

***TM 1-1520-240-MTF**

**MAINTENANCE TEST
FLIGHT MANUAL**

**ARMY MODEL
CH-47D HELICOPTER**

*This manual supersedes TM 55-1520-240-MTF, dated 8 September 1982, including all changes.

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**HEADQUARTERS
DEPARTMENT OF THE ARMY**

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WARNING

A maintenance test flight is an exceptionally demanding operation and requires a thorough flight readiness inspection (PREFLIGHT). The flight readiness inspection is prescribed in TM 1-1520-240-10 operators manual and must be completed prior to each maintenance test flight. Emergency procedures are found in the applicable -10 or checklist (CL) and are not duplicated in this publication. Prior to each maintenance test flight, the pilot will contact maintenance/quality control personnel to determine the maintenance that has been performed. This manual should be used only by qualified maintenance test flight pilots as required in AR 95-1 and TM 1-1500-328-23.

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**REPORTING OF ERRORS AND
RECOMMENDING IMPROVEMENTS**

You can help improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms) located in the back of the applicable operator's manual, (ensure the publication number and title reflect this MTF) direct to: Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5000. A reply will be furnished to you. You may also send in your comments electronically to our e-mail address: 2028@redstone.army.mil or by fax 256-842-6546/DSN 788-6546. Instructions for sending an electronic 2028 may be found at the back of the Aircraft Operator's manual.

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SECTION I INTRODUCTION

1. **Purpose.** The purpose of this manual is to provide complete instructions for performing a maintenance test flight of CH-47D aircraft. For the specific conditions which require a general or limited maintenance test flight, refer to TM 1-1500-328-23 and TM 55-1520-240-23.

2. **Definitions.**

a. **Maintenance Test Flight.** A functional test flight for which the primary purpose is to determine whether the airframe, powerplant, accessories, and other equipment are functioning in accordance with predetermined requirements while subjected to the intended environment.

b. **Warnings, Cautions, and Notes.** Warnings, Cautions, and Notes are used to emphasize important and critical instructions and are used for the following conditions:

WARNING

An operating procedure, practice, ect., which if not correctly followed, will result in personnel injury or loss of life.

CAUTION

An operating procedure, practice, ect., which if not strictly observed, will result in damage or destruction of equipment.

NOTE

An operating procedure, condition, ect., which is essential to highlight.

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3. **General Information.**

a. This manual covers only maintenance test flight of CH-47D aircraft and in no way supercedes any information contained in TM 1-1520-240-10 or applicable -CL, but is to be used in conjunction with the -10 and -CL. For the purpose of maintenance test flights only, this manual satisfies all the requirements of the -CL from Interior Check through Engine Shutdown.

b. Crew requirements will be as specified in TM 1-1500-328-23 and TM 1-1520-240-10.

c. The duration of the general or limited test flight will be in accordance with the requirements of TM 1-1500-328-23.

4. **Special Instructions.**

a. **Cargo and Passengers.** Cargo and passengers are prohibited on maintenance test flights.

b. **Forms and Records.** Forms and records will be checked prior to the maintenance test flight to determine what maintenance has been performed and the type of maintenance test flight required (i.e., general or limited).

c. **Configuration.** The configuration of the aircraft should be determined prior to each maintenance test flight in order to determine performance parameters.

d. **Post Test Flight Inspection.** A thorough visual inspection will be performed to the extent necessary to assure that deficiencies or shortcomings that may have developed as a result of the maintenance test flight are detected.

e. **References.** When a maintenance test flight is required to assure proper operation of a specific system(s), refer to the applicable maintenance manual for the limits of that system.

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f. **Maintenance Test Flight Check Sheet.** The Check Sheet contained in Section V will be used for all test flights. When a test flight is performed to determine if specific equipment or systems are operating properly, completion of only that portion of the maintenance test flight Check Sheet applicable to the specific equipment or systems being tested is required. The aircraft test flight Check Sheets may be locally reproduced. A check (✓) for satisfactory performance or an (X) for problem detected will be recorded and a short statement entered in the remarks block of the Check Sheet. Continuation sheets may be used when necessary. Items that prove to be unsatisfactory during the test flight, and require corrective action, shall be listed in the remarks block during flight and transferred to DA Form 2408-13-1 immediately after termination of the flight. The MP will sign, enter the time, and date the checksheet. The sheet will be attached to DA Form 2408-13-1 upon completion of the MTF. After accumulation of two or more sheets, the data should be reviewed to determine if trends are developing.

g. **Symbolized Checks.** The procedures include items that may be checked by the flight engineer and that may or may not be installed or are tasks or steps required by the Operators Manual. These items are annotated immediately preceding the check to which they are pertinent: **F** for flight engineer, and **O** to indicate a requirement if the equipment is installed, **B** for task or step required by the Operators Manual and ***B** through flight task or step required by the Operators Manual. The complete step as written may not be required only those steps as required by the Operators Manual.

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Symbols Preceding Numbered Steps.

- F** - Indicates flight engineer function or response.
- O** - Indicates "If Installed".
- ④ - Indicates copilot crew stations duties.
- B** - Indicates a task or step required by the Operators Manual.
- *B** - Indicates a task or step required by the Operators Manual and for through-flight flights.

SECTION II MAINTENANCE TEST FLIGHT CHECKLIST

General. This section contains the maintenance test flight requirements peculiar to Army Model CH-47D aircraft. Conditions requiring accomplishment of test flights shall be in accordance with TM 1-1500-328-23. The requirements contained herein are established to assure a thorough inspection of the aircraft before flight, during flight, and upon completion of the maintenance test flight.

PRIOR TO MAINTENANCE TEST FLIGHT

Before Interior Check

1. Publications — Check DA Forms 2408-12, -13, -14, -18, DD Form 365-4, and DD Form 1896, locally required forms and publications, and availability of operators manual (-10), and maintenance test flight manual.
2. Ignition lock switch — ON.
3. BATT switch — OFF.
4. **712** Emergency power panel — Check trip indicators and timers.
5. **712** Topping stops — Check stowed (unless TEAC is to be performed).
6. Cockpit area — Check condition of bottom half inertia reel.
 - a. Pilot and copilot sliding window — Check condition open and close maximum of 50-lbs force. Slide operation maximum 15 lbs, force.
 - b. Jettisonable door release handles and latches
 - (1) Check the handles are stowed and safetied as required.

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PRIOR TO MAINTENANCE TEST FLIGHT (CONT.)

Before Interior Check (Cont.)

- (2) Check the top and bottom latches engage the door supports and locking devices removed.
 - (3) Check through doorplate inspection holes (upper and lower) that the door latches are centered in the latch plate detents.
 - c. Fire Extinguisher — Check seal, security, date, and properly tagged.
 - d. Seat belts and shoulder harness — Check condition.
7. Fuel sample — Check before first flight of the day.
 8. AVA equipment installed if tracking is required.
 9. Accelerometers installed if rotor blade vibration check is required.
 10. Tiedowns, locking devices, covers, and ground cables — Removed and secured.
 11. BATT switch — ON. Check MASTER CAUTION/ADVISORY LIGHTS for proper indication (no chip detectors). CAUTION LIGHTS — TEST for illumination of all caution/advisory light segments.
 12. APU start (Fire guard posted):
 - a. APU start accumulators — Check precharged according to chart in Section V.
 - b. APU — Check condition and servicing.
 - c. EMERGENCY APU FLUID SHUTOFF VALVE — Check OPEN.
 - d. Electronic Sensing Unit — Condition and security.

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PRIOR TO MAINTENANCE TEST FLIGHT (CONT.)

Before Interior Check (Cont.)

- e. APU START switch — RUN for 3 to 5 seconds. Then START for 2 seconds. Then release to RUN. Operation of the APU is controlled by the electronic sensing unit.

NOTE

If the APU ON caution light does not come on, or if the start is automatically shutdown, set the APU switch to OFF and check the bite indicators on the electronic sensing unit for the cause of the shutdown.

- f. APU ON **712** caution light **714A** advisory light — Check on.
- g. UTIL HYD SYS caution light — Check out (30 seconds maximum).
- h. APU GEN switch — ON. Check NO. 1 and NO. 2 RECT OFF caution lights out.
- i. POWER XFR NO. 1 and POWER XFR NO. 2 switches — ON. Check NO. 1 and NO. 2 HYD FLT CONTR caution lights out.

WARNING

If either FLT CONTR caution lights do not go out in 30 seconds after POWER XFR switches are set to ON, set the POWER XFR switches to OFF. Do not fly the helicopter.

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PRIOR TO MAINTENANCE TEST FLIGHT (CONT.)

Before Interior Check (Cont.)

NOTE

After work has been done on the flight controls system, the DASH actuator should be set to 36.0 inches and electrically disconnected. A mechanical rig check is not required if no adjustment has been made to flight controls or the pitch links.

13. Neutral Rig Check — After Phase Maintenance inspection or flight control maintenance. Set DASH actuator to 36 inches for mechanical rig if required. Disconnect electrical connectors from DASH actuator.
14. Flight Controls — Neutral, THRUST. ground detent. (If Neutral Rigging Check not performed).
15. Flight control looseness — Check. See Section IV.
16. **712** No. 1 and/or No. 2 engine(s) N1 and/or N2 rigging — Check as required. Including emergency beep actuator movement maximum 6 seconds from minimum to maximum stop. Refer to TM 55-1520-240-23.
17. HF Radio Setup (AN/ARC-220) — Turn Radio Set function switch to STBY and allow system to go thru self tests. "SYSTEM TESTING" is displayed during test and "SYSTEM-GO" if system passes.
18. Perform data and key fills and setup as necessary. "LOADING" is displayed during and "LOAD COMPLETE" after successful fill.
19. Turn HF radio OFF.

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PRIOR TO MAINTENANCE TEST FLIGHT (CONT.)

Before Interior Check (Cont.)

20. TSEC/KY-100 Setup — Turn system ON, load keys and set up as necessary. A pass tone is heard in headset and “KEY N” (where 'N' is the key location) displayed on Z-AVH for a successful load.
21. Turn TSEC/KY-100 — OFF.
22. CARGO RAMP AND DOOR — Check operation (Refer to Section IV).
- B*** 23. CARGO HOOKS — Check operation as required (Refer to Section IV).
24. WINCH — Check operation as required (Refer to Section IV).
25. Heating Vent Blower Operation — Check (Refer to section IV).
26. POWER XFR NO. 1 and POWER XFR NO. 2 switches — OFF. Check NO. 1 and NO. 2 HYD FLT CONTR caution lights on.
27. APU GEN switch — OFF. Check NO. 1 and NO. 2 RECT OFF caution lights on.
28. APU START switch — OFF. Check APU ON **712** caution **714A** advisory light out.
29. BATT switch — OFF.

INTERIOR

Forward Cabin

1. Flight Control Closet.
 - a. Hydraulics lines — Check for leaks and security.

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INTERIOR (CONT.)

Forward Cabin (Cont.)

- b. IICA. (4) — Check condition, security, and for extended jam indicators. Check area for foreign objects.
- c. Electrical wiring and plugs — Check condition and security.

NOTE

If Mechanical Rig is to be performed, electrical connectors disconnected and secured.

- d. Dash actuator — Check electrical connections, condition, and security.
 - e. Flight controls — Check all push-pull tubes, actuators, magnetic brakes, and viscous dampers for condition and security. Rigging pins removed.
 - f. **714A** Check Thrust Control Position Transducer mount attachment and electrical connections.
 - g. Fwd transmission temperature bulb and chip detector — Check for proper installation.
 - h. Fwd transmission — Check filter button in and oil cooler condition.
- 2. Troop commander's seat and belt — Check condition and security.
 - 3. Cabin and ramp lights, control switch — Check operation.
 - 4. Interior — Check for loose equipment and stowed.

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INTERIOR (CONT.)

Forward Cabin (Cont.)

5. Heater compartment — Check security of components, vibrator contact position, and ignition circuit fuse.
 - a. STVA test box — Check.
 - b. STVA switch - OFF.
 - c. Winch and winch accessories — Check security and proper storage.
6. Cabin Door.
 - a. Condition — Check.
 - b. Upper section escape panel — Check security and condition of seals.
 - c. Lower step — Check condition and static wire.
 - d. Step lock — Check.
7. Emergency escape ax — Check condition and security.
8. Transformer rectifier air screens — Check clear behind and under seat (both sides).
9. Avionics equipment — Check security of components and connections.
10. AFCS computers electrical and pneumatic connections — Check for condition and security.
11. Troop alarm box — Check condition.
12. Hand fire extinguisher — Check seal, security, date and tagged.
13. **712** Engine N1 control boxes (overhead at station 200) — Check security.
14. Seats, litters, first aid kits, cargo and jettisonable cabin windows — Check condition and security.

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INTERIOR (CONT.)

Forward Cabin (Cont.)

15. Cabin lights — Check condition.
16. Emergency exit lights — Check security, safety installed.
17. Utility hatch door — Check and position as necessary.
18. Center cargo hook — Check and position as required. Check air charge. Check forward and aft hook manual release. Position lever in stowed position.
- 19. Forward, center, and aft cargo hook manual release mechanism — Check for security, position lever in stowed position.
20. Lower rescue door — Check position as required and hand crank stowed.
21. Hoist control panel — Check switches and stow grip.
22. **714A** DECU (2) — Check condition and security.
23. **714A** Ratio Detector Power Supply (RDPS) — Check condition and security.
- 24. NO. 1 and NO. 2 EAPS control box — Check condition and security.
25. Loose equipment — Check stowed.
26. Static line — Check condition and security.
27. Crew safety harness — Rig and adjust as required.

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INTERIOR

Aft Cabin

1. Combining transmission area — Check mount bolt exposure by thread count 1 to 2 threads and slippage marks as required.
2. CABIN and RAMP LIGHT switches — As required.
3. Fire detect control unit — Check condition and security (No. 2 engine).
4. Ramp — Check condition.
5. Ramp control lever — STOP.
6. Power steering module — Check
7. **714A** #2 engine P3 condensation drain — Check lines and connections for condition and security, drain for condition and any visible fluid.
8. ENGINE NO. 2 FUEL VALVE — Check OPEN and electrical plug secure.
9. CROSSFEED FUEL VALVE — Check CLOSED and electrical plug secure.
10. Manual defueling valve — Check CLOSED and cap secure.
11. UTILITY hand pump — Check condition and leaks.
12. EMERG UTILITY PRESS control label check valve — Check NORMAL.
13. HYD fill module — Check condition. fluid level, cover secure, and valve OFF.
14. Ramp area hydraulic lines — Check for leaks and security.
15. Utility pressure and return modules — Check condition and pump filter buttons extended.

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INTERIOR (CONT.)

Aft Cabin (Cont.)

16. Maintenance panel — Check hydraulic reservoir levels and pressure and temperature range markings. Refer to table 1.
- 17. Fuzz burn-off module — Check for condition and security.
18. **714A** Power Assurance Test (PAT) switch — Check condition and security.
- 19. AFT POS LIGHT switch — Set as required.
20. AFT transmission — Check as follows:
 - a. Check for oil level and condition (Check filter contamination button in).
 - b. Aft transmission mount bolts — Check condition and security.
 - c. Aft sync shaft, adapter assemblies, lord mounts, and support brackets — Check for condition, security, and foreign objects, connecting bolts for proper installation.
 - d. Oil cooler — Check condition and security. Exhaust duct installed.
 - e. Aft transmission oil pressure transducer — Check condition and security.
 - f. Aft transmission drip pan for proper installation and security. Left and right access doors closed before flight.
21. Engine fire extinguisher bottles — Check squib installation dates and pressure (Refer to Section V, Engine Fire Extinguisher Pressure).
22. Troop alarm box — Check condition.
23. Compass flux valve — Check security. Area clear of stored materials.

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INTERIOR (CONT.)

Aft Cabin (Cont.)

24. Fuel flow power supply — Check condition and security.
25. CROSSFEED FUEL VALVE — Check CLOSED, electrical plug secure.
26. ENGINE NO. 1 FUEL VALVE — Check OPEN, electrical plug secure.
27. Ramp ICS control panel — As required.
28. **714A** #1 engine P3 condensation drain — Check lines and connections for condition and security, drain for condition and any visible fluid.
29. Fire detect control unit — Check condition and security (No. 1 engine).
30. Hand fire extinguisher — Check seal, security, date, and properly tagged.
31. **714A** Ratio Detector Power Supply (RDPS) — Check condition and security.
32. M-130 or AN/ALE-47 Safety switch — Installed as required.

EXTERIOR

Aft Cabin

1. Navigation light — Check condition.
2. Fluid vent and drain lines — Check clear.
3. **714A** Engine wash system — Check condition and security.
4. Right aft landing gear — Check as follows:
 - a. Right aft landing gear support structure— Check for cracks or distortion.
 - b. Tires for inflation and condition.

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EXTERIOR (CONT.)

Aft Cabin (Cont.)

- c. Shock strut for proper extension, cleanliness, and static lock unlocked.
 - d. Power steering actuator, wheel brakes, and hoses for leakage, chafing, and security.
 - e. Electrical connections for condition and security.
 - f. Landing gear proximity switch — Condition, linkage adjustment, and security.
5. Hydraulic system test panel — Check all caps secure.
6. No. 2 engine — Check lower side as follows:

NOTE

If TEAC/PAC is to be performed, all preflight inspection requirements/checks required prior to TEAC/PAC must be accomplished. In this case, EAPS must be moved forward of the engine to gain access for inspection. If TEAC/PAC is not required, EAPS will remain locked into position in front of the engine.

- a. Inlet for foreign objects, hinges, latch secured, and condition.
- b. EAPS for general condition. Check vortex tubes for erosion and damage. Check seals for condition. Check rail and slide mechanisms. Inspect blower fan blades for damage and erosion. Check condition of electrical connectors, harness.
- c. Check fuel, oil, hydraulic, electrical, wash kit and drain lines for connection and leaks.
- d. Check engine for chafing lines and condition and security of components.

EXTERIOR (CONT.)

Top of Fuselage

1. No. 2 engine — Check as follows:

NOTE

If TEAC/PAC is to be performed, all preflight inspection requirements/checks required prior to TEAC/PAC must be accomplished. In this case, EAPS must be moved forward of the engine to gain access for inspection. If TEAC/PAC is not required, EAPS will remain locked into position in front of the engine.

- a. Inlet for foreign objects and condition. If FOD screens are installed, check security and condition.
- b. EAPS for general condition. Check vortex tubes for erosion and damage. Check seals for condition. Check rail and slide mechanisms.

CAUTION

If engine is to be operated with the engine transmission fairing removed, be sure barrel nuts are secured or removed

- c. Oil level and cap secured.
- d. **712** Check N1 topping stop installed if required.
- e. Tailpipe and diffuser for cracks, hot spots, and security.
- f. Power turbine section — Check upper portion of engine for condition, security, and leaks.

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EXTERIOR (CONT.)

Top of Fuselage (Cont.)

- g. Engine fairing condition and security.
 - h. If EAPS is installed. Check EAPS to fairing mating surface for evidence of wear or chafing.
2. Utility and flight control modules and cooler assemblies — Check for extended filter contamination indicators and leaks. Check that accumulators are precharged (Section V). Check PTU condition and security.
3. Aft rotor (right side) — Check as follows:
- a. Check lag damper locknuts removed.
 - b. Check components for proper safety wiring and security.
 - c. Check blade lighting protection straps and cables installed on top and bottom of each blade and condition.
 - d. Check oil in rotor system reservoirs on right side.
 - e. Check droop stop weights and return mechanism and droop stops for condition and security.
 - f. Check droop stop shrouds for condition and security.
 - g. Check rain shield and stiffener for condition and security.
 - h. Check pitch change links, swashplate, slider assembly, and drive arm for condition and security.
 - i. Check upper boost actuator and pilot valve for proper connection, condition, security, leakage, extended jam indicators.

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EXTERIOR (CONT.)

Top of Fuselage (Cont.)

4. Check thrust bearing and thrust bearing mount bolts, aft vertical shaft, and support structure for condition and security.
5. Check top of aft transmission for condition and leakage.
6. Check thrust deck air baffles for security.
7. CGI signal processor — Check electrical connections and security.
8. Anti-collision and formation lights — Check condition.
9. Aft pylon fairing — Check condition and security (right side).
10. Right aft work platform and inspection panels — Check condition and security.
11. Combining transmission area — Check as follows:
 - a. Chip detector — Check condition and security.
 - b. Push-pull tubes, bellcranks, and rod end bearing — Check condition and security.
 - c. Sync shaft and adapter — Check condition.
 - d. Engine to transmission drive shafting — Check for one piece drive shaft and for condition and security.
 - e. Oil level — Check engine and combining transmission sight gage.
 - f. Oil filters and contamination buttons — Check both engines and combining transmissions.
 - g. Oil pressure transducers and temp bulbs — Installed properly.

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EXTERIOR (CONT.)

Top of Fuselage (Cont.)

- h. Transmission fan exhaust duct — Check for cooler fan and stator blades, retainer nut, obstructions and debris.
 - i. Oil coolers and lines — Conditions, security, and FOD.
 - j. Check No. 2 and utility hydraulic exhaust coolers for condition, security, and FOD.
 - k. Combining transmission access doors — Check conditions, seal around exhaust duct when doors are closed, and security.
12. Perform rotor phasing check (Section IV).
13. No. 1 engine — Check as follows:

NOTE

If TEAC/PAC is to be performed, all preflight inspection requirements/checks required prior to TEAC/PAC must be accomplished. In this case, EAPS must be moved forward of the engine to gain access for inspection. If TEAC/PAC is not required, EAPS will remain locked into position in front of the engine.

- a. Inlet for foreign objects and condition. If FOD screens are installed, check security and condition.
- b. EAPS for general condition. Check vortex tubes for erosion and damage. Check seals for condition. Check rail and slide mechanisms.

EXTERIOR (CONT.)

Top of Fuselage (Cont.)

CAUTION

If engine is to be operated with the engine transmission fairing removed, be sure barrel nuts are secured or removed.

- c. Oil level and cap secured.
 - d. **712** Check N1 Topping Stop installed if required.
 - e. Tailpipe and diffuser for cracks, hot spots, and security.
 - f. Power turbine section — Check upper portion of engine for condition, security, and leaks.
 - g. Engine fairing condition and security.
 - h. Check EAPS to fairing mating surface for evidence of wear or chafing.
14. Aft rotor (left side) — Check as follows:
- a. Check lag damper lockouts removed.
 - b. Check components for proper safety wiring and security.
 - c. Check blade lighting protection straps and cables installed on top and bottom of each blade and condition.
 - d. Check oil in rotor system reservoirs on left side.
 - e. Check droop stop weights and return mechanism and droop stops for condition and security.
 - f. Check droop stop shrouds for condition and security.

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EXTERIOR (CONT.)

Top of Fuselage (Cont.)

- g. Check rain shield and stiffener for condition and security.
 - h. Check pitch change links, swashplate, slider assembly, and drive arm for condition and security.
 - i. Check upper boost actuator and pilot valve for proper connection, condition, security, leakage, extended jam indicators.
 - j. Check aft longitudinal cyclic trim actuator for condition and security.
 - k. Cruise guide link and processor — Check for condition and security.
15. Check thrust bearing and thrust bearing mount bolts, aft vertical shaft, and support structure for condition and security.
 16. Aft pylon fairing — Check condition and security (left side).
 17. Left aft work platform and inspection panels — Check condition and security.
 18. Drive shafting, mounts, adapter assemblies and support brackets — Check for condition, security, and foreign objects. Connecting bolts for proper installation.
 19. Formation lights — Check wiring clear of drive shaft and condition.
 20. Push - pull tubes, bellcranks, hydraulic lines, and electrical wiring — Check condition and security.
 21. Baffles — Check condition and security.
 22. Drive shaft fairing — Check security and any looseness of fairings after being secured by fasteners.

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EXTERIOR (CONT.)

Top of Fuselage (Cont.)

23. Top of fuselage — Check skin condition, VHF antenna, GPS antenna, and foreign objects removed.
24. Forward rotor (left side) — Check as follows:
 - a. Check lag damper lockouts removed.
 - b. Check components for proper safety wiring and security.
 - c. Check blade lighting protection straps and cables installed on top and bottom of each blade and condition.
 - d. Check oil rotor system reservoirs on left side.
 - e. Check droop stops, rain shield and stiffener for condition and security.
 - f. Check pitch change links, swashplate, slider assembly, and drive arm condition and security.
 - g. Check upper boost actuators and pilot valve for proper connection, conditions, security and leakage. Check for extended jam indicators.
 - h. Check longitudinal cyclic trim actuator for condition and security.
 - i. Cruise guide link and signal conditioners — Check for condition and security.
25. Forward transmission — Check mount bolts. Check oil cooler inlet for obstruction.
 - a. Forward transmission pressure transducer — Check for leaks and security.
 - b. Hydraulic cooling fan — Check for obstructions, condition, and security.

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EXTERIOR (CONT.)

Top of Fuselage (Cont.)

