ditch and berm.

(1) Start on a level surface within the training area.

(2) The dozers will position themselves perpendicular to each other. Dozer 1 will start cutting the ditch excavating no more than 4" to 6" pushing the material in front of the blade of dozer 2.

(3) As dozer 1 reaches the end of its pass drop the material in front of dozer 2, forming a stockpile.

(4) Dozer 1 then raises its blade and backs the tractor to the starting point.

(5) At this time, dozer 2 will begin pushing the stockpile perpendicular to the ditch starting the berm and clearing the path for dozer 1 to continue creating the ditch.

(6) After the initial marking pass, dozer 1 will cut as much material as possible while maintaining control of the machine not to excavate more than 6”.

(7) Dozer 1 will continue to cut the ditch until it is 3’ deep and 50’ in length while dozer 2 continues to create the berm. Dozer 1 will maintain a flat bottom ditch and a slope ratio of 1:3 on the entrance and exit ramp.

Instructor Note
Do not stop forward motion or cause tracks to spin while pushing material

(ON SLIDE #71-72)

c. **Backfill ditch and berm-**Backfilling the ditch will be a combined effort with both dozers. Dozer 1 will start backfilling at the beginning of the berm and dozer 2 will start backfilling at the end of the berm.

(1) Adjust the blade to the height of the surrounding area and move the crawler tractor into the side of the berm from left to right using 1/3 of the blade to cut.

(2) Adjust blade height to prevent overhang from falling onto the tractor.

(3) Place the tractor in reverse after the blade has been emptied raising the blade all the way back.

(4) Reposition for another pass, again cutting into the berm using 1/3 of the blade.

(5) Repeat these steps until the berm and ditch are evenly spread over the designated training area.

Instructor Note

Remember, spreading the ditch and berm is nothing more than leveling the area. Restore the area as close as possible to the original state to match the surrounding area and existing drainage

(ON SLIDE #73)

Interim Transition: Now that you know about the characteristics, capabilities and limitations, outside view, instruments and controls, starting, operating and shut-down procedures and operating techniques of the MCT, are there any questions? Take a 10 minute break and meet outside in the training area.

(10-minute break)

(ON SLIDE #74)

Interim Transition: Before you went on break you learned about the characteristics, capabilities and limitations, outside view, instruments and controls, starting, operating and shut-down procedures and operating techniques of the MCT, are there any questions? Now we will demonstrate a 360 walk around and some operating techniques of the MCT.

NOTE:

Perform the following demonstration

DEMONSTRATION. (15 MIN) The purpose of this demonstration is to show the students how to perform before, during and after operational checks with the aid of a trip ticket, starting, operating, shut-down procedures and operating techniques of the MCT. The demonstration also covers a 360 degrees walk around. Items required are a 850JR MCT for the Instructor to use and students will have trip tickets and student handouts. Have the students gather around the 850JR MCT for a demonstration of before, during and after operational checks and a 360 walk around. Normal class size is 12. There are two instructors required for this demonstration.

STUDENT ROLE: Students will observe the demonstration asking questions if they don't understand and also identify the checks with the trip ticket.

INSTRUCTOR(S) ROLE: Primary Instructor will demonstrate how to perform before, during and after operational checks with the aid of a trip ticket and a 360 walk around and 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

Blade lift cylinders
Blade pitch adjust
Outside Dozer Frame
Track sag adjustment
Left Side Service Door
Fuel fill
Hydraulic Integrated Control Valve
Hydrostatic Charge Filter
Windshield Washer Bottle
Hydrostatic oil sight gauge
Hydrostatic Reservoir Fill Cap
Fan Oil Filter
Cab Tilt Jack

RIGHT SIDE

Right Side Service Door
Lift Chart
Blade Tilt Cylinder
Data Plate
Engine Service Door
Hydraulic Reservoir Fill Cap
Hydraulic Oil Sampling Port
Hydraulic Oil Sight Gauge
Hydraulic Oil Filter
Batteries
Battery Disconnect Switch
NATO Slave Receptacle
Ether Starting Aid Bottle
Primary Fuel Filter and Water Separator
Final Fuel Filter
Engine Oil Filter
Engine Oil Check and Fill
Air Cleaner
Dust Un-Loader Valve
Coolant Surge Tank

