Chapter 7

Stabilizing the Apparatus

Terms

Write the definition of the terms below on the blanks provided.

1. Gravity Circle (226)

2. Short-Jacking (226)

3. Box Stabilizers (228)

4. Stabilizer (228)

5. Jacobs Engine Brake® (230)

6. Power Take-off System (PTO) (230)

7. Fulcrum-type Stabilizer (236)

True/False

Write True or False on the blanks provided; if false, write the correct statements on the lines provided.

_____ 1. By deploying stabilizers, the base of stability for aerial apparatus is effectively increased. (226)

_____ 2. Excessive loading on the aerial device will result in an expansion of the gravity circle. (228)

_____ 3. Short-jacking is a rotating shaft that transfers power from the engine to auxiliary. (230)

_____ 4. Before the actual deployment of the stabilizers, the driver/operator should make sure that the PTO engagement light is lit before leaving the cab. (233)

_____ 5. The fulcrum-type stabilizer is most common on newer apparatus. (236)

_____ 6. Some apparatus allow for partial extension of the stabilizer arms, sometimes called "short-jacking". (236)

_____ 7. With the jacks fully extended, the driver/operator should be sure that at least two stabilizers are in firm contact with the ground and are bearing weight. (239)

_____ 8. When parked on a longitudinal grade, the driver operator should not extend or retract the aerial device over the side of the apparatus. (242)

_____ 9. Stabilizing a tractor-trailer aerial apparatus, the maximum stability occurs when the angle of the tractor is 90 degrees from the centerline of the trailer. (247)

_____ 10. If the stabilizer lifts off the pad during aerial operations, do not adjust it, for this is normal load shifting. (245)

Short Answer

Write the correct answers on the blanks provided.

1. List three different types of stabilizers and the ways they move into position. (236)

2. List the steps to put manual stabilizers on midship aerial apparatus in service. (244)

Multiple Choice

Write the correct answers on the blanks provided.

_____ 1. Which of the following best describes an A-frame stabilizer?(228)
   A. Straight jacks that extend down from the chassis
   B. Stabilizers used only during an overloading situation
   C. Scissor or X-style stabilizers that extend down away from the chassis at an angle
   D. Stabilizers that extend straight away from the truck and have jacks that extend straight down to the ground

_____ 2. Which of the following will the driver/operator do first to engage the aerial hydraulic system? (229)
   A. Set wheel chocks
   B. Deploy the stabilizers
   C. Turn on Jacob Engine Brakes®
   D. Activate the power take-off (PTO) system

_____ 3. Which of the following statements regarding a "hot-shift" PTO system is MOST accurate? (233)
   A. It is applicable only to older model aerial apparatus.
   B. Jacob Engine Brakes® must be on before engaging.
   C. Systems can be engaged when the main transmission is in neutral.
   D. Systems can be engaged only when that main transmission is in gear.

_____ 4. Which of the following statements regarding principles of stabilizer controls is LEAST accurate? (236)
   A. Many of these controls are lever-type valves that move up to about 90 degrees.
   B. When the driver/operator operates the controls, an increase in engine speed occurs.
   C. The engine idle speed is regulated automatically by operating these controls or by a fast-idle toggle switch.
   D. Many stabilization controls are similar to PTO controls and controls can be operated from the cab of the aerial apparatus.

_____ 5. When stabilizing on uneven terrain, correction of laterial unevenness can be achieved on grades of up to ___ percent. (240)
   A. 3 or 4
   B. 5 or 6
   C. 7 or 8
   D. 9 or 10

