

Aeronca 7AC Pilot Operating Handbook



N1946E
SN 7AC-5513

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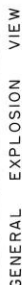
THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY FEDERAL AIR REGULATIONS AND ADDITIONAL INFORMATION PROVIDED BY THE MANUFACTURER.

This handbook meets GAMA Specification No. 1, SPECIFICATION FOR PILOTS OPERATING HANDBOOK, dated February 15, 1975 with rev 2, issued October 18, 1996. It has been compiled from information in the *Service Manual 7A Aeronca Champion*, published by WAG-Aero in 1946 and *USAF Flight Handbook for the USAF Series L-16A and L-16B* published in 1948 and revised in 1953.

While writing this to comply with GAMA Spec 1 (which did not exist when this aircraft was manufactured and extant manuals were published), some of the quaint verbiage of these two manuals has been retained for your entertainment and edification.

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1 General

The Aeronca Champion Is a two place, tandem, high wing monoplane. Basic construction consists of welded tube, fabric covered fuselage. Wings are fabric covered, wood spar with hydro-formed aluminum alloy ribs.

Power is supplied by a 65 horsepower engine turning a fixed pitch wood propeller. The engine is installed against excessive vibration with rubber bushings at the motor mount attachment points, resulting in smooth, noise-free operation.

Unrestricted vision is attained through the use of a one-piece molded windshield, large door windows and rear side windows.

Cabin control cables are concealed adding to the comfort of the spacious cabin. Engine controls are readily accessible from the front and rear seats. A spacious baggage compartment is located aft of the rear seat to accommodate luggage, guns, fishing equipment, and many other items.

Basically, the Aeronca Champion is a conventional three control aircraft. The newly designed control system provides smooth non- fatiguing, positive control action. Brake pedals are provided for both front and rear occupants. A trim tab on the left elevator compensates for load differences and provides hands-off flight. Positive trim tab control is conveniently located above and between each occupant.

The Aeronca oleo landing gear is incorporated in the Champion. This landing gear construction Insures sturdy yet smooth handling on rough fields. Much of the shock is absorbed in the oleo thereby lessening fatigue on the rest of the airframe and wing structure. Ease in ground handling is assured with steerable leaf spring tail wheel and positive acting mechanical brakes.

Tie down rings are incorporated at the strut wing point.

2 Limitations

2.1 *Airspeed Limitations*

Vs -- Clean Stall – 38 mph

Vx -- Best Angle of Climb – 50 mph

Vy -- Best Rate of Climb – 60 mph

Vg -- Best Glide – 60 mph

Va -- Maneuvering Speed – 95 mph

Vne -- Never Exceed – 129 mph

2.2 *Propeller Limits*

2.2.1 Static R.P.M.

Full throttle setting not more than 2200 R.P.M., not less than 2010 R.P.M.

2.2.2 Diameter

Not more than 72 inches.

Not less than 70 inches.

3 Emergency Procedures

3.1 *Engine Runs Rough*

Pull Carburetor full ON. If the roughness is caused by carburetor ice, roughness will probably increase momentarily, then the engine should begin to run smoothly.

If applying carburetor heat does not smooth the engine, check mags. It is possible a fouled plug, worn plug wire, or faulty mag is causing the roughness, in which cases switching to the good mag, while resulting in a slight loss of power, will smooth the engine.

Land as soon as practical.

3.2 *Engine Failure Immediately After Takeoff*

Lower nose immediately to maintain Vg (60 MPH), land straight ahead.

3.3 *Engine Failure During Flight*

Establish a normal glide and go to your field. Depending on load, full nose-up trim will usually provide an airspeed just above Vg (60 MPH).

- Carb Heat ON
- Check mags.
- Check fuel.

3.4 *Low Oil Pressure*

If oil pressure goes under 30 pounds and oil temperature begins to climb, land as soon as possible.

3.5 *Spin Recovery*

If the airplane enters an unintentional spin, immediately apply full rudder opposite direction of rotation; simultaneously bring the stick forward and bring throttle to idle. As rotation stops, return rudder to neutral and gently but firmly recover from the resulting dive.

3.6 *Engine Fire*

- Fuel OFF.
- DIVE in an attempt to blow out fire.
- Land as quickly as possible.

3.7 Ditching

Landing in water will probably put this airplane on its back. Stalling immediately before contact with the surface will mitigate that likelihood.

