

Cape Cod Community College AMTS

Practical Project Guide for AMT 277 Powerplant Curriculum, Subject Item 33 - 39

Part 147, Appendix D, Part 2 - Subject K – Propellers

Item 36. Repair propeller control system components. (Level 2)

Project 1A & 1B & 1C

Purpose: To acquaint the student with the proper procedures of repairing propeller control system components and their rigging procedures.

References:

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook – Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Piper Comanche 250 (PA-24) Service Manual
- (3) Piper Comanche 250 (PA-24) Parts Catalog
- (4) Cessna 402C Service Manual and Parts Manual
- (5) AeroTrain AE-30-520 Operations Manual
- (6) Lycoming O-540 Engine Service Manual
- (7) Continental T S I O-520 Engine Service Manual
- (8) Hartzell Governor Maintenance Manual Number 130B
- (9) Hartzell Manual Number 171: -1, -4, -6 Series Steel "A" Hub Propeller Maintenance Manual

Equipment and Tools Needed:

- (1) Piper Comanche 250 (PA 24)
- (2) Cessna 402C
- (3) T S I O-520 Test Stand (AeroTrain AE-30-520 Training Aid)
- (4) AMT Roll-Around Toolbox
- (5) Computer workstation with internet access.
- (6) #8 Drill Bit (402C only)

Supplies and Materials Needed:

- (1) AN Bolt & Nut
- (2) Proper Spacer (402C)

Procedure:

Complete following procedure on the assigned project 1A or 1B or 1C

- (1) Remove engine cowling and baffling and control quadrant panels as necessary to gain access to the propeller control components.
- (2) Inspect the system for visual defects.
- (3) Replace any missing or damaged components or parts.
- (4) Rig the propeller controls in accordance with the rigging procedure.
- (5) If optional propeller unfeathering system is installed, service accumulator.
- (6) Reinstall any cowling, baffles, and panels removed in step 1 in accordance with installation procedures.
- (7) Perform operational check of propeller and adjust as necessary in accordance with the appropriate manual procedures and using the standard engine operation safety procedures.
- (8) Record all RPM, Manifold Pressure, and Propeller Control position readings during the check.
- (9) Perform final inspection of the component repaired and insure all removed items are properly reinstalled after engine shutdown.
- (10) Secure the aircraft and engine.
- (11) Complete maintenance record entries.
- (12) Answer the below questions.

Project 1A Item 36. Repair propeller control system components

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook – Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Piper Comanche 250 (PA-24) Service Manual
- (3) Piper Comanche 250 (PA-24) Parts Catalog
- (4) Lycoming O-540 Engine Service Manual
- (5) Hartzell Governor Maintenance Manual Number 130B
- (6) Hartzell Manual Number 171: -1, -4, -6 Series Steel "A" Hub Propeller Maintenance Manual

Project 1B Item 36. Repair propeller control system components

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook – Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7 Cessna 402C Service Manual and Parts Manual
- (2) Continental T S I O-520 Engine Service Manual
- (3) McCauley Owner Information Manual

Project 1C Item 36. Repair propeller control system components

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook – Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) T S I O-520 Test Stand (AeroTrain AE-30-520 Training Aid)
- (3) AeroTrain AE-30-520 Operations Manual
- (4) Continental T S I O-520 Engine Service Manual

Questions:

1. What mechanic adjustments are possible on the governor?

2. What is *cushion* in reference to governor control rigging?

3. What reference information will assist the mechanic in identifying the high- and low-pitch stops?

4. If the propeller quadrant control in the cockpit is marked *increase rpm*, in which direction is the propeller pitch moving?

5. Why are the plugs which block the passageways in the governor called oil control plugs?

6. What reference information would a mechanic use to determine the procedure to be followed to mount a governor on an engine?

7. Why are some governors designed to rotate both clockwise and counterclockwise?

8. When a governor is described as clockwise or counter-clockwise direction of rotation, how must the governor be viewed?
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Practical Project Guide for AMT 277 Powerplant Curriculum, Subject Item 33 - 39

Part 147, Appendix D, Part 2 - Subject K – Propellers

Item 37. **Inspect**, check, service, and repair fixed-pitch, **constant-speed, and feathering propellers**, and propeller governing systems. (Level 3)

Project 2

Purpose: To research various aircraft to determine if the propeller installed has a Critical Range and/or other propeller-related required placards.

