SECTION III
OPERATING INSTRUCTIONS

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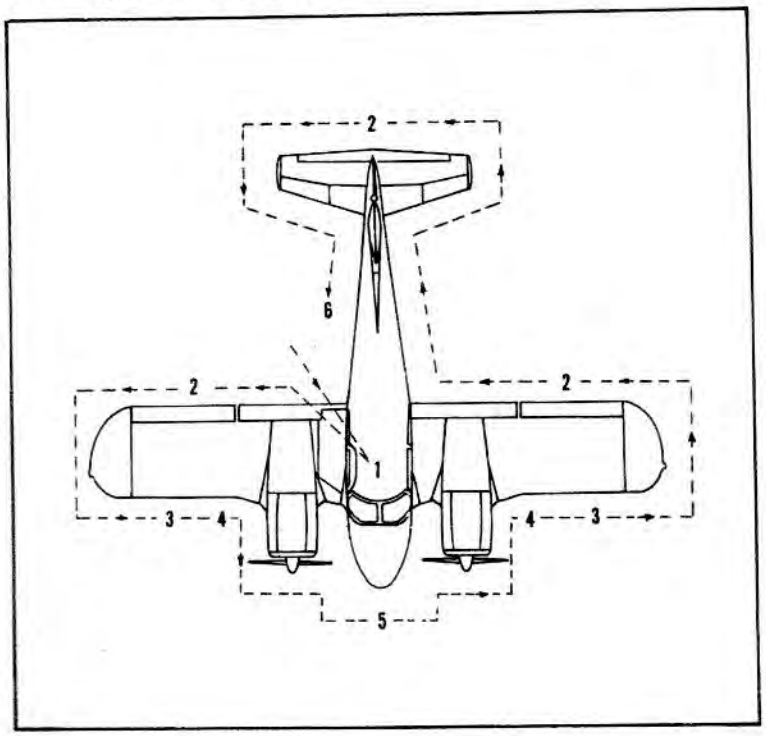
PREFLIGHT

The following safety procedure instructions must become an integral part of the pilot's operational routine and preflight inspection.

Given below is an outline for preflighting the Apache:

1. a. Ignition and battery switches "OFF".



2. a. Determined that there is no external damage or operational interference to the control surfaces, wings or fuselage.

b. Determined that there is no snow, ice, or frost on the wings or control surfaces.

3. a. Check fuel supply.

b. Check fuel cell caps and covers for security (adjust caps to maintain tight seal).

c. The fuel system vents are open.

4. a. The landing gear shock struts are properly inflated (approximately 3" piston exposed).

b. The tires are satisfactorily inflated and not excessively worn.

c. Drain the fuel strainers and lines.

d. The cowling and inspection covers are secured.

e. The propellers are free of detrimental nicks.

f. There are no obvious fuel or oil leaks.

g. The engine oil is at the proper level.

5. a. The windshield is clean and free of defects.

6. a. The tow-bar and control locks are detached and properly stowed. Check that baggage door is secured.

7. a. Upon entering the airplane, ascertain that all controls operate normally.

b. Check that the landing gear selector and the other controls are in their proper position.

c. Close and secure the cabin door.

d. Check that required papers are in order and in the airplane.

STARTING

Before starting the engine, the pilot should set the parking brake and turn on the master switch and the electric fuel pumps. Each set of pumps should be individually checked for operation. When the engine is cold, (under 40^{O} F) prime five to six strokes, making sure fuel valves are on, crossfeed off, fuel pressures normal and fuel quantity checked. Push mixture controls to

full rich, carburetor heat off, and open throttles about one-quarter inch. If the engines are extremely cold, they should be pulled through by hand four to six times.

Next turn all ignition switches on and engage starter on left engine first. After engine starts, idle at 800 to 1400 RPM and start right engine. If battery is low, before starting right engine, run left engine over 1200 RPM to cut in the generator. This will produce extra power for starting the right engine. If the engine does not start in the first few revolutions, open the throttle on that engine while the engine is turning over with the ignition on. When the engine starts, reduce the throttle.

If the above procedure does not start the engine, reprime and repeat the process. Continue to load cylinders by priming or unload by turning the engine over with the throttle open. If the engine still does not start, check for malfunctioning of ignition or fuel system.

Priming can be accomplished by pumping the throttle controls, however, excessive pumping may over-prime the engines, making starting difficult.

