**DEPARTMENT OF THE AIR FORCE**
**Headquarters US Air Force**
**Washington, D.C. 20330-1030**

**QTP24-3-D752**
**14 January 2019**

# Excavators

Vehicle Management Codes: D752, D753, D754, D759


## QUALIFICATION TRAINING PACKAGE

## CONTENTS

## Section 1—OVERVIEW

### 1.1. Overview.

1.1.1. Send comments and suggested improvements on Air Force (AF) Form 847, *Recommendation for Change of Publication* through Air Force Installation and Mission Support Center (AFIMSC) functional managers via e-mail at AFIMSC.IZSL.VehicleOps@us.af.mil.

1.1.2. How to use this plan:

1.1.2.1. Instructor:

1.1.2.1.1. Provide overview of training, **Section 2** and **Section 3**.

1.1.2.1.2. Instructor's lesson plan for trainee preparation, give classroom lecture, **Section 4**.

1.1.2.1.3. Instructor's lesson plan for knowledge overview, **Section 5**.

1.1.2.1.4. Instructor's lesson plan for demonstration, **Section 6**.

1.1.2.1.5. Instructor's lesson plan for performance test evaluation, **Section 7**.

1.1.2.2. Trainee:

1.1.2.2.1. Reads this entire lesson plan prior to starting lecture.

1.1.2.2.2. Follows along with lecture using this lesson plan and its attachments.

1.1.2.2.3. Uses **Attachment 2** and **Attachment 3** as guides for vehicle inspection.

1.1.2.2.4. Takes performance test.

## Section 2—RESPONSIBILITIES

### 2.1. Responsibilities.

2.1.1. The trainee shall:

2.1.1.1. Ensure the trainer explains the Air Force Qualification Training Plan (AFQTP) process and the trainee's responsibilities.

2.1.1.2. Review the AFQTP/Module/Unit with the trainer.

2.1.1.3. The trainee should ask questions if he or she does not understand the objectives for each unit.

2.1.2. Instructor shall:

2.1.2.1. Review the AFQTP with the trainee.

2.1.2.2. Conduct knowledge training with the trainee using the AFQTP.

2.1.2.3. Sign-off the task(s).

## Section 3—INTRODUCTION

### 3.1. Objectives.

3.1.1. Given lectures, demonstrations, and a hands-on driving session, trainees will be able to perform operator's inspection and complete the performance test with zero instructor assists.

3.1.1.1. Train and qualify each trainee in safe operation and preventive maintenance of the excavator.

3.1.1.2. This training will ensure the trainee becomes a qualified excavator operator; an operator who has the knowledge and skills to operate an excavator in a safe, proficient and professional manner.

### 3.2. Desired Learning Outcomes.

3.2.1. Understand the purpose of the excavator and its role in the mission.

3.2.2. Understand the safety precautions to be followed for pre-, during- and post-operation inspections of the excavator.

3.2.3. Know the proper operator maintenance procedures of the excavator IAW applicable technical manual(s) and use of AF Form 1800, *Operator's Inspection Guide and Trouble Report*.

3.2.4. Be completely familiar with the safety features of the excavator.

3.2.5. Safely and proficiently operate the excavator.

### 3.3. Lesson Duration.

3.3.1. Recommended instructional and hands on training time is 26 hours:

**Figure 3.1. Recommended Training Time for Training Activities.**

| Training Activity | Training Time |
|---|---|
| Trainee's Preparation | 30 Minutes |
| Instructor's Lecture | 1 Hour |
| Instructor's Demonstration | 2.5 Hours |
| Trainee's Personal Experience (to build confidence and proficiency)<br>▪ Perform Operator Maintenance<br>▪ Operate the Vehicle | 20 Hours |
| Trainee's Performance Evaluation | 2 Hours |

**Note:** This is a recommended time; training time may be more or less depending how quickly a trainee learns new tasks.

**3.4. Instructional References.**

3.4.1. Risk Management (RM) and Safety Principles IAW Air Force Pamphlet (AFPAM) 90-803, *Risk Management (RM) Guidance and Tools*.

3.4.2. Applicable technical manual(s) or Manufacturer's Operator's Manual (see Vehicle Management for technical manual(s) number for vehicle being used in training).

3.4.3. Air Force Manual (AFMAN) 24-306, *Operation of Air Force Government Motor Vehicle*, Chapters 1-5, 7-9 and 12.

3.4.4. AF Form 1800.

3.4.5. Air Force Instruction (AFI) 91-203, *Air Force Consolidated Occupational Safety Instruction*.

3.4.6. AFI 24-302, *Vehicle Management*.

**3.5. Instructional Training Aids and Equipment.**

3.5.1. Excavator Lesson Plan.

3.5.2. Excavator.

3.5.3. Applicable technical manual or manufacturer's operator's manual.

3.5.4. AF Form 1800.

3.5.5. Suitable training area.

## Section 4—TRAINEE PREPARATION

### 4.1. Licensing Requirements.

4.1.1. Trainee must have in his/her possession a valid state driver's license.

4.1.2. AF Form 171, *Request for Driver's Training and Addition to U.S. Government Drivers* in accordance with (IAW) AFI 24-301, *Vehicle Operations*.

4.1.3. Applicable local licensing jurisdiction requirements.

### 4.2. Required Reading.

4.2.1. Read this entire lesson plan.

4.2.2. Read AFMAN 24-306, Chapters 1-5, 7-9 and 12.

4.2.3. Read manufacturer's operator's manual for the vehicle being trained on.

## Section 5—KNOWLEDGE LECTURE AND EVALUATION

### 5.1. Overview of Training and Requirements.

5.1.1. Training objectives:

5.1.1.1. Given lectures, demonstrations, hands-on operating session(s), the trainee must be able to perform operator's inspection and complete the performance evaluation with zero instructor assists.

5.1.1.2. Train and qualify each trainee in safe operation and preventive/operational maintenance of the excavator.

5.1.1.3. This training will ensure the trainee becomes a qualified excavator operator—an operator who has the knowledge and skills to operate an excavator in a safe, proficient and professional manner.

5.1.2. Desired learning outcomes:

5.1.2.1. Understand the principals of operation, the purpose of the excavator and its role in the mission.

5.1.2.1.1. The purpose of the excavator is to excavate large areas and is a multipurpose piece of equipment that combines the functions of an excavator, dozer, and loader into one machine.

5.1.2.1.2. Role in the mission (Unit/Base/Community (during natural disasters)/Air Force).

5.1.2.2. Understand the importance of efficient operation and performance of preventative maintenance on the excavator to meet mission requirements. Preventative maintenance ensures safe operation and availability for daily and emergency use.

5.1.2.3. Understand the safety precautions to be followed pre-, during- and post-operational inspection of the excavator.

5.1.2.4. Be completely familiar with the safety features of the excavator.

5.1.2.5. Safely and proficiently operate the excavator.

5.1.3. Excavator design. The design of an excavator varies depending on the vehicle manufacturer. Refer to the manufacturer's operator's manual(s) for additional information on the specific excavator being operated.

5.1.4. The operator must know the location and function of all controls and indicators prior to operating the vehicle.

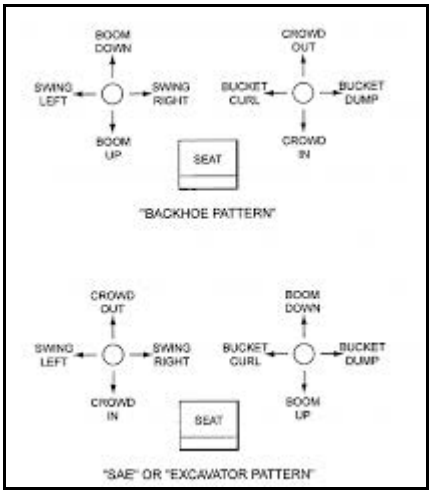
**Table 5.1. Controls and Indicators.**

| **Control/Indicator** | **Description** |
|---|---|
| Front instrument panel indicators | Displays all warning indicators and engine control information |
| Engine coolant gauge | Indicates coolant temperature |
| Fuel gage | Indicates the fuel level |
| Engine oil pressure warning indicator | Lights when engine oil pressure is too low |
| Engine coolant temperature warning indicator | Lights when the coolant temperature gets too high |
| Coolant level indicator light when | Lights when the coolant level is too low |
| Air cleaner clogging warning indicator | Lights when the air cleaner is clogged |
| Air preheating indicator | Lights when the preheating is activated |
| Battery charge warning indicator | Lights when there are malfunctions in the charging system |
| (If applicable) Quick-fit indicator | Lights when the quick-fit is opened, provided that the two quick fit switches on the left instrument panel and the right wall panel are pressed simultaneously |
| **Caution:** If the red warning lamp for the open quick-fit lights up on the front instrument panel, while the bucket is still attached to the bracket, the excavator equipment should not be operated (as the bucket may suddenly loosen). | |
| (If applicable) Overload warning indicator | Lights if the attachment becomes overloaded, provided that the switch on the right instrument panel is pressed down |

