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Grader

Vehicle Management Codes: D652, D653, D655, D657

QUALIFICATION TRAINING PACKAGE

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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 3** as a guide 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 grader.

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

3.2. Desired Learning Outcomes.

3.2.1. Understand the purpose of the grader 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 grader.

3.2.3. Know the proper operator maintenance procedures of the grader 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 grader.

3.2.5. Safely and proficiently operate the grader.

3.3. Lesson Duration.

3.3.1. Recommended instructional and hands on training time is 22.5 hours:

Figure 3.1. Recommended Training Time for Training Activities.

Training Activity	Training Time
Trainee's Preparation	30 Minutes
Instructor's Lecture	2 Hours
Instructor's Demonstration	1 Hour
Trainee's Personal Experience (to build confidence and proficiency) ▪ Perform Operator Maintenance ▪ Operate the Vehicle	18 Hours
Trainee's Performance Evaluation	1 Hour

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.

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*.

3.4.7. 3E251-02-EC02 (CDC Volume 2).

3.4.8. Training films.

3.5. Instructional Training Aids and Equipment.

3.5.1. Grader Lesson Plan.

3.5.2. Grader.

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, *Ground Transportation*.

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.

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 grader.

5.1.1.3. This training will ensure the trainee becomes a qualified grader operator—an operator who has the knowledge and skills to operate a grader 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 grader and its role in the mission.

5.1.2.1.1. The purpose of the grader is for constructing and maintaining airfield runways, roads, taxiways, and building sites. After we clear, strip, cut, fill, and establish

a rough grade, we use the grader to finish the final grade. In addition to its main job of grade finishing, we can use the grader for ditching, sloping banks, spreading material, maintaining unpaved roads, breaking up hard spots (scarifying or ripping), and removing snow.

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 grader 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 grader.

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

5.1.2.5. Safely and proficiently operate the grader.

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

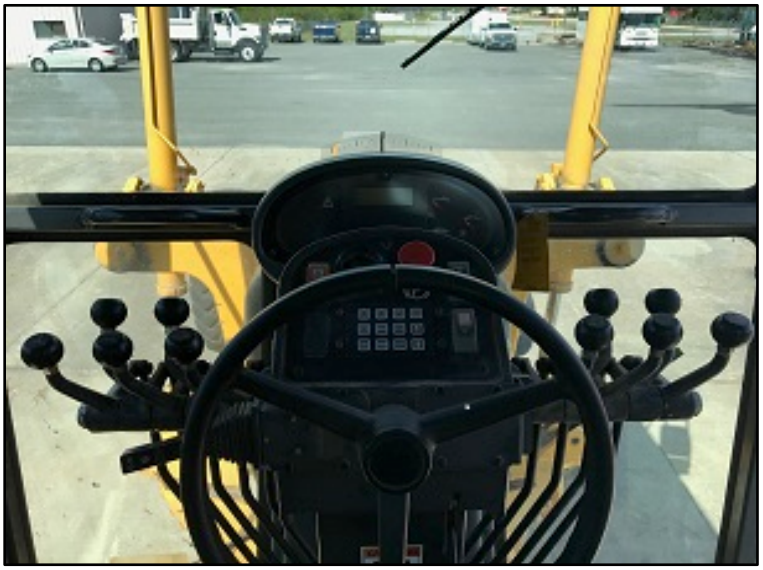
5.1.4. The operator must know the location and function of all controls and indicators prior to operating the vehicle.

Table 5.1. Controls and indicators.

Control/Indicator	**Description**
Engine oil pressure gauge	Indicates engine oil pressure when the engine is running.
Air pressure gauge	Indicates the air system pressure.
Coolant temperature gauge	Indicates engine coolant temperature.
Voltmeter	Indicates the charging level of the electrical system.
Transmission oil temperature gauge	Indicates the temperature of the transmission fluid.
Fuel gauge	Indicates the amount of fuel in the fuel tank. **Caution –** Always visually inspect the fuel level. Never solely check the fuel gauge.
Speedometer	Indicates vehicle speed.
Tachometer	Indicates engine rpm.
Ignition switch	Turns the electrical system on/off and engages the starter.
Light switch	Operates the driving and marker lights.