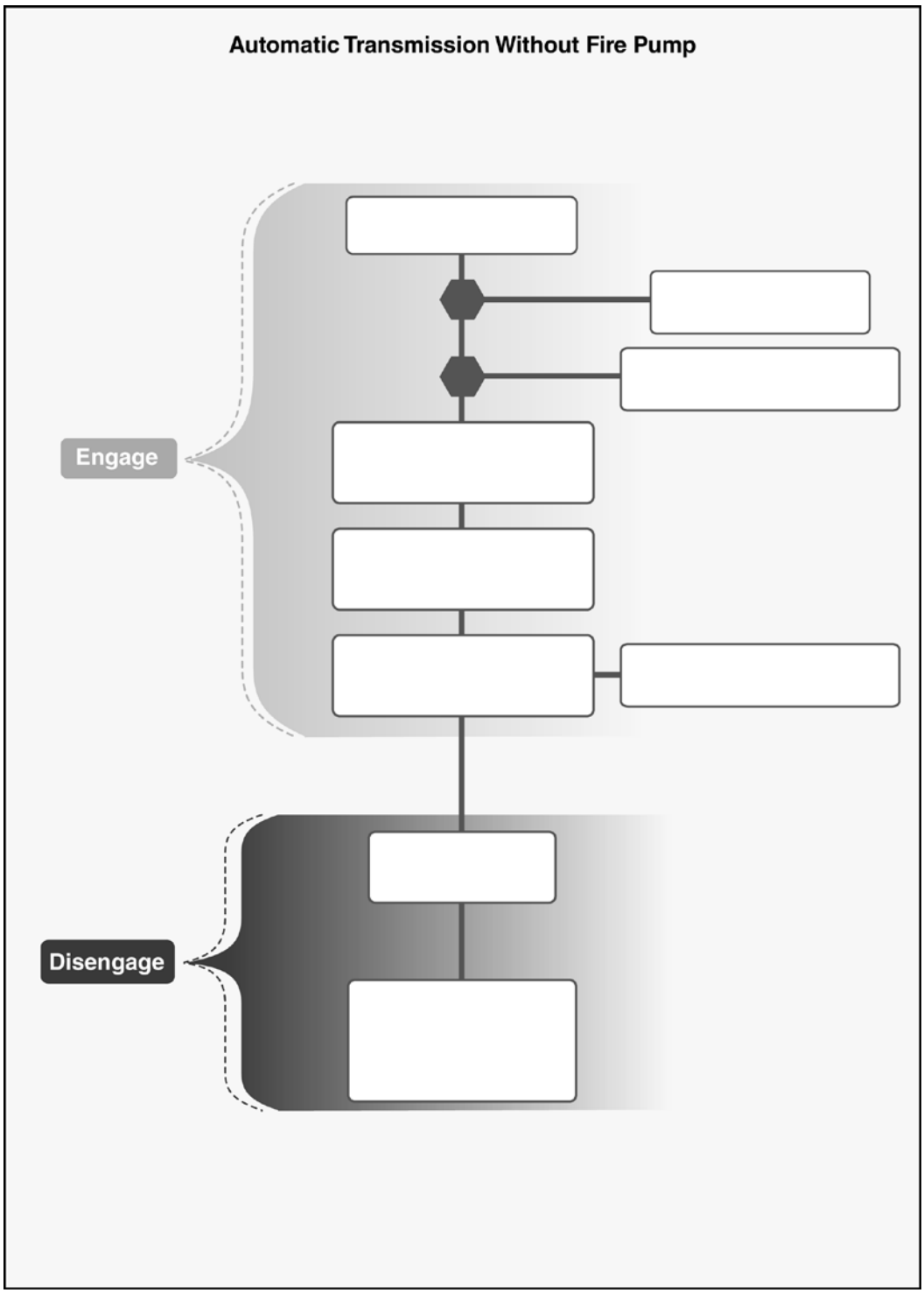
_____ 6. When locking the stabilizers, the ___ valves prevent the movement of fluid within the stabilization system. (242)
   A. holding
   B. selector
   C. transfer
   D. hydraulic

