

EXTERNAL CHECKS

1. TIRES	CHECK
2. LANDING GEAR STRUT CLEARANCE	3 ⁷/₁₆" AND EQUAL
3. PITOT TUBE COVER	REMOVED
4. GUN HATCH COVERS	SECURED
5. GAS TANK CAPS	CLOSED
6. DZUS FASTENERS AND SCREWS	CHECKED
END	

PRE-START

FP	1. IGNITION SWITCH	OFF
Left panel	1. MIXTURE CONTROL	IDLE CUT-OFF
	2. FUSELAGE FUEL	CHECK
	3. FLAP HANDLE	UP
	4. CARBURETOR RAM AIR CONTROL	RAM AIR/FORWARD
	5. CARBURETOR HOT AIR CONTROL	NORMAL/FORWARD
	6. TRIM TABS - RUDDER TRIM - AILERON TRIM - ELEVATOR TRIM	6° RIGHT 0° 0° 2-4° nose-heavy if fuselage tank is filled to >25 gallons.
	7. LANDING GEAR HANDLE	DOWN
	8. PROPELLER CONTROL	FULLY FORWARD
	9. THROTTLE	OPEN 1"
Floor	1. LEFT FUEL GAUGE	CHECK
Front panel	1. GUNSIGHT GYRO SWITCH	FIXED
	2. GUNSIGHT GYRO MOTOR SWITCH	FIXED
Centre console	1. ARMAMENT SWITCHES - ROCKETS SWITCH - BOMBS SWITCHES - GUN SAFETY SWITCH	SAFE OFF OFF
	2. FUEL SHUT-OFF VALVE	ON
	3. FUEL SELECTOR VALVE	MAIN TANK L.H.
Floor	1. RIGHT FUEL GAUGE	CHECK

PRE-START

Front panel	1. ALTIMETER	SET ZERO
	2. DIRECTIONAL GYRO	UNCAGED
	3. FLIGHT INDICATOR	UNCAGED
	4. FLIGHT CONTROLS	CHECK
	5. PARKING BRAKE	SET
	6. FUEL BOOSTER SWITCH	ON
Right panel	1. SUPERCHARGER	AUTO
	2. BATTERY SWITCH	ON
	3. GENERATOR SWITCH	ON
Left panel	1. COOLANT RADIATOR AIR CONTROLS	OFF THEN ON
	2. OIL RADIATOR AIR CONTROLS	OFF THEN ON
<p>Check by listening that the oil and coolant radiator flaps are operating. Maintain both flaps fully open while running the engine on the ground. Flap doors will be set to automatic before take-off.</p>		
Front Panel	3. LANDING GEAR WARNING LIGHTS	PUSH TO CHECK
	4. OXYGEN GAUGE	CHECK 400 PSI
	5. ESSENTIAL LIGHTS - INSTRUMENT FLUORESCENT LIGHTS - COCKPIT SWIVEL LIGHTS - POSITION AND RECOGNITION LIGHTS - LANDING LIGHTS	IF FLYING AT NIGHT CHECK CHECK CHECK CHECK
	END	

STOPPING THE ENGINE (REVIEW BEFORE ENGINE START)

1. PROPELLER CONTROL	FULLY FORWARD
2. ENGINE IDLE	1500 RPM
3. FUEL BOOSTER SWITCH	OFF
4. MIXTURE CONTROL	IDLE CUT-OFF
<p>Open the throttle as the RPM drops below 700 RPM. Do not open the throttle above 700 RPM as any sudden opening of the throttle at this point discharges fuel into the carburetor and causes after-firing – the engine sputters and attempts to fire again.</p>	
5. IGNITION SWITCH	OFF
6. ALL ELECTRICAL SWITCHES	OFF
7. CONTROLS	LOCKED
8. CARBURETOR AIR CONTROL LEVER	UNRAMMED FILTERED AIR
9. PARKING BRAKES	ALLOW TO COOL
END	

START-UP

1. PRIMER SWITCH

3–4 seconds
1 second if engine is hot

Cold weather

NOTE

More than normal priming is required at low temperatures during the starting procedure and immediately after combustion until smooth engine operation is obtained. It is not considered harmful to prime continuously when necessary during the entire cranking period, but prime only when the engine is turning over.

