

TECHNICAL MANUAL

**FUNCTIONAL CHECK
FLIGHT
PROCEDURE
With TCTO 1C-12-601**

**USAF SERIES
C-12F
AIRCRAFT**

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INTRODUCTION

SCOPE

This document is to be used in conjunction with the normal procedures of the USAF C-12F Flight Manual and Aircrew Checklist. The expanded C-12F Functional Check Flight Procedures (FCF) with operational maintenance guidelines are provided in this publication.

Items accomplished in accordance with T.O. 1C-12F-1 are not duplicated in this manual. Any abnormalities will be annotated on the NOTES page of T.O. 1C-12F-6CL-1.

Functional Check Flight Procedures will be used as directed in T.O. 1-1-300. Flight operations will be IAW the provisions of the T.O. When Acceptance or Functional Check Flights are accomplished to test specific equipment or systems, only applicable portions will be used.

- a. Acceptance Check flight. Includes flight checks for performance and operation to verify contractual conformance. This is applicable to all aircraft on production, maintenance, or modification contracts and the full range of the procedures contained in this manual are mandatory.
- b. Functional Check Flight. Includes flight checks to establish if airframe or equipment are operating in accordance with predetermined parameters while subjected to intended environment.

PURPOSE

This manual outlines the requirements for a functional check flight to provide aerodynamic assurance that the aircraft is airworthy and capable of accomplishing its mission following maintenance. Perform applicable flight profile and associated checks in accordance with the following check flight conditions (after the necessary ground checks and prior to release of aircraft for operational use).

- A. Check prefixed by letter "A" are the minimum required at the completion of aircraft rework and transfer of aircraft custody.

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- B. Checks prefixed by letter "B" are the minimum required after any combination of the following affecting either engine:
1. Complete engine change.
 2. Fuel control change.
 3. Hot section inspection.
 4. Propeller change or riggering of propeller.
- C. Checks prefixed by letter "C" are the minimum required:
1. After moveable primary flight control surfaces have been replaced or have undergone major repairs which could affect the flight characteristics of the aircraft and for which satisfactory aerodynamic operation cannot be determined by maintenance operational checks.
 2. After adjustment, replacement or removal and reinstallation of flight control cable components for which certification of system air worthiness cannot be completely verified by maintenance operational checks.
- D. Airframe or engine vibration developed during previous flight where corrective action cannot be completely verified by ground operational checks. Areas to be checked are selective for only that equipment or system(s) that require flight verification.
- E. When required by TCTO requirements.
- F. As directed by the Commander or Chief of Maintenance (CLS Site Supervisor).
1. The purpose of the procedures is to:
 - a. Assist the flight crew in accomplishing acceptance or Functional Check Flights (FCF) in accordance with T.O. 1-1-300 and contractual requirements.
 - b. Assure compliance of the prescribed FCF by providing the flight crew equipment operating procedures, limits, pressure readings, and conditions to be noted and recorded during the course of the Functional Check Flight.

- c. Provide the flight crew with definitive procedures emphasizing how a system/component will be checked when applying predetermined criteria.
 - d. Provide the flight crew the normal and emergency operating procedures and conditions to be noted for those systems and items having an emergency system.
2. Prior to the check flight, CLS site supervisor shall brief pilots on the maintenance performed on the aircraft, pertinent aircraft history, and the check flight requirements for the particular flight. The briefing should include the expected results and trouble shooting recommendations.
3. A crew member will complete the checklist, using symbols specified in the section heading or by recording the actual instrument readings in the remarks section when required. Upon completion of the check flight, the aircraft commander will sign the certification in the space provided to indicate they have completed tire checks. Discrepancies discovered during the course of an FCF will be recorded directly on the applicable AFTO Form 781A.
4. All unsatisfactory conditions will be recorded by the mechanic or crew chief. Corrective action for discrepancies will be indicated on the AFTO 781A.
5. Prior to a Function Check Flight requiring maximum cruise power, speed checks or minimum trim checks, the aircraft weight shall be between 11,300 lbs. and 11,500 lbs. and the CG shall be between F.S. 184.7 and 187.0. All other checks may be conducted within normal weight and CG limits.

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DEFINITIONS

The following definitions apply to warnings, cautions, and notes, found throughout the manual.

WARNING

Operating procedures, techniques, etc., which, if not correctly followed, could result in personal injury or loss of life.

CAUTION

An operating procedure, practice, etc, which if not strictly observed, could result in damage to, or loss of equipment.

NOTE

An operating procedure, technique, etc., which is considered essential to emphasize.

YOUR RESPONSIBILITY - TO LET US KNOW

Every effort is made to keep the flight manual current. Review conferences with operating personnel and a constant review of mishap and maintenance information assures inclusion of the latest data into the manual. However, we cannot correct an error unless we know of its existence. In this regard, it is essential that you do your part. Comments, corrections, and questions regarding this manual or any phase of the flight manual program are welcomed. These should be forwarded on AF Form 847 as directed by AFI 11-215 through your command headquarters.

**PILOT-COPILOT FUNCTIONAL CHECK
FLIGHT PROCEDURES**

PROFILE

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I PRE-FLIGHT

Exterior and interior inspections shall be conducted with special attention directed to all areas where maintenance was performed.

A. Before Exterior Inspection - Accomplish in accordance with T.O. 1C-12F-1. In addition, accomplish the following steps as applicable.

A

1. Cabin entrance door - Checked. Door must lock easily. When closed, lines on door cams should line up with notches on the adjacent door frame and safety lock arm should be in position around the plunger. Check adjustment of CABIN DOOR annunciator light. Check operation of door lowering cylinder, door must lower slowly and smoothly. Check for correct illumination of the CABIN DOOR annunciator.

A

2. Cargo door - Checked. When closed, visually check that both (upper aft and lower forward) door latching handles are secured by the latch hooks, and that the scribed lines on the (4) rotary camlocks align with the notches on the adjacent door frame brackets. Check operation of the door raising cylinders - they must raise the door smoothly and slowly. Check for correct annunciator indication.

A

3. Escape hatch security and key lock/latch operation - Checked.

- a. Check that emergency exit can be opened and removed easily.
- b. Reinstall and check operation of latch and key lock.
- c. Return to unlocked position for flight.

PROFILE

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- 4. Trim tabs check.



Do not force the trim system beyond the limits marked on the indicators.

- a. When operating the trim tabs through full travel range, note if there is excessive friction or binding.
 - b. In the cockpit and at the control surface, simultaneously check tab direction and neutral position.
- 5. Flight controls check.
 - a. Yoke - Disengage gust lock and check yoke movement for full aileron and elevator deflection. Visually confirm proper deflection and displacement.
 - b. Rudder pedals - Check for freedom of movement and full travel. Visually confirm rudder surface movement with pedal movement.
 - c. Check for any excess friction or obstructions through full range of travel.
 - d. When the elevator control is pulled fully aft, there will be no tendency for the control wheels to swing to either side.
- B. Exterior Inspection - Accomplish in accordance with T.O. 1C-12F-1. In addition, accomplish the following steps as applicable.

- 1. Considering the nature of the maintenance performed on the aircraft, appropriate access panel/cowling doors should be opened, and the areas that were worked on should be scrutinized closely for proper assembly, leaks, correct rigging, tools, rags, and other foreign objects.

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2. Power plants - Check for security, fuel, and oil leaks.
3. Landing gear, wheels, tires, struts, and brakes - Check condition and for leaks.
4. Wings, control surfaces, and tabs - Check for general condition, alignment, free play and verify that when the control tabs are set at neutral position the cockpit indications correspond.
5. Pitot tubes, static ports, antennas, and static wicks - Check for general condition.
6. Inspect for missing/worn fasteners, the security of access panels, popped/loose rivets, skin irregularities and general aircraft condition.

C. Interior Inspection - Accomplish in accordance with T.O. 1C-12F-1. In addition, accomplish the following steps as applicable.