| | |
|---|---|
| **Caution:** If the overload warning lamp lights up, stop the lifting operation and reduce the load. Otherwise, this can cause serious accident. | |
| Boost indicator | Lights when the boost power function has been selected with the right control lever |
| (If applicable) Float operation indicator | Lights when the float function has been selected with the right lever |
| (If applicable) Hammer indicator | Lights when the hammer button on the right control lever is pressed while hammer of boost/hammer switch on the right instrument is selected |
| (If applicable) Shear selecting indicator | Lights when the shear switch on the right instrument panel has been pressed |
| Switches and controls | **Note:** Refer to operator's manual |
| Engine speed control switch | Used to select the engine speed |
| Work lights switch | Controls the working lights |
| Power maximum mode selector switch | Used to activate the power maximum mode |
| Auto idle selector | Used to return the engine to idle when there is no load demanded |
| (If applicable) Boost/hammer/shear selector switch | Used to operate either the boost mode, hammer mode or shear mode |
| (If applicable) Right quick-fit switch | Used when the left quick-fit unit is opened. |
| **Note:** This function is activated by pressing the quick-fit switch on the left and right instrument panels simultaneously. | |
| (If applicable) Quick fit audible warning switch | Used to operate quick-fit warning buzzer. |
| Wiper switch | Controls upper/lower wipers |
| Washer switch | Controls windshield washers |
| **Caution:** Never press the washer switch for more than 20 seconds. Do NOT use if the washer fluid container is empty. | |
| Starter switch | Used to start the excavator |
| (If applicable) Extra work lamp switch | Controls the work lamps on the cab and counter weight |
| Beacon light switch | Controls the beacon light |
| Cab dome light switch | Turns dome light on and off |
| (If applicable) Seat heating switch | Used to turn the seat heater on/off |
| (If applicable) Overload warning switch | Controls the warning lamp and buzzer |
| **Caution:** When the overload warning lamp is on, stop the lifting operation and reduce the load. If not, serious and even fatal accidents can occur. | |
| (If applicable) Left quick-fit switch | Used when the left quick-fit unit is open |
| **Note:** This function is activated by pressing the quick-fit switch on the left and right instrument panels simultaneously. | |
| Travel warning sound stop switch | Used to mute the travel warning sound |
| Hour meter indicator | Displays how many hours the engine has run |
| (If applicable) One/two pump selector switch | Used when the boost/hammer/shear switch is set to hammer or shear |

| | |
|---|---|
| Automatic/manual selector switch | Used if the V-ECU malfunctions; the switch must be switched to the manual position |
| (If applicable) Engine diesel heater control | Controls the diesel heater. Refer to the operator's manual |
| Service socket | Used to connect diagnostic equipment |
| A/C and heater switch | Used to turn the A/C and heater on/off |
| Left operating lever | Controls arm out/arm in functions |
| | Controls left/right swing of the excavator |
| | Rotator buttons |
| | Horn buttons |
| Right operating lever | Controls bucket in/out functions |
| | Controls boom raise/lower functions |
| | Boost/hammer button |
| | Horn button |
| Travel levers and pedals (for tracked excavators) | |
| **Caution:** Keep feet clear of the travel pedals and levers when working. Know the track direction before operating travel pedals and levers. Travel operation will be reversed when the sprocket is at the front. | |
| Center position neutral | |
| Forward position of both pedals/levers move the excavator forward | |
| Rear position of both pedals/levers move the excavator in reverse | |
| (If applicable) Optional pedal left hand side | (adjustable boom) |
| (If applicable) Optional pedal right hand side | Operates hammer/shear or crusher |

**Figure 5.1. Excavator Pattern.**




## 5.2. Vehicle Inspection.

5.2.1. Pre-operation vehicle inspection test. Use AF Form 1800 as a 360 walk-around guide.

5.2.2. A Seven-Step Inspection Method will help ensure the inspection is the same each time it is conducted, and that nothing is left out. See **Attachment 3** for the Seven-Step Inspection Method.

5.2.3. Types of Vehicle Inspection. If discrepancies are found the operator must report them to Vehicle Control Officer/Vehicle Control Non-Commissioned Officer (VCO/VCNCO), the supervisor, and/or vehicle maintenance:

5.2.3.1. Pre-operation inspection – identify items/problems that could cause accidents or breakdowns.

5.2.3.1.1. Vehicle Maintenance may authorize continued use for all other maintenance discrepancies.

5.2.3.1.2. Cleanliness/damaged/missing items.

5.2.3.1.3. Leaks (fuel/oil/coolant/air).

5.2.3.1.4. Fluid levels; ensure levels are is within limits:

5.2.3.1.4.1. Engine oil.

5.2.3.1.4.2. Coolant.

5.2.3.1.4.3. Power steering fluid.

5.2.3.1.4.4. Transmission fluid.

5.2.3.1.4.5. Hydraulic fluid.

**Figure 5.2.**

5.2.3.1.5. Battery; security, fluid, damage and corrosion.

5.2.3.1.6. All wheel rims (cracks, splits, etc.); check for loose or missing lug nuts.

5.2.3.1.7. All tires.

5.2.3.1.7.1. Proper inflation.

5.2.3.1.7.2. Sidewalls, tread, to include depth, bulges.

5.2.3.1.7.3. Cuts and abrasions.

5.2.3.1.7.4. Lug nuts.

5.2.3.1.8. Transmission.

5.2.3.1.8.1. Differential(s). Damage, wear and leaks.

5.2.3.1.8.2. Drive train. Damage, wear and leaks.

5.2.3.1.9. Drive belts; tension and fraying.

5.2.3.1.10. Air filter(s).

**Figure 5.3.**


5.2.3.1.11. All hoses and wiring.

5.2.3.1.12. Suspension.

5.2.3.1.12.1. Shocks and springs, damage.

5.2.3.1.13. Frame bolts and other fasteners, visual inspection for damage.

5.2.3.1.14. Welds visual inspection for cracks.

5.2.3.1.15. Visual and auditory warning devices.

5.2.3.1.16. Storage bin doors properly latched, if applicable.

5.2.3.1.17. Pintle hook connection/compatibility, if applicable.

5.2.3.1.18. Fuel tank(s) assembly for damage.

5.2.3.1.19. Diesel exhaust fluid (DEF) tank, if applicable.

5.2.3.1.20. Wiring/lights/reflectors (interior/exterior).

5.2.3.1.21. Mirrors.

5.2.3.1.22. Windshield and windshield wipers/washers.

5.2.3.1.23. Doors.

5.2.3.1.24. Windows.

5.2.3.1.25. Seatbelts.

5.2.3.2. During-operation inspection.

5.2.3.2.1. Ensure master switch is turned to the ON position.

**Figure 5.4.**

5.2.3.2.2. Ignition to accessory position.

5.2.3.2.3. Check all gauges and warning lights/indicators for proper operations.

**CAUTION:** Regeneration system. Refer to technical manual(s).

5.2.3.2.4. Ignition to start.

5.2.3.2.5. Check for unusual conditions (interior).

5.2.3.2.5.1. Sounds.

5.2.3.2.5.2. Odors.

5.2.3.2.5.3. Vibrations.

5.2.3.2.6. Conduct 360 walk-around; check for unusual conditions (exterior).

5.2.3.2.6.1. Sounds.

5.2.3.2.6.2. Odors.

5.2.3.2.6.3. Vibrations.

5.2.3.2.6.4. Leaks.

5.2.3.2.6.5. Light function.

5.2.3.2.7. Conduct function check of all controls.

**Figure 5.5.**

**Figure 5.6.**

5.2.3.2.7.1. Steering wheel. **Note:** Disengage all-wheel steer function.

**Figure 5.7.**

5.2.3.2.7.2. Safety selector.

**Figure 5.8.**

5.2.3.2.7.3. Parking brake.

5.2.3.2.7.4. Windshield wipers.

5.2.3.2.7.5. Climate control.

5.2.3.2.7.6. Conduct 360 walk-around; check for unusual conditions (exterior).

5.2.3.2.7.6.1. Sounds.

5.2.3.2.7.6.2. Odors.

5.2.3.2.7.6.3. Vibrations.

5.2.3.2.7.6.4. Leaks.

5.2.3.2.8. Sign AF Form 1800. Verify Standard Form (SF) 91, Motor Vehicle Accident Report, SF 94, Statement of Witness, and Department of Defense (DD) Form 518, Accident Identification Card are on-hand.

