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**NORMAL PROCEDURES**

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**SECTION 4  
NORMAL PROCEDURES**

**4.1 GENERAL**

This section clearly 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 safe 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.

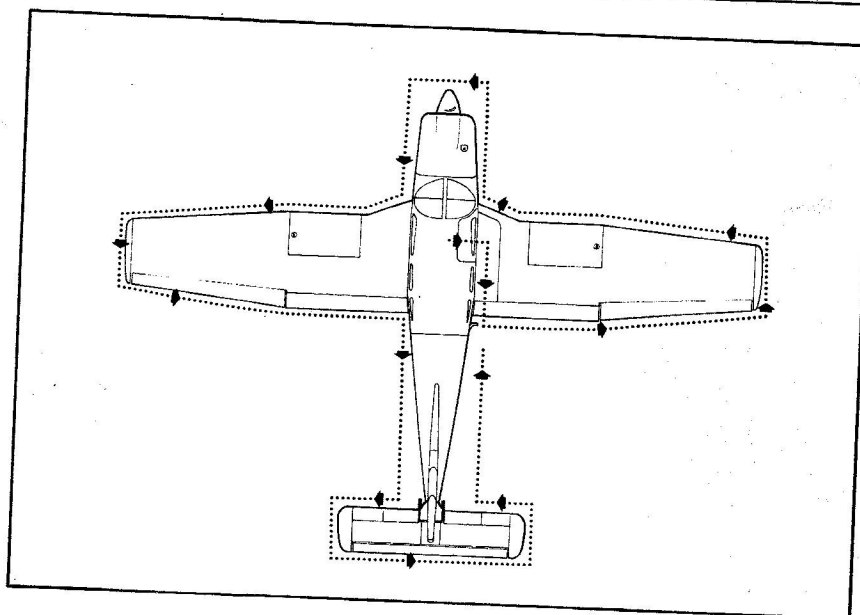
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Performance for a specific airplane may vary from published figures depending upon the equipment installed, the condition of the engine, airplane and equipment, atmospheric conditions and piloting technique.

(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 (Flaps 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
- 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

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- Chock ..... remove
- Main gear strut ..... proper inflation (2.5 ± .25 in.)
- Tire ..... check
- Brake block and disc ..... check
- Fuel tank ..... check supply
- Fuel tank vent ..... visually - secure cap
- Fuel tank sump ..... clear
- Tie down ..... drain
- 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 - 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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**STARTING ENGINE WHEN COLD**

Throttle ..... 1/2" open  
Master switch ..... ON  
Electric fuel pump ..... ON  
Mixture ..... prime - then idle  
cut-off  
Starter ..... engage  
Mixture ..... full RICH  
Throttle ..... adjust  
Oil pressure ..... check

**STARTING ENGINE WHEN HOT**

Throttle ..... 1/2" open  
Master switch ..... ON  
Electric fuel pump ..... ON  
Mixture ..... idle cut-off  
Starter ..... engage  
Mixture ..... advance  
Throttle ..... adjust  
Oil pressure ..... check

**STARTING ENGINE WHEN FLOODED**

Throttle ..... open full  
Master switch ..... ON  
Electric fuel pump ..... OFF  
Mixture ..... idle cut-off  
Starter ..... engage  
Mixture ..... advance  
Throttle ..... retard  
Oil pressure ..... check



**STARTING WITH EXTERNAL POWER SOURCE**

Master switch ..... OFF  
All electrical equipment ..... OFF  
Terminals ..... connect  
External power plug ..... insert in fuselage

Proceed with normal start

Throttle ..... lowest possible RPM  
External power plug ..... disconnect from fuselage  
Master switch ..... ON - check ammeter  
Oil pressure ..... check

**WARM-UP**

Throttle ..... 1400 to 1500 RPM

**TAXIING**

Chocks ..... removed  
Taxi area ..... clear  
Throttle ..... apply slowly  
Prop ..... high RPM  
Brakes ..... check  
Steering ..... check

**GROUND CHECK**

Propeller ..... full INCREASE  
Throttle ..... 2000 RPM  
Magnetos ..... max. drop 175 RPM -  
max. diff. 50 RPM  
Vacuum ..... 4.8" Hg. to 5.1" Hg.  
Oil temperature ..... check  
Oil pressure ..... check

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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  
*TRANSPONDER* ..... ON

**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  
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

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**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  
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 belt  
Flaps ..... full up  
Wheel chocks ..... in place  
Tie downs ..... secure

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**4.7 AMPLIFIED NORMAL PROCEDURES (GENERAL)**

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

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**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 that was 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 and check the function of the inertia reel by pulling sharply on the strap. Fasten seat belts on empty seats.



