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#### NORMAL PROCEDURES

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## **SECTION 4**

### **NORMAL PROCEDURES**

#### **4.1 GENERAL**

This section describes the recommended procedures for the conduct of normal operations for the Archer II. All of the required (FAA regulations) procedures and those necessary for 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.

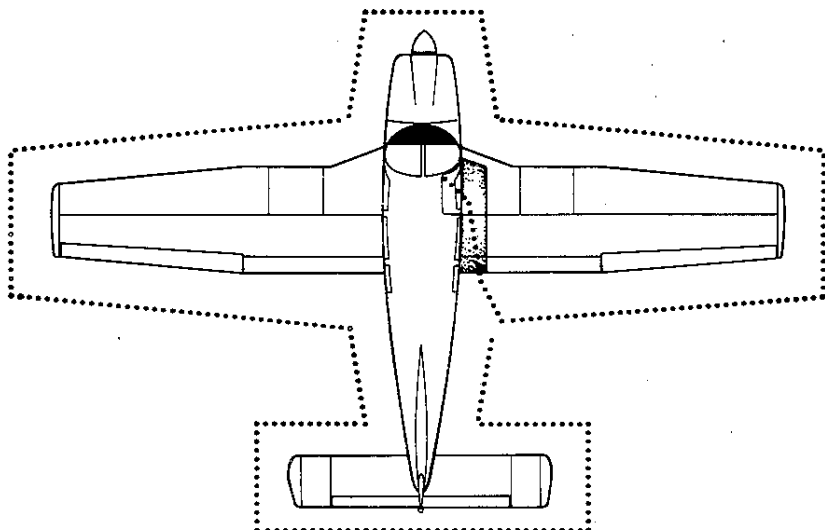
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Performance for a specific airplane may vary from published figures depending upon the equipment installed, the condition of the engine, airplane and equipment, atmospheric conditions and piloting technique.

- (a) Best Rate of Climb Speed ..... 76 KIAS
- (b) Best Angle of Climb Speed ..... 64 KIAS
- (c) Turbulent Air Operating Speed (See  
Subsection 2.3)..... 113 KIAS
- (d) Maximum Flap Speed ..... 102 KIAS
- (e) Landing Final Approach Speed (Flaps 40°) ..... 66 KIAS
- (f) Maximum Demonstrated Crosswind Velocity ..... 17 KTS



### **WALK-AROUND**

**Figure 4-1**

## **4.5 NORMAL PROCEDURES CHECK LIST**

### **PREFLIGHT CHECK**

Control wheel .....	release belts
Avionics .....	OFF
Master switch .....	ON
Fuel quantity gauges .....	check
Master switch .....	OFF
Ignition .....	OFF
Exterior .....	check for damage
Control surfaces .....	check for interference -
	free of ice, snow, frost
Hinges .....	check for interference
Wings .....	free of ice, snow, frost
Stall warning .....	check
Fuel tanks .....	check supply
	visually - secure caps

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Fuel tank sumps ..... drain and check for  
water sediment and proper fuel  
Fuel vents ..... open  
Main gear struts ..... proper inflation (4.50 in.)  
Tires ..... check  
Brake blocks ..... check  
Pitot head ..... remove cover - holes clear  
Windshield ..... clean  
Propeller and spinner ..... check  
Fuel and oil ..... check for leaks  
Oil ..... check level  
Dipstick ..... properly seated  
Cowling ..... secure  
Inspection covers ..... secure  
Nose wheel tire ..... check  
Nose gear strut ..... proper inflation (3.25 in.)  
Air inlets ..... clear  
Alternator belt ..... check tension  
Tow bar and control locks ..... stow  
Baggage ..... stowed properly - secure  
Baggage door ..... close and secure  
Fuel strainer ..... drain and check for  
water sediment and proper fuel  
Primary flight controls ..... proper operation  
Cabin door ..... close and secure  
Required papers ..... on board  
Seat belts and harness ..... fasten/adjust-  
check inertia reel

**BEFORE STARTING ENGINE**

See also AFMS at end

Brakes ..... set  
Carburetor heat ..... full COLD  
Fuel selector ..... desired tank  
Radios ..... OFF

**STARTING ENGINE WHEN COLD**

See also AFMS at end

Throttle ..... 1/4" open  
Master switch ..... ON  
Electric fuel pump ..... ON  
Mixture ..... full RICH

Starter ..... engage  
Throttle ..... adjust  
Oil pressure ..... check

If engine does not start within 10 sec. prime and repeat starting procedure.

