

Comanche Aircraft Maintenance Condition Assessment Procedure

Tail Number: _____ Serial Number: _____ Date: _____

1. Roll aircraft into position. Measure LG strut extension. (should be 2.75")

NG _____ LMG _____ RMG _____

Using digital protractor measure vertical angle of main landing gear.

Left MLG Vertical Angle: _____ Right MLG Vertical Angle: _____ Required: 90 degrees

Open cowl.

Use feeler gage to determine gap of one steering roller to steering arm while the other roller is touching.

Gap _____

If roller gap is greater than 0.010 inches, use dial calipers to measure roller diameter.

Right Roller Dia. _____ Left Roller Dia. _____

Check freedom of rotation of rollers.

Notes _____

Reference PSCSM Sec's 2-30 to 2-35, 6-16. Refence PTCSM Sec's 2-34 to 2-36, 7-13

2. List number of tanks, capacity of each, number and type of valves, number of fuel gages.

Have owner open fuel cap doors. Note gasket condition, evidence of blue stains, signs of leakage

Have owner open fuel caps. Examine caps for operation and rubber hardness. Discuss need to tighten fuel caps sufficiently to prevent low pressure area on top of wing from leaking fuel out of loose caps and streaking back on wing.

Review that Twin Aux tank caps have a tendency for water intrusion/leaking because of vent location in neck.

Note results: _____

Discuss tank vents/ unvented caps/ using gasket plate adaptor and tubing on neck of tank, blow while O/P feels at vent under wing for free flow. Do not use compressed air on tanks. Discuss using bristle brush or wire to clear blocked vent or drain lines being careful to not introduce anything into tanks.

Discuss scupper drains. Use tubing inserted into scupper drain and blow while O/P feels for free flow at drain under wing.

Have owner measure and record fuel level in each tank.

Measured Quantity

Fuel Gage Reading

fuel sticks (empty a tank by transferring fuel, then incrementally refill at the fuel pump using the meter reading for volumes).

Have O/P sump each tank for 15 to 30 seconds into a container. While in cockpit, have O/P record fuel level gage quantity in each tank and compare to measured quantity. Evaluate and record ease of operation of fuel selector valve(s) and detents:

LM _____	_____
RM _____	_____
LA _____	_____
RA _____	_____
LTIP _____	_____
RTIP _____	_____

Discuss fuel level measurement options (calibrated fuel stick, Fuel Hawk, other)

Has O/P calibrated their dipstick? _____ If so, how? _____

Discuss methods for calibrating

Examine sumped sample for water and contaminants. Record results: _____

Discuss sampling / collecting options. Return uncontaminated fuel sample to a tank.

Three position fuel valves have a 400 hour or annually service requirement. Check logs for record of service.

Twins and 400's – AD 79-12-08 requires 50 hour inter-port leakage test, preflight sump draining per SL 851

AD 83-10-01 requires 50 hour selector valve strainer filter cleaning and placard requiring daily sump draining

AD 2015-24-05 requires placard warning loss of power if uncoordinated maneuvers w/ tanks less than ½ full

Reference PSCSM Sec's 2-49 to 2-51 and 8-10, and 8-14. Reference PTCSM Sec's 2-58 to 2-59. Reference S & T POH

Comanche Fuel Planning and Management

Discuss fuel planning and fuel management during flight

ALWAYS personally measure and record fuel level in each tank during preflight

ALWAYS sump each tank to check for water/contaminants and confirm fuel flows.

Piper OH advises use of aux and tip tanks only in level flight. Use fullest main tank for TO&L

Piper OH advises for maximum utilization, run tanks until dry. Has O/P run a tank dry? _____

If O/P wants to experience running a tank dry, do so safely, at altitude, with ample fuel. Estimate the time at which the tank will run dry, and be ready to select the next tank when engine burbles. If you start with a precise known fuel level in the tank, record the start time, record the tank dry time, and refill to precisely the same level after running the tank dry, you can calculate the fuel burn rate accurately.