References:

- (1) www.faa.gov Type Certificate Data Sheets

Equipment and Tools Needed:

- (1) Internet access

Supplies and Materials Needed:

- (1) none

Procedure:

Complete following procedure on all aircraft indicated below

- (1) Research each aircraft/engine/propeller combination and determine if there is a Critical Range established for that combination. If more than one propeller is approved for a particular aircraft, choose one for the below information.
- (2) Fill in all missing information asked for below. NOTE: only list placards if they apply to the propeller.

Aircraft:

Piper PA-28RT-201, Arrow IV

Make/Model of Engine: _____

Make/Model of Propeller: _____

NOTE: If more than one is listed, choose one.

"Critical Range": _____

Placards Required:

Beechcraft Corporation B-50, Twin Bonanza

Make/Model of Engine: _____

Make/Model of Propeller: _____

NOTE: If more than one is listed, choose one.

"Critical Range": _____

Placards Required:

Beechcraft Corporation C18S (C-45), Twin Beech

Make/Model of Engine: _____

Make/Model of Propeller: _____

NOTE: If more than one is listed, choose one.

"Critical Range": _____

Placards Required:

Textron Aviation (Cessna) 310H

Make/Model of Engine: _____

Make/Model of Propeller: _____

NOTE: If more than one is listed, choose one.

"Critical Range": _____

Placards Required:

Piper PA-34-200T, Serial Number 34-7570100

Make/Model of Engine: _____

Make/Model of Propeller: _____

NOTE: If more than one is listed, choose one.

"Critical Range": _____

Placards Required:

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Part 147, Appendix D, Part 2 - Subject K – Propellers

Item 34. **Identify and select propeller lubricants** (Level 2)

Item 37. **Inspect, check, service, and repair fixed-pitch, constant-speed, and feathering propellers, and propeller governing systems.** (Level 3)

Project 3A & 3B & 3C & 3D & 3E

Purpose: To practice the inspection of a fixed-pitch and constant-speed/feathering propeller.

References:

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Piper Comanche 250 (PA-24) Service Manual
- (3) Piper Comanche 250 (PA-24) Parts Catalog
- (4) Cessna 402C Service Manual
- (5) Cessna 402C Parts Manual
- (6) Piper Colt (PA-22-108) Flight Manual
- (7) Piper Colt (PA-22-108) Parts Manual
- (8) Sensenich Propeller Repair Instructions
- (9) Hartzell Propeller Owner's Manual Number 168
- (10) McCauley Propeller Owner/Operator Information Manual

Equipment and Tools Needed:

- (1) Piper Colt (PA-22-108)
- (2) Piper Comanche 250 (PA 24)
- (3) Cessna 402C
- (4) Avotek O-320 Test Stand
- (5) T S I O-520 Test Stand (AeroTrain AE-30-520 Training Aid)
- (6) Avotek 3-bladed Reversing Prop Stand
- (7) AMT Roll-Around Toolbox
- (8) Computer workstation with internet access.

Supplies and Materials Needed:

- (1) Approved Propeller lubricants

Procedure:

Complete following procedure on the assigned project (3A or 3B) and (3C or 3D or 3E) and 3F

- (1) Research the assigned aircraft/engine/propeller to prepare for a 100-hour Inspection of the assigned propeller and governing system (as applicable).
- (2) Remove (as applicable) propeller spinner, engine cowling, and engine baffling to allow complete access for inspection.
- (3) Inspect the assigned propeller and governing system (as applicable) to identify any discrepancies and record your results on a sheet of paper.
- (4) Show the Instructor all discrepancies noted.
- (5) (3C, 3D, or 3E only) Select the recommended lubricant and lubricate the propeller as required by the manufacturer.
- (6) Reinstall all removed baffling, cowling, and spinner.
- (7) Perform operational check of propeller and adjust (as applicable) in accordance with the appropriate manual procedures and using the standard engine operation safety procedures.
- (8) Record all RPM, Manifold Pressure, and Propeller Control position readings (as applicable) during the check.
- (9) Perform final inspection of the propeller and governing system and insure all removed items are properly reinstalled after engine shutdown.
- (10) Secure the aircraft and engine.
- (11) Complete maintenance record entries.