If it is absolutely necessary to land in the water, land upwind if on a lake, downstream if in a river.

On lakes, waves are always perpendicular to wind, and streaks are always parallel to the wind.

3.8 Inadvertent Flight into Clouds

DO NOT enter clouds in this airplane.

However, in the event of inadvertent entry into cloud, one of two options may prevent loss of control of the airplane:

1. If the pilot is instrument certified, an immediate 180 back to VFR may be possible. Standard Rate Turn with this needle is indicated by the right edge of the needle touching the left edge of the index, or the left edge of the needle touching the right edge of the index. Check time, roll gently into a standard rate for one minute, then roll out.
2. If the pilot is NOT instrument certified, attempting the above procedure will almost certainly result in loss of control of the aircraft and subsequent inflight structural failure.

Therefore, if the pilot is not instrument certified, the only option is to **TURN LOOSE OF THE STICK**. Maintain heading by reference to the compass with very light rudder inputs; very, very gently ease back on the throttle a few hundred rpm to establish a gentle descent to VFR under the clouds.

3.9 Night Flight

Because this aircraft has no electrical system and, therefore, no lights, night flight is prohibited. Any circumstance such as unexpected headwinds that result in flight after sundown constitutes an emergency requiring landing as soon as possible at the nearest lighted airfield.

4 Normal Procedures

4.1 *Operating Checklists*

4.1.1 Preflight Walkaround

4.1.1.1 Controls

- Controls free
- Radio, Intercom -OFF
- Magnetos -OFF
- Fuel -ON
- Visual check of instruments
- Fuel tank and hoses
- Brakes
- Rudder pedal cables
- Seat belts

4.1.1.2 Right Wing

- Wing root fairing
- Step back and check the top of the wing for rips or tear in the fabric, or any other abnormality (ice, dirt, etc.)
- Trailing edge

4.1.1.3 Aileron

- Check the four attachment points
- Ensure all nuts, bolts and cotter pins are in place and in good shape
- Aileron control
- Check nuts, bolts and cotter pins both above and below the wing
- Check for movement
- Wing tip
- Wing movement -grasp the wing tip and move the wing fore-aft and up-down, ensure there is no unusual movement, watch the landing gear

4.1.1.4 Struts

- Bolts and lock nuts are in place
- Attachment to the wing, cross members, fuselage
- Leading edge

- Check pitot/static tube

4.1.1.5 Landing Gear

- Bolts, nuts, tires, and brake cables
- Check strut to wheel cable
- Check fabric for damage

4.1.1.6 Windshield

- Check for Cleanliness.

NOTE: Do not use abrasives or harsh chemicals, especially ammonia-based glass cleaners. Rinse dust off by flushing with water. Clean with a good plexiglass cleaner and soft cloth.

4.1.1.7 Engine and Nose

- Check fuel level
- Gas cap on secure
- Oil 3.5 to 4 quarts
- Bird nests, no FOD
- No leaks
- Drain valve --Check fuel for water and dirt
- Wires – plug, mags
- Cowling securely attached, general condition
- Cooling intake
- Exhaust pipes -- Grab and check for movement
- Air intake - check filter

4.1.1.8 Propeller

- Check leading edge for dents, cracks or damage
- Tug or pull to ensure it is on
- Tap both ends to compare musical notes
- Check spinner security

4.1.1.9 Left Wing

- Repeat checks made to right wing

4.1.1.10 Right Fuselage

- Check for fabric damage

4.1.1.11 Elevator

- Check attachment points, nuts, bolts and cotter pins
- Check for loose movement
- Check tension and attachment on elevator and rudder wires
- Check trim for wire tension

4.1.1.12 Rudder

- Check attach points, nuts, bolts and cotter pins
- Check control wires for looseness
- Check for loose movement

4.1.1.13 Tailwheel

- Check rubber, springs, nuts and bolts

4.1.1.14 Left Fuselage

- Check for fabric damage

4.1.2 Pre-Takeoff: CIGARS-T

- **C** ontrols
- **I** nstruments
 - Oil Pressure
 - Oil Temperature
- **G** as
- **A** ltimeter
- **R** unup 1500 RPM
 - Mags
 - Carb Heat
- **S** eatbelts
- **T** rim

4.1.3 Pre-Landing: CIGUMPS

- Carb Heat
- Instruments
 - Oil Pressure
 - Oil Temperature
- Gas
- Undercarriage NA
- Mixture NA
- Seatbelts

4.1.4 Post Landing

- Carb Heat OFF

4.1.5 Shutdown

- Intercom/Radio - OFF.