Windshield wiper/washer control knob	Operates the windshield wipers and windshield washer.
Converter temperature gauge	Indicates converter oil temperature.
Horn button	Activates the horn.
Gear selector lever	Selects the desired gear and forward/reverse/neutral position of the transmission.

Figure 5.1. Controls and indicators.



5.1.5. Common grader controls include:

5.1.5.1. Center shift lever.

5.1.5.2. Wheel lean lever.

5.1.5.3. Right/left frame steer lever (articulation).

5.1.5.4. Left lift cylinder lever,

5.1.5.5. Right lift cylinder lever.

5.1.5.6. Circle side-shift lock.

5.1.5.7. Blade pitch lever.

5.1.5.8. Circle rotation.

5.1.5.9. Scarifier.

5.1.5.10. See **Figures 5.2** through **5.4.**, showing the lever and joystick controls for grader function. **Note:** The majority of the 3E2X1 career field operates the older version of the grader with lever controls. There are typically nine control levers on a grader.

Figure 5.2. Grader assembly.

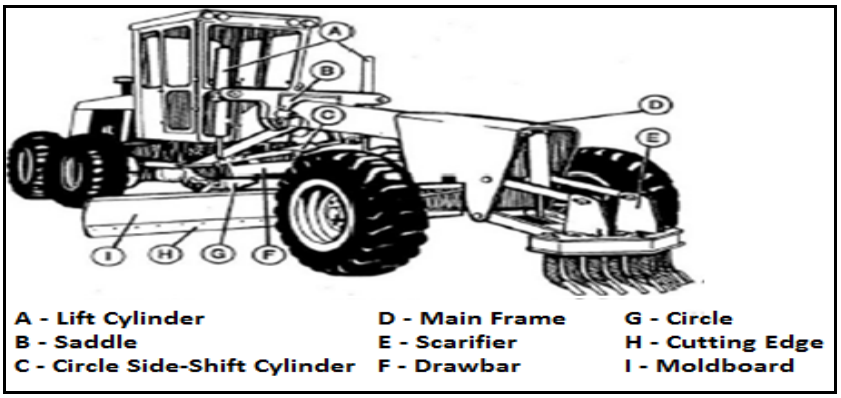


Figure 5.3. Lever controls.

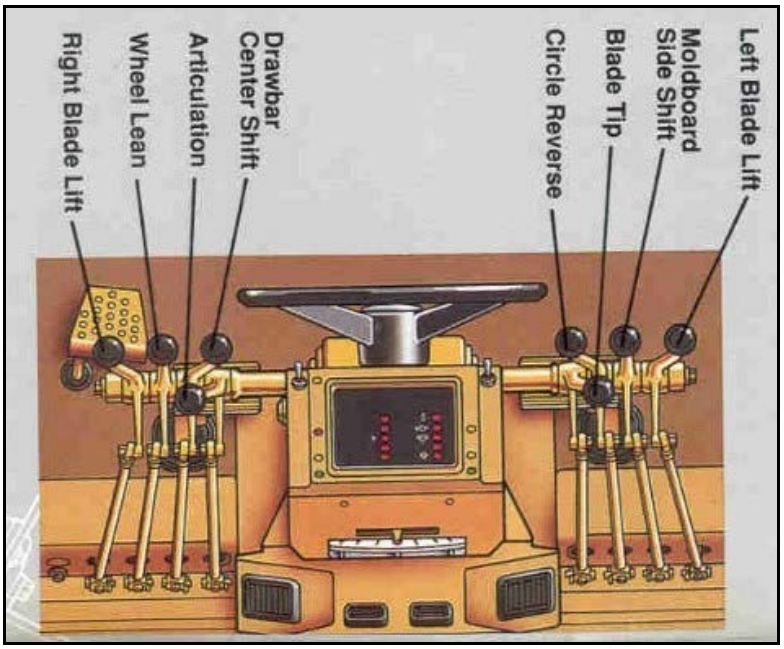


Figure 5.4. Joystick controls.

5.2. Vehicle Inspection.

5.2.1. Pre-operation vehicle inspection test. Use AF Form 1800 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.

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).

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. Plow assembly components.