### **STARTING ENGINE WHEN HOT**

Throttle ..... 1/2" open  
Master switch ..... ON  
Electric fuel pump ..... ON  
Mixture ..... full RICH  
Starter ..... engage  
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

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**WARM-UP**

Throttle .....800 to 1200 RPM

**TAXIING**

Chocks .....removed

Taxi area .....clear

Throttle .....apply slowly

Brakes .....check

Steering .....check

**GROUND CHECK**

Parking brake .....set

Throttle .....2000 RPM

Magnetos .....max. drop 175 RPM -  
max. diff. 50 RPM

Vacuum .....5.0" Hg.  $\pm$  .1

Oil temp .....check

Oil pressure .....check

Air conditioner .....check

Annunciator panel .....press-to-test

Carburetor heat .....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**    See also AFMS at end

Master switch .....ON

Flight instruments .....check

Fuel selector .....proper tank

Electric fuel pump .....ON

Engine gauges .....check

Carburetor heat .....OFF

Seat backs .....erect

Mixture .....set

Primer .....locked



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 52 to 65 KIAS  
Control wheel ..... back pressure to rotate  
to climb attitude

### SHORT FIELD, OBSTACLE CLEARANCE

Flaps ..... 25° (second notch)  
Accelerate to 41 to 49 KIAS depending on aircraft weight.  
Control wheel ..... back pressure to rotate  
to climb attitude  
After breaking ground, accelerate to 45 to 54 KIAS depending on aircraft  
weight.  
Accelerate to best flaps up angle of climb speed - 64 KIAS, slowly retract  
the flaps and climb past the obstacle.  
Accelerate to best flaps up rate of climb speed - 76 KIAS.

### SOFT FIELD

Flaps ..... 25° (second notch)  
Accelerate to 41 to 49 KIAS depending on aircraft weight.  
Control wheel ..... back pressure to rotate  
to climb attitude  
After breaking ground, accelerate to 45 to 54 KIAS depending on aircraft  
weight.  
Accelerate to best flaps up rate of climb speed 76 KIAS.  
Flaps ..... retract slowly

## CLIMB

Best rate (flaps up) ..... 76 KIAS  
Best angle (flaps up) ..... 64 KIAS  
En route ..... 87 KIAS  
Electric fuel pump ..... OFF at desired altitude

## CRUISING

See also AFMS at end

Reference performance charts and Avco-Lycoming Operator's Manual.  
Normal max. power ..... 75%  
Power ..... set per power table  
Mixture ..... adjust

## DESCENT

See also AFMS at end

### NORMAL

Throttle ..... 2500 rpm  
Airspeed ..... 122 KIAS  
Mixture ..... RICH  
Carburetor heat ..... ON if required

### POWER OFF

Carburetor heat ..... ON if required  
Throttle ..... closed  
Airspeed ..... as required  
Mixture ..... as required  
Power ..... verify with throttle  
every 30 seconds

## APPROACH AND LANDING

Fuel selector ..... proper tank  
Seat backs ..... erect  
Belts/harness ..... fasten/adjust  
Electric fuel pump ..... ON  
Mixture ..... set

Flaps ..... set - 102 KIAS max  
Air conditioner ..... OFF  
Trim to 75 KIAS. Final approach speed (flaps 40°) ..... 66 KIAS

### **STOPPING ENGINE**

Flaps ..... retract  
Electric fuel pump ..... OFF  
Air conditioner ..... OFF  
Radios ..... OFF  
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 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 distance 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 aircraft. The flaps must be placed in the UP position before they will lock and support weight on the step.

Upon entering the cockpit, release the seat belts securing the control wheel. Turn OFF all avionics equipment. Turn ON the master switch and check the fuel quantity gauges for sufficient fuel. After the fuel quantity check is made turn the master switch OFF and check that the ignition switch is OFF.

To begin the exterior walk-around, check for external damage and operational interference of the control surfaces or hinges. Insure that the wings and control surfaces are free of snow, ice, frost or any other foreign materials.

An operational check of the stall warning system should now be made. Turn the master switch ON. Lift the detector while checking to determine if the horn is actuated. The master switch should be returned to the OFF position after the check is complete.

A visual check of the fuel tank quantity should be performed. Remove the filler cap from each tank and visually check the supply and color. Be sure to secure the caps properly after the check is complete.