2. STARTING SWITCH

UNCOVERED

3. STARTING SWITCH

HOLD ON

4. IGNITION SELECTOR

BOTH
After 6 propeller blades

5. MIXTURE CONTROL

RUN
As engine catches

6. STARTING SWITCH

RELEASE

NOTE

If the engine fails to take hold after several revolutions, give it one second more prime.

⚠ CAUTION

If the engine cuts out after starting, immediately turn the Mixture Control to IDLE CUT-OFF.

7. ENGINE WARM-UP

CHECK

NOTE

Monitor the following parameters as the engine warms:

- Check that oil pressure reaches at least 50 PSI within 30 seconds. If not, stop the engine.
- Idle at about 1200-1300 RPM until the oil temperature reaches 40°C and the oil pressure is steady.
 - Check the suction gauge to show between 3.75 to 4.25" of vacuum pressure.
- Check all of the engine instruments. Make sure they don't exceed or fall below their limits.

⚠ CAUTION

If for any reason you anticipate pulling more than 40" of manifold during the engine ground run, be sure that the airplane is anchored.

8. ENGINE IDLE

Once engine is running hot, throttle back to keep the engine clean but cool.

1000 RPM

Consult the table below for a chart of manifold pressure and engine RPM limits for flight, as well as engine instrument limits.

Manifold Pressure and RPM Limits for Flight	Takeoff maximum	War Emergency	Military Power	Maximum Continuous	Maximum Cruise
Manifold Pressure (in.)	61	67	61	46	42
RPM	3,000	3,000	3,000	2,700	2,400

Engine Instrument Limits	Coolant Temperature	Oil Temperature	Oil Pressure	Fuel Pressure
Minimum	—	—	50 PSI	14 PSI
Desired	100°–110°C	70°–80°C	70–80 PSI	16–18 PSI
Maximum	121°C	105°C	—	19 PSI

END

NORMAL STEP

FULL PROCEDURE STEP

CONDITIONAL STEP

NON-FUNCTIONAL STEP

PREFLIGHT CHECK

Instruments and controls	1. PRIMARY CONTROLS	CHECK
	2. ALTIMETER	SET
	3. DIRECTIONAL GYRO	SET
	4. FLIGHT INDICATOR	SET
	5. ALL INSTRUMENTS	WITHIN RANGES
	6. ALL SWITCHES AND CONTROLS	IN DESIRED POSITIONS
Fuel system	1. FUEL TANK SELECTOR HANDLE	MAIN TANK L.H.
	2. FUEL BOOSTER PUMP SWITCH	ON
	3. PRIMER SWITCH	OFF
Control surfaces	1. FLAPS	UP
	2. TRIM: - RUDDER - AILERON - ELEVATOR	6° RIGHT 0° 0° Or 3-4° Nose heavy per fuel load
Power plant	1. PROPELLER CONTROL	FULLY FORWARD
	2. ENGINE POWER	CHECK
	Advance throttle to obtain 2,300 RPM. At this RPM, the manifold pressure should read ½" Hg less than field barometric pressure within ±½" Hg. Manifold pressure in excess of field barometric pressure indicates the engine is not producing maximum power and should be checked.	
	3. IGNITION SYSTEM	CHECK
	At 2300 RPM, with the propeller in full INCREASE, move ignition switches from BOTH to L, back to BOTH, then to R, and back to BOTH. Allow engine speed to stabilize at BOTH between checks. A maximum drop of 100 RPM is allowable for the right magneto and 130 RPM drop for the left magneto.	
	4. IDLE SPEED Idle engine at 650-700 RPM with throttle against idle stop	CHECK
	5. ACCELERATION & DECELERATION	CHECK
	With mixture set to RUN, advance throttle from idle to 2,300 RPM. Engine should accelerate and decelerate smoothly with no tendency to backfire.	
	6. CARBURETOR RAM AIR CONTROL	RAM AIR/FORWARD
	7. MIXTURE CONTROL	RUN
8. SUPERCHARGER CONTROL SWITCH	AUTO	
9. COOLANT & OIL RADIATOR AIR CONTROLS	AUTOMATIC	
⊘ CAUTION Do not exceed 40" Hg during ground run-up without having the tail tied down; the aircraft may nose over.		
Cold weather	1. CARBURETOR HEAT	ON
	2. PITOT HEAT	ON