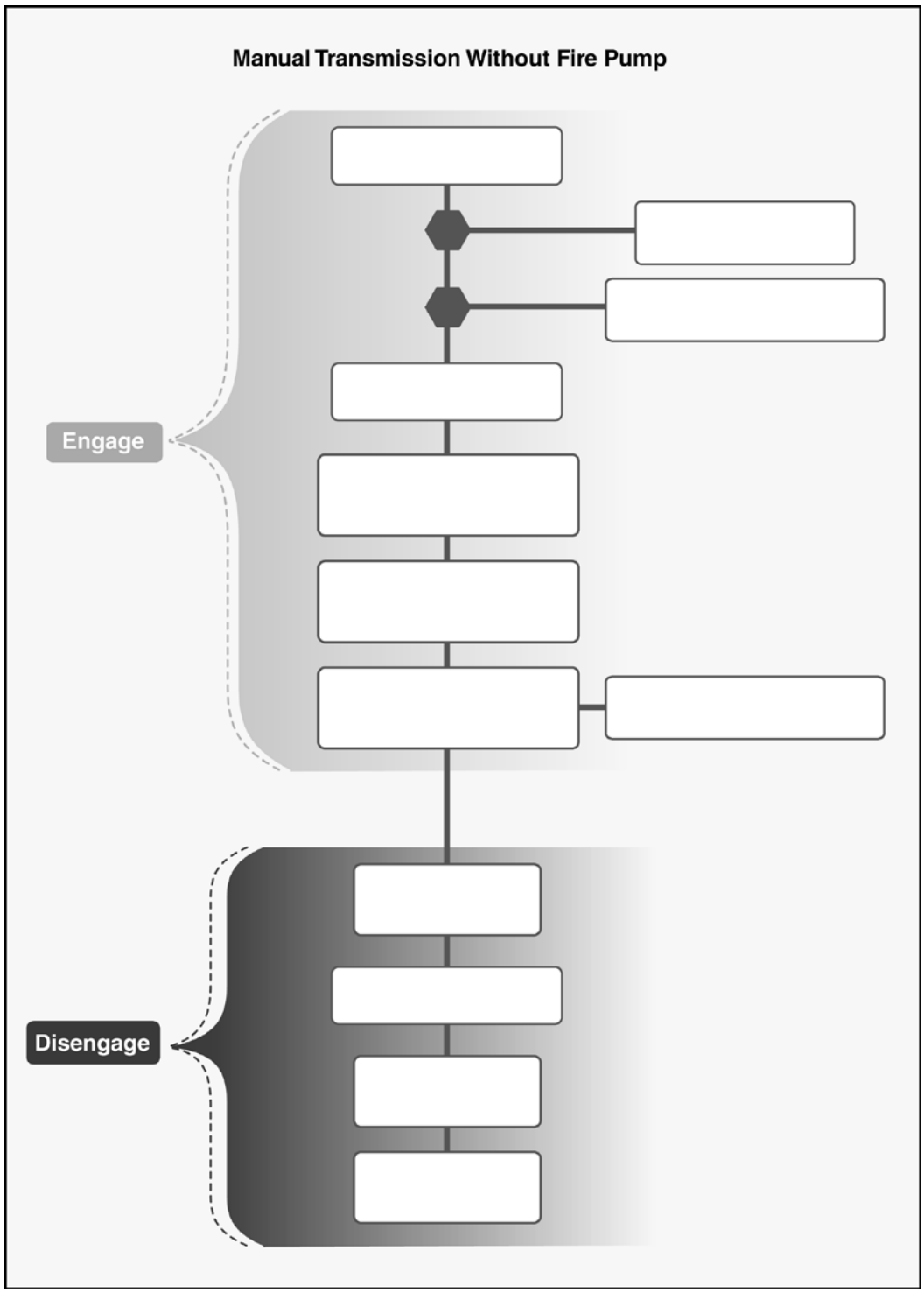
_____ 7. Which of the following stabilizers consist of an extension arm that has a screw jack attached to the end of the arm? (244)
   A. Box
   B. Manual
   C. A-frame
   D. Post-type