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- Magnetos - OFF.
- Fuel - OFF.
- Cockpit - CLEAN and NEAT, Stick tied
- Logs - ENGINE HOURS
- Tie down

4.2 Normal Takeoff

NOTE: No takeoff data exists for this airplane. The following table was drawn from an 85-hp 7AC; your runway lengths will be longer.

TAKE-OFF DISTANCES — FEET													
500 - TURF RUNWAY													
MODEL (S): L-16A&B													
		-5 DEG. CENT.				+15 DEG. CENT.				+35 DEG. CENT.			
CONFIGURATION AND GROSS WEIGHT		ZERO WIND		30 KNOT WIND		ZERO WIND		30 KNOT WIND		ZERO WIND		30 KNOT WIND	
		PRESSURE ALTITUDE											
		GROUND RUN	CLEAR 50'	GROUND RUN	CLEAR 50'	GROUND RUN	CLEAR 50'	GROUND RUN	CLEAR 50'	GROUND RUN	CLEAR 50'	GROUND RUN	CLEAR 50'
1350 LB.	50	190	470	35	85	220	540	35	80	490	950	30	120
	1,000	230	550	30	85	250	700	45	100	430	1150	40	140
	2,000	270	640	35	85	320	900	45	120	540	1350	70	180
	3,000	330	800	42	105	430	1030	50	130	670	1600	85	210
	4,000	400	960	50	125	480	1160	60	150	810	1900	100	240
	5,000	470	1130	60	150	540	1390	70	170	900	2400	120	300

4.3 Normal Landing

NOTE: No landing data exists for this airplane. The following table was drawn from an 85-hp 7AC, but should be representative of the genre.

LANDING DISTANCE - FEET									
STANDARD DAY									
MODEL (S): L-16 A&B									
		BEST IAS FOR APPROACH		500 - TURF - NO WIND					
GROSS WEIGHT LB		POWER OFF	POWER ON	AT SEA LEVEL		AT 2000 FT		AT 4000 FT	
				GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'
		M.P.H.	M.P.H.	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'
1350		53	42	240	1110	275	1150	295	1195
								310	1240

4.4 Cold Weather Preflight

4.4.1 Fabric and Plexiglass Surfaces

Remove snow and ice from the surface of the airplane. Loose snow or ice can be wiped or brushed off. If frozen to the surfaces, it can best be removed by placing airplane in a heated hanger or by blowing hot air from a heater unit over the surfaces. If either of these methods cannot be employed, melt the ice with glycol, warm water, or a brine solution.

NOTE: Do not try to chip ice either from the fabric or plexiglass surfaces

4.4.2 Control Surfaces

Make sure all control surfaces and hinges are free of ice.

4.4.3 Landing Gear

Make sure landing gear and brakes are free of ice.

4.4.4 Engine Preheat

If temperatures are below freezing (0°C/32°F), preheat the engine before attempting a start to save wear on the engine.

If temperatures are below 0°F, preheat is necessary; successful start is unlikely.

5 Performance

5.1 *Performance Speeds*

Top Speed 100 M.P.H.

Cruising Speed 90 M.P.H.

Landing speed 35 M.P.H.

Best Glide (V_g) 60 M.P.H.

Best Rate of Climb (V_y) 60 M.P.H.

Best Angle of Climb (V_x) 55 M.P.H.

5.2 *Power off Stalling Speeds*

POWER OFF STALLING SPEEDS			
STALLING SPEED MPH CALIBRATED I. A. S.			
ANGLE OF BANK (DEGREES)	GROSS WEIGHT		
	1300 lbs.	1220 lbs.	1000 lbs.
0	43.5	42	38
10	43.5	42	38
20	45.5	44	39
30	46.5	45	41
40	49.5	48	43
50	53.5	52	48

5.3 *Range*

Rate of Climb 500 ft. per minute

Fuel Capacity 13 gallons

Cruising Range 260 miles

5.4 Runway Lengths

NOTE: Takeoff and Landing data are not available for the 65 hp Champ 7AC. The following tables are from the USAF manual for the L16A/B. Our runway requirements will be similar.