5.2.3.3. Post-operation inspection.

5.2.3.3.1. Check fuel level (< ¾ tank, refuel).

5.2.3.3.2. Check DEF level (< ¾ tank, refuel).

5.2.3.3.3. Ensure vehicle and components are cleaned.

5.2.3.3.4. Park vehicle. Ensure transmission in neutral, apply parking brake.

5.2.3.3.5. Follow manufacturer's shut-down procedures.

5.2.3.3.6. Shut off lights and accessories.

5.2.3.3.7. Ensure master switch is turned to the OFF position

5.2.3.3.8. Post 360 walk-around

**5.3. Vehicle Safety and Equipment.**

5.3.1. Hazards and human factors:

5.3.1.1. Traffic due to size and weight.

5.3.1.2. Jerky starts and stops.

5.3.1.3. Traveling too fast and turning too sharply.

5.3.1.4. Slip hazards.

5.3.1.4.1. Always maintain three-points of contact when mounting/dismounting the vehicle.

5.3.1.5. High rollover risk.

5.3.1.6. Restricted visibility.

5.3.2. Safety clothing and equipment:

5.3.2.1. Safety toed boots must be worn.

5.3.2.2. Leather gloves.

5.3.2.3. Hearing protection.

5.3.2.4. Inclement weather gear, if required.

5.3.2.5. Reflective belt during hours of reduced visibility and on flightline.

5.3.2.6. First aid kit.

5.3.2.7. Cones.

5.3.2.8. Tire gauge.

5.3.2.9. Fire extinguisher.

5.3.2.10. AF Form 1800, SF 91 and DD Form 518.

**5.4. Driving Safety and Precautions.**

5.4.1. Overview safety and precautions. The following are safety items and procedures to be followed during excavator operations. The manufacturer's operator's manual will also provide safe operating procedures and the vehicle itself may have warnings, cautions and danger stickers that the vehicle operator should be aware of.

5.4.2. Vehicle data plate. Be familiar with the location and information found on the data plate.

5.4.3. Plan the route.

5.4.3.1. Overhead clearance. Check the clearance height of the vehicle relative to the overhead obstructions such as power lines, trees, and bridges. Refer to AFI 91-203 for guidance on working in areas with overhead power lines and the distance the operator must maintain.

5.4.3.2. Width restrictions/construction zones, over-the-road.

5.4.3.3. Weight restriction (roads, bridges, off-road conditions).

5.4.3.4. Inclines.

5.4.3.5. Uneven ground.

5.4.3.6. Soft surfaces.

5.4.4. Over the road operation.

5.4.4.1. Greater vehicle weight. The operator needs to consider the combined weight of the excavator and the load. This will affect the following:

5.4.4.1.1. Operator's ability to stop. Do not tailgate the vehicle in front. Allow more distance between vehicles in order to increase reaction time.

5.4.4.1.2. Vehicle's ability to accelerate/follow the flow of traffic. Accelerate smoothly and gradually so the vehicle does not jerk. Rough acceleration causes unnecessary, premature mechanical damage to the vehicle's drive train. Maintain a safe speed.

5.4.4.2. Downgrades/upgrades. The operator will use lower gears more frequently to climb hills or mountains with increasing grade steepness, length and/or heavy load weight.

Plan ahead to identify downgrades/upgrades on the route of travel. If possible, talk to other drivers who are familiar with the grades to find out what speeds are safe. When encountering downgrades/upgrades as described, the operator will need to address:

5.4.4.2.1. Speed. On downgrades, gravity causes the speed of the vehicle to increase. The operator must select an appropriate safe speed, use a low gear, and proper braking techniques. The operator must go slow enough so as to not overheat the vehicle's brakes.

5.4.4.2.2. Stopping. If the brakes become too hot, they may start to "fade". Brake fade will cause partial or complete loss of the brakes.

5.4.4.3. Sharp turns. Slow down before entering the turn. During the turn, avoid sharp sudden movements with the steering wheel. This reduces the chance of the vehicle weight shifting, and also prevents the possibility of tipping over due to the higher center of gravity.

5.4.4.4. Surroundings. Operating a excavator requires the operator's constant attention. Many situations can be avoided by simply paying close attention to the surrounding conditions. Road signs such as "steep grade", "low overhead clearance", "sharp turn ahead", and special speed limits are posted for the driver's safety.

5.4.4.5. Blind spots. Operators must know where there will be limited or no visibility surrounding the vehicle being operated.

5.4.4.6. Size. The operator must take into account, the size/width of the attachment assembly when operating the vehicle.

5.4.5. Backing.

5.4.5.1. Use a spotter and hand signals.

5.4.5.2. Back slowly and keep the spotter in view at all times. If the operator loses sight of the spotter, the operator must immediately stop the vehicle.

5.4.5.3. See AFMAN 24-306 for standard AF spotter hand signals and additional guidance on spotter safety.

5.4.6. General operation.

5.4.6.1. Walk around the vehicle to ensure the area is clear before moving.

5.4.6.2. Before operating, the operator must understand all controls. He/she should ASK, if they do not understand!

5.4.6.3. Never attempt to start or operate the vehicle from any location other than the operator's seat.

5.4.6.4. Never leave the vehicle running unattended.

5.4.6.5. Do not attempt to get on or off of the machine while it is moving.

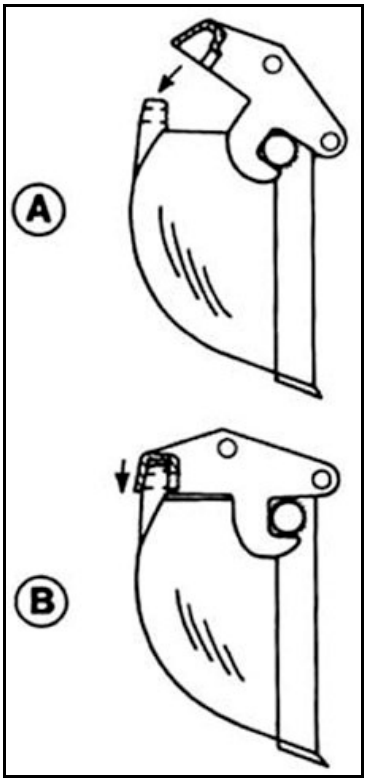
**5.5. Vehicle Operation.**

5.5.1. Attachment installation/removal. Different types of excavator attachments such as the impactor, compactor and bucket can greatly increase the versatility of the machine.

**Caution:** Before you install/remove an attachment, be sure the excavator is resting securely on solid level ground. To install an attachment on a typical excavator.

5.5.1.1. Attachment installation.

**Figure 5.9. Attachment Installation.**




5.5.1.1.1. Insert the hook onto the cross member of the attachment (**Figure 5.2.** – A).

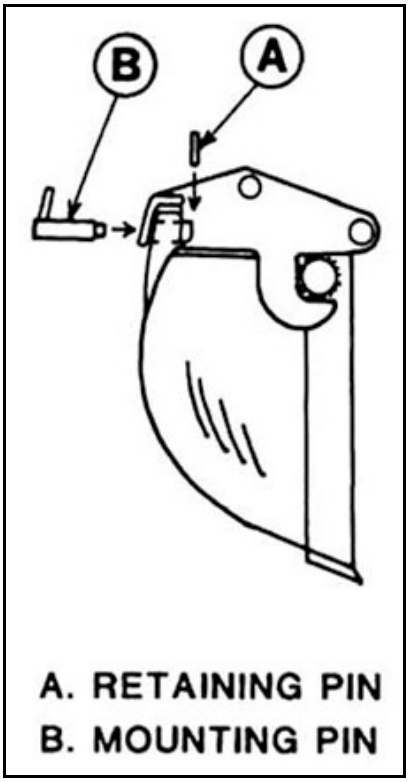
5.5.1.1.2. Extend the bucket cylinder until the rear connector engages the aligning bearing (**Figure 5.2.** – B).