END

TAKEOFF

Normal takeoff	1. TAKEOFF AREA CLEAR	CHECK
	2. NO AIRCRAFT ON FINAL APPROACH	CHECK
	3. BRAKES	RELEASE
	4. AIRCRAFT LINED UP	CHECK
	5. THROTTLE Advance smoothly and steadily to 61" Hg MP at 3,000 RPM	TAKEOFF POWER
<p>⊘ CAUTION</p> <p>Do not attempt to lift the tail too soon as this increases directional instability. Pushing the stick forward unlocks the tail wheel, thereby making steering difficult. The best takeoff procedure is to hold the tail down until sufficient speed for rudder control is attained and then to allow the tail to rise slowly. Some rudder input may be necessary to maintain heading as the tail is lifted and stabilized in a takeoff attitude.</p>		
<p>NOTE</p> <p>It is recommended that 61" Hg and 3,000 RPM be used for takeoffs and that this power setting is reached as quickly as possible after the takeoff run is started. However, advance the throttle smoothly and never jam it forward. Torque effects appearing from a sudden onset of power can lead to a loss of directional control of the aircraft.</p> <p>When a formation takeoff is performed, a lower power setting of 55" Hg may be used to allow the wingmen room for increased power over the leader in order to maintain their position.</p>		
<p>⊘ CAUTION</p> <p>If rough engine occurs during the takeoff run, immediately throttle back 4 or 5" Hg manifold pressure to complete the takeoff if conditions permit.</p>		
<p>NOTE</p> <p>To accomplish a minimum-run takeoff, lower flaps to 15°–20°. Keep the aircraft in a three-point attitude and allow it to fly itself off the ground in this position. As soon as airborne, allow airspeed to build up and climb out when speed exceeds 100 mph. Retract landing gear when airspeed reaches a safe value. Raise flaps above 200 feet altitude.</p>		
Cross-wind takeoff	1. THROTTLE Advance smoothly and steadily to 61" Hg MP at 3,000 RPM	TAKEOFF POWER
	2. ELEVATORS Ensure positive rudder control. Speed should be slightly greater than for normal takeoff. Meanwhile, keep the aircraft firmly on the runway until speed is sufficient to make a smooth, clean break.	TAIL HELD DOWN
	3. WINGS Apply sufficient aileron control to keep wings level or even to effect a slightly wing-low attitude into the wind.	LEVEL OR LOW INTO THE WIND
	4. WHEN AIRBORNE	CRAB INTO WIND
Cold weather	1. THROTTLE At the start of the takeoff run, advance the throttle to Takeoff Power as rapidly as possible to ensure that the rated takeoff power is obtainable. Abort the takeoff if required power is not available, because engine failure may occur.	TAKEOFF POWER
<p>END</p>		