The fuel system sumps and strainer should be drained daily prior to the first flight and after refueling. Check for proper fuel and the accumulation of contaminants such as water or sediment. Each fuel tank is equipped with an individual quick drain located at the lower inboard rear corner of the tank. The fuel strainer is equipped with a quick drain located on the front lower corner of the firewall. Each of the fuel tank sumps should be drained first. Then the fuel strainer should be drained twice, once with the fuel selector valve on each tank. Each time fuel is drained, sufficient fuel should be allowed to flow to ensure removal of contaminants. This fuel should be collected in a suitable container, examined for contaminants, and then discarded.

### **CAUTION**

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

Each quick drain should be checked after closing it to make sure it has closed completely and is not leaking.

Check all of the fuel tank vents to make sure they are open.

Next, complete a check of the landing gear. Check the main gear shock struts for proper inflation. There should be 4.50 inches of strut exposure under a normal static load. The nose gear should be checked for 3.25 inches of strut exposure. Check all tires for cuts and wear and insure proper inflation. Make a visual check of the brake blocks for wear or damage.

Remove the cover from the pitot head on the underside of the left wing. Check the pitot head to make sure the holes are open and clear of obstructions.

Don't forget to clean and check the windshield.

The propeller and spinner should be checked for defects or nicks.

Lift the cowlings and check for any obvious fuel or oil leaks. Check the oil level. Make sure that the dipstick has properly seated after checking. Secure the cowlings and check the inspection covers.

Check the air inlets for foreign matter and the alternator belt for proper tension.

Stow the tow bar and check the baggage for proper storage and security. The baggage compartment doors should be closed and secure.

Upon entering the aircraft, ascertain that all primary flight controls operate properly. Close and secure the cabin door and check that all the required papers are in order and in the airplane.

Fasten and adjust 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.

#### **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 carburetor heat lever moved to the full COLD 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 1/4 inch. Turn ON the master switch and the electric fuel pump.

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

If the engine does not fire within five to ten seconds, disengage the starter, prime the engine and repeat the starting procedure.

**(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 full RICH and engage the starter by rotating the magneto switch clockwise. When the engine fires, release the magneto switch 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 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 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.

**4.15 WARM-UP**

Warm-up the engine at 800 to 1200 RPM for not more than two minutes in warm weather and four minutes in cold. 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 fully 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. 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**

Set the parking brake.

The magnetos should be checked at 2000 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  $5.0" \pm .1"$  Hg at 2000 RPM.

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

Carburetor heat should also be checked prior to takeoff to be sure the control is operating properly and to clear any ice which may have formed during taxiing. Avoid prolonged ground operation with carburetor heat "ON" as the air is unfiltered.

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.

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 and check the engine gauges. The carburetor heat should be in the OFF position.

All seat backs should be erect.

The mixture should be set and the primer checked to insure that it is locked. The seat belts and shoulder harness should be fastened and adjusted. Fasten the seat belts snugly around the 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.

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 Archer II. 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 48 to 53 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 should be lowered to 25° (second notch). Allow the aircraft to accelerate to 41 to 49 KIAS depending on the aircraft weight and rotate the aircraft to climb attitude. After breaking ground, accelerate to 45 to 54 KIAS, depending on aircraft weight. Continue to climb while accelerating to the flaps-up rate of climb speed, 76 KIAS if no obstacle is present or 64 KIAS if obstacle clearance is a consideration. Slowly retract the flaps while climbing out.

#### **4.25 CLIMB**

The best rate of climb at gross weight will be obtained at 76 KIAS. The best angle of climb may be obtained at 64 KIAS. At lighter than gross weight these speeds are reduced somewhat. For climbing en route, a speed of 87 KIAS is recommended. This will produce better forward speed and increased visibility over the nose during the climb.

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

#### **4.27 CRUISING**

The cruising speed of the Archer II 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. Airspeeds which may be obtained at various altitudes and power settings can be determined from the performance graphs provided by Section 5.

Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at higher altitudes. The mixture should be leaned during cruising operation above 5000 ft. altitude and at pilot's discretion at lower altitudes 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 under 5000 feet.

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.

If the airplane is equipped with the optional exhaust gas temperature (EGT) gauge, a more accurate means of leaning is available to the pilot. Best economy mixture is obtained by moving the mixture control aft until peak EGT is reached. Best power mixture is obtained by leaning to peak EGT and then enriching until the EGT is 100° F. rich of the peak value. Under some conditions of altitude and throttle position, the engine may exhibit roughness before peak EGT is reached. If this occurs, the EGT corresponding to the onset of engine roughness should be used as the peak reference value.