1. Passenger/cargo compartment - Checked.
 - a. Check webbing installation and baggage compartment placard.
 - b. Check toilet and passenger seats for secure installation and operation.
 - c. Check safety belt installation for security to each seat.
 - d. Check all cabin lights for proper operation and all required placards are in place.
 - e. Check carpet and cabin liner for condition.
 - f. Check fire extinguishers (2) stowed.
2. Pilot's and copilot's seats - Check condition of each chair, seat belt installation and operation, and check operation and security of seat mechanism.

PROFILE

II BEFORE STARTING ENGINES

Accomplish in accordance with T.O. 1C-12F-1. In addition, accomplish the following steps as applicable.

A. Right Station - Checked.

- A 1. Cockpit - Check operation of switches, rheostats, cockpit, and instrument lights. Check for missing hardware, decals, instruction plates, frequency and compass cards. Note condition of windshield and all windows. Check rudder pedals, seats, and restraint harness adjustments. Check all circuit breakers.
- A B 2. Propeller levers and condition levers - Check for freedom of movement through full range of travel.
- A B 3. Power control levers - Check for freedom of movement and smoothness through idle to full power range only.



Do not move power levers into reverse mode when engines are not running.

- A B 4. Control friction locks - Check for proper function.
- A 5. Instruments - Check that they are properly marked: i.e., ITT, torque, propeller tachometer (N₂), turbine tachometer (N₁), oil temperature, oil pressure.
- A 6. Clocks - Check pilot and copilot clocks (respective control wheels) for normal operation.
- A 7. Fuel quantity indications - Checked.
 - a. With full fuel left and right, main tank quantity indicators must indicate within 82 pounds of one another. Auxiliary tank quantity indicators must indicate within 35 pounds of each other with full tanks.

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A B

8. External power - Check with battery switch Off. Connect external power cart (300 amps continuous, 1000 amps for .1 second if start is to be performed). EXT PWR annunciator light shall illuminate. Turn the battery On to absorb voltage transients, then turn the external power cart On.

III STARTING ENGINES

Accomplish in accordance with T.O. 1C-12F-1. In addition, accomplish the following steps as applicable.

- A. Starter - Check as follows:
 1. Starts shall be made using the aircraft battery or the aircraft battery in parallel with external power.
 2. Starter should operate normally. N₁ should stabilize at or above 12% (battery start).

NOTE

- Observe starter limitations.
- FUEL PRESSure and No Transfer lights should extinguish within 30 to 50 seconds of engine start.

- B. Maximum Allowable ITT - Checked.
 1. Monitor ITT during all engine starts. Observe 5 second limit if peak is 1000 degrees (MAX).
- C. Low Idle - Checked.
 1. Engine Low Idle should be 58 to 60% (N₁).
- D. Oil Pressure - Checked.
 1. Confirm 60 PSI minimum each engine (low idle).
- E. High Idle - Checked.
 1. Engine should accelerate to 70% to 73% (N₁) from Low Idle.

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A B

- F. Generator and Regulator - Check as follows:
1. Turn both generators On (one at a time). Both generators should come on the line. Check loadmeters for proper generator paralleling. Observe each generator individually for the following:
 - a. Positive charge rate.
 - b. Precision voltmeter - (28.0 to 28.5 volts) within .5 volts of each other.
 - c. Load - shall not exceed 85%.

A

- G. Battery Charge Light - Checked.
1. Monitor BATTERY CHARGE annunciator light after engine start. This light shall illuminate approximately 6 seconds after generator is brought on line. Light should extinguish within 5 minutes (10 minutes for lead acid batteries) following a normal engine start on battery.

IV BEFORE TAXI

Accomplish in accordance with T.O. 1C-12F-1. In addition, accomplish the following steps as applicable.

A

- A. Environmental Control - Checked.
1. Cabin temp mode switch - MAN COOL.
 2. Right engine - Low Idle.
 3. AIR CND N1 LOW light - Illuminated.
 4. Right engine condition lever - N₁ to approximately 65%.
 5. AIR CND N1 LOW light - Extinguished.
 6. Air conditioning compressor - In approximately 8 to 12 seconds the compressor will turn On as evidenced by a sustained increase in ITT on right engine.

PROFILE

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A

7. Set controls as desired for operation.

B. Lights - Checked.

1. Verify that lights function by noting a loadmeter deflection as each switch is turned on. Utilizing only one generator during this check enhances the visual deflection. Have a lineman verify all external lights are in working order.

C. No Smoking and Fasten Safety Belt Switch - Checked.

1. Set to FSB position, then to FSB and NO SMOKE position. Check for illumination of appropriate cabin signs and listen for audible chime.

D. Wing Flaps - Checked.

1. Operate flaps through a full cycle and check for proper operation. Movement should be free. Compare position of flaps with instrument panel indicator.

E. Altimeter - Checked.

1. Check all altimeters to a tolerance of within ± 50 feet of field elevation and within 75 feet of each other.

V TAXI

Accomplish in accordance with T.O. 1C-12F-1. In addition, accomplish the following steps as applicable.

A. Steering - Checked.

1. No turning tendency shall exist while taxiing straight ahead with no braking and no rudder applied to either side. This check shall be made with minimum crosswind.
2. Check freedom of movement and ability to turn with rudder pedals and brakes. Note any excessive vibration or shimmy during takeoff or landing.

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A

B. Flight Instruments - Checked.

1. Check PFD, ND and ESIS for proper indications during taxi.

A

C. Brake Operation - Check.

1. New brakes shall be burned in by applying near maximum braking (short of locking) for one or two landings or high speed taxi runs. After this, brakes should be checked for any tendency to drag or bypass fluid using both the pilot's and copilot's pedals.

VI RUNUP

Accomplish in accordance with T.O. 1C-12F-1. In addition, accomplish the following steps as applicable.

A

A. Parking Brake - Checked.

1. Confirm that the parking brake:
 - a. Locks without undue tension on the control.
 - b. Holds aircraft with power levers at 2000 RPM.

NOTE

New brakes that have not burned in by applying near maximum braking (short of locking) for one or two landings or high speed taxi runs may not hold the aircraft.

- c. Unlocks when control is pushed in.

A

B. Rudder Boost - Checked/ON.

Perform test on one engine at a time

1. Rudder boost control switch - ON.
2. Propeller controls - Full Forward.
3. Condition levers - Low Idle.
4. Left Power Lever - Increase until rudder movement is noted. Observe

PROFILE

ITT and torque limits. The rudder boost should actuate within the following values of engine N_1 .

OAT	Engine Speed N_1	
	Min	Max
More than 35°C	93	96
10°C to 35°C	90	95
Less than 10°C	87	92

A B

C. Pressurization - Check as follows:

1. Condition Levers - High Idle.
2. Bleed air valve switches - PNEU and ENVIRO OFF. Check that pneumatic pressure gauge goes to zero and that the L and R BL AIR FAIL lights illuminate.
3. Bleed air valve switches - Set individually to the OPEN position. Check that the L and R BL AIR FAIL lights extinguish each time.
4. Bleed air valve switches - PNEU and ENVIRO OFF.
5. Cabin altitude controller - Set to 500 feet lower than field elevation.
6. Cabin pressurization rate control - Set to maximum.
7. Cabin pressurization switch - TEST (hold).
8. Left bleed air valve switch - OPEN.
9. Cabin altitude indicator - Check for a descent indication within 10 to 15 seconds.
10. Left bleed air valve switch - PNEU and ENVIRO OFF. Check that cabin altitude returns to field elevation.
11. Repeat the above procedure for the other bleed air valve.
12. Bleed air valve switches - OPEN.
13. Cabin altitude controller - Set to 500 feet above field elevation.
14. Cabin pressurization switch - PRESS.

