www.commerciallevel.com

Operations Manual

PA28R-200 Arrow II

TAXI, TAKEOFF, CLIMB, CRUISE, DESCENT & LANDING

Commercial Level Simulations

Disclaimer

This manual is not provided from, endorsed by, affiliated with, nor supported by the New Piper Aircraft, Inc., Lycoming Engines, or any other parts or equipment vendor in any way.

All copyrights remain the property of their respective owners.

The CLS aircraft, manuals, and procedures are not intended for training purposes or real world flight.

The procedures contained within are the Commercial Level Simulations interpretation of generic flight operations. These procedures are not always accurate in all situations.

CLS assumes no liability for any incorrect information.

The purpose of the manual is not to claim ownership of any content herein, rather, to show flight operations and performance of the PA28R based on available public information.

Commercial Level Simulations aircraft are intended as an add-on for Microsoft Flight Simulator 2004 and Flight Simulator X.

Commercial Level Simulations – PA28R Arrow II
Version 2007.1.0

The visual model, 2D panel, virtual cockpit, virtual cabin, flight dynamics, and graphic art textures are based on photos, data currently obtainable from the internet, the FAA, and aircraft manuals.

Preface

This manual serves as a reference for operating procedures and training maneuvers. The flight profiles show the basic recommended configuration during flight.

The maneuvers should normally be accomplished as illustrated. However, due to airport traffic, ATC distance separation requirements, and radar vectoring, modifications may be necessary.

Exercise good judgment.

Introduction

The Piper PA-28 Cherokee is a series of Light Four Seated Aircraft. The first production received its FAA certificate in 1960. It began its life journey as retractable undercarriage variants.

In 1967 Piper first introduced PA-28R-180 Cherokee Arrow which featured a constant speed propeller and retractable landing gear. The engine was powered by 180 Horsepower Lycoming O-360 engines. The engines was later upgraded to 200 Horsepower, eventually in 1969 the designation of the aircraft was changed to PA-28R-200.

Changes to the design included the same 12.7cm stretched fuselage that was introduced on the Cherokee Challenger and Cherokee Charger. With greater rear legroom and more baggage capacity, it is larger than its predecessors and a larger horizontal tail and dorsal fin fillet.

All series of Piper Cherokee family are all-metal, unpressurized, single engine Piston powered aircraft wit a low mounted wings and tricycle landing gear.

Piper designed the PA-28 to compete with the Cessna popular 172 Series. The Piper is very popular for Flight Training and is used worldwide.

PA28R - PRINCIPLE DIMENSION AND AREAS

Specifications
Fuel Capacity: 72 gal/182 l
Stall Speed: 53 kts (dirty)
Max TAS: 145 kts
Cruise TAS: 137 kts (75% power)
Cruise Range: 880 nm/1630 km (with 45 min reserve)

Service Ceiling: 16,200 ft (100 fpm)/3,353 m
Rate of Climb: 649 fpm

Takeoff
Typical Takeoff VR – 60 knots
Typical Takeoff V2 / Climb speed – 85 knots
Ground Roll: 1065 ft
Over 50ft Obstacle: 1760 f

Engine
Manufacturer Lycoming
Model IO-360-C1C6
Horsepower 200 hp
Num of Cylinders 4

Dimensions
Wing Span 35.4 ft/10.8 m
Length 24.7 ft/ 7.5 m
Height 7.9 ft/ 2.4 m
Wing Area 170 ft sq/15.79 m sq

Max TOW 2750 lbs/1247 kg
Stand Empty Equip Weight 1336 lbs/607 kg
Useful Load 967 lbs/438 kg

Typical Landing Speed – 80 knots

Panel Description

Piper PA28 Panel Description

Main Panel

1. Clock
2. Indicated Airspeed
3. Attitude Indicator
4. Altimeter
5. VOR1 Indicator
6. ADF1
7. Turn Coordinator
8. Aircraft Turning Angle Indicator
9. Vertical Speed Indicator
10. VOR2 Indicator
11. Parking Brake
12. Avionics Master Switch
13. NAV/GPS Switch
14. Simicons (Checklist - Map - GPS)
15. Autopilot Panel
16. Radio Stack
17. Aircraft Lights Control
18. Fuel Panel
19. Panel Switch (Secondary)
20. Compass

Secondary Panel

21. Elevator Trim
22. Flaps Lever
23. Gear Knob
24. Throttle
25. Engine Indicators
26. Panel Switch (Main)
27. Indicators

Notes

Click on panel switch icon (19) on the Main Panel, the Secondary Panel will appear on top of the red border highlighted area.

