PILOT'S OPERATING HANDBOOK AND AIRPLANE FLIGHT MANUAL

Serial Number: **<u>CCK1865-00XX</u>**

Registration number: ________________

This handbook includes the material required by the Federal Aviation Administration to be furnished to the pilot. It also includes additional information provided by the manufacturer/owner and constitutes the written operating instructions. This document must be carried in the airplane at all times.

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WARNING

THIS OPERATING MANUAL IS ONLY VALID FOR USE WITH THE AIRCRAFT IDENTIFIED ON THE FACE PAGE.

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AIRPLANE FLIGHT MANUAL

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SECTION 1

GENERAL INFORMATION

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1 GENERAL INFORMATION

1.1 INTRODUCTION

This manual is not intended to be a flight instruction manual. It is not a substitute for adequate, competent flight training.

The pilot-in-command is responsible for determining whether the airplane is safe for flight. He/She is also responsible for ensuring that all operations are conducted within the limitations defined by the appropriate FAA regulations, this manual, the aircraft's instrument markings, and appropriate placards.

While it is intended that this manual be used in flight, it must be studied regularly. The pilot must be familiar with all limitations, performance data, procedures and operational handling characteristics of the airplane prior to operating the airplane.

1.2 WARNING, CAUTIONS, AND NOTES

WARNINGS, CAUTIONS and **NOTES** are used to emphasize critical and important information, and are used as defined below:

WARNING
AN OPERATING PROCEDURE, PRACTICE, OR A CONDITION WHICH, IF NOT CORRECTLY FOLLOWED OR REMEDIED, COULD RESULT IN SERIOUS PERSONAL INJURY OR LOSS OF LIFE.

CAUTION
An operating procedure, practice, or a condition which, if not strictly observed or corrected, could result in destruction of, or damage to equipment.

NOTE
An operating procedure, practice, or condition which is important to emphasize.

1.3 SUMMARY OF PERFORMANCE SPECIFICATIONS

Gross Weight (wheels or skis) .... 1865 lbs

Gross Weight (floats) 1865bs

Top Speed (Sea Level/80hp) .... 138 mph

Cruise Speed (6000’, 80hp) .... 96 mph

Range (6000’, 80hp, w/reserves .... 650 sm

Endurance (6000’, 80hp, w/reserves) .... 6.5 hours

Rate of Climb (2000’) .... 2000 fpm

Stall Speed (full flaps) .... 32 mph

Stall Speed (no flaps) .... 40 mph

Fuel Capacity (Total, both tanks) ....44 gallons

Fuel Capacity (Usable, both tanks) ....42 gallons

Approved Fuel Grades 100LL

Maximum Continuous Engine Power .... 180 hp

Maximum Engine RPM.....................................2700rpm

Oil Capacity.. 6 Quarts

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SECTION 2

LIMITATIONS

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2. LIMITATIONS

2.1 GENERAL

This section provides the approved operating limitations, instrument markings, color-coding and basic placards for operation of the aircraft.

2.2 AIRSPEED LIMITATIONS

SPEED	IAS (mph)
Never Exceed Speed (V_{NE})	141

Do not exceed this speed in any operation.

Maximum Operating Maneuvering Speed (V_A)

At 1320 lbs weight	93mph
At 1430 lbs weight	97mph
At 1865 lbs gross weight	99mph

Do not make full or abrupt control movements above this speed.

> **CAUTION**
> **Maximum operating speed *DECREASES* at lighter weight as the effects of aerodynamic forces become more pronounced. Linear interpolation may be used for intermediate gross weights.**

SPEED	IAS (mph)
Maximum Flap Extended Speed (V_{FE})	
First notch (15°)	85mph
Second notch (35°)	81mph
Full flaps (50°)	81mph

Maximum Demonstrated Crosswind Component	11 kts

Do not exceed the flap speed corresponding to a given setting

SPEED	IAS (mph)
Stall Speed	
Stall Speed with Full Flaps	32mph
Stall Speed with No Flaps	40mph

2.3 AIRSPEED INDICATOR MARKINGS

Airspeed indicator markings and their significance are shown in Table 2-1.

MARKING	SPEED RANGE OR VALUE (IAS)	SIGNIFICANCE
Red radial line	141 mph	Never exceed speed V_{NE}
Yellow arc	101-141 mph	Operations must be conducted with caution and in smooth air
Green arc	40-101 mph	Normal operating range
White arc	32-81 mph	Operating range with up to 50° flaps extended

Table 2-1 Airspeed Indicator Markings

2.4 POWERPLANT LIMITATIONS

Engine manufacturer .... CubCrafters

Engine model number CC340

Engine operating limits

- Max Continuous Power 180hp
- Takeoff Power 180hp
- Maximum engine speed 2700rpm
- Oil Pressure, Minimum 25psi
- Oil Pressure, Maximum 100psi
- Oil Temperature, Maximum .... 245°F
- Fuel limitations (grade) 100LL
- Oil Capacity .... 8 Quarts

2.5 POWERPLANT INSTRUMENT MARKINGS

TACHOMETER	Red radial line	2700 rpm
	Green arc (normal operating range)	500-2700 rpm
OIL PRESSURE	Yellow arc (caution, low)	25-60 psi
	Green arc (normal)	60-85 psi
	Yellow arc (caution, high)	85-100 psi
	Red radial line (maximum)	100 psi
OIL TEMPERATURE	Yellow arc (caution, low)	40-120°F
	Green arc (normal)	120-245°F
	Red radial line (maximum)	245°F

Table 2-2 Powerplant Instrument Markings

2.6 WEIGHT LIMITS

Maximum Weight (On Wheels or Skis) .... 1865 lbs

Maximum Weight (On Floats) .... 1865 lbs

2.7 CENTER OF GRAVITY

Forward CG Limits
At 1865 lbs...................................74 inches aft of datum

At 1600 lbs or less ....70.5 inches aft of datum

(Straight line variation between points given)

Aft CG Limit (at all weights) ....79 inches aft of datum

The datum is 60 inches forward of wing leading edge.

2.8 MANEUVERS

CAUTION
All aerobatic maneuvers, including spins, are prohibited.

2.9 MANEUVER LOAD FACTORS

Maximum positive load factor, flaps up ....4.0 g

Maximum positive load factor, flaps down ....2.0 g

Maximum negative load factor ....-2.0 g

No inverted maneuvers are approved.

2.10 MINIMUM FLIGHT CREW

The minimum required flight crew is one pilot in the front seat.

2.11 KINDS OF OPERATION

Day V.F.R.

Flight into I.M.C. is prohibited.

Flight into known icing is prohibited.

2.12 MAXIMUM OPERATING ALTITUDE

The maximum operating altitude is 17,999 feet. Use supplemental oxygen as required by your Civil Aviation Authority.

2.13 MAXIMUM PASSENGER SEATING

The aircraft is approved to carry one passenger, seated behind the pilot, if equipped.

2.14 ALLOWABLE FUEL LOADING

44 US gallons total capacity

42 US gallons total usable

2.15 BAGGAGE AND CARGO LOADING

Forward cargo compartment
(behind passenger) .... 100 lbs
Cargo compartment
(behind forward cargo compartment) .... 60 lbs

See Section 6 for loading information and distribution.

2.16 SMOKING

Smoking is prohibited in the aircraft

2.17 TYPES OF SURFACES

The aircraft may be operated from paved and unpaved runways.

2.18 VORTEX GENERATORS

The aircraft is allowed to fly with the following number of vortex generators missing:

- Not more than three vortex generators missing on an aircraft.
- Not more than two vortex generators missing on a wing.
- The missing vortex generators must not be next to each other.

2.19 PLACARDS

In view of the pilot:

OPERATOR MUST READ AND BE FAMILIAR WITH PILOT OPERATING HANDBOOK BEFORE FLYING AIRCRAFT. NO INTENTIONAL SPINS.

OR

READ THE PILOT'S OPERATING HANDBOOK. NO INTENTIONAL SPINS. FLIGHT INTO IMC PROHIBITED.

[redacted]

If equipped with extended range fuel tanks:

MAXIMUM FUEL IMBALANCE
5 GALLONS DIFFERENCE BETWEEN TANKS

On top inboard of all lift struts:

NO STEP

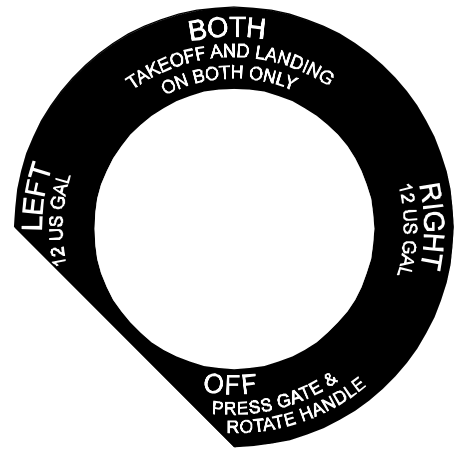
Behind the front seat:

THIS AIRCRAFT WAS MANUFACTURED IN ACCORDANCE WITH LIGHT SPORT AIRCRAFT AIRWORTHINESS STANDARDS AND DOES NOT CONFORM TO STANDARD CATEGORY AIRWORTHINESS REQUIREMENTS.

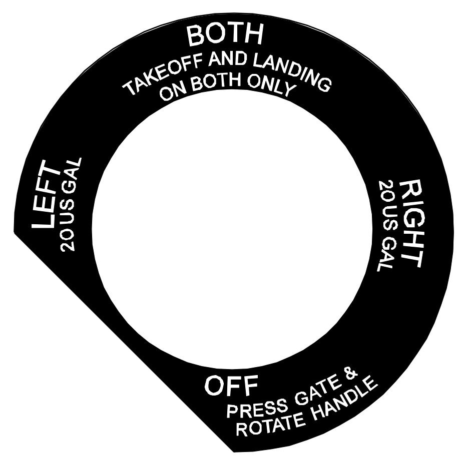
In forward cargo compartment:

FORWARD CARGO COMPARTMENT MAX CAPACITY 100 LBS

Next to fuel selector for standard tanks:



Next to fuel selector for extended range tanks:



In cargo shelf compartment:

On extended baggage compartment door:

On flap lever:

On wing next to tank filler with standard tanks:

On wing next to tank filler with extended range tanks:

Near stall warning vane:

On right-hand side of empennage:

Below each throttle control:

On instrument panel, if equipped:

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SECTION 3

EMERGENCY PROCEDURES

3 EMERGENCY PROCEDURES

3.1 GENERAL

This section provides the recommended procedures that should be followed during an emergency or a critical situation. It is divided into two parts. The first contains emergency procedure checklists. The second part amplifies the items listed in the checklists and includes information that is not readily adaptable to a checklist format or which the pilot could not be expected to refer to in an emergency situation. This information should be reviewed regularly.

Pilots must familiarize themselves with the procedures in this section and must be prepared to take appropriate action should an emergency arise.

It is stressed that the procedures outlined in this section are recommendations only. They are not a substitute for sound judgment and common sense and may have to be adjusted, depending on the circumstances prevailing at the time of the emergency. It is important that the pilot be thoroughly familiar with the aircraft. The pilot must review and practice as many of these procedures as are safe to perform as part of his training.

Above all, in any emergency situation, MAINTAIN CONTROL OF THE AIRCRAFT.

3.2 EMERGENCY OPERATION AIRSPEEDS

STALL SPEEDS
Flaps up (V_{S1}) .... 40 mph (IAS)

Flaps down (50°) (V_{S0})...............................32 mph (IAS)

OPERATING MANEUVERING SPEED (V_A)
At 1320 lb...93 mph (IAS)

At 1865 lb...99 mph (IAS)

BEST GLIDE (V_G)
Flaps up (1865 lb)......................................68 mph (IAS)

Flaps down (50°, 1865 lb)............................49mph (IAS)

3.3 EMERGENCY CHECKLIST

3.3.1 ENGINE FIRE DURING START

Starter ....Crank engine
Continue to get a start that would suck the flames and accumulated fire into the engine.

If engine starts:
Power ....1700 RPM for a few minutes
Engine .... Shut down by pulling mixture to idle cut-off

Have a qualified technician thoroughly inspect the engine and the airframe.