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- D. Ground Idle Stop - Check as follows:
 - 1. Read the corrected propeller torque at 1800 RPM from Figure A-2.
 - 2. Propeller lever - FULL FORWARD.
 - 3. Power levers - Set 1800 RPM.
 - 4. Torquemeter - Read and record torque.
 - 5. Torque reading must equal the corrected torque read from Figure A-2, ± 40 ft/lbs.
 - 6. Repeat procedure for other engine. The difference in torque readings between left and right engines should not be greater than ± 20 ft/lbs.
 - 7. Repeat procedure using the values obtained from the Propeller Torque Flight Idle Low Pitch Graph, (Figure A-3) while activating the GND IDLE STOP switch.

A B

- E. Auto Ignition System - Checked.
 - 1. Power levers - Set above 480 ft/lbs torque.
 - 2. Auto ignition switches (2) - ARM.
 - 3. Power levers - Retard.
 - 4. Ignition annunciator lights - Illuminated (360 to 460 ft/lbs. torque).
 - 5. Auto Ignition Switches (2) - Off.
- F. Autofeather - Checked (P).
 - 1. Conduct normal check of Autofeather system. Check limits of torque switches as follows:
 - 400 ft/lbs should be 360 to 460 ft/lbs.
 - 260 ft/lbs should be 210 to 310 ft/lbs.
 - 2. Individually advance each power lever above 90% N_1 with the autofeather armed and the other power lever at Idle. The AUTOFEATHER lights should not come on.

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3. Advance both power levers above 90% N_1 simultaneously, both AUTOFEATHER lights should come on.
 4. Move the left power below 85% N_1 ; both AUTOFEATHER lights should go out.
 5. Return the left power lever to above 90% N_1 and retard the right power lever below 85% N_1 ; both AUTOFEATHER lights should go out.
 6. Retard both power levers to IDLE.
- G. Brake De-ice System - Check as follows:
1. Condition levers - HIGH IDLE. Check 70 to 73% N_1 .
 2. Left bleed air valve switch - PNEU and ENVIRO OFF.
 3. Right bleed air valve switch - OPEN.
 4. Brake de-ice switch - Check that BRAKE DE-ICE ON annunciator illuminates.
 5. Pneumatic pressure gauge - Monitor for a momentary decrease in pressure indications when brake de-ice system is turned on.
 6. Brake de-ice switch - OFF.
 7. Right bleed air valve switch - PNEU and ENVIRO OFF.
 8. Left bleed air valve switch - OPEN.
 9. Brake de-ice switch - ON. Check that BRAKE DE-ICE ON annunciator illuminates.
 10. Pneumatic pressure gauge - Monitor for a momentary decrease in pressure indication when brake de-ice system is turned on.
 11. Brake de-ice switch - OFF.
 12. Both bleed air valve switches - OPEN.
 13. Condition levers - LOW IDLE.

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VII TAKEOFF

Accomplish in accordance with T.O. 1C-12F-1. In addition, accomplish the following steps as applicable.

A B

- A. Takeoff - Check as follows:
 - 1. Propeller tachometers - During take-off the propeller tachometers should indicate 2000 RPM and the props should be in sync. If props are in sync (confirmed audibly) and indicator tolerances result in a difference in indicated RPM between left and right, then the lower of the two values shall be 2000 RPM. The maximum indicator tolerance is 20 RPM.
 - 2. Engine instruments - Check for proper indications.
 - 3. BRAKE DE-ICE - Check as follows:
Ensure temperature is less than 15°C.
 - a. BRAKE DE-ICE - ON (Check BRAKE DE-ICE ON annunciator light illuminates.)
 - b. BRAKE DE-ICE ON annunciator light - (Check extinguished within approximately 10 minutes of landing gear retraction.
 - c. Brake de-ice switch - OFF, then ON. - Observe that BRAKE DE-ICE ON light does not illuminate.
 - d. Landing gear switch - DOWN. Observe BRAKE DE-ICE ON light illuminates.
 - e. Landing gear switch - UP.
 - f. Brake de-ice switch - OFF.

VIII CLIMB

Accomplish in accordance with T.O. 1C-12F-1. In addition, accomplish the following steps as applicable.

A B

- A. Engine Instruments - Checked.
 - 1. All instruments shall give proper indication with minimum fluctuation. Maximum allowable oil pressure fluctuation is ± 10 PSIG in the normal operating range of 105 to 135 PSIG (green arc).

PROFILE

B	<p>B. Engine Control Levers - Check for alignment.</p> <p>C. Propeller Syncrophaser - Check.</p> <ol style="list-style-type: none"> 1. Turn PROP SYNC - OFF. 2. Establish a small out-of-sync (less than 20 RPM) condition. 3. Turn PROP SYNC - ON. 4. Synchronization and synchrophasing should be established and held in a few seconds.
A	<p>D. Vertical Speed Indicators - On both PFDs and the ESIS, check normal operation of the vertical speed indicators against the altimeter as follows:</p> <ol style="list-style-type: none"> 1. Aircraft rate of climb - Fly an indicated 1000 feet per minute. 2. Read altimeter at beginning of timing, and time for one minute. 3. Read altimeter at the end of one minute. The second reading must be 1000 ± 200 feet more than the first reading.
A	<p>E. Altimeters - Checked.</p> <ol style="list-style-type: none"> 1. Verify both altimeters and the ESIS stay within 75 feet of each other for the entire climb.
A	<p>F. Generators - Checked.</p> <ol style="list-style-type: none"> 1. Check both generators ON and the load is balanced between them. 2. Balance check for proper balanced operation. Maximum loadmeter spread not to exceed 10% of total load. 3. Observe each generator individually for the following: <ol style="list-style-type: none"> a. Positive load indication. Voltage - 27.5 to 29.0 volts. b. Load - Shall not exceed 100%. 4. Check all electrical systems for proper operation.

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A	<p>G. Cabin and Cockpit Ventilation System - Checked. Check the following items for flow of air, binding controls, and the capability of being shut off by its own control.</p> <ol style="list-style-type: none">1. Eye-ball cold air vents.2. Pilot's and copilot's air vents.3. Windshield defroster ducts.4. Main cabin air ducts.
A	<p>H. Manual Temperature Control - Checked.</p> <ol style="list-style-type: none">1. CABIN TEMP MODE control - MAN HEAT or COOL.2. MANUAL TEMP switch - Hold in INCR position for one minute. Observe increase in cabin temperature.3. MANUAL TEMP switch - Hold in DECR position for one minute. Observe decrease in temperature.
A	<p>I. Automatic Temperature Control - Checked.</p> <ol style="list-style-type: none">1. CABIN TEMP MODE control - AUTO.2. CABIN TEMP control - Rotate fully clockwise.3. Note an increase in cabin temperature.4. CABIN TEMP control - Rotate fully counterclockwise. Note a decrease in cabin temperature. Air conditioning should come on if cabin temperature is above 60 to 65°F.5. The temperature control rheostat should be in mid-section at approximately 75°F cabin temperature.
A	<p>J. Cabin Altimeter - Checked.</p> <p>After takeoff, the cabin altimeter needle should stabilize at selected altitude ± 250 feet and the cabin differential pressure needle should continue climbing. The cabin altimeter needle should remain at selected altitude until the maximum pressure differential of 6.0 ± 0.1 is reached. At this point (approximately 13,900 feet pressure altitude) the cabin altitude should increase while the differential pressure remains constant.</p>

PROFILE

**IX LEVEL 8000 FEET PRESSURE
ALTITUDE (5000 AGL MINIMUM)**

A

A. Airspeed and Altimeter Indicating System (Alternate System) - Check as follows:

1. Emergency STATIC AIR SOURCE switch - NORMAL position.
2. Airspeed - Between 130 to 150 kts.
3. PILOT'S STATIC AIR SOURCE switch - ALTERNATE position. Pilot's airspeed, vertical speed and altimeter indication should increase.
4. PILOT'S STATIC AIR SOURCE switch - NORMAL position. Pilot's altimeter, vertical speed, and airspeed indicators should return to initial values.