Click on the panel switch icon (26) on the Secondary Panel, the Main Panel will appear on the red border highlighted area.

TAXI

1) Prior to taxi, select the flight plan in accordance with the aircraft range.

2) Determine the aircraft required runway takeoff length for the trip gross weight. **<NOTE:> At Maximum Takeoff Weight, the PA-28R requires 1,065 FT runway at sea level.**

3) Determine the aircraft reference speeds. These speeds are based on runway length and aircraft weight. **CLS recommended takeoff flap setting is T/O -- Position 1:**

4) The rudder movement and the engine thrust are used to taxi the airplane.

5) Make sure you have the necessary clearance when you go near a parked airplane or other structures.

6) Set takeoff flaps to T/O position -- Position 1.

7) The taxi speed must not be more than approximately 20 knots. Speeds more than 20 knots added to long taxi distances would cause heat to collect in the tires. Recommended speed is 10 knots. Beware of changing GS numbers due to tailwinds or headwinds during taxi.

8) Before making a turn, decrease the speed of the airplane to a speed of approximately 8 to 12 knots. Make all turns at a slow taxi speed to prevent tire skids.

9) When it is possible, complete the taxi in a straight-line roll for a minimum of 5 feet.

10) NOTE: This will remove the tensional stresses in the landing gear components, and in the tires.

11) Monitor the wingtips and the horizontal stabilizer carefully for clearance with buildings, equipment, and other airplanes.

12) When a left or right engine is used to help make a turn, use only the minimum power possible.

13) Do not let the airplane stop during a turn.

14) Do not use the brakes to help during a turn. When you use the brakes during a turn, they will cause the main and nose landing gear tires to wear.

15) Use the airspeed indicator to monitor the taxi speed.

16) If the airplane taxi speed is too fast (with the engines at idle), operate the brakes slowly and smoothly for a short time. NOTE: This will decrease the taxi speed.

17) If the taxi speed increases again, operate the brakes as you did in the step before.

18) Always use the largest radius possible when you turn the airplane. NOTE: This will decrease the side loads on the landing gear, and the tire wear will be decreased.

19) Operate the brakes to stop the airplane. Set the parking brake after the airplane has stopped.

TAKEOFF

1) Align aircraft with runway centerline.

2) Prior to takeoff, increase engine power to 1000 RPM, and monitor for engine problems.

3) Verify that engine power, fuel pressure, oil pressure, and vacuum have stabilized.

4) For takeoff, increase power smoothly to engine **full power**.

5) At Vr, smoothly rotate aircraft 5 degrees upwards at a pitch rate of 2 – 3 degrees per second.

6) Hold nose at 650 feet per minute after positive rate of climb is confirmed, then raise landing gear after altitude indicator shows climb.

7) Set initial climbout speed to a minimum of 85 KTS, 650 fpm climb.

8) For full maneuverability beneath 10,000 FT, flaps must be fully retracted with aircraft at minimum safe airspeed.

CLIMB

1) Normal climb power set to 2500 RPM, with mixture at full rich. Once climb throttle is set, the autopilot will compensate for environmental condition changes automatically during the climb.

2) It is recommended that the aircraft be flown manually up at low altitude, weather and ATC traffic conditions permitting. However, in high traffic conditions, to easy the workload of the pilot, the autopilot altitude intervention may be engaged above a minimum altitude of 80 FT with the landing gear up.

3) For **enroute climb**, climb at a rate of 600 - 1000 FPM, pursuant to ATC and traffic conditions. If there are no altitude or airspeed restrictions, accelerate to cruise speed. The sooner the aircraft can be accelerated to the proper climb speed, the more fuel and time efficient the flight.

4) As **engine and pitot** may occur during the climb and descent, the carburetor and pitot anti-icing heat system should be in the ON position whenever icing is possible. NOTE: Failure to do so may result in engine stall, overheating, or engine damage.

5) Set **standard barometer** above airport transition level (depends on local airport geography).

CRUISE

1) **Cruise** at 120 knots true air speed (normal cruise), 145 knots true air speed (max cruise).

2) **Step climb** typically in 2000 FT minimum intervals, minimum 100 FPM climb.

3) **Headwinds** will increase engine power, reduce cruise speed and decrease range.

4) **Tailwinds** will decrease engine power, increase cruise speed and increase range.

5) Follow previously entered **waypoints** if necessary.