If engine fails to start:
Mixture.. Idle cut-off
Throttle .... Open
Fuel selector.. Off

Have a qualified technician thoroughly inspect the engine and the airframe.

If fire persists:
Fire Extinguisher .... If safe to do so, remove extinguisher and attempt to extinguish fire

IF FIRE PERSISTS, ABANDON AIRCRAFT AND SUMMON HELP.

3.3.2 ENGINE FAILURE DURING TAKEOFF

PRIOR TO LIFT-OFF

Maintain directional control
Throttle .... Idle
Brakes ....Apply as necessary
Wing flaps.. Retract
Mixture... Idle cut-off
Electronic ignition switches .... Off
Master switch .... Off

AFTER LIFT-OFF

If sufficient runway remains for a normal landing, land straight ahead.

If insufficient runway remains:
Maintain a safe airspeed.
Use shallow turns to avoid obstructions.
Use of flaps depends on circumstances. Normally, flaps should be extended for touchdown.

If you have gained sufficient altitude to attempt a restart, proceed as follows:
Maintain safe airspeed
Fuel selector..Both
Mixture...Check rich
Electronic ignition ....Ensure both on
Ignition Backup Battery (if equipped) ....Emergency
Starter..Engage

If restart is unsuccessful, when landing area is assured:

Electronic ignition .... Off
Master switch .... Off
Fuel selector .... Off
ELT .... Activated
Seat belts .... Tight and secure
Door .... Open
Touchdown .... At the lowest possible airspeed

3.3.3 LOSS OF ENGINE POWER IN FLIGHT

If at low altitude:

Airspeed (best glide) ....MAINTAIN 68 mph (IAS)

If altitude permits:

Airspeed (best glide)...................MAINTAIN 68 mph (IAS)
Fuel selector...Both
Mixture .... Full rich
Carburetor heat .... On (Hot)
Electronic ignition ....Ensure both on
Ignition Backup Battery (if equipped) ....Emergency
Engine instruments ....Check for indication of cause of engine power loss
Starter...Engage

If power is not restored and is insufficient to sustain level flight, prepare for an emergency landing without engine power (Section 3.3.4).

3.3.4 EMERGENCY LANDING WITHOUT ENGINE POWER

Locate suitable field.

Airspeed .... 68 mph (IAS, flaps up)
Seat belts .... Tight and secure

When landing area is assured:

Flaps..As required
Door.. Open
Touchdown...................... At the lowest possible airspeed
ELT... Activate

If time permits, check GPS or charts for airports in the immediate vicinity. If possible, notify your difficulty and intentions by radio on frequency 121.50 and/or squawk 7700.

If practical, establish spiral pattern above the selected landing field. Fly a normal downwind approach, 1000’ AGL abeam the desired landing point, noting any obstacles. Plan your initial approach for the middle of the field.

When aircraft comes to a stop:

Electronic ignition .... Off
Master switch .... Off
Fuel selector .... Off

3.3.5 PRECAUTIONARY LANDING WITH ENGINE POWER

Fuel selector...Both

Seat belts ....Fastened

Mixture ....Set

Flaps ....Set

Maximum speed first notch flaps (15°)........... 85 mph IAS

Maximum speed full flaps (>15°).................... 81 mph IAS

Trim ....As required

Speed...As required

(1.3 times full flaps stall speed at gross weight is 42 mph IAS)

If time permits, check GPS or charts for airports in the immediate vicinity.

If possible and if you are in contact with Air Traffic Control or another aircraft notify your difficulty and intentions by radio on frequency 121.50 and/or squawk 7700, as appropriate.

Fly normal downwind approach 1000' AGL abeam the desired landing field, noting obstacles.

3.3.6 FIRE IN FLIGHT

Source of fire .... Locate

ELECTRICAL FIRE
Master switch .... Off
Windows... Open
Cabin door.. Open

If source of fire is located and it is safe and practical:
Fire extinguisher.. Activate
Land as soon as possible

If fire has been extinguished and electrical power is essential for the continuation of the flight to the nearest suitable airport or landing area:
All electrical switches .... Off
Avionics master switch and avionics .... Off
Circuit breakers ....Check for faulty circuit

If any breakers are out, note the circuits and do not reset or use the equipment powered by these circuits

Master switch .... On
Avionics master switch .... On
Avionics and electrical switches .... On, one at a time, with a delay after each, to ensure that problem does not recur

CAUTION
If the above procedures do no fully contain a smoke/fire, the Alternator circuit breaker may be pulled. If this breaker is pulled and there has been an internal alternator failure, it is unlikely you will be able to recover any alternator use until alternator is replaced.

ENGINE FIRE

Fuel selector .... Off
Throttle .... Idle
Mixture.. Idle cut-off
Cabin heater .... Off
Airspeed ....Maintain the highest possible, within limitations

Proceed with emergency descent (Section 3.3.9) and emergency landing without engine power (Section 3.3.4).

3.3.7 LOSS OF OIL PRESSURE

Land as soon as practical and investigate cause.
Prepare for emergency landing without power (Section 3.3.4).

3.3.8 HIGH OIL TEMPERATURE

Airspeed .... Increase
Power ....Reduce as much as practical
Mixture ....Enrich

Land as soon as practical and investigate cause.
Prepare for emergency landing without power (Section 3.3.4).

3.3.9 EMERGENCY DESCENT

WARNING

DO NOT EXCEED 141 mph (IAS) IN SMOOTH AIR WITH FLAPS UP.

DO NOT EXCEED 93 mph (IAS) IN ROUGH AIR WITH FLAPS UP.

DO NOT EXCEED 81 MPH (mph) WITH FLAPS DOWN.

Throttle .... Idle
Airspeed ....Do not exceed limitations

3.3.10 ALTERNATOR FAILURE

Alternator output failure may be indicated by the low voltage annunciator illuminating. The alternator circuit breaker may trip. Output failure may be the result of a mechanical failure of the alternator or breaking of the alternator belt.

Battery master switch .... Off
Circuit breakers .... Check, in

If the alternator drive-belt failure is NOT obvious and NO circuit breakers are out:

Battery master switch .... On

If the drive belt failure is obvious, the circuit breaker is out, or electrical power is NOT restored, determine what electrical equipment is essential to continue the flight and:

Battery master switch .... On
Electrical Load ....Reduce

CAUTION
If the alternator has an internal failure, it may need to be manually disconnected by pulling the circuit breaker. It is unlikely you will be able to recover any alternator use until alternator is replaced.

3.3.11 UNDERVOLTAGE

If the bus voltage drops to an unsatisfactorily low level, the under voltage annunciator will illuminate. If this light is illuminated, you are supplementing electrical systems with battery power. If the light is on for extended periods, correction action should be taken. For a short period (low RPM, high electrical demand) this may not require immediate corrective action.

Prolonged low engine RPM could be the cause of a low voltage situation. Increase engine RPM if possible, and/or reduce electrical load by switching off non-essential systems.

3.3.12 INADVERTENT SPIN

Aileron Control .... Neutral
Throttle ....Closed
Rudder ....Full opposite
(Opposite to direction of spin)
Elevator .... Control Forward
(To break stall)
Elevator and Throttle ....As required
(To resume level flight smoothly)

If flaps were down, retract once a safe flying speed has been attained. Ensure that the flap speed is not exceeded (81 mph IAS).

CAUTION
This recovery procedure is applicable only when the aircraft is in a spin. Application of controls as described above during a stall or after the aircraft has stopped gyrating may cause the aircraft to enter into a spin.

3.3.13 INADVERTENT ICING ENCOUNTER

WARNING
THIS AIRCRAFT IS NOT APPROVED FOR FLIGHT INTO KNOWN ICING.
FLIGHT INTO KNOWN ICING CONDITIONS IS PROHIBITED.

CAUTION
Ice accumulation on the wings and other airframe components will greatly increase the stall speed of the airplane and result in unpredictable flight characteristics.
Ice accumulation over engine induction air inlet can cause engine roughness and/or loss of power.
Ice formations on the propeller may cause severe propeller/engine vibrations.
Ice accumulation over the pitot tube may cause erroneous airspeed indications.
Ice build-up on the windshield will distort vision and probably obscure forward visibility.

At first indication of encountering icing conditions
Carburetor heat .... On (Hot)

If ice continues to cause reduced power:
Throttle .... Full

Climb at maximum rate to produce as much heat as possible to aid in clearing the ice.

Fly toward warmer air, clear of visible moisture and/or descend to lower altitude (**if safe to do so**).

If condition persists, proceed with emergency descent (Section 3.3.9) and prepare for an emergency landing without engine power (Section 3.3.4).

3.4 AMPLIFIED EMERGENCY PROCEDURES

3.4.1 ENGINE FIRE DURING START

Engine fires during starting may be caused by excessive use of the engine fuel primer. The first attempt to extinguish the fire should be to draw the excess fuel into the engine.

If the engine has not already started, the mixture must be moved to cut-off and the throttle opened fully before cranking the engine.

If the engine starts, and fire goes out within a few seconds, run it at 1700 rpm for a few minutes.

If the fire continues for more than a few seconds, it should be extinguished by the best available external means.

WARNING
IF A FIRE IS ON THE GROUND, UNDER THE AIRPLANE, DUE TO OVER-PRIMING, AND THE ENGINE HAS STARTED, TAXI AWAY FROM THE FIRE AS QUICKLY AS POSSIBLE. IF A FIRE IS ON THE GROUND BUT ENGINE HAS NOT STARTED, ABANDON THE AIRPLANE IMMEDIATELY.

In either case, have the aircraft inspected thoroughly by a qualified mechanic to ensure that it is airworthy prior to any further flights.

3.4.2 ENGINE FAILURE DURING TAKEOFF

If an engine failure occurs prior to lifting off, the pilot must ensure he maintains control of the aircraft and comes to a stop on the remainder of the runway. The items in the checklist are listed to provide added safety after a failure of this type.

If engine power is lost after lift-off, the first response must be to lower the nose to maintain airspeed. In most cases, the landing should be straight ahead with only small changes in direction to avoid obstacles. There is seldom enough altitude and airspeed to execute a 180° gliding turn to the runway. In a turn the glide angle is considerably steeper and the stall speed is substantially higher (in a 60° bank the stall speed is 62 mph IAS, flaps up).

If the aircraft is high enough to attempt to re-start the engine, above all, maintain a safe airspeed. Ensure that the fuel selector is in the BOTH position, the mixture RICH.

If the engine failure was caused by fuel exhaustion due to the selector being on an empty tank, power will not be restored until the air in the fuel lines is flushed out, and this may take a few seconds.

3.4.3 TOTAL LOSS OF ENGINE POWER IN FLIGHT

If the engine loses power, whether this is a total or a partial loss of power or if the engine runs roughly, the most important thing to do is to continue flying the aircraft, maintaining a safe airspeed. Trim the aircraft as required. In case of a total loss of power, the best glide speed is 68 mph (IAS) with flaps up.

The aircraft will glide 1.2 nautical miles for every 1000 feet of altitude loss. The rate of descent will be approximately 715 feet per minute. Most GPS receivers have a “Direct To” (commonly Đ›) function that shows the closest airports. Use charts to assess the topography of airports in the immediate vicinity.

If there is enough altitude, try to determine the cause of failure. In most cases the reason is fuel exhaustion due to the selector being on an empty tank. Switching to the BOTH position or to the opposite tank causes fuel to feed to the engine. However, power will not be restored until the air in the fuel lines is purged, and this may take a few seconds.

Another common cause of engine failure is carburetor ice. Unfortunately, if this is the case, an excessively rich air/fuel mixture may have cooled the engine to the point where there may not be sufficient hot air in the engine compartment to melt the accumulation of carburetor ice, even when the carburetor heat control is in the full "hot" position. At this point the engine will not develop enough power to maintain airspeed and altitude. It is of the utmost importance that the guidelines concerning the use of the carburetor heat given in paragraph 7.5.7 (Air induction system) of this manual be followed closely.