5.2.3.1.17.1. Plow head.

5.2.3.1.17.2. Cutting edge/moldboard.

5.2.3.1.17.3. Lift frame/lift cylinder/wire rope.

5.2.3.1.17.4. Chains, shackles, and pins.

5.2.3.1.17.5. Hydraulic lift/tilt/turn cylinders.

5.2.3.1.17.6. Hydraulic hoses.

5.2.3.1.17.7. Casters/shoes.

5.2.3.1.18. Underbody scraper components.

5.2.3.1.18.1. Cutting edge/moldboard.

5.2.3.1.18.2. Hydraulic lift/tilt/turn cylinders.

5.2.3.1.18.3. Hydraulic hoses.

5.2.3.1.18.4. Frame assembly/bolts/pins.

5.2.3.1.19. Spreader box components, if applicable.

5.2.3.1.19.1. Tarp assembly.

5.2.3.1.19.2. Spreader box top screens.

5.2.3.1.19.3. Spreader box/headache rack.

5.2.3.1.19.4. Spreader belt/chain/sprockets.

5.2.3.1.19.5. Spreader box gate assembly.

5.2.3.1.19.6. Spinner assembly.

5.2.3.1.19.7. Hydraulic gear box.

5.2.3.1.19.8. Hydraulic hoses.

5.2.3.1.19.9. Work/warning lights/warning signs.

5.2.3.1.20. Auxiliary engine(s), if applicable.

5.2.3.1.20.1. Refer to **Paragraph 5.2.**

5.2.3.1.21. Pintle hook connection/compatibility, if applicable.

5.2.3.1.22. Fuel tank(s) assembly for damage.

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

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

5.2.3.1.25. Mirrors.

5.2.3.1.26. Windshield and windshield wipers/washers.

5.2.3.1.27. Doors.

5.2.3.1.28. Windows.

5.2.3.1.29. Seatbelts.

5.2.3.2. During-operation inspection.

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

5.2.3.2.2. Ignition to accessory position.

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

Figure 5.5. Gauges and warning lights/indicators.

Figure 5.6. Gauges and warning lights/indicators.

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.

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

5.2.3.2.7.2. Shift selector.

Figure 5.7. Throttle and gear selector.

5.2.3.2.7.3. Parking brake.

5.2.3.2.7.4. Plow assembly lift/rotate/turn levers.

5.2.3.2.7.5. Underbody scraper lift/tilt/rotate levers.

5.2.3.2.7.6. Spreader control levers.

5.2.3.2.7.7. Windshield wipers.

5.2.3.2.7.8. Climate control.

5.2.3.2.8. Start auxiliary engine.

5.2.3.2.8.1. Check for unusual conditions (interior).

5.2.3.2.8.1.1. Sounds.

5.2.3.2.8.1.2. Odors.

5.2.3.2.8.1.3. Vibrations.

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

5.2.3.2.8.2.1. Sounds.

5.2.3.2.8.2.2. Odors.

5.2.3.2.8.2.3. Vibrations.

5.2.3.2.8.2.4. Leaks.

5.2.3.2.9. 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. Ground attachments.

5.2.3.3.6. Follow manufacturer's shut-down procedures.

5.2.3.3.7. Shut off lights and accessories.

5.2.3.3.8. Ensure master switch is turned to the OFF position

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. Respiratory protection, if dusty.

5.3.2.5. Head protection, if required.

5.3.2.6. Inclement weather gear, if required.

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

5.3.2.8. First aid kit.

5.3.2.9. Cones.

5.3.2.10. Tire gauge.

5.3.2.11. Fire extinguisher.

5.3.2.12. 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 grader 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.

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 grader 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 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 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 grader 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. General vehicle operations.

5.5.1.1. Complete a pre-operation vehicle inspection.

5.5.1.2. Sign the current AF Form 1800.

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

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

5.5.2. Starting the vehicle.

5.5.2.1. To start the vehicle, ensure the parking brake is set and place the transmission shift lever in neutral. Press in clutch (if applicable).

5.5.2.2. 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.

5.5.2.3. 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 before operating with a full load, and ensuring the air pressure is at 120 psi.

5.5.2.4. Monitor all gauges and warning lights.

5.5.2.5. Check horn, wiper blades for proper operation.

5.5.2.6. Raise the blade off of the ground.

5.5.2.7. Depress brake pedal and release the parking brake. Depress clutch and place transmission gear selector in the appropriate gear. Release the foot brake and accelerate to desired speed.