Use a written fuel log to record starting times, fuel levels, expected burn time per tank, weight per tank, planned tank sequencing, time burned on each, etc. to keep track of where your remaining fuel is. See example Comanche Fuel log.

Suggest a simple fuel sequencing plan: Startup, taxi, runup and Take Off on LM. Once at cruise altitude, switch to Right Aux (or Right Tip if equipped). Alternate tanks from side to side to balance weight every 30 minutes or every hour. When Tip tanks are dry, switch to Aux tanks. When Aux tanks are dry, switch the Right Main. At top of descent for landing, switch to Left Main, which has probably 1.5 hours of fuel remaining.

Be conservative on fuel, plan to land with 1 hour remaining.

The three most useless things in Aviation: the runway behind you, the altitude above you, and the fuel you left on the fuel truck.

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3. Using tow bar, align rudder as follows: **Singles:** Rudder/Tail Cone aligned. **Twins:** Rudder 0.25" to right of Tail Cone.

Reference PSCSM Sec 6-16, 5-27 Reference PTCSM Sec 5-37

4. Level Control Wheels, install wood clamping device to control columns, install gust lock between copilot wheel and rudder pedals. Measure setting of aerodynamic control surfaces with digital protractor as follows:

Measure Angle of Aircraft at Leveling Screws: _____

Measure Angle of Right Aileron 6.5 inches from inboard edge next to rivets: _____ **Required:** 12 degrees

Measure Angle of Right Flap 23 inches from inboard edge next to rivets: _____ **Required:** 13 degrees

Measure Angle of Left Flap 23 inches from inboard edge next to rivets: _____ **Required:** 13 degrees

Measure Angle of Left Aileron 6.5 inches from inboard edge next to rivets: _____ **Required:** 12 degrees

Subtract Aircraft angle from measured control surface angles to obtain final surface settings:

Right Aileron: _____ **Left Aileron:** _____ **Right Flap:** _____ **Left Flap:** _____

Using Alignment Tool, drop plumb bob to aft edge of tire, determine offset: _____ **Required:** Centered

Remove wood control column clamping device and wheel/rudder pedal gust lock.

Reference PSCSM Sec 5-2, 5-4

Reference PTCSM Sec 5-2

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5. Remove aft fuselage access panel and observe stabilator and rudder cable movement, pulley rotation, and lubrication. Note results: _____

Measure elevator and rudder cable tension with tensiometer:

Aileron Cable Tension: _____ **Required:** 20 lbs+/- 20% **Recommended** 24 lbs minimum /26 lbs maximum

Stabilator Cable Tension: _____ **Required:** 18 lbs+/-20% **Recommended** 24 lbs minimum /28 lbs maximum

Stabilator Trim Tab Tension: _____ **Required:** 12 lbs+/-20% **Recommended** 14 lbs minimum /16 lbs maximum

Rudder Cable Tension: _____ **Required:** 25 lbs to 40 lbs **Recommended** 25 lbs to 40 lbs

Reference PSCSM Sec 5-3, 5-4 Table V-I Reference PTCSM Sec 5-3 Table V-I

6. Apply lifting and fore/aft forces to each stabilator and visually inspect integrity of all four torque tube bearing fittings for looseness of rivets or Hi-Shear rivets as appropriate for model. Note any findings (including satisfactory below)
Note if any Hi Shear Replacement Kits (760-835) Have been installed per SB411A

Notes: _____

Reference PSCSM Sec 4-16

Reference PTCSM Sec 4-48

7. Using steel fixture, clamp magnetic dial indicator to fixture, align dial indicator to aft edge of stabilator trim tab, and set dial to zero. Holding stabilator in the nose up position with left hand, determine total trim tab play using right hand.