- c. Forward transmission cooler shroud — Check security.
- 26. Brake accumulator — Check precharge (Section V) and security.
- 27. First and second stage mixing units — Check for rod end condition, security, and rigging pins removed.
- 28. Forward pylon fairings — Check condition and security (left and right sides).
- 29. Forward rotor (right side) — Check as follows:
 - a. Check lag damper lockouts removed.
 - b. Check components for proper safety wiring and security.
 - c. Check blade lighting protection straps and cables installed on top and bottom of each blade and condition.
 - d. Check droop stops, rain shield and stiffener for condition and security.
 - e. Check pitch change links, swashplate, slider assembly, and drive arm for condition and security.
 - f. Check upper boost actuator and pilot valve for proper connections, condition, security, leakage, and extended jam indicators.
- 30. Forward transmission oil level — Check.
- 31. Forward transmission — Check mount bolts.
- 32. CGI signal conditioner — Check electrical connections and security.

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EXTERIOR (CONT.)

Top of Fuselage (Cont.)

33. Flight control hydraulic cooler and module — Check for extended filter contamination indicators, leaks and that accumulator is precharged (Section V). Check PTU condition and security.
34. No. 1 Flight control hydraulic reservoir — Check level indicator.

Right Cabin

1. Fuselage skin — Check for dents, wrinkles, and loose or missing rivets.
2. Aft aux fuel tank — Check as required and cap security.
3. Fuel vent — Check clear and fairing secure.
4. Windows — Check condition, seals and proper installation, cracks and cleanliness.
5. AFT cargo hook (if installed) — Check the following.
 - a. Hook properly installed with hook opening pointing forward.
 - b. Electrical connector properly installed. Dust cap stowed.
 - c. Emergency release cable properly connected. Dust cap stowed.
 - d. Hook clean and load beam closed.
 - e. Latch roller moves freely.
6. Main fuel tank — Check as required and cap security.
7. Fuel vent — Check clear and fairing secure.

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EXTERIOR (CONT.)

Right Cabin (Cont.)

8. FWD cargo hook (if installed) — Check as in step 5 above.
9. Antennas — Check condition and security.
10. Fwd aux fuel tank — Check as required and cap security.
11. Fuel vent — Check clear and fairing secure.
12. Fwd aux fuel tank electrical connections and fuel line — Check condition and security.
13. Pressure refueling station — Check as follows.
 - a. PWR and LT switches — OFF.
 - b. All TEST switches — PRI OFF.
 - c. Refueling receptacle cover installed, retainer wire condition, and secure.
 - d. PRESS REFUELING INSTRUCTIONS on panel — Check condition.
 - e. Landing gear support structure — Check for cracks and distortion.
 - f. Landing gear and pressure refueling panel cover — Check position light, closed and secure.
14. Static port — Check clear.
15. Forward landing gear — Check as follows.
 - a. Tires for inflation and condition.
 - b. Shock strut for extension and cleanliness.
 - c. Hoses and wheel brakes for leakage, chafing, and security.

EXTERIOR (CONT.)

Right Cabin (Cont.)

16. Right electrical compartment — Check as follows:
 - a. GEN/CT FAULT bite — Check all black.
 - b. Transformer-rectifier — Check condition and security.
 - c. **712** No. 2 minimum beep resistor — Check condition and security.
 - d. Access door — Check condition and security.

Forward Cabin

1. Heater intake, exhaust and fuel drain outlets — Check clear.
2. Pilot's jettisonable door — Check condition and security.
3. Free air temperature gage — Check.
4. Pilot's hydraulic brake lines — Check for leakage.
5. Antennas (underside of helicopter) — Check security, condition, and free of dirt and oil.
6. Searchlights — Check condition.
7. Nose access panel — Check secure.
8. Windshield wipers — Check condition.
9. Windshield — Check for cracks and cleanliness.
10. Glide slope and IFF antennas — Check condition.
11. Pitot tubes — Check condition and security.
12. AFCS yaw ports — Check clear.

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EXTERIOR (CONT.)

Forward Cabin (Cont.)

13. Copilot's hydraulic brake lines — Check for leakage.
14. Copilot's jettisonable door — Check condition and security.
15. HYD SYS TEST panel — Check capacities and fairing secure.
16. Emergency escape panel — Check condition and security.

Left Cabin

1. Left electrical compartment — Check as follows:
 - a. GEN/CT FAULT bite — Check all black.
 - b. Transformer-rectifier — Check condition and security.
 - c. **712** No. 1 minimum beep resistor — Check condition and security.
 - d. Battery for security, sump jar, and vent line.
 - e. Battery CHARGING and CHARGED lights — Check.
 - f. BATT CHG FAULT bite — Check all black.
 - g. Access door — Check condition and security.
2. GPU access panel and connections — Check condition.
3. Forward landing gear — Check as follows:
 - a. Tires for inflation and condition.
 - b. Shock strut for extension and cleanliness.
 - c. Hoses and wheel brakes for leakage, chafing, and security.

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EXTERIOR (CONT.)

Left Cabin

4. Fwd aux fuel tank — Check as required and cap security.
5. Fuel Vent — Check clear and fairing secure.
6. Forward landing gear support structure — Check as follows.
 - a. Fwd aux fuel tank electrical connections and fuel lines — Check condition and security.
 - b. Position light — Check wiring and condition.
 - c. Access panel — Check condition and security.
 - d. ERFS II refuel valve — Check condition and security of electrical connection.
7. Static port — Check clear.
8. Anti-collision light — Check condition.
9. HF antenna — Check antenna wire and standoffs condition and security.
10. Main fuel tank — Check as required and cap security.
11. Fuel vent — Check clear and fairing secure.
12. Aft aux fuel tank — Check as required and cap security
13. Fuel vent — Check clear and fairing security.
14. Fuselage skin — Check for dents, wrinkles, loose or missing rivets.
- 15. ERFS II — Check vents and drain clear.
16. Windows — Check condition, seals, and proper installation, cracks, and cleanliness.
17. **714A** Engine wash system connectors — Check condition and security.

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EXTERIOR (CONT.)

Left Cabin (Cont.)

18. Left aft landing gear — Check as follows:
 - a. Left aft Landing gear support structure — Check for cracks or distortion.
 - b. Tires — Check for inflation and condition.
 - c. Static ground wire — Check wire secure and contacting the ground.
 - d. Shock strut — Check proper extension, cleanliness, and static lock unlocked.
 - e. Electrical connections — Check condition and security.
 - f. Landing gear proximity switch — Check condition, linkage adjustment, and security.
19. No. 1 engine — Check lower side as follows:

NOTE

If TEAC/PAC is to be performed, all preflight inspection requirements/checks required prior to TEAC/PAC must be accomplished. In this case, EAPS must be moved forward of the engine to gain access for inspection. If TEAC/PAC is not required, EAPS will remain locked into position in front of the engine.

- a. Inlet for foreign objects, hinge, latch secured, and condition.
- b. EAPS for general condition. Check vortex tubes for erosion and damage. Check seals for condition. Check rail and slide mechanisms. Inspect blower fan blades for damage and erosion. Check condition of electrical connectors, and harness.

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EXTERIOR (CONT.)

Left Cabin (Cont.)

- c. Check fuel, oil, hydraulic, electrical, wash kit, and drain lines for connections, leaks, and condition.
 - d. Check engine for chafing lines and condition and security of components.
 - e. Check N1 topping stop installed, if required.
- B* 20.** Walk Around Check and Security Brief.
- a. All access doors — Secure. Including EAPS if installed.
 - b. Tie downs, locking devices, covers, and ground cables — Removed and secured.
 - c. Cockpit, fwd transmission, and fwd cabin area soundproofing installed —Check.
 - d. Crew briefing — Purpose, duration, and any special mission considerations or limitations of test flight.

BEFORE STARTING ENGINES

- 1. Seat belts and shoulder harness — Fasten, and tighten.
- B 2.** Seats and pedals — Adjust.
- a. Check seat fore-and-aft, vertical, and tilt adjustments lock in place.
 - b. Check pedals lock into each detent. Check matched when completed.

NOTE

Seat belt locking device should be installed on the left side.

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BEFORE STARTING ENGINES (CONT.)

- B** 3. Shoulder harness locks — Check inertia reel functions properly (i.e., the shoulder harness should lock automatically when given a sharp pull).
- B*** 4. NO. 1 and NO. 2 power distribution panels — Check all circuit breakers and gang bar up. Check for clearance between gang bar and cover. Check dust and water protection boot for condition and security.
- 5. Mirror — Adjust.
- 6. FAT gage — Check FAT, condition, and security.
- B*** 7. Overhead switches and control panels, set as follows:
 - O** a. EAPS ENG 1 and ENG 2 FAN switches — OFF. DOORS — Close.
 - b. EXT LTG switches — As required.
 - c. CPLT LTG switches — As required.
 - d. COMPASS switch — As required.
 - e. TROOP WARN switches — OFF.
 - f. HTG switches — As required.
 - g. W/S WIPER switch — OFF.
 - h. ELECT switches — OFF.
 - i. LTG switches — As required.
 - j. FUEL CONTROL switches — Set as follows:
 - (1) XFEED switch — CLOSE.
 - (2) REFUEL STA switch — OFF.
 - (3) ALL FUEL PUMPS switches — OFF.
 - k. **712** START switches — OFF.
 - l. ENG COND levers — STOP.

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BEFORE STARTING ENGINES (CONT.)

- m. **714A** FADEC switches — Check or set as follows:
 - (1) NR% switch — 100%.
 - (2) 1 and 2 PRI-REV switches — PRI.
 - (3) B/U PWR switch — OFF.
 - (4) LOAD SHARE switch — TRQ.
- n. INTR LTG switches — As required.
- o. PLT LTG switches — As required.
- p. ANTI-ICE switches — OFF.
- q. HOIST switches — OFF.
- r. CARGO HOOK switches — Set as follows:
 - (1) MSTR switch — OFF.
 - (2) HOOK SEL switch — As required.
 - (3) EMERG REL ALL switch — OFF. Cover down.
- s. HYD switches — Set as follows:
 - (1) PWR XFR switches — OFF.
 - (2) FLT CONTR switch — BOTH.
 - (3) BRK STEER switch — ON. Cover down.
 - (4) RAMP switch — ON.
 - (5) RAMP EMER switch — HOLD. Cover down.
- 8. Magnetic compass — Check full fluid, no bubbles or discoloration, and compensated within last 12 months.
- B** 9. FIRE PULL handles — In.
- B** 10. AGENT DISCH switch — Check spring loaded to the neutral position.

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BEFORE STARTING ENGINES (CONT.)

11. Systems instruments — Check engine, transmission, torque, rotor, hydraulics systems, and airspeed indicators for static indications slippage marks, orientation, and operating range markings. Refer to Table 2-1.
- B*** 12. XMSN OIL PRESS — SCAN.
- B*** 13. XMSN OIL TEMP switch — SCAN.
14. Flight instruments — Check indications and set as follows:
 - a. Turn and slip indicators — Check race full of fluid, needle and ball centered. Alignment between indicators.
 - b. Airspeed indicators — Compare indicator readings.
 - c. Vertical velocity indicators — Note indications.
 - d. HSI — Check as follows:
 - (1) Four flags present RANGE, HDG, NAV, GS.
 - (2) Heading knob — Rotate 360 degrees checking for smooth operation.
 - (3) Course knob — Rotate 360 degrees then 90 degrees opposite direction stopping at a cardinal heading. Check for smooth operation and that the course heading and number in the window are within 1 degree of each other.

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Table 2-1. Instrument Range Markings

INDICATOR	RANGE MARKING
712 GAS PRODUCER TACHOMETER	YELLOW RADIAL 60% RED RADIAL 107%
712 POWER TURBINE INLET TEMPERATURE	GREEN ARC 400 TO 780°C YELLOW ARC 781° TO 940°C RED RADIAL 890°C BLUE RADIAL 810°C RED RADIAL 940°C
712 ENG OIL TEMPERATURE	RED RADIAL 140°C
712 ENGINE OIL PRESSURE	RED RADIAL 20 PSI RED RADIAL 35 PSI GREEN ARC 35 TO 90 PSI RED RADIAL 110 PSI RED DOT 150 PSI
714A GAS PRODUCER TACHOMETER	YELLOW RADIAL 50% RED RADIAL 110%
714A POWER TURBINE INLET TEMPERATURE	GREEN ARC 400° TO 815°C YELLOW ARC 815° TO 940°C BLUE RADIAL 855°C RED RADIAL 900°C RED RADIAL 940°C
714A ENG OIL TEMPERATURE	RED RADIAL 149°C
714A ENGINE OIL PRESSURE	RED RADIAL 5 PSI RED RADIAL 35 PSI GREEN ARC 35 TO 90 PSI RED RADIAL 110 PSI RED DOT 150 PSI
XMSN OIL PRESSURE	RED RADIAL 7 PSI RED RADIAL 20 PSI GREEN ARC 20 TO 90 PSI
XMSN OIL TEMPERATURE	RED RADIAL 140°C
712 TORQUEMETER	RED RADIALS 100% AND 123%

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Table 2-1. Instrument Range Markings (Continued)

INDICATOR	RANGE MARKING
714A TORQUEMETER	RED RADIALS 100% AND 123%
ROTOR TACHOMETER	RED DOT 91% RED RADIAL 96% GREEN ARC 97 TO 101% YELLOW ARC 102 TO 105% RED RADIAL 106% RED RADIAL 108% RED RADIAL 111% RED DOT 111%
AIRSPPEED	RED RADIAL 170
FLT CONTROL HYDRAULIC PRESSURE	RED RADIAL 2500 PSI GREEN ARC 2500 TO 3200 PSI RED RADIAL 3200 PSI
UTILITY HYDRAULIC PRES-SURE	RED RADIAL 2500 PSI GREEN ARC 2500 TO 3500 RED RADIAL 3500 PSI
HYDRAULIC TEMPERATURE	RED RADIAL 120°C YELLOW ARC 95° TO 120°C

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BEFORE STARTING ENGINES (CONT.)

- B*** 15. VGI switches — NORM.
- B** 16. CYCLIC TRIM switch — AUTO.
- B*** 17. AFCS SYSTEM SEL switch — OFF.
- B*** 18. M-130 or AN/ALE-47 switch — SAFE/OFF.
- B** 19. Avionics equipment — Set as required.
- BO** 20. HEAD UP DISPLAY — HUD Off.
- B** 21. **712** EMERG ENG TRIM switches — AUTO, covers down.
- B** 22. Swivel switch - Lock.

STARTING ENGINES

1. Personal equipment — Check.

- B*** ② BATT switch — ON. Check BAT SYS MAL caution light out (may stay on until APU GEN is on if SLAB installed) and the following caution panel lights on:

XMSN OIL PRESS, L. FUEL PRESS, R. FUEL PRESS, XMSN AUX OIL PRESS, NO. 1 RECT OFF, NO. 2 RECT OFF, NO. 1 GEN OFF, NO. 2 GEN OFF, NO. 1 HYD FLT CONTR, NO. 2 HYD FLT CONTR, UTIL HYD SYS, NO 1 AFCS OFF, NO. 2 AFCS OFF, **714A** FADEC 1, FADEC 2.

3. Interphone — Check stations.

- B** 4. MASTER CAUTION LIGHTS TEST switch — TEST. Check that all **712** caution **714A** caution/advisory capsules and the two MASTER CAUTION lights on the instrument panel come on.
- B** 5. Clocks — check operation, set as required.

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STARTING ENGINES (CONT.)

- BF** ⑥. TROOP ALARM and JUMP LIGHTS — Check operation as required.
- a. TROOP ALARM switch — ON; the alarm should sound, then OFF.
 - b. TROOP JUMP LTS — PRESS-TO-TEST.
 - (1) Select RED.
 - (2) Select Green.
 - c. CABIN AND RAMP LIGHTS.
 - (1) Select NVG — Check cabin lights go from full bright to dim with rheostat.
 - (2) Select Red/White — Check cabin lights go from full bright to dim with rheostat.
 - (3) Check Troop Lights go dim when red/white is selected.
 - (4) Cabin and Ramp lights OFF — Check cabin and ramp lights off, troop lights return to bright.
 - d. TROOP JUMP LTS — OFF.
7. Master caution and dome lights — Check.
- a. Master caution lights — Dim. Check master caution lights and panel lights go dim.
 - b. DOME SELECT — NVG then WHITE. Check Master Cautions and caution panel lights go from dim to bright when white selected. Check both dome lights for NVG and White.
 - c. CAUTION lights — Press to reset.
 - d. DOME SELECT — OFF.
8. Floodlights (NVG) — Check.
- a. FLOOD LTS rotary control — ON.

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STARTING ENGINES (CONT.)

- b. FLOOD LTS selection switches on INST PNL/OVHD PNL — ON.
 - c. Check following lights on:
 - (1) 6 under glareshield.
 - (2) 2 on overhead bulkhead (sta 95)
 - d. FLOOD LTS rotary control — Adjust checking for proper response then OFF.
 - e. FLOOD LTS selection switches on INST PNL/OVHD PNL — OFF.
9. Emergency Floodlights — Check as follows:
- a. Pilot's FLT INST LTS rotary control switch — ON.
 - b. Check (6) emergency lights under glareshield and (2) on overhead bulkhead are on.
 - c. Pilot FLT INST LTS rotary control switch — OFF.
10. PILOT and COPILOT utility lights — Check rheostat operation.
11. Ground Power Unit — If required, connect GPU for ground start. Check EXT PWR caution light on.

BF* (12) Fire guard — Posted.

CAUTION

If a start results in a roar with flame in the exhaust (hot or torching start), shut down the APU by setting the APU switch to OFF.

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STARTING ENGINES (CONT.)

NOTE

Allow one minute for cooling between APU shutdown and restart. Failure to do so may result in a premature shutdown on restart due to overtemperature.

- B*** (13). APU START — Check as follows:
- a. APU ON caution/advisory light illuminated.
 - b. UTIL HYD SYS caution — Check out. If the light does not go out within 30 seconds of operation, shut down the APU. Have the utility system checked.
- B*** (14). APU GEN switch — ON. Check as follows:
- a. NO. 1 and NO. 2 REC OFF caution out.
 - b. Avionics cooling fan on.
 - c. VGI alignment within 90 seconds.
15. GPU — Disconnect if used. Check EXT PWR light out.
- B*** (16). POWER XFR No. 1 and No. 2 switches — ON. Check HYD FLT CONT caution lights out within 30 seconds. If not out within 30 seconds POWER XFR No. 1 and No. 2 switches off, do not fly the aircraft.
- BF*** 17. Maintenance panel — Check as follows:
- F** a. #1 and #2 HYD FLT Control pressures within 2500 - 3200 PSI, \pm 50 PSI maximum fluctuation.
 - F** b. Utility hydraulic pressure within 2500 - 3500 PSI, \pm 50 PSI maximum fluctuation.

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STARTING ENGINES (CONT.)

- F c.** Filter change and Pump fault lights — Check Out.
- d.** Filter Change and Pump Fault lights — Press To Test. Check all individual lights come on when pressed.
- e.** GND Test switch
 - F (1)** Normal — Check all magnetic indicators are reset (all black on black indications).
 - F (2)** Test and hold — Check all magnetic indicators are tripped (black and white indications).
 - (3)** XMSN OIL HOT, NO. 1 ENG Chip Det, XMSN Chip Det, and NO. 2 ENG Chip Det caution panel lights and Master Caution lights — Illuminate in the cockpit.
 - F (4)** Reset — Check all bite indicators have reset (all black indications).
- F f.** Main Oil Press, Aux Oil Press, and Ground Contact light — Check all on.
- 18.** XMSN OIL PRESS gage — Check 0 ± 5 psi all positions.
- B* 19.** Avionics — ON as required.
- FO (20)** EAPS Bypass Door Check.
 - a.** NO. 1 and NO. 2 EAPS control boxes. Press-to-test EAPS BYPASS DOORS OPEN light.
 - b.** EAPS ENG 1 DOORS switch — OPEN. Check both doors open and BYPASS DOORS OPEN light is on.

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STARTING ENGINES (CONT.)

- c. EAPS ENG 1 DOORS switch — CLOSE.
Check both doors closed and BYPASS DOORS OPEN light is off.
- d. Repeat steps b and c for EAPS ENG 2.

BF 21. Pitot and Windshield Anti-Ice system — Check as follows:

CAUTION

Do not leave the pitot heaters on for more than 5 minutes. Ground operation shortens service life.

- a. PITOT (and AFCS yaw ports heat) — Check. ON then OFF

CAUTION

Do not operate windshield anti-ice system above a free air temperature of +24°C.

- b. WINDSHIELD ANTI-ICE switches — ON.
Check heating elements feel warm to the touch, then OFF.

F 22. Lights.

WARNING

NVG Helicopters have an infrared filter searchlight. Check filament operation for presence of heat. Do not touch or look directly into light.

- BF a.** PLT and CO-PLT SLT FIL switches — ON.
 - (1) Check both lights come on. Turn NVG light off once illumination is verified.

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STARTING ENGINES (CONT.)

- (2) Light, EXTEND, RETRACT, and rotation from both THRUST CONT positions.
- (3) PLT and CO-PLT SLT CONT — (AUTO) RETR. Check operation from both switches.
- (4) Searchlight — Set as desired and OFF.
- F b.** ANTI-COLL LTS — TOP and BOTTOM — ON.
- F c.** POSITION and FORMATION LTS — Check operation, then OFF. Check aft position light ON/OFF switch if MWO installed. Operate rheostat to vary FORMATION LT intensity from DIM to BRT.
- d.** Cockpit PRESS TO TEST lights — Check (Table 2-2).

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Table 2-2 Cockpit PRESS TO TEST Caution Lights

Overhead Panel

1. L and R AUX (FUEL) PRESS (2)
2. **712** ENG 1 and 2 STARTER ON (2)
3. FWD and AFT HOOK LOADED (2)

Center Instrument Panel

- 1. GPS ALERT (1)
- 2. CIPHER ON (1) (if hardware installed)
- 3. IFF FAIL (1) (if hardware installed)

Pilot/Copilot Instrument Panel

1. **712** EMERG PWR (2)
2. HSI MODE SELECT, BRG and MKR BCN lights (8) on each pilot panel.

CANTED Console

1. HDG, BARO, and RAD hold
2. ALQ-156 (if installed)
 - a. Press STATUS for STAND BY light.
 - b. Check CM JAM and CM INOP caution panel lights out.

Troop CDR

Cipher — Press-To-Test.

STARTING ENGINES (CONT.)

- B*** 23. Parking Brakes/Swivel Locks.
- a. Wheel parking brakes — Reset. Check PARK BRAKE ON, **712** caution light and Master Caution, **714A** Advisory light — On.
 - F** b. SWIVEL switch — Check UNLOCK and LOCK, (check status of swivels down and locked or down but not locked).

WARNING

Anytime the ramp isolation switch is moved from one position to another ensure NCM's hand is clear of the ramp control handle.

24. Ramp Isolation — Check as follows: (Not required if completed during power on checks. Check emergency control as required, see section IV).
 - a. Place ramp control lever in the DOWN position until ramp rests on the ground, then STOP.
 - b. RAMP isolation switch — OFF.
 - c. RAMP control lever — UP. Check that ramp does not move, then STOP.
 - d. RAMP isolation switch — ON.
 - e. Adjust ramp as necessary.
- B** 25. Cruise Guide Indicator — Test FWD and AFT. Check pointer in white test band within 8 seconds.
- B*** 26. Altimeters — Set local barometric pressure (tower setting) and compare with field elevation. If more than a 50 foot error is noted, corrective action should be initiated. Unreliable for flight if more than a 70 foot error exists.

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STARTING ENGINES (CONT.)

- B*** 27. RAD ALT — Set LO index to 100 feet. Set HI index to 800 feet and allow 1 minute for warm-up.
- 28. VGI Operation. Check both pilot's and co-pilot's.
 - a. Pitch/roll adjustment and travel — Check 8° minimum roll left and right, 5° up, 10° down minimum, smooth operation.
 - b. VGI switch — EMER. Check that OFF flag stays hidden.
 - c. VGI switch — As required.
- B** 29. FIRE DETR switch — TEST; check FIRE PULL handle warning lights on, release switch; and check FIRE PULL handle warning lights out.
- F** 30. FIRE PULL handle
 - a. NO. 1 FIRE PULL handle — Pull.
 - b. NO. 1 FUEL VALVE — CLOSED. Check FUEL VALVE indicating light cycles from off to on then off as valve aligns with switch position selected.
 - c. NO. 1 FIRE PULL handle — Push in.
 - d. NO. 1 FUEL VALVE indication light on — then off. Check FUEL VALVE — OPEN.
 - e. Repeat check for NO. 2 FIRE PULL handle.
- F** 31. Crossfeed Fuel Valve Check — Check as follows.
 - a. CROSSFEED FUEL VALVE switch — OPEN. Check that both crossfeed fuel valves open and indicating lights cycle on then off.
 - b. CROSSFEED FUEL VALVE switch — CLOSE. Check that both crossfeed fuel valves close and indicating lights cycle on then off.