A possible cause of engine failure for an electrically dependant engine is a failure of the power delivery system. In the remote event of engine driven alternator failure, and main battery power is exhausted, the pilot may switch the right ignition system to a backup battery (if installed) and continue to a safe place to land. In test conditions the backup battery has been shown to last approximately 30 minutes.

3.4.4 EMERGENCY LANDING WITHOUT ENGINE POWER

When you have located a suitable field, establish a spiral pattern around this field. Try to be at 1,000 feet above the field at the downwind position, to make a normal approach. Plan your approach for landing at the midpoint of the runway; aim for the normal touchdown area only after gliding to the runway is assured.

Excess altitude may be lost by widening your pattern, using flaps, slipping, or by using a combination of these techniques.

If possible, transmit a MAYDAY message on 121.5 MHz stating location and intentions, and squawk 7700. Activate the ELT.

Once the landing site is secure and you are committed to land, apply flaps and reduce speed to 49 mph (IAS). Close the throttle, move the mixture control to idle cut-off, shut off the electronic ignition switches, turn the fuel selector to OFF and turn off the master switch.

WARNING
BE EXTREMELY CAUTIOUS WHEN MANEUVERING FOR LANDING AT LOW ALTITUDES. MAINTAIN A SAFE MARGIN ABOVE STALL SPEED.

NOTE
With the master switch off, the instrument, landing, and navigation lights will not operate.

If the landing site is very rough, there is a possibility that the aircraft may come to rest inverted. Should this occur, once the aircraft has come to a stop, open the cabin door (if you have not already done so). If the doors are jammed, or if there is no clear path to leave the aircraft on the right side, it is relatively easy to push out the windows on the left side. Next, protect your head with one arm and release the seat harness with the other. Exit the aircraft through the doors or the windows.

Once the risk of fire has passed, ensure that the emergency locator transmitter (ELT) has been activated. If battery power is available, it may be possible to transmit to passing aircraft using the aircraft’s VHF radio.

3.4.5 PRECAUTIONARY LANDING WITH ENGINE POWER

A forced landing with engine power should be treated in the same way as described in the previous section. Bear in mind that if the engine is not running correctly, it may fail at any time. It is advisable to have a contingency plan in mind.

3.4.6 FIRE IN FLIGHT

The presence of fire is noted through smoke, smell, and heat in the cabin. Electrical fires are often accompanied by an acrid smell of burning insulation.

Engine fires are very rare. The procedures outlined in the checklist are very general and pilot judgment should be the determining factor in the action to be taken. The maximum rate of descent may be obtained by diving the aircraft to 141 mph (IAS) and adjusting the throttle so as not to exceed 2700 rpm. Use extreme caution when flying at these limits, and do not perform abrupt maneuvers. (See section 3.3.9).

It may be advisable to side slip the aircraft in case of an engine fire. This will direct the flames away from the fuselage. If there is an option as to which way to side slip, it is preferable to have the right wing up, as the gascolator is on the lower, left side of the firewall.

If the fire persists, conduct an emergency descent, land immediately, and evacuate the aircraft.

3.4.7 LOSS OF OIL PRESSURE

More often than not, a loss of oil pressure will be gradual. If it is accompanied by an increase in oil temperature, it is a sign that there is a problem with the engine's oil system and the aircraft should be landed as soon as practical, as the engine may stop suddenly. At reduced power maintain altitude and proceed to the nearest suitable landing site. Be prepared for a power-off, forced landing.

Low oil pressure can be the result of a faulty gauge or sending unit or a malfunction in the oil pressure regulating system. In any case, land as soon as practical and have the problem investigated.

3.4.8 HIGH OIL TEMPERATURE

Abnormally high oil temperature indications may be caused by a variety of reasons, among them:

- Low oil level
- Obstruction in the air flow reaching the oil cooler
- Defective gauge

A rapid rise in oil temperature must be treated seriously. Monitor the oil pressure gauge. Reduce power, enrich the mixture and, if practical, maintain a high airspeed to ram cooling air through the oil cooler.

Land as soon as practical and investigate the cause, but be prepared for a power-off forced landing.

3.4.9 EMERGENCY DESCENT

An Emergency Descent should be initiated whenever a situation occurs at high altitude requiring a high rate of descent. This is done in order to minimize exposure of the crew and passengers to an uncontrolled fire or when smoke, toxic fumes, or other situation threatens control of the airplane through incapacitation or restricted visibility for the pilot (See paragraph, FIRE IN FLIGHT 3.4.6).

Retard throttle to IDLE.

Trim airplane for maximum allowed indicated airspeed appropriate to the configuration selected and the atmospheric conditions. Advise the control center if flight path is in an airway.

WARNING

IF DESCENT IS TO BE MADE USING FULL FLAPS, SLOW THE AIRPLANE TO 81 mph IAS PRIOR TO FLAP EXTENSION AND PRIOR TO STARTING THE DESCENT. EXCEEDING THE FLAP EXTENDED SPEED CAN CAUSE DAMAGE TO THE WING STRUCTURE AND POSSIBLE FAILURE OF THE FLAP ATTACHMENTS.

IF THE DESCENT IS TO BE MADE WITH THE FLAPS RETRACTED, DO NOT EXCEED 141 mph IAS (IN SMOOTH AIR) OR 93 mph IAS (IN ROUGH AIR). DO NOT MAKE FULL ABRUPT CONTROL MOVEMENTS ABOVE 93 mph IAS. EXCEEDING THE NEVER EXCEED SPEED OR THE DESIGN AND OPERATING SPEEDS CAN CAUSE SEVERE DAMAGE TO AND POSSIBLE FAILURE OF THE AIRPLANE STRUCTURE.

3.4.10 ALTERNATOR FAILURE

Alternator output failure can be caused by a mechanical failure of the alternator, a momentary over-voltage condition, or other reasons.

A zero or negative reading on the ammeter (if installed), or less than 12.0*V* on the voltmeter (if installed), can indicate alternator output failure. The alternator circuit breaker may trip. A mechanical failure of the alternator may be accompanied by unusual sounds coming from the engine compartment. The first step is to reduce the electrical load to a minimum.

NOTE

Duration of the battery is dependent on the condition of the battery at the time of the failure and the electrical load being demanded.

Turn the master switch OFF for at least one second. Turn the master switch ON. Check that the ammeter shows a POSITIVE indication (if installed), or voltmeter shows greater than 12.0*V* (if installed).

If the alternator returns on line, continue flight, monitor the ammeter or voltmeter (if installed) and have the system checked after landing.

If the alternator does not return on line, reduce electrical load to the minimum required for safe flight by switching off all non-essential systems. Maintain only the equipment required to provide information for safe flight.

Land AS SOON AS IS PRACTICAL and conduct appropriate repairs.

3.4.11 UNDERVOLTAGE

If the bus voltage drops to an unsatisfactorily low level, the under voltage annunciator will illuminate. If this light is illuminated, you are supplementing electrical systems with battery power. If the light is on for extended periods, correction action should be taken. For a short period (low RPM, high electrical demand) this may not require immediate corrective action.

Prolonged low engine RPM could be the cause of a low voltage situation. Increase engine RPM if possible, and/or reduce electrical load by switching off non-essential systems.

3.4.12 INADVERTENT SPIN

If an inadvertent spin is entered, close the throttle, neutralize the ailerons and apply full rudder opposite to the direction of the spin. Move the elevator control forward to break the stall after applying the rudder. When the rotation stops, neutralize the rudder, relax the forward pressure on the elevator control as required to smoothly regain level flight, and return to initial power setting. If the flaps were down, retract them once a safe speed has been attained. Ensure that the maximum flap speed is not exceeded.

CAUTION
This recovery procedure is applicable only when the aircraft is in a spin. Application of controls as described above during a stall or after the aircraft has stopped gyrating may cause the aircraft to enter into a spin.

3.4.13 INADVERTENT ICING ENCOUNTER

Icing conditions are very difficult to predict. Aviation weather services may predict light, moderate, or severe icing conditions at certain locations and altitudes and no icing will be encountered. At other times, icing conditions may not be forecast and any of the above levels of icing may occur.

When unexpected icing conditions are encountered, immediate action must be taken to divert from them. It may be possible to descend to a lower, warmer altitude, or it may be necessary to return to an area where no icing is present.

NOTE
Ice is especially prevalent if flying in clouds or visible moisture. This aircraft is approved for VFR flight only.

If ice build-up becomes evident on the windshield and/or the lift struts or if the engine operates rough, apply full carburetor heat.

Carburetor ice may form in temperatures from 32° to 100°F when the relative humidity is greater than 50%. Be alert for this condition if flying when the difference between the temperature and dew point is less than 20° or when there is visible moisture in the air. If carb icing is suspected of causing a loss in power, apply full carburetor heat. If the engine operation remains rough, adjust the mixture control to obtain maximum smoothness. Leave the throttle setting the same and wait for the engine to run smoothly once again after the ice is cleared. If there is no improvement, gradually apply full throttle and initiate a maximum rate climb to produce as much heat as possible under the cowling.

If the engine continues to run rough, it may indicate that ice is accumulating on the propeller.

It is also good practice to apply carburetor heat prior to and during an extended descent as a preventive measure.

CAUTION
Ice accumulation on the wings and other airframe components will greatly increase the stall speed of the airplane and result in unpredictable flight characteristics.
Ice accumulation over engine induction air inlet can cause engine roughness and/or loss of power.
Ice formations on the propeller may cause severe propeller/engine vibrations.
Ice accumulation over the pitot tube may cause erroneous airspeed indications.
Ice build-up on the windshield will distort vision and probably obscure forward visibility.

3.4.14 LOSS OF PRIMARY INSTRUMENTS

In the event of instrument failure, it is recommended to return to the airfield and perform a normal landing, paying very close attention to keep the airspeed well above stall speed. If the airspeed indicator is not functioning, the general feel and sound of the airplane should be used to ensure an adequate airspeed is maintained for safe flight and landing.

3.4.15 LOSS OF FLIGHT CONTROLS

Aileron or Rudder Failure (cable driven)

In the event of failure of the rudder or ailerons, control can still be approximately maintained with operation of the remaining control surface. Plan a landing as soon as practicable on a runway or field that minimizes the crosswind component. Make every effort to keep the aircraft in coordinate flight as much as possible. A margin for safety should be added to the approach airspeed.

Elevator Failure (cable driven)

In the event of a failure of the elevator control system, the airplane could be controlled and landed using the stabilizer trim, power, and flaps. The airplane should be landed as soon as possible with priority given to an airport with a long runway. Establish horizontal flight. Using the trim system, trim to make a shallow decent, adding flaps and re-trim as appropriate. At touch down, reduce power and raise the flaps to prevent lifting back off the runway.

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SECTION 4

NORMAL PROCEDURES

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4 NORMAL PROCEDURES

4.1 INTRODUCTION

This section describes the procedures that Cub Crafters recommends for the pilot to follow during normal operations of the aircraft. It is divided into two parts. The first has abbreviated checklists; these are in a format suitable for reference in the cockpit. The second part amplifies the information given in the checklists. It provides the pilot with detailed descriptions that will help him understand the procedures and techniques.

This manual assumes that the pilot is appropriately rated in an aircraft with a conventional, or tailwheel, landing gear configuration.

4.2 AIRSPEEDS FOR NORMAL OPERATIONS

The speeds in this section are based on a maximum weight of 1320 lbs under standard sea-level conditions.