Always remember that the electric fuel pump should be turned ON before switching tanks, and should be left on for a short period thereafter. In order to keep the airplane in best lateral trim during cruising flight the fuel should be used alternately from each tank. It is recommended that one tank be used for one hour after takeoff, then the other tank be used for two hours; then return to the first tank, which will have approximately one and one half hours of fuel remaining if the tanks were full at takeoff. The second tank will contain approximately one half hour of fuel. Do not run tanks completely dry in flight. 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 the other tank and the electric fuel pump switched to the ON position.

#### **4.29 DESCENT**

##### **NORMAL**

To achieve the performance on Figure 5-29 the power on descent must be used. The throttle should be set for 2500 RPM, mixture full rich and maintain an airspeed of 122 KIAS. In case carburetor ice is encountered apply full carburetor heat.

## **POWER OFF**

If a prolonged power off descent is to be made, apply full carburetor heat prior to power reduction if icing conditions are suspected. Throttle should be retarded and mixture control leaned as required. Power response should be verified approximately every 30 seconds by partially opening and then closing the throttle (clearing the engine). When leveling off enrichen mixture, set power as required and select carburetor heat off unless carburetor icing conditions are suspected.

## **4.31 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 adjusted and the inertia reel checked.

### **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.

Turn **ON** the electric fuel pump and turn **OFF** the air conditioner. The mixture should be set in the full **RICH** position.

The airplane should be trimmed to an initial approach speed of about 75 KIAS with a final approach speed of 66 KIAS with flaps extended. The flaps can be lowered at speeds up to 102 KIAS, if desired.

The mixture control should be kept in full **RICH** position to insure maximum acceleration if it should be necessary to open the throttle again. Carburetor heat should not be applied unless there is an indication of carburetor icing, since the use of carburetor heat causes a reduction in power which may be critical in case of a go-around. Full throttle operation with carburetor heat on can cause detonation.

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 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.

#### **4.33 STOPPING ENGINE**

At the pilot's discretion, the flaps should be raised and the electric fuel pump turned OFF.

#### **NOTE**

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

The air conditioner and radios should be turned OFF, 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.

#### **4.35 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.

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.

#### **4.37 STALLS**

The stall characteristics of the Archer II 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 Archer II with power off and full flaps is 49 KIAS. With the flaps up this speed is increased 6 KTS. Loss of altitude during stalls varies from 100 to 350 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.

#### **4.39 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. (See Subsection 2.3)

#### **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).



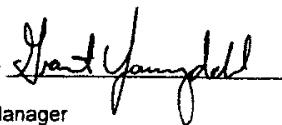
**FAA APPROVED**  
**AIRPLANE FLIGHT MANUAL SUPPLEMENT**  
**FOR**  
**Piper PA-28 Series Aircraft**  
**See Applicable Model and Serial Number List**

Registration Number OE-KBS

Serial Number 28-8390087

This Supplement must be attached to the FAA Approved Airplane Flight Manual applicable to that particular airplane when the airplane has been modified in accordance with STC SA2660CE. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in this supplement, consult the basic Airplane Flight Manual.

FAA APPROVED



*for* Margaret Kline, Manager  
Aircraft Certification Office  
Federal Aviation Administration  
Wichita, Kansas

## **2. PROCEDURES SECTION:**

### **Emergency Procedures**

#### **Fuel Management**

When operating on auto gas, including when auto gas is intermixed with aviation gasoline:

- a) Right fuel quantity less than  $\frac{1}{4}$  tank – Land using left fuel tank.

**NOTE:** Operating on the left tank may make the airplane more susceptible to vapor formation than the right tank.

#### **Fuel System:**

##### **Fuel Pump Failure**

SA2660CE equips PA-28's with two separate electric fuel pumps. If one pump fails, throw the three way fuel pump switch to engage the second, redundant electric fuel pump. If the other electric fuel pump is also inoperative, check to make sure the Master switch is ON, check circuit breakers.

If the engine is running rough or not at all, lower the nose, reduce throttle setting to 75% or less, Mixture to FULL RICH, Carb Heat ON, and switch fuel tanks. Choose a suitable off airport landing location or if possible continue flight to the nearest airport.

### **Normal Procedures:**

#### **Fuel Management:**

When operating on auto gas, including when auto gas is intermixed with aviation gasoline:

- a) Before Takeoff

- (1) Fuel Selector – Right Tank

- b) Cruise

- (1) Fuel Selector – Use right and left tank positions to maintain lateral fuel balance.