5.4.1 Takeoff

TAKE-OFF DISTANCES — FEET																	
MODEL (S): L-16A/B				SOD - TURF RUNWAY										L-16 A 1 ENGINE 0-190-1 L-16B 1 ENGINE 0-205-1			
CONFIGURATION AND GROSS WEIGHT	PRESSURE ALTITUDE	-5 DEG. CENT.				+15 DEG. CENT.				+35 DEG. CENT.				+55 DEG. CENT.			
		ZERO WIND		30 KNOT WIND		ZERO WIND		30 KNOT WIND		ZERO WIND		30 KNOT WIND		ZERO WIND		30 KNOT WIND	
		GROUND RUN	CLEAR 50'	GROUND RUN	CLEAR 50'	GROUND RUN	CLEAR 50'	GROUND RUN	CLEAR 50'	GROUND RUN	CLEAR 50'	GROUND RUN	CLEAR 50'	GROUND RUN	CLEAR 50'	GROUND RUN	CLEAR 50'
		SL	195	470	25	60	270	660	35	80	400	950	50	125	540	1275	70
1350 L.B.	1,500	230	550	30	65	320	780	40	100	460	1100	40	145	630	1500	60	200
	2,500	270	660	35	85	370	900	45	120	565	1350	70	180	730	1800	95	340
	3,500	330	800	42	105	430	1030	50	150	670	1600	85	210	820	2180	115	290
	4,500	400	950	50	125	480	1160	60	180	810	1900	100	250	1100	2640	140	350
	5,000	475	1150	60	150	540	1290	70	170	1000	2400	120	320	1380	3250	170	420
	SL																

5.4.2 Landing

LANDING DISTANCE - FEET										
STANDARD DAY										
MODEL (S): L-16 A & B				L-16A 1 ENGINE 0-190-1 L-16B 1 ENGINE 0-205-1						
GROSS WEIGHT LB	BEST IAS FOR APPROACH		SOD - TURF - NO WIND							
	POWER OFF	POWER ON	AT SEA LEVEL		AT 2000 FT		AT 4000 FT		AT 6000 FT	
			GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'	GROUND ROLL	CLEAR 50'
1350	53	42	260	1110	275	1150	295	1195	310	1240

6 Weight and Balance

6.1 *Weight and Balance Worksheet*

Item	Weight	Arm	Moment
EW	782	19.37	15147.34
Fuel	_____	-19	_____
Pilot	_____	12	_____
Pax	_____	46	_____
Baggage	_____	68	_____
TOTALS	_____	_____	_____
CG		_____	

CG LIMITS

CG Range	10.9 - 21.5
Max Allowable Gross	1320

I certify these figures true and correct
to the best of my knowledge.
Stations measured 10/19/09

James C. Efird
1536280CFI 10/19/09

6.2 *Center of Gravity Limits*

Datum line wing leading edge

M.A.C. 58.84 inches

Leading Edge M.A.C. plus .28 inches

Center of gravity range plus 10.9, (18.0% M.A.C.) most forward, plus 21.5 (36.0%M.A.C.) most rearward.

6.3 *General Weight Limits*

Empty weight Seaplane 810 lbs., landplane 710 lbs.

Gross weight Seaplane 1320 lbs., landplane 1220 lbs.

Useful load Seaplane 510 lbs.1 landplane 510 lbs.

Wing Loading Seaplane 7.7 lbs., landplane 7.2 lbs per sq. ft.

Power Loading Seaplane 20.3 lbs., landplane 18.8 lbs. per h.p.

6.4 *Baggage Compartment Limits*

20 lbs. when flying solo rear

40 lbs. when flying solo front

7 Airplane and Systems

7.1 *Dimensions*

Length, overall, (level) 21' 5 13/16"

Height, overall, (three point) 7'

Height, (level position) 8' 7 5/8"

Wing Span 35' 1 3/4"

Wing Chord 60"

Stabilizer Span 10' 2 1/4"

Wheel tread (static) 70"

Wheel base (static, level) 16' 3/16"

Wing Area (including fuselage) 170.22 sq. feet

Aileron Area 16.54 sq. feet

Stabilizer Area 14.08 sq. feet

Elevator Area 11.92 sq. feet

Fin Area (not including fuselage) 5.17 sq. feet

Rudder Area 6.80 sq. feet

Elevator Trim Tab Area .83 sq. feet

Wing dihedral plus 2°

Wing incidence plus 1°

Stabilizer incidence (approx.) minus 5°

Fin offset 3/8" left

7.2 *Engine*

7.2.1 General

Continental A65-8 A.T.C. 205. Horizontally opposed, four cylinder, air cooled with 3 7/8" bore and 3 5/8" stroke. Total piston displacement is 171 cubic inches and compression ratio 6.3 to 1.