STARTING ENGINES (CONT.)

- B* 32.** FUEL QUANTITY Indicator — Check as follows.
 - a. Check individual tank indications coincide with known contents.
 - b. Note digital readout remains constant during individual tank readings.
 - c. Select TOTAL. Check pointer rotates behind mask. Check total fuel indicated is within 420 pounds of known fuel on board.
- B* 33.** CYCLIC TRIM Indicators — Check both in GND position.
- 34.** CYCLIC TRIM switch — MANUAL.
 - a. Check for proper operation and indicator movement by first retracting the FWD then AFT actuator into the RET position.
 - b. Check actuators by fully extending the FWD and AFT actuator into the EXT range on the indicator. (Full RET to full EXT not to exceed 25 seconds).
 - c. CYCLIC TRIM switch — AUTO. Observe both indicators move from the full EXT position to the GND position.
- BF* 35.** Rotor Blades — Check position.

CAUTION

Prior to performing the static flight control check, be sure that an aft rotor blade is not within 30° of the centerline of the fuselage, since blade-fuselage interference may occur. In addition, the rotor blades may rotate due to wind or APU operation.

- B* 36.** AFCS Check. (Refer to Section IV). Not required if mechanical rig check is to be performed.

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STARTING ENGINES (CONT.)

BF* 37. Flight controls — Check.

a. Control Interference.

- (1) Both sets of pedals (full aft) — Pilot and copilot pedal adjustment lever may contact the cockpit floor structure when pedals are in the rearmost adjustment position and full pedal travel is made in either left or right direction.

NOTE

This contact is permissible provided the yaw bellcrank in the first-stage mixing unit has already contacted its stop.

- (2) The cyclic stick contact with the pedal adjust lever is also possible and permissible with the above pedal conditions.
 - (3) Reset pedals for flight.
- b. Pedal adjustment — Matched.
 - c. Obtain neutral pedal measurement.
 - d. Set cyclic to placard measurement. Ensure position indicator is +1 in.
 - e. Control Breakout Forces — (Refer to Section IV).

NOTE

If the flight controls are moved erratically or rapidly, upper boost actuator stall (binding), and/or jam button extension may occur, and unusual vibrations may be felt.

STARTING ENGINES (CONT.)

- BF*** 38. Flight Control Travel Check — FLT CONTR HYDRAULIC switch — BOTH. With slow smooth flight control inputs, check each axis individually for smoothness of operation and full travel. While mixing pitch, roll, and yaw axis control inputs, check for smoothness of operation. Check for minimum cyclic stick travel of 7 inches forward and 4 inches aft.
- a. FLT CONTR HYDRAULIC switch to NO. 1 — ON. Check as follows:
 - (1) NO. 2 HYD FLT CONTR caution light — ON.
 - F** (2) FLT CONTR NO. 2 PRESSURE indicator — Zero \pm 50psi
 - (3) MASTER CAUTION light — On, then RESET.
 - (4) With slow smooth flight control inputs, check each axis for smoothness of operation and full range of travel.
 - b. Flight Control Hydraulic switch — BOTH.
 - F** (1) FLT CONTR HYDRAULIC PRESSURE — Check normal operating range
 - (2) NO. 2 HYD FLT CONTR caution light — Out.
 - c. FLT CONTR HYDRAULIC switch to NO. 2 — ON. Check as follows:
 - (1) NO. 1 HYD FLT CONTR caution light — On.
 - F** (2) FLT CONTR NO. 1 Pressure Indicator — Zero \pm 50 psi.
 - (3) MASTER CAUTION light — Check on the RESET.

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STARTING ENGINES (CONT.)

- (4) With slow smooth flight control inputs, check each axis for smoothness of operation and full range of travel.
- d. FLT CONTR HYDRAULIC switch — BOTH.
NO. 1 HYD FLT CONTR caution light — Out.

NOTE

The flight engineer shall observe No. 2 system returns to normal operating pressure as No. 1 pressure drops below 2000 psi. The same is true for No. 1 System when No. 2 drops below 2000 psi.

- e. Control interlock — Simulate failure of the NO. 1 and then NO. 2 hydraulic boost systems by the following.
 - (1) FLT CONTR HYDRAULIC switch — NO. 1 ON.
 - F** (2) POWER XFR NO. 1 — OFF. Check NO. 1 HYD FLT CONTR caution light out, then on. NO. 2 HYD FLT CONTR caution light on then out. Flight engineer announce the pressure of the NO. 1 system when the NO. 2 system returns to normal pressure.
 - (3) POWER XFR NO. 1 — ON. Check NO. 1 HYD FLT CONTR caution light out. NO. 2 HYD FLT CONTR caution light on.
 - (4) FLT CONTR HYDRAULIC switch — NO. 2 on.

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STARTING ENGINES (CONT.)

- F (5) Power XFR NO. 2 — OFF. Check NO. 2 HYD FLT CONTR FLT CONTR caution light out then on. Flight engineer announce the pressure of the NO. 2 system when the NO. 1 system returns to normal pressure.
 - (6) POWER XFR NO. 2 — ON. Check NO. 2 HYD FLT CONTR caution light out. NO. 1 HYD FLT CONTR caution light on.
 - (7) FLT CONTR HYDRAULIC switch — BOTH.
 - f. Control Centering — Control centering will hold cyclic and pedals within 1/2 inch from stops — Check ability to override control centering in all quadrants.
 - g. Flight Control — Neutralize (with DASH set to 36.0 inch and electronically disconnected neutral is - 3/4 inch).
- B 39.** Avionics — Perform operational check and set as required.
- BF*** (40). **714A** DECU PRESTART BIT Check — Perform the following:
- a. Back-up power switch — ON. Check FADEC 1 & 2 capsules OUT. Check REV 1 & 2 and ENG FAIL 1 & 2 capsules — cycle ON then OUT within 12 seconds.
 - b. ENG COND levers — GND.
 - F c.** Check both DECU displays read 88. If other than 88 on either DECU, then refer to, DECU Fault Codes in Section IV, for evaluation.
 - d. ENG COND levers — STOP.

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STARTING ENGINES (CONT.)

- B 41. **712** NO. 1 and NO. 2 ENGINE BEEP TRIM switch — DECREASE for 8 seconds.
- 42. Ignition Lock — ON.
- BF*** 43. Area — Clear for start.

NOTE

If the start is not normal, abort it. If a second start is attempted, wait at least 15 seconds after N1 tachometer indicates zero before starting. This will allow sufficient time for fuel to drain out of the combustion chamber.

CAUTION

Sand and debris within the EAPS will be ejected when the EAPS fan is operating. Personnel shall stand clear of the exhaust when fan is turned on.

NOTE

The EAPS fans have high start up electrical power requirements. To prevent an overload, the fans must be turned on one at a time. The first fan must be allowed to stabilize for 10-15 seconds before the second fan is turned on.

- BO*** (44) EAPS FAN NO. 1 and NO. 2 switches — ON, (one at a time). Allow first fan to stabilize for 10-15 seconds before the second fan is turned on.

STARTING ENGINES (CONT.)

CAUTION

With the DASH actuator set to 36 inches and electrically disconnected, neutral on the stick position is $3/4 \pm 1/4$ inch aft of neutral.

45. **714A** Abort Start — Check.
- F a. Fire guard — Posted, Rotor blades clear.
 - b. Left main fuel pump switches on — Check L FUEL PRESS caution lights out.
 - c. XFEED — Open check R FUEL PRESS caution light out.
 - d. ENG COND lever — GND.
 - e. ENG START switch to 1 until N1 reaches 10% and release.
 - f. Prior to completion of start sequence (30 - 40% N1), place ENG 1 ECL to STOP.
 - F g. Verify start was aborted and check for leaks
 - h. Repeat steps d - g for ENG 2.

NOTE

Wait at least 15 seconds after N1 reaches zero before attempting another start. This will allow time for fuel to drain out of the combustion chamber.

NOTE

Ensure DECU reads 88 with ECL in ground prior to restarting either engine.

STARTING ENGINES (CONT.)

- B*** (46). **712** Starting Engines, See Section IV; **714A**
Engine Start — Primary Mode (Refer to Section IV).
- a. Record ENG OIL PRESS and GND idle speed after 45 seconds for each engine.
 - b. Check XMSN AUX OIL PRESS light out.
 - c. During rotor acceleration — Check XMSN OIL PRESS caution light out at approximately 20 psi.
- B*** (47). **714A** P3 Bellows Check, See Section IV.

CAUTION

Operation at NR (RRPM) below 45% is to be minimized.

Do not release the FADEC OSPD Switch until the associated ECL has been moved to STOP. Excessively high engine temperature may be generated.

Ensure that the No. 1 engine is restarted before performing the overspeed check on the No. 2 engine to allow flight engineer to verify that the droop stops are engaged prior to shut down of both engines.

NOTE

Check transmission oil pressure a minimum of 7 psi before advancing ECL passed the GND position.

STARTING ENGINES (CONT.)

NOTE

Flight engineer check droop stops engage before ENG No. 1 shutdown.

48. **714A** Overspeed check:
- a. Ensure both engines are in PRI FADEC position.
 - b. Ensure both ECLs are at GND.
 - c. Advance ENG 1 COND lever from GND to set RRPM at $79 \pm 1\%$. Allow RRPM and FUEL FLOW to stabilize.
 - d. OSPD switch — No. 1 activate and hold switch. Check that fuel flow drops to **approximately 300 PPH**. Fuel flow, PTIT, N1, and RRPM will decrease and stabilize but monitor for abnormal indications.
 - e. When fuel flow increase is noted — ENG 1 COND lever stop.
 - f. Release OSPD switch.
 - g. Advance ENG No. 2 ENG COND lever from GND to $79 \pm 1\%$ RRPM.

NOTE

A reversionary start procedure may be used for ENG No.1 and ENG No. 2 restart. If a reversionary start is performed on either engine, step j and 49 may be disregarded for that engine.

- h. ENG No. 1 — Restart.
- i. Repeat steps d thru f for ENG No 2.
- j. Normal shutdown.

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STARTING ENGINES (CONT.)

- ④9. **714A** Engine Start — Reversionary Mode as required. (Refer to Section IV).
- B* 50. XMSN OIL PRESS — Check for minimum 7 psi (as required).
- B* ⑤1. ENG COND levers — FLIGHT. **712** Check stabilized at 92 to 96%. RRPM. **714A** Check stabilized at 100% RRPM \pm 1% and pilot and copilot rotor tachometer readings 2% split maximum.
- B* 52. **712** ENGINE BEEP TRIM system operation.
 - a. Check Pilot's NORMAL ENGINE BEEP TRIM operation NO.1 and NO. 1 & NO. 2 switches.
 - b. Check Copilot's NORMAL ENGINE BEEP TRIM operation NO. 1 and NO. 1 & NO. 2 switches. Establish 100% rotor rpm and match torque.
 - c. Pilot's and Copilot's rotor tachometer readings 2% split max.
- F 53. Fluid drain lines — Check.

NOTE

714A Delay turning second generator on or off for at least two seconds. This delay will give the DECU time to sample power without causing soft faults.

- B* ⑤4. NO. 1 and NO. 2 GEN — ON. Check both GEN OFF caution lights out.
- B* ⑤5. APU GEN — OFF.

STARTING ENGINES (CONT.)

NOTE

If DECU display is not 88, shut down engine being checked and remove all power from the DECU by pulling the respective PRI CONT and REV CONT circuit breakers on the PDP. Repeat engine start sequence and DECU fault monitoring check. If DECU display is not 88 refer to latest AMCOM DECU fault code matrix. System should be troubleshot and repaired prior to releasing the aircraft for missions.

- B*** (56). **714A** DECU Start BIT — Check as follows:
- a. ENG COND levers — Retard 5 degrees.
 - F** b. Check No. 1 and No. 2 DECU display reads 88.
 - c. ENG COND levers — Flight.
- B*** (57). POWER XFR NO. 1 and NO. 2 — OFF.
- B*** (58). APU switch — OFF. APU ON caution light **712** caution light, **714A** advisory light — OUT.
- B*** 59. Systems — Check.
- a. Rotor, torque, engine, transmission, fuel, and **712** caution panel, or **714A** master caution/advisory panel.
 - b. ENG OIL PRESS — Check. Fluctuation ± 5 psi maximum.
 - F** c. Maintenance Panel — Check as follows
 - (1) Hydraulic pressures and temperatures — Check.
 - (2) Bite indicators — Check all black and caution lights out.

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STARTING ENGINES (CONT.)

60. **712** Minimum Beep Check:
- a. NO. 1 & NO. 2 ENGINE BEEP TRIM switch — Full DECREASE.
 - b. NO. 2 ENGINE CONDITION lever — GROUND. Check NO. 1 ENGINE for 91-94% rotor rpm. Record data.

NOTE

Minimum rotor rpm is set during single engine operation only. Dual engine operating rpm will be somewhat higher. This increase in minimum rotor rpm should not be considered as requirement for readjustment.

NOTE

NO. 1 & NO. 2 ENGINE BEEP TRIM switch — INCREASE then DECREASE if adjustment are made.

- c. NO. 2 ENGINE CONDITION lever — FLIGHT.
 - d. NO. 1 ENGINE CONDITION lever — GROUND. Check NO. 2 ENGINE for 91-94% rotor rpm and record data.
 - e. NO. 1 ENGINE CONDITION lever — FLIGHT
61. **712** Bleed Band Check — (Refer to Section IV).
62. **712** NO. 1 & NO. 2 ENGINE BEEP TRIM switch — 100% rotor rpm.

ENGINE RUN UP

CAUTION

If the heater is operating, set the HEATER switch to VENT BLOWER ONLY and allow two minutes for the heater to purge. This procedure will prevent a possible heater fire when generator power is lost in the following tests.

1. HEATER switch — OFF. Allow 2 minutes with HEATER switch in VENT BLOWER ONLY if heater has been in operation.
2. Generators — Check operation.
 - a. Generator-rectifier, crosstie operation — Check as follows:
 - (1) NO. 1 GEN switch — OFF. Check the NO. 1 GEN OFF caution light comes on and the NO. 1 RECT OFF caution light remains off. NO. 1 GEN switch — TEST. Check that the NO. 1 GEN caution light goes out. NO. 1 GEN switch — ON. Check that the NO. 1 GEN OFF caution light is out.
 - (2) Repeat step (1) for NO. 2 GEN.
 - b. Underfrequency cutoff — Check as follows:
 - (1) **712** EAPS ENG 1 and ENG 2 FAN switches — OFF.
 - (2) **712** ENG BEEP TRIM switch (No. 1 & 2) — Full decrease.
 - (3) ENGINE COND lever No. 2 — GROUND.

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ENGINE RUN UP (CONT.)

- (4) ENGINE COND lever No. 1— Slowly move toward GROUND until RRPM is 88%. Hold this RRPM for 7 seconds. Ensure both GEN OFF caution lights remain out.

NOTE

714A Skip step (5) go directly to step (6).

- (5) **712** Continue reducing RRPM with the ENGINE CONDITION lever until RRPM is 80% and check that NO.1 and NO.2 GEN OFF and REC OFF caution lights are on as RRPM goes through approximately 82% RRPM.
 - (6) ENGINE CONDITION levers — FLIGHT.
 - (7) Check NO. 1 and NO. 2 GEN OFF and REC OFF caution lights out as RRPM goes through approximately 89%.
 - (8) **712** NO. 1 & NO. 2 ENGINE BEEP TRIM switch — set 100% rotor rpm.
 - (9) **712** EAPS ENG 1 and ENG 2 FAN switches — ON (one at a time).
- c. Differential current protection circuit — Check as required. (Refer to Section IV).
- B*** (3) Transponder Master Switch — STBY. Check TEST/MON NO GO light on within 30 seconds. Check PRESS TO TEST lights.
- B** (4) FUEL PUMPS and XFEED — Check operation as follows:
- a. All FUEL PUMP switches — OFF. Check L and R Fuel Press caution capsules should come on.

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ENGINE RUN UP (CONT.)

- b. L AFT MAIN FUEL PUMP switch — ON. Check L and R Fuel Press caution capsules should go out. Then switch OFF.
 - c. Remaining MAIN FUEL PUMP switches — Check as in step b. above.
 - d. Left AFT AUX FUEL PUMP switch — ON. Check L AFT AUX — Press light comes on then goes out. Set FUEL PUMP switch to OFF.
 - e. Remaining three AUX FUEL PUMP — Check as in step d, except check R AUX press light on, then off, for R AUX FUEL PUMP switches.
 - F** f. CROSSFEED switch — Closed. Check closed.
 - g. Either LEFT MAIN FUEL PUMP ON — Check only left fuel pressure caution light out. LEFT MAIN FUEL PUMP switch OFF.
 - h. Check RIGHT MAIN FUEL PUMP in same fashion as in steps b. through d. above.
- B*** 5. ALL FUEL CONTR Switches — Set.
- B** 6. VGI switches — As required.
7. XMSN OIL PRESS and TEMP Indicator Operation.
- a. Check individual XMSN OIL PRESS readings. Allowable fluctuation of oil pressure readings shall not exceed $\pm 10\%$ of actual readings.
 - b. XMSN OIL PRESS — SCAN. Reading ± 3 psi of low transmission.
 - c. XMSN OIL PRESS — TEST. Check to 0 psi or below.
 - d. XMSN OIL PRESS switch — SCAN.

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ENGINE RUN UP (CONT.)

- e. Check all XMSN OIL TEMP readings.
- f. XMSN OIL TEMP — SCAN. Reading $\pm 5^\circ$ of high temperature xmsn.
- g. XMSN OIL TEMP — TEST. Check to -70°C or below.

B* 8. Flight instruments — Check as follows:

- a. Horizontal Situation Indicator (HSI) — Check synchronized. Cross-check with magnetic compass.
- b. Attitude indicators — Adjust as required.

B 9. **712** EMERG ENG TRIM System — Check operation (as required).

- a. Note N1 reading.
- b. NO.1 EMERG ENG TRIM AUTO/MAN switch — MAN.

CAUTION

When EMER ENG TRIM switch is held in the DEC position it is possible that N1 speed may go below the minimum allowable of 60 % and the engine fail. Monitor N1 speed closely if engine N1 speed goes below 60% and fails immediately place associated ECL to STOP and be prepared to motor the engine if high PTIT is noted.

- c. NO. 1 EMERG ENG TRIM INC/DECR switch — Full DECR. Engine speed should decrease and stabilize at 60% N1 or above. Ensure engine remains running.
- d. NO. 1 EMERG ENG TRIM INC/DECR switch — INC to previously noted N1 speed.
- e. No. 1 ENG TRIM AUTO/MAN switch — AUTO.

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ENGINE RUN UP (CONT.)

f. Repeat steps a. through e. for NO. 2 ENG.

- B** (10). **714A** Reversionary System Check (first flight of day) may be omitted if performing FADEC Reversionary mode beep check.
- a. FADEC 1 switch — REV.
 - b. No. 1 INC/DEC switch — DEC momentarily. Check #1 ENG, N1 and TRQ decreases.
 - c. No. 1 INC/DEC switch — INC momentarily. Check #1 ENG, N1 and TRQ increases.
 - d. FADEC 1 switch — PRI.
 - e. Repeat steps a thru d. for No. 2 FADEC.
 - f. Set RRPM to 100%, TQs matched, set FADEC 1 & 2 switches to PRI.
11. Systems instruments — Check engine, transmission, rotor, and fuel systems indications. **712** Master Caution panel, **714A** Master Caution/Advisory panel — Check
- B** 12. Altimeters — Set/Test.
- a. Barometric altimeter — Recheck tower setting.
 - b. Radar Altimeter — Check (Refer to Section IV).
- B** (13). Transponder — Check and Set.
- BO** 14. AN/ASN-128 Doppler — Program doppler with UTM (or latitude/longitude) coordinates for checkpoints in test course. Enter magnetic variation.
- BO** 15. AN/ASN-128B DGNS.
- a. Load several known local waypoints into DGNS either through CDU or through Data Loader Module.

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ENGINE RUN UP (CONT.)

- b. Load SA/AS variable into DGNS through SA/AS port on SDC.

* B BEFORE TAXI

1. SWIVEL switch — As required.
2. AFCS switch — As required.
3. CYCLIC TRIM indicators — check GND.
- F 4. M-130 or AN/ALE-47 safety pin — Remove and stow.
- F 5. Chocks removed and secured.
- F 6. Ramp and Cabin door — As required.
- F 7. Crew, passengers, and mission equipment — Check ready for taxi.
- F 8. Taxi directors and blade watchers — Positioned as required.
- F 9. Parking Brake — As required.
 - a. Check Handle seated.
 - b. Park Brake caution/advisory light — Out.

* B TAXIING

1. Wheel Brakes — Check Pilot's and Copilot's right and left pedals for smooth operation and no fade upon application.
2. Power steering — Check as required.
 - a. Directional control — SWIVEL switch — Steer.
 - b. Left and right turns, 30 degree turns. Check HSI, magnetic compass, and turn needle for proper operation.

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*** B TAXIING (CONT.)**

- c. Check PWR STEER caution light — Out.
 - (1) Check 10 degree deviation (maximum) in 100 feet.
 - (2) SWIVEL switch — LOCK, Check 5 degree deviation (maximum in 100 feet.
 - (3) Check power STEERING CONTROL inoperative with SWIVEL at LOCK.

B BEFORE HOVER

B* 1. Swivel switch — Lock.

B* 2. AFCS System control panel — Set as follows:

- a. AFCS System SEL switch — Both.
- b. Cyclic Trim — Auto.

B 3. **714A** FADEC system Check.

a. FADEC RRPM Check.

- (1) FADEC NR% switch — 97. Check RRPM decreases to 97% \pm 1% with torques matched within 4%.
- (2) FADEC NR% switch — 103. Check RRPM increases to 103% \pm 1% with torques matched within 4%.
- (3) FADEC NR% switch — 100. Check RRPM decreases to 100% \pm 1% with torques matched within 4%.

b. FADEC Reversionary Mode Beep Check.

- (1) ENG No. 2 ECL — GND.
- (2) FADEC No. 1 PRI/REV switch — REV.
- (3) Thrust Control Lever — Increase to obtain 90% N1

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B BEFORE HOVER (CONT.)

- (4) Pilot's No. 1 INC/DEC switch check for proper operation with momentary decrease then increase checking N1, PTIT, torque, and RRPM response.
- (5) Copilot's No. 1 INC/DEC switch — DEC and hold. Check that RRPM stabilizes at 97% (+1%, -2%). If RRPM continues to decrease below 97%, return RRPM to 100% by holding the switch in the INC position and releasing it at 100% RRPM. Corrective maintenance action is required.
- (6) Copilot's FADEC No. 1 INC/DEC switch — INC Incrementally until RRPM no longer increases. Check that RRPM stabilizes at 103% (+2%, -1%). If RRPM continues to increase, return RRPM to 100% with the Copilots FADEC No. 1 INC/DEC switch. Corrective maintenance action is required.
- (7) Copilot's beep No. 1 INC/DEC switch DEC as necessary to obtain 100% RRPM.
- (8) Thrust Cont lever — Increase to maximum possible without lifting off the ground. Check that RRPM stabilizes at $100\% \pm 2\%$.
- (9) Thrust Control Lever — Reduce to Ground Detent.
- (10) FADEC No. 1 switch — PRI.
- (11) ENG No. 2 ECL — FLT.
- (12) Repeat steps (1) through (10) with other engine.

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B BEFORE HOVER (CONT.)

NOTE

HIT/PAT check may be deferred to hover check. HIT/PAT is not required for the engine(s) that required a TEAC/PAC.

- B 4. **712** Health Indicator Test (HIT) check — Perform as required.
- B 5. **714A** Power Assurance Test (PAT) — Perform as required. May be deferred and completed in conjunction with torque differential check if required.
- B* 6. RRPM — Set as required.

CAUTION

Monitor all fuel tanks for overpressurization.

NOTE

During the fuel system check, observe the following:

No fuel will be pumped into any AUX tank.

At 1650 ±50 pounds, the main tank (with its pumps on) will start receiving fuel from its respective AUX tanks and stop when tank capacity reaches 1800 ±50 pounds, maximum 2000 ±50.

- 7. RH Fuel system Check — Start, note fuel quantity in all tanks.
 - a. CROSSFEED FUEL VALVE(S) — OPEN.
 - b. LH FUEL PUMPS — OFF.
 - c. Fuel selector — Monitor RH tank fuel level.

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B BEFORE HOVER (CONT.)

8. Ground Instability — Check.
 - F a. Ensure swivels are locked and engaged.
 - b. Ensure Brakes are set.
 - c. Lift FWD gear off the ground and check rear brakes hold.
 - d. Check flight control response all axes.