Never exceed speed (V_{NE}) ....141 mph (IAS)

Operating maneuvering speed (V_A).................93 mph (IAS)

Maximum flap speed (V_{FE})
 15° ....85 mph (IAS)
 Greater than 15°..81 mph (IAS)

Best rate of climb speed (V_Y) ....71 mph (IAS)

Best angle of climb speed (V_X)........................50 mph (IAS)

Maximum demonstrated crosswind velocity............... 11 kts

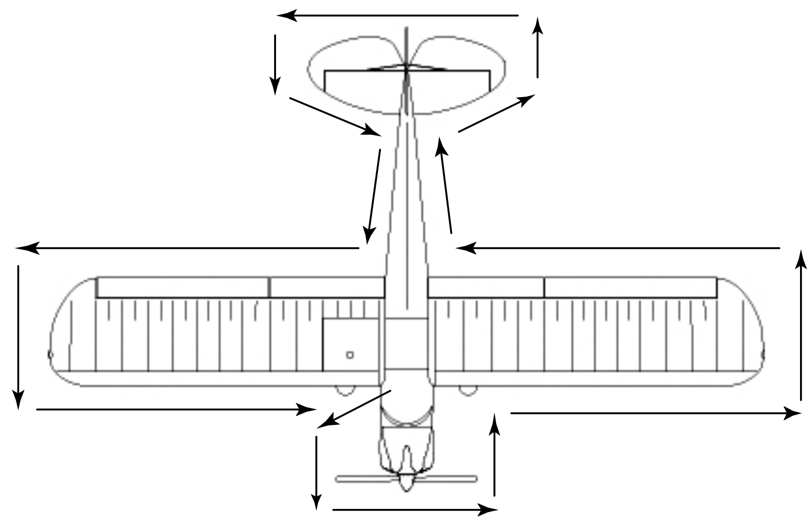

Figure 4-1 Walk Around

4.3 NORMAL PROCEDURES CHECKLIST

4.3.1 PREFLIGHT

4.3.1.1 Cockpit

- Flight controls .... Free and correct operation
- Master switch .... On
- Trim .... Check operation and set for takeoff (marked on empennage)
- Fuel selector .... Both
- Flaps .... Extend and retract
- Fuel gauges .... Sufficient fuel for intended flight
- Mixture .... Idle cut-off
- Carburetor heat .... Cold
- Ignition switch .... Off
- Electrical switches .... Off
- Navigation/strobe lights (if installed)..... Check operation
- Landing light (if installed)...................... Check operation
- Stall warning horn................................ Check operation
- Circuit breakers .... Check in
- Windows .... Clear
- Documentation .... Onboard
- Master switch .... Off
- Front seat .... Adjust
- Rear seat .... Check and belts secure
- Baggage and cargo .... Secure

> **NOTE**
> Ensure forward bar under passenger seat does not conflict with rudder cables.

> **NOTE**
> If passenger seat will be unoccupied, secure seat harness to prevent it from interfering with the flight controls or the pilot during flight.

4.3.1.2 Nose Section

- Cowling .... Secure
- Cowling Flaps (if installed) .... Secure
- Oil door .... Open
- Oil quantity .... __________ Check and cap secure
- Engine condition .... Check
- Oil door .... Close
- Propeller and spinner .... Check condition
- Air inlets .... Clear of obstructions
- Fuel strainer .... Drain

4.3.1.3 Left Fuselage, Wing, & Landing Gear

- Chocks ....Remove
- Tire ....Check
- Brakes and lines..Check
- Main landing gear leg and wing strut................Check
- Fuel tank... Check quantity
- Fuel cap/vent....... Check vent is clear and cap secure
- Pitot tube .... Check condition
- Jury struts & brackets....................... Check condition
- Stall warning vane ....Check operation
- Landing light (if installed).................. Check condition
- Aileron control cable......................... Check condition
- Tie down...Remove
- Wing strut .... Check condition
- Vortex generators..Check
- Wing tip and lights (if installed).......... Check condition
- Aileron hinges...Check
- Aileron surface .... Check condition
- Flap hinges..Check
- Flap surface..................................... Check condition
- Left fuselage..Check

4.3.1.4 Empennage

- Bracing wires & attach brackets ...... Check for tension
- Hinges ....Check
- Rudder cables ....Check
- Beacon and position light (if installed)..............Check
- Control surfaces ....Check
- Tailwheel and springs.......................................Check
- Tie down...Remove

4.3.1.5 Right Fuselage, Wing, & Landing Gear

- Right fuselage ....Check
- Fuel sump (under fuselage) .... Drain
- Flap surface...................................... Check condition
- Flap hinges...Check
- Aileron surface .... Check condition
- Aileron hinges...Check
- Wing tip and lights (if installed).........................Check
- Vortex generators...Check
- Tie down..Remove
- Wing strut ....Check Condition
- Jury struts and brackets .... Check condition
- Fuel cap/vent....... Check vent is clear and cap secure
- Fuel tank... Check quantity
- Main landing gear leg and wing strut.................Check
- Brakes and lines..Check
- Tire ....Check
- Chocks ....Remove

4.3.1.6 General

Check that all wings and other external surfaces are free from frost, ice, snow.

4.3.2 STARTUP AND TAXI

4.3.2.1 Before Starting Engine

- Preflight inspection ....Complete
- Seat belts ....Fastened
- Passenger briefing ....Complete
- Parking brakes (on master cylinders)...Both wheels, set
- Door.. Closed and latched
- Fuel selector...Both
- Avionics master switch .... Off
- Propeller area .... Clear

CAUTION

The parking brake on each main wheel is set by depressing the top of each rudder pedal and rotating the valve on each master cylinder so the lever is oriented horizontally while maintaining pressure on the pedal. To release the brakes, rotate both valves so the levers are oriented vertically. Do not close the valves without any pressure applied to the pedals, as this will not apply the brakes and will allow the aircraft to be moved while the brakes are rendered inoperative for ground operations.

4.3.2.2 Starting Engine

- Master switch .... On
- Mixture.. Full rich
- Primer...Apply*
- Throttle ....Open 1/2 inch
- Starter ....Engage
- Low Voltage Light...........................Will be Illuminated

After engine has started:

- Oil Pressure...Check
- Throttle .... Set 1000 rpm
- Ignition Switch ....Both
- Lights..As required
- Avionics Master Switch .... On
- Low Voltage Light.....................Will not be Illuminated

*Normal procedure three times. If engine is hot, omit this step.

WARNING
ENSURE THAT THE PRIMER IS CLOSED AND LOCKED AFTER THE ENGINE HAS STARTED. APPLYING THE PRIMER WITH THE ENGINE RUNNING WILL MAKE THE ENGINE STOP.

4.3.2.3 Starting Engine when Flooded

- Mixture... Idle cut-off
- Throttle .... Full open
- Starter ....Engage

When engine fires:

- Mixture..Rich
- Throttle .... Retard to 1200 rpm
- Ignition switch..Both
- Oil pressure ....Check
- Lights..As required
- Avionics master switch .... On

4.3.2.4 Warm Up

- Throttle ....1000 to 1200 rpm

4.3.2.5 Taxiing

- Parking brakes (on master cylinders).....Release both
- Taxi area .... Clear
- Throttle .... Apply slowly
- Brakes ....Check
- Steering ....Check

4.3.3 FLIGHT

4.3.3.1 Before Takeoff

- Brakes .... Set
- Throttle .... 1700 rpm*
- Electronic Ignition .... Check for alternating fault lights and no roughness. Little to no RPM drop should be noted
- Backup Battery (if installed)......key: R, EMERGENCY
  Engine runs same
  Amber light illuminates
  NORMAL, key: BOTH
- Carburetor heat .... Hot (note rpm drop then cold)
- Engine instruments.. Check
- Ammeter (if installed) .... Check
- Throttle ....Check idle
- Throttle .... 1000 rpm
- Flight instruments .... Check
- Fuel selector........ Both and sufficient quantity for flight
- Mixture.. Set*
- Ignition switch .... Both
- Carburetor heat ....Off
- Primer..Closed and locked
- Trim .... Set
- Flaps..First notch (takeoff)
- Controls ....Free and proper movement
- Doors.. Closed
- Strobes (if installed).................................. As required
- Transponder and other avionics..............................On
- Seat belts .... Check fastened
- Brakes .... Release

* When operating at high altitudes and/or temperatures, it may be necessary to lean the mixture for peak rpm.

4.3.3.2 Takeoff

Accelerate to 52 mph IAS (depending on aircraft weight) allowing tail to rise; maintain directional control.
Control stick ....Gentle back pressure
Accelerate to desired climb speed
Flaps .... Retract
Landing lights (if applicable)... Off

4.3.3.3 Climb

- Best rate .... 71 mph IAS
- Best angle .... 50 mph IAS
- Mixture............................ Lean to obtain maximum rpm
- Carburetor heat ....As required
- RPM 2700

4.3.3.4 Cruise

- Power ....Adjust
- Mixture...Adjust
- Carburetor heat ....As required

4.3.3.5 Descent

- Power ....Adjust
- Mixture...Adjust
- Carburetor heat ....As required

4.3.3.6 Approach and Landing

4.3.3.6.1 Normal Landing

- Fuel selector....................Both
- Seat belts....................Fastened
- Mixture....................Set
- Flaps....................Set
- Maximum speed first notch flaps (15°)........ 85 mph IAS
- Maximum speed (>15°).................... 81 mph IAS
- Trim....................As required
- Speed....................As required
- (1.3 times full flaps stall speed at gross weight is 42 mph IAS)

4.3.3.6.2 Crosswind Landing

- Fuel selector....................Both
- Seat belts....................Fastened
- Mixture....................Set
- Flaps....................Set below white arc
- Maximum speed, first notch (15°)................ 85 mph IAS
- Maximum speed (>15°).................... 81 mph IAS
- Trim....................As required
- Speed....................As required
  (A higher speed than normal is recommended)
- Ailerons-rudder.................... On short final
  Use ailerons to keep upwind wing low
  Rudder to hold runway alignment
- Touchdown...... Do not drift sideways during touchdown
- Landing roll............... Use ailerons to keep upwind wing down, rudder and brakes to maintain directional control

4.3.3.7 Go-Around

- Throttle.................... Full power
- Airspeed....................Above 52 mph
- Flaps....................Retract slowly
- Trim....................As required

4.3.3.8 Stopping Engine

- Parking brakes....................Set
- Flaps.................... Retract
- Electrical equipment.................... Off
- Avionics master switch.................... Off
- Throttle.................... Idle
- Mixture.................... Idle cut off
- Ignition switch.................... Off
- Master switch.................... Off

4.4 AMPLIFIED NORMAL PROCEDURES

4.4.1 PREFLIGHT

4.4.1.1 Cockpit

Enter the cockpit and operate the flight controls to ascertain that they operate freely in the correct sense. As a rule of thumb, if the stick is moved towards a control surface, that surface must go up. Make sure that the passenger (or cargo being carried in place of the rear seat) will not limit the travel of the control stick in any direction.

Set the leading edge of the horizontal stabilizer (pitch trim) to the takeoff position using the rocker switch on the control stick. Ensure that the stabilizer moves smoothly. The trim is in the takeoff position when the leading is within the marks on the left side of the empennage.

Check the flaps by lowering them to all positions and retracting them. Check that the detent on the handle engages in all positions.

Set the fuel selector to BOTH. Ensure that there is enough fuel for the intended flight by checking the sight gauges.

The mixture should be in the idle/cut-off position and the carburetor heat in the off (cold) position.

Ensure that the ignition switch is off.

Check that all the electrical systems that will be used for the flight operate as intended. To confirm that the stall warning is functioning correctly, have someone gently

operate the vane on the leading edge of the left wing with the master switch on. The stall horn should sound.
After operating the electrical system, make sure that all circuit breakers are in.

Check that the windows are clean and clear of frost or snow.

Ensure that all the documentation required for the flight is onboard. This includes charts, airworthiness certificate, registration certificate, aircraft flight manual, weight and balance data, etc.

Adjust the position of the front seat.

Turn the master switch off before leaving the cockpit.

Verify rear seat straps are correctly routed through slide adjusters, as shown in Section 7.6. If no passenger is being carried, secure the aft seat belts and harnesses.

4.4.1.2 Nose Section

As you make your way around the forward part of the aircraft, inspect the condition of the cowling and cowl flaps for cracks and ensure the fasteners are secure.

Open the oil door on the right-hand side of the cowling. Check the oil quantity. The oil quantity for normal operation should be between 4.5 and 5 quarts. Ensure that the oil filler cap is secure. Inspect the engine through the door and then close and secure it.

Check the propeller for nicks and the spinner for security and cracks.

Look through the air inlets on the front of the cowl and visually inspect the condition of the engine.

Check the general condition of the exhaust system. Drain fuel from the gascolator, and inspect for water and sediment. Dispose of the fuel in an appropriate manner.