Rated horsepower at sea level, 65 h.p. at 2300 R.P.M. Recommended, cruising 2150 R.P.M.

NOTE: Recommended cruising R.P.M. should be static or the maximum R.P.M. shown on the tachometer when the engine is run up prior to flight with carburetor heat off.

7.2.2 Oil

Warm weather S.A.E. #40

Cold weather S.A.E. #30

Oil pressure 10 - 35 pounds per sq. inch

Oil temperature

Minimum - 120°F.

Maximum - 220°F.

7.2.3 Carburetor

Stromberg N.A.-S3A1

7.2.4 Fuel

73 octane.

FUEL CONSUMPTION: 4.25 U. S. gallons per hour

7.2.5 Ignition

7.2.5.1 Magnetos and Spark Plugs

Bendix, Scintilla or Eiseman magnetos. Champion C-26 spark plugs.

7.2.5.2 Firing Order

1 - 3 - 2 - 4.

7.2.5.3 Spark Advance

30° B.T.C. with both magnetos. Left magneto (Number 1 mag.) fires lower spark plugs, right magneto (Number 2 mag.) fires upper plugs.

7.2.6 Heat Control

Flow of the heated air to the carburetor heater and cabin heater is controlled from the engine control panel and Instrument panel respectively.

CAUTION: Leather binding around the upper cylinder baffles must always extend inward. This Insures a snug cowling and baffle fit when air pressure is exerted against the leather binding in flight.

7.2.7 Carburetor Heater

This assembly controls the flow of heated air from the baffle systn to the carburetor venturi. A butterfly valve connected to the carburetor heater control

cable directs the airflow to the carburetor, when heat is desired, or through the outlet at the bottom of the air scoop assembly when not in use.

CAUTION: Proper functioning of the heater butterfly valve may be determined as follows:

Set throttle at cruising RPM. (2150 to 2200 R.P.M.) Pull heater control on, RPMs should drop not less than 75 RPM, not more than 200 RPM.

If no change is noted, check butterfly valve for proper seating.

7.3 Fuel System

7.3.1 General

The welded aluminum tank is located directly behind the firewall (capacity 13 gallons.) Fuel is gravity fed from tank to gascolator filter assembly and from gascolator to carburetor. A positive and accurate method for checking fuel supply is provided with a float type fuel gauge located directly on top of the fuel tank deck. The fuel shutoff valve is readily accessible from front or rear seat, on the engine control panel.

A primer is furnished to aid in cold weather starting.

7.3.2 Gascolator Filter Assembly

Located on the engine side of the firewall, the gascolator assembly affords a means of straining sediment and foreign matter from the fuel flow. The gascolator is located at the lowest point in the system; therefore, water is collected in the sediment bulb and care should be taken to check for its presence.

CAUTION: This check can be accomplished visually and should be a daily check. Operating in cold weather and storing in warm hanger with an unfilled tank, also operating in a climate where high humidity ratio is prevalent, are most probable causes for condensation and the presence of water in the fuel system.

Care should be taken to replace the bowl securely and re-safety. Gascolator gasket should not be used more than once before being replaced. When draining gascolator bowl, filter screen should be cleaned and checked for enlarged mesh or damage.

7.3.3 Primer

For cold weather starting, three slow movements of the primer pump as the propeller is being pulled through will force fuel directly into the induction system assuring quick, positive starting.