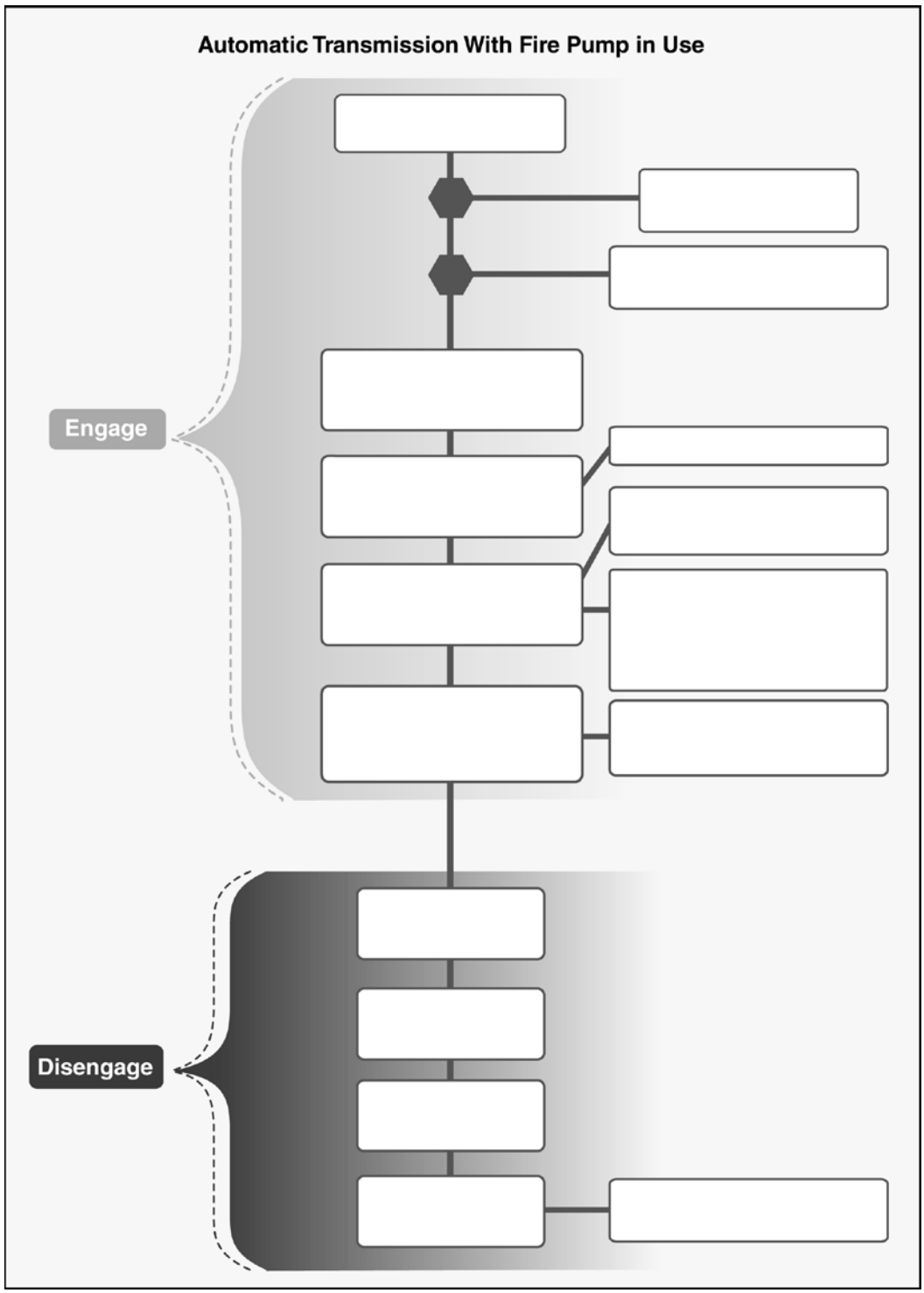
_____ 8. A tractor-trailer aerial apparatus should never be positioned at an angle greater than ___ degrees. (247)
   A. 55
   B. 60
   C. 75
   D. 90