When the engines are warm, (over 40° F) two to three strokes of the throttle as the engine is initially rotated by the starter is recommended. The engines should start after rotating through about four compression strokes.

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

WARM-UP AND GROUND CHECK

As soon as the engines start, the oil pressure should be checked. If no pressure is indicated within thirty seconds, stop the engine and determine the trouble. (If a very cold temperature exists (10° F or below) a little longer period of time may be necessary.)

Warm-up the engines at 1000 to 1400 RPM for not more than two minutes in warm weather, four minutes in cold weather. Avoid prolonged idling at low RPM as this practice

5. Crossfeed off.
6. Primers locked.
7. Electric fuel pumps on.
8. Flaps up.
9. Tabs set.
10. Carburetor heat off.
11. Mixtures rich.
12. Propellers set.
13. Engine gauges normal.
14. Door locked.

After the take-off has proceeded to the point where a landing can no longer be made wheels-down in event of power failure, the wheels should be retracted. When the wheels are up, the throttles should be brought back to climbing power, 24" MP, and the RPM reduced to 2400. Minimum single engine speed (80 MPH) should be attained before take-off.

CLIMB

The best rate of climb is obtained at 110 MPH, but to give a high forward speed as well as a good rate of climb, a cruising climb speed of 130 MPH is recommended.

STALLS

All controls are effective at speeds down through the stalling speed, and stalls are gentle and easily controlled.

STALL SPEED TABLE	
Configuration	Power Off
Gear and Flaps Up	72 T.I.A.S.
Gear and Flaps Down (Full)	62 T.I.A.S.

These figures are at gross weight of 4800 lbs. in MPH.

CRUISING

The cruising speed of the Apache is determined by many factors including power setting, altitude, temperature, load,

and equipment installed on the airplane.

The normal recommended economy cruising power setting of the Apache is at 65% power. At 11,000 feet this gives a True Air Speed of 183 MPH. This power setting is obtained under standard conditions at 2400 RPM and 19.9" MP. Fuel consumption is about 11 gallons per hour, or 22 gallons per hour total.

The optimum cruising speed of the Apache at 7000' is 191 MPH. (See Power and Performance charts for power settings and performance under various conditions.)

The Lycoming engines on the Apache can be cruised at any percent of power from 75% down. 2400 RPM is recommended for maximum cruise performance and lower RPM's, down to 1800, for more economical cruising conditions. Ordinarily an RPM setting should be selected which will give maximum smoothness. To avoid undesirable stresses on the propeller and the possibility of detonation in the engine, no Manifold Pressure settings over 25" should be used with an RPM of less than 2000.

The mixture should be leaned 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. Always enrich the mixture before increasing power settings. Use of the mixture control in cruising flight reduces fuel consumption significantly, especially at higher altitudes, and reduces lead deposits when the alternate fuels are used. The fuel consumption data in this manual is for cruising with the mixture leaned.

There is no problem in overheating the engine cylinders on the Apache by excessive leaning, provided leaning is done at a cruise power of 75% or less. For this reason no cylinder head temperature gauge is provided. The engines run very rich at the full rich mixture position, and leaning is essential to achieve satisfactory economy of operation.

To lean, pull back the mixture controls to the farthest aft point at which a rapid forward movement of the control does not produce a momentary surge in RPM, indicating that the mixture has been too lean for maximum power. To get optimum leaning, the control must be within 1/8" forward of this

point, which may be established by using a thumbnail as a temporary marker, or adding a pencil reference line on the quadrant placard.

The carburetor air heater on the Apache is of extremely high capacity, and is designed to provide enough heat to remove carburetor icing and related induction system phenomena under the most severe conditions. A heat rise of approximately 185° F can be obtained with the application of full heat. This creates a power loss of about 18% with very little indication on the Manifold Pressure gauge, which has a maximum drop of about 1" MP. The power loss will show up in the performance of the airplane, and should be held to a minimum by applying only that amount of heat required to keep the carburetor or induction system free of ice.

Locking controls on the carburetor air heaters and carburetor air temperature controls are provided to facilitate setting and maintaining the carburetor air temperatures at the proper level for positive de-icing without excessive power loss. Due to the two stage action of the carburetor heat box control, a slight retarding action will be noticed when pulling the carburetor heat control on at about the three quarter open position; however, a slight pull will allow the control to continue to full carburetor heat.

The application of carburetor heat enriches the mixture, therefore the mixture should be leaned after heat has been applied, for smooth and economical engine operation.