Project 3A Item 37. Inspect, check, service, and repair fixed-pitch, constant-speed, and feathering propellers, and propeller governing systems. (Level 3)

- (1) 4 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Piper Colt (PA-22-108)
- (3) Piper Colt (PA-22-108) Flight Manual
- (4) Piper Colt (PA-22-108) Parts Manual
- (5) Sensenich Propeller Repair Instructions

Project 3B Item 37. Inspect, check, service, and repair fixed-pitch, constant-speed, and feathering propellers, and propeller governing systems. (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Avotek O-320 Test Stand
- (3) McCauley Propeller Owner/Operator Information Manual

Project 3C Item 34. Identify and select propeller lubricants (Level 2) and Item 37. Inspect, check, service, and repair fixed-pitch, constant-speed, and feathering propellers, and propeller governing systems. (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Piper Comanche 250 (PA 24)
- (3) Piper Comanche 250 (PA-24) Service Manual
- (4) Piper Comanche 250 (PA-24) Parts Catalog
- (5) Hartzell Propeller Owner's Manual Number 168

Project 3D Item 34. **Identify and select propeller lubricants** (Level 2) and Item 37. **Inspect, check, service,** and repair fixed-pitch, **constant-speed, and feathering propellers, and propeller governing systems.** (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Cessna 402C
- (3) Cessna 402C Service Manual
- (4) Cessna 402C Parts Manual
- (5) McCauley Propeller Owner/Operator Information Manual

Project 3E Item 34. **Identify and select propeller lubricants** (Level 2) and Item 37. **Inspect, check, service,** and repair fixed-pitch, **constant-speed, and feathering propellers, and propeller governing systems.** (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook – Powerplant, Volume 1 (FAA-H-8083-32) Chapter 2 & Volume 2 Chapters 6 & 10 Aviation Maintenance Technician Handbook – Powerplant, Volume 1 (FAA-H-8083-32) Chapter 2 & Volume 2 Chapters 6 & 10
- (2) T S I O-520 Test Stand (AeroTrain AE-30-520 Training Aid)
- (3) AeroTrain AE-30-520 Operations Manual
- (4) Cessna 402C Service and Parts Manuals
- (5) Continental T S I O-520 Engine Service Manual
- (6) McCauley Propeller Owner/Operator Information Manual

Project 3F Item 34. **Identify and select propeller lubricants** (Level 2) and Item 37. **Inspect, check, service,** and repair fixed-pitch, **constant-speed, and feathering propellers, and propeller governing systems.** (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Avotek 3-bladed Reversing Prop Stand
- (3) Hartzell Propeller Owner's Manual Number 168

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Part 147, Appendix D, Part 2 - Subject K – Propellers

Item 37. **Inspect**, check, service, and **repair** fixed-pitch, constant-speed, and feathering propellers, and propeller governing systems. (Level 3)

Item 39. **Repair aluminum alloy propeller blades.** (Level 3)

Project 4A & 4B & 4C & 4D

Purpose: To practice the repair of a fixed-pitch and constant-speed/feathering propeller.

References:

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7 Piper Comanche 250 (PA-24) Service Manual
- (2) Piper Comanche 250 (PA-24) Parts Catalog
- (3) Cessna 402C Service Manual
- (4) Cessna 402C Parts Manual
- (5) Piper Colt (PA-22-108) Flight Manual
- (6) Piper Colt (PA-22-108) Parts Manual
- (7) Sensenich Propeller Repair Instructions
- (8) Hartzell Propeller Owner's Manual Number 168
- (9) Hartzell Manual Number 171: -1, -4, -6 Series Steel "A" Hub Propeller Maintenance Manual
- (10) McCauley Fixed Pitch Service Manual
- (11) McCauley Propeller Owner/Operator Information Manual

Equipment and Tools Needed:

- (1) Piper Colt (PA-22-108)
- (2) Piper Comanche 250 (PA 24)
- (3) Cessna 402C
- (4) Avotek O-320 Test Stand
- (5) AMT Roll-Around Toolbox
- (6) Computer workstation with internet access.
- (7) NDT equipment appropriate for aluminum
- (8) Files and Scotch-Brite

Supplies and Materials Needed:

- (1) Approved Propeller lubricants

Procedure:

Complete following procedure on the assigned project (4A or 4B) and (4C or 4D)

- (1) Repair any blade nicks as assigned by the Instructor.
- (2) Show the Instructor the finished repair.
- (3) Perform the appropriate NDT process in the area of the repair.
- (4) Show the Instructor the results BEFORE cleaning the NDT material off the blade.
- (5) Thoroughly clean the blade to remove all traces of the NDT material.
- (6) Complete maintenance record entries.