Measured Trim Tab Play: _____ **Required:** Less than 0.076 inches **Recommended:** Less than 0.050 inches

Using flashlight, make visual inspection of trim drum play, rod-end play, and trim tab bushing / bolt play. **Check trim tab bolt/nut (Jesus Bolt/Nut) for proper lock nut assembly. 400's have castle nut/cotter pin.** Report findings:

Review results with Owner/Pilot. _____

Replace aft fuselage access panel using new 8-32 screws as required

Reference PSCSM Sec 4-50

Reference PTCSM Sec 4-48

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8. Inspect aft edge of rudder attachment fittings on vertical fin for cracks. Use stepladder to inspect rudder tip rib for movement and listen for possible cracks. Note findings below:

Notes: _____

9. Use wood sticks placed on main landing gear wheels centerlines, measure distance between sticks front and back side of tire. Measure tire diameter.

Tire Diameter: _____ Tire to Tire (Front Side) _____ Tire to Tire (Back Side) _____

Toe-In (Toe-Out) = $\arctan(\text{Front Side} - \text{Back Side}) / \text{Tire Diameter} =$ _____ Positive = Toe-Out, Negative = Toe-in

10. Attach Tail Stand (350 pounds for twins – 400 pounds for Singles) to tail tiedown fitting, install jacks at wing lifting points, and elevate aircraft evenly so that all wheels clear the surface: not too nose high. Verify that sufficient tail weight has been used to prevent aircraft from tipping towards nose. Jack aircraft to be level laterally with surface. Secure jacks with safety features to prevent accidental collapse. Connect Battery Charger and Clamp on amp meter. Remove bungee inspection panels.

Confirm bungees arms are down and in.

Reference PSCSM Sec 2-11

Reference PTCSM Sec 2-12

11. Have Owner in Left Seat. Owner to remove Emergency Gear Extension Access Door. Turn Master switch on.

Confirm Green Gear Down light _____ Turn Nav Lights on/off. Does Green Light Dim? _____

Using Gear switch, raise gear. Record retraction amperage _____

Note retraction time and gear transmission noise. _____

Check for Amber Gear Up light _____

Singles: Check Gear Horn with throttle retarded.

Twins: Either throttle retarded – Flashing Light, Both Throttles retarded - gear horn

Notes: _____

Confirm bungee rollers roll: Left bungee roller _____ Right bungee roller _____

Reference PSCSM Sec 6-63

Reference PTCSM Sec 7-33, 7-54

POH

12. Pull Gear Motor Circuit Breaker. Have a mechanic ready to prevent the gear from slamming down under the plane. Have the owner follow the Printed instructions on the Access Door and preform a manual gear extension.

Check boomerang links for straightness and cotter pins _____

Check transmission retract spring _____

Note ease of disconnect, full forward movement of release handle, effectiveness of spring to lift transmission, and completion of down travel by position of Emergency Landing Gear Handle and Green Gear Down light.

Pull throttle(s), Confirm Gear Horn is off. _____ Turn off Master Switch.

Notes: _____

Simulate in flight emergency extension by having Owner/Pilot use Emergency Gear Extension handle to partially retract gear. Have NLG mechanic apply "air pressure" load to front of nose wheel. Have Owner/Pilot use Emergency Gear Extension handle to force landing gear into fully down and locked position. Note and discuss airspeed, force required, and down and locked position of emergency gear extension handle.

Reference POH

13. If the Piper Landing Gear Emergency Extension Security System is installed, disable it for this test. Have Owner/Pilot use the Emergency Gear Extension Handle to partially raise gear and release while 3 mechanic/helpers observe synchronization of the three gear toggle linkages. All three gears should go into locked position simultaneously. With gear partially retracted, evaluate condition of all bushings, bolts, rod ends, springs, spring swivels, push pull conduits, linkages, wiring, switches, and bungee rollers for corrosion, wear, looseness, lubrication, and proper operation. Record observations:

Left Main Gear

Lower Drag Link Rod End to Strut Housing _____

Lower Drag Link to Upper Drag Link Connection _____

Upper Drag Link to Side-brace Stud Connection _____

Side-brace stud to side-brace mount connection _____

Conduit Rod End to Upper Drag Link Connection (nut to aft side) _____

Spring Swivel Rotation and Connection _____

LMG Spring to Strut Housing Bracket Clevis pin and Cotter _____

LMG Switch actuation after over-center _____

Wiring and Switches condition, and routing _____

Bungee roller rotation _____

Right Main Gear

Lower Drag Link Rod End to Strut Housing _____

Lower Drag Link to Upper Drag Link Connection _____

Upper Drag Link to Side-brace Stud Connection _____

Side-brace stud to side-brace mount connection _____

Conduit Rod End to Upper Drag Link Connection (nut to aft side) _____

Spring Swivel Rotation and Connection _____

RMG Spring to Strut Housing Bracket Clevis pin and Cotter _____

RMG Switch actuation after over-center _____

Wiring and Switches condition, and routing _____

Bungee roller rotation _____

Nose Gear

Lower Drag Link to Push-Pull Rod _____

Lower Drag Links to Engine Mount Bushing Connections _____

Lower Drag Link to Upper Drag Link Connections _____

Lower Drag Links to Upper Drag Links hit stops simultaneously _____

Upper Drag Link Connection NLG Strut Housing Connections _____

NLG Springs Connection and Condition _____

NLG Switch actuation after over-center _____

NLG Wiring and Switches condition, and routing _____

Cotter Pins, Safety Wires, Cleanliness, Lubrication, Other Notes _____

Attach magnetic base dial indicator to strut tube. Position dial indicator plunger vertically under toggle pivot point and zero. Use handheld digital force gage to apply vertical force under toggle pivot point. Record the force to produce 0.125 inch deflection of each main gear and 0.185 inch deflection of nose gear.

Caution: Do Not Exceed 80 pounds. Gear may be adjusted with excessive pre-load or steering rollers touching first.

Left Main Gear Preload: _____

Right Main Gear Preload: _____

Nose Gear Preload: _____

There is no Service Manual requirement, however, Recommended Load = 35 to 50 pounds each gear

Reference PSCSM Sec 6-13, 6-15, 6-32, 6-34 Reference PTCSM Sec 7-39

14. Buckle both rear seat belts. Position the 2 by 2 wood stud across the rear seats secured by the seat belts. Anchor the long end of the ratchet strap to the 2 by 2 wood. Attach the ratchet end of the strap to the Emergency Gear Handle.

If the Piper Landing Gear Emergency Extension Security System is installed, disable it for this test.

Pull Landing Gear Motor circuit breaker. Turn Master switch on. Use ratchet to pull Emergency Gear Handle just until Green Gear Down Light goes off. Attempt to retract each gear assembly by pushing on the tire. Record results.

LMG Retraction Test _____ **RMG Retraction Test** _____ **NG retraction Test** _____

Requirement: Landing gear shall not retract or unlock from the link over-center position

Turn off Master Switch.

Reference PSCSM Sec 6-53 Reference PTCSM Sec 7-44

15. Have Gear Motor Circuit Breaker disconnected. Partially retract gear with emergency extension handle. Install torque wrench adapter tool and torque wrench aligning with centerline of retraction torque tube. Turn on Master Switch and slowly pull aft on the torque wrench to retract gear until Amber Gear Up light comes on. Record torque reading and compare to Maximum Value per Table VI-I. Turn Master Switch **OFF**

Measured Torque Value _____

Table VI-I Maximum Value _____

Reference PSCSM Sec 6-58

Reference PTCSM Sec 7-49

16. Measure Main Gear and Nose Gear side load and fore/aft load play. If gear play is found indicate which items exhibit the motion. Rotate wheels and check for bearing noise and smoothness. Visual check of brake pad thickness and disk for wear.