5.5.1.1.3. Raise the attachment completely off the ground. Insert the mounting pin into the quick coupler, and install the retaining pin back into the mounting pin.

5.5.1.1.4. Depending on the attachment, connect the two hydraulic hoses.

5.5.1.2. Attachment removal.

**Figure 5.10. Attachment Removal.**




5.5.1.2.1. Depending on the attachment, disconnect the two hydraulic hoses.

5.5.1.2.2. Remove the retaining pin from the mounting pin.

5.5.1.2.3. Remove the mounting pin from the quick coupler (**Figure 5.2.**).

5.5.1.2.4. After you remove the mounting pin, take pressure off the bucket. Retract the bucket cylinder and remove the attachment.

5.5.2. General vehicle operations.

5.5.2.1. Complete a pre-operation vehicle inspection.

5.5.2.2. Sign the current AF Form 1800.

5.5.2.3. Climb into the vehicle. Use three points of contact.

5.5.2.4. Adjust the seat and mirrors as needed; fasten seat belt.

5.5.3. Starting the vehicle.

5.5.3.1. Turn on the master switch.

5.5.3.2. Place safety locking system handle in the down position.

5.5.3.3. Make sure the operation control lever is in the disengaged position.

5.5.3.4. With the gear selector in neutral and the parking brake applied, turn the ignition switch to the start position. When the engine starts, release the ignition switch.

**Caution:** Do not engage the starter for more than 30 seconds at a time. If the engine does not start within 30 seconds, allow the starter two minutes to cool-off.

5.5.3.5. After the engine starts, ensure that oil pressure is indicated on the gauge within 15 seconds after starting. Idle engine for 3 to 5 minutes at 1000 revolutions per minute (RPM) before operating.

5.5.4. Operating procedures (working with the bucket). The excavator is a multi-task machine capable of being fitted with a multitude of special attachments to perform many types of work. Only the simplest operations are described below.

**Note:** You must have an approved AF Form 103, *Base Civil Engineering Work Clearance Request*.

5.5.5. Backhoe work.

5.5.5.1. For digging work at a lower level than the machine is located:

5.5.5.1.1. When the angle between the bucket cylinder and links, arm cylinder and arm is set to 90 degrees, respectively, the working efficiency of cylinder will be at its maximum.

5.5.5.1.2. In case of digging, take advantage of this angle to improve the work efficiency.

5.5.5.1.3. When digging the useful movement of the arm is 30 degrees forward and 45 degrees rearward. There may be a little difference according to digging depth.

5.5.5.1.4. Do not use the cylinder up to its stroke end, but only within this range. Machine position is critical when digging large excavations, as seen in **Figure 5.4.**

5.5.6. Ditching work.

5.5.6.1. Install the proper bucket for ditching.

5.5.6.2. Place the machine over where the ditch is to work effectively.

5.5.6.3. In the case of a wide ditch, dig both sides first, then the center area.

**Figure 5.11. Ditching Work.**

5.5.7. Loading work. Loading a dump truck with an excavator is different than loading with other equipment (loaders, backhoes, etc.).

5.5.7.1. The excavator is normally positioned on top of the stockpile above and behind the dump truck. See **Figure 5.12.**

5.5.7.2. Position the hauler so as to achieve a small slewing movement and good visibility for the operator to work effectively.

5.5.7.3. Also, load over the rear of the dump truck, rather than the side. This makes it easier for the excavator to swing the machine and place the material in the dump. This also prevents the possibility of material being dropped on the truck cab.

5.5.8. When working with the bucket:

5.5.8.1. Do not strain the slewing mechanism. Do not use the slewing force for raking over the ground, demolition of buildings or thrusting bucket teeth in the ground. This operation may cause damage to the excavator and its attachments.

5.5.8.2. Do not work with the traveling motors. Do not dig by using the traveling motors and thrusting the bucket teeth into the ground. This can overload the rear of the excavator and damage the track drive.

5.5.8.3. Do not extend the hydraulic cylinder to its end of stroke. This can overload the stop in the cylinder and shorten the life span of the excavator. Work with as much clearance as possible.

5.5.8.4. Do not work by slamming the bucket into the ground. Do not perform digging by dropping the boom or using the bucket instead of a pick. Striking, digging or deliberate striking can overload the rear of the excavator or damage the attachment.

5.5.8.5. Do not carry out lifting work. Using the excavator as a crane is prohibited. Know the municipal, provincial, state and/or national regulations governing lifting work.

5.5.8.6. If lifting work is permitted, a properly installed rated bucket hook and certified slings/shackles are required.

5.5.8.7. Do not drop force of the excavator body. Do not operate by dropping the excavator body.

**Figure 5.12. Dump Truck Loading**


5.5.9. Working on a slope.

5.5.9.1. While traveling on a slope, keep the angle between the boom and arm at 90-110 degrees. Raise the bucket 20-30 cm from the ground.

5.5.9.2. Do not descend backwards on a slope.

5.5.9.3. Do not change the direction or travel across on a slope. Change the direction on level ground. If necessary, first come down to level ground and make a detour.

5.5.9.4. If the excavator slides, immediately lower the bucket to the ground.

5.5.9.5. Do not perform swing work or operation of attachments. The machine can turn over if unbalanced. Do not swing a loaded bucket. In an unavoidable case, pile up earth on the slope and make the excavator level and stable.

5.5.9.6. Do not travel on a slope of 30 degrees or more.

**Caution:** Be cautious when operating on a slope. If the engine shuts down on a slope, do not operate the swing function. The superstructure may be swung under its own weight and cause tipping or side slipping. Be careful when opening/closing doors. Operational force may change rapidly. Keep doors closed when operating and when the vehicle is not in use.

5.5.9.7. When operating up a slope of 15 degrees or more, position the excavator so it is square to the slope. Keep the angle between the boom and arm at 90 to 110 degrees. Raise the bucket 20 to 30 cm from the ground.

5.5.9.8. If the track shoe slips on a slope, thrust the bucket into the ground. Pull the arm in to assist the track drive to move the excavator up the slope.

5.5.9.9. When operating down a slope of 15 degrees or more, position the excavator so it is square to the slope. Keep the angle between the boom and arm at 90 to 110 degrees. Raise the bucket 20 to 30 cm from the ground and travel at a slow speed.

**Figure 5.13. Working on a Slope.**


5.5.10. Operation of the hammer attachment.

5.5.10.1. The main uses of the hammer attachment are breaking stone, demolition work and road repair. It is widely used for demolition of buildings, breaking road surfaces, tunnel work, smashing slag and breaking or cutting stone.

5.5.10.2. Press the chisel firmly onto the surface at the right angle.

5.5.10.3. When striking, press the chisel firmly onto the surface. Lift the frame about 5 cm. **Caution:** Never raise the excavator unnecessarily high.

5.5.10.4. If the surface is struck repeatedly, but it does not break within one minute, move the chisel nearer one end and strike again.

5.5.10.5. The striking direction of the chisel and the direction of the breaker body are deviate slightly. Adjust the bucket cylinder so that the direction of body and chisel is always the same.

5.5.10.6. Press the chisel firmly against the surface to avoid idle striking.

5.5.10.7. During hammer operation:

5.5.10.7.1. Do not operate the cylinder to its end of stroke; leave approximately 5 cm.

5.5.10.7.2. Do not swing the hammer against the rocks, concrete, etc.

5.5.10.7.3. Do not move the chisel while it is striking a blow.

5.5.10.7.4. Do not strike vertically or in an upward direction.

5.5.10.7.5. Do not bend the chisel to make a hole in the ground.

5.5.10.7.6. Do not hoe the chisel.

5.5.10.7.7. Do not raise the excavator by extending the bucket cylinder to its maximum.

5.5.11. Shutdown procedures.

5.5.11.1. Bring the excavator to a complete stop.

5.5.11.2. Return the travel levers/pedals to the neutral position.

5.5.11.3. (If applicable) Apply parking brake.