B HOVER

1. Flight Controls — Check flight controls for correct response.
2. System Instruments — Check Normal.
3. Flight Instruments — Check as required.
 - a. VSI, barometric and radar altimeters — Indicate climb and descent.
 - b. Turn pointers, heading indicators and magnetic compass — Indicate turns left and right. HIS 2° split between pilot and copilots indicators. Magnetic compass ± 5 of HSI indication.
 - c. Slip indicators — Ball free in the race.
 - d. Attitude indicators — Indicate nose high, nose low, banks left and right.
 - e. Airspeed indicators — Check.
- F 4. LCTs — Check retracted.
5. Ground Contact Indicating lights check — Both off.
6. AFCS — Check first flight of the day if AFCS MTF checks at a hover check are not going to be performed.

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B HOVER (CONT.)

- F 7. Perform PAT/HIT if previously deferred as required.
- 8. Power — Check. Note torque, EOP, and N1.

NOTE

After work has been done on the flight control system, the dash actuators should be set to 36.0 inches and electrically disconnected. A mechanical rig check is not required if no adjustment have been made to the flight controls or the pitch links.

- 9. Mechanical Rig Check. (If no adjustments have been made to the flight controls or pitch change links, proceed to step 10).

NOTE

Even though the AFCS selector switch is in the BOTH ON position during check, the AFCS OFF caution lights may stay on.

- a. Perform crosswind hover — Check cyclic position of 3/4 inch aft \pm 1/4 inch.
 - b. Land helicopter.
 - c. AFCS selector switch — OFF. Electrically reconnect DASH actuator.
 - d. AFCS Selector switch — ON.
10. Controls positions. (Refer to Section V).
- a. Longitudinal.
 - (1) Perform crosswind hover.
 - (2) Stick position indicator — Check N \pm 1/4 inch.

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B HOVER (CONT.)

- b. Lateral.
 - (1) Hover into the wind.
 - (2) Measure position from copilot's door post placard.
 - (3) 0 to 1/2 inch right of neutral position.
 - c. Directional.
 - (1) Hover into the wind.
 - (2) Measure pedal separation.
 - (3) 1/2 inch maximum separation.
11. AFCS function check. Conduct from 15 to 20 feet aft wheel height.

NOTE

All of the following tests must be started from precisely trimmed condition. If this is not done, unsymmetrical or poor response will result, and the intent of this test will not be met. The performance criteria of this test are based on flight in smooth to light turbulent air.

- a. Engagement Error — Check as follows.
 - (1) AFCS SYSTEM SEL — NO. 1. Move switch from NO. 1 to OFF, then back to NO. 1. Check for engagement error.
 - (2) AFCS SYSTEM SEL — NO. 2. Move switch from NO. 2 to OFF, then back to NO. 2. Check for engagement error.
 - (3) AFCS SYSTEM SEL — BOTH.
- b. Pitch axis test. AFCS SYSTEM SEL — BOTH. Check pitch axis response as follows:

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B HOVER (CONT.)

NOTE

During AFCS function check, insure that both the pilot's and copilot's pitch and roll beep trim switches are operational. Pilot and copilot pitch beep trim switches can be checked on AFCS Both, #1, or #2. The pilot and copilot roll beep trim must be checked on each AFCS system #1 and #2.

- (1) While trimmed for stabilized hover, raise the nose of the helicopter 3° above hover attitude, and without retrimming longitudinal control or releasing the mag brake, return the stick to detent. The aircraft shall return to its approximate original pitch attitude, with no more than one and one-half residual oscillations and hold attitude within $\pm 2^\circ$.
 - (2) Repeat test for 3° nose-down trim displacement.
- c. PITCH BEEP TRIM Check. Check pitch beep trim as follows:
- (1) While trimmed for hover, operate the four-way (conical) switch on the longitudinal stick grip to forward position. A small nose down pitch change shall be noted.
 - (2) Operate the four-way switch to aft position. A small nose up change shall occur.
- d. Roll axis test. Check roll axis response as follows:.
- (1) Trim the aircraft to a level roll attitude. The aircraft shall hold this level attitude within $\pm 3^\circ$.

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B HOVER (CONT.)

- (2) Operate the roll beep trim switch left and right. Roll attitude changes shall correspond to beep action.
- e. Yaw axis test. Check yaw axis response as follows:
 - (1) Apply a right pedal directional control input of 1/2 inch. Do not operate the magnetic brake switch.
 - (2) Hold this input until a heading change of approximately 30° has occurred. Return the pedals to trim and do not apply any force to the pedals. The aircraft yaw rate shall diminish. When the rate has dropped to approximately 1.5°/second, a new heading shall be captured.
 - (3) Repeat steps (1) and (2), except apply left pedal.

NOTE

The AFCS yaw axis heading hold function is disabled when the SWIVEL switch is at UNLOCK or STEER.

- (4) Set the SWIVEL switch to UNLOCK and repeat steps (1) thru (3). The aircraft should not lock on to any heading. The heading hold functions will be inoperative.
- f. Heading hold and bank angle hold check in sideward flight. Perform as follows:
 - (1) SWIVEL switch — LOCK.

B HOVER (CONT.)

- (2) Trim to a stable hover. Without operating the magnetic brake switch, apply a 5°- 7° bank angle to produce a sideward velocity. Return longitudinal stick to the trim detent. The helicopter shall maintain the commanded bank angle and hold its original heading ($\pm 3^\circ$) during sideward flight.
- (3) Repeat step (2), flying sideways in the opposite direction.
- g. Hover check (NO.1 AFCS). With the aircraft trimmed in pitch, roll, and yaw, AFCS SYSTEM SEL — NO.1 and repeat the tests on step b. thru f. Then set AFCS SYSTEM SEL switch to both.
- h. Hover check (NO.2 AFCS). With the aircraft trimmed in pitch, roll, and yaw, AFCS SYSTEM SEL — NO.2 and repeat the tests on step b. thru f. Then set AFCS SYSTEM SEL switch to both.

CAUTION

Barometric altitude hold shall not be used in a hover. Rotor downwash and turbulence changes the reference pressure to the altitude hold transducer.

- i. Radar altitude hold. RAD ALT — ENGAGED. Check segment lighted. Check radar altitude hold response while hovering at a known true altitude of at least 25 feet. Altitude shall be held within ± 5 feet.

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B HOVER (CONT.)

- (1) Displace helicopter approximately 10 feet above known attitude by slipping THRUST CONT (do not use mag brake), and then release the THRUST CONT. Helicopter shall return to original altitude within ± 5 feet.
 - (2) Repeat test, slipping THRUST CONT 10 feet below known altitude and after releasing THRUST CONT note helicopter returns to original altitude with 5 feet.
 - (3) RAD ALT HOLD-OFF.
12. Land helicopter, THRUST CONT in ground detent
 13. RH Fuel System check — Stop, note fuel quantity in all tanks.
 14. LH Fuel System CHECK — START, note fuel quantity in all tanks.
 - a. LH FUEL PUMPS — ON.
 - F** b. CROSSFEED FUEL VALVES — Recheck OPEN (Flight Engineer Response).
 - c. RH FUEL PUMPS — OFF.
 - d. Fuel selector — Monitor LH fuel tank level.

NOTE

Power Assurance Test (PAT) not required at a hover if already accomplished on the ground.

15. **714A** Power Assurance Test — Perform as required.
16. Torque Differential Check.

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B HOVER (CONT.)

NOTE

Ensure that no aircraft limitations are exceeded during this maneuver. The goal is to obtain the maximum torque without endangering the aircraft or crew (70-100%). Depending on conditions i.e. aircraft gross weight and DA the check may be performed on the ground.

- a. **712** Torque Differential Check.
 - (1) While stable on the ground, flat pitch, 100% RRPM move No. 2 ECL to the Ground detent. Increase RRPM to 100% using beep No. 1 and No. 2 switch. Increase thrust until aircraft is stabilized at 5 to 20 foot aft wheel height while maintaining RRPM at 100%. Record TRQ and N1 values on No. 1 engine when stabilized.
 - (2) Maintaining a constant thrust position slowly bring the No. 2 ECL to the FLT position while simultaneously maintaining the RRPM at 100% with the No. 1 and No. 2 beep trim switch. Reduce No. 1 ECL smoothly to the ground position while maintaining 100% RRPM with the No. 1 and 2 beep trim switch. When No. 1 ECL is at the GND position record TRQ and N1 values on No. 2 engine.
 - (3) Smoothly decrease thrust to ground detent while maintaining 100% RRPM with No. 1 and No. 2 beep switch. Decrease RRPM to minimum beep using 1 and 2 beep switch. Advance No. 1 ECL to flight position. Beep RRPM to 100%.
 - (4) Difference will be no greater than 6% between No. 1 and No. 2 ENG TRQ values.

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B HOVER (CONT.)

- b. **714A** Torque Differential Check.
 - (1) While stable on the ground, flat pitch, 100% RRPM and FADEC in PRI move No. 2 ECL to the Ground detent. Ensure RRPM is 100%. Increase thrust until aircraft is stabilized at 5 to 20 foot aft wheel height while ensuring RRPM is 100%. Record TQ and N1 values on No. 1 engine when stabilized.
 - (2) Maintaining a constant thrust position slowly bring the No. 2 ECL to the FLT position while monitoring the RRPM at 100%. Reduce No. 1 ECL smoothly to the ground position while monitoring RRPM at 100%. When No. 1 ECL is at GND position record TQ and N1 values on the No. 2 engine.
 - (3) Smoothly decrease thrust to ground detent. Smoothly advance No. 1 ECL to flight position. Ensure RRPM 100%.
 - (4) Difference will be no greater than 6% between No. 1 and No. 2 ENG TQ values.
- 17. Droop Eliminator.
 - a. Establish 100 percent rotor rpm in the ground detent.
 - b. AFCS SYSTEM SEL — BOTH.
 - c. Lift off to stabilized hover, 15 to 20 feet aft wheel height.
 - d. Check 100% rotor rpm (+0 -1.0%), maximum stabilized droop. Maximum stabilized torque split **712** 6%, **714A** 4%.

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B HOVER (CONT.)

18. **714A** FADEC PTIT Load Share Check.
 - a. Move FADEC Load Share switch from TRQ to PTIT.
 - b. Check that ENG No. 1 and ENG No. 2 PTIT temperature are within 30°C of each other.
 - c. Move FADEC Load Share switch from PTIT to TRQ.
19. Land helicopter. THRUST CONT in ground detent.
20. LH Fuel System Check — Stop, note fuel quantity in all tanks.
 - a. RH FUEL PUMPS — ON.
 - b. CROSSFEED FUEL VALVES — CLOSE.
21. Cowling and Leak Check — Performed.

***B BEFORE TAKEOFF**

1. Systems — Check indications of the following:
 - a. Rotor.
 - b. Torque.
 - c. Engine.
 - d. Transmission.
 - e. Fuel.
 - f. **712** Master caution panel.
 - g. **714A** Caution/advisory panel.
2. PARKING BRAKE — As required.
3. AFCS SYSTEM SEL — BOTH.
4. CYCLIC TRIM — AUTO.
5. SWIVEL switch — LOCK.

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***B BEFORE TAKEOFF (CONT.)**

6. Transponder — As required.
7. Crew and mission equipment — Check.

CRUISE

1. AFCS Control Panel — As required.

NOTE

Operating the maintenance panel test switch in flight will cause the caution panel lights to go on. The flight engineer shall alert the pilot when the test switch is used in flight.

- BF** 2. Ramp area and maintenance panel — Check every 30 minutes.
3. Fuel consumption — Check.

IN-FLIGHT

1. Speed Sweep — Check.

CAUTION

With inoperative CGI, do not exceed airspeed limits (figure FO-1).

NOTE

FWD and AFT LCT schedules corrected for increases in pressure altitude are shown in Section V.

- a. Stabilize airspeed at 50 knots. Observe both CYCLIC TRIM indicators are in the 60 knot (RET) range.

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IN-FLIGHT (CONT.)

- b. Increase and stabilize airspeed at 60 knots.
 - (1) Record longitudinal stick position.
 - (2) Record lateral stick position.
 - (3) Record directional pedal separation.
 - (4) Compare pilot and copilot airspeed indicators (7 knots maximum difference).
- 2. CYCLIC TRIM — Check.
 - a. Record initial CYCLIC TRIM indicator lift off airspeed (Refer to Section V).
 - b. Increase and stabilize airspeed at 70 knots.
 - c. Observe that both CYCLIC Trim indicators have moved out of the RET.
- 3. Speed Sweep — Check.
 - a. Increase and stabilize airspeed at 80 knots.
 - b. Record longitudinal stick position.

NOTE

Before selecting either AFCS, trim the helicopter to 90 knots with both AFCS operation.

- 4. AFCS Evaluation.
 - a. Stabilize airspeed at 90 knots.
 - b. BARO ALT ENGAGED. Check that altitude hold maintains altitude ± 100 feet during steps c. through i.
 - c. Directional pedal separation — Check as follows:
 - (1) Insure aircraft is in trim (ball centered).
 - (2) AFCS SYSTEM SEL — BOTH.

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IN-FLIGHT (CONT.)

- (3) Switch from BOTH to NO. 1 — Measure pedal adjustment required to return aircraft to trim. Yaw correction should not exceed 0.5 inch.
 - (4) AFCS SYSTEM SEL — BOTH.
 - (5) Check NO. 2 the same as NO. 1, — Yaw correction should not exceed 0.5 inch per system or 1.0 inch total.
- d. Pitch axis — Check as follows:
- (1) Established trimmed airspeed and attitude at 90 knots. Move the cyclic stick forward, without operating the centering device release button. Allow airspeed to increase to 100 knots. return stick to trim position. Airspeed should return to 90 knots and hold ± 5 knots.
 - (2) Repeat step (1) except move the stick aft to decrease airspeed to 80 knots.
 - (3) Pitch beep trim check. While trimmed level at 90 knots, operate the four way switch on the cyclic stick (without moving the stick) forward momentarily. The aircraft shall respond smoothly and increase airspeed. Do not allow airspeed to exceed 100 knots.
 - (4) Repeat (3) using aft beep trim to attain 90 knots.
- e. Roll axis and coordinated turn. Check roll axis operation by trimming the helicopter to level roll attitude at 90 knots.
- (1) Trimmed attitude shall be maintained with $\pm 3^\circ$ roll and heading within $\pm 3^\circ$. The ball on the turn and slip indicator shall be centered within 1/2 ball width.

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IN-FLIGHT (CONT.)

- (2) Move the cyclic stick out of detent to the right (do not operate the centering device's release button) to generate a 20° bank angle. Release stick back into detent. Hold turn for 60°. The newly acquired bank angle shall be held within ±5°. During entry into the turn, the ball shall not be off-centered by more than one ball diameter. When stabilized in the turn, the ball in the turn and slip indicator shall be centered within 1/2 ball width.
 - (3) Using cyclic stick, return aircraft to level attitude. Aircraft shall hold level roll attitude ±3° and heading within ±3° with controls free. Repeat steps (2) and (3) banking to the left.
- f. Roll beep trim — Check as follows:
- (1) While trimmed level, operate the four-way (conical) switch on the control stick grip to the right to attain 20° bank angle. The aircraft shall respond smoothly to beep inputs. The system shall hold the attitude acquired within 5°.
 - (2) Operate the four-way switch to the left to attain a 20° left bank angle. The system shall hold this angle within ±5°.
 - (3) Return aircraft to level trimmed flight using the roll beep trim switch.
- g. Repeat steps 4.d through 4.f first with NO. 1, then NO. 2 AFCS selected.
- h. AFCS SYS SEL — BOTH.
- i. Heading select test. Check as follows.

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IN-FLIGHT (CONT.)

- (1) Trim to level flight at 90 kts. Set the cursor on the Pilots HSI indicator 45° to the right. Engage pilot's CMD SEL switch on the HSI mode select panel: press the AFCS HDG switch to engage. Helicopter shall enter into standard rate turn and shall roll out smoothly onto the selected heading and maintain this heading within 5°.
 - (2) Depress centering release switch on pilot's cyclic. HDG switch shall release.
 - (3) Set the cursor on the pilot's HSI 45° to the left. Engage HDG switch. Helicopter shall enter into a standard rate turn to the left and shall roll out smoothly onto the selected heading. It shall maintain the new heading $\pm 5^\circ$.
 - (4) Select CMD SEL on co-pilot's mode select panel. HDG switch shall release.
 - (5) Repeat step (1) for co-pilot's HSI.
 - (6) Depress centering release switch on co-pilot's cyclic. HDG switch shall release.
 - (7) Repeat step (3) for co-pilot's HSI.
 - (8) Depress CMD SEL switch on pilot's mode select panel HDG switch shall release.
 - (9) Engage HDG switch. Depress HDG switch to insure it will release.
- j. Barometric altitude hold test:

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IN-FLIGHT (CONT.)

- (1) BARO-ALT-ENGAGED.
Note ENGAGED switch lighted. Trim to level flight at a selected altitude. Then without pressing the THRUST CONT magnetic brake switch, increase altitude by 75 feet by pulling against the brake. Release THRUST CONT. The helicopter shall then return to the selected altitude within ± 25 feet, in no more than 30 seconds. Repeat this step, reducing altitude 75 feet below selected altitude. Release THRUST CONT. The helicopter shall return as above.
 - (2) Press the BARO ALT ENGAGED switch to disengage altitude hold.
- k. DASH Actuator Low Rate Operation Check.
- (1) Trim helicopter at 100 knots.
 - (2) Set the AFCS switch to either OFF position. Check that both MASTER CAUTION and NO. 1 and NO. 2 AFCS OFF caution lights come on; then reset MASTER CAUTION lights.
 - (3) Slow to 80 knots and trim the helicopter.
 - (4) Set the AFCS switch to BOTH and check that both AFCS OFF caution lights go out within 20 seconds.
 - (5) Reset the AFCS switch to either OFF position: and check that both MASTER CAUTION and AFCS OFF caution lights come on.
 - (6) Accelerate to 100 knots and trim the helicopter.

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IN-FLIGHT (CONT.)

- (7) Set the AFCS switch to BOTH and check that both MASTER CAUTION and both AFCS OFF caution lights go out within 20 seconds.
5. Speed Sweep — Check.
 - a. Increase and stabilize airspeed at 100 knots.
 - b. Record longitudinal stick position.
6. Speed Sweep Check.
 - a. Increase and stabilize airspeed at 120 knots.
 - (1) Record longitudinal stick position.
 - (2) Check jettisonable doors for security and vibration.
7. STVA evaluation.

CAUTION

Do not operate the self-tuning absorber test feature in flight. In-flight operation may damage the absorber.

Stabilize airspeed at 120 knots.

- a. Check rotor rpm at 100%.
- b. **712** Increase rotor rpm to 101% and start clock. **714A** FADEC NR% switch — Increase RRPM to 101% and start clock. Absorbers should retune within 60 seconds.
- c. Increase and stabilize airspeed at 140 knots.

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IN-FLIGHT (CONT.)

- d. **712** Decrease rotor rpm to 97%, and start clock. **714A** FADEC NR% switch — Decrease RRPM to 97% and start clock. Absorbers should retune within 60 seconds.
 - e. Return RRPM to 100%.
8. Rotor RPM Droop Check and Thrust Rod Slippage Check.
- a. Stabilize airspeed at 125 knots straight and level.
 - b. Rotor rpm 100%.
 - (1) Maintaining altitude and direction **712** without beeping RRPM, increase thrust as necessary to stabilize airspeed at 140 knots with thrust brake trigger depressed. Note and record any change in RRPM from 100%. Note dual engine TRQ then release thrust brake trigger and relax pressure on thrust. Note and record any change in dual engine TRQ.
 - (2) Maximum change in rotor rpm shall be **712** $\pm 2\%$ or **714A** $+1\%$.
 - (3) Maximum thrust rod slippage with thrust brake applied shall be 2% dual engine torque.
9. Speed Sweep — Check.

Stabilize airspeed at 140 knots.

- a. Record longitudinal stick position.
- b. Record lateral stick position.
- c. Record directional pedal separation.
- d. Compare pilot and copilot airspeed indicators (6 knots maximum difference).

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IN-FLIGHT (CONT.)

10. Speed Sweep — Check.

Increase and stabilize airspeed at 150 knots.

- a. Record longitudinal stick position.
- b. Evaluate 1/REV and 3/Rev vibration.
- c. Coordinated turns.

11. CYCLIC TRIM — Check.

- a. Observe both CYCLIC TRIM indicators have reached the leading edge of the EXT range 150 knots. FWD and AFT LCT schedules corrections for increases in pressure altitude are shown in Section V.

IN-FLIGHT (CONT.)

- b. Decrease and stabilize airspeed below extended envelope corrected for altitude (Refer to Section V).
- c. CYCLIC TRIM indicators — Check both out of EXT range.

CAUTION

Before entering autorotation ensure outside area is clear, suitable forced landing area within range and crew notified.

NOTE

Autorotation above 102% RRPM will be accompanied by an overall increase in vibration.

12. **712** Autorotation RRPM — Check as follows:

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IN-FLIGHT (CONT.)

- a. Autorotation RRPM — Check as follows.
 - (1) Stabilize airspeed 75 ± 5 knots.
 - (2) EMERG ENG TRIM, AUTO MANUAL switches covers — UP, switches to Manual.
 - (3) Thrust Control — Reduce to ground detent while decreasing manual switches to maintain RRPM at 100%.
 - (4) Reduce thrust to full down while decreasing EMERG ENG TRIM INC/DEC switches — DEC as necessary until both engine N1 speeds are between 60 and 70%.
 - (5) When stabilized in autorotation with Thrust Control Lever — Full Down, Note following data: (Refer to section V).
 - (a) RRPM.
 - (b) Pressure Altitude (PA).
 - (c) Pedal — 1 inches maximum separation.
 - (d) Unusual Vibrations.
 - (6) Accomplish Power Recovery prior to 1000' AGL.
 - (a) Load Rotor by relaxing pressure on Thrust Control Lever allowing it to come up as required if RRPM is above 100%.
 - (b) EMERG ENG TRIM, AUTO MANUAL switches — AUTO (covers down, one at a time).
 - (c) Reestablish 100% RRPM, safe airspeed, and altitude.

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IN-FLIGHT (CONT.)

- (d) Climb back to altitude where PA was noted and record following:
 - 1 Free Air Temperature.
 - 2 Fuel Quantity.
 - (7) Record Previously noted: RRPM, PA, Pedal Separation, Unusual Vibrations (as applicable).
 - (8) Compare data to chart in Section V for proper RRPM. Ensure conversion from PA and FAT to DA.
- b. **714A** Autorotation RRPM Check.
- (1) Stabilize airspeed at **75±5** kts.
 - (2) THRUST CONT lever — Reduce to ground detent. Check RRPM stabilized.
 - (3) Simultaneously reduce thrust to full down while placing the FADEC NR% rheostat to 97% position.

NOTE

Rotor RPM must be at 98% or higher. If it is not at or above 98% the pitch change links must be adjusted.

- (4) When in stabilized autorotation with thrust full THRUST CONT — Record the following data. (Refer to Section V.)
 - (a) RRPM.
 - (b) PA.
 - (c) Pedal — 1 inches maximum separation.
 - (d) Unusual vibrations.

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IN-FLIGHT (CONT.)

- (5) Accomplish Power Recovery prior to 1000' AGL.
 - (a) Load Rotor by relaxing pressure on Thrust Control Lever allowing it to come up as required if RRPM is above 100%.
 - (b) FADEC NR% rheostat — 100% position.
 - (c) Reestablish 100% RRPM, safe airspeed, and altitude.
 - (d) Climb back to altitude where PA was noted and record following:
 - 1 Free Air Temperature.
 - 2 Fuel Quantity.
 - (e) Record previously noted: RRPM, PA, Pedal Separation, and Unusual Vibrations (as applicable).
- (6) Compare data to chart in Section V for proper RRPM. Ensure conversion from PA and FAT to DA.
- 13. **712** Engine TEAC check, if required. (Refer to Section IV.)
- 14. **714A** Power Assurance Check, if required. (Refer to Section IV.)
- 15. Fuel consumption check — STOP.
- 16. Navigation and Communication. (Refer to Section IV.)
- 17. Miscellaneous (as required).
 - a. Vertical velocity indicators
 - b. Turn and slip indicators.

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IN-FLIGHT (CONT.)

- c. Pressure altimeters.
 - (1) Pilot and copilot difference:
 - 100 @ 0-500 ft
 - 150 @ 1000-2000 ft
 - 200 @ 2000-4000 ft
 - 300 @ 4000-8000 ft
 - 350 @ 8000-10,000 ft
 - (2) No pointer sticking at any altitude.
- d. Establish cruise flight and record.
 - (1) ENG OIL PRESS.
 - (2) ENG OIL TEMP.
 - (3) XMSN OIL PRESS.
 - (4) XMSN OIL TEMP.
 - F** (5) Hydraulic pressures.
 - (6) Hydraulic fluid temperatures.