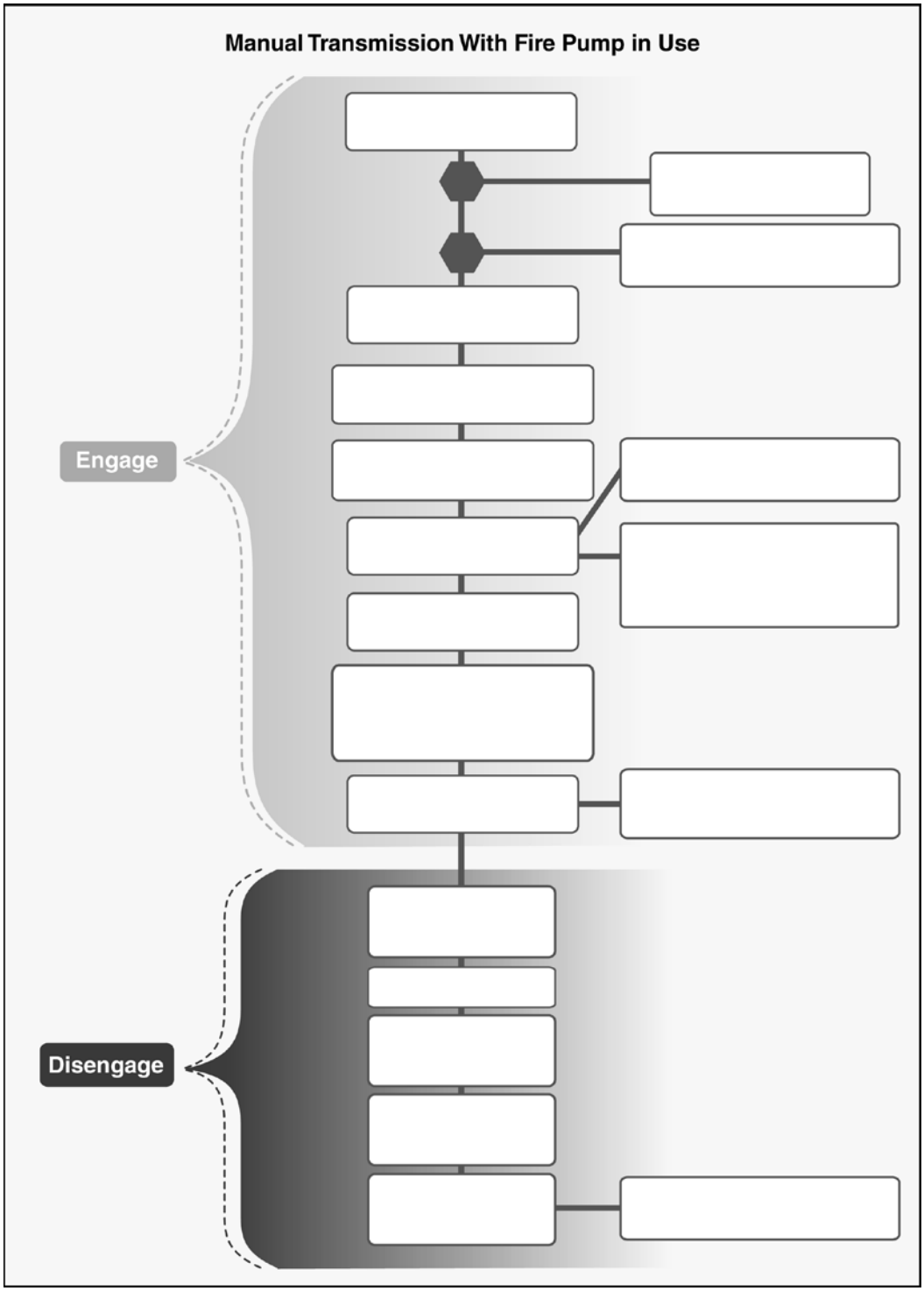
Identification

Place in correct order the instructions for engaging and disengaging the PTO system for each type of aerial apparatus listed.




Manual Transmission Without Fire Pump
Engage
Disengage


Automatic Transmission With Fire Pump in Use
Engage
Disengage


Manual Transmission With Fire Pump in Use
Engage
Disengage

Skill Sheet 7-1

Objective 3: Transfer power to the hydraulic system of an apparatus equipped with a fire pump. *(NFPA® 1002, 6.2.2)*

Student Name: _____ **Date:** _____

Directions

For this skills evaluation checklist, students will transfer power to the hydraulic system, using an apparatus equipped with a fire pump.

Equipment & Materials

- Driver/operator candidate
- Certified aerial apparatus driver/operator
- Fire service aerial apparatus equipped with a fire pump
- Apparatus operator's manual

Task Steps

Automatic Transmission

ENGAGING THE PTO

1. Start the apparatus.
2. Set the parking brake.
3. Engage the tiller axle brake if applicable.
4. Turn off the Jacobsen engine brake if applicable and recommended by the aerial device manufacturer.
5. Place the transmission in the proper gear.
6. Engage the PTO.
7. Place the transmission selector in Neutral.

   Note: If the PTO transfer is complete, the indicator light will come on. On most makes of apparatus, completion of this procedure will also automatically release the bed ladder locks.
8. Transfer power from the drive axle to the pump.
9. Shift to pumping gear.

DISENGAGING THE PTO

10. Return the engine to idle speed.
11. Place the transmission in Neutral.
12. Transfer power from the pump back to the drive axle.
13. Deactivate the PTO.

Manual Transmission

ENGAGING THE PTO

1. Start the apparatus.
2. Set the parking brake.
3. Engage the tiller axle brake if applicable.
4. Turn off the Jacobsen engine brake if applicable and recommended by the aerial device manufacturer.
5. Place the transmission in Neutral.
6. Engage the PTO.
7. Engage the clutch.

   Note: If the PTO transfer is complete, the indicator light will come on. On most makes of apparatus, completion of this procedure will also automatically release the bed ladder locks.
8. Transfer power from the drive axle to the pump.
9. Disengage the clutch.
10. Shift the apparatus transmission into pumping gear.
11. Engage the clutch.

    Note: If the shift is complete, the pump control light will be lit and there will be a minimal reading on the speedometer.

DISENGAGING THE PTO

12. Return the engine to idle speed.
13. Place the transmission in Neutral.
14. Transfer power from the pump back to the drive axle.
15. Deactivate the PTO.

Skill Sheet 7-2

Objective 4: Transfer power to the hydraulic system of an apparatus not equipped with a fire pump. *(NFPA® 1002, 6.2.2)*

Student Name: _____ **Date:** _____

Directions

For this skills evaluation checklist, students will transfer power to the hydraulic system of an apparatus which is not equipped with a fire pump.