Project 4A Item 37. **Inspect**, check, service, and **repair** fixed-pitch, constant-speed, and feathering propellers, and propeller governing systems. (Level 3) and Item 39. **Repair** aluminum alloy propeller blades. (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Piper Colt (PA-22-108)
- (3) Piper Colt (PA-22-108) Flight Manual
- (4) Piper Colt (PA-22-108) Parts Manual
- (5) Sensenich Propeller Repair Instructions

Project 4B Item 37. **Inspect**, check, service, and **repair** fixed-pitch, constant-speed, and feathering propellers, and propeller governing systems. (Level 3) and Item 39. **Repair** aluminum alloy propeller blades. (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Avotek O-320 Test Stand
- (3) McCauley Propeller Owner/Operator Information Manual

Project 4C Item 37. **Inspect**, check, service, and **repair** fixed-pitch, constant-speed, and feathering propellers, and propeller governing systems. (Level 3) and Item 39. **Repair** aluminum alloy propeller blades. (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Piper Comanche 250 (PA 24)
- (3) Piper Comanche 250 (PA-24) Service Manual
- (4) Piper Comanche 250 (PA-24) Parts Catalog
- (5) Hartzell Propeller Owner's Manual Number 168
- (6) Hartzell Manual Number 171: -1, -4, -6 Series Steel "A" Hub Propeller Maintenance Manual

Project 4D Item 37. **Inspect**, check, service, and **repair** fixed-pitch, constant-speed, and feathering propellers, and propeller governing systems. (Level 3) and Item 39. **Repair** aluminum alloy propeller blades. (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Cessna 402C
- (3) Cessna 402C Service Manual
- (4) Cessna 402C Parts Manual
- (5) McCauley Propeller Owner/Operator Information Manual

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Part 147, Appendix D, Part 2 - Subject K – Propellers

Item 38. Install, troubleshoot, and remove propellers. (Level 3)

Project 5A & 5 B

Purpose: To acquaint the student with the proper procedures of installation and removal and troubleshooting of propeller vibrations.

References:

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7 Piper Colt (PA-22-108) Flight Manual
- (2) Piper Colt (PA-22-108) Parts Manual
- (3) Sensenich Installation Instructions for Metal Fixed-Pitch Propellers
- (4) Sensenich Troubleshooting Solving Aircraft/Engine/Propeller Performance Problems
- (5) Sensenich Troubleshooting Propeller Vibration Checklist
- (6) Hartzell Propeller Owner's Manual Number 168
- (7) McCauley Fixed Pitch Service Manual
- (8) McCauley Propeller Owner Information Manual
- (9) McCauley Service Bulletin 227B Prop Installation Mounting Torque and Service Letter 1949-4D Dynamic Balance and Vibration Troubleshooting
- (10) Lycoming Direct Drive Engine Overhaul Manual

Equipment and Tools Needed:

- (1) Piper Colt (PA-22-108)
- (2) Avotek O-320 Test Stand
- (3) AMT Roll-Around Toolbox
- (4) Dial Indicator and Mounting Kit
- (5) Computer workstation with internet access.

Supplies and Materials Needed:

- (1) .040 -Inch Safety Wire

Procedure:

Complete following procedure on the assigned project 5A or 5B

- (1) Research the appropriate manufacturer's information as preparation for the removal, troubleshooting, and installation of the assigned propeller.
- (2) Remove the assigned propeller as per the manufacturer's information.
- (3) Perform a Crankshaft Flange Runout inspection and show the Instructor the results.
- (4) Prepare and reinstall the propeller as per the manufacturer's information.
- (5) Perform a Propeller Track Check and show the Instructor the results. Pretend the Track is not within limits (or if it is not), explain to the Instructor the procedure to follow to correct the issue. If it is actually not within limits, follow the procedure to correct it.
- (6) Review the Owner/Pilot report below.
- (7) Troubleshoot the indicated problem and list the likely cause(s) and how you would determine the final cause.

Owner/Pilot Report:

"I observed an unusual vibration with the engine running. The vibration is present throughout the entire range of RPMs. Otherwise, the engine operations are normal."