AFTER TAKEOFF

1. LANDING GEAR Ensure lever catches in the up position.	UP
2. FLAPS Raise flaps when altitude is above 200', sufficient airspeed has been achieved, and all obstacles have been cleared.	UP
3. COOLANT AND OIL TEMPERATURES	CHECK
⊘ CAUTION Do not apply brakes after takeoff to stop rotation of the wheels to prevent the brake disks from seizing.	
4. THROTTLE After reaching an altitude of 500'	46" Hg; 2,700 RPM
5. TRIM FOR LEVEL FLIGHT	CHECK
6. ALL INSTRUMENTS	CHECK
Check all of your instruments for proper function within normal parameters. In doing so, be sure to check the ammeter indicator showing proper charging from the generator. Immediately after takeoff, the rate of charge should not exceed 100 amps, dropping back to the normal 50 amps or less after 5 minutes of operation. If the charge does not reduce, turn the generator disconnect switch to OFF and return to the airfield. Also check the hydraulic pressure to read approximately 1,000 PSI after the landing gear has been retracted.	
7. GUN HEATERS If weather and mission so requires.	ON
8. CLIMB OUT AT SPEED	170mph
END	

Cold
weath.**COLD-WEATHER OPERATION IN FLIGHT**

1. CARBURETOR HEAT	AS REQUIRED
Use carburetor heat as required to improve fuel vaporization and combat carburetor icing, but do not use carburetor heat above 12,000 feet as resultant excessively lean mixtures will cause engine roughness due to the effect of heat on the altitude compensator of the carburetor.	
⊘ CAUTION Because of the constant-speed propeller and the automatic manifold pressure regulator, it is difficult to detect carburetor ice formation except by irregular engine operation.	
2. PROPELLER SPEED	CHECK
Increase propeller speed momentarily by approximately 200 RPM every half hour to ensure continued governing at extremely low temperatures. Return to desired cruising RPM as soon as the tachometer indicates proper governing.	
END	

APPROACH

1. FUEL TANK SELECTOR HANDLE	FULLEST TANK	
2. FUEL BOOSTER PUMP SWITCH	ON	
3. MIXTURE CONTROL	RUN / AUTO RICH	
4. CARBURETOR RAM & HOT AIR CONTROLS	AS REQUIRED	
5. COOLANT & OIL RADIATOR AIR CONTROLS	AUTOMATIC	
6. ENGINE Run at 61" Hg and 3,000 RPM for 1 minute.	CLEAN	
7. PROP CONTROL	FORWARD @ 2,700 RPM	
8. LANDING GEAR Check indicator to see that the gear is down and locked. Note, the gear should be lowered at 170 mph or less.	DOWN	
9. FLAPS Flaps are usually lowered for the turn to final approach.	FULL DOWN	
10. SHOULDER HARNESS Check by leaning forward against it.	LOCK	
NOTE Since temperature inversions occur frequently in cold environments, avoid engine overcooling during descents.		
Cold weather	1. CARBURETOR HEAT If outside air temperature is below -12°C / 10°F	ON
	2. ALL NON-ESSENTIAL ELECTRICAL EQUIPMENT	OFF 1 minute before final approach
	3. BRAKES	PUMP To remove accumulated ice
END		

LANDING

1. INITIAL AIRSPEED	170mph	
2. LANDING GEAR	DOWN	
<p>When lowering the landing gear, make sure the control handle is DOWN and locked. Check the landing gear indicator lights. Be sure the hydraulic pressure returns to approximately 1,000 PSI. Be prepared for the aircraft to feel nose-heavy when the gear is down. Adjust elevator trim to compensate.</p>		
<p>⚠ WARNING Do not change gear position until cycle is completed as gear may get out of proper sequence</p>		
3. TRAFFIC PATTERN AIRSPEED	150mph	
4. FLAPS When turning on final approach and airspeed is <165 IAS.	DOWN	
5. LINE-UP SPEED	115–120mph	
6. THROTTLE When sure of a correct landing approach.	CLOSED	
7. FLARE Break the glide with a controlled flare and approach so as to land within the first third of the runway in a 3-point attitude.	ON RWY THRESHOLD	
8. LANDING SPEED Hold the aircraft in the 3-point attitude just above the runway until flying speed is lost and the plane sets down at approximately 90 mph.	90mph	
<p>NOTE The tail wheel is locked when the stick is neutral or aft, so steering is limited after touchdown. Keep the stick held back until enough speed is lost and you are ready to turn off the runway and taxi.</p>		
<p>⚠ CAUTION Never attempt to push the stick forward and unlock the tail wheel in a turn when taxiing. Release the tail wheel before starting the turn.</p>		
Cross-wind landing	1. APPROACH SPEEDS	+5–10mph
2. AILERONS Drop the wing into the wind slightly to counteract the drift, and keep the plane straight with the runway.	DROPPED INTO WIND ON APPROACH	
3. FLAPS	HALF	
4. AILERONS	WINGS LEVEL ON TOUCH-DOWN	
5. TAIL WHEEL Be sure to keep the stick back after touch down, so that the tail wheel will remain locked.	LOCKED	
<p>NOTE Make a wheel landing if the crosswind is excessive, gusty, strong, or otherwise doubtful.</p>		
<p>⚠ CAUTION If crabbing is required during the approach, be sure to straighten out before landing. Never land in a crab as it is very stressful on the landing gear.</p>		