**NOTE:** Vapor formation is more likely when operating at ambient temperatures of 85F or above. Additional vapor margin is provided from the right tank due to its larger fuel supply line, and when the fuel quantity in the right tank is maintained at or above the  $\frac{1}{4}$  full indication. Plan flight so as to have  $\frac{1}{4}$  tank or more fuel remaining in the right tank for landing and possible go-around.

- c) Before Landing

- (1) Fuel Selector – Right tank.

## **PROCEDURES SECTION:** (CONT'D)

### **Normal Procedures:**

#### **Fuel System:**

##### **Auxiliary Fuel Pumps:**

There are two pumps, Pump A and Pump B controlled by an electric switch on the pilot's instrument panel. Either Pump A or Pump B must be ON for takeoff, landing, ground taxi and climb operations. The selected fuel pump may be turned OFF (center position) during cruise operations only, provided proper fuel pressure values are maintained (See Limitations Section in basic Airplane Flight Manual). It is recommended that Pump A and Pump B be used alternately to obtain approximately even usage.

Before starting engine:

- 1) With Master switch ON, check auxiliary fuel pumps, Pump A and Pump B one at a time as follows:
  - a. Listen for pump operation
  - b. Verify proper fuel pressure is obtained.
- 2) Turn fuel pumps OFF

#### **Engine Priming:**

To prime the engine before starting:

##### **Manual Priming**

- 1) Aircraft equipped with manual engine priming pump. With the Mixture FULL RICH, pull the primer out then push it in 3 to 5 times. Make certain that the primer pump is in the closed and locked position (pushed in and rotated till locked) before activating a fuel pump or starting the engine.

##### **Electrical Priming**

- 2) Aircraft equipped with electric engine priming system:
  - a. Turn Master Switch ON
  - b. Turn fuel selector switch to the Right tank.
  - c. Depress the electric priming switch with one hand.  
(this opens the primer solenoid valve)
  - d. While depressing the fuel primer solenoid valve switch, throw the fuel pump toggle switch either up or down with the other hand to activate one Pump.
  - e. Run the pump for only a short time (one to three seconds)
  - f. Shut the pump off and release electric priming solenoid switch.
  - g. Start the engine.
  - h. After the engine starts, activate either the Pump A or Pump B switch so that a fuel pump remains on for taxi, takeoff, and climb.

Manual or Electrically Primed: After the engine starts and during warm up, allow the engine to run with the electric fuel pumps off to verify that the engine driven fuel pump is operating properly. Before taxi activate either Pump A or Pump B so that one of the electric fuel pumps remains on for taxi, takeoff, and climb.

-----END-----



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**Service Bulletin**  
**PA-28-160, -161, -180, -181**  
Bulletin No. 05-3  
Revision No. (-)  
Date April 12, 2005

**Subject:**

**VERIFYING THAT THE PRIMER CONTROL IS CLOSED AND LOCKED PRIOR TO ELECTRIC FUEL PUMP OPERATION.**

**Effectivity:**

This Service Bulletin applies to all PA-28-160, -161, -180, -181 aircraft on which STC SA2660CE has been installed.

**Reason:**

It has come to our attention that an unlocked manual primer control may allow fuel to be directed both to the carb and directly to the cylinders via the priming system upon activation of the electric fuel pumps. This could result in an a mixture that is too rich for proper engine operation, or could increase the possibility of fire during engine startup. Worn o-rings in the primer could result in similar situations.

**Instructions:**

Following normal engine priming make certain that the primer control knob is in the closed and locked position (pushed in and rotated till locked) before activating a fuel pump or starting the engine. Check the integrity of the primer o-rings at each annual or 100 hour inspection.

## SECTION 4 – NORMAL PROCEDURES

### GFC 500 POWER UP

During the preflight test the G5 or G3X will display PFT in the autopilot status box. When the GFC 500 passes preflight test, PFT will be removed from the autopilot status box.

### FLIGHT DIRECTOR / AUTOPILOT NORMAL OPERATING PROCEDURES

Autopilot/Flight Director mode annunciations are displayed at the top of the G5 Electronic Flight Instrument or the top of the G3X Electronic Flight Instrument System PFD. Green text indicates active autopilot/flight director modes. Armed modes are indicated in white text. Normal mode transitions will flash inverse video for 10 seconds before becoming steady. Abnormal mode transitions will flash for 10 seconds in amber text before the default mode is annunciated as the active mode in green text. Default autopilot/flight director modes are Roll (ROL) and Pitch (PIT) modes.

The autopilot status box displays the autopilot engagement status as well as armed and active flight director modes.