#### 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.

#### 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.

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(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 determine

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 manufactures 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.

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**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.

**4.21 BEFORE TAKEOFF**

All aspects of each particular takeoff should be considered prior to executing the takeoff procedure.

After takeoff on aircraft equipped with the backup gear extender, if the gear selector switch is placed in the gear up position before reaching the airspeed at which the system no longer commands gear down\*, the gear will not retract. For obstacle clearance on takeoff and for takeoffs from high altitude airports, the landing gear can be retracted after lift-off at the pilot's discretion by placing the gear selector switch in the "UP" position and then locking the emergency gear

\*Approximately 75 KIAS at sea level to approximately 88 KIAS at 10,000 ft. with a straight line variation between.

lever in the "OVERRIDE ENGAGED" position. If desired, the "OVERRIDE ENGAGED" position can be selected and locked before takeoff, and the gear will then retract as soon as the gear selector switch is placed in the "UP" position. Care should always be taken not to retract the gear prematurely, or the aircraft could settle back onto the runway. If the override lock is used for takeoff, it should be disengaged as soon as sufficient airspeed and terrain clearance are obtained, to return the gear system to normal operation. For normal operation, the pilot should extend and retract the gear with the gear selector switch located on the instrument panel, just as he would if the back-up gear extender system were not installed.

After all aspects of the takeoff are considered, a pretakeoff check procedure must be performed.

Turn "ON" the master switch and check and set all of the flight instruments as required. Check the fuel selector to make sure it is on the proper tank (fullest). Turn "ON" the electric fuel pump. Check the engine gauges. The alternate air should be in the "CLOSED" position.

All seat backs should be erect.

The mixture and propeller control levers should be set and the seat belts and shoulder harness fastened. Fasten the seat belts snugly around the empty seats.

Exercise and set the flaps and trim tab. Insure proper flight control movement and response.

All doors should be properly secured and latched.

On air conditioned models, the air conditioner must be "OFF" to insure normal takeoff performance.

#### 4.23 TAKEOFF

The normal takeoff technique is conventional for the Arrow IV. The tab should be set slightly aft of neutral, with the exact setting determined by the loading of the airplane. Allow the airplane to accelerate to 65 to 75 KIAS depending on the weight of the aircraft and ease back on the control wheel to rotate to climb attitude.

The procedure used for a short field takeoff with an obstacle clearance or a soft field takeoff differs slightly from the normal technique. The flaps

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should be lowered to 25° (second notch). Allow the aircraft to accelerate to 50 to 60 KIAS depending on the aircraft weight and rotate the aircraft to climb attitude. After breaking ground, accelerate to 55 to 65 KIAS, depending on aircraft weight and select gear up\*. Continue to climb while accelerating to the flaps-up rate of climb speed, 87 KIAS if no obstacle is present or 77 KIAS if obstacle clearance is a consideration. Slowly retract the flaps while climbing out.

**4.25 CLIMB**

On climb-out after takeoff, it is recommended that the best angle of climb speed (77 KIAS) be maintained only if obstacle clearance is a consideration. The best rate of climb speed (87 KIAS) should be maintained with full power on the engines until adequate terrain clearance is obtained. At lighter than gross weight these speeds are reduced somewhat\*\*. An en route climb speed of 104 KIAS or higher is also recommended. This increased climb speed provides better engine cooling, less engine wear, reduced fuel consumption, lower cabin noise level, and better forward visibility.

When reaching the desired altitude, the electric fuel pump may be turned OFF.

**NOTE**

On aircraft equipped with the backup gear extender, during climbs at best angle of climb speed at any altitude and best rate of climb speed above approximately 9000 ft. density altitude, it may be necessary to select "OVERRIDE ENGAGED" to prevent the landing gear from extending automatically during the climb. This altitude decreases with reduced climb power and increases with increased climb airspeed.

\*If desired, on aircraft equipped with the backup gear extender, the override engaged position can be selected and locked before takeoff, and the gear will then retract as soon as the gear selector switch is placed in the up position. In this case care should be taken not to retract the gear prematurely, or the aircraft could settle back onto the runway. If the override lock is used for takeoff, it should be disengaged as soon as sufficient terrain clearance is obtained, to return the gear system to normal operation.