A C

B. Flap Operation - Check as follows:

NOTE

- Flap operation will be free and smooth throughout while extending at maximum speeds.
 - Aircraft rolling tendency with flap extension should be minimal. Flaps should extend from up to full down within 13 seconds, and retract within 9 seconds.
1. Flaps - APPROACH (40%). Extend from UP to APPROACH at a speed of 200 KIAS
 2. Flaps - UP. Flaps should retract within 9 seconds.
 3. Flaps - DOWN (100%). Extend from UP to DOWN at a speed of 155 KIAS. Flaps should extend within 13 seconds.

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- C. Landing Gear Warning Horn - Check as follows:
1. Power levers - Retard individually and slowly until landing gear warning horn first sounds.
 2. Turbine tachometers - Read N_1 on first hearing landing gear warning horn. The landing gear warning horn must sound when power levers are retarded below 79 to 82% N_1 or when the flaps are extended beyond the APPROACH position (40%) regardless of power lever position.
 3. Power levers - Advance past 79 to 82% N_1 . Landing gear warning horn silence and re-armed again.
 4. Silence button - Check to ensure it will cancel the warning horn but not the illuminated handle light when the flaps are either UP or in the APPROACH position (40%). The silence button should not cancel either the warning horn or the illuminated handle light at flap settings beyond the APPROACH position (40%).
- D. Trim Tabs - Check as follows:
1. In smooth air, determine the lateral trim and directional trim at cruising power.
 2. Maintain 160 KIAS.
 3. The aircraft will fly or be rigged to fly straight and level at these settings.
 4. Ailerons will be trim in level flight, symmetrically aligned at the trailing edge.
- E. Airspeed - Check as follows:
1. Compare pilot's, copilot's and ESIS airspeed indicators at 20 KT increments. The maximum allowable difference is 4 KIAS.

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F. Landing Gear - Check.

1. Gear extension - Check that the gear extends properly and that extension time is approximately 4 to 6 seconds at 181 KIAS.
2. Gear retraction - Check that the gear retracts properly and that the retraction time is approximately 5 to 7 seconds at 163 KIAS.
3. Check landing gear handle light (red) illuminates when the gear is in transit. Check landing gear down indicator lights illuminate (green) when the gear is down.
4. Landing Gear Alternate Extension - Check.

Perform Landing Gear Manual Extension checklist and Landing Gear Retraction After Manual Extension checklist.

G. Fuel Systems - Checked.

1. Determine that auxiliary fuel transfer is operating currently by monitoring auxiliary fuel level.

H. Attitude Indicators - Checked.

1. The horizon reference line should immediately indicate changes in aircraft attitude.

I. Cabin Noise Level - Checked.

1. There will be no undue air noise in the cabin from around the perimeter of the doors, nor between the window frames and the door frames. There will be no undue noise in the cabin due to vibrating and rattling articles.

PROFILE

J. Engine Ice vanes - Checked as follows:

CAUTION

After the ice vanes have been manually extended, they may be mechanically retracted only. Do not attempt electrical retraction as damage to the electric actuator will result. Do not reset the Ice Vane circuit breakers in flight. The ice vane actuators must be reset on the ground before electrical actuation is attempted, or damage will occur to the actuator.

1. Ice vane switches (2) - EXTEND.
2. Ice vane extended annunciator lights (2 green) - Check illuminated.
3. Torquemeters - Monitor for a 150 to 350 ft/lbs drop in torque with ice vanes extended.
4. Ice vane switches - RETRACT.
5. Torquemeters - Monitor for an increase in torque.
6. Ice vane annunciator lights (2 green) - Checked extinguished.
7. Ice vane control circuit breakers (2) - Pull.
8. Airspeed - 160 KIAS.
9. Ice vane switches - EXTEND.
10. Vane fail annunciator lights (yellow) - Check illuminated within 15 to 20 seconds after ice vane switch actuation.
11. Manual engine ice vane controls - Pull to extend. Pulling force required to extend the ice vanes should not be excessive.
12. Vane fail annunciator lights (yellow) - Checked extinguished.

PROFILE

13. Ice vane extended annunciator lights (green) - Check illuminated.
14. Ice vane switches - RETRACT.
15. Vane fail annunciator lights (yellow) - Check illuminated within 15 to 20 seconds after ice vane switch actuation.
16. Manual engine ice vane controls - Push in to retract.
17. Ice vane extended annunciator lights (green) - Check extinguished.

K. Cruise Engine Rigging - Check as follows:

1. Establish cruise engine power. After speed has stabilized, check engine control levers and instruments for proper alignment and match (left to right).

L. Auto Ignition - Check.

1. Engine Auto Ignition Arm.
2. Slowly retard each power lever, checking that the IGNITION ON lights illuminate at 360 to 460 ft/lbs torque.
3. If the system appears to be operating, continue with next steps.
4. Establish cruise power with the auto ignition armed.
5. Rapidly retard the left condition lever to CUT OFF for three seconds and return to LOW IDLE.
6. Engine relight should occur within 3 to 5 seconds. If relight does not occur within the prescribed time, the engine fails to accelerate, or ITT does not appear normal, immediately abort the start. Attempt to restart the engine using Engine Restart During Flight (Starter Assist) procedures.
7. Repeat step 5 and 6 on the right engine.

PROFILE

M. Propeller Manual Feathering and Unfeathering - Check each engine as follows:

1. Autofeather - OFF.
2. Airspeed - 120 KIAS (Minimum).
3. Power Lever (engine to be feathered) - Idle.
4. Propeller lever (engine to be feathered) - Set 2000 RPM.
5. Auto Ignition (engine to be feathered) - Off.
6. Condition Lever (engine to be feathered) - FUEL CUTOFF.
7. Propeller Lever (engine to be feathered) - FEATHER. Time to feather must not exceed 10 seconds from windmilling at 2000 RPM to no rotation in the feathered position.
8. Engine - Restart engine in Feather.

NOTE

Refer to Engine Restart During Flight (Starter Assisted) to restart engine.

9. With the Power lever in Idle and Condition lever in Low Idle, move the propeller lever out of the Feather Detent.
10. The propeller should unfeather smoothly and the propeller tachometer must reach 1000 RPM in 30 seconds or less.

N. Propeller Autofeather - Check each engine as follows:

1. Autofeather - ARM.
2. At 104 KIAS minimum set takeoff power (2000 RPM and max torque).
3. Condition Lever - FUEL CUTOFF.
4. Time from fuel cutoff to visual feather. Visual feather is when the blades are individually visible but the prop is still rotating.

PROFILE

2. Airspeed - Trim to trim speed for configuration flown in stall speed table, then reduce as close as possible to one knot per second or less until full aft control wheel movement has been reached.
3. Stall warning horn - Check airspeed when stall warning is first heard. The stall warning horn should sound at no more than 12 and no less than 4 knots above the initial buffet speed.
4. Stall characteristics - Check that roll and yaw is controllable up to the time that the aircraft reaches initial buffet speed. Roll and yaw will be controllable within 15° of wings level during recovery.
5. Repeat procedure for gear and flaps down.
6. The appropriate stall and trim speeds, based on 11,300 lbs are as follows:

CONFIGURATION	POWER	TRIM SPEED	INITIAL BUFFET SPEED
Gr and Flps Down	Low Idle	114 KIAS	65 to 73 KIAS
Gr and Flps Up	Low Idle	145 KIAS	90 to 98 KIAS

Observe the speed of initial buffet onset power off and the activation of the stall warning horn.

WARNING

The stall warning horn should activate +4 to +12 KIAS above initial buffet.