***B BEFORE LANDING**

- 1. Systems — Check indications of the following:
 - a. Rotor.
 - b. Torque.
 - c. Engine.
 - d. Transmission.
 - e. Fuel.
 - f. **712** Master caution panel.
 - g. **714A** Caution/Advisory panel.
- 2. PARKING BRAKE — As required.
- 3. AFCS control panel — Check as follows:
 - a. AFCS HDG and ALT switches as required.
 - b. Cyclic Trim switch as required.

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*B BEFORE LANDING (CONT.)

c. AFCS selector switch as required.

F 4. Crew and mission equipment — Check.

5. Searchlights — As required.

B AFTER LANDING

1. Flight Controls — Neutralize.

2. Cyclic Trim indicators — Check GND indication.

F 3. GND contact annunciator lights — ON.

4. AFCS System Sel switch — As required.

5. Swivel switch — As required.

6. Transponder — As required.

7. SLT -FIL switches — As required.

8. ANTI-ICE switches — As required.

B ENGINE SHUTDOWN

1. Flight Controls - Neutralize.

2. Parking Brake — Set.

③ HTG switches — OFF.

4. SLT-FIL switches — OFF and stow as required.

⑤ AFCS System Select switch — OFF.

F 6. Ramp — as required.

F 7. Wheels — Chocked.

F 8. Mission equipment — Safe as required.

F 9. Fire guard — Posted.

⑩ APU — Start.

⑪ APU GEN switch — ON.

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B ENGINE SHUTDOWN (CONT.)

- ⑫ GEN 1 & 2 switches — OFF.
- ⑬ PWR XFER 1 & 2 switches — ON.
- 14. CYCLIC TRIM indicators — Check ground position.
- ⑮ ENGINE COND levers — GND, run engines at GND for 2 minutes.

NOTE

If DECU display is other than 88, refer to the DECU BIT Fault Code List/Matrix.

- 16. **714A** DECU Shutdown BIT — Check displays read 88.
- ⑰ FUEL CONTR switches — SET.

WARNING

Check Rotor Droop Stops Engaged.

- F 18.** Droop Stops — Engaged.
 - ⑲ ENGINE COND levers — STOP. Check that engine coast down time is 25 seconds minimum.
 - 20. AVIONICS — OFF.
 - 21. Radar altimeter — OFF.
 - ⑳ EAPS 1 and 2 Fan switches — OFF.
- F 23.** Maintenance Panel — Check for tripped indicators and lit Pump Fault or Filter Change lights. GND Test switch — Test, then reset. Check indicators for proper operation. Filter change and Pump Fault lights — Press to Test.

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B ENGINE SHUTDOWN (CONT.)

24. **714A** FADEC B/U PWR — OFF.
25. PWR XFER 1 and 2 switches — OFF after rotors have stopped.
26. APU GEN switch — OFF
27. APU switch — OFF.
28. Light switches — OFF as required.
29. BATT switch — OFF.
30. Ignition lock switch — OFF.
31. EMERGENCY POWER panel — Check.
32. Check Sheet — Signed.
33. All information from Check sheet — Transcribed to applicable aircraft forms and records.

BEFORE LEAVING HELICOPTER

1. Walk-around inspection — Perform. Check for damage, fluid leaks and levels.
2. Check the following:
 - a. Fluid levels.
 - b. Bypass indicators and filter buttons.
 - c. Jam indicators.
 - d. Cabin and mission secured.
 - e. Tiedowns, grounding cables , and covers.
3. Helicopter — Secure as required.
- B*** 4. Parking Brakes/Swivel Locks.
Wheel parking brakes — Reset. Check PARK BRAKE ON, **712** caution light and Master Caution, **714A** Advisory light — On

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SECTION III. TROUBLE SHOOTING

NOT APPLICABLE

3-1/(3-2 blank)

SECTION IV. SPECIAL PROCEDURES

GENERAL This section contains special procedures which were referenced in Section II.

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LIST OF PROCEDURES

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A. AFCS BITE CHECKS.

Reference: TM 55-1520-240-23

This test should only be performed to verify a suspected AFCS discrepancy. The bite test is performed by pressing the BITE switch on the AFCS computer. The bite associated with system No. 1 tests system No. 1 only and system No. 2 test system No. 2 only. The engine condition levers provide a bite interlock which prevents inadvertent bite operation during flight. The bite test can be interrupted during operation by moving the engine condition level out of the STOP position and back again, or by switching the AFCS to OFF.

1. Prior to activating the bite test, perform the following:
 - a. Start apu and apply electrical and hydraulic power.
 - b. Close all circuit breakers.
 - c. AFCS SYSTEM SEL — NO. 1 or NO. 2 (do not select BOTH).
 - d. CYCLIC TRIM — AUTO.
 - e. Cyclic stick and directional pedals — Center.
 - f. STEERING CONTROL panel — Knob centered.
 - g. SWIVEL switch — LOCK.
 - h. Radar altimeter — Set LO knob to 100 feet.
 - i. Heading bug to heading of helicopter, then 30° clockwise.
 - j. ENG CONDITION levers — STOP.
 - k. Ensure left and right aft landing gear is in ground contact. (Not on jacks.)

WARNING

The bite check results in flight control motions. Keep hands and body clear of moving controls. Severe injury can occur.

2. Press and release the bite switch on the AFCS computer for the system to be tested. A light in the push button switch will flash to show that the test is in progress. The digital-display will indicate the test number of the current circuit under test. Should a failure be present, the flashing light will turn to a steady glow 20 seconds after the failure is detected. Bite test numbers 0, 1, 2, and 3 are bite tests allocated to the self checking of the interrogation circuits. When bite is initiated, it will run quickly thru these first tests and after approximately 20 seconds, the flashing light will become steady with 3 shown in the digital-display. Press and release the bite switch again to allow the test to proceed.
3. If a failure occurs, record the number on the digital-display and press the bite switch to proceed with the test. When the test is completed, the bite will shut down. Refer to TM 55-1520-240-23 for the recommended maintenance actions for the failures detected. There are programmed failures at bite test numbers 6 and 18 of system No. 1. Results of bite test numbers 7 and 47 shall be disregarded.
4. BITE numerical test numbers correspond to the malfunction as follows:

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BITE TEST TABLE

TEST NO.	MALFUNCTION
0-69	AFCS UNIT
70-74	PITCH ILCA
75-79	YAW ILCA
80-84	ROLL ILCA
85-86	DASH ACTUATOR
87-88	CCDA ACTUATOR
89-90	LONG CPT
91-92	PEDAL CPT
93-94	LATERAL CPT
95-96	RADAR ALTIMETER
97	AUTOMATIC STOP

B. SELF-TUNING ABSORBER SYSTEMS CHECK.

NOTE

Perform this test on the ground with the rotors stopped. If the absorbers are tested with the rotors turning, the absorbers may be damaged.

1. APU — ON.
2. APU generator control switch — ON.
3. Vibration absorber circuit breakers (left, right and center)—Pushed in.
4. Selector switch — Left.
5. Test switch — Retract.

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NOTE

The meter pointer will move in direction selected. (retract or extend). The pointer may initially deflect offscale then return to the required average meter deflection and fall to appropriately zero in the required time interval for ambient temperature as shown below. Hold switch until the meter pointer indicates zero or stabilizes at approximately zero.

6. Test switch — Extended.

7. Test switch — Retract.

TEMPERATURE	AVG METER DEFLECTION	TIME INT SECONDS
10C and above	.05 to .20	50 to 300
-20C to 10C	.04 to .20	50 to 360
-55C to -20C	.02 to .20	50 to 480

8. Selector switch — Center.

9. Repeat steps 5 thru 7.

10. Selector switch — Right.

11. Repeat steps 5 thru 7.

12. Selector switch — Off.

C. CONTROL BREAKOUT FORCES.

Reference: TM 55-1520-240-23

The control breakout forces check is intended to detect improper installation of close tolerance bolts, overtorqued hardware, or dirty bearings.

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NOTE

A push-pull type fish scale can be used to check these forces. All forces measured from zero stick position and magnetic brake on.

1. Longitudinal forward and aft 1.8 to 2.5 lb.
(Breakout force forward must be greater than breakout force aft.)
2. Lateral left and right 1.2 to 2 lb.
3. Directional left and right 7 to 12 lb.
4. THRUST CONTROL SYSTEM

MEASURE- MENT	MAG BRAKE	DIRECTION	POUNDS REQUIRED
UP FROM ¹ DETENT	OFF	UP	<u>7.0 MAX.</u> 2.0 MIN.
DOWN FROM ¹ DETENT	OFF	DOWN	<u>15.0 MAX.</u> 5.0 MIN.
SLIP FORCE AT NEUTRAL	ON AT 28 ±2 VDC	UP AND DOWN	<u>23.0 MAX.</u> 7.0 MIN.
UP FROM ¹ NEUTRAL	OFF	UP	<u>4.0 MAX. *</u> 1.0 MIN.
DOWN FROM ¹ NEUTRAL	OFF	DOWN	<u>4.0 MAX. *</u> 1.0 MIN.

NOTE

Thrust breakout to be measured when output rod of lower boost actuator starts to move.

¹ Switch depressed and taped down.

*Breakout forces, up and down, must be within 1.5 lbs of each other.

5. ENGINE CONDITION levers.
 - a. Move either lever to a position between GROUND and FLIGHT.

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- b. Position scale below lever knob. Force required to move lever 4 to 5 lb.

D. WINCH OPERATIONAL TEST.

Reference: TM 55-1520-240-T

1. Perform an operational test of the cargo hoisting system as follows:
 - a. With the APU running, apply hydraulic pressure and electrical power to the helicopter.
 - b. Route the winch cable in the hoist configuration. (Refer to TM 55-1520-240-10.)
 - c. Plug in the cable cutter at sta 120 or 325.
 - d. Check the HOIST CONT circuit breaker on the No. 1 pdp is closed. Set the HOIST MASTER switch REMOTE.
 - e. Set the shifting lever on the winch to RESCUE. (If the shift lever fails to operate properly, replace the winch.) Operate the winch from either of the auxiliary hoist operator's control panels. Connect the winch control from to the panel using the extension cord.
 - f. Press the WINCH ARMING TRIGGER and rotate the WINCH CABLE switch to OUT. Continue to operate the winch until it stops. Check that the out-limit switch stops the winch when 2 1/2 wraps of the first layer of cable remain on the drum. If the winch does not stop within the specified limit, readjust the out-limit switch. (Refer to TM 55-1520-240-23, Ch. 14.) If the time required to reel the cable fully OUT is not about 90 seconds, replace the winch.

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CAUTION

In case of an in-limit switch failure, do not allow the end of the cable to reel in and jam in a pulley. The winch, pulley, or airframe may be damaged.

- g. Operate the WINCH CABLE control switch to IN. Continue to operate the winch to IN until the winch stops. Check that the rescue mode in-limit switch stops the winch when 28½ feet of cable remain extended. Measure the distance from the outer roller on the level wind mechanism to the ball end of the cable. If the winch does not stop automatically within the specified limit, readjust the rescue mode in-limit switch. (Refer to TM 55-1520-240-23, Ch. 14.) If the time required to reel the cable in to the limit switch is not 90 seconds, or if there is binding or uneven spooling of the cable drum, replace the winch.
- h. Operate the winch to reel out the cable. Connect the cable hook to 600-pound weight. Raise the weight with the winch and release the WINCH CABLE switch to OFF. Check that the hoist remains in the stopped position and the weight does not creep downward. If the weight creeps downward, replace the winch.
- i. Lower the weight and remove it from the cable. Remove the winch cable from the pulleys. Remove the pulleys and return them to the stowage container. Unplug the cable cutter stowage receptacle.
- j. Set the shifting lever on the winch to CARGO.

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CAUTION

In case of an in-limit switch failure, do not allow the end of the cable to reel in and jam in the reel assembly. The winch may be damaged.

- k. Operate the winch to reel in the remaining length of the cable. Check that the cargo mode in-limit switch stops the winch when 3 feet of the cable remain extended. If the winch does not stop when the specified length of cable is extended, adjust the cargo mode in-limit switch or have it replaced. (Refer to TM 55-1520-240-23.)
- l. Place the shifting lever to RESCUE. Unplug the cable cutter from the stowage receptacle and connect it to the overhead receptacle above the rescue hatch.

NOTE

RESCUE operation mode is used to reduce reel-out time. Keep tension on the cable while it is reeling out.

- m. Operate the winch to reel out the cable. Continue to operate the winch until the cable is fully extended.
- n. Set the shifting lever to CARGO. Unplug the cable cutter from the overhead receptacle and connect it to the stowage receptacle.
- o. Attach a 3,100 to 3,300-pound load to the winch cable.

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- p. Operate the winch to reel in the cable. Check that the overload-limit switch stops the winch when the second layer of the cable wraps start on the cable drum. If winch does not stop operating on the second layer of cable, adjust the overload-limit switch and repeat this step. (Refer to TM 55-1520-240-23, Ch. 14.)
- q. Check the winch for leakage of the hydraulic oil lubricating grease from the housing. If other than minor seepage is noted, replace the winch.
- r. Stow the winch cable and its related equipment. Set the HOIST MASTER switch in the cockpit to OFF. Shut down the apu. (Refer to TM 55-1520-240-23, Ch. 14.)
- s. Troubleshooting. (Refer to TM 55-1520-240-23.)

E. LOOSENESS CHECK.

Reference: TM 55-1520-240-23

WARNING

Keep head, hands and other body parts clear of moving flight controls. Hydraulic forces are strong enough to cause sever injury.

NOTE

Impedance bolts have been installed in flight control connections. These bolts are self-retaining and require a special nut and torque. Refer to chapter 1 of reference for information on the bolts.

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NOTE

To do a satisfactory looseness check, all binding conditions within control system must be corrected. Binding in some components will prevent detection of looseness in other components. Also, looseness (or wear) in some components can cause binding.

1. Check for binding in the tunnel controls as follows:

CAUTION

Dirt on the bellcranks and idlers can sift into the bearings. Dirty bearings will bind and cause jerky control movements.

- a. Open the forward fairings and work platforms. Open the six tunnel covers.
- b. Apply ac and hydraulic boost pressure to the flight control system.
- c. Move the thrust control, cyclic stick, and directional pedals to produce motion in the tunnel controls.

NOTE

Thrust or pitch control input will move the idlers.
Roll or directional control input will move the walking beams.

- (1) Observe the walking beams and idlers. Check for jerking movements. Observe components attacking bolts. Check for jerky rotation.

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WARNING

Be careful when feeling bellcranks and idlers for vibration. Personnel can have fingers caught between bellcranks and idlers if care is not used.

- (2) Listen for cracking or squeaking sounds. Carefully feel bellcranks and idlers for vibration.
- d. Disconnect the links at the walking beams and idlers that may be binding. (Refer to TM 55-1520-240-23, Ch. 11.)

NOTE

Disconnecting the links and moving the walking beam and idler by hand is the most accurate method of locating a binding component.

- (1) Move the walking beam and idler by hand. Feel for binding and roughness.
- (2) If binding or roughness is found, have the walking beam or idler bearings cleaned and lubricated.
- (3) Attach the connecting links to the walking beams and idler. (Refer to TM 55-1520-240-23, Ch. 11.)
- e. Attach the connecting links to the walking beams and idler. (Refer to TM 55-1520-240-23, Ch. 11.)

WARNING

Make sure area is clear of foreign objects before closing tunnel covers. If not, damage to components or systems could result in personal injury or death.

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- f. Shut down ac and hydraulic power. Pick up tools and clean area. Close tunnel covers.
2. Looseness Check Tolerances. The following tolerances apply to looseness check.
 - a. Bearings with radial looseness in excess of 0.007 inch must be replaced.
 - b. If each bearing in a series of bearings, has less than 0.007 inch radial looseness, but overall system looseness is in excess of 3/8-inch, all or a portion of these bearings must be replaced to reduce looseness to within the 3/8-inch overall looseness tolerance.
 3. Check for control system looseness at forward upper control as follows:
 - a. Apply a manual force of about 10 pounds up and down to connecting link attaching points of right and left bell cranks. (Refer to TM 55-1520-240-23, Ch. 11.)
 - b. Measure distance that either bellcrank end moves. If a bellcrank moves more than 3/8 inch, there is excess looseness in this portion of the control system.
 - c. Isolate the cause of excess looseness. (Refer to TM 55-1520-240-23, Ch. 11.)
 4. Check for control system looseness at the aft upper control as follows:
 - a. Apply force of about 10 pounds up and down to link attaching points of right and left pylon upper bellcranks. (Refer to TM 55-1520-240-23, Ch. 11.)

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- b. Measure distance that either bellcrank end moves. If a bellcrank moves more than 3/8 inch, there is excess looseness in this portion of control system.
- c. Isolate cause of excess looseness. (Refer to TM 55-1520-240-23, Ch. 11.)

F. ROTOR PHASING.

Reference: TM 55-1520-240-23

WARNING

Improper phasing can result in injury to personnel and serious damage to helicopter. Whenever the rotary-wing system has been dephased or components of the drive system (except the engine drive shafts or engine XMSN's) have been removed or disconnected, the system must be properly phased before the system is operated. The method of checking or obtaining proper phase relationship of the rotors is given in the above reference.

WARNING

Phasing requires alignment of the swiveling actuators with the rotating swashplates. Do not perform any alignments using pivoting actuators. The swiveling actuator on the forward rotor is located on the left side of the swashplate and the swiveling actuator on the aft rotor is on the right side of the swashplate.

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NOTE

Phasing the rotary-wing system shall be accomplished with a minimum crew of two; one crewman to install the phasing blocks and one to turn the forward rotor blades.

1. Rotor Phasing.
 - a. Obtain two phasing blocks. If necessary, locally manufacture them from aluminum alloy sheet, 3/8 inch thick,
 - b. Gain access to the right side of the aft swashplate. Rotate the rotor head to align a pitch link lug on the rotating swashplate with the upper flange of the swiveling actuator.
 - c. Install one phasing block over the lug and the flange. Leave in place.
 - d. Gain access to the left side of the forward swashplate. If the rotor system is properly phased, a pitch lug on the rotating swashplate will align with the upper flange of the swiveling actuator. Install a phasing block over the lug and flange to verify alignment.
 - e. If the lug and flange are not in alignment, the rotor system must be phased. Refer to TM 55-1520-240-23 for procedure.

G. **712** NO. 1 and NO. 2 ENGINE START

Reference: TM 1-1520-240-10

CAUTION

The flight controls must be manned anytime the helicopter is on the ground with the rotors turning

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NOTE

Either engine may be started first.

NOTE

If engine does not reach 15% but exceeds 10% N1 (minimum) and has reached its maximum speed, initiate start, but monitor engine and PTIT for a possible hung start and/or excessive PTIT.

1. First engine — Start as follows:
 - a. L FUEL PUMP MAIN switches — ON. Check L FUEL PRESS caution capsule out.
 - b. XFEED switch — OPEN. Check R FUEL PRESS caution capsule out.
 - c. ENG COND lever — STOP.
 - d. ENG START switch — MTR.

NOTE

Avoid motoring in excess of **15** seconds before moving the ENG COND lever to GND. These excess periods can have a detrimental effect on starter reliability.

- e. Motor engine to a minimum of **15%** N1. Set ENG COND lever — GND; ENG START switch to START immediately. Check STARTER ON light on.
- f. Release START switch to MTR prior to PTIT reaching **200°C**. When N1 is **50%**, set START switch to OFF. Check STARTER ON light out.

CAUTION

If no oil pressure is indicated during the starting sequence, shut down engine and investigate.

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- g. ENGINE OIL PRESS — Check and record (20 psi Minimum).
- h. Engine instruments — Check.

NOTE

Ground idle **60.0** to **63.0** percent N1 is the minimum speed at which the engine will operate satisfactorily for extended periods. If the engine speed stabilizes below ground idle, shut down the engine and investigate.

- i. Ground idle speed after **45** seconds — Check and record.

NOTE

If the start is not normal, abort it. If a second start is to be attempted, wait **at least 15** seconds after the tachometer indicates zero before starting. This will allow sufficient time for fuel to drain out of the combustion chamber.

CAUTION

After starting the first engine, the second engine must be started or motored for 10 seconds within 3 minutes. When operating for extended periods with only one engine operating, the second engine must be motored for 10 seconds every 30 minutes. The N2 section of the second engine starts turning when the first engine is started; however, the lubrication system of the second engine is driven by N1 section: which does not begin to turn until the START sequence is initiated. Delay in starting the second engine will result in excessive wear on the N2 bearing package and seals.

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2. Second engine — Start by using the same method as first engine.

H. 714A NO. 1 AND NO. 2 ENGINE START

Reference: TM 1-1520-240-10

NOTE

Either engine may be started first.

CAUTION

The flight controls must be manned anytime the helicopter is on the ground with the rotors turning.

CAUTION

If no oil pressure is indicated during the starting sequence, shut down engine and investigate.

1. First engine — Start as follows:
 - a. L FUEL PUMP MAIN switches — ON. Check L FUEL PRESS caution capsule out.
 - b. XFEED switch — OPEN. Check R FUEL PRESS caution capsule out.
 - c. ENG COND lever — GND.
 - d. FADEC ENG 1 and FADEC ENG 2 switch — PRI.
 - e. FADEC ENG START switch — Select first engine to be started and hold until N1 accelerates to **10%**. Release switch.
 - f. Check and record engine oil pressure (**5 PSI** minimum).

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- g. Check and record engine time and N1 speed to ground idle (**50** to **59%** within **45** sec). If abnormal see figure 5-15. N1 speed and T1 temperature on the Chart reflect DECU values and not those indicated in the cockpit. The SPORTS computer must be installed and referenced to use chart.

CAUTION

After starting the first engine, the second engine must be started or motored for 10 seconds within 3 minutes. When operating for extended periods with only one engine operating, the second engine must be motored for 10 seconds every 30 minutes. The N2 section of the second engine starts turning when the first engine is started; however, the lubrication system of the second engine is driven by N1 section: which does not begin to turn until the START sequence is initiated. Delay in starting the second engine will result in excessive wear on the N2 bearing package and seals.

2. Second engine — Start by using the same method as the first.

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I. 714A P3 BELLOWS CHECK

NOTE

Perform this check anytime maintenance is performed on the engine P3 air line system, Bleed Band actuator, or P3 drain valve, if the engine had a major repair or been replaced, the HMA or DECU has been removed and reinstalled or replaced, the engines have been washed, or the aircraft has undergone a phase inspection. During the P3 Bellows Check, the engine N1 may decrease or increase when REV is selected. The engine should not increase or decrease erratically and should stabilize with no erratic fluctuation noted.

3. First engine.
 - a. Engine # 1 FADEC PRI-REV switch (started engine) — REV.
 - b. FADEC Caution — ON.
 - c. N1 — Check stabilized at 50 to 60% or above.
 - d. Engine #1 FADEC PRI-REV switch — PRI.
 - e. FADEC FAIL caution — OUT.
 - f. Repeat for Engine #2.

J. 714A NO. 1 AND NO. 2 ENGINE REVERSIONARY START.

Reference: TM 55-1520-240-23

NOTE

Either engine may be started first.

CAUTION

The flight controls must be manned anytime the helicopter is on the ground with the rotors turning.

1. First Engine — Start as follows:
 - a. L FUEL PUMP MAIN switches — ON. Check L FUEL PRESS caution capsule out.
 - b. XFEED switch — OPEN. Check R FUEL PRESS caution capsule out.
 - c. ENG COND lever — GND.
 - d. FADEC ENG 1 and FADEC ENG 2 switch — REV.
 - e. FADEC ENG START switch — Select first engine to be started and hold until N1 accelerates to **10%**. Release switch.

CAUTION

If no oil pressure is indicated during the starting sequence, shut down engine and investigate.

- (1) Check and record engine oil pressure (**5 PSI** minimum).
 - (2) Check and record engine acceleration speed to ground idle (stabilize at **45%** N1 or above).
2. FADEC switch of engine started — PRI.
 3. FADEC caution light — Check out.

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CAUTION

After starting the first engine, the second engine must be started or motored for 10 seconds within 3 minutes. When operating for extended periods with only one engine operating, the second engine must be motored for 10 seconds every 30 minutes. The N2 section of the second engine starts turning when the first engine is started; however, the lubrication system of the second engine is driven by N1 section: which does not begin to turn until the START sequence is initiated. Delay in starting the second engine will result in excessive wear on the N2 bearing package and seals.

4. Second engine — Start by using the same method as the first.

K. 714A POWER ASSURANCE CHECK (PAC).

CAUTION

The following limits must not be exceeded during the Power Assurance Check:

- a. PTIT — 899°
- b. N1 — 110%
- c. Airspeed — 140 KIAS
- d. Torque — 123%

NOTE

Perform this check if the engine has had a major repair or been replaced, the HMA or DECU has been replaced, there is a question as to whether or not the engine is producing at least the minimum torque, or the aircraft has undergone a phase inspection.

