

SECTION 4

NORMAL PROCEDURES

4.1 GENERAL

This section describes the recommended procedures for the conduct of normal operations for the Arrow IV. All of the required (FAA regulations) procedures and those necessary for the operation of the airplane as determined by the operating and design features of the airplane are presented.

Normal procedures associated with those optional systems and equipment which require handbook supplements are provided by Section 9 (Supplements).

These procedures are provided to present a source of reference and review and to supply information on procedures which are not the same for all aircraft. Pilots should familiarize themselves with the procedures given in this section in order to become proficient in the normal operations of the airplane.

The first portion of this section consists of a short form check list which supplies an action sequence for normal operations with little emphasis on the operation of the systems.

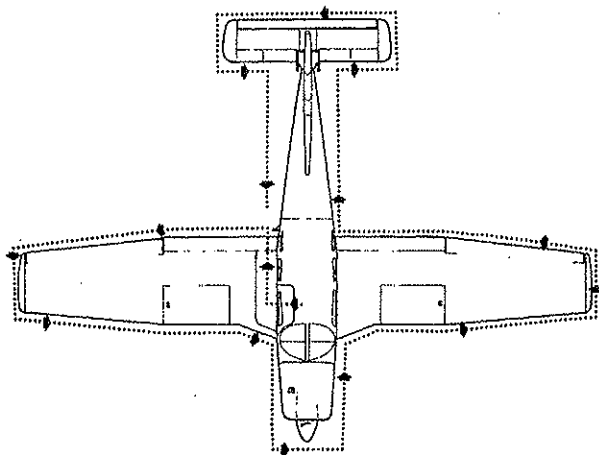
The remainder of the section is devoted to amplified normal procedures which provide detailed information and explanations of the procedures and how to perform them. This portion of the section is not intended for use as an in-flight reference due to the lengthy explanations. The short form check list should be used for this purpose.

4.3 AIRSPEEDS FOR SAFE OPERATIONS

The following airspeeds are those which are significant to the safe operation of the airplane. These figures are for standard airplanes flown at gross weight under standard conditions at sea level.

Performance for a specific airplane may vary from published figures depending upon the equipment installed, the condition of the engine, airplane and equipment, atmospheric conditions and piloting technique.

- | | |
|--|----------|
| (a) Best Rate of Climb Speed | |
| gear up, flaps up | 87 KIAS |
| gear down, flaps up | 76 KIAS |
| (b) Best Angle of Climb Speed | |
| gear up, flaps up | 77 KIAS |
| gear down, flaps up | 70 KIAS |
| (c) Turbulent Air Operating Speed (See Subsection 2.3) | 121 KIAS |
| (d) Maximum Flap Speed | 108 KIAS |
| (e) Landing Final Approach Speed (Full 40°) | 74 KIAS |
| (f) Maximum Demonstrated Crosswind Velocity | 17 KTS |



WALK-AROUND
Figure 4-1

4.5 NORMAL PROCEDURES CHECK LIST

PREFLIGHT CHECK

COCKPIT

Control wheel	release restraints
Avionics	OFF
Parking brake	set
All switches	OFF
Mixture	idle cut-off
Master switch	ON
Fuel gauges	check quantity
Annunciator panel	check
Master switch	OFF
Primary flight controls	proper operation
Flaps	proper operation
Trim	neutral
Pitot and static systems	drain
Windows	check clean

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Required papers check on board
Tow bar and baggage stow properly - secure
Baggage door close and secure

RIGHT WING

Surface condition clear of ice, frost, snow
Flap and hinges check
Aileron and hinges check
Wing tip and lights check
Fuel tank check supply
visually - secure cap
Fuel tank vent clear
Fuel tank sump drain
Tie down and chock remove
Main gear strut proper
inflation (2.5 + .25 in.)
Tire check
Brake block and disc check
Fresh air inlet clear

NOSE SECTION

General condition check
Cowling secure
Windshield clean
Propeller and spinner check
Air inlets clear
Alternator belt check tension
Chock remove
Nose gear strut proper
inflation (2.75 + .25 in.)
Nose wheel tire : check
Engine baffle seals check
Oil check quantity
Dipstick properly seated
Fuel strainer drain

LEFT WING

Surface condition clear of ice, frost, snow
Fresh air inlet clear

Chock	remove
Main gear strut	proper inflation (2.5 ± .25 in.)
Tire	check
Brake block and disc	check
Fuel tank	check supply visually - secure cap
Fuel tank vent	clear
Fuel tank sump	drain
Tie down	remove
Pitot/static head	remove cover - holes clear
Wing tip and lights	check
Aileron and hinges	check
Flap and hinges	check