Project 5A Item 38. Install, troubleshoot, and remove propellers. (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Piper Colt (PA-22-108) Flight Manual
- (3) Piper Colt (PA-22-108) Parts Manual
- (4) Sensenich Installation Instructions for Metal Fixed-Pitch Propellers
- (5) Sensenich Troubleshooting Solving Aircraft/Engine/Propeller Performance Problems
- (6) Sensenich Troubleshooting Propeller Vibration Checklist

Project 5B Item 38. Install, troubleshoot, and remove propellers. (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Avotek O-320 Test Stand
- (3) McCauley Fixed Pitch Service Manual
- (4) McCauley Propeller Owner Information Manual
- (5) McCauley Service Bulletin 227B Prop Installation Mounting Torque and Service Letter 1949-4D Dynamic Balance and Vibration Troubleshooting
- (6) Lycoming Direct Drive Engine Overhaul Manual

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Part 147, Appendix D, Part 2 - Subject K – Propellers

Item 36. Repair propeller control system components Level 2

Project 6

Purpose: To acquaint the student with the proper procedures of repairing propeller control system components and their rigging procedures.

References:

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook – Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Piper Comanche 250 (PA-24) Service Manual
- (3) Piper Comanche 250 (PA-24) Parts Catalog
- (4) Cessna 402C Service Manual and Parts Manual
- (5) Lycoming O-540 Engine Service Manual
- (6) Continental T S I O-520 Engine Service Manual
- (7) Hartzell Governor Maintenance Manual Number 130B
- (8) Hartzell Manual Number 171: -1, -4, -6 Series Steel "A" Hub Propeller Maintenance Manual

Equipment and Tools Needed:

- (1) Piper Comanche 250 (PA 24)
- (2) Cessna 402C
- (3) AMT Roll-Around Toolbox
- (4) Computer workstation with internet access.
- (5) #8 Drill Bit (402C only)

Supplies and Materials Needed:

- (1) AN Bolt & Nut
- (2) Proper Spacer
(402C)

Procedure:

Complete following procedure on the assigned project 1A or 1B

- (1) Remove engine cowling and baffling and control quadrant panels as necessary to gain access to the propeller control components.
- (2) Inspect the system for visual defects.
- (3) Replace any missing or damaged components or parts.
- (4) Rig the propeller controls in accordance with the rigging procedure.
- (5) If optional propeller unfeathering system is installed, service accumulator.
- (6) Reinstall any cowling, baffles, and panels removed in step 1 in accordance with installation procedures.
- (7) Perform operational check of propeller and adjust as necessary in accordance with the appropriate manual procedures and using the standard engine operation safety procedures.
- (8) Record all RPM, Manifold Pressure, and Propeller Control position readings during the check.
- (9) Perform final inspection of the component repaired and insure all removed items are properly reinstalled after engine shutdown.
- (10) Secure the aircraft and engine.
- (11) Complete maintenance record entries.
- (12) Answer the below questions.

Project 1A Item 36. Repair propeller control system components

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook – Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7 Piper Comanche 250 (PA-24) Service Manual
- (2) Piper Comanche 250 (PA-24) Parts Catalog
- (3) Lycoming O-540 Engine Service Manual
- (4) Hartzell Governor Maintenance Manual Number 130B
- (5) Hartzell Manual Number 171: -1, -4, -6 Series Steel "A" Hub Propeller Maintenance Manual

Project 1B Item 36. Repair propeller control system components

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook – Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Cessna 402C Service Manual and Parts Manual
- (3) Continental T S I O-520 Engine Service Manual
- (4) McCauley Owner Information Manual

Questions:

1. What mechanic adjustments are possible on the governor?

2. What is cushion in reference to governor control rigging?

3. What reference information will assist the mechanic in identifying the high- and low-pitch stops?

4. If the propeller quadrant control in the cockpit is marked increase rpm, in which direction is the propeller pitch moving?

5. Why are the plugs which block the passageways in the governor called oil control plugs?

6. What reference information would a mechanic use to determine the procedure to be followed to mount a governor on an engine?

7. Why are some governors designed to rotate both clockwise and counterclockwise?

8. When a governor is described as clockwise or counter-clockwise direction of rotation, how must the governor be viewed?

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Item 37. **Inspect**, check, service, and repair fixed-pitch, **constant-speed, and feathering propellers**, and propeller governing systems. (Level 3)

Project 7

Purpose: To research various aircraft to determine if the propeller installed has a Critical Range and/or other propeller-related required placards.

References:

- (1) www.faa.gov Type Certificate Data Sheets

Equipment and Tools Needed:

- (1) Internet access

Supplies and Materials Needed:

- (1) none

Procedure:

Complete following procedure on all aircraft indicated below

- (1) Research each aircraft/engine/propeller combination and determine if there is a Critical Range established for that combination. If more than one propeller is approved for a particular aircraft, choose one for the below information.
- (2) Fill in all missing information asked for below. NOTE: only list placards if they apply to the propeller.