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1. Maximum Continuous Power (MCPC)/Maximum Power Check (MPC):
 - a. Stabilize airspeed at 120 KIAS. with RRPM **100%**.
 - b. Pilot's or Copilot's altimeter set to **29.92**.
 - c. Determine required minimum TRQ for Maximum Continuous Power Check (MCPC) from figure 5-11. (not to exceed 123%) and the maximum continuous N1 speed from figure 5-14 (Refer to Section V.) for MCPC.
 - d. Determine required minimum TRQ for Maximum Power Check (MPC) from figure 5-12. (not to exceed 123%) and the maximum N1 speed from figure 5-14 (Refer to Section V.) for MPC.
 - e. ENG COND lever of engine not being checked — Slowly retard towards GND until the predetermined minimum required torque (from step c - above) is attained. Ensure that ENG PTIT for engine being checked does not exceed the MCPC temperature limit from figure 5-13 (Refer to Section V.) or the maximum continuous N1 speed. If MCPC temperature limit or maximum continuous N1 speed is reached **prior to required minimum TRQ being attained**, stop the PAC on this engine, and proceed to step j.
 - f. Raise THRUST CONT lever once the ENG COND lever is in the GND position, **if required, to obtain minimum TRQ** while ensuring the maximum PTIT or maximum continuous N1 limits of figures 5-14 and 5-13 respectively (Refer to Section V) are not exceeded.

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- g. Allow conditions to stabilize and record the following:
 - (1) FAT.
 - (2) PA.
 - (3) RRPM.
 - (4) ENG PTIT.
 - (5) N1.
 - (6) TRQ.
 - (7) FF.
- h. Recover engine not being tested by placing the ENG COND lever to FLT position.
 - (1) Engine passes test if the PTIT recorded in paragraph K.g.(4) is less than or equal to the MCPC temperature limit from figure 5-13 and the maximum continuous N1 speed from figure 5-14 (Refer to Section V.) is not exceeded.
 - (2) Record the TEMP MARGIN VALUE by subtracting the recorded PTIT found in paragraph K.g.(4) from the MCPC temperature limit from figure 5-13.(e.g. Recorded PTIT is 775. 806-775=31 TEMP MARGIN VALUE).
- i. Repeat steps a. through h. for engine not previously tested.
- j. If engine fails use Maximum Continuous Power Check (MCPC) follow the steps below.
 - (1) Continue retarding the ECL and/or raising the THRUST CONT lever, if required, **to obtain minimum TRQ** while ensuring maximum PTIT or maximum N1 of figures 5-14 and 5-13 are not exceeded.

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- k. Allow conditions to stabilize and record the following:
 - (1) FAT.
 - (2) PA.
 - (3) RRPM.
 - (4) ENG PTIT.
 - (5) N1.
 - (6) TRQ.
 - (7) FF.
- l. Recover the engine not being tested.
 - (1) Engine passes test if the PTIT recorded in paragraph K.k.(4) is less than or equals to the MAX temperature limit from figure 5-13 and recorded N1 speed is equal to or less than the maximum N1 speed from figure 5-14 (Refer to Section V.)
 - (2) Record the TEMP MARGIN VALUE by subtracting the recorded PTIT found in paragraph K.k.(4) from the MAX temperature limit from figure 5-13 (e.g. Recorded PTIT is 872. $899-872=27$ TEMP MARGIN VALUE).
- m. Return to step e, if required.

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L. **714A** POWER ASSURANCE TEST (PAT) BASELINE AND TRIGGER VALUE.

NOTE

Recalculating the trigger value is not required unless the PAC was performed for an engine major repair or change or replacement of the HMA or DECU. The PAT Baseline shall be used in conjunction with the Power Assurance Check, Maximum Continuous Power or Maximum Power (MCP or MP) to determine the PAT pass/fail trigger value. Perform the PAT Baseline check as soon as possible after the PAC.

NOTE

The Power Assurance Test (PAT) Baseline and Trigger Value check may be performed on the ground, at a hover, or in flight.

CAUTION

Performance of the in-flight Power Assurance Test (PAT) Baseline and Trigger Value check is restricted to temperatures of -40°C to + 54°C, Pressure Altitude of Sea Level to 14,000 feet, airspeed of 80 KIAS to 100 KIAS and torque between 60% and 70%. The in-flight check may be performed only in extreme environmental conditions, such as sand, dust or snow.

1. Power Assurance Test (PAT) Baseline and Trigger Value.
 - a. On the ground with aircraft facing into the wind, at a hover, or in flight, verify the NR at 100%.
 - b. Adjust ECL as required to attain 60-70% torque on engine being checked.

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- c. Stabilize for 15 seconds.
- d. Activate Power Assurance Test Switch.
- e. Record DECU hexadecimal digit series displayed as the Power Assurance Value or "PATN". Determine the appropriate PATN adjustment Value from TM 55-1520-240-23 or aircraft log book utilizing the current FAT. Combine (add or subtract) the PATN FAT Adjustment Value to the PATN to determine the Adjusted Power Assurance Value (or Adjusted PATN)
- f. Repeat steps 1.b. through 1.e. for other engine.
- g. Take the TEMP MARGIN VALUE determined during the Maximum Continuous Power Check or Maximum Power Check (paragraph K.g.(2) or K.k.(2)). Divide the TEMP MARGIN VALUE by 5 and round the result off to the nearest whole number to determine the PACN Margin.
- h. Subtract PACN Margin from the Adjusted Power Assurance TEST Value (Adjusted PATN) to obtain the PAT Trigger Value. Enter this value as the PAT Trigger Value on the PAT LOG in the aircraft log book IAW TM-55-1520-240-23.

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Example:

A Maximum Continuous Power Check / Maximum Power Check were performed under Ambient Conditions of Altitude — 4,000 feet; Temperature = +10°C.

NOTE

Engine No. 2 defines an engine failing the Maximum Continuous Power Check.

FAT = +10°C
PA = 4,000 feet
NR = 100%

	#1 engine	#2 engine
Minimum Torque required	97%	111 %
Maximum N1 speed allowed	104%	109.2%
Maximum PTIT allowed	806%	899°C (Maximum Power Check)
Recorded	ENGINE #1	ENGINE #2
PTIT (°C)	775	872 (MAX Power Check required)
N1 (%)	102	107
TORQUE (%)	97	111
FF (LBS/Hr)	1940	2020

The above example illustrates the minimum acceptable torque for the MCPC is 97% and the minimum acceptable torque for MPC is 111%. The recorded datum shows both Engine #1 and Engine #2 were at the minimum torque required.

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Following the Maximum Continuous Power Check/Maximum Power Check, a Baseline Power Assurance Test was performed at a FAT of +14°C. The PATN values were;

ENG #1, 26 ENG #2, 28

The PATN adjustment for a FAT of +14° is -1 (minus 1). The **ADJUSTED PATN** is

ENG #1, 25 ENG #2, 27

The TEMP MARGIN VALUE determined during PAC is:

Engine #1	Engine #2
806	899
<u>-775</u>	<u>-872</u>
31	27

Dividing the TEMP MARGIN VALUE by 5 and rounding the results off to the nearest whole number determine PACN Margins for Engine #1 and #2 as 6.2 and 5.4 rounded is 6 and 5.

NOTE

If the value if the PACN is not a whole number, round the number right of the decimal point to the nearest whole number. If .4 or less round DOWN, if .5 or greater, round UP.

Subtracting PACN Margins from the Adjusted PATN obtains each engine's PAT Trigger Values as #1 engine 19 and #2 engine 22. Enter these values as the PAT Trigger Value on the PAT LOG. Also enter all pertinent data in the aircraft historical DA Forms 2408-19-1 I/A/W DA PAM 738-751

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COMPLETE PROCEDURE	Engine No. 1	Engine No. 2
Maximum PTIT allowed	806	899
Recorded PTIT (subtracted)	<u>-775</u>	<u>-872</u>
TEMP MARGIN VALUE	31	27
PAC Number Margins	$31 \div 5 = 6.2$	$27 \div 5 = 5.4$
Rounded PAC Margin	6	5
DECU PAT switch value	26	28
PATN adj for FAT +14°C	<u>-1</u>	<u>-1</u>
Adjusted PATN	25	27
Adjusted PATN	25	27
PAC Margins(subtracted)	<u>-6</u>	<u>-5</u>
DECU PAT Trigger Values	19	22

Enter these values as the PAT Trigger Value on the PAT LOG.

M. 712 INTERSTAGE AIR-BLEED SPEED ADJUSTMENT

Reference: TM 55-1520-240-23

NOTE

Unsatisfactory bleed band cycling or compressor stall may be encountered if bleed band closure is not within N1 speed range specified. If N1 speed for bleed band closure is above that specified, an increase in specified fuel consumption will result until bleed band closes. In an extreme case, where bleed band does not close at all, or may be open again at high power, engine will suffer loss of maximum power.

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NOTE

1. NO. 1 & NO. 2 ENGINE BEEP TRIM — DECREASE for 8 seconds.
2. Note engine N1 readings.
3. Use the appropriate beep system (Normal or Emergency on either engine) to indicate an engine N1 less than the minimum specified for the applicable ambient temperature as indicated on figure 5-6 on the engine to be checked.

This procedure requires two-way communication between the pilot and the mechanic. The pilot will run the engine and note the N1 readings. The mechanic will notify the pilot when the bleed band closes and adjust, if necessary.

NOTE

Bleed band must be open under this operating condition.

CAUTION

Do not allow engine speed to go below minimum N1 speed during this check.

4. Slowly increase appropriate beep trim while maintaining rotor rpm within limits and determine N1 when bleed band has just closed.

NOTE

Closure may be determined by inserting a 0.010 inch feeler gage under the bleed band.

5. The N1 at the bleed band closure point must be within the limits specified on the chart on figure 5-6.

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6. If adjustment is necessary, turn adjusting screw on the fuel control 1/8 turn increments. If the bleed band is closing too soon, turn the adjusting screw counterclockwise to increase the N1 speed at which the bleed band closes. If the bleed band closes too late, turn the adjusting screw clockwise to decrease the N1 at which the bleed band opens.

NOTE

The adjustment of the interstage air-bleed system shall be recorded in the fuel control service record. One full revolution of the adjustment screw equals approximately 5 percent N1.

7. EMERG ENG TRIM — AUTO, to restore normal operation if required.
8. Repeat steps 1 through 7 for second engine if required.
9. Regain 100% rpm upon completion of check.

N. AFCS CHECK.

Reference: TM 1-1520-240-10

1. AFCS SYSTEM SEL switch — OFF.
 - a. NO. 1 & NO. 2 AFCS caution lights — ON.
 - b. Controls centered, longitudinal — Neutral (N) on longitudinal stick position indicator.
2. AFCS SYSTEM SEL — NO. 1.
 - a. NO. 2 AFCS OFF caution light — ON.
3. AFCS SYSTEM SEL — BOTH.
 - a. NO. 1 & NO. 2 AFCS OFF caution lights off.
4. AFCS SYSTEM SEL — NO. 2.
 - a. NO. 1 AFCS OFF caution light on.

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5. AFCS SYSTEM SEL — OFF.
 - a. NO. 1 & NO. 2 AFCS OFF caution lights on.
6. MASTER CAUTION light — RESET.

O. HEATING/VENT BLOWER OPERATION.

Reference: TM 1-1520-240-10

1. HEATER function switch — VENT BLOWER ONLY. AIR CONTROL knobs — PULL and check operation.
2. COCKPIT AIR CONTROL knobs — Pilot and copilot, PULL.
3. Right Main Fuel pump switches — ON.
4. HEATER function switch — HEATER ON.
5. HEATER START switch — Press. Check ignition (within 10 seconds).
6. CABIN TEMP SELECTOR — Check heater operation and rheostat from COLDER to WARMER.
 - a. Heat Distribution check.
 - (1) For Maximum Cockpit Heat proceed as follows:
 - (a) Pilot and Copilot cockpit air control knobs — Pull.
 - (b) DEFOG or DEFROST handle — PULL.
 - (c) CABIN AIR handle — PUSH.
 - (d) CABIN TEMP SEL switch — Full clockwise.
 - (2) For maximum Cabin heat proceed as follows:
 - (a) Pilot and copilot air control knobs — Push.

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- (b) DEFOG or DEFROST handle — PUSH.
 - (c) CABIN AIR handle — PULL.
 - (d) Cabin adjustable outlets — Full Open.
 - (e) CABIN TEMP SEL switch — Full clockwise.
7. HEATER function switch — OFF. Check that blower continues to run until combustion chamber cools.
8. Right main fuel pump switches — OFF.

P. Cargo Hook Operational Check.

WARNING

When stowing or positioning the cargo hook, do not grasp the hook assembly by the synchronizing assembly shaft. Serious injury can result if the hook is operated while the hand is in this position. The nylon web strap is to be used when positioning or stowing the hook.

1. CARGO HOOK MSTR switch — ARM.
2. CARGO HOOK SEL switch — FWD.
3. Press the CARGO HOOK Release switch on the pilot's cyclic stick — Check that the FWD HOOK OPEN caution capsule comes on and the hook opens.

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NOTE

The forward and aft cargo hooks will not open unless a force is applied. As long as one the CARGO HOOK Release switches are pressed, the forward and aft hooks will make a chattering sound. This sound indicates the hook solenoids are operating normally.

4. CARGO HOOK SEL switch — MID.
5. Press the CARGO HOOK Release switch on the copilot's cyclic stick. Check that the MID HOOK OPEN caution capsule comes on and the hook opens.
6. CARGO HOOK SEL switch — AFT.
7. CARGO HOOK switch on HOIST OPERATORS PANEL — ARM.
8. Press the CARGO HOOK Release switch on the WINCH/HOIST CONTROL GRIP — Check that the AFT HOOK OPEN caution capsule comes on and the hook solenoid activates. RESET and release to OFF.
9. CARGO HOOK MSTR switch — RESET and release to OFF. Check all HOOK OPEN caution capsules lights go out and the hooks ar close. Then set to ARM.
10. CARGO HOOK SEL switch — TANDEM.
11. Press the CARGO HOOK Release switch on the pilot's cyclic stick. Check that the FWD and AFT HOOK OPEN caution capsules come on and the forward and aft solenoids activate.
12. CARGO HOOK MSTR switch — RESET and release to OFF. Check both HOOK OPEN caution capsules go out and the hooks close. Then set to ARM.
13. CARGO HOOK SEL switch — ALL.

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14. Press the CARGO HOOK Release switch on the copilot's stick. Check that all HOOK OPEN caution capsules lights come on and the hooks open or solenoids activate.
15. CARGO HOOK MSTR switch — RESET and release to OFF. Check all HOOK OPEN caution capsules go out and the hooks close.
16. To confirm safety of the cargo hook system, the pilot, copilot, and flight engineer each press a CARGO HOOK Release switch to attempt to open cargo hooks with the CARGO HOOK MSTR switch at OFF.

Q. TRACKING AND BALANCING PROCEDURES

Reference: TM 55-6625-724-13 & P

R. ENGINE VIBRATION CHECK

Reference: TM 55-6625-724-13 & P

S. **712** ACCELERATION CHECK

Reference: TM 55-1520-240-23

1. With both Engine Condition Levers (ECL) in flight and thrust control in ground detent position, take both engines to minimum beep using the No. 1 and No. 2 engine beep trim switch.

WARNING

Do not exceed any operation limits during the following steps.

2. Check the acceleration of the No. 1 engine as follows:
 - a. Place the No. 2 engine auto/manual switch to the manual position.

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- b. Using the No. 1 & 2 engine beep trim switch, set the RRPM to 100%.
- c. Increase the thrust control to set the No. 1 engine N1 speed to 92%.
- d. Using the No. 1 ECL, retard the N1 speed to 70% while maintaining a constant thrust position.
- e. Rapidly advance the No. 1 ECL to flight while timing the N1 speed acceleration to 90%.
- f. Repeat the above two steps and numerically average the two times. The average time from ECL advance to 90 percent N1 shall not exceed the values given below.

OAT (Deg. Celsius)	Max Time From 70% N1 to 90% N1 (seconds)
-40	2.4
-30	2.6
-20	2.8
-10	3.0
0	3.2
10	3.4
20	3.8
30	4.3
40	4.7

- g. Place thrust control in ground detent position and decrease the No. 1 and No. 2 engine beep trim switch for 8 seconds.
- h. Place the No. 2 auto/manual switch to the auto position.

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3. To check acceleration of the No. 2 engine, repeat the steps of paragraph 2 using the No. 1 auto/manual switch and the No. 2 ECL.
4. Upon completion of the acceleration check return both ECLs to flight and RRPM to 100%.
5. If the average time from ECL advance to 90 percent N1 exceed the values given above, the fuel selector switch must be set to JP-4 or the acceleration schedule adjusted to decrease acceleration time to within limits.

T. 712 TURBINE ENGINE ANALYSIS CHECK (TEAC)

Reference: TM 55-1520-240-23

NOTE

Insure that engine indicating systems are operating properly before performing TEAC.

1. Make sure the engine trim stops are installed on the N1 controls.
2. Set the copilot's altimeter at 29.92 barometric pressure to determine pressure altitude.

CAUTION

To prevent tripping the indicator and starting the timer, do not allow the EMERG PWR light to remain on longer than 3 seconds.

3. Climb to an altitude where topping can be accomplished at 120 KIAS to 140 KIAS (not to exceed Vne) at 98 percent rotor rpm.

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NOTE

Below 5 degrees C FAT it may be impossible to conduct a TEAC without exceeding 10,000 feet pressure altitude. During cold weather periods, precise trimming of the fuel control is less critical since considerable reserve power exists due to low ambient temperature. When the above conditions occur, enter a red dash in the aircraft forms and accomplish the TEAC as soon as conditions permit.

4. Using NO. 1 & 2 ENGINE BEEP TRIM, set rotor RPM to 100 percent.

CAUTION

If during the check it becomes necessary to reduce engine power, initially reduce power by operating the No. 1 & 2 ENGINE BEEP TRIM switch until rotor speed begins to decrease. Then lower thrust. Do not lower thrust until rotor rpm begins to decrease or an engine overspeed may occur. Also, to prevent tripping the indicator and starting the timer, do not allow the EMERG PWR light to remain on longer than 5 seconds.

5. Set ENGINE CONDITION LEVER of the engine not being checked to GROUND. Maintain 100 percent rotor rpm using NO. 1 & NO. 2 ENGINE BEEP TRIM switch.

CAUTION

While performing this check, do not exceed the following limits:

- | | |
|-------------|----------|
| 1. PTIT | 890°C |
| a. N1 | 105% |
| b. Airspeed | 140 KIAS |
| c. Torque | 123% |

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6. Begin increasing thrust and increasing NO. 1 & NO. 2 ENGINE BEEP TRIM switch until gas producer (N1) speed for engine being TEACed stabilizes at maximum and rotor rpm droops to 98 percent. Reduce thrust slightly to allow RRPM to return to 100%. Note N1 then increase thrust to droop RRPM to 98% without exceeding limits. Verify N1 has not increased from that noted.
7. Stabilize the rotor speed at 98 percent, then record the following:
 - a. FAT.
 - b. PA.
 - c. RRPM 98%.
 - d. Engine PTIT.
 - e. N1.
 - f. TRQ .
 - g. FF.

CAUTION

Do not move the ENGINE CONDITION lever of the other engine from GROUND to FLIGHT until N1 speed and torque of the engine being TEACed has been reduced.

8. After completion of the check, reduce engine power initially by operating the No. 1 & 2 ENGINE BEEP TRIM switch to decrease rotor rpm, N1, and torque. Do not lower thrust until rotor rpm and N1 begins to decrease.
9. Move the ENGINE CONDITION LEVER of the next engine to be TEACed from GROUND to FLIGHT.

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10. Repeat steps 5 thru 8 for the other engine.
11. Determine Engine Trim.
 - a. Enter figure 5-8 at the recorded FAT, proceed vertically to the curves which define the acceptable range of N1 values, then horizontally to the topping N1 (percent scale).
 - b. Establish the PTIT band of figure 5-9 as follows:

Upper limit — the upper limit of the PTIT band is the top most line as marked on figure 5-9.

Lower limit — from the engine lower limit baseline.

Establish Engine Baseline Lower Limit

- (1) Engine that have previous acceptable TEAC checks within the upper PTIT band shall continue to have the band 1 lower limit.
- (2) Certain engines have performance improvements. These engines will be N1 limited and shall be trimmed to the acceptable N1 speed band limits. The thermocouple assemblies shall have a resistance check performed to assure serviceability prior to initial TEAC baseline. Subsequent TEAC checks do not require resistance checks.
- (3) The TEAC performed following Step 2 shall determine the engine lower limit baseline. A tolerance of 20°C shall be subtracted from the recorded PTIT.

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NOTE

The 20 degrees subtracted from the PTIT for initial TEAC is not subtracted from subsequent TEACS.

- (4) To determine the lower limit baseline enter figure 5-9 at the prevailing FAT, proceed vertically to a value 20°C less than the measured PTIT. The lower limit baseline is identified as the number of degrees above the applicable reference line 1, 2, 3 or 4 on figure 5-9. When the engine lower limit baseline has been determined, record the line number and the number of degrees above the line in the remarks section of the Historical Record For Aircraft (Form 2408-15 TEAC overprint).

Example

During the TEAC, PTIT was recorded at 800°C, N1 speed was 103%, FAT was -14°C.

$$\begin{array}{rcl} \text{PTIT} & = & 800^{\circ}\text{C} \\ \text{Tolerance} & = & -20^{\circ}\text{C} \\ \hline \text{Engine Lower Limit Baseline} & = & 780^{\circ}\text{C} \end{array}$$

The engine lower limit is 5°C above line 3 at all ambients. Record lower limit in the Historical Record For Aircraft as shown below.

NOTE

The purpose of the lower limit is to validate the accuracy of the PTIT temperature measurement system, as mentioned in the troubleshooting chart. A PTIT temperature below the established lower limit, with all other indications correct, is an indication of temperature system problems.

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c. Enter figure 5-10 at the recorded FAT, proceed vertically to the pressure altitude, then horizontally to the torque available scale.

12. The engine trim is acceptable if the following conditions are met:

a. Recorded N1 is between the values from step 11a which define acceptability
and

Recorded PTIT is between the values from step 11b which define acceptability

and

Recorded torque exceeds the value from step 11c.

or

b. For engines that fall above the band 1 line in figure 5-9 the TEAC is acceptable if the following conditions are met: Recorded PTIT is within band 1 figure 5-9.

and

Recorded torque exceeds the value from step 11c

and

Recorded N1 is within 5%, but does not exceed the Max N1 line of figure 5-8.

13. If the criteria of step 12 are not met, troubleshoot the engine indicating systems prior to trimming the engine to comply. Do not trim the engine to exceed PTIT limits. To increase N1 or PTIT, turn the N1 trim adjustment clockwise. To decrease N1 or PTIT, turn N1 trim adjustment counterclockwise. Trim sensitivity is , 1/4 turn of

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screw changes N1 approximately 1% PTIT approximately 25°C and torque 5 - 6%. If the recorded N1 is acceptable, but the recorded PTIT is lower than it should be according to 11a, a resistance check of the PTIT harness should be performed. If the PTIT indicating system is OK the engine is acceptable.

U. DIFFERENTIAL CURRENT PROTECTION CIRCUIT CHECK

Reference: TM 55-1520-240-23

Perform this check whenever maintenance has been performed on a generator, or a generator control unit, a current transformer or the wiring between these units.

Perform the check as follows:

1. Set the following switches to the specified positions:
 - a. HEATER — VENT BLOWER ONLY.
 - b. CPLT, CTR, and PLT WINDSHIELD ANTI-ICE — ON.
 - c. CPLT and PLT SLT-FIL — ON.
 - d. FUEL PUMPS — ALL ON.
2. GEN 1 switch — OFF. Check NO. 1 GEN OFF caution light is on and NO. 2 GEN OFF caution light is out.
3. GEN 1 switch — ON. GEN 2 switch — OFF. Check NO. 1 GEN OFF caution light is out and NO. 2 GEN OFF caution light is on.
4. GEN 2 switch — ON. Check both GEN OFF caution lights are out.
5. HEATER, WINDSHIELD ANTI-ICE, SLT-FIL, and FUEL PUMPS switch — Set as desired.

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V. CARGO RAMP AND DOOR CHECK.

Reference: TM 55-1520-240-T.

1. Cargo ramp and door — Check fully closed.
2. Electrical and hydraulic power — Off.
3. APU START ACCUMULATOR gauge — Check 2,500 psi minimum. If not, use the hand pump to charge accumulator.
4. EMERG UTIL PRESS valve — OPEN.
5. RAMP CONTROL VALVE handle — DN and hold until ramp is level with cabin floor, STOP. Check for the following sequence of actions:
 - a. Ramp and cargo door open and move downward about 10 inches, then stop.
 - b. Cargo door then retracts into ramp.
 - c. Ramp then continues to move downward, then stops when the RAMP CONTROL VALVE handle is moved to STOP.
6. EMERG UTIL PRESS valve — NORMAL.
7. Apply electrical and hydraulic power.
8. UTIL SYS CONT circuit breaker — Check closed.
9. RAMP EMER CONT circuit breaker — Check closed.
10. RAMP PWR switch on overhead panel — ON.
11. RAMP CONTROL SEQUENCE VALVE — Turn pin to horizontal position.
12. RAMP CONTROL VALVE handle — DN. Check that ramp moves to full down position (resting on ground), and cargo door remains retracted.