5.5.11.4. Lower all attachments to the ground.

5.5.11.5. Turn the engine speed control switch to idle.

5.5.11.6. Allow engine three to five minutes to cool down.

5.5.11.7. Turn the key to the OFF position.

5.5.11.8. Check for damage.

5.5.12. End of duty day.

5.5.12.1. Perform post-operation procedures as described in **Paragraph 5.2.**

5.5.12.2. Cleaning air intake filters. There are generally two elements, the inner and the outer. Under dusty operating conditions, clean outer elements daily (even more often if working conditions are extremely dusty). The inner filter will be replaced during regular scheduled maintenance. For cleaning procedures, use guidelines stated in the operator's maintenance manual.

5.5.12.3. Lubricating the vehicle according to intervals listed in the maintenance chart. If operating the machine in severe conditions, lubricate the machine more frequently.

5.5.12.4. Fuel the Excavator at the end of each working day to prevent moisture from condensing and forming droplets of water within the fuel tank. Contact base fuels to come to the job site if your equipment can't be driven to the service station (i.e., extreme distances, tracked vehicles, no drivable support equipment, etc.). Ensure the vehicle has a minimum of three-fourths tank of fuel at the end of the duty day.

## Section 6—EXPLANATION AND DEMONSTRATION.

### 6.1. Instructor's Preparation.

6.1.1. Establish a training location.

6.1.2. Obtain appropriate vehicle operator's manual.

6.1.3. Schedule/reserve a vehicle.

6.1.4. Ensure trainee completes AF Form 171.

### 6.2. Safety Procedures and Equipment.

6.2.1. The following safety items should be followed by both the instructor and trainee.

6.2.1.1. Chock wheel (if required) when excavator is parked.

6.2.1.2. Remove all jewelry and identification tags.

6.2.1.3. Personal protective equipment (PPE) and equipment items.

6.2.1.3.1. Safety toed boots must be worn.

6.2.1.3.2. Gloves will be worn during pre-operation inspection, post-operation inspection and while performing maintenance/adjustments to the attachment.

6.2.1.3.3. Hearing protection, if required

6.2.1.3.4. Eye protection, if required.

6.2.1.3.5. Inclement weather gear.

6.2.1.3.6. Reflective belt during hours of reduced visibility or on the flightline.

6.2.1.3.7. Warning triangles.

6.2.1.4. The trainer and the trainee should conduct a 360 walk-around the vehicle to become familiar with all warning labels and signs.

6.2.1.5. Ensure that the vehicle is properly parked and the brakes are set before accomplishing the walk-around inspection.

6.2.1.6. Properly adjust driver's seat and all mirrors.

6.2.1.7. Ensure trainee wears seat belt.

6.2.1.8. Throughout demonstration, practice excavator operational safety.

6.2.2. Practice basic AF RM process during demonstration:

6.2.2.1. Identify the hazards.

6.2.2.2. Assess the hazards.

6.2.2.3. Develop controls and make decisions.

6.2.2.4. Implement controls.

6.2.2.5. Supervise and evaluate.

**6.3. Operator Maintenance Demonstration.**

6.3.1. With trainee, accomplish vehicle inspection using AF Form 1800. The vehicle inspection will follow the seven-step method as described in **Attachment 3**. An inspection guide can be used to ensure all areas of the excavator are covered in addition to the "Operation Demonstration" guidelines provided below.

**6.4. Operation Demonstration.**

6.4.1. Throughout demonstration:

6.4.1.1. Allow for questions.

6.4.1.2. Repeat demonstrations as needed.

6.4.2. Demonstrate/discuss pre-operation and during-operation inspection requirements.

6.4.3. Describe the operation and location of the following items:

6.4.3.1. Knob throttle.

6.4.3.2. Steering controls.

6.4.3.3. Horn button.

6.4.3.4. Gear selector.

6.4.3.5. Hydraulic controls and functions.

6.4.3.6. Parking brake.

6.4.3.7. Operation safety lock control lever.

6.4.4. Discuss the following important operational notes:

6.4.4.1. Radiator checks. When cold, the coolant level should be approximately 1 inch from the top of the filler neck and the full cold mark on the reservoir.

6.4.4.2. Typically, transmission fluid must be checked with the transmission warm, engine running and gear selector in the neutral position. Excavator transmissions vary from model to model and may require different fluid checking procedures. Check the operator's manual prior to checking the fluid.

6.4.4.3. Engine oil must be at the full mark on the oil dipstick.

6.4.4.4. Do not operate the starter for more than 30 seconds. If the engine does not start within 30 seconds, allow the starter motor to cool for 2 minutes before attempting to restart the engine.

6.4.4.5. If a wheel is removed and replaced for puncture repair or any other reason, the wheel nuts must be tightened to the torque specification (ft/lbs) provided in the operator's manual and checked daily until stabilized.

6.4.5. Demonstrate the following for the excavator.

6.4.5.1. Proper mounting and dismounting procedures.

6.4.5.2. Engine start up, including proper safety precautions.

6.4.5.3. Instrument use and their indications.

6.4.5.4. Proper use of excavator controls.

6.4.5.5. Proper movement with and without a load.

6.4.5.5.1. Forward.

6.4.5.5.2. Turning. (at various speeds)

6.4.5.5.3. Braking.

6.4.5.5.4. Backing, (use spotter when backing).

6.4.5.5.5. Parking.

6.4.5.6. Excavator operations. **Note:** Refer to the technical manual for additional guidance pertaining to the vehicle being operated. Demonstrate:

6.4.5.6.1. Backhoe work.

6.4.5.6.2. Ditching work.

6.4.5.6.3. Loading work.

6.4.5.6.4. Working on a slope.

6.4.5.6.5. Changing attachments.

6.4.5.6.6. Operating the hammer.

6.4.5.6.7. Demonstrate shutdown procedures.

6.4.6. Demonstrate/discuss post-operation requirements.

6.4.6.1. Ensure vehicle is clean.

6.4.6.2. Refuel vehicle.

6.4.6.3. Following manufacturer's shut-down procedures.

6.4.6.4. Perform a 360 walk-around inspection.

6.4.6.5. Annotate any discrepancies found on AF Form 1800.

6.4.7. Conclude by allowing time for questions and any requested re-demonstrations.

## Section 7—TRAINEE PERFORMANCE AND EVALUATION

### 7.1. Trainee Performance.

7.1.1. Instructor will:

7.1.1.1. Ensure safety at all times. **Note:** Stop training when safety items are violated. Proceed only when the trainee fully understands how to avoid repeating the safety infraction(s).

7.1.1.1.1. Chock wheel (if required) when excavator is parked.

7.1.1.1.2. Remove all jewelry and identification tags.

**Note:** If available, mark vehicle with magnetic sign indicating “Driver-in-Training” or “Trainee Operator.”

7.1.1.2. PPE and other items:

7.1.1.2.1. Safety toed boots must be worn.

7.1.1.2.2. Gloves will be worn during pre-operation, post-operation inspection and while performing maintenance/adjustments to the attachment.

7.1.1.2.3. Hearing protection, if required.

7.1.1.2.4. Eye protection, if required.

7.1.1.2.5. Reflective belt during hours of reduced visibility or on the flightline

7.1.1.2.6. Warning triangles.

7.1.1.2.7. Inclement weather gear, if required.

**Note:** Discuss when it is required that applicable PPE should be worn/utilized.

7.1.1.3. Pay particular attention to the cautions and warnings listed in the operator's manual.

7.1.1.4. Properly adjust driver’s seat and all mirrors.

7.1.1.5. Ensure trainee wears seat belt.

7.1.1.6. Excavator safety items/procedures.

7.1.1.7. Ensure the trainee is aware of tasks to be performed.

7.1.1.8. Conduct during/after-action reviews with the trainee. (Demonstration may need to be re-accomplished).

7.1.2. Trainee Performance.

7.1.2.1. Conduct operator maintenance (have trainee explain items being inspected).

7.1.2.1.1. Pre-operation inspection.

7.1.2.1.2. During-operation inspection.

7.1.2.2. Ensure AF From 1800 is properly documented.

7.1.2.2.1. Identify and explain excavator gauges, switches, levers and buttons.

7.1.2.2.2. Establish a road course that will have the following: (if the course does not have one of the following, then the trainee should be able to explain the correct operating techniques).