6) **Fuel Freeze --** Extended operation at cruise altitude will lower fuel temperature. Fuel cools at a rate of 3 degrees C per hour, with a max of 12 degrees C in extreme conditions. Fuel temperatures tend to follow TAT (total air temperature). To raise fuel temperature/TAT, a combination of factors can be employed:

   - Descend into warmer air.
   - Deviate to warmer air.
   - Increase Mach speed.

   An increase of 0.01 MACH will increase TAT by 0.5 – 0.7 degrees C.

7) **Increased fuel burn** can result from:
   - High TAT
   - Lower cruiser altitude than originally planned.
   - More than 2,000 FT above the optimum calculated altitude.
   - Speed faster or slower than 111 - 137 KTAS cruise.
   - Strong headwind.
   - Unbalanced fuel.
   - Improper aircraft trim.

8) **Fuel penalties** are:

   - 2000 FT above optimum – 3 percent increase in fuel usage
   - 4000 FT below optimum – 5 percent increase in fuel usage
   - Higher climb rates over 1000 FPM – increased fuel usage

9) **While performing step climb cruise, select the optimum altitude** for the aircraft weight, outside air temperature, and wind conditions (conversion key: 1 LB = 2.2 KG):

10) Trim aircraft for proper elevator alignment.

11) In case of engine out cruise, trim rudder for directional alignment.

12) Deviate from flight plan for weather, turbulence, or traffic as necessary after receiving clearance from ATC.

DESCENT & LANDING

1) Descent at pre-determined TOD (Top of Decent)

2) Descend at no more than 145 knots.

3) Proper descent planning is necessary to ensure proper speed and altitude at the arrival point. Distance required for descent is 3NM/1000FT.

4) Plan to descend so that aircraft is at approximately 10,000 FT above ground level, less than 250 KTS, 30 miles from airport.

5) Set airport altimeter below transition level.

6) Avoid using the landing gear for drag to avoid damage to doors or passenger discomfort due to buffeting.

7) **Stall recovery** can be accomplished by lowering the aircraft's nose and increasing power at once to gain airspeed. Beware of terrain. Do not retract gear until confirmed stall recovery and positive rate of climb. Keep nose at 5 degrees above the horizon or less.

8) If deployed, do not retract flaps during the recovery, as it will result in altitude loss.

9) **Visual Approach** - The aircraft must be stabilized by 500 feet above field level.

10) For **wind correction**, add ½ the steady state wind plus all of the gust factor to the Vref. When landing in a crosswind, do not bank excessively as wingtip or engine pod strike may occur.

11) Always land at flaps position 3 - Full flaps down, 85 knots, plus wind component.

12) Land the aircraft.

13) Turn off onto high-speed taxiways at 30 knots or less.

14) Decelerate to 8 – 12 knots for 90 degree turns.

15) Taxi to the general aviation ramp.

Commercial Level Simulations

PA28R-200 Arrow II – Frequently Asked Questions

Q) How to I adjust engine and prop speed?

A) The Arrow has a constant speed prop, similar to an automatic transmission on car. Adjust the engine RPMs using the throttle, prop adjustment level, and rich/lean fuel mixture.

Q) The plane has a tendency to bank left depending on throttle position. Why?

A) The torque of the engine spinning right will cause the body to torque to the left. The dihedral effect will keep the wings level, or adjust as necessary.

Q) How do I get to my max altitude of 16,200 ft?

A) Climb at lower altitudes can range from 1000 down to 300 fpm. Climb to final max altitude will require 100 fpm climb.

Commercial Level Simulations

PA28R-200 Arrow II – Frequently Asked Questions – Continue….

Q) Does the Arrow have popup spoilers or autobraking?

A) No. To stop the airplane on the ground, use the toe brakes / wheel brakes.

Q) I can't get to my cruise speed of 120 KIAS, or max cruise speed of 145 KIAS. What's wrong?

A) Specifications for the Arrow are listed as Knots *True* Air Speed, not indicated air speed.

Q) Where is the flap lever?

A) In the VC, it is between the seats. Pull up to deploy flaps down. For the 2D panel, click the lower panel icon on the lower left side of the panel to reach the additional gauges and flap lever.

Q) Where is the trim wheel?

A) In the VC, it is between the seats. On the 2D panel, it is on the lower panel. Again, click the lower panel icon on the lower left side of the 2D panel.

Q) The CLS Arrow doesn't "flap" around like most flight simulator aircraft. When I turn the yoke, or pull the yoke, there is a slight delay, then I must compensate to fly. Why is this?

A) The FDE author has 140 flight hours in the Piper Arrow and Cherokee. This is how the mass and inertia feels for the aircraft. With practice, you will fly like a champ.