PROFILE

A	
A B	

X SYSTEM OPERATIONAL CHECKS

- A. Altimeters - Check the pilot's, copilot's and ESIS altimeters. All three should read a maximum difference of 75 feet when set to identical pressure settings.
- B. Pressurization and Oxygen systems Check.
1. Cabin pressurization leak rate - Check as follows:
 - a. Set cabin controller to 0 feet PA, cabin altitude should stabilize and remain at ± 250 feet PA.
 - b. Initiate a climb. Cabin altitude should remain stable until maximum differential pressure of 6.5 ± 0.1 PSI is reached. At this point (approximately 15,300 feet PA), the cabin altitude should increase and the differential pressure remains constant.
 - c. Descend to approximately 14,500 feet PA and maintain 6.5 ± 0.1 differential.
 - d. Bleed Air Valves - Environmental OFF.
 - e. When the cabin differential reaches approximately 5.7 to 6.1 PSI, record the cabin rate of climb. This should not exceed 2200 fpm.
 - f. Bleed Air Valves - OPEN.
Re-establish the 6.5 ± 0.1 PSI cabin differential.
 - g. Left Bleed Air Valve - Environmental OFF.
 - h. Slowly retard the right power lever and record the minimum N_1 speed on the right engine that will maintain cabin pressure differential at 6.5 ± 0.1 . N_1 should not exceed 85% and the minimum desirable is 80%.

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PROFILE

- i. Right Bleed Air Valve - Environmental OFF.
- j. Slowly retard the left power lever and record the minimum N_1 speed on the left engine that will maintain cabin pressure differential at $6.5 \pm 0.1 N_1$ should not exceed 85% and the minimum desirable is 80%.
- k. Right Bleed Air Valve - OPEN.
- l. Cabin altitude controller - Set to 10,000 feet pressure altitude.
- m. Cabin pressurization rate knob - Set to MAX.
- n. Cabin rate of climb indicator - Read and record cabin rate of climb. Cabin rate of climb should be between 1500 to 2500 fpm.
- o. Cabin pressurization rate knob - Set to MIN.
- p. Cabin rate of climb indicator - Read and record cabin rate of climb. Cabin rate of climb should be between 50 to 300 fpm.
- q. Cabin pressurization rate knob - Set as desired.
- r. Cabin altitude indicator - Read and record altitude. Cabin altitude should stabilize at 9600 to 10,400 feet PA.
- s. Aircraft Altitude - Below 12,000 feet to reduce pressure differential.
- t. Oxygen masks - 100% and on.
- u. Cabin pressurization dump switch - DUMP.
- v. Aircraft altitude - Increase toward 12,500 feet pressure altitude with Cabin Press switch in DUMP.
- w. Cabin altitude warning annunciator light - Check that it illuminates between 12,000 and 12,500 feet pressure altitude.

PROFILE



- x. Oxygen System - Check that automatic deployment of masks occurs between 12,000 and 12,500 feet pressure altitude.
- y. Cabin pressurization dump switch - PRESS.
- z. Cabin altitude controller - Set to field elevation +500 feet. Cabin should start descent within 20 seconds.
- aa. PASS OXY ON annunciator - OFF.

Check that annunciator extinguishes passing through 11,000 feet cabin altitude.

- ab. Oxygen Masks - Check.

Test at least one passenger oxygen mask from each group by pulling the appropriate lanyard and breathing through the mask. Reset the actuation pins for all passenger masks, then pull the manual override handle. The green PASS OXY ON annunciator will illuminate. Push in the manual override handle. Provided all the pins are reset properly, the green PASS OXY ON annunciator should remain illuminated until pressure in the system bleeds down a few seconds later.

XI LEVEL 16,000 FEET PRESSURE ALTITUDE

A B

- A. Speed power runs shall be made in smooth air to determine consistency with performance figures. Torque settings, fuel flow and airspeed to be achieved will be determined by reference to the Maximum Cruise Power charts in the Flight Manual. Maximum Cruise Power torque setting must be attainable without exceeding the ITT limit of 800°C to be acceptable.

PROFILE

1. Maximum Cruise speed - Check as follows.
 - a. Ice Vanes - Retract.
 - b. Bleed Air Valves - Open.
 - c. Electrical load 50% per engine or less.
 - d. Set Maximum Cruise Power.
 - e. Allow power and airspeed to stabilize for one minute prior to recording data.
 - f. Record actual airspeed, torque and fuel flow for each engine.
 - g. Fuel flow (at charted torque) more than +10/-25 LBS/HR from chart value, while not cause for an unsatisfactory check, requires a 781 entry.
 - h. Airspeed should be approximately speed charted in the Maximum Cruise Power Chart.

B. Engine Acceptance Check

1. Ice Vanes - Retract.
2. Bleed Air Valves - Open.
3. Electrical load 50% per engine or less.
4. Establish level flight at 16,000 feet pressure at 2000 propeller RPM.
5. Set one engine torque as specified in Figure A-5, Engine Acceptance Graph, for the indicated outside air temperature.
6. Adjust the opposite engine to maintain 160 KIAS.
7. Stabilize power for one minute prior to recording data.
8. Record the engine ITT.
9. Repeat the procedure for the opposite engine.

PROFILE

Aircraft performance is based on obtaining at least charted torque. The engine must be able to meet the chart value of torque without exceeding ITT limit of 800°C to be acceptable. If this check is not acceptable then the Engine Acceptance Check at FL250 must be accomplished.

- C. Maximum Power Lever Position Check.
1. Propeller Lever - Set to 2000 RPM.
 2. Power Levers - Advance power towards the maximum position. The check is considered satisfactory if one of the following conditions is met:
 - a. N_1 of 101.2%, not to exceed 101.5% RPM.
 - b. ITT of 800°C is reached prior to the stop.
 - c. Maximum torque (2230) is reached prior to the stop.

NOTE

The power lever stop is not intended to act as a mechanical stop to prevent and over temperature or over torque.

XII LEVEL FL 250 (IF REQUIRED)**NOTE**

The following checks are required only if the speed check at 16,000 was unacceptable.

A B

- A. Engine Acceptance Check at Maximum Cruise Power.
1. Engine performance shall be determined by comparing engine torque available with that computed from the Engine Acceptance Graph (Figure A-5). In addition, the following parameters must be observed.
 - a. Ice vanes retracted.

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PROFILE

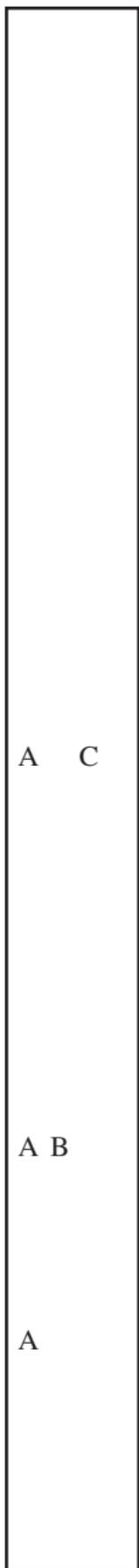
- b. Bleed air valves open.
 - c. Electrical load 50% per engine or less.
 - d. Stabilize power for one minute prior to recording data.
 - e. Establish level flight at 25,000 feet pressure altitude at 1900 propeller RPM.
 - f. Adjust the opposite engine to maintain 175 KIAS.
 - g. Set the engine torque as specified by the Engine Acceptance Graph (Figure A-5) for the recorded outside air temperature.
 - h. Record the engine ITT.
 - i. Repeat the procedure for the opposite engine.
2. Aircraft performance is based on obtaining at least charted torque. An engine must be able to meet the chart value of torque without exceeding ITT limit of 800°C to be acceptable.

XIII DESCENT

Accomplish in accordance with T.O. 1C-12F-1. In addition, accomplish the following steps as applicable.

- | | | |
|---|---|---|
| A | C | A. Maximum Rate (V_{mo}). If the pilot is satisfied that the entire aircraft is functioning properly, perform the maximum rate descent check as follows: <ol style="list-style-type: none">1. Pressure altitude - Above 18,000 feet.2. Gear - UP.3. Flaps - UP. |
|---|---|---|

PROFILE



4. Airspeed - For V_{mo} Dive, C-12F.

PRESSURE ALTITUDE	KIAS
18,000	247
17,000	251
16,000	257
15,000 and below	259

WARNING

Immediately reduce airspeed if any flutter, oscillation or vibration is encountered.