FUSELAGE

Antennas	check
Empennage	clear of ice, frost, snow
Fresh air inlet	clear
Stabilator and trim tab	check
Tie down	remove
Master switch	ON
Cockpit lighting	check
Nav and strobe lights	check
Stall warning	check
Pitot heat	check
All switches	OFF
Passengers	board
Cabin door	close and secure
Seat belts and harness	fasten/adjust check inertia reel

BEFORE STARTING ENGINE

Brakes	set
Propeller	full INCREASE rpm
Fuel selector	desired tank
Alternate air	OFF
Radios	OFF

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Air conditioner check
Annunciator panel press-to-test
Propeller exercise - then full INCREASE
Alternate air check
Engine is warm for takeoff when throttle can be opened without engine faltering.
Electric fuel pump OFF
Fuel pressure check
Throttle retard

BEFORE TAKEOFF

Master switch ON
Flight instruments check
Fuel selector proper tank
Electric fuel pump ON
Engine gauges check
Alternate air CLOSED
Seat backs erect
Mixture set
Prop set
Belts/harness fastened/adjusted
Empty seats seat belts snugly fastened
Flaps set
Trim tab set
Controls free
Doors latched
Air conditioner OFF

TAKEOFF

NORMAL

Flaps set
Tab set
Accelerate to 65 to 75 KIAS.
Control wheel back pressure to rotate to climb attitude

SHORT FIELD, OBSTACLE CLEARANCE

- Flaps 25° (second notch)
Accelerate to 50 to 60 KIAS depending on aircraft weight.
Control wheel back pressure to
rotate to climb attitude
After breaking ground, accelerate to 55 to 65 KIAS depending on aircraft weight.
Gear (override engaged on aircraft equipped with backup gear extender) UP
Accelerate to best flaps up angle of climb speed - 77 KIAS, slowly retract the flaps and climb past the obstacle.
Accelerate to best flaps up rate of climb speed - 87 KIAS.

SOFT FIELD

- Flaps 25° (second notch)
Accelerate to 50 to 60 KIAS depending on aircraft weight.
Control wheel back pressure to
rotate to climb attitude
After breaking ground, accelerate to 55 to 65 KIAS depending on aircraft weight.
Gear (override engaged on aircraft equipped with backup gear extender) UP
Accelerate to best flaps up rate of climb speed 87 KIAS.
Flaps retract slowly

CLIMB

- Best rate (2750 lb.)(gear up)
(flaps up) 87 KIAS
Best rate (2750 lb.)(gear down)
(flaps up) 76 KIAS
Best angle (2750 lb.)(gear up)
(flaps up) 77 KIAS
Best angle (2750 lb.)(gear down)
(flaps up) 70 KIAS
En route 104 KIAS
Electric fuel pump OFF at desired altitude

CRUISING

Reference, performance charts, Avco-Lycoming Operator's Manual and power setting table.

Normal max power 75%
Power set per power table
Mixture adjust

APPROACH AND LANDING

Fuel selector proper tank
Seat backs erect
Belts/harness fasten/adjust
Electric fuel pump ON
Mixture set
Propeller set
Gear down - 130 KIAS max
Flaps set - 108 KIAS max
Air conditioner OFF
Trim to 75 KIAS

STOPPING ENGINE

Flaps retract
Electric fuel pump OFF
Air conditioner OFF
Radios OFF
Propeller full INCREASE
Throttle full aft
Mixture idle cut-off
Magnetos OFF
Master switch OFF

PARKING

Parking brake set
Control wheel secured with belts
Flaps full up
Wheel chocks in place
Tie downs secure

4.7 AMPLIFIED NORMAL PROCEDURES (GENERAL)

The following paragraphs are provided to supply detailed information and explanations of the normal procedures necessary for operation of the airplane.

4.9 PREFLIGHT CHECK

The airplane should be given a thorough preflight and walk-around check. The preflight should include a check of the airplane's operational status, computation of weight and C.G. limits, takeoff and landing distances, and in-flight performance. A weather briefing should be obtained for the intended flight path, and any other factors relating to a safe flight should be checked before takeoff.

CAUTION

The flap position should be noted before boarding the airplane. The flaps must be placed in the UP position before they will lock and support weight on the step.

COCKPIT

Upon entering the cockpit, release the seat belts securing the control wheel, turn OFF all avionics equipment and set the parking brake. Insure that all electrical switches and the magneto switch are OFF and the mixture is in idle cut-off. Turn ON the master switch, check the fuel quantity gauges for adequate supply and check that the annunciator panel illuminates. Turn OFF the master switch. Check the primary flight controls and flaps for proper operation and set the trim to neutral. Open the pitot and static drains to remove any moisture that has accumulated in the lines. Check the windows for cleanliness and that the required papers are on board. Properly stow the tow bar and baggage and secure. Close and secure the baggage door.