Q) How do I view my Arrow checklist in the flight simulator?

A) Be sure to select your checklist from the flight simulator pull down menu or icon.

Commercial Level Simulations
Piper Pa28R-200 Arrow II

CHECKLIST

BEFORE STARTING ENGINE

[ ] Seat and Seat-Belts
[ ] Electrical Equipment -- OFF
[ ] Avionics -- OFF
[ ] Speed Brake -- SET

ENGINE START

[ ] Master Switch -- ON
[ ] Fuel Quantity -- CHECK
[ ] Rotating Beacon -- ON
[ ] Fuel Selector Valve -- FULLEST TANK
[ ] Throttle -- OPEN 1.5 CM
[ ] Mixture -- RICH
[ ] Fuel Pump -- ON
[ ] Propeller Area -- CLEAR
[ ] Magnetos -- LEFT then BOTH
[ ] Ignition Switch -- "START"
[ ] Oil Pressure -- CHECK
[ ] Throttle -- 1000 RPM
[ ] Fuel Pump -- OFF
[ ] Nav Lights -- ON as required
[ ] Flight Controls -- FREE AND CORRECT

BEFORE TAKEOFF

[ ] Speed Brake -- SET
[ ] Throttle -- 1800 RPM
[ ] Magnetos -- CHECK
[ ] Suction -- 4 - 6 (5) in.
[ ] Carb heat -- ON (check for RPM drop)
[ ] Engine Instruments and Ammeter -- CHECK
[ ] Throttle -- 1000 RPM
[ ] Radios and Avionics -- SET
[ ] Elevator Trim -- SET for takeoff
[ ] Flaps -- SET for takeoff (0-10 degrees)
[ ] Fuel Selector Valve -- L/R then FULLEST TANK
[ ] Fuel Pump -- ON
[ ] Flight Instruments -- CHECK and SET
[ ] Pitot Heat -- AS DESIRED

TAKEOFF

[ ] Throttle -- FULL
[ ] Elevator Control -- LIFT NOSE WHEEL (at 60 KIAS)
[ ] Normal Take-Off Climb Speed -- 85 KIAS (flaps 0 degrees)
[ ] Flaps -- RETRACT
[ ] Power -- 2500 RPM,25 MP
[ ] Engine Instruments -- CHECK
[ ] Fuel Pump -- OFF

CLIMB

NORMAL CLIMB

[ ] Mixture -- FULL RICH
[ ] Power -- 2500 RPM,25 MP
[ ] Airspeed -- 85 KIAS
[ ] Pitot Heat -- AS DESIRED

CRUISE

[ ] Power -- 2300 RPM,22-23 MP (List)
[ ] Mixture -- LEAN (FF 8-10)
[ ] Elevator Trim -- ADJUST

DESCENT

[ ] Mixture -- RICH
[ ] Power -- 2300 RPM,15-17 MP (List)

BEFORE LANDING

[ ] Mixture -- FULL RICH
[ ] Fuel Pump -- ON
[ ] Fuel Selector Valve -- FULLEST TANK
[ ] Power -- 2300 RPM,15-18 MP
[ ] Prop Controls -- 2600 RPM
[ ] Gear -- DOWN < 130 KIAS
[ ] Flaps -- AS DESIRED < 100 KIAS
[ ] Landing Lights -- ON
[ ] Airspeed -- 80 KIAS

NORMAL LANDING

[ ] Touchdown -- MAIN WHEELS FIRST
[ ] Landing Roll -- LOWER NOSE WHEEL GENTLY
[ ] Braking -- MINIMUM REQUIRED

AFTER LANDING / SECURING AIRPLANE

[ ] Flaps -- UP
[ ] Pitot Heat -- OFF
[ ] Fuel Pump -- OFF
[ ] Speed Brake -- SET
[ ] Throttle -- IDLE
[ ] Avionics -- OFF
[ ] Mixture -- IDLE CUT-OFF
[ ] Magnetos -- OFF
[ ] Rotating Beacon -- ON
[ ] Nav Lights -- OFF
[ ] Master Switch -- OFF

--- **EMERGENCY CHECKLIST** ---

[ ] Speed -- 95 KIAS
[ ] Fuel Selector Valve -- CHANGE
[ ] Auxiliary Fuel Pump -- ON
[ ] Alt.Air -- OPEN
[ ] Mixture -- RICH
[ ] Magnetos – CHECK

For support or questions, please visit our forum at:

www.CommercialLevel.com

From the CLS Staff

Thank you for purchasing a CLS product!!!