- 5. Flight controls - Check for any indication of flutter, oscillation, vibration, or malfunction.
 - 6. Windows and doors - Check for wind noise indication air leaks.
 - 7. Level off aircraft at 10,000 feet.
- B. Elevator Trim - Nose down trim stops will be set as follows:
- 1. Power levers - Set 2230 ft/lbs torque. Do not exceed N_1 or ITT limits.
 - 2. Propeller levers - Set 2000 RPM.
 - 3. Airspeed - 250 KIAS.
 - 4. Trim Aircraft.
 - 5. Excess nose down trim should be at least 0.9 but not exceed 1.4 trim wheel indicator units.
- C. Pressurization - Checked.
- 1. Cabin altitude should remain steady during descent, and descent rate should be adjusted to remain steady at 500 feet per minute.
- D. Vertical Speed - Checked.
- 1. Check normal operation of the pilot's, copilot's and ESIS VSIs against the respective altitude indicators (tolerance ± 50 feet at indicated 1000 FPM.)

PROFILE

XIV LEVEL 5000 - 6000 AGL AND APPROACH PHASE

A

- A. Magnetic Compass - Checked.
 - 1. Verify that completed calibration card is installed. Compare with slaved compasses.

NOTE

Electro-thermal windshield heat and air conditioner should be off. All normally used electronic equipment and vent blower should be On.

A

- B. Radio Equipment - Checked.
 - 1. Radio installation (VHF, UHF, and HF)
 - a. Radio Control Units shall be completely checked to verify their ability to tune all applicable communication and navigation equipment. Verify XTUNE operation.
 - b. CDUs shall be completely checked to verify their ability to tune all applicable communication and navigation equipment utilizing the Tune Page.
 - c. Radios shall be completely checked for proper operation and excessive noise.
 - d. V/UHF radio control head shall be checked for proper calibrations and markings.
 - e. Radio transmitters and receivers shall be checked with local control tower and other facilities at a distance of not less than 20 miles for volume control, signal dropout, sidetone clarity and normal operation.

PROFILE

- f. VHF, UHF, and HF communications shall be checked on at least 3 frequencies, each at a distance of at least 50 NM. Check each station on various relative bearings from the aircraft.
2. VOR - Both systems will indicate within $\pm 2^\circ$ of several known magnetic bearings. Check at specified known checkpoints.
3. ADF - Pointer will indicate a known bearing to within $\pm 4^\circ$ tolerance. The needle oscillation on either single or dual selection will not exceed $\pm 5^\circ$.
4. TACAN - Pointer will indicate a known bearing to within $\pm 0.5^\circ$ tolerance. Distance accuracy will be ± 0.1 NM.
5. Weather radar - Check for returns and noise on scope, gyro stabilization and tilt and gain adjustment.
6. Transponder - Check for proper operation. Altitude reporting shall be within ± 125 ft of indicated altitude.
7. Audio system - (speakers, head-sets, cabin speakers, intercom, paging interphone, oxygen mask microphones, audio control panel, etc.) will be checked for proper operation without excessive noise or feedback.
8. SATCOM - Check for proper operation.
9. Marker receivers - Verify marker beacon reception is clearly audible in both high and low sensitivity at 2500 feet above the station and will indicate a 2 to 3 mile width in Hi sense.
10. ILS - Equipment will give position indications with no glide-path or localizer needle oscillations from the outer marker to the approach end of the runway.

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A

C. TAWS - Checked

1. Check that all reactive modes are operating properly by flying the flight test profile shown in Figure A-5.
2. Check bank angle mode. Using the chart below, verify bank angle warning.

Radio Altitude	Bank Angle Limit
Between 30 ft and 150 ft	Linear from 10° (30 ft) to 40° (150 ft)
Between 150 ft and 2450 Ft	Linear from 40° (150 ft) to 55° (2450 ft)
Above 2450 ft	55°

3. Terrain inhibit - Check for proper operation.
4. Altitude callout - Verify FIVE HUNDRED callout.

A C

D. Autopilot and Flight Directors - Checked.

1. All channels of the autopilot shall operate positively and smoothly with no oscillations in any flight control. Control buttons shall be checked for proper lighting.
2. Slaved compass - Insure both compasses are slaved and heading information on both PFDs, ND and the ESIS are operating properly. Verify that the heading information on all four instruments is within 2 degrees of a known magnetic heading and 3 degrees of each other.
3. Flight director functions - Check for proper indications. Verify the system operates positively, smoothly, and with no oscillations in both the coupled and uncoupled modes.

PROFILE

A B
A
A

XV LANDING

Accomplish in accordance with T.O. 1C-12F-1. In addition, accomplish the following steps as applicable.

- A. Propeller Reversing System - Check as follows:
 - 1. During landing utilize maximum reverse power.
 - 2. Check for smoothness of operation and equal thrust from engines.
 - 3. Maximum Reverse should be 85% to 88%.
 - 4. Maximum difference between engines shall be 2% N₁ RPM.
- B. Brake Operation - Checked.
 - 1. Check during the landing roll with nose wheel on the ground. Apply moderate braking, noting any tendency for brakes to bleed down, to drag after brakes are released, or to apply more braking power on one side than the other.

XVI POST LANDING

- A. Walk Around - Complete.
 - 1. A walk around post flight check should be accomplished. Discrepancies that developed should be recorded on the Aircraft Maintenance Form. Particular attention should be given to oil, fuel or hydraulic leaks.