Equipment & Materials

- Driver/operator candidate
- Certified aerial apparatus driver/operator
- Fire service aerial apparatus equipped with a fire pump
- Apparatus operator's manual

Task Steps

Automatic Transmission

ENGAGING THE PTO

1. Start the apparatus.
2. Set the parking brake.
3. Engage the tiller axle brake if applicable.
4. Turn off the Jacobsen engine brake if applicable and recommended by the aerial device manufacturer.
5. Place the transmission in the proper gear.
6. Engage the PTO.
7. Place the transmission selector in Neutral.

   Note: If the PTO transfer is complete, the indicator light will come on. On most makes of apparatus, completion of this procedure will also automatically release the bed ladder locks.

DISENGAGING THE PTO

8. Return the engine to idle speed.
9. Place the transmission in Neutral.
10. Deactivate the PTO.

Manual Transmission

ENGAGING THE PTO

1. Start the apparatus.
2. Set the parking brake.
3. Engage the tiller axle brake if applicable.
4. Turn off the Jacobsen engine brake if applicable and recommended by the aerial device manufacturer.
5. Place the transmission in Neutral.
6. Engage the PTO.
7. Engage the clutch.

   Note: If the PTO transfer is complete, the indicator light will come on. On most makes of apparatus, completion of this procedure will also automatically release the bed ladder locks.

DISENGAGING THE PTO

8. Return the engine to idle speed.
9. Place the transmission in Neutral.
10. Deactivate the PTO.
11. Engage the clutch.

Skill Sheet 7-3

Objective 9: Deploy, unlock, and raise hydraulic stabilizers on even terrain. *(NFPA® 1002, 6.2.2)*

Student Name: _____ **Date:** _____

Directions

For this skills evaluation checklist, students will deploy, unlock, and raise the hydraulic stabilizers of an aerial apparatus while parked on an even terrain.

Equipment & Materials

- Two firefighters; one driver/operator candidate, one spotter
- Fire service aerial apparatus (untillered)
- Pike pole
- Closet hook
- Wheel chocks
- Apparatus operator's manual

Task Steps

Box-Type or Straight-Extension Hydraulic Stabilizers

1. Engage the PTO system.
2. Check that the PTO system is engaged.
3. Dismount the apparatus cab, using hand rails.
4. Chock the apparatus wheels.
5. Check the stabilizer's expected travel path using a short pike pole or closet hook.

   Note: Check the deployment area for other vehicles, utility poles, hoselines, etc. Position a firefighter in the area of deployment to keep people away from the stabilizers.
6. Provide hydraulic power to the stabilizing system.
7. Position at the stabilization controls.
8. Extend the parallel extension arms.
9. Place the portable stabilizer pads.
10. Lower the stabilizing jacks on one side of the apparatus.
11. Lower the stabilizers on the opposite side of the apparatus.
12. Raise the apparatus to its working position.
13. Check that the apparatus has been raised evenly.

LOCKING THE STABILIZERS AND TRANSFERRING POWER TO THE AERIAL DEVICE

14. Ensure that the interlocks are locked and that they will stay in place.
15. Safeguard against slippage.

RAISING THE HYDRAULIC STABILIZERS

16. Return the selector valve to the STABILIZATION position.
17. Move the wheel chocks.
18. Remove the safety pins (if present) from the stabilizer jacks.
19. Raise the stabilizers.
20. Return the selector valve to the Neutral position.
21. Collect and stow the stabilizer pads.
22. Mount the apparatus cab.
23. Disengage the PTO system.
24. Collect and stow the wheel chocks.

Fulcrum-Type Hydraulic Stabilizers

1. Engage the PTO system.
2. Check that the PTO system is engaged.
3. Dismount the apparatus cab, using hand rails.
4. Chock the apparatus wheels.
5. Check the stabilizer's expected travel path using a short pike pole or closet hook.

   Note: Check the deployment area for other vehicles, utility poles, hoselines, etc. Position a firefighter in the area of deployment to keep people away from the stabilizers.
6. Provide hydraulic power to the stabilizing system.
7. Position at the stabilization controls.
8. Lower the stabilizing jacks to within a few inches (mm) of the ground.
9. Place the portable stabilizer pads.
10. Finish lowering the stabilizing jacks.
11. Lower the stabilizers on the opposite side of the apparatus to within a few inches (mm) of the ground
12. Place the portable stabilizer pads.
13. Finish lowering the stabilizing jacks.
14. Raise the apparatus to its working position.
15. Check that the apparatus has been raised evenly.