4.4.1.3 Left Fuselage, Wing, & Landing Gear

Check the general condition of the left side of the fuselage.

Inspect the landing gear, tires, brakes, and shock absorber for condition and remove any chocks from under the wheel. Check the fuel cap by standing on the step provided on the landing gear. Visually check the fuel level in the wing tank and ensure there are no obstructions in the vent tube.

As you walk along the leading edge of the wing, look for dents, ensure that the tie downs have been removed, and gently operate the stall warning vane. Ensure that all the vortex generators are in place. If one should be missing, there will be a mark on the paint of the wing where it should be. Check the landing light lens for cracks and check the security of the wingtip light assembly (if installed). Check the general condition of the wings, lift struts, jury struts, and tip. Check the flaps and ailerons for general condition. Pay particular attention to the hinges to make sure they are secure and the cotter pins are in place.

4.4.1.4 Empennage

Check the tail surfaces for general condition and the tail wire bracing for security and tension. The hinges should all be secured with cotter pins. Check the condition of the tailwheel and the springs. Check the rudder cable for condition and proper attachment. Check the condition of

the lights (if installed) on the rudder. Remove the tie down.

4.4.1.5 Right Fuselage, Wing, & Landing Gear

Repeat the procedure carried out on the left wing, fuselage side, and landing gear.

4.4.1.6 General

Before re-entering the cockpit, make sure that the entire aircraft is free of snow or frost.

4.4.2 STARTUP AND TAXI

4.4.2.1 Before Starting the Engine

Adjust the pilot seat using the pins on the sides of the seat-base. The pins must be securely installed prior to flight. Adjust the straps to accommodate the passenger. Make certain the forward bar under the passenger seat does not conflict with the control systems. Seat belts should be fastened and the passenger briefed. Close the door. Engage the parking brakes, which are individual valves located on each brake master cylinder. Ensure that the fuel selector is in the BOTH position. Verify that the avionics master switch is off and ensure that the propeller area is clear.

4.4.2.2 Starting the Engine

Turn the master switch on. The low voltage light should be illuminated. Push the mixture control in to full rich. If the engine is cold, it may be desirable to prime the engine. To do this, rotate the primer control until it unlocks, pull it out, allowing the pump to fill with fuel, and push it in, normally three times (more priming may be required in colder weather). After priming, make sure that the control is locked. Open the throttle 1/2 inch. Verify that the propeller area is clear and engage the starter. Oil pressure should rise within 30 seconds; otherwise, shut the engine down. Turn on any lights that may be required. The avionics master may now be switched on and the radios tuned as necessary. The low voltage light should go off after the engine has started.

4.4.2.3 Starting Engine when Flooded

The throttle should be in the full open position. Turn the master switch on. The mixture control should be in the idle cut-off position. Verify that the propeller area is clear and engage the starter. As soon as the engine starts, move the mixture control to the rich position and retard the throttle. Oil pressure should rise within 30 seconds; otherwise, shut the engine down.

4.4.2.4 Warm Up

Before takeoff the engine should be warmed up for two to three minutes minimum, although longer may be required when the temperatures are below freezing. The engine is warm enough when it idles at around 600 rpm and accelerates smoothly. Ensure the oil pressure is within the green arc on the gauge.

Avoid running the engine at idle for too long, as it will tend to foul the spark plugs.

If you need to add power over loose stones or gravel, do so carefully to avoid damaging the propeller.

4.4.2.5 Taxiing

Before starting to taxi, make sure that the propeller blast will not affect the area behind the aircraft and that there are no unapproved, unqualified people close to the aircraft.

Release the parking brakes. Apply power and keep the elevator control stick back at all times. Apply both brakes and steer from side-to-side to make sure the aircraft is controllable on the ground.

4.4.3 FLIGHT

4.4.3.1 Before Takeoff

When the run-up area is reached, set the parking brake. Perform the electronic ignition system check at 1700 rpm, as follows:

- Switch to the left ignition and note the rpm, check for engine smoothness and right fault light illuminated. Switch back to both.
- Switch to the right ignition and note the rpm, check for engine smoothness and left fault light illuminated.
- If ignition backup battery option installed, switch to EMERGENCY, check for engine smoothness and amber light illuminated. Switch back to NORMAL
- Switch back to both.

There should be little to no drop with the electronic ignitions system. The engine should run smoothly on either system. If there is a fault indication light it should be checked.

Apply the carburetor heat to be sure that it is operating. You will note a drop of about 50 to 75 rpm when it is applied. This will also clear any ice that may have formed during taxiing. Bear in mind that when the carburetor heat is applied, unfiltered air is entering the engine. Therefore, its use on the ground should be kept to a minimum.

The presence of ice may be recognized by the fact that the engine may momentarily run roughly when the carburetor heat is applied. This may be followed by an increase in rpm. When the carburetor heat is removed, the rpm may increase beyond 1700 rpm.

Check all engine parameters. Apply an electrical load (for example, by switching on the landing light) and observe

that there is an increase in the electrical current drawn from the alternator (if an ammeter is installed).

Retard the throttle to idle to verify that the engine runs smoothly at minimum rpm (at least 600 rpm). Advance it to 1000 rpm.

In hot and high conditions, especially above 3,000 feet, it is important to lean the mixture prior to the magneto check. To do this, apply full power. Slowly lean the mixture until you observe the peak RPM. Retard the throttle slowly and proceed with the rest of the run-up.

Prior to takeoff, verify that the flight instruments operate correctly. Ensure that the fuel selector is on BOTH, the mixture is set, and the carburetor heat in the cold position. Engine gauges should be in the normal ranges. Flaps should be selected for takeoff; first notch (15°) is recommended. The door should be closed and seat belts fastened.

4.4.3.2 Takeoff

4.4.3.2.1 Normal Takeoff

The normal takeoff technique uses the first notch (15°) of flaps. Align on the runway and open the throttle. Maintain directional control at all times using appropriate rudder inputs. With the elevator in neutral, allow the tail to come up. At about 40 mph IAS, apply back pressure on the stick until the aircraft leaves the runway.

4.4.3.3 Climb

The best rate of climb speed (V_Y) at gross weight is 71 mph IAS and best angle (V_X) is at 50 mph IAS, with flaps up.

Normal en-route climbs should be carried out at 80 to 90 mph. While climbing, lean the mixture to achieve maximum engine speed. Consider the use of carburetor heat if weather conditions that may produce carburetor icing prevail.

4.4.3.4 Cruise

Once cruising altitude is reached, set the power as desired. Reduce the power to the selected setting and adjust the mixture. The engine may be leaned by slowly pulling the mixture back until there is a drop in rpm or the engine runs roughly. At this point, advance the mixture slightly (about 1/8 of an inch) or until the engine runs smoothly.

NOTE
With a new engine, try to use full power as often as possible until either a total of 50 hours of operations have been accumulated or the oil consumption has stabilized. This will ensure that the piston rings seat correctly.

4.4.3.5 Descent

During descent use the carburetor heat as required. Take care not to exceed the maximum speed of the engine (2700 rpm). Also, use caution to prevent shock-cooling the engine by descending at high airspeeds with too low of a throttle setting. Enrich the mixture as you descend.

4.4.3.6 Approach and Landing

Flaps may be lowered to the first notch (15°) when the airspeed is below 85 mph IAS. The maximum speed for more flaps (>15°) is 81 mph IAS.

CAUTION
Plan the pattern so that steep turns are not required when turning from down-wind to base leg and from base leg to final. Steep turns increase stall speed (Fig 5-2 and 5-3, Stall Speed Versus Angle of Bank). Steep turns, low power, and slow airspeed can be dangerous, particularly if the airplane is heavily loaded and/or with gusty or turbulent wind conditions.

4.4.3.6.1 Normal Landing

The normal landing is in a three-point, stalled condition. Adjust the throttle and pitch attitude to compensate for ground effect as the aircraft approaches the runway. At approximately 10 feet AGL, smoothly begin landing flare to attain a three-point attitude. Maintain this attitude and adjust the throttle to accomplish a smooth touchdown. Gradually bring the stick back, keeping it back throughout the landing roll. Maintain directional control with rudder and differential braking, as necessary.

It is possible to settle the aircraft on the ground at higher speeds in a two-point configuration. The landing flare is kept flat, aiming to place the main landing gear wheels on the runway at a minimum sink rate. When the wheels contact the ground, the stick must be moved forward to counteract the pitching up reaction of the aircraft. After the aircraft has slowed down, the tail may be brought down with the stick. Bear in mind that the rudder will begin to lose effectiveness as airspeed is reduced. Maintain directional control. Apply brakes as necessary.

4.4.3.6.2 Crosswind Landing

When established on a short final approach, use the ailerons and rudder to maintain the approach path. Lower the upwind wing using ailerons and use the rudder to hold runway alignment. At approximately 10 feet AGL, increase the pitch attitude to flare. Ensure that the aircraft is not drifting sideways when touching down. When a satisfactory touchdown has been accomplished, reduce the throttle to IDLE and adjust ailerons slightly to allow the downwind main wheel to touch down.
Maintain the stick deflected into the wind as necessary to keep the upwind wing from lifting, and use rudder and differential braking, as necessary, to maintain directional control. Once the three wheels are on the ground, move the stick all the way back and keep it there at all times during the landing roll. Apply brakes only as required to maintain directional control, slow to taxi speed or stop.

NOTE
It is recommended that a slightly higher airspeed be used on final approach during gusty or turbulent wind conditions. Add approximately one (1) mph IAS for each two (2) knots of reported gust.

4.4.3.7 Short Field Procedures

4.4.3.7.1 Takeoff

Using the first notch of flaps (15°), add full power and allow the tail to rise. Accelerate to V_X (50 mph) and climb out until obstacle clearance is achieved, then raise flaps and decrease climb rate as desired.

4.4.3.7.2 Landing

Make a normal approach and use two notches of flaps (35°). After clearing obstacles, the third notch/full flaps (50°) should be used for the final descent to the landing area. Power should be used as required to arrest the descent.

4.4.3.8 Soft Field Procedures

For soft field operations, proper use of the elevator and very mild braking should be exercised to prevent the aircraft from getting stuck or nosing over. Takeoff should be performed in three-point configuration. Landings should be made in three-point configuration, concentrating on a soft touch-down.

4.4.3.9 Balked Landing (Go-around)

In a balked landing, apply full power. Slowly retract the flaps to the first notch (15°) and establish a positive rate of climb. Maintain climb speed. Trim as required.

4.4.3.10 Stopping the Engine

The parking location should be free of loose material such as gravel, debris, or unsecured tie down ropes, which could be blown up by the propeller.

When the aircraft is parked, turn off all electrical equipment, including avionics. The engine must always be stopped by pulling the mixture control to the idle cut-off position. Turn the ignition switch off. Finally, turn the master switch off.

NOTE
Any device(s) plugged into an accessory port may drain the battery.

After the airplane has been positioned, release the brakes and determine whether the airplane is likely to roll as the crew exits. If so, set the parking brakes by turning the valve on each brake master cylinder while applying force to the brake pedals. Retract the flaps to prevent damage to the flaps and their operating mechanism in the event of strong winds from the tail direction.

Install wheel chocks, if available. Tie down both the wings and the tail. Straps or ropes are preferred over chains. Tie-downs should be firmly secured but without excessive tension. Close cabin windows and doors.

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SECTION 5

PERFORMANCE

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5 PERFORMANCE

5.1 INTRODUCTION

The purpose of this section is to provide information that will assist the pilot with planning a flight in detail with reasonable accuracy.

All data has been corrected to I.C.A.O. standard day conditions. Where appropriate, the data has been expanded analytically for variations in weight, altitude, temperature, etc.

The data has been derived from actual flight tests. The pilot must use sound judgment when assessing the effect of conditions not found in the charts, such as soft runways and winds aloft. The parameters will be affected by the performance of the engine. Therefore, the pilot must be thoroughly familiar with its operation, including the procedures for adjusting the mixture control.

Data should not be extrapolated beyond the limits shown on the charts.

All information is presented in the units used on the aircraft's instrumentation.