LANDING

Gusty landing

In a gusty wind condition, maintain speeds slightly faster than normal to minimize the likelihood of a sudden loss of lift between wind gusts. Watch for the effect of gust on the aircraft. The gust tends to have a ballooning effect. Then, when the gust quits, the aircraft may drop as lift is reduced, resulting in an impact with the ground.

Use about half flaps when performing a landing in gusty conditions.

Wet log.

Wet landing require special attention in using the brakes. Avoid jamming the brakes, which could result in skidding out of control. If visibility out of the front wind shield is poor, use the front panels on each side of the windshield.

END

LANDING GO-AROUND

1. THROTTLE

46" Hg @ 2,700 RPM

⊘ CAUTION

Advance the throttle quickly, but smoothly to a manifold pressure of 46" at 2700 RPM. Avoid a sudden rush of power to prevent a possible loss of control due to increasing torque effects.

2. RIGHT RUDDER AND RIGHT TRIM

Counteract left torque from throttle power-up.

AS NEEDED

3. LANDING GEAR

UP

4. ELEVATORS

TRIMMED

To relieve pressure

5. FLAPS

After your IAS reaches 120 mph and altitude reaches 500 feet. Bring the flaps up gradually, 10° at a time. Monitor the change in attitude as the flaps are raised.

UP

6. COOLANT & OIL RADIATOR AIR CONTROLS

AS NEEDED

⊘ CAUTION

Do not make sudden and large throttle movements. Use all of the controls smoothly to avoid a loss of control.

NOTE

If the aircraft has been trimmed for landing, it may take considerable stick-forward pressure to maintain the nose down until the elevator is re-trimmed.

▲ WARNING

It's critical to maintain a straight course until enough airspeed is gained to raise the flaps and begin maneuvering.

END

AFTER LANDING

1. THROTTLE	1,000 RPM
2. CANOPY	OPEN
3. COOLANT & OIL RADIATOR AIR CONTROLS	OPEN
4. FLAPS	FULLY UP
5. COOLANT & OIL RADIATOR AIR CONTROLS	OFF When flaps have fully retracted
6. TRIM TABS	NEUTRAL
7. PROPELLER CONTROL	FULLY FORWARD
8. FUEL BOOSTER PUMP	OFF
END	

ENGINE SHUT-DOWN

1. PROPELLER CONTROL	FULLY FORWARD
2. ENGINE IDLE	1500 RPM
3. FUEL BOOSTER SWITCH	OFF
4. MIXTURE CONTROL	IDLE CUT-OFF
<p>Open the throttle as the RPM drops below 700 RPM. Do not open the throttle above 700 RPM as any sudden opening of the throttle at this point discharges fuel into the carburetor and causes after-firing – the engine sputters and attempts to fire again.</p>	
5. IGNITION SWITCH	OFF
6. ALL ELECTRICAL SWITCHES	OFF
7. CONTROLS	LOCKED
8. CARBURETOR AIR CONTROL LEVER	UNRAMMED FILTERED AIR
9. PARKING BRAKES	ALLOW TO COOL
END	