RIGHT WING

Begin the walk-around at the trailing edge of the right wing by checking that the wing surface and control surfaces are clear of ice, frost, snow or other extraneous substances. Check the flap, aileron and hinges for damage and operational interference. Static wicks should be firmly attached and in good condition. Check the wing tip and lights for damage.

Open the fuel cap and visually check the fuel color and the quantity should match the indication that was on the fuel quantity gauge, replace cap securely. The fuel tank vent should be clear of obstructions.

Drain the fuel tank through the quick drain located at the lower inboard rear corner of the tank, making sure that enough fuel has been drained to insure that all water and sediment is removed. The fuel system should be drained daily prior to the first flight and after each refueling.

CAUTION

When draining any amount of fuel, care should be taken to insure that no fire hazard exists before starting engine.

Remove the tie down and chock.

Next, a complete check of the landing gear. Check the gear strut for proper inflation, there should be $2.5 \pm .25$ inches of strut exposure under a normal static load. Check the tire for cuts, wear, and proper inflation. Make a visual check of the brake block and disc.

Check that the fresh air inlet is clear of foreign matter.

NOSE SECTION

Check the general condition of the nose section, look for oil or fluid leakage and that the cowling is secure. Check the windshield and clean if necessary. The propeller and spinner should be checked for detrimental nicks, cracks, or other defects. The air inlets should be clear of obstructions and check the alternator belt for proper tension. The landing light should be clean and intact.

Remove the chock and check the nose gear strut for proper inflation, there should be $2.75 \pm .25$ inches of strut exposure under a normal static load. Check the tire for cuts, wear, and proper inflation. Check the engine baffle seals. Check the oil level, make sure that the dipstick has been properly seated.

Open the fuel strainer located on the left side of the firewall long enough to remove any accumulation of water and sediment.

LEFT WING

The wing surface should be clear of ice, frost, snow, or other extraneous substances. Check that the fresh air inlet is clear of foreign matter and remove the chock. Check the main gear strut for proper inflation, there should be $2.5 \pm .25$ inches of strut exposure under a normal static load. Check the tire and the brake block and disc.

Open the fuel cap and visually check the fuel color. The quantity should match the indication on the fuel quantity gauge. Replace cap securely. The fuel tank vent should be clear of obstructions. Drain enough fuel to insure that all water and sediment has been removed.

Remove tie down and remove the cover from the pitot/static head on the underside of the wing. Make sure the holes are open and clear of obstructions. Check the wing tip and lights for damage. Check the aileron, flap, and hinges for damage and operational interference and that the static wicks are firmly attached and in good condition.

FUSELAGE

Check the condition and security of the antennas. The empennage should be clear of ice, frost, snow, or other extraneous substances, and the fresh air inlet at the top of the fin should be clear of foreign matter. Check the stabilator and trim tab for damage and operational interference. The trim tab should move in the same direction as stabilator. Remove the tie down.

Upon returning to the cockpit, an operational check of the interior lights, exterior lights, stall warning system, and pitot heat should now be made. Turn the master switch and the appropriate switches ON. Check the panel lighting and the overhead flood light. Visually confirm that exterior lights are operational. Lift the stall detector on the leading edge of the left wing and determine that the warning horn is activated. With the pitot heat switch ON the pitot head will be hot to the touch. After these checks are complete the master switch and all electrical switches should be turned OFF.

Board the passengers and close and secure the cabin door. Fasten the seat belts and shoulder harness. Fasten seat belts on empty seats.

NOTE

If the fixed shoulder harness (non-inertia reel type) is installed, it must be connected to the seat belt and adjusted to allow proper accessibility to all controls including fuel selector, flaps, trim, etc. while maintaining adequate restraint for the occupant.

If the inertia reel type shoulder harness is installed, a pull test of its locking restraint feature should be performed.

4.11 BEFORE STARTING ENGINE

Before starting the engine the brakes should be set ON and the propeller lever moved to the full INCREASE rpm position. The fuel selector should then be moved to the desired tank. Check to make sure that all the radios are OFF.

4.13 STARTING ENGINE

(a) Starting Engine When Cold

Open the throttle lever approximately 1/2 inch. Turn ON the master switch and the electric fuel pump. Move the mixture control to full RICH until an indication is noted on the fuel flow meter. The engine is now primed.

Move the mixture control to idle cut-off and engage the starter by rotating the magneto switch clockwise. When the engine fires, release the magneto switch, advance the mixture control to full RICH and move the throttle to the desired setting.

If the engine does not fire within five to ten seconds, disengage the starter and reprime.