- Airspeeds will be presented in statute miles per hour
- Weights in pounds
- Altitudes in feet
- Temperatures in degrees Fahrenheit
- Wind speed in nautical miles per hour

The aircraft may be equipped with different tires and propellers. All of the data presented in this chapter are based on an aircraft equipped with the Catto Propeller 78” x 54” pitch propeller and 800X6 tires.

5.2 PERFORMANCE CHARTS

5.2.1 AIRSPEED CALIBRATION

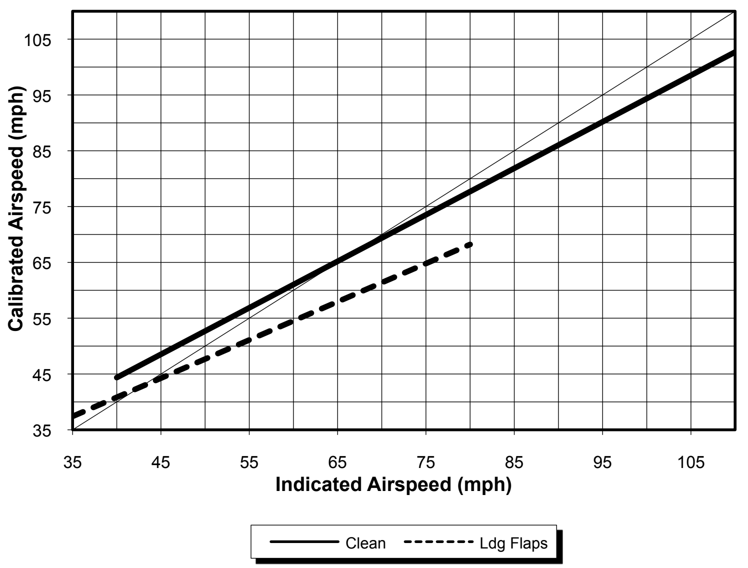

Figure 5-1 Airspeed System Calibration

> **NOTE**
> Indicated airspeed assumes zero instrument error.

> **NOTE**
> Airspeed indication can vary by several miles per hour depending on whether the door and windows are open or closed. All values listed are for indications with the windows and the door in the closed position.

5.2.2 STALL SPEED

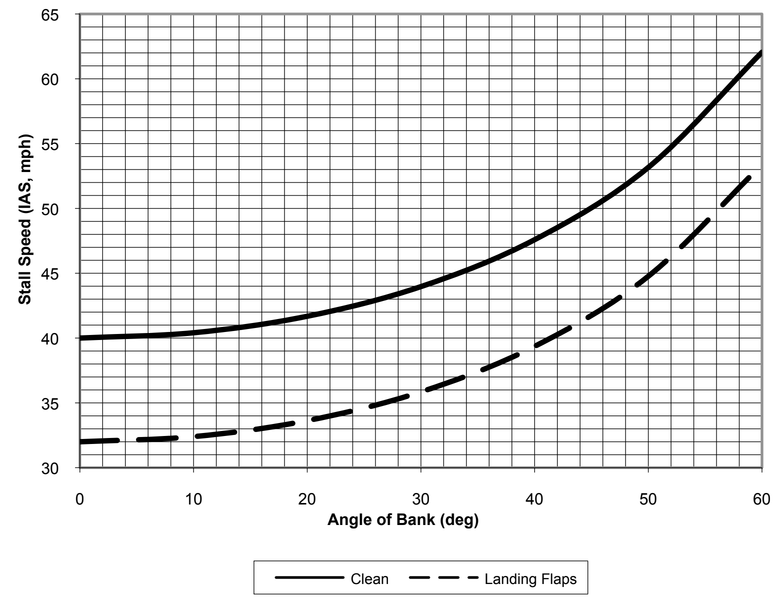

Figure 5-2 Stall Speed versus Angle of Bank

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5.2.3 CLIMB RATE AND GRADIENT

Pressure Altitude (ft)		Indicated Airspeed (mph)	OAT (°F)	Climb Gradient (%)	Rate of Climb (fpm)
0	27°F Below Std Temp	70	32	5	1890
2000		71	25	4	1850
4000		71	18	3	1759
6000		72	11	3	1608
8000		72	4	3	1374
0	Std Temp	71	59	4	1750
2000		71	52	4	1667
4000		72	45	3	1578
6000		72	38	3	1410
8000		73	31	2	1165
0	16° Above Std Temp	71	75	4	1620
2000		71	68	3	1503
4000		72	61	2	1415
6000		73	54	2	1237
8000		74	47	2	987

Figure 5-3 Maximum Rate and Gradient of Climb

NOTE
Mixture leaned for maximum RPM.

5.2.4 CRUISE

Pressure Altitude (ft)	RPM	Hp	% Power (of 180)	True Airspeed (mph)	Fuel Flow (gph)	Manifold Pressure
2000	**1900**	58	32	75	3.3	13.1
	2000	67	37	78	3.7	13.9
	2100	77	43	87	4.2	14.9
	2150	80	44	89	4.4	15.1
4000	**1900**	54	30	75	3.2	12.3
	2000	62	34	78	4.0	13.9
	2100	71	39	84	4.3	14.2
	2200	80	44	92	4.7	15.1
6000	**1900**	50	28	74	3.0	12.1
	2000	57	32	78	3.7	13.4
	2100	67	37	85	4.3	13.9
	2200	77	43	92	4.6	14.2
	2250	80	44	95	4.8	14.5
	2100					
	2200					
	2300					

Chart Continues on the next page

Pressure Altitude (ft)	RPM	Hp	% Power (of 180)	True Airspeed (mph)	Fuel Flow (gph)	Manifold Pressure
8000	**1900**	47	26	75	3.1	11
	2000	54	30	79	3.6	12.1
	2100	63	35	83	4.2	13
	2200	72	40	93	4.4	13.4
	2300	80	44	99	4.8	14.0
10000	**1900**	44	24	76	2.9	10.2
	2000	51	28	80	3.3	11.4
	2100	58	32	85	3.6	12
	2200	67	37	93	4.0	12.9
	2300	76	42	99	4.3	13.6
	2350	80	44	103	4.5	13.8
12000	**1900**	40	22	67	2.8	10.6
	2000	47	26	73	3.2	11.2
	2100	55	31	83	3.7	11.7
	2200	64	36	92	4.0	12.2
	2300	72	40	97	4.3	13.0
	2400	80	44	105	4.7	13.5

Figure 5-4 Cruise Speed

5.2.5 BALKED LANDING

Pressure altitude (ft)	Airspeed (mph IAS)	Climb gradient (%)
4,000	70	>2.3

Figure 5-5 Balked Landing Climb Gradient

> **NOTE**
> First notch flaps (15°)
> Mixture leaned for peak RPM

5.2.6 GLIDE

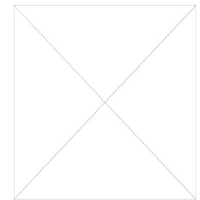

Figure 5-6 Glide Performance

> **NOTE**
> At 1865 lbs, glide speed 68 mph, flaps up.

		SERIAL NUMBER		REGISTRATION NUMBER			PAGE NUMBER	
Date	Item No.	Description of Article or Modification	Added (+) Removed (-)	Weight Change			Running Basic Empty Weight	
				Wt (lb.)	Arm (in.)	Moment	Wt (lb.)	Moment
	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
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	13							
	14							
	15							
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	18							
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	20							
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	22							
	23							

Table 6-2 Weight and Balance Record

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Table 6-2 Weight and Balance Record

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SECTION 6

WEIGHT AND BALANCE

Paragraph Page

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6 WEIGHT AND BALANCE

6.1 INTRODUCTION

This section provides two very important pieces of information. Section 6.3 describes the methods for determining the empty weight of the aircraft and the position of the center of gravity relative to the datum. Section 6.5 supplies the information necessary to calculate the takeoff weight and the position of the center of gravity for a given flight. An example is provided in paragraph 6.6.

Weight and balance limits are important for two reasons:

- The structure was designed for a certain maximum weight.
- Weight and center of gravity affect both the performance, stability, and control characteristics, particularly in stall and spin recovery.

The aircraft will only attain the performance and exhibit the handling characteristics used for certification if it is flown with the center of gravity within the approved range. An overloaded aircraft will not take off, climb, or cruise as well as a properly loaded one. The center of gravity is a determining factor in flight characteristics. If the CG is too far forward, the aircraft will require high stick forces for control and increases the risk of nosing over on the ground. If the CG is too far aft, the aircraft may pitch up during climb. Longitudinal and directional stability will be reduced. This can lead to inadvertent stalls and even spins. Spin recovery will become more difficult, if not impossible.

The aircraft will perform as intended when it is properly loaded.

6.2 PERTINENT INFORMATION FOR WEIGHT AND BALANCE

Position of datum .... 60 inches ahead of wing leading edge

Maximum gross weight (wheels or skis) 1865lbs

Maximum gross weight (floats) ...._1865lbs

Forward CG Limits

At 1865lbs .... 74.0 inches aft of datum

At 1600 lbs or less.............. 70.5 inches aft of datum

(Straight line variation between points given)

Aft CG Limit (at all weights)............... 79 inches aft of datum

Note that the aircraft can be equipped with different propellers and tires. These will affect weight and balance and performance.

TERMINOLOGY

Arm	The horizontal distance from the reference datum to the center of gravity (CG) of an item.
Basic Empty Weight	Standard empty weight plus optional equipment.
Center of gravity (CG)	The point at which an aircraft or an item of equipment would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight.
CG Arm	The arm obtained by adding the airplane's individual moments and dividing the sum by the total weight.
CG Limits	The extreme center of gravity limits within which the aircraft must be operated at a given weight.
Datum	An imaginary vertical plane from which all horizontal distances are measured for balance purposes.

Moment	The product of the weight of an item multiplied by its arm.
Maximum Takeoff Weight	Maximum weight approved for the start of the takeoff run.
Standard Empty Weight	Weight of a standard airplane, including unusable fuel, full operating fluids and oil.
Unusable fuel	The quantity of fuel at which the first evidence of malfunctioning occurs under the most adverse fuel feed condition.
Useful load	Difference between takeoff weight and basic empty weight.

6.3 WEIGHING PROCEDURES

This procedure is to be followed for weighing the landplane.

6.3.1 PREPARATION

Make sure that all of the equipment listed in the Aircraft Equipment List (Section 6.4) is installed and is in the proper location.

1. Remove any items not listed on the Aircraft Equipment List (such as rags, charts, tools, etc.).

2. Clean the aircraft to remove excess dirt and grease.

3. Remove the fuel from the aircraft. This may be accomplished by opening the fuel drains until all remaining fuel is drained.

4. Check that the oil is at the recommended level.

5. Position the pilot's seat in the mid-range position. Retract the flaps, place all controls in neutral, and close the door and windows.

6. Place the aircraft in a hangar with the doors closed where the wind will not affect the readings of the scales.

6.3.2 LEVELING

Have a set of calibrated weighing scales available. The range should be 1000 lbs for each main and 250 lbs for the tail. Zero the scales or record the tare, as appropriate.

1. Place the aircraft approximately in a flight level attitude by supporting the tail wheel on a bench.

2. Place the aircraft on the calibrated weighing scales.

3. Level the aircraft as follows:

   - Place a spirit level on the open door edge as shown in Figure 6-1. Lower or raise the tail until the aircraft is level. If necessary, this may be accomplished by letting air out of the tires.

   - Place the level on the upper forward cross tube located in the cabin just behind the windshield, as shown in Figure 6-2. Center the bubble to level the wings.