**Autopilot Engagement with Flight Director Off** — Upon engagement, the autopilot will be set to hold the current attitude of the airplane if the flight director was not previously on. In this case, 'ROL' and 'PIT' will be annunciated.

**Autopilot Engagement with Flight Director On** — If the flight director is on, the autopilot will smoothly pitch and roll the airplane to capture the FD command bars. The prior flight director modes remain unchanged.

**Autopilot Disengagement** — The most common way to disconnect the autopilot is to press and release the AP DISC / TRIM INT button located on the control yoke. An autopilot disconnect tone will sound and an amber AP will be annunciated on the G5 or G3X autopilot status box. Other ways to disconnect the autopilot include:

- Pressing the AP Key on the GMC 507 Mode Controller
- Operating the Electric Pitch Trim Switch (located on the control wheel)
- Pulling the AUTOPILOT circuit breaker

In the event of unexpected autopilot behavior, press and holding the AP DISC / TRIM INT button will disconnect the autopilot and remove all power to the servos.

# VERTICAL MODES

## VERTICAL SPEED (VS) MODE

- 1. Altitude Preselect ..... SET to Desired Altitude
- 2. Press VS Key, autopilot synchronizes to the airplane's current vertical speed.
- 3. Vertical Speed Reference .....ADJUST using UP / DN Wheel
- 4. Green ALT..... VERIFY Upon Altitude Capture

## INDICATED AIRSPEED (IAS) MODE

- 1. Altitude Preselect ..... SET to Desired Altitude
- 2. Press IAS Key, autopilot synchronizes to the airplane's current indicated airspeed.
- 3. AIRSPEED Reference .....ADJUST using UP / DN Wheel
- 4. Adjust throttle as required ..... INCREASE POWER to climb  
DECREASE POWER to descend
- 5. Green ALT..... VERIFY Upon Altitude Capture

## ALTITUDE HOLD (ALT) MODE, MANUAL CAPTURE

- 1. When at the desired altitude .....PRESS ALT key

The autopilot will hold the altitude at which the ALT key was pressed.

If climbing or descending at a high rate when the ALT key is pressed, the airplane will overshoot the reference altitude and then return to it. The amount of overshoot will depend on the vertical speed when the ALT key is pressed.

The altitude reference is displayed in the autopilot status box. The reference may be changed by +/- 200 FT using the UP / DN wheel.

## VERTICAL NAVIGATION (VNAV)

1. Navigation Source..... SELECT CDI to GPS
2. Vertical Navigation Profile .....LOAD into the GPS navigator's flight plan
3. Altitude Preselect ..... SET to the vertical clearance limit  
When ATC clearance received.
4. GMC 507 Mode Panel..... PRESS VNAV within 5 minutes of the top of descent (TOD)

### NOTE

Vertical navigation will not function for the following conditions:

- Selected navigation source is not GPS navigation. VNAV will not function if the navigation source is VOR or Localizer.
- VNAV is not enabled on the GPS Navigator
- If the altitude preselect is not set below the current aircraft altitude.
- No waypoints with altitude constraints in the flight plan
- Glideslope or Glidepath is the active flight director pitch mode.
- OBS mode is active
- Dead Reckoning mode is active
- Parallel track is active
- Aircraft is on the ground

Vertical navigation is not available between the final approach fix (FAF) and the missed approach point (MAP)

ALTV will be the armed vertical mode during the descent if the altitude preselect is set to a lower altitude than the VNAV reference altitude. This indicates the autopilot / flight director will capture the VNAV altitude reference. ALTS will be the armed mode during the descent if the altitude preselect is set at or above the VNAV reference altitude, indicating that the autopilot / flight director will capture the altitude preselect altitude reference.

## GO AROUND

1. GO AROUND button .....PRESS – Verify GA / GA on G5 or G3X  
autopilot will not disengage
2. Autopilot (if engaged) .....VERIFY airplane pitches up following flight director command bars
3. Power .....APPLY Go Around power
4. GMC 507 Mode Panel .....PRESS NAV to couple to selected navigation source  
OR  
PRESS HDG to Fly ATC Assigned Missed Approach Heading
5. Altitude Preselect .....VERIFY  
Set to appropriate altitude.

### NOTE

The pilot is responsible for initial missed approach guidance in accordance with published procedure. When the GA button is pressed the Flight Director command bars will command go-around pitch attitude and wings level. The pilot must select the CDI to the appropriate navigation source and select the desired lateral and vertical flight director modes.

## MANUAL PITCH TRIM WITH AUTOPILOT ENGAGED

(Amber TRIM UP or TRIM DOWN displayed on G5 or G3X.)