(b) Starting Engine When Hot

Open the throttle approximately 1/2 inch. Turn ON the master switch and the electric fuel pump. Move the mixture control lever to idle cut-off and engage the starter by rotating the magneto switch clockwise. When the engine fires, release the magneto switch, advance the mixture and move the throttle to the desired setting.

(c) Starting Engine When Flooded

The throttle lever should be full OPEN. Turn ON the master switch and turn OFF the emergency fuel pump. Move the mixture control lever to idle cut-off and engage the starter by rotating the magneto switch clockwise. When the engine fires, release the magneto switch, advance the mixture and retard the throttle.

(d) Starting Engine With External Power Source

An optional feature called the Piper External Power (PEP) allows the operator to use an external battery to crank the engine without having to gain access to the airplane's battery.

Turn the master switch OFF and turn all electrical equipment OFF. Connect the RED lead of the PEP kit jumper cable to the POSITIVE (+) terminal of an external 12-volt battery and the BLACK lead to the NEGATIVE (-) terminal. Insert the plug of the jumper cable into the socket located on the fuselage. Note that when the plug is inserted, the electrical system is ON. Proceed with the normal starting technique.

After the engine has started, reduce power to the lowest possible RPM, to reduce sparking, and disconnect the jumper cable from the aircraft. Turn the master switch ON and check the alternator ammeter for an indication of output. **DO NOT ATTEMPT FLIGHT IF THERE IS NO INDICATION OF ALTERNATOR OUTPUT.**

NOTE

For all normal operations using the PEP jumper cables, the master switch should be OFF, but it is possible to use the ship's battery in parallel by turning the master switch ON. This will give longer cranking capabilities, but will not increase the amperage.

CAUTION

Care should be exercised because if the ship's battery has been depleted, the external power supply can be reduced to the level of the ship's battery. This can be tested by turning the master switch ON momentarily while the starter is engaged. If cranking speed increases, the ship's battery is at a higher level than the external power supply.

When the engine is firing evenly, advance the throttle to 800 RPM. If oil pressure is not indicated within thirty seconds, stop the engine and deter-

mine the trouble. In cold weather it will take a few seconds longer to get an oil pressure indication. If the engine has failed to start, refer to the Lycoming Operating Handbook, Engine Troubles and Their Remedies.

Starter manufacturers recommend that cranking periods be limited to thirty seconds with a two minute rest between cranking periods. Longer cranking periods will shorten the life of the starter.

4.15 WARM-UP

Warm-up the engine at 1400 to 1500 RPM. Avoid prolonged idling at low RPM, as this practice may result in fouled spark plugs.

Takeoff may be made as soon as the ground check is completed, provided that the throttle may be opened without backfiring or skipping, and without a reduction in engine oil pressure.

Do not operate the engine at high RPM when running up or taxiing over ground containing loose stones, gravel or any loose material that may cause damage to the propeller blades.

4.17 TAXIING

Before attempting to taxi the airplane, ground personnel should be instructed and approved by a qualified person authorized by the owner. Ascertain that the propeller back blast and taxi areas are clear.

Power should be applied slowly to start the taxi roll. Taxi a few feet forward and apply the brakes to determine their effectiveness. Taxi with the propeller set in low pitch, high RPM setting. While taxiing, make slight turns to ascertain the effectiveness of the steering.

Observe wing clearances when taxiing near buildings or other stationary objects. If possible, station an observer outside the airplane.

Avoid holes and ruts when taxiing over uneven ground.

Do not operate the engine at high RPM when running up or taxiing over ground containing loose stones, gravel or any loose material that may cause damage to the propeller blades.

4.19 GROUND CHECK

The magnetos should be checked at 2000 RPM with the propeller set at high RPM. Drop off on either magneto should not exceed 175 RPM and the difference between the magnetos should not exceed 50 RPM. Operation on one magneto should not exceed 10 seconds.

Check the vacuum gauge; the indicator should read between 4.8 and 5.1 inches Hg at 2000 RPM.

Check the annunciator panel lights with the press-to-test button. Also check the air conditioner and the alternate air.

The propeller control should be moved through its complete range to check for proper operation, and then placed in full "INCREASE" rpm for takeoff. To obtain maximum rpm, push the pedestal mounted control fully forward on the instrument panel. Do not allow a drop of more than 500 RPM during this check. In cold weather the propeller control should be cycled from high to low RPM at least three times before takeoff to make sure that warm engine oil has circulated.

The electric fuel pump should be turned "OFF" after starting or during warm-up to make sure that the engine driven pump is operating. Prior to takeoff the electric pump should be turned ON again to prevent loss of power during takeoff should the engine driven pump fail. Check both oil temperature and oil pressure. The temperature may be low for some time if the engine is being run for the first time of the day. The engine is warm enough for takeoff when the throttle can be opened without the engine faltering.