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13. RAMP CONTROL VALVE handle — UP. Check that ramp moves to the full up position and cargo door remains retracted.
14. RAMP CONTROL VALVE handle — DN and hold until ramp is at mid-position, then STOP. Check that ramp stops at mid-position with cargo door fully retracted.

CAUTION

Do not manually operate cargo door with ramp in full up position. Damage to door and fuse-lage will occur.

15. RAMP CONTROL SEQUENCE VALVE — Turn pin to vertical position.
16. RAMP CONTROL SEQUENCE VALVE MANUAL OPER knob — Pull up and hold. Check that cargo door extends fully.
17. RAMP CONTROL SEQUENCE VALVE MANUAL OPER knob — Release. Check that cargo door retracts fully into ramp.
18. RAMP PWR switch on overhead panel — OFF.
19. RAMP CONTROL VALVE handle — UP. Check that ramp does not move.
20. RAMP CONTROL VALVE handle — STOP.
21. RAMP PWR switch on overhead panel — ON.
22. RAMP CONTROL VALVE handle — DN. Check that ramp moves to the full down position (resting on the ground), and cargo door remains retracted.
23. RAMP CONTROL VALVE handle — UP. Check for the following sequence of actions:
 - a. Ramp moves upwards and stops approximately 8 inches from the fully closed position.

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- b. Cargo door then extends fully from ramp.
 - c. Ramp and door then move up into the fully closed position.
24. Pull and hold knob on the door sequence valve. Perform the next step while holding the knob.
 25. RAMP CONTROL VALVE handle — DN and hold till ramp is at mid-position, then STOP. Check that ramp moves to mid-position and stops with cargo door fully extended.
 26. Release knob on the sequence valve. check that cargo door retracts fully into ramp.
 27. RAMP CONTROL VALVE handle — UP. Check that ramp and cargo door move to the fully closed position in the proper sequence described above.
 28. RAMP CONTROL VALVE handle — STOP.
 29. RAMP EMER switch on overhead panel — Lift guard and move switch to the DN position momentarily, then release switch. Check that switch returns to the HOLD position when released. Check that ramp does not move when switch is in the DN position.
 30. RAMP PWR switch on overhead panel — EMERG. Check that RAMP CONTROL VALVE handle is resistant to manual movement, and returns to the STOP position if moved to either the UP or DN positions.
 31. RAMP EMER switch on overhead panel — DN momentarily, then release. Check for the following:
 - a. RAMP CONTROL VALVE handle moves to the DN position.
 - b. Ramp and cargo door open and move downward in the proper sequence for approximately 5 seconds, then stop.

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- c. RAMP CONTROL VALUE handle returns to the STOP position.
- 32. RAMP EMER switch on overhead panel — DN momentarily, then immediately to UP momentarily, then release to HOLD. Check for the following:
 - a. RAMP CONTROL VALVE handle moves to DN, then UP, then STOP.
 - b. Ramp moves downward momentarily, then stops in less than 5 seconds..
- 33. RAMP EMER switch on overhead panel — DN and hold until ramp is fully open (resting on ground), then release to HOLD. Check that ramp remains fully open.
- 34. RAMP EMER switch on overhead panel — UP and hold until ramp is in level position, then release to HOLD. Check ramp remains in level position.
- 35. RAMP EMER switch on overhead panel - UP and hold until ramp and cargo door are fully closed, then release to HOLD. Check that ramp and cargo door close in proper sequence, remain fully closed.
- 36. Place the RAMP EMER switch guard in the closed (cover down) position.
- 37. RAMP PWR switch on overhead panel — OFF.
- 38. Remove hydraulic and electrical power.
- 39. UTILITY RESERVOIR DEPRESSURIZE valve — OPEN.
- 40. Press depressurization valve on apu start module. Check that utility system depressurizes.
- 41. UTILITY RESERVOIR DEPRESSURIZE valve — NORMAL.

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- 42. RAMP CONTROL VALVE handle — DN. Check that ramp does not move.
- 43. RAMP CONTROL VALVE handle — STOP.

W. RADAR ALTIMETER CHECK.

- 1. Radar Altimeter —Check.
 - a. Dial pointers between -5 and 5 feet.
 - b. Digital display indicates 0-3 feet.
 - c. Set LO Set Index at 100 feet and HI Set Index 800 feet.
 - d. LO caution light is on
 - e. HI caution light is off.
 - f. OFF flags not in view.
 - g. Pilot's Radar Altimeter Only — Periodic audio warning "ALTITUDE LOW, TOO LOW" heard in headsets (pilot, copilot, flight engineer response).
 - h. PRESS-TO-TEST, hold and note.
 - (1) OFF flags not in view.
 - (2) Dial points 900-1,100 feet.
 - (3) Digital points 900-1,100 feet.
 - (4) LO caution light off.
 - (5) HI caution light on.
 - (6) Periodic audio warning "ALTITUDE HIGH, CHECK ALTITUDE" heard in headsets (pilot, copilot, flight engineer response)
 - (7) Release PRESS-TO-TEST.
 - i. Momentarily depress PRESS-TO-TEST (pilot's)

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- (1) 1 Time — Volume of the audio warning message decreases by one-half.
- (2) 2 Times — Audio warning message is disabled and no longer heard in headsets.
- j. Check dimming control for proper operation from DIM to BRT.
 - (1) Check digital display dims and goes out.
 - (2) Check LO caution lights dim but do not go out.

X. NAVIGATION and COMMUNICATION CHECK.

- 1. UHF.
 - a. Transmit and receive.
 - b. Preset and manual tune.
 - c. Check both a high and low frequency, e.g., over 300 MHz and under 300 MHz.
- 2. VHF-AM/FM.
 - a. Transmit and receive.
 - b. Check both AM and FM bands at high, medium, and low frequencies.
 - c. FM Homing.
 - (1) MODE SEL — DF.
 - (2) HSI MODE SELECT panel —FM SEL, check FM SEL lit.
 - (3) Course deviation bar on HSI — Check response in turns.
 - (4) TO-FROM arrows concealed on HSI.
 - (5) GS and NAV OFF flags concealed on HSI.

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3. HSI and Magnetic Compass.
 - a. HSI synchronized.
 - b. Magnetic compass $\pm 5^\circ$ of HSI.
 - c. 2° maximum difference between pilot and copilot indicators.
4. VOR.
 - a. Tuning, reception, and volume.
 - b. HSI MODE SELECT panel — VOR SEL and CMD SEL engaged and lit.
 - c. HSI MODE SELECT panel — VOR ADF engaged and lit.
 - d. No. 2 pointer on HSI $\pm 3^\circ$ of correct magnetic course to station.
 - e. Note course direction on HSI.
 - (1) Centered when on selected VOR course.
 - (2) 10° off-course gives full deviation bar displacement.
 - f. Station passage.
 - g. Total No. 2 pointer fluctuation 5° .
 - h. VOR frequency — Tune to 108.00 MHz.
 - (1) VOR/MB TEST switch — Press and hold.
 - (2) On both, HSI, note TO arrow in view, the deviation bar deflects within the ± 2 dot deflection and NAV warning flags are concealed.
 - (3) Note all three marker beacon lights lit on HSI MODE SELECT panel.
 - (4) Release TEST switch and return VOR to operational frequency.

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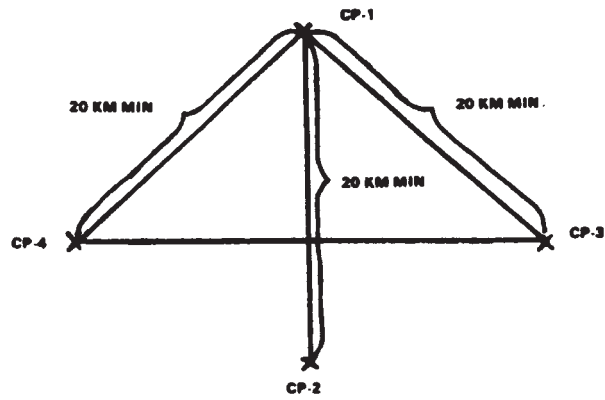
5. ILS (if available).
 - a. At a distance of at least 9 nautical miles, tune to the localizer frequency. Start on ILS approach.
 - b. Check that NAV and GS warning flags are concealed.
 - c. Steer right and left. Check that the localizer pointer moves left and right, respectively.
 - d. Climb and descend. Check that the glide slope pointer moves up and down, respectively.
 - e. Check marker beacon lights and audio during approach. Check high and low sensitivity.
 - f. With pointers centered, continue approach to runway to ascertain that proper landing can be made.
6. ADF.
 - a. Tuning, reception and volume.
 - b. Check ADF, ANT and LOOP operation.
 - c. ADF on HSI MODE SELECT panel — Engaged and lit.
 - d. No. 2 pointer on HSI within $\pm 3^\circ$ of magnetic bearing to station.
 - e. No. 2 pointer fluctuation $\pm 5^\circ$.
 - f. Station passage.
7. Marker beacon.
 - a. Push to test any MKR BCN light. (One light tests all three).
 - b. Check audio high and low sensitivity over appropriate markers.

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- c. Check light operation high and low sensitivity over appropriate markers.
- 8. Transponder AN/APX-100 and Radar Signal Detecting Set AN/APR-39.
 - a. Transponder master switch — STBY. Allow 2 minutes for warmup. Check CODE OFF flag on pilot's barometric altimeter out of sight.
 - b. At a minimum altitude of 2,000 feet and distance of 30 miles, request a transponder check from an appropriate radar facility.
 - c. Check all modes, including emergency. Check AIMS altimeter.
 - d. Obtain operation information from radar facility.
 - e. While checking transponder, check operation of radar signal detecting set. Check that detecting set displays bearing to all known radar facilities.
- 9. Doppler Navigation Set (AN/ASN-128).
 - a. Verify proper system operation with MODE switch at TEST and display indicates GO.
 - (1) Fly helicopter over surveyed test course (figure 4-1) at cruise airspeeds. The altitude should be low enough to minimize error in establishing position over checkpoints.
 - (2) Enter magnetic variations, lateral and longitudinal coordinates of the checkpoints.

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- (3) With the MODE switch in UTM, the DISPLAY switch in GS/TK and the FLY-TO-DEST thumbwheel in position "0", take off and observe that MEM and MAL lights are extinguished and ground-speed (GS) and track angle (TK) are reasonable.
- (4) Set DISPLAY switch to DIST/BRG/TIME and FLY-TO-DEST thumbwheel to position "1".
- (5) Fly over the initial checkpoint (CP-1) on a heading for the first destination checkpoint (CP-3). As CP-1 is flown over, depress, first the KYBD key then the ENTR key.
- (6) Set the FLY-TO-DEST thumbwheel to position "3".
- (7) Use the track angle error (TKE) display, DIST/BRG/TIME display, or an independent NAV aid, to steer the helicopter to the first (CP-3) destination.
- (8) As the first (CP-3) checkpoint is located, change the helicopter heading as necessary to fly over the checkpoint. Set the DISPLAY switch to "PP" and depress KYBD as the checkpoint is overflown. Record the displayed present position coordinates or depress TGT STR.
- (9) For leg number 2, steer the helicopter and fly over checkpoint CP-3 on a heading for destination checkpoint CP-4. Set the DISPLAY switch to DIST/BRG/TIME and as CP-3 is flown over, depress the KYBD key and then ENTR key.



*Figure 4-1. Test Course for Overland Accuracy
Doppler*

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- (10) Set the FLY-TO-DEST thumbwheel to position "4".
 - (11) Repeat step (7) for destination CP-4.
 - (12) Repeat step (8) for checkpoint CP-4.
 - b. Navigation Accuracy Test Legs — The following navigation legs shall be flown in the indicated numerical sequence.
 - (1) Leg Number 1 — Fly from CP-1 to CP-3 at normal cruising speed. Record the displayed present position coordinates at CP-3 flyover.
 - (2) Leg Number 2 — Fly from CP-3 to CP-4 at maximum helicopter speed. Record the displayed present position coordinates at CP-4 flyover.
 - (3) Leg Number 3 — Fly from CP-4 to CP-1 at minimum safe speed (greater than 20 knots) of the helicopter. Record the displayed present position coordinates at CP-1.
 - c. Maximum cross track error is $\pm 5\%$ of the distance of the leg. Maximum error along the track is 2% of the distance of the leg.
10. GPS/Doppler Flight Test Procedure.
- a. Verify proper system operation with MODE switch to TEST and display line 1 indicating **TEST COMPLETE** and line 2 **TEST OK**.
 - b. Verify proper response of CDU panel lighting to aircraft dimmer control and Display lighting to CDU BRT control. Adjust to comfortable level.

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- c. Perform GPS system Start-Up procedure. Ensure four (4) satellite measurements (SAT) are being used and estimated position error (EPE) is 50 (meters) or less with keys loaded or 200 (meter) or less with a cold start.
- d. Fly helicopter over surveyed test course consisting of two (2) waypoints used as checkpoints (CP) a minimum of 20KM apart.
- e. To minimize errors in establishing positions over the checkpoints (CP), the altitude shall be the lowest compatible with safety standards.
- f. If checkpoint (CP) information was not entered through the data loader during Start-Up, with the Mode switch set to NAV enter checkpoints using the CDU.
- g. Set Mode switch to NAV.
- h. Depress GPS/DOP select button on HSI Mode Select Panel.
- i. Set Data switch to MSN. Depress waypoint key (WP) until > is displayed in upper left corner of display (meaning destination mode). On Page 1, ensure that an arrow (←) is in front of Doppler Only (**DOP ONLY**) and GPS Only (**GPS ONLY**), on lines 3 and 4 respectively.
- j. Set the Data switch to OPT.
 - (1) Select the Doppler backup mode on Page 1, Line 1 (* Back-Up displayed).
 - (2) Slew (⇅) down to Page 3.

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- (3) Verify an arrow (←) is in front of **STATIONARY** on line one. (This means that Stationary operation is not selected. An asterisk (*) in front would mean that Stationary operation was selected).
- k. Set the Data switch to POS. Observe that the present position, displayed on lines two and three, is changing.
- l. Set the Data switch on the CDU to DIS-TG.
 - (1) Select waypoint examination mode by depressing WP key.
 - (2) Open line one of Page 1 and enter waypoint identification by number, alphanumeric name or frequency of the destination CP (CP-1).
 - (3) Verify the values for the distance-to-go (**DIS**), displayed on line two, and bearing (**BRG**), displayed on line four are accurate.
 - (4) Depress WP key to select destination mode.
- m. Fly towards CP-1.
- n. When GPS set indicates arrival at CP-1, set Data switch to POS.
- o. While hovering over CP-1 depress the MARK key. Press line select key 3 to store coordinates and altitude. This will be Mark "A".
- p. Depress CLR key to exit Mark operation.

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- q. Set Data switch to MSN. Open line three and enter an arrow (←) in front of Doppler Only (**DOP ONLY**). Ensure that an arrow is also in front of **GPS ONLY** on line four. GPS/DOP (GPS/Doppler) mode of operation is selected.
- r. Set Data switch to DIS-TG, WP mode. While still hovering CP-1, open line 1 and select CP-2. Record distance and bearing to CP-2 (lines 2 and 4). Slew (↓) down to Page 2 and record slant range destination (Line 2).
- s. With Data switch still set to DIS-TG, switch to destination mode and fly from CP-1 to CP-2. While hovering over CP-2, record displayed present position at CP-2 by performing the following: Depress the MARK key. Press line select key 3 to store coordinates and altitude. This will be Mark "B". Press the Clear key (CLR) to return to original screen.
- t. Set Data switch to POS and record the present position coordinates.
- u. Set Data switch to DIS-TG, WP mode. While still hovering over CP-2, open line 1 and select CP-1. Record distance and bearing to CP-1 (lines 2 and 4). Slew (↓) down to Page 2 and record slant range to destination (line 2).
- v. With Data switch still set to DIS-TG, switch to destination mode and fly from CP-2 back to CP-1. While hovering over CP-1, store displayed present position at CP-1 by performing the following: Depress the MARK key. Press line select key 3 to store coordinates and altitude. This will be Mark "B". Press the Clear key (CLR) to return to original screen.

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- w. Set Data switch to POS and manually record present position coordinates.
- x. Set Data switch to DIS-TG and manually record distance to Cp-2 (line two).
- y. Return to ground station.

11. GPS/Doppler Flight Test Data Analysis

Compare all MARK positions with the actual positions of the corresponding Check Point. Compare differences, if any, with Allowable Navigation Error Limits outlines in TM 11-5826-308-12. If errors exceed the Allowable Navigation Error Limits, use the self-test of the GPS system and fault isolation procedures to determine the failure mode.

12. Zeroize loaded keys from GPS memory.

NOTE

Zeroize at termination of test flight or so dictated by operations.

NOTE

Aircraft power must be connected, or power applied to aircraft.

- a. Lift zeroize switch guard and toggle switch.
- b. With the GPS receiver turned on, turn Data Switch to Stat. Observe message on Page 1, Line 2. The message **ZEROED** indicates all keys have been erased from memory and the unit is unclassified.

O AN/ASN-128B DOPPLER WITH EMBEDDED GPS

13. DGNS Flight Test Procedure.

- a. Verify proper system operation with MODE switch to TEST. Left display GO and Right display ALL. MAL lamp is off.

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- b. Verify proper response of CDU panel lighting to aircraft BRT and DIM controls. Adjust to comfortable level.
- c. Perform DGNS system Start-Up procedure. Ensure four (4) satellite measurements (SAT) are being used and estimated position error (EPE) is 50 (metes) or less with keys loaded or 200 (meters) or less with a cold start.
- d. Fly helicopter over surveyed test course consisting of two (2) waypoints used as checkpoints (CP) a minimum of 20 KM apart.
- e. To minimize errors in establishing positions over the checkpoints (CP), the altitude shall be the lowest compatible with safety standard.
- f. If checkpoint (CP) information was not entered through the data loader during Star-Up, enter checkpoints using the CDU.
- g. Set MODE switch to MGRS or LAT/LONG.
- h. Set DISPLAY switch to XTK/TKE. Observe standard Cross Track (XTK) and Track angle error (TKE) display.
- i. Depress GPS/DOP select button on HSI Mode Select Panel.
- j. To display Fly-To destination depress the INC key or DEC key, or depress the first number key and the second number key.

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- k. Fly shortest distance to first destination from present position, set DISPLAY switch to DIST/BRG/TIME position and steer helicopter to bearing displayed. As an aid to maintaining course, set DISPLAY switch to XTK/TKE position and steer helicopter to keep track angle error (TKE) nominally zero. If display indicates a L (left) TKE, the aircraft must be flown to the left to zero the error.
- l. At first destination set DISPLAY switch to PP and KYBD key is depressed and released note the position altitude and magnetic variation.
- m. Fly to the remaining destination using the procedures described in (K) and (L) above.
- n. Return to ground station.

14. DGNS Flight Test Data Analysis.

Compare all MARK positions with the actual positions of the corresponding Check Point. Compare differences, if any, with Allowable Navigation Error Limits outlines in TM 11-5841-305-12. If errors exceed the Allowable Navigation Error Limits, use the self-test of the GPS system and fault isolation procedures to determine the failure mode.

NOTE

Zeroize at termination of test flight or so dictated by operations.

NOTE

Aircraft power must be connected, or power applied to aircraft.

- a. Lift zeroize switch guard and toggle switch.
- b. Release toggle switch and close switch guard.

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15. HF Radio (AN/ARC-220)/COMSEC (KY-100).
 - a. AN/ARC-200 Function switch — T/R. Mode switch — PRE and Channel selector — Appropriate preset (1-20) containing a frequency to transmit /receive in USB.
 - b. KY-100 — Mode switch — PT. Preset — Desired position for plaintext operation. Plaintext beeps are heard when system is idle or receiving.
 - c. Transmit/Receive and evaluate communications throughout a 360 degree turn.
 - d. Repeat the process with ARC-220 operating on LSB, AME and CW.
 - e. KY-100 — Mode switch — CT, Preset — Desired position for ciphertext operation.
 - f. Transmit/Receive with ARC-220 operating on LSB, AME or CW.
 - g. ARC-220 — Mode switch — ALE,SQL switch — 0 or 1.
 - h. Push PTT.
 - i. ARC-220 displays “CALLING”
 - j. Wait for a short gong tone and “LINKED” on display before transmitting to a like configured station.
 - k. ARC-220 — Mode switch — ECCM. Channel switch — Desired channel, SQL switch — 0 or 1.
 - l. Transmit to a like station by pressing PTT, wait for preamble tones to cease and begin transmission.

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- m. While still in ECCM mode, transmit a message from a like cond ground/air station to aircraft ARC-220 HF radio "RCVING PREAMBLE" and/or "INCOMING CALL" is displayed before message is heard.

SECTION V. CHARTS AND FORMS

General. This section contains the necessary charts and forms required to ascertain that the aircraft is performing to established standards and to record readings, pressures, RPM, etc., obtained during maintenance test flight.