Aircraft:

Piper PA-28RT-201, Arrow IV

Make/Model of Engine: _____

Make/Model of Propeller: _____

NOTE: If more than one is listed, choose one.

"Critical Range": _____

Placards Required:

Beechcraft (Raytheon) B-50, Twin Bonanza

Make/Model of Engine: _____

Make/Model of Propeller: _____

NOTE: If more than one is listed, choose one.

"Critical Range": _____

Placards Required:

Beechcraft (Raytheon) C18 (C-45), Twin Beech

Make/Model of Engine: _____

Make/Model of Propeller: _____

NOTE: If more than one is listed, choose one.

"Critical Range": _____

Placards Required:

Cessna 310H

Make/Model of Engine: _____

Make/Model of Propeller: _____

NOTE: If more than one is listed, choose one.

"Critical Range": _____

Placards Required:

Piper PA-34-200T, Serial Number 34-7570100

Make/Model of Engine: _____

Make/Model of Propeller: _____

NOTE: If more than one is listed, choose one.

"Critical Range": _____

Placards Required:

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Part 147, Appendix D, Part 2 - Subject K – Propellers

Item 34. **Identify and select propeller lubricants** (Level 2)

Item 37. **Inspect, check, service, and repair fixed-pitch, constant-speed, and feathering propellers, and propeller governing systems.** (Level 3)

Project 8A, 8B, 8C, 8D & 8E

Project 2

Purpose: To practice the inspection of a fixed-pitch and constant-speed/feathering propeller.

References:

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
Piper Comanche 250 (PA-24) Service Manual Piper Comanche 250 (PA-24) Parts Catalog
- (2) Cessna 402C Service Manual
- (3) Cessna 402C Parts Manual
- (4) Piper Colt (PA-22-108) Service Manual
- (5) Piper Colt (PA-22-108) Parts Manual
- (6) Avotek PT6A-20 Information
- (7) Sensenich Propeller Repair Instructions
- (8) Hartzell Propeller Owner's Manual Number 168
- (9) McCauley Propeller Owner/Operator Information Manual

Equipment and Tools Needed:

- (1) Piper Colt (PA-22-108)
- (2) Piper Comanche 250 (PA 24)
- (3) Cessna 402C
- (4) Avotek O-320 Test Stand
- (5) Avotek PT6A-20 Test Stand
- (6) AMT Roll-Around Toolbox
- (7) Computer workstation with internet access.

Supplies and Materials Needed:

- (1) Approved Propeller lubricants

Procedure:

Complete following procedure on the assigned project (1A or 1B) and (1C or 1D or 1E)

- (1) Research the assigned aircraft/engine/propeller to prepare for a 100-hour Inspection of the assigned propeller and governing system (as applicable).
- (2) Remove (as applicable) propeller spinner, engine cowling, and engine baffling to allow complete access for inspection.
 - (3) Inspect the assigned propeller and governing system (as applicable) to identify any discrepancies and record your results on a sheet of paper.
- (4) Show the Instructor all discrepancies noted.
- (5) (1C, 1D, or 1E only) Select the recommended lubricant and lubricate the propeller as required by the manufacturer.
- (6) Reinstall all removed baffling, cowling, and spinner.
- (7) Perform operational check of propeller and adjust (as applicable) in accordance with the appropriate manual procedures and using the standard engine operation safety procedures.
- (8) Record all RPM, Manifold Pressure, and Propeller Control position readings (as applicable) during the check.
- (9) Perform final inspection of the propeller and governing system and insure all removed items are properly reinstalled after engine shutdown.
- (10) Secure the aircraft and engine.
- (11) Complete maintenance record entries.

Project 1A Item 37. **Inspect, check,** service, and repair **fixed-pitch,** constant-speed, and feathering propellers, and propeller governing systems. (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Piper Colt (PA-22-108)
- (3) Piper Colt (PA-22-108) Service Manual
- (4) Piper Colt (PA-22-108) Parts Manual
- (5) Sensenich Propeller Repair Instructions

Project 1B Item 37. **Inspect, check,** service, and repair **fixed-pitch,** constant-speed, and feathering propellers, and propeller governing systems. (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Avotek O-320 Test Stand
- (3) McCauley Propeller Owner/Operator Information Manual