APPENDIX

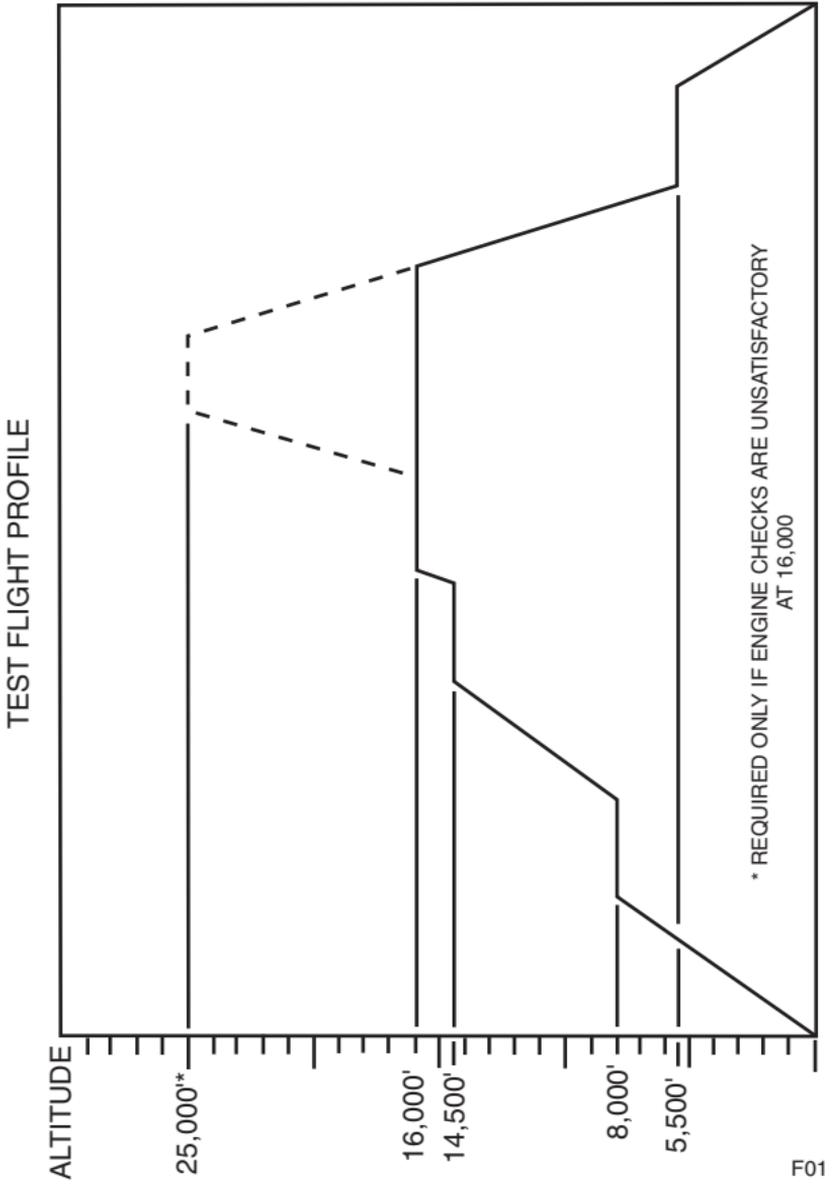
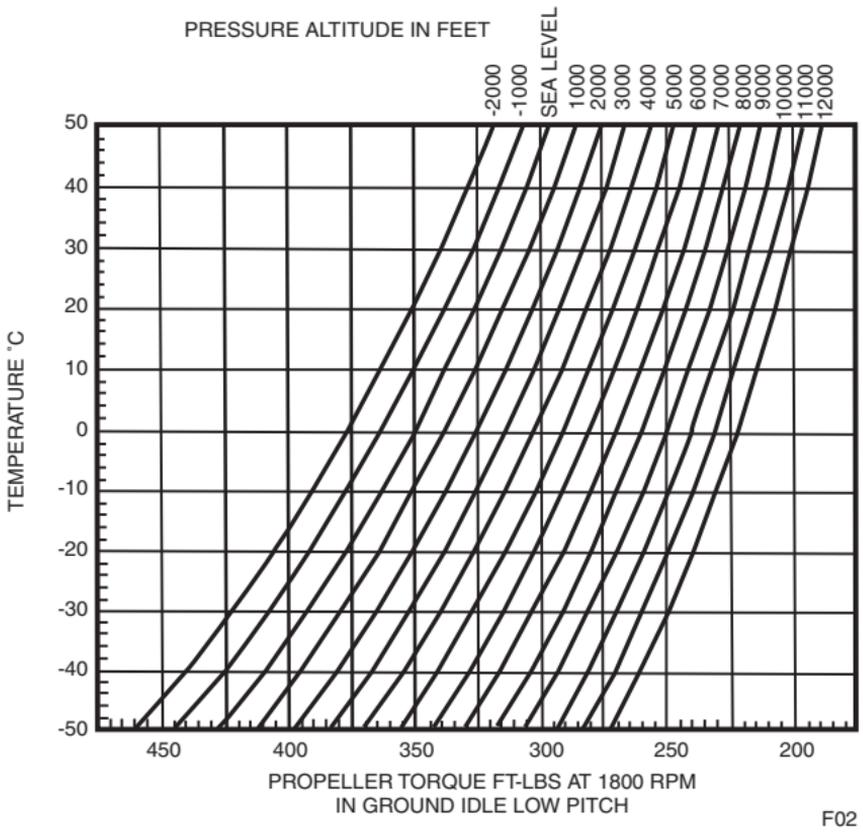
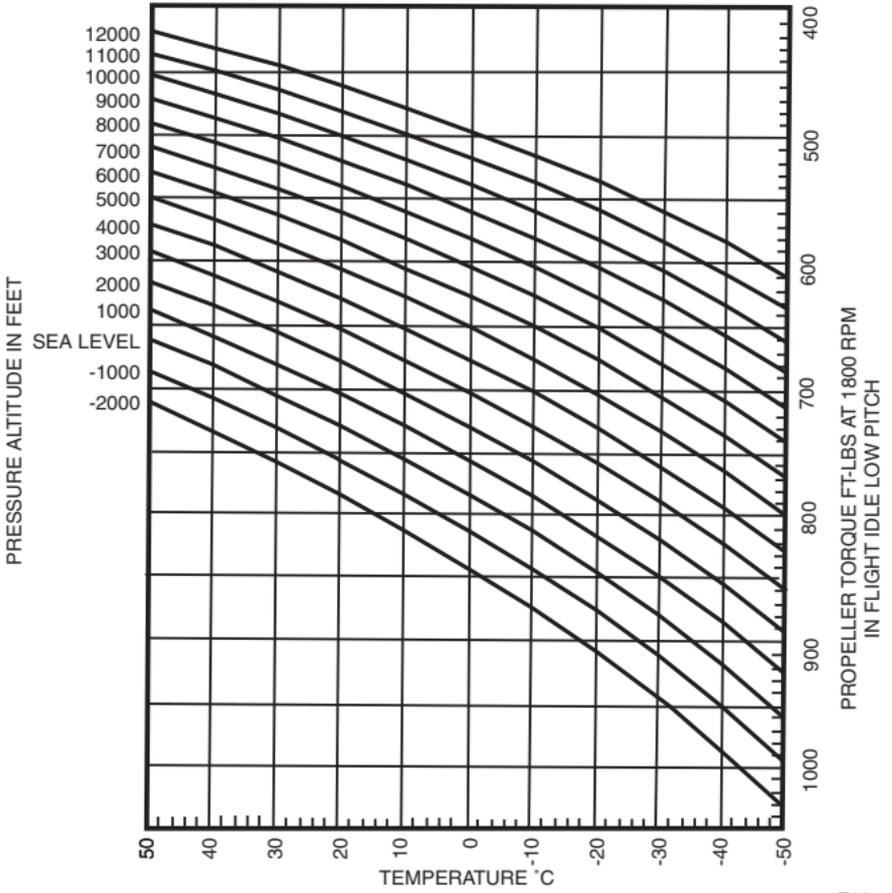