7.1.2.2.2.1. Forward.

7.1.2.2.2.2. Turning.

7.1.2.2.2.3. Braking.

7.1.2.2.2.4. Backing (use spotter when backing).

7.1.2.2.2.5. Parking.

7.1.2.2.2.6. Excavator operation. **Note:** Refer to the technical manual for additional guidance pertaining to the vehicle being operated.

7.1.2.2.2.6.1. Backhoe work.

7.1.2.2.2.6.2. Ditching work.

7.1.2.2.2.6.3. Loading work.

7.1.2.2.2.6.4. Working on a slope.

7.1.2.2.2.6.5. Changing attachments.

7.1.2.2.2.6.6. Operating the hammer.

7.1.2.2.2.6.7. Shutdown procedures.

7.1.2.2.3. Perform post-operation inspection.

7.1.2.2.3.1. Ensure vehicle components are cleaned.

7.1.2.2.3.2. Check fuel level. If there is < ¾ tank, refuel the vehicle.

7.1.2.2.3.3. Check diesel exhaust fluid level, if equipped.

7.1.2.2.3.4. Following manufacturer's shut-down procedures.

7.1.2.2.3.5. Park.

7.1.2.2.3.5.1. Place transmission in neutral.

7.1.2.2.3.5.2. Apply parking brake.

7.1.2.2.3.6. Perform a 360 walk-around inspection checking for leaks and damage.

**7.2. Performance Evaluation.**

7.2.1. Trainee will perform performance evaluation found in **Attachment 2**.

7.2.1.1. Instructor and trainee will review **Attachment 2**.

7.2.1.2. Instructor will answer trainee's questions.

**Note:** If available, mark vehicle with magnetic sign indicating "Driver-in-Training" or "Trainee Operator".

7.2.2. Instructor will:

7.2.2.1. Ensure safety at all times.

7.2.2.1.1. Place wheel chocks (if required) when excavator is parked,

7.2.2.1.2. Remove all jewelry and identification tags.

7.2.2.2. PPE and other items.

7.2.2.2.1. Safety toed boots must be worn.

7.2.2.2.2. Gloves will be worn during pre-operation inspection, post- operation inspection and while performing maintenance/adjustments to the attachment.

7.2.2.2.3. Hearing protection, if required.

7.2.2.2.4. Eye protection, if required.

7.2.2.2.5. Reflective belt during hours of reduced visibility or on the flightline.

7.2.2.2.6. Warning triangles.

7.2.2.2.7. Inclement weather gear, if required.

7.2.2.3. Ensure trainee wears seat belt.

7.2.2.4. Properly adjust driver's seat and all mirrors.

7.2.2.5. Excavator safety items/procedures.

7.2.3. Explain operating techniques.

7.2.4. The trainee will demonstrate and be evaluated on the following procedures:

7.2.4.1. Vehicle/equipment checkout.

7.2.4.2. Pre-operation inspection/preventative maintenance.

7.2.4.3. Start-up procedures.

7.2.4.4. Forward.

7.2.4.5. Turning.

7.2.4.6. Braking.

7.2.4.7. Backing (use spotter when backing).

7.2.4.8. Parking.

7.2.4.9. Excavator operation. **Note:** Refer to the technical manual for additional guidance pertaining to the vehicle being operated.

7.2.4.9.1. Backhoe work.

7.2.4.9.2. Loading work.

7.2.4.9.3. Working on a slope.

7.2.4.9.4. Changing attachments.

7.2.4.9.5. Operating the hammer.

7.2.4.9.6. Shutdown procedures.

7.2.4.10. Perform post-operation inspection.

7.2.4.10.1. Ensure vehicle components are cleaned.

7.2.4.10.2. Check fuel level. If there is < ¾ tank, refuel the vehicle.

7.2.4.10.3. Following manufacturer's shut-down procedures.

7.2.4.10.4. Park.

7.2.4.10.4.1. Place transmission in neutral.

7.2.4.10.4.2. Apply parking brake.

7.2.4.10.5. Perform a 360 walk-around inspection checking for leaks and damage.

7.2.5. Ensure the driver is aware of operating situations.

7.2.6. Conduct after-action reviews with the trainee.

7.2.7. Trainee is not allowed any instructor assists to pass performance evaluation.

7.2.8. Evaluation checklist provided in **Attachment 2**.

7.2.9. Retraining; retrain No-Go's.

7.2.9.1. Re-demonstrate "No-Go" items.

7.2.9.2. Have trainee re-perform until they show proficiency in operating, critique weaknesses as observed.

7.2.9.3. Re-evaluate.

**Attachment 1**

**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION**

***References***

**AFI 13-213**, *Airfield Driving*, 1 June 2011

**AFI 24-301**, *Vehicle Operations*, 5 May 2016

**AFI 24-302**, *Vehicle Management*, 26 June 2012f

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**AFI 91-203**, *Air Force Consolidated Occupational Safety Instruction*, 15 May 2012

**AFMAN 24-306**, *Operation of Air Force Government Motor Vehicles*, 9 December 2016

**AFPAM 90-803**, *Risk Management (RM) Guidance and Tools*, 11 February 2013

***Adopted Forms***

**AF Form 103**, *Base Civil Engineering Work Clearance Request*, 11 March 2003

**AF Form 171**, *Request for Driver's Training and Addition to U.S. Government Drivers*, 15 March 2011

**AF Form 847**, *Recommendation for Change of Publication*, 22 September 2009

**AF Form 1800**, *Operator's Inspection Guide and Trouble Report*, 1 April 2010

***Abbreviations and Acronyms***

**AF—**Air Force

**AFI—**Air Force Instruction

**AFIMSC—**Air Force Installation Mission Support Center

**AFMAN—**Air Force Manual

**AFQTP—**Air Force Qualification Training Plan

**DD—**Department of Defense

**DEF—**Diesel Exhaust Fluid

**IAW—**In Accordance With

**PPE—**Personal Protective Equipment

**PSI—**Pounds per Square Inch

**RM—**Risk Management

**SF—**Standard Form

**VCNCO—**Vehicle Control Non Commissioned Officer

**VCO—**Vehicle Control Officer

## Attachment 2

## PERFORMANCE TEST

### A2.1. Desired Learning Outcome.

A2.1.1. Understand the safety precautions to be followed pre-, during-, and post-operation of the excavator.

A2.1.2. Understand the purpose of the excavator and its role in the mission.

A2.1.3. Know the proper operator maintenance procedures of the excavator, IAW applicable technical orders and use of Air Force (AF) Form 1800.

A2.1.4. Safely and proficiently operate the excavator.

**A2.2. Instructions.** Before beginning the performance test, the trainer will brief the trainee on the scenario that will need to be accomplished. He/she will be given additional directions and instructions as needed throughout the scenario.

### A2.3. Scoring.

A2.3.1. The trainer examiner will be scoring the trainee on excavator operations and also the general safe driving practices. The examiner will give directions and instructions to the trainee in sufficient time for him/her to execute a driving maneuver. They will not be asked to drive in an unsafe manner.

A2.3.2. The examiner will be making various marks on the performance test checklist. This does not necessarily mean anything has been done wrong. It is in the best interest to concentrate on the operation of the excavator. The trainer will explain the test results at the conclusion of the performance test.

A2.3.3. Tasks being graded are listed on the following page; the trainee will be required to successfully pass all items.

A2.3.4. The instructor will stop the test at any time safe operations are not being followed or as deemed necessary for safety concerns.