5.5.3. Moving the vehicle.

5.5.3.1. Use proper mounting and dismounting procedures.

5.5.3.2. Demonstrate proper movement (forward and backward).

5.5.3.3. Forward movement:

5.5.3.3.1. Depress emergency brake controls to release parking brakes.

5.5.3.3.2. Place gearshift lever in desired gear.

5.5.3.4. Sopping the vehicle:

5.5.3.4.1. To stop vehicle, slowly apply brakes until the vehicle is stopped, place transmission in neutral.

5.5.3.4.2. Set parking brake. (Check brake by placing vehicle in motion using third gear while vehicle brake is set.)

5.5.3.5. Reverse:

Caution: Keep vehicle under control. Keep the spotter in sight at all times. If the operator loses sight of the spotter, he/she must immediately stop the vehicle.

5.5.3.5.1. Always bring the vehicle to a complete stop before changing the direction of travel.

5.5.3.5.2. Place gearshift lever in reverse gear.

5.5.3.5.3. Release parking brake lever while applying pressure to the foot brake.

5.5.3.6. Parking. When desired parking position is attained, place gear lever in neutral, set parking brake and shutdown the engine.

5.5.4. Level materials/maintaining unpaved surfaces overview.

5.5.4.1. Leveling an area and maintaining an unpaved surface is nothing more than cutting high spots and filling in the lows spots.

5.5.4.2. When maintaining unpaved surfaces, try to keep the original contours and slopes.

5.5.4.3. Level and maintain the surface by working the material across the road or runway from one side to the other.

5.5.4.4. To maintain a satisfactory surface in dry climates (like in the Middle East) work traffic-eroded material from the edges and shoulders of the road toward the center.

5.5.4.5. The surface is easier to work if damp; therefore, after it rains is a good time to perform surface maintenance. A water truck may be necessary to dampen dry material.

5.5.5. Level materials/maintaining unpaved surfaces steps:

5.5.5.1. Obtain an approved Civil Engineering work clearance request (AF Form 103) for the area to be leveled.

5.5.5.2. Perform an operational inspection.

5.5.5.3. Assess the job site and create a mental picture of what the project should look like when it is finished.

5.5.5.4. Decide where to start, usually where the most material is available.

5.5.5.5. Look for hazards in the area such as culverts, cable markers, etc.

5.5.5.6. When grading a road, it is better to accomplish this in small sections. After grading the first section, it will serve as a reference point for starting the other sections.

5.5.5.7. Select the position of the blade and wheels.

5.5.5.7.1. Rotate the moldboard so that the toe is on the right side of the grader at about a 50-degree to 60-degree angle to the frame. The more you increase the angle of the moldboard, the more earth will spill off the heel.

Figure 5.8. Moldboard.

5.5.5.7.2. Ensure that the blade is pitched halfway.

5.5.5.7.3. Center shift the blade until the left lift cylinder is straight up and down.

5.5.5.7.4. Lean the front wheels to the left.

5.5.5.7.5. Lower the moldboard until the toe and heel slightly touch the ground.

5.5.5.8. Place the grader in motion and, as the moldboard crosses the project start line, apply enough downward pressure on both the heel and the toe to penetrate the surface on a level plain about ½ inch.

5.5.5.9. Maintain a straight course, adjusting the moldboard slightly to carry the material the length of the project.

Caution: Do not pile windrows in front of the rear wheel. This will affect traction and grading accuracy.

5.5.5.10. Feather the material at the end of each pass.

5.5.5.11. Stop the grader and straighten the front wheels after the material is feathered to a smooth termination.

Figure 5.9. Leveling.