CAB
Decelerator Mode Switch
Optional light Switch
Start Aid Switch
Ignition Switch
CAN Monitor Unit
Status and Warning Lights
Front windshield wiper/washer switch
Door Wiper/washer switch
Air conditioning switch
Fan speed control
Air temperature control
Transmission oil warm-up Indicator
Engine Speed Control Knob
Horn
Speed in Grip Button
Transmission Control Lever
Park Lock Lever
IGC Controls
Blade Control Lever
Hydraulic Enable Switch/Hydraulic Accumulator Discharge
Winch Control Lever
Ripper Control Lever
HI-Speed switch
Free spool switch
Safety lock
Decel/Brake Pedal
Foot Rest

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

INTERIM TRANSITION: We've just went over how to perform before, during and after operational checks with the aid of a trip ticket and a 360 walk around are there any questions? If not, let's move on to the practical application of a 360 walk around on the 850JR MCT.

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INSTRUCTOR NOTE

Introduce Practical Application of 360 walk around.

PRACTICAL APPLICATION. (1 Hrs) The purpose of this Practical Application is to allow the students to complete a 360 walk around on the 850JR MCT. Items required are four 850JR MCT's for the students. Normal class size is 12. The students are broken into groups of four and assigned a tractor with one student conducting a 360 walk around and the others observing. There are two instructors required for this demonstration.

PRACTICE: Students will perform the following checks.

LEFT SIDE
Blade lift cylinders
Blade pitch adjust
Outside Dozer Frame
Track sag adjustment
Left Side Service Door
Fuel fill
Hydraulic Integrated Control Valve
Hydrostatic Charge Filter
Windshield Washer Bottle
Hydrostatic oil sight gauge
Hydrostatic Reservoir Fill Cap
Fan Oil Filter
Cab Tilt Jack

RIGHT SIDE
Right Side Service Door
Lift Chart
Blade Tilt Cylinder
Data Plate
Engine Service Door
Hydraulic Reservoir Fill Cap
Hydraulic Oil Sampling Port
Hydraulic Oil Sight Gauge
Hydraulic Oil Filter
Batteries
Battery Disconnect Switch
NATO Slave Receptacle
Ether Starting Aid Bottle
Primary Fuel Filter and Water Separator
Final Fuel Filter
Engine Oil Filter
Engine Oil Check and Fill
Air Cleaner
Dust Un-Loader Valve
Coolant Surge Tank

CAB
Decelerator Mode Switch

Optional light Switch
Start Aid Switch
Ignition Switch
CAN Monitor Unit
Status and Warning Lights
Front windshield wiper/washer switch
Door Wiper/washer switch
Air conditioning switch
Fan speed control
Air temperature control
Transmission oil warm-up Indicator
Engine Speed Control Knob
Horn
Speed in Grip Button
Transmission Control Lever
Park Lock Lever
IGC Controls
Blade Control Lever
Hydraulic Enable Switch/Hydraulic Accumulator Discharge
Winch Control Lever
Ripper Control Lever
HI-Speed switch
Free spool switch
Safety lock
Decel/Brake Pedal
Foot Rest

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 conducting a 360 walk around on the 850JR MCT, are there any questions? If not, let's move on to the demonstration of hand and arm signals

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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:
Blade Up
Blade Down
Oscillate Right
Oscillate Left
Winch out
Winch in
Parkline

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

INTERIM TRANSITION: We've just gone over the demonstration of hand and arm signals, are there any questions before the practical application.

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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:
Blade Up
Blade Down
Oscillate Right
Oscillate Left
Winch out
Winch in
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've just went over the practical application of conducting hand and arm signals, are there any questions? If not, let's move on to the demonstration of ripping operating the 850JR MCT

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INSTRUCTOR NOTE
Introduce Demonstration of equipment ripping operations

DEMONSTRATION. (45 MIN) The purpose of this demonstration is to show the students how to operate the ripper on the 850JR MCT. Items required are a 850JR MCT for the Instructor to use and students will have student handouts to take any notes. Issue hearing protection to students. Have the students gather around the 850JR MCT for a demonstration of operations. Normal class size is 12. There are two 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 ripper operating the equipment and the assistant Instructor will assist the primary Instructor with the demonstration and any student 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 entering tractor
Proper starting procedures
Proceed forward and lower the ripper to desired height
Continue forward ripping the entire area that needed to be ripped
Slowly raise the ripper until the entire shank is out of the ground
Place the tractor in reverse after the ripper is all the way up
Reposition for another pass if needed

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

INTERIM TRANSITION: We've just went over the demonstration of operating the ripper on the 850JR MCT, are there any questions? If not, let's move on to the practical application.