Project 1C Item 34. **Identify and select propeller lubricants** (Level 2) and Item 37. **Inspect, check, service,** and repair fixed-pitch, **constant-speed, and feathering propellers, and propeller governing systems.** (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Piper Comanche 250 (PA 24)
- (3) Piper Comanche 250 (PA-24) Service Manual
- (4) Piper Comanche 250 (PA-24) Parts Catalog
- (5) Hartzell Propeller Owner's Manual Number 168

Project 1D Item 34. **Identify and select propeller lubricants** (Level 2) and Item 37. **Inspect, check, service,** and repair fixed-pitch, **constant-speed, and feathering propellers, and propeller governing systems.** (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Cessna 402C
- (3) Cessna 402C Service Manual
- (4) Cessna 402C Parts Manual
- (5) McCauley Propeller Owner/Operator Information Manual

Project 1E Item 34. **Identify and select propeller lubricants** (Level 2) and Item 37. **Inspect, check, service,** and repair fixed-pitch, **constant-speed, and feathering propellers, and propeller governing systems.** (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Avotek PT6A-20 Test Stand
- (3) Avotek PT6A-20 Information
- (4) Hartzell Propeller Owner's Manual Number 168

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Practical Project Guide for AMT 277 Powerplant Curriculum, Subject Item 37

Part 147, Appendix D, Part 2 - Subject K – Propellers

Item 37. **Inspect**, check, service, and **repair** fixed-pitch, constant-speed, and feathering propellers, and propeller governing systems. (Level 3)

Item 39. **Repair aluminum alloy propeller blades.** (Level 3)

Project 9A, 9B, 9C, & 9D

Project 3

Purpose: To practice the repair of a fixed-pitch and constant-speed/feathering propeller.

References:

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7 Piper Comanche 250 (PA-24) Service Manual
- (2) Piper Comanche 250 (PA-24) Parts Catalog
- (3) Cessna 402C Service Manual
- (4) Cessna 402C Parts Manual
- (5) Piper Colt (PA-22-108) Service Manual
- (6) Piper Colt (PA-22-108) Parts Manual
- (7) Sensenich Propeller Repair Instructions
- (8) Hartzell Propeller Owner's Manual Number 168
- (9) Hartzell Manual Number 171: -1, -4, -6 Series Steel "A" Hub Propeller Maintenance Manual
- (10) McCauley Fixed Pitch Service Manual
- (11) McCauley Propeller Owner/Operator Information Manual

Equipment and Tools Needed:

- (1) Piper Colt (PA-22-108)
- (2) Piper Comanche 250 (PA 24)
- (3) Cessna 402C
- (4) Avotek O-320 Test Stand
- (5) AMT Roll-Around Toolbox
- (6) Computer workstation with internet access.
- (7) NDT equipment appropriate for aluminum
- (8) Files and Scotch-Brite

Supplies and Materials Needed:

- (1) Approved Propeller lubricants

Procedure:

Complete following procedure on the assigned project (1A or 1B) and (1C or 1D)

- (1) Repair any blade nicks as assigned by the Instructor.
- (2) Show the Instructor the finished repair.
- (3) Perform the appropriate NDT process in the area of the repair.
- (4) Show the Instructor the results BEFORE cleaning the NDT material off the blade.
- (5) Thoroughly clean the blade to remove all traces of the NDT material.
- (6) Complete maintenance record entries.

Project 1A Item 37. **Inspect**, check, service, and **repair** fixed-pitch, constant-speed, and feathering propellers, and propeller governing systems. (Level 3) and Item 39. **Repair** aluminum alloy propeller blades. (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Piper Colt (PA-22-108)
- (3) Piper Colt (PA-22-108) Service Manual
- (4) Piper Colt (PA-22-108) Parts Manual
- (5) Sensenich Propeller Repair Instructions

Project 1B Item 37. **Inspect**, check, service, and **repair** fixed-pitch, constant-speed, and feathering propellers, and propeller governing systems. (Level 3) and Item 39. **Repair** aluminum alloy propeller blades. (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Avotek O-320 Test Stand
- (3) McCauley Propeller Owner/Operator Information Manual

Project 1C Item 37. **Inspect**, check, service, and **repair** fixed-pitch, constant-speed, and feathering propellers, and propeller governing systems. (Level 3) and Item 39. **Repair** aluminum alloy propeller blades. (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Piper Comanche 250 (PA 24)
- (3) Piper Comanche 250 (PA-24) Service Manual
- (4) Piper Comanche 250 (PA-24) Parts Catalog
- (5) Hartzell Propeller Owner's Manual Number 168
- (6) Hartzell Manual Number 171: -1, -4, -6 Series Steel "A" Hub Propeller Maintenance Manual