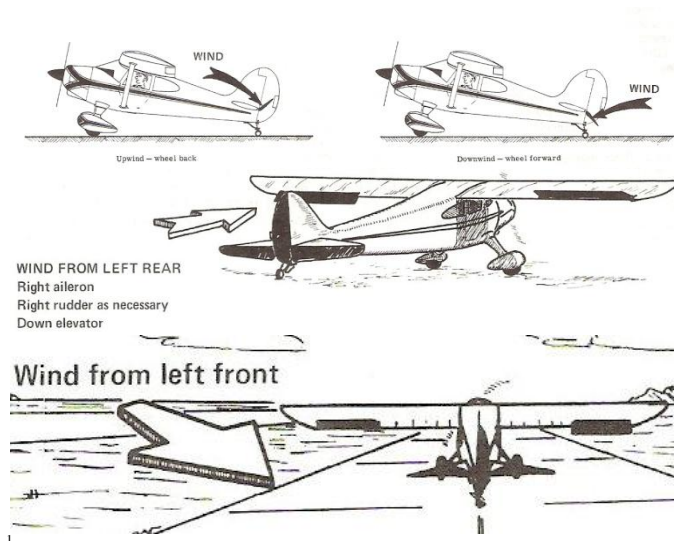
7.4 Landing Gear

8 Handling, Servicing, and Maintenance

8.1 *Taxiing*

This airplane wants to point into the wind. It is a 700-pound weathervane.

When taxiing in more than a gentle breeze, position controls according to the following diagram:



8.2 *Takeoff*

The following is from AFM L-16a, 15 July 1953

¹ These drawings copied with permission from *The Student Pilot's flight Manual* by William K.Kerschner, published in 1980 by the Iowa State University Press.

2-14. NORMAL TAKE-OFF.

- a. Release brakes.
- b. Apply full throttle.
- c. Follow conventional surface control procedure.
- d. Just prior to take-off, a slight back pressure on the control stick will aid the airplane to leave the ground.
- e. Best take-off speed—approximately 48 mph IAS.
- f. Take-off distance—refer to Take-off, Climb and Landing Charts (See figure A-3).

2-15. MINIMUM RUN TAKE-OFF.

- a. Hold airplane with brakes while applying full throttle until engine has attained maximum rpm.
- b. Release brakes with control stick slightly forward of a neutral position.
- c. During ground-run, hold airplane in slightly "tail-low" position.
- d. At approximately 49 mph IAS, a swift backward movement of the control stick will result in the airplane leaving the ground.

CAUTION

Do not allow tail wheel to strike the ground as this will reduce the forward speed of the airplane.

- e. When airborne, climb at approximately 45 mph in the Model L-16A airplane and at 47 mph in the Model L-16B airplane.

8.3 Landing

2-29. APPROACHES.

2-30. NORMAL APPROACH. A normal approach in the airplane should be made power-off at a glide speed of 55 mph. This speed permits ample control in the glide and for the landing "flare," as well as permitting maximum visibility forward and down. If the glide is of long duration the engine should be "cleared" at intervals by short applications of power. The elevator trim tab should be used as an aid in trimming.

2-31. MINIMUM GLIDE OVER AN OBSTACLE. To approach over an obstacle, for landing at a minimum horizontal distance from the obstacle, it is necessary to glide the airplane at a speed just above the stall with a small amount of power. An airspeed of 42 mph for the Model L-16A and 44 mph for the Model L-16B and approximately 1350 rpm will produce the desired glide and permit adequate control of the airplane under normal conditions.

2-32. LANDING.

2-33. NORMAL LANDING. The airplane is conventional in its landing characteristics. Brakes may be applied at any time after landing if required, although caution should be exercised in their use if pilot is flying solo from the front seat. Refer to Take-Off, Climb and Landing Charts for data concerning landings.

2-34. **CROSS WIND LANDING.** Because of the light weight and low landing speed of the airplane it is advisable to exercise care in making a cross wind landing. Drop the upwind wing slightly and apply slight pressure to opposite rudder to hold a straight glide path.

2-35. **MINIMUM RUN LANDING.** To accomplish a landing with minimum of landing roll, the airplane should touch down at minimum speed in a three point attitude. Brakes can then be applied as required.

2-36. **EMERGENCY LANDING.** Refer to Section III, Emergency Operating Procedures.

2-37. **GO-AROUND.** Should the pilot overshoot the field or be forced to go-around for any reason, full throttle may be applied immediately. In applying the throttle it should be opened completely but not suddenly. A gradual movement of the throttle control will prevent the engine from cutting-out, as will proper "clearing" during the glide. If the trim tab has been moved to tail heavy position for landing, care should be taken to prevent the nose from coming up too fast as power is applied and speed increases.

8.4 Maneuvers

2-23. POWER-OFF STALL. Stalls with power off are similar to those with power. The stalling speed of the Model L-16A is 42 mph IAS and the stalling speed for the Model L-16B is 43.5 mph IAS.