\*\*To obtain the performance presented in the Performance Section of this handbook, full power (full throttle and 2700 RPM) must be used.

#### 4.27 CRUISING

The cruising speed of the Arrow IV is determined by many factors, including power setting, altitude, temperature, loading and equipment installed in the airplane.

The normal maximum cruising power is 75% of the rated horsepower of the engine. When selecting cruising RPM below 2400, limiting manifold pressure for continuous operation, as specified by the appropriate "Avco-Lycoming Operator's Manual," should be observed.

To obtain the desired power, set the manifold pressure and RPM according to the power setting table in this manual.

Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at higher altitudes. The mixture should be leaned during cruising operation when 75% power or less is being used. If any doubt exists as to the amount of power being used, the mixture should be in the full "RICH" position for all operations.

To lean the mixture, disengage the lock and pull the mixture control until the engine becomes rough, indicating that the lean mixture limit has been reached in the leaner cylinders. Then enrich the mixture by pushing the control towards the instrument panel until engine operation becomes smooth. The fuel flow meter will give a close approximation of the fuel being consumed. The low side of the power setting, as shown on the fuel flow meter, indicates best economy for that percent of power while the high side indicates best power.

If the airplane is equipped with the optional exhaust gas temperature (EGT) gauge, a more accurate means of leaning is available to the pilot. For this procedure, refer to the "Avco-Lycoming Operator's Manual."

Following level-off for cruise, the airplane should be trimmed.

The pilot should monitor weather conditions while flying and should be alert to conditions which might lead to icing. If induction system icing is expected, place the alternate air control in the "ON" position.

During flight, keep account of time and fuel used in connection with power settings to determine how the fuel flow and fuel quantity gauging systems are operating. If the fuel flow indication is considerably higher than the fuel actually being consumed, a fuel nozzle may be clogged and require cleaning.

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There are no mechanical uplocks in the landing gear system. In the event of a hydraulic system malfunction, the landing gear will free-fall to the gear down position. The true airspeed with gear down is approximately 75% of the gear retracted airspeed for any given power setting. Allowances for the reduction in airspeed and range should be made when planning extended flight between remote airfields or flight over water.

In order to keep the airplane in best lateral trim during cruise flight, the fuel should be used alternately from each tank at one hour intervals.

Always remember that the electric fuel pump should be turned "ON" before switching tanks, and should be left on for a short period thereafter. To preclude making a hasty selection, and to provide continuity of flow, the selector should be changed to another tank before fuel is exhausted from the tank in use. The electric fuel pump should be normally "OFF" so that any malfunction of the engine driven fuel pump is immediately apparent. If signs of fuel starvation should occur at any time during flight, fuel exhaustion should be suspected, at which time the fuel selector should be immediately positioned to a full tank and the electric fuel pump switched to the "ON" position.

#### **4.29 APPROACH AND LANDING**

Check to insure the fuel selector is on the proper (fullest) tank and that the seat backs are erect. The seat belts and shoulder harness should be fastened and the inertia reel checked.

Turn "ON" the electric fuel pump. The mixture should be set in the full "RICH" position. Set the propeller at full "INCREASE" rpm to facilitate ample power for an emergency go-around.

The landing gear may be extended at speeds below 130 KIAS. The airplane should be trimmed to a final approach speed of about 75 KIAS with flaps extended. The flaps can be lowered at speeds up to 108 KIAS, if desired. Turn "OFF" the air conditioner.

The mixture control should be kept in full "RICH" position to insure maximum acceleration if it should be necessary to open the throttle again.



The amount of flap used during landings and the speed of the aircraft at contact with the runway should be varied according to the landing surface and conditions of wind and airplane loading. It is generally good practice to contact the ground at the minimum possible safe speed consistent with existing conditions.

Normally, the best technique for short and slow landings is to use full flap and enough power to maintain the desired airspeed and approach flight path. Mixture should be full "RICH," fuel on the fullest tank, and the electric fuel pump "ON." Reduce the speed during the flareout and contact the ground close to the stalling speed. After ground contact hold the nose wheel off as long as possible. As the airplane slows down, gently lower the nose and apply the brakes. Braking is most effective when flaps are raised and back pressure is applied to the control wheel, putting most of the aircraft weight on the main wheels. In high wind conditions, particularly in strong crosswinds, it may be desirable to approach the ground at higher than normal speeds with partial or no flaps.

#### **4.31 STOPPING ENGINE**

At the pilot's discretion, the flaps should be raised.

#### **NOTE**

The flaps must be placed in the "UP" position for the flap step to support weight. Passengers should be cautioned accordingly.