**Figure A2.1. Performance Test Checklist:**

| PERFORMANCE TEST | | | |
|---|---|---|---|
| **Trainees Name:** | | **Date:** | |
| **Event** | **Go** | **No Go** | **Notes** |
| **1. PRE, DURING, AND POST- OPERATION INSPECTION** | | | |
| 1.1. Operator has required Personal Protective Equipment. | | | |
| 1.2. Follows general pattern of pre-trip checklist. | | | |
| 1.3. Performs brake component check | | | |
| 1.4. Signs AF Form 1800 to signify accomplishment of complete inspection. | | | |
| 1.5. Cleans windshield, windows, mirrors, lights and reflectors | | | |
| 1.6. Continues during operations inspection checks. | | | |
| 1.7. Knows use of jacks, tools, emergency devices, tire chains, fire extinguishers, etc. | | | |
| 1.8. Performs post trip inspection and reports malfunctions to Vehicle Management. | | | |
| **Event** | **Go** | **No Go** | **Notes** |
| **2. BASIC CONTROL AND VEHICLE OPERATION** | | | |
| 2.1. Safety belt is used; obeys all traffic signs, signals, and laws; completes test without an accident or moving violation. | | | |
| 2.2. Avoids jerky starts and stops. | | | |
| 2.3. Does not cut corners sharply. | | | |
| 2.4. Maintains proper speed and space. | | | |
| 2.5. Ensure proper excavator safety practices. List safety violations. | | | |

| | | | |
|---|---|---|---|
| 2.6. Turns: | | | |
| Checks traffic in all directions; uses turn signals and safely get into the lane needed for the turn; slows down smoothly, changes gears as needed to keep power; checks mirrors to ensure proper clearance; vehicle should not move into oncoming traffic. | | | |
| 2.7. Stopping - decelerates smoothly, brakes evenly, changes gears as necessary; brings vehicle to a full stop without coasting. | | | |
| 2.8. Starting - checks traffic, avoids jerky starts. | | | |
| **Event** | **Go** | **No Go** | **Notes** |
| **3. KNOWLEDGE OF VEHICLE AND USE OF CONTROLS** | | | |
| 3.1. Engine: | | | |
| Uses proper starting procedures | | | |
| Allows proper warm-up. | | | |
| Understands all gauges. | | | |
| Uses proper shutdown procedures. | | | |
| Basic knowledge of engines. | | | |
| 3.2. Brakes and Braking Techniques | | | |
| Understands the principles of an air brake system. | | | |
| Proper use of parking brake. | | | |
| Performs brake check before pulling out. | | | |
| **Event** | **Go** | **No Go** | **Notes** |
| **4. BACKING/PARKING** | | | |
| 4.1. Backing. | | | |
| Positions properly. | | | |
| Inspects before backing. | | | |
| Uses spotters properly. | | | |
| Uses mirrors properly. | | | |
| Avoids blind side backing. | | | |
| Controls speed. | | | |
| 4.2. Parking. | | | |
| Checks traffic position before parking. | | | |
| Secures vehicle properly. | | | |
| Parks legally and safely. | | | |
| Uses emergency warning devices, if required. | | | |

| Event | Go | No Go | Notes |
|---|---|---|---|
| **5. EXCAVATOR OPERATIONS** | | | |
| 5.1. Backhoe work. | | | |
| 5.2. Ditching work. | | | |
| 5.3. Loading work. | | | |
| 5.4. Working on a slope. | | | |
| 5.5. Changing attachments. | | | |
| 5.6. Operating the hammer. | | | |
| **CERTIFIER COMMENTS:** | | | |

## Attachment 3

## SEVEN-STEP INSPECTION PROCESS

**Figure A3.1. Seven-Step Inspection Process.**

| Seven-Step Inspection Process | |
|---|---|
| **Step** | **Procedure** |
| 1. Vehicle Overview | • Review the AF Form 1800.<br>o Ensure any discrepancy has been corrected.<br>o Vehicle Management annotated the discrepancy was completed.<br>o Approaching the vehicle.<br>o Damage or vehicle leaning to one side.<br>o Fresh leakage of fluids.<br>o Hazards around vehicle. |
| 2. Check Engine Compartment | • **Note:** Check that the parking brakes are on and/or wheels chocked. The operator may have to raise the hood, tilt the cab (secure loose things so they don't fall and break something), or open the engine compartment door.<br>• Check the following:<br>o Engine oil level.<br>o Coolant level in radiator; condition of hoses.<br>o Power steering fluid level; hose condition (if so equipped).<br>o Windshield washer fluid level.<br>o Battery fluid level, connections and tie-downs (battery may be located elsewhere).<br>o Automatic transmission fluid level (may require engine to be running).<br>o Check belts for tightness and excessive wear (alternator, water pump, air compressor)--learn how much "give" the belts should have when adjusted right. |

| | |
|---|---|
| | o Leaks in the engine compartment (fuel, coolant, oil, power steering fluid, hydraulic fluid, battery fluid). Cracked, worn electrical wiring insulation. |
| 3. Start Engine and Inspect Inside the Cab (Get in and Start Engine) | • Make sure parking brake is on.<br>• Put gearshift in neutral (or park if automatic). Start engine; listen for unusual noises.<br>• If equipped, check the Anti-lock Braking System (ABS) indicator lights. Light on dash should come on and then turn-off. If it stays on the ABS is not working properly.<br>• Look at the gauges.<br>o Oil pressure. Should come up to normal within seconds after engine is started.<br>o Air pressure. Pressure should build from 50 to 90 psi within 3 minutes. Build air pressure to governor cut-out (usually around 120 – 140 psi. Know the vehicle's requirements.<br>o Ammeter and/or voltmeter. Should be in normal range(s).<br>o Coolant temperature. Should begin gradual rise to normal operating range.<br>o Engine oil temperature. Should begin gradual rise to normal operating range.<br>o Warning lights and buzzers. Oil, coolant, charging circuit warning, and antilock brake system lights should go out right away.<br>o Check Condition of Controls. Check all of the following for looseness, sticking, damage, or improper setting:<br>o Steering wheel.<br>o Clutch.<br>o Accelerator (gas pedal).<br>o Brake controls.<br>o Foot brake.<br>o Parking brake.<br>o Transmission controls. |

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| | o Interaxle differential lock (if vehicle has one).<br>o Horn(s).<br>o Windshield wiper/washer.<br>o Lights.<br>o Headlights.<br>o Dimmer switch.<br>o Turn signal.<br>o Four-way flashers.<br>o Parking – clearance – identification – marker switch (switches).<br>• Check mirrors and windshield.<br>o Inspect mirrors and windshield for cracks, dirt, illegal stickers, or other obstructions to seeing clearly. Clean and adjust as necessary.<br>• Check emergency equipment.<br>o Check for safety equipment:<br>o Spare electrical fuses (unless vehicle has circuit breakers).<br>o Three red reflective triangles, 6 fuses or 3 liquid burning flares.<br>o Properly charged and rated fire extinguisher. Check for optional items such as:<br>o Chains (where winter conditions require).<br>o Tire changing equipment.<br>o List of emergency phone numbers Accident reporting kit (packet).<br>o Check safety belt. Check that the safety belt is securely mounted, adjusts; latches properly and is not ripped or frayed. |
| 4. Turn-off Engine | • Make sure the parking brake is set, turn-off the engine, and take the key with.<br>• Turn-on headlights (low beams) and four-way emergency flashers, and get out of the vehicle. |

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| 5. Do Walk-Around Inspection | • General.<br>o Go to front of vehicle and check that low beams are on and both of the four-way flashers are working.<br>o Push dimmer switch and check that high beams work.<br>o Turn-off headlights and four-way emergency flashers.<br>o Turn-on parking, clearance, side-marker, and identification lights.<br>o Turn-on right turn signal, and start walk-around inspection.<br>o Walk around and inspect.<br>o Clean all lights, reflectors, and glass as while doing the walk-around inspection.<br>• Left front side.<br>o Driver's door glass should be clean.<br>o Door latches or locks should work properly.<br>• Left front wheel.<br>o Condition of wheel and rim--missing, bent, broken studs, clamps, lugs, or any signs of misalignment.<br>o Condition of tires--properly inflated, valve stem and cap OK, no serious cuts, bulges, or tread wear.<br>o Use wrench to test rust-streaked lug nuts, indicating looseness.<br>o Hub oil level OK, no leaks. Left front suspension.<br>o Condition of spring, spring hangers, shackles,<br>o U-bolts.<br>o Shock absorber condition.<br>• Left front brake.<br>o Condition of brake drum or disc.<br>o Condition of hoses.<br>• Front.<br>o Condition of front axle. Condition of steering system.<br>o No loose, worn, bent, damaged or missing parts.<br>o Mustgrab steering mechanism to test for looseness.<br>o Condition of windshield. |