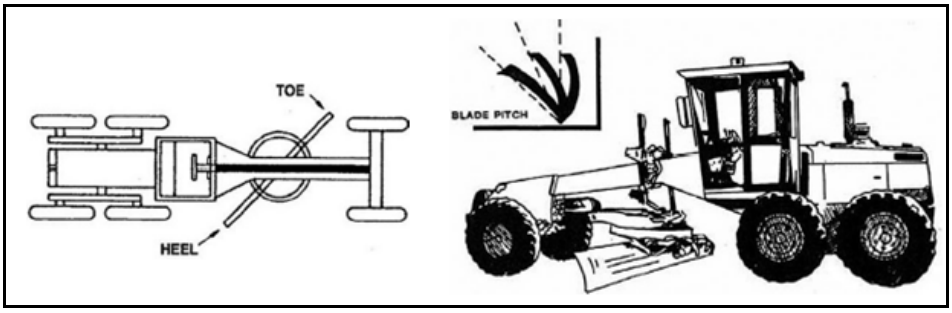


Figure 5.10. Leveling.

5.5.5.12. Remove windrows.

5.5.5.12.1. Raise both cylinders all the way.

5.5.5.12.2. Position the grader to straddle the windrow just made, and back the grader to the starting point while ensuring the windrow is between the wheels. **Caution:** Do not drive on top of the windrow.

5.5.5.12.3. Repeat the select position of the blade and wheels and start leveling steps until the entire area is leveled.

5.5.6. Shutdown procedures.

5.5.6.1. Bring the grader to a complete stop.

5.5.6.2. Place direction control lever in neutral.

5.5.6.3. Apply parking brake.

5.5.6.4. Lower all attachments to the ground.

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

5.5.6.6. Turn the key to the OFF position.

5.5.6.7. Check for damage.

5.5.7. End of duty day.

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

5.5.7.2. 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.

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

5.5.7.4. Fuel the Grader 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 the 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.

5.5.8. Changing cutting edges and end bits.

5.5.8.1. The earth-moving part of the grader consists of three components: the moldboard (blade base), the cutting edge (blade) and the end bits.
5.5.8.2. The moldboard is the large earth-moving part of the grader. The moldboards itself is protected from damage and wear created in the cutting action by the cutting edge and end bits.

5.5.8.3. Changing the cutting edges and end bits on a grader is part of operator maintenance. The grader's cutting edges are the most common area subject to excessive wear. It is the operator's responsibility to know how to accomplish this critical task and to ensure that the cutting edges and end bits do not wear down into the moldboard.

Caution: Never leave the engine running when changing the cutting edges/end bits. Although the blade will only come down under the power of the engine, always block the moldboard for added safety. Constantly, be aware of safety issues and conscious when working with or around construction equipment.

5.5.8.4. Before removing the cutting edges, clean dirt and remove rust from the bolt threads. Use penetrating oil on the bolt threads to loosen the rust and clean the threads with a wire brush. Use the proper size socket to remove the nuts. Remove the bolts and blade.

5.5.8.5. On many graders, the cutting edge can be reused if reversed.

5.5.8.6. Always use the proper tools when changing cutting edges. A large punch to align the bolt holes is a helpful tool when are aligning the bolt holes onto the moldboard.

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 grader 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. Respiratory protection, if dusty.

6.2.1.3.6. Head protection, if required.

6.2.1.3.7. Inclement weather gear.

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

6.2.1.3.9. 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 belts.

6.2.1.8. Throughout demonstration, practice grader 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 grader 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. Foot brake pedal.

6.4.3.2. Steering wheel.

6.4.3.3. Horn button.

6.4.3.4. Gear selector.

6.4.3.5. Parking brake.

6.4.3.6. Lever/joystick controls.

6.4.3.7. Clutch pedal.

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. Grader 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.

6.4.5. Demonstrate the following for the grader.

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 grader controls.

6.4.5.5. Proper movement.

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

6.4.5.6.1. Leveling materials/maintaining unpaved surfaces.

6.4.5.6.2. 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 grader 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. Respiratory protection, if dusty.

7.1.1.2.6. Head protection, if required.

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

7.1.1.2.8. Warning triangles.

7.1.1.2.9. 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. Grader 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 grader 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. Grader operation. **Note:** Refer to the technical manual for additional guidance pertaining to the vehicle being operated.

7.1.2.2.2.6.1. Level materials/maintain unpaved surfaces.

7.1.2.2.2.6.2. 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 grader 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. Grader 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. Grader operation. **Note:** Refer to the technical manual for additional guidance pertaining to the vehicle being operated

7.2.4.9.1. Leveling materials/maintaining unpaved surfaces.

7.2.4.9.2. 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, *Ground Transportation*, 1 November 2018

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

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 171, *Request for Driver's Training and Addition to U.S. Government Drivers*, 1 November 2018

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 grader.