Project 1D Item 37. **Inspect**, check, service, and **repair** fixed-pitch, constant-speed, and feathering propellers, and propeller governing systems. (Level 3) and Item 39. **Repair** aluminum alloy propeller blades. (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Cessna 402C
- (3) Cessna 402C Service Manual
- (4) Cessna 402C Parts Manual
- (5) McCauley Propeller Owner/Operator Information Manual

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Practical Project Guide for AMT 277 Powerplant Curriculum, Subject Item 38

Part 147, Appendix D, Part 2 - Subject K – Propellers

Item 38. Install, troubleshoot, and remove propellers. (Level 3)

Project 10A & 10B

Purpose: To acquaint the student with the proper procedures of installation and removal and troubleshooting of propeller vibrations.

References:

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Piper Colt (PA-22-108) Service Manual
- (3) Piper Colt (PA-22-108) Parts Manual
- (4) Sensenich Installation Instructions for Metal Fixed-Pitch Propellers
- (5) Sensenich Troubleshooting Solving Aircraft/Engine/Propeller Performance Problems
- (6) Sensenich Troubleshooting Propeller Vibration Checklist
- (7) Hartzell Propeller Owner's Manual Number 168
- (8) McCauley Fixed Pitch Service Manual
- (9) McCauley Propeller Owner Information Manual
- (10) McCauley Service Bulletin 227B Prop Installation Mounting Torque and Service Letter 1949-4D Dynamic Balance and Vibration Troubleshooting
- (11) Lycoming Direct Drive Engine Overhaul Manual

Equipment and Tools Needed:

- (1) Piper Colt (PA-22-108)
- (2) Avotek O-320 Test Stand
- (3) AMT Roll-Around Toolbox
- (4) Dial Indicator and Mounting Kit
- (5) Computer workstation with internet access.

Supplies and Materials Needed:

- (1) .040 -Inch Safety Wire

Procedure:

Complete following procedure on the assigned project 1A or 1B

- (1) Research the appropriate manufacturer's information as preparation for the removal, troubleshooting, and installation of the assigned propeller.
- (2) Remove the assigned propeller as per the manufacturer's information.
- (3) Perform a Crankshaft Flange Runout inspection and show the Instructor the results.
- (4) Prepare and reinstall the propeller as per the manufacturer's information.
- (5) Perform a Propeller Track Check and show the Instructor the results. Pretend the Track is not within limits (or if it is not), explain to the Instructor the procedure to follow to correct the issue. If it is actually not within limits, follow the procedure to correct it.
- (6) Review the Owner/Pilot report below.
- (7) Troubleshoot the indicated problem and list the likely cause(s) and how you would determine the final cause.

Owner/Pilot Report:

"I observed an unusual vibration with the engine running. The vibration is present throughout the entire range of RPMs. Otherwise, the engine operations are normal."

Project 1A Item 38. Install, troubleshoot, and remove propellers. (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Piper Colt (PA-22-108) Service Manual
- (3) Piper Colt (PA-22-108) Parts Manual
- (4) Sensenich Installation Instructions for Metal Fixed-Pitch Propellers
- (5) Sensenich Troubleshooting Solving Aircraft/Engine/Propeller Performance Problems
- (6) Sensenich Troubleshooting Propeller Vibration Checklist

Project 1B Item 38. Install, troubleshoot, and remove propellers. (Level 3)

- (1) 14 CFR, Federal Aviation Regulations for Aviation Maintenance Technicians (Current Edition), Aviation Maintenance Technician Handbook Powerplant, Volume 2 (FAA-H-8083-32) Chapter 7
- (2) Avotek O-320 Test Stand
- (3) Sensenich Installation Instructions for Metal Fixed-Pitch Propellers
- (4) Sensenich Troubleshooting Solving Aircraft/Engine/Propeller Performance Problems
- (5) Sensenich Troubleshooting Propeller Vibration Checklist
- (6) McCauley Fixed Pitch Service Manual
- (7) McCauley Propeller Owner Information Manual
- (8) McCauley Service Bulletin 227B Prop Installation Mounting Torque and Service Letter 1949-4D Dynamic Balance and Vibration Troubleshooting
- (9) Lycoming Direct Drive Engine Overhaul Manual

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