Figure 6-1 Leveling the Aircraft

Figure 6-2 Leveling the Aircraft

6.3.3 WEIGHING

1. Once the aircraft has been leveled, record the weight on the main wheels and the tailwheel.

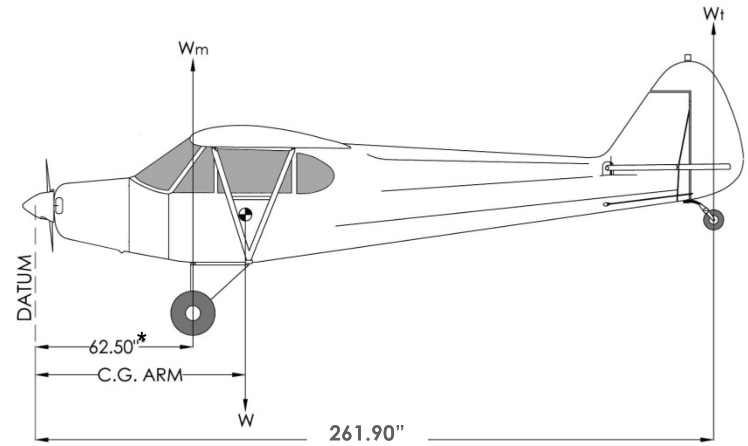
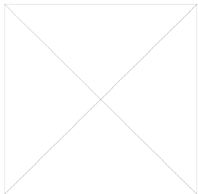


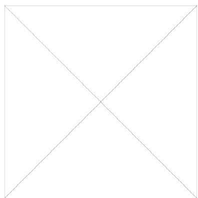
Figure 6-3 Standard Aircraft Geometry

** 59.50 for aircraft equipped with 3X3 landing gear.*

Standard Aircraft CG Calculation:



3X3 Landing Gear Equipped Aircraft CG Calculation:



Where:

CG Arm	=	Distance from the datum to the center of gravity (in inches)
W	=	Total weight of the aircraft
W_m	=	Sum of the weight on both main wheels
W_t	=	Weight on the tailwheel

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6.4 WEIGHT AND BALANCE DATA AND RECORD

Table 6-1 shows the following information at the time when the aircraft was licensed at the factory:

- Basic empty Weight
- Center of Gravity
- Useful Load

Aircraft Serial Number: **CCK1865-00XX**

Registration Number: ____________

Date: **XX/XX/XXXX**

Basic empty weight (lbs)	Arm (inches)	Moment (in·lbs)

Table 6-1 Basic Empty Weight

Useful load = Maximum takeoff weight- Basic empty weight

= **1865lbs – XXXlbs**

= **XXXlbs**

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CC11-160		Serial Number:	Registration Number:				Page Number:	
Date	Item No.	Description of Article or Modification	Added (+) Removed (-)	Weight Change			Running Basic Empty Weight	
				Wt (lb)	Arm (in)	Moment/100	Wt (lb)	Moment/100

Table 6-2 Weight and Balance Record

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6.5 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT

In order to calculate the weight and balance of the aircraft:

1. Insert the respective loads in Table 6-3 or 6-4.

2. Multiply each load by its respective arm and note the moment.

3. Add the loads to calculate the takeoff weight

4. Add the moments to compute the total moment.

5. Divide the moment by the takeoff weight. This is the final position of the center of gravity.

6. Plot the point on Figure 6-4. If it is within the weight and balance envelope, the aircraft is within the approved envelope.

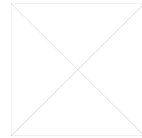

Table 6-3 Weight and Balance Loading Form

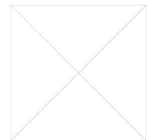

Table 6-4 Weight and Balance Loading Form Extended Cargo Compartment

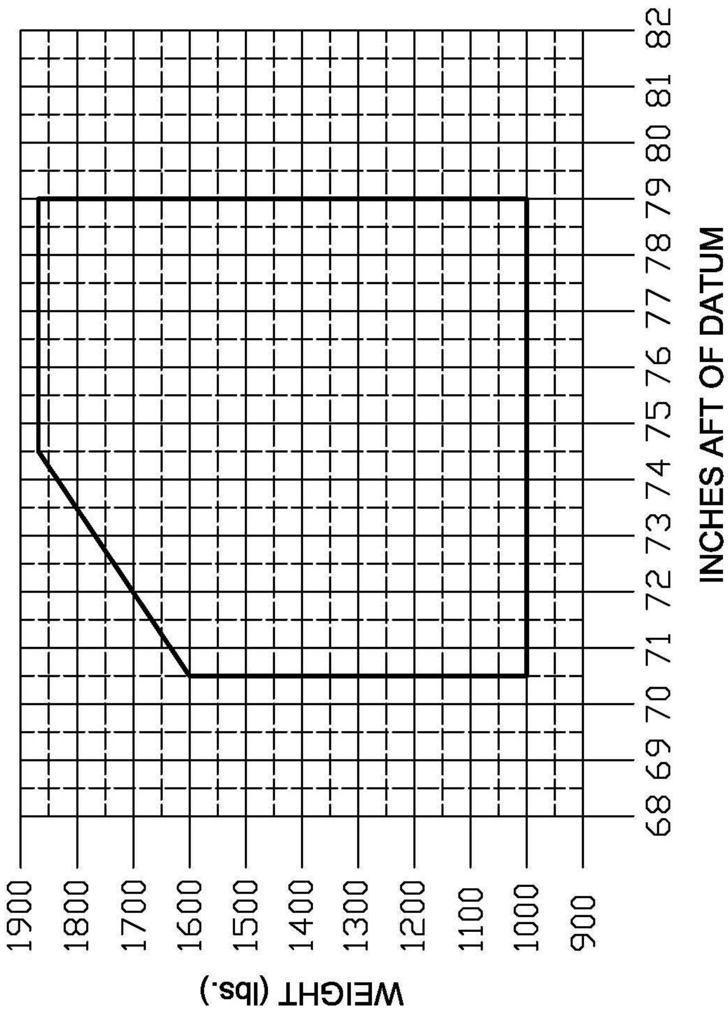

Figure 6-4 Weight and Balance Envelope

6.6 SAMPLE WEIGHT AND BALANCE CALCULATION

This section will provide a sample weight and balance calculation using the methods given in paragraph 6.5.

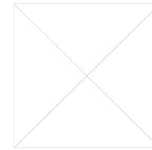

Table 6-5 Sample Weight and Balance

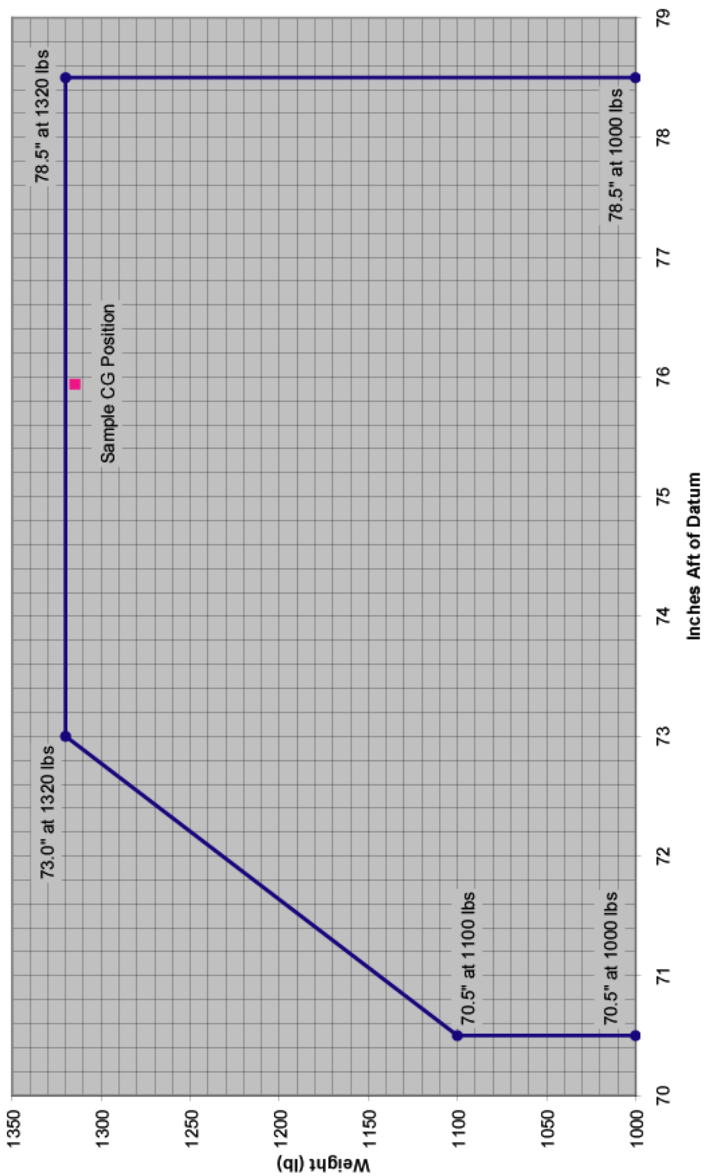

Figure 6-5 Sample CG Location

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SECTION 7

AIRCRAFT AND SYSTEMS

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7 AIRCRAFT SYSTEM AND DESCRIPTION

7.1 INTRODUCTION

This section gives a description of the operation of the aircraft systems and standard equipment. For information and operation of optional equipment, please refer to Section 9.

7.2 AIRFRAME

The structure of the fuselage consists of a truss made of high-strength steel tubing. The members are joined together using inert gas fusion welding. The steel structure is powder coated to protect it from corrosion.

The wing is made up of a framework of stamped aluminum ribs mounted onto extruded wing spars. Tubular drag and compression struts and high strength stainless steel drag wires make up the rest of the structure. The leading edges are covered with aluminum sheet. The wing tip is made from fiberglass and is fairly flexible, enabling it to withstand some abuse.

The wings attach onto the fuselage with hinge fittings and are supported by two lift struts. The rigging of the wings is accomplished by adjusting the forks that join the lift struts to the fuselage.

The fin, rudder, stabilizers, and elevators are all constructed of tubular steel with steel channel ribs. Stainless steel tie rods and fittings brace the stabilizers to the fins and fuselage. The tail brace wires should not be used for lifting or handling the aircraft on the ground.

7.3 LANDING GEAR

The aircraft has a conventional, or tailwheel, landing gear configuration. The main gear legs are made from welded steel tubing. Bungee cords on cabane struts provide shock absorption.

Each main wheel is provided with a set of disc brakes. The left and right systems are independent of each other. There are two valves that operate the parking brake located under the pilot’s seat. The units form an integral part with the copilot’s toe brakes. To operate the parking brake, press both brake pedals and rotate both valves 90 degrees (if the valve is vertical, the brakes are unlocked, if the valve is horizontal, the brakes are locked).

The tailwheel swivels through 360 degrees and is steerable via the rudder pedals. It is mounted to the fuselage with steel spring leafs.

7.4 FLIGHT CONTROLS

The aircraft has conventional controls, operated with a control stick and rudder pedals and actuated with cables.

Pitch trim is accomplished via an electric servo which moves the leading edge of the horizontal stabilizer up and down, effectively changing the angle of incidence. The servo is actuated with a rocker switch located on the control stick. Optional rear seat trim can be added for flight instruction.

Slotted flaps are actuated mechanically using a lever in the upper, left-hand side of the cockpit ahead of the pilot. The flaps have four positions: retracted, 15°, 35°, and 50°.

The flap lever has a spring latch system that will hold the flap in the selected position. To extend the flaps, depress the trigger on the flap handle and pull down and back on the flap handle. To retract the flaps, depress the trigger and move the handle up and forward.

The flight controls allow the aircraft to be flown solo from the front seat only or controlled from the rear seat when a pilot is at the front seat controls. The front seat occupant must be able to properly use the controls in the front or be able to follow instructions from an instructor seated in the rear.

7.5 POWERPLANT

7.5.1 ENGINE

The aircraft is powered by a Cub Crafters, Inc. CC340 engine. This is an air-cooled four cylinder powerplant that is capable of delivering up to 180 for takeoff and a maximum continuous power is 80 hp.

A throttle controls power to the engine. Each occupant is provided with a throttle on the left side of the cockpit. The air-to-fuel mixture is adjusted manually with a control on the left side of the instrument panel. Pulling the mixture control all the way back operates a cut-off valve on the carburetor that stops the supply of fuel to the engine. The mixture control should always be used to stop the engine.

7.5.2 ENGINE MOUNT

The structure of the mount is made of high-strength steel and the engine is attached to the mount through rubber mounts that help reduce vibration.