LOCKING THE STABILIZERS AND TRANSFERRING POWER TO THE AERIAL DEVICE

16.Ensure that the interlocks are locked and that they will stay in place.

RAISING THE HYDRAULIC STABILIZERS

17. Return the selector valve to the STABILIZATION position.
18. Move the wheel chocks.
19. Raise the stabilizers.
20. Return the selector valve to the Neutral position.
21. Collect and stow the stabilizer pads.
22. Mount the apparatus cab.
23. Disengage the PTO system.
24. Collect and stow the wheel chocks.

Skill Sheet 7-4

Objective 10: Deploy, unlock, and raise hydraulic stabilizers on laterally uneven terrain. *(NFPA® 1002, 6.2.2)*

Student Name: _____ **Date:** _____

Directions

For this skills evaluation checklist, students will deploy, unlock, and raise the hydraulic stabilizers of an aerial apparatus while parked on a laterally uneven terrain.

Equipment & Materials

- Two firefighters; one driver/operator candidate, one spotter
- Fire service aerial apparatus (untillered)
- Pike pole
- Closet hook
- Wheel chocks
- Apparatus operator's manual

Task Steps

1. Engage the PTO system.
2. Check that the PTO system is engaged.
3. Dismount the apparatus cab, using hand rails.
4. Chock the apparatus wheels.
5. Check the stabilizer's expected travel path using a short pike pole or closet hook.

   Note: Check the deployment area for other vehicles, utility poles, hoselines, etc. Position a firefighter in the area of deployment to keep people away from the stabilizers.
6. Provide hydraulic power to the stabilizing system.
7. Determine which side of the apparatus should be raised first.
8. Position at the stabilization controls.
9. Lower the stabilizing jacks on one side of the apparatus.

   Box and straight-extension stabilizers: Only until solid contact is made with the ground

   Fulcrum-type stabilizers: To within a few inches (mm) of the ground
10. Fulcrum-type only: Place the portable stabilizer pads.
11. Fulcrum-type only: Finish lowering the stabilizing jacks.
12. Lower the stabilizers on the opposite side of the apparatus.
13. Fulcrum-type only: Place the portable stabilizer pads.
14. Fulcrum-type only: Finish lowering the stabilizing jacks.
15. Check the surface the stabilizers are resting on.

16. Raise the apparatus to its working position when all stabilizers have made contact with the ground.
17. Check that the apparatus has been raised evenly.

LOCKING THE STABILIZERS AND TRANSFERRING POWER TO THE AERIAL DEVICE

18. Ensure that the interlocks are locked and that they will stay in place.
19. Box-type stabilizers only: Safeguard against slippage by inserting a pin into the hole closest to the jack housing on each stabilizer.

RAISING THE HYDRAULIC STABILIZERS

20. Return the selector valve to the STABILIZATION position.
21. Move the wheel chocks.
22. Remove the safety pins (if present) from the stabilizer jacks.
23. Raise the stabilizers.
24. Return the selector valve to the Neutral position.
25. Collect and stow the stabilizer pads.
26. Mount the apparatus cab.
27. Disengage the PTO system.
28. Collect and stow the wheel chocks.

Skill Sheet 7-5

Objective 11: Deploy, unlock, and raise hydraulic stabilizers on longitudinally uneven terrain. *(NFPA® 1002, 6.2.2)*

Student Name: _____ **Date:** _____

Directions

For this skills evaluation checklist, students will deploy, unlock, and raise the hydraulic stabilizers of an aerial apparatus parked on longitudinally uneven terrain.

Equipment & Materials

- Two firefighters; one driver/operator candidate, one spotter
- Fire service aerial apparatus (untillered)
- Pike pole
- Closet hook
- Wheel chocks
- Apparatus operator's manual
-

Task Steps

Note: Before performing this skill, the student should determine if the aerial device can be operated on the grade selected.

1. Position the apparatus to minimize stresses on the aerial device.

   Telescoping aerial device: Stop just short of the target or pull just past the target
   Articulating aerial device: Pull just past the target
2. Engage the PTO system.
3. Check that the PTO system is engaged.
4. Dismount the apparatus cab, using hand rails.
5. Chock the apparatus wheels.
6. Check the stabilizer's expected travel path using a short pike pole or closet hook.