APPROACH AND LANDING

During the approach, the gear can be lowered at speeds under 150 MPH, preferably on the downwind leg. Flaps should be lowered in final approach at an airspeed under 125 MPH, and the airplane trimmed to a gliding speed of 95 MPH. Normally about 12" MP should be maintained to give a reasonable approach angle. RPM should be left at high cruising RPM or approximately 2400. This propeller setting gives ample power for an emergency go-around and will prevent over-speeding of the engines if the throttle is advanced sharply. The mixture

control should be kept in full rich position to insure maximum acceleration if it should be necessary to open throttle again.

The amount of flap used during landings and the speed of the airplane at contact should be varied according to the wind, the landing surface, and other factors. It is always best to contact the ground at the minimum practicable speed consistent with landing conditions.

Normally, the best technique for short and slow landings is to use full flap and a small amount of power, holding the nose up as long as possible before and after ground contact. In high wind conditions, particularly in strong crosswinds, it may be desirable to approach the ground at higher than normal speeds, with half or no flaps.

Landing check list:

1. Mixtures "RICH".
2. Propellers at high cruising RPM.
3. Carburetor heat "OFF" (unless icing conditions exist).
4. Electric fuel pumps "ON".
5. Fuel on proper tanks.
6. Landing gear "DOWN" (under 150 MPH), check green indicator lights on, landing gear warning horn off, and flashing red light in gear handle off.
7. Flaps full down or as desired (under 125 MPH).

If, for any reason, it becomes necessary to "go around" apply full power, retract the landing gear and put up the flaps as quickly as possible.

STOPPING THE ENGINES

During the landing roll, the flaps should be raised, the heater turned off, and the electric fuel pumps off. After parking, the radios should be turned off, and the engines stopped by pulling the mixture controls aft to idle cut-off. When using alternate fuels, the engines should be run up to 1200 RPM for one minute prior to shutdown to clean out any unburned fuel. The throttle should be left full aft to avoid engine vibration while stopping. Then the ignition and master switches must be turned off, and the parking brakes set.

EMERGENCY PROCEDURES

1. Engine Failure:

An engine failure on the Apache during cruising flight prevents very minor operational problems. As the engine loses power, a slight yaw in the direction of the dead engine will occur, which can be corrected easily with the rudder or the rudder trim tab. While the plane is slowing down to the single engine cruising speed of about 135 MPH at low altitudes and at moderate power settings, the propeller on the dead engine should be feathered by pulling the throttle to idling position, and the prop pitch control back fully; then the mixture should be set at idle cut-off, and the ignition off. Best single engine performance will be obtained with the dead engine wing held up about 3 degrees higher than level to help counteract the tendency to turn in that direction.

CAUTION

If the left engine has failed, the hydraulic pump will not be functioning. If it is necessary to lower the landing gear or flaps with the left engine dead, the hydraulic hand pump located in the pedestal is used. (See 5, this section.)

2. Feathering:

The Hartzell feathering propellers can only be feathered while the failed engine is rotating, and not if the engine stops completely, because the centrifugal force due to rotation is necessary to hold out a stop-pin which keeps the propeller from feathering each time the engine is stopped on the ground. Therefore, if an engine freezes up, it will not be possible to feather its propeller. In that case, single engine flight can be maintained with the dead engine propeller unfeathered, although a noticeable decrease in single engine performance will take place.

If an engine failure occurs during take-off run, the power on the good engine should be cut and the airplane stopped

straight ahead. If it occurs after leaving the ground, but with sufficient landing area still ahead, a landing should be effected immediately. If no landing can be made directly after the failure, the following steps should be followed:

a. Apply full power to good engine.

b. Feather dead engine.

c. Retract landing gear and flaps, if extended (using hand pump if left engine is out). If enough altitude has been reached before the failure occurred, or if performance is satisfactory for reaching the airport with the gear extended, leave the landing gear in the down position.

d. Maintain a best climb airspeed of 110 MPH.

e. Trim directionally with rudder trim.

f. As the airport is reapproached for landing, reduce power on the good engine and gradually retrim with the rudder tab. When it is obvious that the airport can be reached easily, lower the landing gear and check the indicators to make sure it is down and locked. Maintain a little extra altitude and speed during the approach, keeping in mind that the landing should be made right the first time, and that either undershooting or overshooting may require the use of full power on the good engine, making control more difficult. Lower the flaps at the last moment if desired.