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INSTRUCTOR NOTE

Introduce Practical Application of ripper operations

PRACTICAL APPLICATION (1 HR 30 MIN) The purpose of this Practical Application is to allow the students to operate the ripper on the 850JR MCT. Items required are four 850JR MCT's for the students, hearing protection and radios. Normal class size is 12. The students are broken into groups of four and assigned a tractor with one student operating and the others observing. There are two instructors required for this demonstration.

PRACTICE: Students will perform the following

Proper 360 walk around
3 points of contact entering tractor
Proper starting procedures
Proceed forward and lower the ripper to desired height
Continue forward ripping the entire area that needed to be ripped
Slowly raise the ripper until the entire shank is out of the ground
Place the tractor in reverse after the ripper is all the way up
Reposition for another pass if needed

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 ripper operations on the 850JR MCT, are there any questions? If not, let's move on to the demonstration of winching operations.

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INSTRUCTOR NOTE
Introduce Demonstration of winching operations

DEMONSTRATION. (30 MIN) The purpose of this demonstration is to show the students how to operate the winch on the 850JR MCT. Items required are a 850JR MCT for the Instructor to use and students will have student handouts to take any notes. Issue hearing protection to students. Have the students gather around the 850JR MCT for a demonstration of winch operations. Normal class size is 12. There are two 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 operating the winch on the equipment and the assistant

Instructor will assist the primary Instructor with the demonstration and any student 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 entering tractor
Proper starting procedures
Proceed forward to the disabled vehicle
Turn around so the winch is in line with the vehicle being winched
Place tractor in proper park line position
Winch out so there is slack in the cable
Assistant instructor will unhook cable and pull toward the disabled vehicle
Winch out while the cable is being pulled by assistant instructor
Attach cable to disabled vehicle
Ensure area safety is being followed, clear area 1 ½ times the amount the cable is out
Winch in until the disabled vehicle is where you need it
Unhook disabled vehicle
Reel cable back in
Move dozer back to park line

INTERIM TRANSITION: We've just went over the demonstration of operating the winch on the 850JR MCT, are there any questions? If not, let's move on to the demonstration of equipment operations.

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INSTRUCTOR NOTE
Introduce Demonstration of equipment operations

DEMONSTRATION. (1 HR) The purpose of this demonstration is to show the students how to operate the 850JR MCT. Items required are a 850JR MCT for the Instructor to use and students will have student handouts to take any notes. Issue hearing protection to students. Have the students gather around the 850JR MCT for a demonstration of operations. Normal class size is 12. There are two 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 operating the equipment and the assistant Instructor will assist the primary Instructor with the demonstration and any student 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 entering tractor
Proper starting procedures
Proceed forward and lower the blade to desired height
Adjust the blade to the height of the surrounding area
Raise and lower the blade to maintain a smooth pass
Slowly raise the blade until all material is feathered evenly while moving forward
Place the tractor in reverse after the blade has been emptied and raise the blade all the way up
Reposition for another pass if needed

Constructing a Ditch and Berm

Start on a level surface within the training area
The dozers will position themselves perpendicular to each other.
Dozer 1 will start cutting the ditch excavating no more than 4" to 6" pushing the material in front of the blade of dozer 2
As dozer 1 reaches the end of its pass drop the material in front of dozer 2, forming a stockpile
Dozer 1 then raises its blade and backs the tractor to the starting point
At this time, dozer 2 will begin pushing the stockpile perpendicular to the ditch starting the berm and clearing the path for dozer 1 to continue creating the ditch
After the initial marking pass, dozer 1 will cut as much material as possible while maintaining control of the machine not to excavate more than 6"
Dozer 1 will continue to cut the ditch until it is 3' deep and 50' in length while dozer 2 continues to create the berm. Dozer 1 will maintain a flat bottom ditch and a slope ratio of 1:3 on the entrance and exit ramp

Backfill Ditch and Berm

Adjust the blade to the height of the surrounding area and move the crawler tractor into the side of the berm from left to right using 1/3 of the blade to cut
Adjust blade height to prevent overhang from falling onto the tractor

Place the tractor in reverse after the blade has been emptied raising the blade all the way back
Reposition for another pass, again cutting into the berm using 1/3 of the blade
Repeat these steps until the berm and ditch are evenly spread over the designated training area

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

INTERIM TRANSITION: We've just went over the demonstration of operating the 850JR MCT, are there any questions? If not, let's move on to the practical application.