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| | o Check for damage and clean if dirty.<br>o Check windshield wiper arms for proper spring tension.<br>o Check wiper blades for damage, "stiff" rubber, and securement.<br>o Lights and reflectors.<br>o Parking, clearance, and identification lights clean, operating, and proper color (amber at front).<br>o Reflectors clean and proper color (amber at front).<br>o Right front turn signal light clean, operating, and proper color (amber or white on signals facing forward).<br>• Right side<br>o Right front: check all items as done on left front.<br>o Primary and secondary safety cab locks engaged (if cab-over-engine design).<br>o Right fuel tank(s).<br>o Securely mounted, not damaged, or leaking. Fuel crossover line secure.<br>o Tank(s) contain enough fuel. Cap(s) on and secure.<br>o Condition of visible parts. Rear of engine--not leaking. Transmission--not leaking.<br>o Exhaust system--secure, not leaking, not touching wires, fuel, or air-lines.<br>o Frame and cross members--no bends or cracks.<br>o Air-lines and electrical wiring--secured against snagging, rubbing, wearing.<br>o Spare tire carrier or rack not damaged (if so equipped).<br>o Spare tire and/or wheel securely mounted in rack.<br>o Spare tire and wheel adequate (proper size, properly inflated).<br>o Curbside cargo compartment doors in good condition, securely closed, latched/locked and required security seals in place.<br>• Right rear. |

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| | o Condition of wheels and rims--no missing, bent, or broken spacers, studs, clamps, or lugs.<br>o Condition of tires--properly inflated, valve stems and caps OK, no serious cuts, bulges, tread wear, tires not rubbing each other, and nothing stuck between them.<br>o Tires same type, e.g., not mixed radial and bias types.<br>o Tires evenly matched (same sizes). Wheel bearing/seals not leaking.<br>o Suspension.<br>o Condition of spring(s), spring hangers, shackles, and u-bolts.<br>o Axle secure.<br>o Powered axle(s) not leaking lube (gear oil). Condition of torque rod arms, bushings.<br>o Condition of shock absorber(s).<br>o If retractable axle equipped, check condition of lift mechanism. If air powered, check for leaks.<br>o Condition of air ride components.<br>o Brakes.<br>o Brake adjustment.<br>o Condition of brake drum(s) or discs.<br>o Condition of hoses--look for any wear due to rubbing.<br>o Lights and reflectors.<br>o Side-marker lights clean, operating, and proper color (red at rear, others amber).<br>o Side-marker reflectors clean and proper color (red at rear, others amber).<br>• Rear.<br>o Lights and reflectors.<br>o Rear clearance and identification lights clean, operating, and proper color (red at rear).<br>o Reflectors clean and proper color (red at rear).<br>o Taillights clean, operating, and proper color (red at rear). |

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| | o Right rear turn signal operating, and proper color (red, yellow, or amber at rear).<br>o License plate(s) present, clean, and secured.<br>o Splash guards present, not damaged, properly fastened, not dragging on ground, or rubbing tires.<br>o End gates free of damage, properly secured in stake sockets.<br>o Rear doors securely closed, latched/locked.<br>• Left side.<br>o Check all items as done on right side, plus:<br>o Battery (batteries) (if not mounted in engine compartment).<br>o Battery box (boxes) securely mounted to vehicle. Box has secure cover.<br>o Battery (batteries) secured against movement. Battery (batteries) not broken or leaking.<br>o Fluid in battery (batteries) at proper level (except maintenance-free type).<br>o Cell caps present and securely tightened (except maintenance-free type).<br>o Vents in cell caps free of foreign material (except maintenance-free type). |
| 6. Check Signal Lights | • Get in and turn-off all lights.<br>• Turn-on stop lights (apply trailer hand brake or have a helper put on the brake pedal).<br>• Turn-on left turn signal lights.<br>• Get out and check lights.<br>• Left front turn signal light clean, operating and proper color (amber or white on signals facing the front).<br>• Left rear turn signal light and both stop lights clean operating, and proper color (red, yellow, or amber).<br>• Get in vehicle.<br>o Turn-off lights not needed for driving. |

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| | o Check for all required papers, trip manifests, permits, etc.<br>o Secure all loose articles in cab (they might interfere with operation of the controls or hit the operator in a crash).<br>o Start the engine. |
| 7. Start the Engine and Check Test for Hydraulic Leaks | • Test for hydraulic leaks.<br>o If the vehicle has hydraulic brakes, pump the brake pedal three times.<br>o Then apply firm pressure to the pedal and hold for five seconds.<br>o The pedal should not move. If it does, there may be a leak or other problem.<br>• Brake system.<br>• Test parking brake.<br>o Fasten safety belt.<br>o Set parking brake (power unit only). Place vehicle into a low gear.<br>o Gently pull forward against parking brake to make sure the parking brake holds.<br>o If it doesn't hold vehicle, it is faulty; get it fixed.<br>• Test service brake stopping action.<br>o Go about 5 miles per hour.<br>o Push brake pedal firmly.<br>o "Pulling" to one side or the other can mean brake trouble.<br>o Any unusual brake pedal "feel" or delayed stopping action can mean trouble.<br>o If the trainee finds anything unsafe during the Vehicle inspection, get it fixed. Federal and state laws forbid operating an unsafe vehicle.<br>• Check vehicle operation regularly:<br>o Instruments.<br>o Air pressure gauge (if the vehicle has air brakes). Temperature gauges.<br>o Pressure gauges. Ammeter/voltmeter.<br>o Mirrors.<br>o Tires.<br>o Cargo, cargo covers. Lights, etc. |

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| | o If the trainee sees, hears, smells, or feels anything that might mean trouble, he/she should check it out.<br>• Safety inspection.<br>• Document any discrepancy on AF Form 1800. Sign-off AF Form 1800 to signify accomplishment of inspection. |

**Figure A4.2. Additional Steps for Inspecting Air Brakes System.**

| **Additional Steps for Inspecting Air Brakes** | |
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| **Step** | **Procedure** |
| 2. Engine Compartment Checks | • Check air compressor drive belt condition and tightness (if compressor is belt driven). |
| 5. Walk-Around Inspecting | • Check manual slack adjusters on S-cam brakes. **Note:** Vehicles with automatic slack adjustors still must be checked.<br>o Park on level ground and chock the wheels.<br>o Release the parking brakes so the operator can move the slack adjusters.<br>o Use gloves and pull hard on each slack adjuster that it can be reached.<br>o Check slack adjuster, more than 1-inch indicates adjustments required (vehicles with too much brake slack can be very hard to stop). Adjust it or have it adjusted.<br>• Check brake drums (or discs), linings, and hoses. |
| 7. Final Air Brake Check | • Test low pressure warning signal.<br>o Shut the engine off when the vehicle has enough air pressure so that the low pressure warning signal is not on.<br>o Turn the electrical power on.<br>o Step on and off the brake pedal to reduce air tank pressure.<br>o Low air pressure warning signal should come on before the pressure drops to less than 60 psi in the air tank with lowest pressure.<br>• Check that the spring brakes come on automatically.<br>o Chock the wheels.<br>o Release the parking brakes when enough air pressure is built up.<br>o Shut the engine off. |

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| | o Step on and off the brake pedal to reduce the air tank pressure.<br>o "Parking brake" knob should pop out when the air pressure falls to the manufacturer's specification.<br>• Check rate of air pressure buildup<br>o Refer to manufacturer's recommendation for average buildup time.<br>o If not within recommended time, the air pressure may drop too low during driving operations.<br>• Test air leakage rate.<br>o With a fully-charged air system (typically 125 psi).<br>o Turn-off the engine.<br>o Release the service brake and time the air pressure drop.<br>o The loss rate should be less than 2 psi in one minute for single vehicles.<br>o Not less than 3 psi in 1 minute for combination vehicles.<br>• Then apply 90 psi or more with the brake pedal.<br>o After the initial pressure drop, if the air pressure falls more than 3 psi in 1 minute for single vehicles.<br>o Not more than 4 psi for combination vehicles.<br>• Check air compressor governor cut-in and cut-out pressures.<br>o Air compressor should start at about 100 psi and stop at about 125 psi.<br>o Run the engine at a fast idle.<br>o Air governor should cut-out the air compressor at about the manufacturer's specified pressure.<br>o Engine idling, step on and off brake to reduce air tank pressure.<br>o Compressor should cut-in at manufacturer's specified cut-in pressure.<br>o Test parking brake: Stop the vehicle; put the parking brake on; gently pull against it in low gear to determine if parking brake will hold.<br>o Test service brakes.<br>o Wait for normal air pressure.<br>• Release the parking brake. |

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| | • Move the vehicle forward slowly (about 5 mph).<br>• Apply the brakes firmly using the brake pedal.<br>• Note any vehicle "pulling" to one side, unusual feel, or delayed stopping action. |