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

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

A2.1.4. Safely and proficiently operate the grader.

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 grader 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 grader. 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 grader 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. GRADER OPERATIONS			
5.1. Level materials/maintain unpaved surfaces.			
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. o Ensure any discrepancy has been corrected. o Vehicle Management annotated the discrepancy was completed. o Approaching the vehicle. o Damage or vehicle leaning to one side. o Fresh leakage of fluids. 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. • Check the following: o Engine oil level. o Coolant level in radiator; condition of hoses. o Power steering fluid level; hose condition (if so equipped). o Windshield washer fluid level. o Battery fluid level, connections and tie-downs (battery may be located elsewhere). o Automatic transmission fluid level (may require engine to be running). 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. • Put gearshift in neutral (or park if automatic). Start engine; listen for unusual noises. • 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. • Look at the gauges. o Oil pressure. Should come up to normal within seconds after engine is started. 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. o Ammeter and/or voltmeter. Should be in normal range(s). o Coolant temperature. Should begin gradual rise to normal operating range. o Engine oil temperature. Should begin gradual rise to normal operating range. o Warning lights and buzzers. Oil, coolant, charging circuit warning, and antilock brake system lights should go out right away. o Check Condition of Controls. Check all of the following for looseness, sticking, damage, or improper setting: o Steering wheel. o Clutch. o Accelerator (gas pedal). o Brake controls. o Foot brake. o Parking brake. o Transmission controls.

	o Interaxle differential lock (if vehicle has one). o Horn(s). o Windshield wiper/washer. o Lights. o Headlights. o Dimmer switch. o Turn signal. o Four-way flashers. o Parking – clearance – identification – marker switch (switches). • Check mirrors and windshield. o Inspect mirrors and windshield for cracks, dirt, illegal stickers, or other obstructions to seeing clearly. Clean and adjust as necessary. • Check emergency equipment. o Check for safety equipment: o Spare electrical fuses (unless vehicle has circuit breakers). o Three red reflective triangles, 6 fuses or 3 liquid burning flares. o Properly charged and rated fire extinguisher. Check for optional items such as: o Chains (where winter conditions require). o Tire changing equipment. o List of emergency phone numbers Accident reporting kit (packet). 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. • Turn-on headlights (low beams) and four-way emergency flashers, and get out of the vehicle.

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

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

	o Condition of wheels and rims--no missing, bent, or broken spacers, studs, clamps, or lugs. 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. o Tires same type, e.g., not mixed radial and bias types. o Tires evenly matched (same sizes). Wheel bearing/seals not leaking. o Suspension. o Condition of spring(s), spring hangers, shackles, and u-bolts. o Axle secure. o Powered axle(s) not leaking lube (gear oil). Condition of torque rod arms, bushings. o Condition of shock absorber(s). o If retractable axle equipped, check condition of lift mechanism. If air powered, check for leaks. o Condition of air ride components. o Brakes. o Brake adjustment. o Condition of brake drum(s) or discs. o Condition of hoses--look for any wear due to rubbing. o Lights and reflectors. o Side-marker lights clean, operating, and proper color (red at rear, others amber). o Side-marker reflectors clean and proper color (red at rear, others amber). • Rear. o Lights and reflectors. o Rear clearance and identification lights clean, operating, and proper color (red at rear). o Reflectors clean and proper color (red at rear). o Taillights clean, operating, and proper color (red at rear).

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

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

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

Figure A3.2. Additional Steps for Inspecting Air Brakes System.

Additional Steps for Inspecting Air Brakes	
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. o Park on level ground and chock the wheels. o Release the parking brakes so the operator can move the slack adjusters. o Use gloves and pull hard on each slack adjuster that it can be reached. 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. • Check brake drums (or discs), linings, and hoses.
7. Final Air Brake Check	• Test low pressure warning signal. o Shut the engine off when the vehicle has enough air pressure so that the low pressure warning signal is not on. o Turn the electrical power on. o Step on and off the brake pedal to reduce air tank pressure. 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. • Check that the spring brakes come on automatically. o Chock the wheels. o Release the parking brakes when enough air pressure is built up. o Shut the engine off.

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

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