2-24. CONTROL AT SPEEDS NEAR THE STALL. The airplane is completely controllable by normal use of the control surfaces. Normal turns with 15° of bank can safely be made at speeds of 10 percent above stalling speed (46 mph for the Model L-16A airplane and 48 mph for the Model L-16B airplane). Beyond the stall, the rudder will be found to be more effective in controlling the airplane than the ailerons.

2-25. SPINS. The airplane possesses normal spinning characteristics. To accomplish recovery, first apply rudder opposite the direction of spin, then ease the stick forward until normal flying speed is attained when airplane can be brought out of the dive. Caution should be exercised so as not to exceed 129 mph IAS in the dive. Avoid abrupt pull-outs.

2-26. PERMISSIBLE ACROBATICS. Although the airplane will satisfactorily perform most of the conventional acrobatic maneuvers, a knowledge and application of

the proper technique is essential to prevent undue stresses in the airplane. In performing the maneuvers, avoid excessive speeds and abrupt pullouts. Following is a list of permitted maneuvers:

- a. Normal stall.
- b. Normal spin.
- c. Slow roll (Do not exceed 85 mph IAS).
- d. Vertical bank (Do not exceed 70 degrees).
- e. Snap roll (Do not exceed 85 mph IAS).
- f. Half roll.

2-27. DIVING. The airplane possesses normal diving characteristics. Do not exceed 129 mph IAS in a dive.

9 Supplements

9.1 *Handstarting an Airplane*

When I started to fly, handstarting airplanes was a common enough experience that the FAA manual included instructions on how to do it safely. Today it's rare enough that the handstarting section of FAA H-8083-3A is very brief, although also very good. Having handstarted scores, if not hundreds, of airplanes of various shapes and sizes, I offer the following additional guidelines for those who may be contemplating the purchase of a Classic aircraft, or may find themselves stuck on a remote corner of an airport away from home with a dead battery.

9.1.1 **First, some basic concepts**

As any good gunman will tell you, "Every gun is loaded". Likewise, **Every prop is hot**. If you must look down the barrel of a gun or put an important piece of your anatomy inside the arc of the propeller, do so very, very carefully. (This is true whether you have an electric starter or not).

Never move a prop unless you're prepared for it to start. That means someone you trust is in the cockpit standing on the brakes, or the airplane is tied down at all three points. (Yes, if I've untied an airplane then decide for some reason I need to pull the blade through, I put the ropes back on.) I've heard pilots object: "But the switch is off, isn't it?" Maybe, but that doesn't mean a P-lead isn't also off.

If you must move a propeller, double check the cockpit to make sure the throttle is closed, mixture is in idle cutoff, and the switch is off. Or confirm with the person in the cockpit that everything is "off and closed".

Handstarting an airplane can be done safely and, for reasons I do not understand, can be remarkably satisfying. But never forget, not for an instant, that

the noisy end of an airplane
can bite you.

9.1.2 **Handstarting with Pilot/Ground Crew**

NOTE: When handstarting an airplane, the guy at the blade is in charge. I don't care if the person at the controls is Chuck Yeager and the guy in front is the pimply-faced high school kid (hereinafter referred to as "Propper") washing airplanes to pay for his lessons, Propper is calling the shots.

Check footing under nose of airplane. If necessary, push the airplane to solid ground. If no solid ground is available, be very much aware of what's underfoot. Loose rocks on a gravel surface, wet grass can be slick. Once in Alaska I refused to start a Taylorcraft until we found some way to deal with the icy surface. We found some kitty litter in a nearby hanger; it worked just fine.

Check your feet. The instant the engine catches is a bad time to step on your own shoelace.

Brief carefully, to make sure Yeager and Propper understand their respective rolls.

After Yeager is strapped into the airplane, Propper calls "Off and Closed; Brakes". (This means "Mags are off and throttle is closed, brakes set".

Yeager checks mags and throttle, stands on the brakes, then repeats "Off and Closed, Brakes Set".

While making eye contact with Yeager, Propper pulls hard on the prop hub to make sure brakes are set (No, even with Yeager at the controls don't trust him: check him), then pulls the prop through a few times to prime engine. Depending on engine, Yeager and Propper may agree for Yeager to prime with the pump before or during the pull-through prime.

Usually, while pulling the blade through, Propper will hear a gentle sucking sound from the engine when it's ready.