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INSTRUCTOR NOTE
Introduce Practical Application of equipment operations

PRACTICAL APPLICATION. (23 HRS) The purpose of this Practical Application is to allow the students to operate the 850JR MCT. Items required are four 850JR MCT's for the students, hearing protection and radios. Normal class size is 12. The students are broken into groups of four and assigned a tractor with one student operating and the others observing. There are two instructors required for this demonstration.

PRACTICE: Students will perform the following.
Proper 360 walk around
3 points of contact entering tractor
Wear of safety belt
Proper starting procedures
Proceed forward and lower the blade to desired height
Adjust the blade to the height of the surrounding area
Raise and lower the blade to maintain a smooth pass
Slowly raise the blade until all material is feathered evenly while moving forward
Place the tractor in reverse after the blade has been emptied and raise the blade all the way up
Reposition for another pass if needed

Constructing a Ditch and Berm
Start on a level surface within the training area

The dozers will position themselves perpendicular to each other.
Dozer 1 will start cutting the ditch excavating no more than 4" to 6" pushing the material in front of the blade of dozer 2
As dozer 1 reaches the end of its pass drop the material in front of dozer 2, forming a stockpile
Dozer 1 then raises its blade and backs the tractor to the starting point
At this time, dozer 2 will begin pushing the stockpile perpendicular to the ditch starting the berm and clearing the path for dozer 1 to continue creating the ditch
After the initial marking pass, dozer 1 will cut as much material as possible while maintaining control of the machine not to excavate more than 6"
Dozer 1 will continue to cut the ditch until it is 3' deep and 50' in length while dozer 2 continues to create the berm. Dozer 1 will maintain a flat bottom ditch and a slope ratio of 1:3 on the entrance and exit ramp

Backfill Ditch and Berm

Adjust the blade to the height of the surrounding area and move the crawler tractor into the side of the berm from left to right using 1/3 of the blade to cut
Adjust blade height to prevent overhang from falling onto the tractor
Place the tractor in reverse after the blade has been emptied raising the blade all the way back
Reposition for another pass, again cutting into the berm using 1/3 of the blade
Repeat these steps until the berm and ditch are evenly spread over the designated training area

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 850JR MCT, are there any questions? If not, let's move on to the demonstration of conducting PMCS.

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INSTRUCTOR NOTE

Introduce demo of conducting PMCS

DEMONSTRATION. (15 Min) Have the students gather around the 850JR MCT for a demonstration of conducting PMCS. Normal class size is 12. There are two 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 any student 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
Track tension
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 the practical application of the PMCS.

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INSTRUCTOR NOTE
Introduce practical application of conducting PMCS

PRACTICAL APPLICATION. (2 HRS 15 MIN) The purpose of this Practical Application is to allow the students to conduct PMCS. Items required are all 850JR MCT's on hand for the students, hearing protection, safety glasses and PMCS worksheets. Have the students break into groups of two's. Normal class size is 12. There are two instructors required for this practical application.

PRACTICE: Students will work the practical application checking for and correcting all discrepancies and complete the PMCS worksheet.
PROVIDE-HELP: N/A
1. Safety Brief: N/A
2. Supervision and Guidance: Instructor is moving around the ready line, assisting students, and answering questions as they arise.

(ON SLIDE #75)

Transition: You've just received a demonstration on properly performing before operation checks, starting, operating, shut-down procedures and operating techniques of the MCT. Are there any questions? I have a question for you, **Q** what is one of the operating techniques of the MCT? **A** Leveling, slot, blade to blade, push load scrapers, ditch and berm.

(ON SLIDE #76)

Summary: **(5 MIN)**

So far we've covered characteristics, instruments and controls, capabilities and limitations, starting, operating and shut-down procedures and operating techniques of the MCT. With this knowledge I am certain that you will be able to properly operate the MCT. This concludes the period of instruction. Those of you with the IRF's fill them out and place them on my desk. The rest of you take a 10 minute break.

REFERENCES

TM 11503A-OR 850 JR Crawler Dozer

SL-3-11825A Basic Operators Bag

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

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

FM 21-60 Visual Signals