   Note: Check the deployment area for other vehicles, utility poles, hoselines, etc. Position a firefighter in the area of deployment to keep people away from the stabilizers.
7. Provide hydraulic power to the stabilizing system.
8. Determine which side of the apparatus should be raised first.
9. Position at the stabilization controls.
10. Lower the stabilizing jacks on one side of the apparatus.

    Box and straight-extension stabilizers: Only until solid contact is made with the ground
    Fulcrum-type stabilizers: To within a few inches (mm) of the ground

11. Fulcrum-type only: Place the portable stabilizer pads.
12. Fulcrum-type only: Finish lowering the stabilizing jacks.
13. Check that the stabilizers are in solid contact with the ground.
14. Lower the stabilizers on the opposite side of the apparatus.
15. Fulcrum-type only: Place the portable stabilizer pads.
16. Fulcrum-type only: Finish lowering the stabilizing jacks.
17. Check that the stabilizers are in solid contact with the ground.
18. Raise the apparatus to its working position when all stabilizers have made contact with the ground.
19. Check that the apparatus has been raised evenly.

LOCKING THE STABILIZERS AND TRANSFERRING POWER TO THE AERIAL DEVICE

20. Ensure that the interlocks are locked and that they will stay in place.
21. Box-type stabilizers only: Safeguard against slippage by inserting a pin into the hole closest to the jack housing on each stabilizer.

RAISING THE HYDRAULIC STABILIZERS

22. Return the selector valve to the STABILIZATION position.
23. Move the wheel chocks.
24. Remove the safety pins (if present) from the stabilizer jacks.
25. Raise the stabilizers.
26. Return the selector valve to the Neutral position.
27. Collect and stow the stabilizer pads.
28. Mount the apparatus cab.
29. Disengage the PTO system.
30. Collect and stow the wheel chocks.

Skill Sheet 7-6

Objective 12: Deploy, unlock, and then unlock and stow manual stabilizers. *(NFPA® 1002, 6.2.2)*

Student Name: _____ **Date:** _____

Directions
For this skills evaluation checklist, students will first deploy and unlock manual stabilizers, then unlock and stow them as appropriate.

Equipment & Materials

- Two firefighters; one driver/operator candidate, one spotter
- Fire service aerial apparatus (tillered and/or untillered)
- Wheel chocks
- Apparatus operator's manual

Task Steps

Untillered Apparatus

1. Dismount the apparatus cab.
2. Chock the apparatus wheels.
3. Release and unlock the stabilizers on one side of the apparatus.
4. Lock the stabilizer on one side.
5. Position the stabilizer pad on one side.
6. Lower the stabilizer jack on one side.
7. Check that the surface the stabilizer is in solid contact with the ground.
8. Repeat steps 3 through 7 for the stabilizer on the other side of the apparatus.

STOWING THE STABILIZERS

9. Move wheel chocks out of the way.
10. Raise the stabilizer jacks.
11. Unlock the extension arm.
12. Maneuver extension arm back into its stowed position.
13. Lock the extension arm/beam.

Tillered Apparatus

1. Dismount the apparatus cab.
2. Chock the apparatus wheels.
3. Release and unlock the stabilizers on one side of the apparatus.
4. Swing the jack away from the apparatus.
5. Pull the sliding extension arm out.
6. Position the stabilizer pad.
7. Lock the extension arm in place.
8. Lower the jack.
9. Repeat steps 3 through 8 for the stabilizer on the other side of the apparatus.
10. Check that the apparatus has been raised evenly.

STOWING THE STABILIZERS

11. Move wheel chocks out of the way.
12. Raise the stabilizer jacks to lower the apparatus to the ground.
13. Unlock the extension arm.
14. Maneuver extension arm back and swing the jack into its stowed position.
15. Lock the extension arm/beam.

Skill Sheet 7-7

Objective 14: Stabilize tractor-trailer aerial apparatus. *(NFPA® 1002, 6.2.2)*

Student Name: _____ **Date:** _____

Directions
For this skills evaluation checklist, students will stabilize a tractor-trailer aerial apparatus.

Equipment & Materials
- Driver/operator candidate
- Certified driver/operator
- Older tractor-trailer aerial apparatus with manual stabilizers
- Apparatus operator's manual

Task Steps

1. Approach the intended objective.
2. Pull the tractor slightly forward while cutting the tractor wheels sharply toward the center of the street.
3. (Tiller operator) Position the tiller, cutting the wheels sharply toward the building.
4. Apply all brakes, including one for tractor axle.
5. Stabilize the apparatus.