XIV.F. Demonstrating the Effects of Various Airspeeds and Configurations during Engine Inoperative Performance

References: POH/AFM

<table>
<thead>
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<th>Objectives</th>
<th>The student should develop knowledge of the elements related to the effects of speed and configuration on single engine performance at Vyse</th>
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| Key Elements | 1. Maintain Vyse  
2. Feathering reduces HUGE amounts of drag  
3. Control the airplane |
| Elements | 1. Entry Procedure  
2. Demonstration  
3. Recovery |
| Schedule | 1. Discuss Objectives  
2. Review material  
3. Development  
4. Conclusion |
| Equipment | 1. White board and markers  
2. References |
| IP’s Actions | 1. Discuss lesson objectives  
2. Present Lecture  
3. Ask and Answer Questions  
4. Assign homework |
| SP’s Actions | 1. Participate in discussion  
2. Take notes  
3. Ask and respond to questions |
| Completion Standards | The student understands the importance of reducing drag and feathering the engine in order to maximize single engine performance. |
Instructors Notes:

Introduction:
   Attention
   Interesting fact or attention grabbing story

   Overview
   Review Objectives and Elements/Key ideas

What
This lesson is used to provide a first person demonstration of the effects of a feathered vs unfeathered propeller as well as airspeed, flaps and landing gear on single engine performance.

Why
Safety, safety, safety. Understanding the importance of reducing the drag, feathering the propeller, and maintaining Vyse is essential for safe multiengine flying.

How:
1. Entry Procedure (similar to Vmc demonstration entry)
   A. Reduce the power on the critical engine to zero
      i.  Do not feather (or simulate feathering) the engine
          a. The first portion of this demonstration is done to show the performance of the aircraft in various configurations with a windmilling prop
   B. Establish a zero sideslip, trim the aircraft
      i. Elevator and Rudder trim to reduce control pressures
   C. While maintaining altitude slow to and maintain Vyse
   D. Once established at Vyse in straight and level flight we can begin the performance demonstration
   E. CE – Improper entry procedures, including pitch attitude, bank attitude, and airspeed

2. Demonstration
   A. Propeller Windmilling
      i. Apply full power and maintain Vyse in a clean configuration
         a. Note the climb performance as well as the pitch attitude required to maintain Vyse in the clean configuration with the propeller windmilling
         b. Adjust the airspeed 5 knots or so above and below Vmc and note the changes in performance
      ii. Next, add the Approach flaps
         a. Adjust the controls as necessary to maintain a zero sideslip and Vyse
         b. Note the climb performance and pitch attitude necessary
         c. Adjust the airspeed 5 knots or so above and below Vmc and note the changes in performance
      iii. Next, extend the Landing Gear
         a. Adjust the controls as necessary to maintain a zero sideslip and Vyse
         b. Note the climb performance and pitch attitude necessary
         c. Adjust the airspeed 5 knots or so above and below Vmc and note the changes in performance
      iv. Next, extend the Landing flaps
         a. Adjust the controls as necessary to maintain a zero sideslip and Vyse
         b. Note the climb performance and pitch attitude necessary
         c. Adjust the airspeed 5 knots or so above and below Vmc and note the changes in performance
      v. Notice the difficulty the airplane has maintain altitude as drag is increased
B. Propeller Feathered
   i. With the aircraft still in a ‘dirty’ configuration feather the critical engine
      a. Adjust control pressure as necessary to maintain a zero sideslip and Vyse
      b. Note the climb performance and pitch attitude necessary
      c. Adjust the airspeed 5 knots or so above and below Vmc and note the changes in performance
   ii. Next, retract the Landing flaps
      a. Adjust the controls as necessary to maintain a zero sideslip and Vyse
      b. Note the climb performance and pitch attitude necessary
      c. Adjust the airspeed 5 knots or so above and below Vmc and note the changes in performance
   iii. Next, retract the landing gear
      a. Adjust the controls as necessary to maintain a zero sideslip and Vyse
      b. Note the climb performance and pitch attitude necessary
      c. Adjust the airspeed 5 knots or so above and below Vmc and note the changes in performance
   iv. Next, retract the approach flaps (back to a clean configuration, but with the prop feathered)
      a. Adjust the controls as necessary to maintain a zero sideslip and Vyse
      b. Note the climb performance and pitch attitude necessary
      c. Adjust the airspeed 5 knots or so above and below Vmc and note the changes in performance
   v. Notice the improved performance with the propeller feathered in the same configurations

C. CE – Improper airspeed control throughout the demonstration

D. CE – inadequate knowledge of the effects of airspeeds above or below Vyse and of various configurations on performance

E. CE – Rough and/or uncoordinated use of flight controls

3. Recovery
   A. Restart the feathered engine
   B. Increase power on the restarted engine, maintain control (adjust rudder and aileron pressure) during the recovery
      i. Reduce power on the operating engine
   C. Return to straight and level coordinated flight
   D. CE – Improper procedures during resumption of cruise flight

Conclusion:
Brief review of the main points

PTS Requirements:
To determine that the applicant:
   1. Exhibits instructional knowledge of the elements related to the effects of various airspeeds and configurations during engine inoperative performance by describing:
      a. selection of proper altitude for the demonstration.
      b. proper entry procedure to include pitch attitude, bank attitude, and airspeed.
      c. effects on performance of airspeed changes at, above, and below VYSE.
      d. effects on performance of various configurations:
         i. extension of landing gear.
         ii. extension of wing flaps.
         iii. extension of both landing gear and wing flaps.
         iv. wind milling of propeller on inoperative engine.
      e. airspeed control throughout the demonstration.
f. proper control technique and procedures throughout the demonstration.

2. Exhibits instructional knowledge of common errors related to the effects of various airspeeds and configurations during engine inoperative performance by describing:
   a. inadequate knowledge of the effects of airspeeds above or below $V_{YSE}$ and of various configurations on performance.
   b. improper entry procedures, including pitch attitude, bank attitude, and airspeed.
   c. improper airspeed control throughout the demonstration.
   d. rough and/or uncoordinated use of flight controls.
   e. improper procedures during resumption of cruise flight.

3. Demonstrates and simultaneously explains the effects of various airspeeds and configurations during engine inoperative performance from an instructional standpoint.

4. Analyzes and corrects simulated common errors related to the effects of various airspeeds and configurations during engine inoperative performance.