If the aircraft is not equipped with a pitch trim servo, the pilot must manually adjust the pitch trim when airspeed and aircraft configuration changes are made. A message will be displayed on the G5 or G3X display to indicate the pitch servo is holding sustained force, and the pilot must manually trim the aircraft.

1. If TRIM UP message is displayed .....MANUALLY TRIM nose up
2. If TRIM DOWN message is displayed .....MANUALLY TRIM nose down



## LATERAL MODES

### HEADING MODE (HDG)

1. HDG Key .....PRESS  
The autopilot will turn the airplane in the direction of the heading bug.
2. HDG/TRK Knob .....Rotate to set heading bug to desired heading.
3. When the airplane reaches the heading bug, the autopilot will roll the wings level to track the reference.

### TRACK MODE (TRK)

1. TRK Key .....PRESS  
The autopilot will turn the airplane in the direction of the track bug.
2. HDG/TRK Knob .....Rotate to set track bug to desired track.
3. When the airplane reaches the track bug, the autopilot will roll the wings level to track the reference.

### NAVIGATION (VOR)

1. Navigation Source. ....SELECT CDI to VHF NAV  
Tune and identify the station frequency.
2. Course Pointer .....SET CDI to the Desired Course
3. Intercept Heading ..... ESTABLISH in HDG, TRK or ROL mode
4. NAV Key.....PRESS

#### NOTE

If the Course Deviation Indicator (CDI) is greater than one dot from center, the autopilot will arm the VOR mode. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is one dot or less from center, the autopilot will enter the capture mode when the NAV key is pressed.

## NAVIGATION (GPS)

1. Navigation Source..... SELECT CDI to GPS
2. Waypoint ..... SELECT on Navigation Source
3. Course Pointer .....VERIFY CDI set to the Desired Course
4. Intercept Heading.....ESTABLISH in HDG or ROL mode
5. NAV Key.....PRESS

### NOTE

If the Course Deviation Indicator (CDI) is greater than one dot from center, the autopilot will arm the GPS mode. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is one dot or less from center, the autopilot will enter the capture mode when the NAV key is pressed.

## APPROACHES

### ILS

1. Navigation Source..... SELECT CDI to VHF Nav  
Tune and Identify an ILS station frequency.
2. CDI ..... SET to front LOC course
3. Ensure that the current heading will result in a capture of the selected course.
4. Press APR Key ..... VERIFY LOC and GS ARMED
5. Verify ..... Airplane Captures and Tracks LOC and GS
6. Set Missed Approach Altitude in Altitude preselect.
7. At Decision Altitude (DA),
  - AP DISC / TRIM INT button ..... PRESS, Continue visually for a normal landing  
Or
  - GO AROUND (GA) button.....PRESS, Execute Missed Approach Procedure
  - Apply GA power.

### NOTE

Pressing the GA button will not disconnect the autopilot. Select NAV or HDG mode to fly the missed approach procedure.

If the Course Deviation Indicator (CDI) is greater than half scale deflection, the autopilot will arm the LOC mode. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is within half scale deflection, the autopilot will enter the capture mode when the APR key is pressed.

When the selected navigation source is an ILS, glideslope coupling is automatically armed when the APR key is pressed. The glideslope cannot be captured until the localizer is captured. The autopilot can capture the glideslope from above or below the glideslope.

**LOC (GS out)**

- 1. Navigation Source.....SELECT CDI to VHF Nav  
Tune and Identify an ILS station frequency.
- 2. Course Pointer ..... SET to front LOC course
- 3. Ensure that the current heading will result in a capture of the selected course.
- 4. Press NAV Key ..... VERIFY LOC ARMED
- 5. Verify ..... Airplane Captures and Tracks LOC Course
- 6. Once airplane is in ALT mode inbound to the FAF, set the altitude preselect to the next required step down altitude. Use VS mode to descend airplane along the vertical step downs and to the MDA.
- 7. When in ALT mode at the MDA, set missed approach altitude in the altitude preselect.
- 8. At Missed Approach Point,
  - AP DISC / TRIM INT button ..... PRESS, Continue visually for a normal landing  
Or
  - GO AROUND (GA) button.....PRESS, Execute Missed Approach Procedure
  - Apply GA power.
  - Set missed approach altitude in the altitude preselect.

**NOTE**

Pressing the GA button will not disconnect the autopilot. Select NAV or HDG mode to fly the missed approach procedure.