The electric fuel pump, air conditioner and radios should be turned "OFF," the propeller set in the full "INCREASE" position, and the engine stopped by disengaging the mixture control lock and pulling the mixture control back to idle cut-off. The throttle should be left full aft to avoid engine vibration while stopping. Then the magneto and master switches must be turned "OFF."

#### **4.33 PARKING**

If necessary, the airplane should be moved on the ground with the aid of the nose wheel tow bar provided with each airplane and secured behind the rear seats. The aileron and stabilator controls should be secured by looping the safety belt through the control wheel and pulling it snug. The flaps are locked when in the "UP" position and should be left retracted.

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Tie downs can be secured to rings provided under each wing and to the tail skid. The rudder is held in position by its connections to the nose wheel steering and normally does not have to be secured.

**4.35 STALLS**

The stall characteristics of the Arrow IV are conventional. An approaching stall is indicated by a stall warning horn which is activated between five and ten knots above stall speed. Mild airframe buffeting and gentle pitching may also precede the stall.

The gross weight stalling speed of the Arrow IV with power off and full flaps is 53 KIAS. With the flaps up this speed is increased 6 KTS. Loss of altitude during stalls can be as great as 400 feet, depending on configuration and power.

**NOTE**

The stall warning system is inoperative with the master switch "OFF."

During preflight, the stall warning system should be checked by turning the master switch "ON," lifting the detector and checking to determine if the horn is actuated. The master switch should be returned to the "OFF" position after the check is complete.

**4.37 TURBULENT AIR OPERATION**

In keeping with good operating practice used in all aircraft, it is recommended that when turbulent air is encountered or expected, the airspeed be reduced to maneuvering speed to reduce the structural loads caused by gusts and to allow for inadvertent speed build-ups which may occur as a result of the turbulence or of distractions caused by the conditions.

#### **4.39 LANDING GEAR**

Some aircraft are equipped with an airspeed - power sensing system (backup gear extender) which extends the landing gear under low airspeed - power conditions\* even though the pilot may not have selected gear down. This system will also prevent retraction of the landing gear by normal means when the airspeed - power values are below a predetermined minimum. To override this system or to hold the emergency gear lever in the "OVERRIDE ENGAGED" position without maintaining manual pressure on the emergency gear lever, pull the lever full up and push the lock pin in. To release the override, pull lever up and then release.

For normal operation, the pilot should extend and retract the gear with the gear selector switch located on the instrument panel, just as he would if the back-up gear extender system were not installed.

The pilot should become familiar with the function and significance of the landing gear position indicators and warning lights.

The red gear warning light on the instrument panel and the horn operate simultaneously in flight when the throttle is reduced to where the manifold pressure is approximately 14 inches of mercury or below, and the gear selector switch is not in the "DOWN" position. On aircraft equipped with the backup gear extender this warning will also occur during flight when the back-up extender system has lowered the landing gear and the gear selector switch is not in the "DOWN" position and the manifold pressure is reduced below approximately 14 inches of mercury. The red gear warning light

on the instrument panel and the horn will also operate simultaneously on the ground when the master switch is "ON" and the gear selector switch is in the "UP" position and the throttle is in the retarded position.

The three green lights on the instrument panel operate individually as each associated gear is locked in the extended position.

\*Approximately 95 KIAS at any altitude, power off.

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***WARNING***

Panel lights' dimmer switch must be off to obtain gear lights full intensity during daytime flying. When aircraft is operated at night and panel lights' dimmer switch is turned on, gear lights will automatically dim.

On aircraft equipped with the backup gear extender the yellow "Auto Ext. OFF" light immediately below the gear selector switch flashes whenever the emergency gear lever is in the "OVERRIDE ENGAGED" position.

When the Emergency Landing Gear Extension Procedure (Paragraph 3.27) is performed for training purposes, the following changes must be made to the procedure to prevent the hydraulic pump from activating during the procedure. On aircraft equipped with the backup gear extender the landing gear selector must be left in the UP position until all gear position indicators are green. On aircraft which do not have the backup gear extender a pull type LANDING GEAR PUMP circuit breaker is installed and must be pulled prior to executing the emergency extension procedure to allow normal gear system operation.

**4.41 WEIGHT AND BALANCE**

It is the responsibility of the owner and pilot to determine that the airplane remains within the allowable weight vs. center of gravity envelope while in flight.

For weight and balance data, refer to Section 6 (Weight and Balance).