LMG Play _____ Upper L Torque Link Play _____ Middle L Torque Link Play _____
Lower L Torque Link Play _____ L Wheel Bearing Play _____ LMG Brake Pads _____
LMG Disk Wear _____

RMG Play _____ Upper R Torque Link Play _____ Middle R Torque Link Play _____
Lower R Torque Link Play _____ R Wheel Bearing Play _____ RMG Brake Pads _____
RMG Disk Wear _____

Nose Gear Play _____ Upper NG Torque Link Play _____ Middle NG Torque Link Play _____
Lower NG Torque Link Play _____ Nose Wheel Bearing Play _____
Nose LG Turn Stops _____

Reference PSCSM Sec 6

Reference PTCSM Sec 7

17. Inspect Main Gear Strut Housing for cracks on rear web, especially examine near screw hole in web. Note if web is rough cut or polished. Advise that bracket/ bolt has to be removed to check chamfer on hole.

Left Main Gear Strut Housing _____

Right Main Gear Strut Housing _____

18. To reconnect Landing Gear Motor Transmission, reconnect Gear Motor Circuit Breaker, select Gear switch Down, turn Master switch on, check that Green Gear Down Light is ON. Pull back on Emergency Gear Handle to run motor to retract the jackscrew to a convenient position, then release Emergency Gear Handle to stop motor. Turn Master Switch off. Raise the Red Release handle to open the jackscrew coupling. Pull back on the Emergency Gear Handle to align the jackscrew coupling with the cross pin in the torque arm linkage and engage the coupling. Lock the Red Release Handle down to secure the coupling to the cross pin. With the gear partially retracted, pull/push on the Emergency Gear Handle to evaluate transmission end play. End play should not exceed 0.015 inch.

Note Brand of Transmission: Dura _____ Dukes _____

Transmission End Play Notes:

Reference PSCSM Sec 6-44

Reference PTCSM Sec 7-35

19. Check that everyone and everything is clear of the landing gear. Select Gear Switch Down. Turn Master Switch On and check that Green Gear Light comes on when gear is down and locked. Raise gear to full up position, checking for Amber Gear-Up Light and Gear Horn operation with throttle(s) pulled. Turn Master Switch **OFF**

Gear Horn Operation _____ **Amber Gear Up Light** _____

20. Check fit of wheel in wheel well. Gear should be snug against rubber stop pad in wheel well.

RMG Retract Position _____ **LMG Retract Position** _____ **NG Retract Position** _____

Reference PSCSM Sec 6-57 Reference PTCSM Sec 7-48

21. Measure Main Gear Door Pre-Load with the landing gear in the retracted position. Use a full width small wood stick on the inside of door, a small stick on the outside of door and clamp together at the center of the door with a small C clamp. Hang a 9 pound weight from the C clamp (or apply 9 pounds down pull with the digital force gage). Measure the gear door deflection at the leading edge.

LMG Door Deflection: _____ **Requirement: 0.125 inches**

RMG Door Deflection: _____ **Requirement: 0.125 inches**

Inspect Nose Gear Door for snug fit, hinge looseness, and centering on fuselage: _____

Reference PSCSM Sec 6-39 Reference PTCSM Sec 7-30

22. Final System Check

Turn Master Switch On

Pull Throttle(s) fully to idle. Confirm Gear Warning Horn operates _____

Place Gear Selector Switch Down to extend gear.

Record Gear Motor Amperage during extension _____

Confirm Green Gear Down Light _____

Use a floor jack to compress Left Main Gear Strut 0.75 inches. Landing Gear Safety Squat Switch on Left Main Gear should prevent gear from retracting. Confirm Squat Switch function by selecting Gear Up on Landing Gear Selector Switch.

Requirement: Gear should not retract when strut is >0.75 inches from full extension _____

Turn Master Switch Off. Remove floor jack. Place Gear selector Switch in Gear Down Position. Turn Master Switch ON. Confirm Green Gear Down Light is ON _____

Confirm Gear Warning Horn is OFF with throttle(s) retracted _____

Turn Off Master Switch.