3. Unfeathering:

It is not recommended that propeller feathering and unfeathering be practiced on the ground because of the excessive vibration that occurs in the engine installation. In flight, feathering should be practiced only to familiarize the pilot with the proper procedures. To unfeather a propeller in flight, the following technique is recommended:

a. Ignition switches "ON".

b. Mixture "RICH".

c. Pump throttle several times, then close.

d. Prop control at cruise setting.

e. Engage starter until engine starts and reaches 500 RPM.

f. Allow engine to idle at 1000 to 1500 RPM with carburetor heat "ON" until oil temperature begins to rise. Adjust to cruising power when engine is warm.

The Standard Apache, operating at gross weight under optimum conditions of turbulence and pilot technique, and under standard conditions of temperature and altitude, has a single engine absolute ceiling of 6600 feet at 4800 lbs. gross weight and maximum obtainable power.

Under ideal conditions, the Apache can be expected to maintain approximately the stated maximum altitudes. When adverse conditions of turbulence, temperature, altitude, pilot technique, or aircraft condition or equipment are encountered, the absolute ceiling altitude will be reduced. These factors must be taken into consideration in the single engine operation of any twin engine aircraft.

Pilots of this airplane should remain reasonably proficient in single engine flight. In many cases, "simulated" single engine operation (zero thrust condition, approximately 10" MP and 2200 RPM) will be preferable, but actual single engine operation should be practiced occasionally. The following precautions should be exercised in actual single engine flight:

a. Do not feather a propeller if you have reason to suspect that the starting characteristics of the engine are not normal and that restarting in the air may be difficult or impossible.

b. Do not feather a propeller in conditions of temperature, altitude, weight or turbulence which may prevent single engine flight at altitudes well above the local ground elevation.

c. Do not feather a propeller at any time when conditions of terrain or other conditions may prevent the aircraft from reaching an airport easily, in case the dead engine cannot be restarted.

d. Single engine operation must be practiced only with a well qualified twin engine rated pilot, familiar with Apache characteristics and procedures, in one of the pilots' seats.

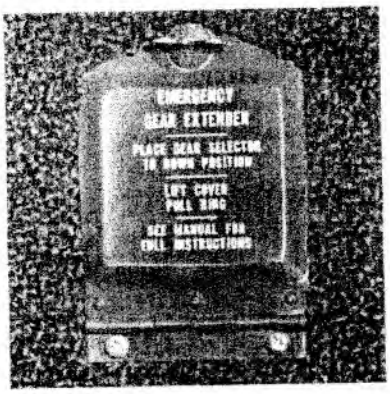
4. Emergency Landings:

The Apache is designed to take gear-up emergency landings without extensive damage to the structure of the airplane. All three wheels protrude about one-third of their diameter when retracted, and structure is provided to take minor loads in this condition. On a wheels-up landing, since the main wheels are forward of their down position, the airplane will tend to settle down at the rear when the landing speed is decreasing, and full forward control wheel pressure should be used to hold the tail up as long as possible. The flaps should not be extended because they will contact the ground first, causing damage to the flap and the wing. The propellers should be feathered and stopped in a horizontal position. Fuel valves and electrical switches should be turned to off position.

A wheels-up landing should only be made during an emergency when the surface is too soft or too rough to permit a gear-down landing, or when an emergency water landing is necessary.

5. Emergency Landing Gear Extension:

If the engine driven hydraulic pump fails, or the left engine driving the pump, extension of the landing gear or flaps is accomplished by supplying hydraulic pressure with the manual hydraulic pump. With the gear or flap control in the desired position, 30-40 strokes of the pump handle will raise or lower



WARNING

The landing gear control on the selector valve must be in the "down" position when the gear extender control is pulled, in order to allow the gear to be extended properly.

the landing gear, and 12 strokes will raise or extend the flaps.

In the event of hydraulic system failure caused by a line breaking or the selector valve malfunctioning, the landing gear can be lowered by using the Emergency Gear Extender. The control for the extender is located beneath a small cover plate under the pilot's seat. When this control is pulled, CO_2 flows from a cylinder under the floorboards through separate lines to shuttle valves adjacent to the gear extension cylinders. The gas pressure opens the shuttle valves, allowing CO_2 to enter the gear cylinders, extending the gears.

The Emergency Gear Extender should only be used when all other means of lowering the landing gear have failed, and only when the gear can be left down for landing.