7.5.3 PROPELLER

The aircraft has as Catto 78” Diameter X 54” Pitch propeller.

7.5.4 ENGINE COWLING

The engine cowling is made of composite materials. The upper cowl can be removed using Philips-head fasteners. There is an oil access door located in the upper, right-hand portion that allows easy access to the oil fill neck/dip stick, making removal of the cowl unnecessary during preflight inspections.

The lower cowl is equipped with ground adjustable cowl flaps. Remove the lower cowl from the aircraft to adjust the flaps as necessary, ensuring all attachment fasteners are retightened.

7.5.5 EXHAUST SYSTEM

The exhaust system is made of stainless steel. It is covered with a shroud that is used as a heat exchanger to draw hot air for the cabin and for the induction system.

7.5.6 IGNITION SYSTEM

Two independent electronic ignition modules supply the ignition for the engine. Like magnetos, the engine will run with the Master Switch off. The pilot must ensure that both modules are operating correctly prior to takeoff. Fault indication lights are located on the instrument panel. In an emergency, the engine will continue to run if one of the ignition modules should fail. If equipped, the pilot may switch the right ignition to run on a backup battery. When the backup battery is powering the right ignition, they are isolated and disconnected from the rest of the electrical system. If the left ignition is disabled and the backup battery is on, when the backup battery is exhausted it will result in engine ignition shutdown. In test conditions the ignition backup battery has been shown to last approximately 30 minutes.

WARNING
WHEN THE RIGHT IGNITION BACKUP BATTERY IS IN USE, IT IS NOT BEING CHARGED. THE SWITCH ON INSTRUMENT PANEL SHOULD BE IN NORMAL POSITION EXCEPT FOR TESTING OR ACTUAL

EMERGENCY.

7.5.7 AIR INDUCTION SYSTEM

The induction air for the engine enters through a filter on the lower side of the cowling. Alternatively, the pilot may use the carburetor heat control which operates a butterfly valve allowing heated, unfiltered air into the carburetor. The control is located on the instrument panel.

CAUTION
Ground operations with the carburetor heat control in the hot position must be limited because of the fact that air by-passes the filter.

Should the air filter become obstructed, the carburetor air control provides an alternate means of supplying the engine with air for the induction system.

It is important that the pilot become knowledgeable about carburetor icing and the use of the carburetor heat. Cub Crafters recommends the following publication, available from the FAA website:

> Advisory Circular 20-113 - Pilot Precautions and Procedures to be taken in Preventing Aircraft Reciprocating Engine Induction System and Fuel System Icing Problems.

WARNING
AS CARBURETOR ICE ACCUMMULATES, IT PRODUCES AN EXCESSIVELY RICH AIR/FUEL MIXTURE. THE ENGINE MAY START TO LOSE POWER OR STOP COMPLETELY. AT THIS POINT THERE MAY NOT BE SUFFICIENT HOT AIR IN THE

ENGINE COMPARTMENT TO MELT THE ACCUMULATION OF CARBURETOR ICE, EVEN WHEN THE CARBURETOR HEAT CONTROL IS IN THE FULL "HOT" POSITION.

In general, follow these practices:

When icing conditions exist, apply carburetor heat often in all flight regimes. The main symptom of icing in the induction system will be loss of power.

Never use partial carburetor heat unless the aircraft is equipped with a carburetor temperature gauge, ice light or similar instrumentation. Partial heat could make matters worse, unless you know exact carburetor temperatures. Remember, full heat or nothing.

Be especially vigilant at lower power settings. It is good practice to use carburetor heat during any descent where you have reduced power, especially for landing.

In conditions conducive to icing or if ice was noted during engine run-up, perform another carburetor heat check immediately before takeoff. DO NOT leave carburetor heat on for the actual takeoff.

7.5.8 OIL SYSTEM

The oil system is an integral part of the engine, except for the cooler that is mounted on the top center of the engine cooling plenum, above the engine. The oil filler is on the right side of the engine.

7.5.9 FUEL SYSTEM

Fuel is carried in two tanks located on the inboard end of the wings. Each tank has a total capacity of 22 gallons

for a total of 44 gallons. The total usable fuel is 42 gallons.

The tanks are made of aluminum. There are two drains for the entire aircraft. One is located underneath the fuselage on the right side of the cockpit; the other is located on the left side, under the cowl and just forward of the firewall. These should be drained before each flight to test for water and sediment in the fuel system. The fuel system is gravity-fed with no separate boost pump.

The fuel flows from the tanks into a selector valve located on the lower, left side of the cockpit that has four positions:

- Both. The engine is fed by all fuel tanks
- Left. Fuel is supplied by the left tank(s)
- Right. Fuel is supplied by the right tank(s)
- Off. Fuel supply to the engine is cut off

Fuel will flow from one set of tanks to the other when the selector valve is in either the Off or the Both position. When parking the aircraft on a slope, leave the selector on either the left or right position to prevent cross-feeding and overflowing of the lower tank.

The engine may be operated on the Both, Left or Right positions. However, the Both position is required for takeoff and landing.

Fuel quantity is determined with two sight-gauges located on either side of the cockpit at the wing root. The ventilation of the tanks is through the forward facing vented fuel caps.

Prior to refueling the aircraft, connect the fueling equipment's grounding wire to either of the wing tie downs or the exhaust pipes. This will ensure there is no electrical potential difference between the aircraft and the fueling equipment and will minimize the risk of electrical sparks when the aircraft is being refueled.

7.5.10 ELECTRICAL SYSTEM

The main sources of electrical energy are a 12 volt battery and a 40 amp belt driven alternator. The system has over voltage protection and an integral voltage regulator. The main battery is located underneath the front seat. If equipped, a small 12 volt backup battery is connected into the right ignition system.

7.5.11 LIGHTS

Optional anti-collision light assemblies may be installed on each wingtip. These consist of a navigation light and a strobe. There may also be a position light and a beacon on the rudder. An optional landing light may be mounted in the leading edge of the left wing.

Optional LED lighting package may be installed on the aircraft. On the LED system, the NAV light must be turned on first in order for the strobes to operate.

7.5.12 STALL WARNING

The stall warning system is activated by a vane located on the leading edge of the right wing. As the aircraft approaches the stall, a horn will sound. The system is calibrated so that the horn will come on at least 6 miles per hour above the stall speed.

7.5.13 PITOT-STATIC SYSTEM

The pitot system senses dynamic pressure through a tube that is aligned with the flow of air and is located in the leading edge of the jury strut on the left wing.

The static pressure source for each instrument is vented to the inside of the cabin. Because of this, the indications for airspeed, altitude, and rate of climb will be affected by opening the windows, door, or cabin air vents.

7.6 COCKPIT

Entry to the cockpit is through a door and window arrangement on the right side of the aircraft. The window is latched to the door using rotating tangs that engage slots in the door. The door is opened using a rotating handle. The window must be raised until it engages the latch on the wing. Close the door by rotating the door handle and pulling it closed. Release the handle once the door is fully closed, allowing the latching pins to engage in the fuselage. Release the window latch on the wing and lower the window closed. Engage the tangs in the door.

A window on the left-hand side of the fuselage operates in a similar manner to that on the right.

The aircraft seats up to two in a tandem configuration. All flight controls are within reach of the front occupant, and therefore, the aircraft must be flown from this position. The rear occupant, if rear seat equipped, is provided with a stick, rudder pedals, throttle and brakes for flight instruction.

The front seat is adjustable fore and aft. To move the seat, remove the quick-release pins on the sides of the seat and slide to the desired position.

If equipped with a rear seat, the seat straps should be checked for proper routing through the slide adjuster as shown below.

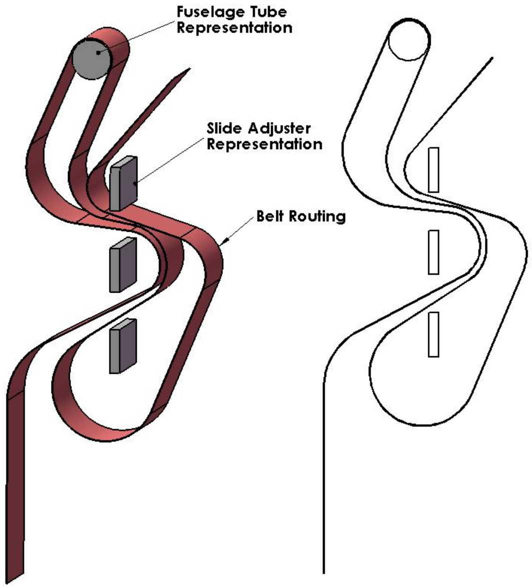

Figure 1 - Rear Seat Strap Routing

7.7 INSTRUMENT PANEL

The instrument panel contains all flight, navigation, and engine instruments that are required for V.F.R. operations.

7.8 CABIN HEAT

Hot air for heating the cabin is supplied by a heat exchanger located around the engine exhaust. Hot air enters the cabin through opening in the floorboard. To select the heater, the control on the upper right part of the instrument panel must be pulled aft.

7.9 BAGGAGE AND CARGO COMPARTMENT

The aircraft has a cargo compartment located behind the rear occupant that is divided into two areas. The forward area has a capacity of 100 lbs and the aft area 60 lbs.

7.10 ELT OPERATION AND LOCATION

The aircraft is supplied with an ELT transmitter that meets TSO C91a. The ELT is mounted in a bracket directly underneath the pilot's seat and may be accessed through an opening on the forward side of the seat column.

7.11 MUSIC JACK

An optional Music Jack may be installed on the aircraft.

NOTE
When any device is plugged into the music jack, this will disable all GPS auditory warnings. However, visual warnings will still be displayed on the GPS screen.

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SECTION 8

HANDLING AND SERVICING

Paragraph Page

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8 HANDLING AND SERVICING

8.1 INTRODUCTION

This section gives a description of the ground handling and basic servicing of the aircraft.

8.2 GROUND HANDLING

8.2.1 TOWING INSTRUCTIONS

The aircraft can be moved manually without the use of a tow bar. The forward lift struts and the leading edge of the horizontal or vertical stabilizer may be used for moving the aircraft. Pushing or pulling on the propeller is not recommended.

8.2.2 TIE-DOWN INSTRUCTIONS

If possible, tie-down the aircraft pointed into the wind. The flaps should be fully retracted. If tie-downs are unavailable, the parking brake should be set. If tie-downs are available, tie-down both wings using the tie down rings on the outboard portion of the forward wing strut at the strut/wing interface. Tie down the tailwheel at the head of the tailwheel.

8.3 SERVICING FUEL, OIL, AND OTHER FLUIDS

8.3.1 OIL

Approved Oils:
Phillips XC 20W50

The oil is checked by using the oil door on the upper right portion of the cowl. Determine oil level by reading the markings on the dipstick.

8.3.2 FUEL

Approved Fuel Grades:

100 Aviation Fuel (green tint)

100LL Aviation Fuel (blue tint)

The fuel caps on each tank have a forward facing vented cap. Prior to fueling, attach a ground cable and remove fuel caps. Monitor the amount of fuel added by visually watching the amount of fuel rise inside the tank. Sump the drains as described in the preflight actions under the **NORMAL PROCEDURES** section. Secure fuel caps on both tanks with vent tube facing forward.

8.3.3 BRAKE FLUID

Approved Fluid:
Brake Fluid per MIL-H-5606G (Aeroshell #41)

Visually inspect fluid levels. If brake fluid is required, fill with an approved fluid approximately 2/3 full to leave space for the reservoir cap when it is installed.

8.3.4 AIR FILTER

Approved Air Filter:
Cub Crafters Part Number PC54108-001

Visually inspect air filter. Depending on the operating conditions, filter life will vary. Monitor filter and obtain replacement from Cub Crafters when required.

8.4 CLEANING AND CARE

8.4.1 EXTERIOR

Use mild automotive soap for washing the exterior of the aircraft.

The windows and windshield can be cleaned using Zep Foaming Glass Cleaner.

8.4.2 INTERIOR

A damp rag is typically adequate for cleaning the interior of the aircraft.

The windows and windshield can be cleaned using Zep Foaming Glass Cleaner.

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