Figure A-1. Test Flight Profile



F02

Figure A-2. Ground Idle Torque Correction Graph



F03

Figure A-3. Flight Idle Torque Correction Graph

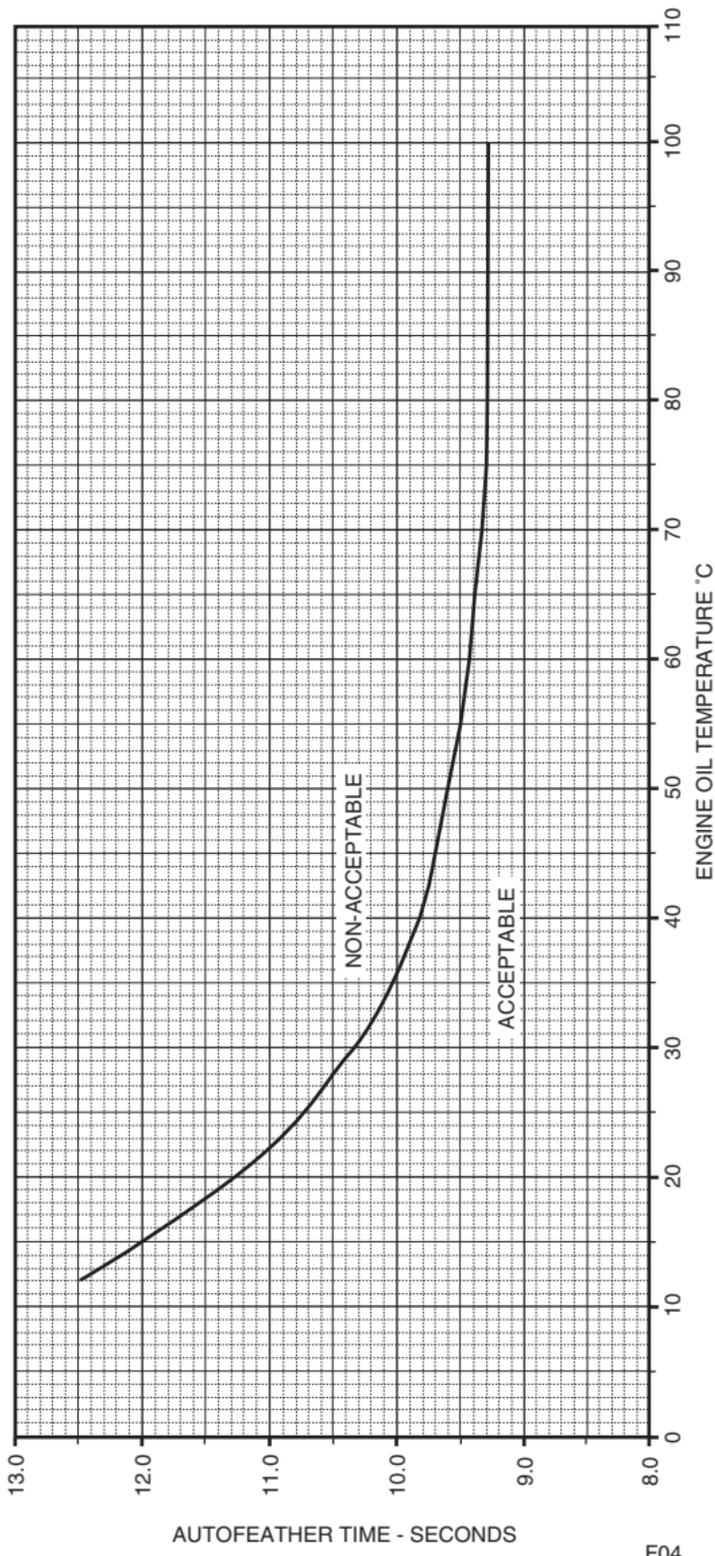
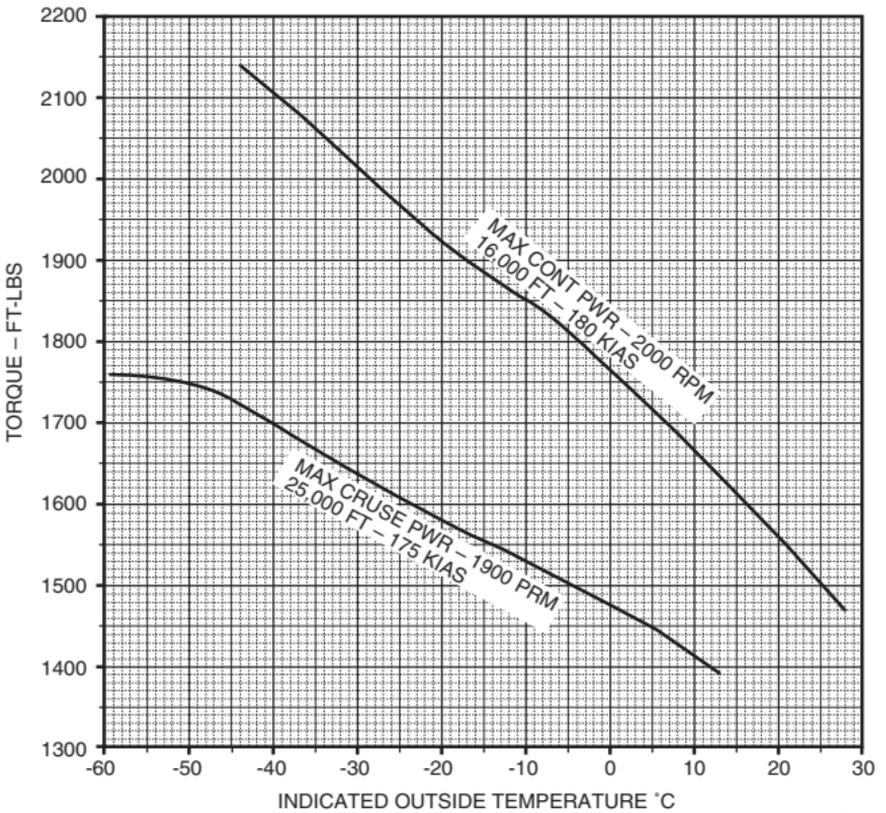


Figure A-4. Autofeather Time Requirement

ENGINE ACCEPTANCE – PT6A-42 ENGINE
 MAXIMUM CRUISE POWER

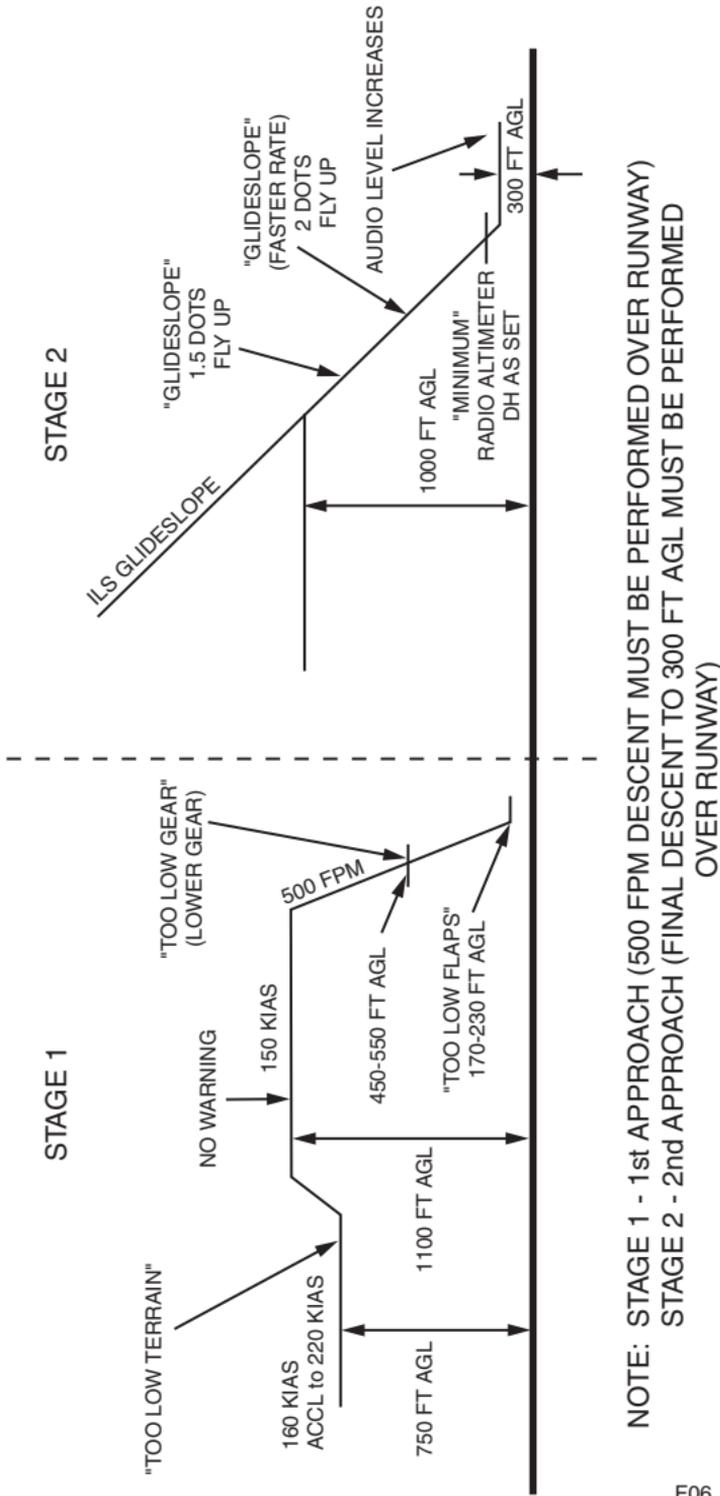
2000 RPM – 160 KIAS – 16,000 FT
 1900 RPM – 175 KIAS – 25,000 FT

ICE VANES RETRACTED, BLEED AIR ON



F05

Figure A-5. PT6A-42 Engine Acceptance Graph



*Figure A-6. Ground Proximity Warning System/
Enhanced Ground Proximity Warning System
Flight Test Profiles*