CAUTION

When the Extender has been used, the landing gear or flaps must not be actuated hydraulically in any way until the extension system has been returned to its normal condition.

6. In-Flight Cabin Door Closing Procedure:

In the event the cabin door is inadvertently unlocked in flight or should the handle not be pushed forward to its full locked position before take-off and becomes dislodged from its latching mechanism, the following procedure has been determined to be practicable for closing the cabin door while in flight, assuming adequate altitude has been attained.

a. Retard throttle.
b. Reduce airspeed to 90 MPH or less.
c. Open storm window (left of pilot).
d. Close door.
e. Recover power and airspeed.

Other conditions, take-off, landing approach, and general low altitude flight, will require action at the discretion of the pilot.

GROUND HANDLING AND MOORING

The Apache should be moved on the ground with the aid of the nose wheel steering bar provided with each plane and installed in the baggage compartment.

Tie down ropes for mooring the airplane can be fastened to the wing tie down rings and at the tail skid.

The aileron and stabilator controls should be secured by means of a safety belt or control locks to prevent control surface damage. The rudder is held in position by its connections with the steerable nose wheel, and does not need to be secured except under unusually high wind conditions.

WEIGHT AND BALANCE

For weight and balance data, see the Weight and Balance Form, which gives the exact weight of the airplane and permissible center of gravity conditions.

OPERATION TIPS

In the operation of the Apache, as in that of any other type of aircraft, there are a few points of technique and information that apply particularly to this model. The following Operating Tips may be helpful in the operation of the Apache:

1. Learn to trim the airplane for take-off so that only a very light back pressure on the wheel is required to lift the ship off the ground.

2. Due to the very rapid feathering action of the propeller on the Apache, it will be necessary when feathering during ground check to move the propeller control in and out of feather position very quickly in order to prevent the RPM from dropping below 1400 RPM and causing excessive manifold pressure.

3. On take-off, do not retract the gear prematurely. The aircraft may settle and make contact with the ground because of lack of flying speed, atmospheric conditions or rolling terrain.

4. The best speed for take-off is at about 80 MPH under normal conditions. Trying to pull the airplane off the ground at too low an airspeed decreases the controllability of the airplane in event of engine failure. (Minimum controllable single engine airspeed is 80 MPH.)

5. In high density areas where high traffic pattern speeds are necessary or when it is advantageous to extend the gear, it is permissible to extend the landing gear at speeds up to 150 MPH: however, it is recommended the landing gear should normally be extended at speeds below 150 MPH.

6. The flaps may be lowered at airspeeds up to 125 MPH. To reduce flap operating loads, however, it is desirable to have the airplane at a slower speed before extending the flaps.

7. Before attempting to reset any circuit breaker, allow a two to five minute cooling off period.

8. Always ascertain position of landing gear by checking the gear position light.

9. For convenience and to obtain best service life from the heater components, it is recommended that the heater switch be turned off about two minutes before stopping the engines and shutting off the master switch. This should normally be done during taxiing after landing.

10. Remember that when the navigation lights are on the gear position lights are very dim.

11. Before starting the engines ascertain that all radio switches, light switches, and the pitot heat switch are in the off position so as not to create an overloaded condition when the starter is engaged.

12. The trim tab on the Apache is very responsive and a small adjustment in trim control gives a rapid trim change attitude.

13. The Lycoming Engines on the Apache run rich at the full rich position of the mixture control, and must be leaned under all cruise conditions to achieve satisfactory economy.

RADIO OPERATION

Communication and navigational equipment controls are located in the center of the instrument panel. Associated auxiliary switches are located on a separate panel below the altimeter instrument on the lower left side of the instrument panel. Circuit breakers for the radios are located on the same panel as the other circuit breakers.

All sets may be turned "ON" by the switch located on the control head of each particular unit, with the exception of the marker beacon which has its switch located on the Audio Selector Switch Panel.

After power is supplied, the pilot may wish to operate one of the two transmitters by moving the transmitter selector switch to the proper position. The switch is located on the selector switch panel.

A separate three position audio selector switch is provided for each receiver. Each receiver audio output may be connected to either the speaker or the headset. In addition they may be placed in the "OFF" or standby position.

Two or more sets may be simultaneously connected to either the headset or speaker position by placing the selector switches in the desired combination. For example, the A.D.F. and the Mark V may be selected to operate on the speaker and the Mark 10 may be selected for headset operation. If desired the pilot may listen to the speaker and the co-pilot the headset.