Propper pauses, calls "Contact, throttle cracked" (throttle placement may differ depending on engine and engine temp).²

Yeager sets Mags on, sets throttle, then repeats "Contact, throttle set". He confirms good brakes, stick back, and watches Propper.

Propper looks Yeager in the eyes, assures he is paying attention, pulls the hub again to check brakes, visually confirms elevator up, and pulls the blade through. As the blade comes through, Propper is moving out and to the side, away from it.

Warning

DO NOT move the blade unless you're making eye contact. If Yeager is adjusting shoulder harness, fishing for charts, or engaged in any other activity, wait for him to finish.

² **Note:** *Saying "Contact" rather than "Switch On" is not B-movie dramatics when we want the switch on. There is a reason: "Switch On" is easy to mis-hear as "Switch Off". "Contact" doesn't sound anything like "Switch Off".*

Most books that deal with handpropping airplanes advise NOT to put your fingers on the trailing edge of the blade, as it may pop back at you and injure your fingers. They advise using pressure only on the front of the blade. That's good advice, but frankly, I've never been able to do it that way. I do, however, use gloves when I can.

9.1.3 Solo Handstarting

In the old days, the books said the rule for solo handstarting was **DON'T**.

Again, that's good advice; but most of my students were in Alaska, I knew they'd be going to the bush and handcranking the thing solo out on a sandbar somewhere. (Even at Merrill Field, the world's busiest general aviation airport, it was not always possible to find someone willing to crank it for you). Here's the procedure.

NOTE: A friend of mine at MRI got it wrong; his Champ jumped the chocks, chewed up the 170B at the next tiedown, and Lew's flying days were over. **DO NOT** deviate from this procedure.

Make sure the airplane is tied down at all 3 points and Mains are chocked, with the pigtail from the chocks in the door so you can retrieve chocks after you saddle up.

Tie the stick back with seat belt so elevator is up.

Preflight complete, double check "off and closed".

Prime the engine.

Set switch and throttle

Turn the switch on.

Most aircraft will start with throttle closed. That's best. If it won't start after a few blades, crack the throttle. Be aware, of course, that the more throttle you use the higher the risk.

Pull the blade through, as you're doing so moving out and back.

When the engine starts, walk well clear of the prop, aft of the strut, reach in through the window and stabilize the engine at idle and check oil pressure. (usually, you'll be on the left side of the airplane.)

Once certain the engine is stabilized, untie the left wing; right wing; then tail.

Here's the tricky part. Now the airplane's untied and running, you've got to get on board without bumping or snagging anything.

Pilot Operating Handbook, Champ 7AC

Carefully mount up, watching you don't catch a sleeve on the throttle or switch or bump anything. *CAREFUL!!! WATCH WHAT YOU'RE DOING!!!*

Once settled into the seat, release seat belt from stick and secure it around your lap.

Put your headset on. Take care of other business (kneeboard, checklist, etc.)

Set brakes.

Take the pigtail, jerk the chocks from the mains (this may take some practice; suggest the first time you try it, do so with the engine off), pull them in and toss 'em in the luggage compartment.

Go flying.

10 Safety and Operational Tips

The following list directly from the 1946 Service Manual, for your entertainment and edification. It is good counsel.

DO'S AND DON'TS

DO - tie your ship down.
DO - cover the pitot tube head when not in use.
DO - check fuel and oil supply before takeoff.
DO - keep your ship clean.
DO - check your mags before takeoff.
DO - check your oil pressure when starting engine.
DO - fasten your safety belt before starting engine.
DO - check freedom of controls before takeoff.
DO - check sediment bulb for water, daily.
DO - check traffic before turning, climbing or gliding.
DO - lubricate oleos every 25 hours.
DO - check engine and engine mount attachment bolts, every 20 hours
for security and tightness.
DO - face wind during engine warm up.
DO - tail airplane into wind when parking if possible.

DON'T - take off until oil temperature reads at least 90° F.
DON'T - use the rudder trailing edge to push the airplane.
DON'T - use strong soap on the aircraft finish.
DON'T - leave your plane untied.
DON'T - hangar your plane without filling the fuel tank.
DON'T - neglect those 20 and 100 hour checks.
DON'T - try to imitate the stunt pilots.
DON'T - neglect checking tire pressures (13 to 15 pounds).
DON'T - force upper cowlings above horizontal when checking oil.
DON'T - use waste fabric to clean your windows and windshield.
DON'T - "jazz" your throttle.