## GPS Approach (LPV, LNAV/VNAV, LP+V, or LNAV+V)

1. Navigation Source..... SELECT CDI to GPS
2. Course Pointer .....VERIFY CDI set to the Desired Course
3. Ensure that the current heading will result in a capture of the selected course.
4. Press APR Key ..... VERIFY GPS and GP ARMED
5. Verify ..... Airplane Captures and Tracks GPS and GP
6. Press ALT Key to level off at the MDA for a LP+V or LNAV+V approach
7. At DA (LPV or LNAV/VNAV approach), or MDA and Missed Approach Point (LP+V or LNAV+V)
  - AP DISC / TRIM INT button ..... PRESS, Continue visually for a normal landing  
Or
  - GO AROUND (GA) button.....PRESS, Execute Missed Approach Procedure
  - Apply GA power.
  - Set missed approach altitude in the altitude preselect.

### NOTE

Pressing the GA button will not disconnect the autopilot. Select NAV or HDG mode to fly the missed approach procedure.

## GPS Approach (LP, LNAV)

1. Navigation Source..... SELECT GPS on the CDI
2. Course Pointer .....VERIFY CDI set on the Desired Course
3. Ensure that the current heading will result in a capture of the selected course.
4. Press NAV Key ..... VERIFY GPS ARMED
5. Verify .....Airplane Captures and Tracks GPS Course
6. Once airplane is in ALT mode inbound to the FAF, set the altitude preselect to the next required step down altitude. Use VS mode to descend airplane along the vertical step downs and to the MDA.
7. When in ALT mode at the MDA, set missed approach altitude in the altitude preselect.
8. At Missed Approach Point,
  - AP DISC / TRIM INT button ..... PRESS, Continue visually for a normal landing  
Or
  - GO AROUND (GA) button.....PRESS, Execute Missed Approach Procedure
  - Apply GA power.
  - Set missed approach altitude in the altitude preselect.

### NOTE

Pressing the GA button will not disconnect the autopilot. Select NAV or HDG mode to fly the missed approach procedure.

## BC

1. Navigation Source.....SELECT CDI to VHF Nav  
Tune and Identify an ILS station frequency
2. Course Pointer ..... SET CDI to LOC Front Course
3. Ensure that the current heading will result in a capture of the selected course.
4. Press NAV Key .....VERIFY BC ARMED  
(when heading is within 75 degrees of BC course)
5. Verify ..... Airplane Captures and Tracks BC Course
6. Once airplane is in ALT mode inbound to the FAF, set the altitude preselect to the next required step down altitude. Use VS mode to descend airplane along the vertical step downs and to the MDA.
7. When in ALT mode at the MDA, set missed approach altitude in the altitude preselect.
8. At Missed Approach Point:
  - AP DISC / TRIM INT button ..... PRESS, Continue visually for a normal landing  
Or
  - GO AROUND (GA) button.....PRESS, Execute Missed Approach Procedure
  - Apply GA power.
  - Set missed approach altitude in the altitude preselect.

### NOTE

Pressing the GA button will not disconnect the autopilot. Select NAV or HDG mode to fly the missed approach procedure.

## VOR Approach

1. Navigation Source..... SELECT CDI to VHF Nav  
Tune and identify the station frequency
2. Course Pointer .....SET CDI to the Desired Course
3. Ensure that the current heading will result in a capture of the selected course.
4. Press NAV Key ..... VERIFY VOR ARMED
5. Verify .....Airplane Captures and Tracks VOR Course
6. Once airplane is in ALT mode inbound to the FAF, set the altitude preselect to the next required step down altitude. Use VS mode to descend airplane along the vertical step downs and to the MDA.
7. When in ALT mode at the MDA, set missed approach altitude in the altitude preselect.
8. At Missed Approach Point:
  - AP DISC / TRIM INT button ..... PRESS, Continue visually for a normal landing  
Or
  - GO AROUND (GA) button..... PRESS, Execute Missed Approach Procedure
  - Apply GA power.
  - Set missed approach altitude in the altitude preselect.

### NOTE

Pressing the GA button will not disconnect the autopilot. Select NAV or HDG mode to fly the missed approach procedure.

## DISABLING ESP

ESP can be disabled on the G5 attitude indicator with the following procedure. ESP will default to "Enabled" on the next power cycle.

1. G5 Knob ..... PRESS
2. ESP ..... SELECT
3. G5 Knob ..... PRESS

ESP can be disabled on the G3X with the following procedure. ESP will default to "Enabled" on the next power cycle.

1. Autopilot Status Box ..... TOUCH
2. ESP Button ..... TOUCH
3. Back Button ..... PRESS