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5-2	APU Start Accumulator Precharge Limits	5-5
5-3	Flight/Utility/Power Steering Accumulator Precharge Limits	5-6
5-4	Brake Accumulator Precharge Limits	5-7
5-5	Engine Fire Extinguisher Pressures	5-8
5-6	712 Interstage Air-Bleed Closure Chart	5-9
5-7	Autorotational RRPM Chart	5-10
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5-9	712 Turbine Engine Analysis Check PTIT Chart	5-12
5-10	712 Turbine Engine Analysis Check Torque Chart	5-13
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LIST OF CHARTS (Continued)

Figure Number	Title	Page
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5-15	714A N1 Idle Speed	5-18
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FO-1	CH-47D Cockpit Controls Position Envelope	FP-1
FO-2	Airspeed Operating Limits with Inoperative CGI	FP-5
FO-3	Airspeed Operating Limits with Retracted LCT	FP-7
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FO-5	Maintenance Test Flight Check Sheet	FP-13

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Look up reading in middle column; if in degrees Centigrade, read Fahrenheit equivalent in right-hand column; if in degrees Fahrenheit, read Centigrade equivalent in left-hand column

C	F	C	F	C	F	C	F				
-54	-65	-85	28.9	84	183.2	266	510	950	538	1000	1832
-51	-60	-76	30.0	86	186.8	271	520	968	543	1010	1850
-46	-50	-58	31.1	88	190.4	277	530	986	549	1021	1868
-40	-40	-40	32.2	90	194.0	282	540	1004	554	1031	1886
-34	-30	-22	33.3	92	197.6	288	550	1022	560	1040	1904
-29	-20	-4	34.4	94	201.2	293	560	1040	566	1050	1922
-23	-10	14	35.6	96	204.8	299	570	1058	571	1060	1940
-17.8	0	32	36.7	98	208.4	304	580	1076	577	1070	1958
-16.7	2	35.6	37.8	100	212.0	310	590	1094	582	1080	1976
-15.6	4	39.2	43	110	230	316	600	1112	588	1090	1994
-14.4	6	42.8	49	120	248	321	610	1130	593	1100	2012
-13.3	8	46.4	54	130	266	327	620	1148	599	1110	2030
-12.2	10	50.	60	140	284	332	630	1166	604	1120	2048
-11.1	12	53.6	66	150	302	338	640	1184	610	1130	2066
-10.0	14	57.2	71	160	320	343	650	1202	616	1140	2084
-8.9	16	60.8	77	170	338	349	660	1220	621	1150	2102
-7.8	18	64.4	82	180	356	354	670	1238	627	1160	2120
-6.7	20	68.0	88	190	374	360	680	1256	632	1170	2138
-5.6	22	71.6	93	200	392	366	690	1274	638	1180	2156
-4.4	24	75.2	99	210	410	371	700	1292	643	1190	2174
-3.3	26	78.8	104	220	428	377	710	1310	649	1200	2192
-2.3	28	82.4	110	230	446	382	720	1328	654	1210	2210
-1.1	30	86.0	116	240	464	388	730	1346	660	1220	2228
0	32	89.6	121	250	482	393	740	1364	666	1230	2246
1.1	34	93.2	127	260	500	399	750	1382	671	1240	2264
2.2	36	96.8	132	270	518	404	760	1400	677	1250	2282
3.3	38	100.4	138	280	536	410	770	1418	682	1260	2300
4.4	40	104.0	143	290	554	416	780	1436	688	1270	2318
5.6	42	107.6	149	300	572	421	790	1454	693	1280	2336
6.7	44	111.2	154	310	590	427	800	1472	699	1290	2354
7.8	46	114.3	160	320	608	432	810	1490	704	1300	2372
8.9	48	118.4	166	330	626	438	820	1508	710	1310	2390
10.0	50	122.0	171	340	644	443	830	1526	716	1320	2408
11.1	52	125.6	177	350	662	449	840	1544	721	1330	2426
12.2	54	129.2	182	360	680	454	850	1562	727	1340	2444
13.3	56	132.8	188	370	698	460	860	1580	732	1350	2462
14.4	58	136.4	193	380	716	466	870	1598	738	1360	2480
15.6	60	140.0	199	390	734	471	880	1616	743	1370	2498
16.7	62	143.6	204	400	752	477	890	1634	749	1380	2516
17.8	64	147.2	210	410	770	482	900	1652	754	1390	2534
18.9	66	150.8	216	420	788	488	910	1670	760	1400	2552
20.0	68	154.4	221	430	806	493	920	1688	766	1410	2570
21.1	70	158.0	227	440	824	499	930	1706	771	1420	2588
22.2	72	161.6	232	450	842	504	940	1724	777	1430	2606
23.3	74	165.2	238	460	860	510	950	1742	782	1440	2624
24.4	76	168.8	243	470	878	516	960	1760	788	1450	2642
25.6	78	172.4	249	480	896	521	970	1778	793	1460	2660
26.7	80	176.0	254	490	914	527	980	1796			
27.8	82	179.6	260	500	932	532	990	1814			

Figure 5-1. Temperature Conversion Chart

5-3/(5-4 blank)

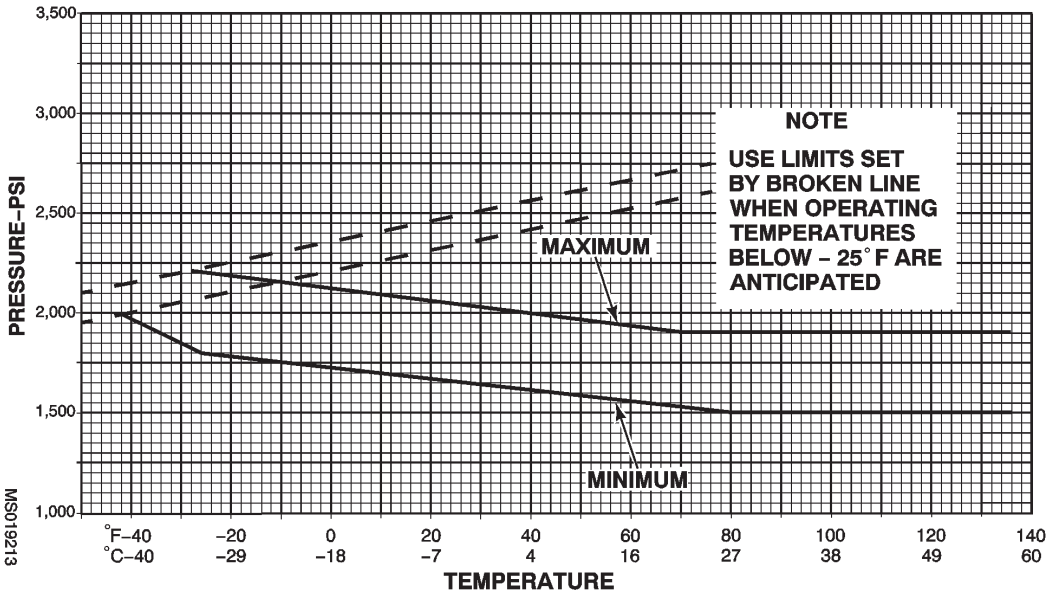


Figure 5-2. Apu Start Accumulator Precharge Limits
5-5

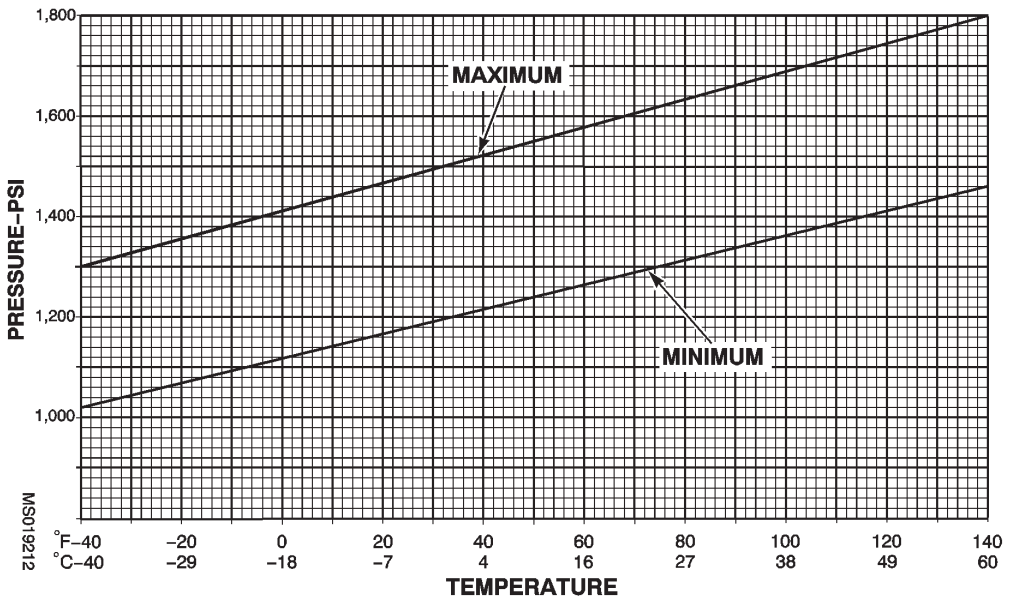


Figure 5-3. Flight/Utility/Power Steering Accumulator Precharge Limits
5-6

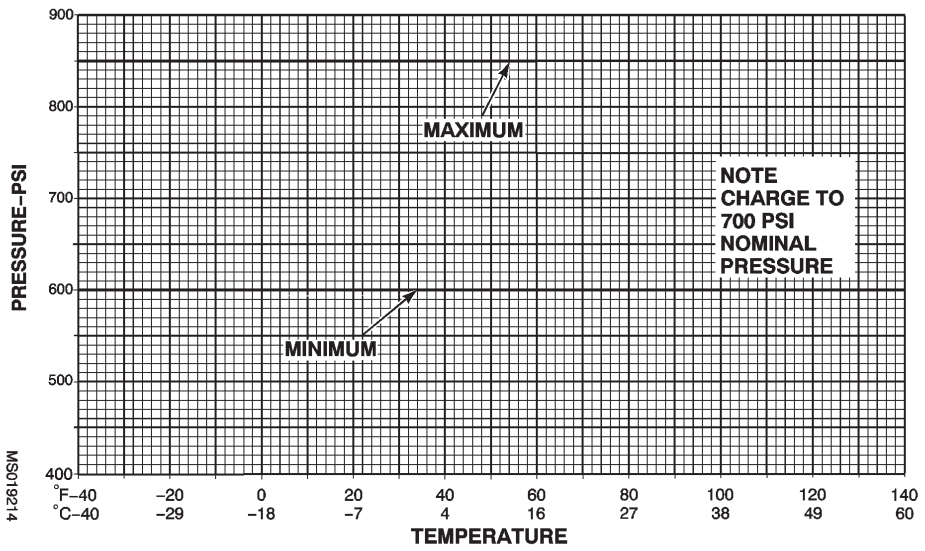


Figure 5-4. Brake Accumulator Precharge Limits
5-7

TM 1-1520-240-MTF

Ambient Temperature (Fahrenheit)	(Cnetigrade)	Minimum Indication (Psi)
-65°	-54°	271
-60°	-51°	275
-40°	-40°	292
-20°	-29°	320
0°	-18°	355
20°	-7°	396
40°	4°	449
60°	15°	518
80°	27°	593
100°	38°	691
125°	52°	785

Figure 5-5. Enginee Fire Extinguisher Pressures

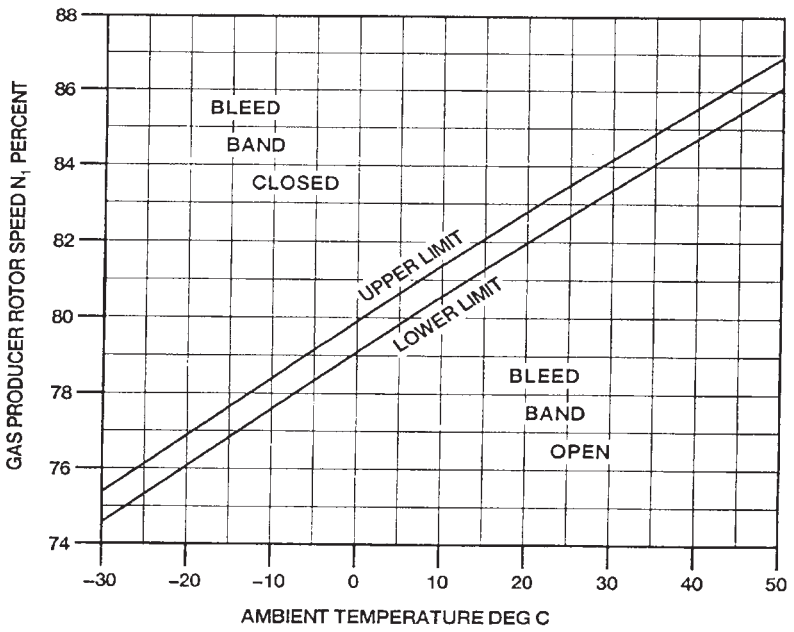
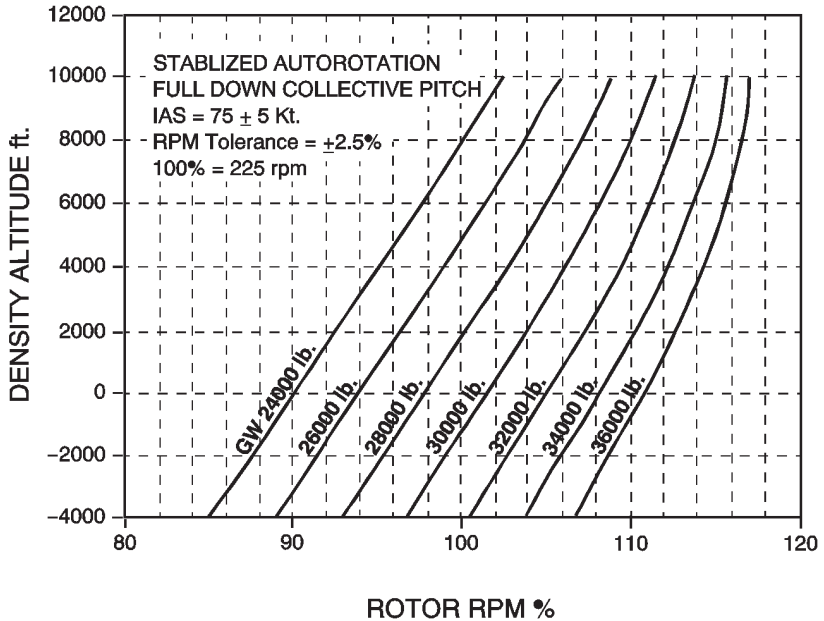


Figure 5-6. 712 Interstage Air-Bleed Closure Chart
5-9

AUTOROTATIONAL ROTOR SPEED CHECK



MS019144

Figure 5-7. Autorotational RRPM Chart
 5-10

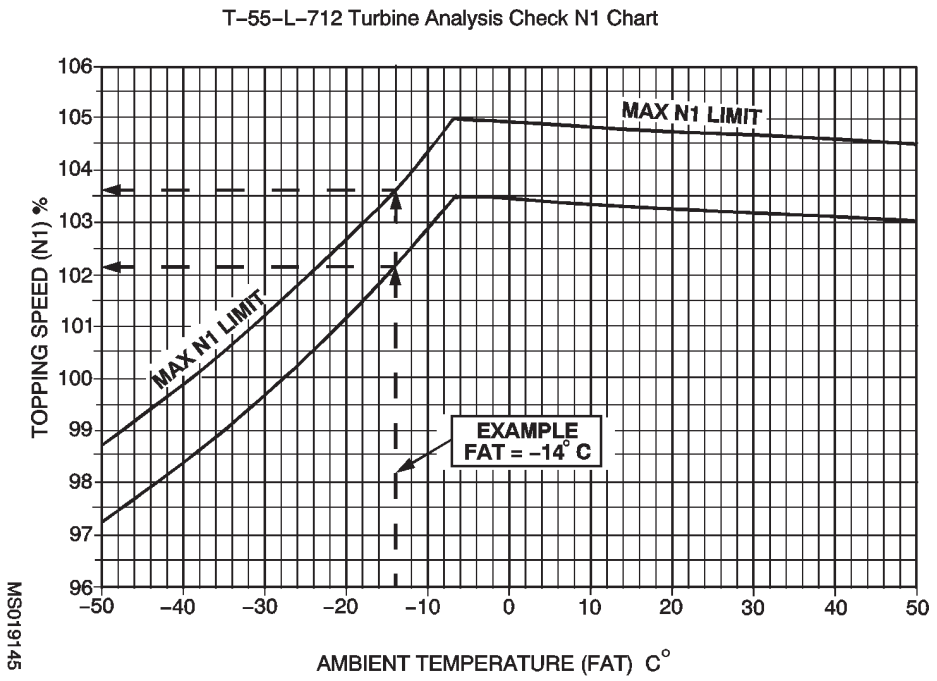


Figure 5-8. **712** Turbine Engine Analysis Check N1 Chart
5-11

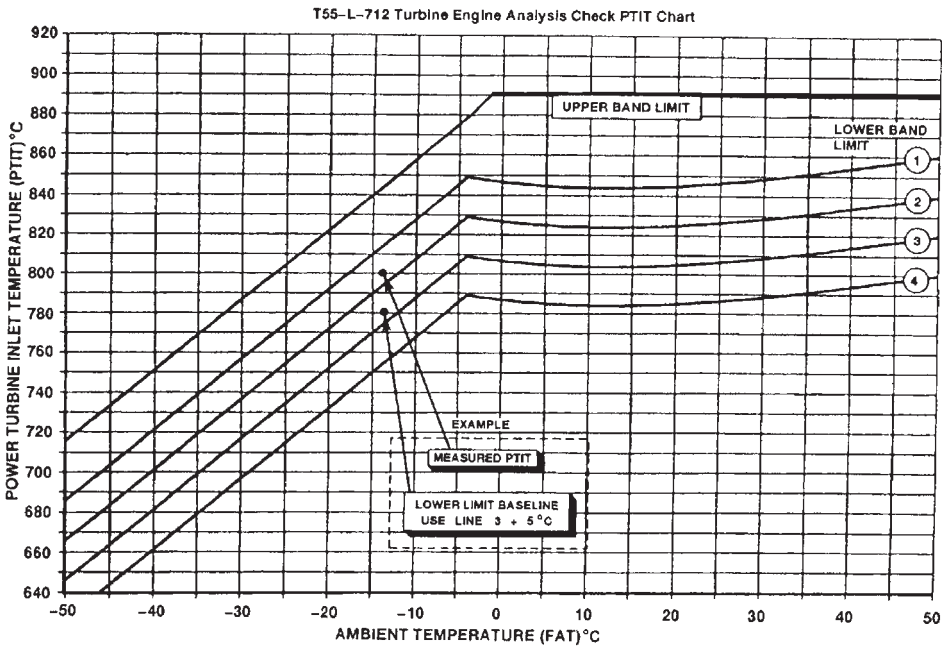


Figure 5-9. **712** Turbine Engine Analysis Check PTIT Chart
5-12

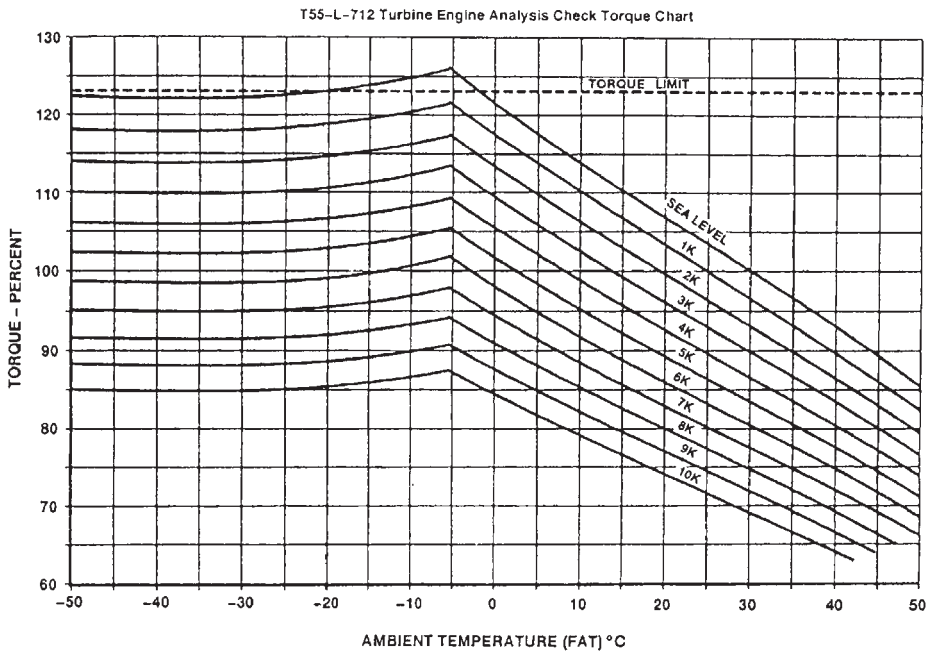


Figure 5-10. T55-L-712 Turbine Engine Analysis Check Torque Chart

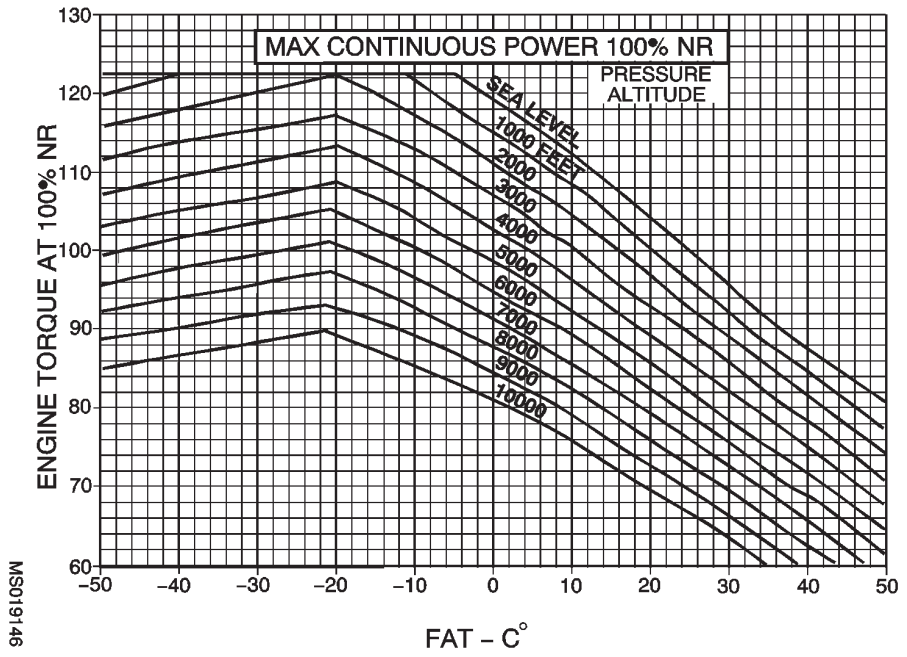
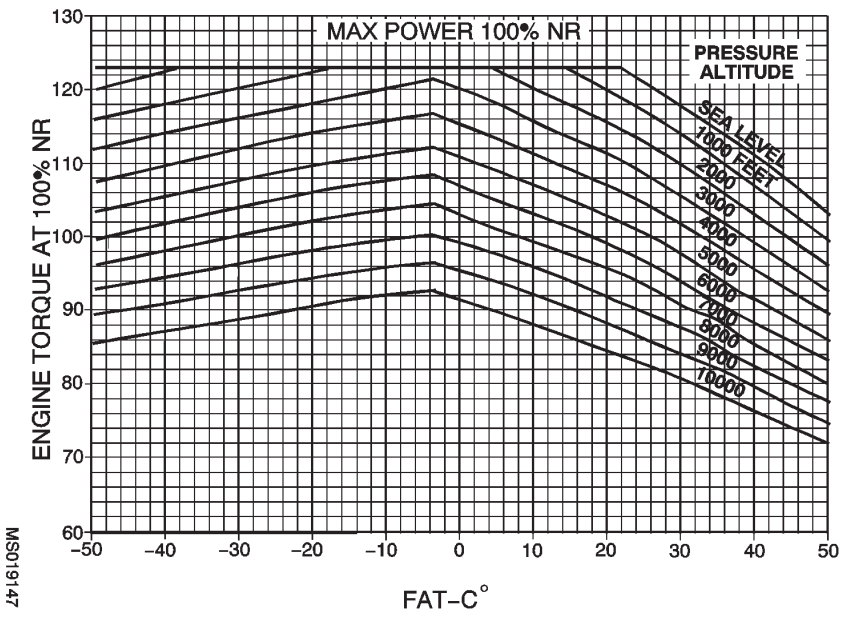


Figure 5-11. T14A Power Assurance Check
Maximum Continuous Power Chart
5-14



MS019147

Figure 5-12. **F14A** Power Assurance Check
Maximum Power Chart
5-15

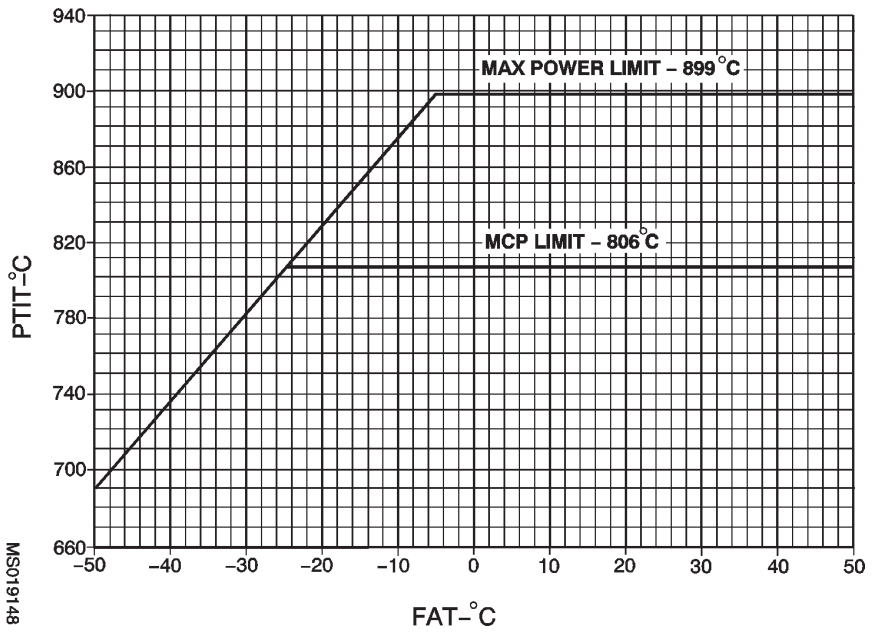
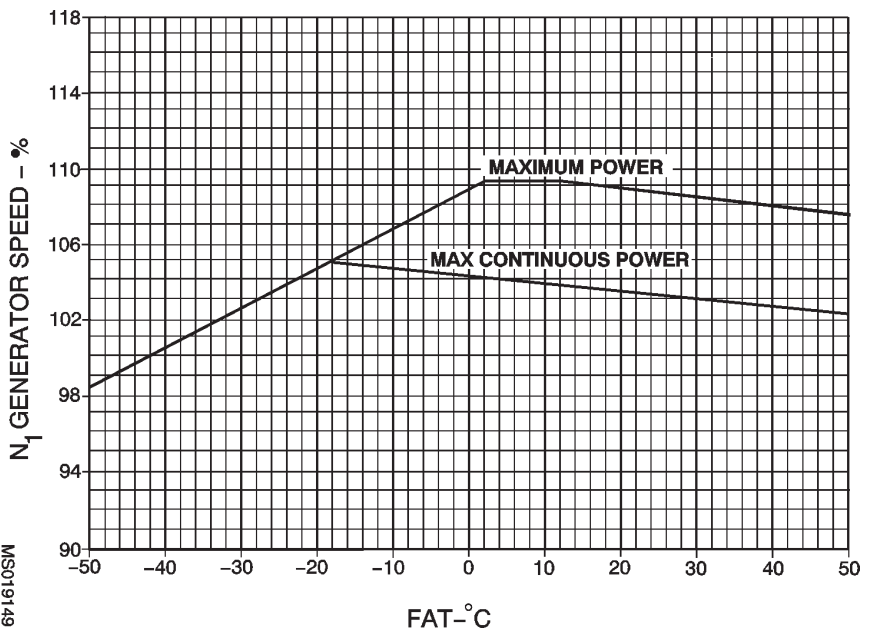
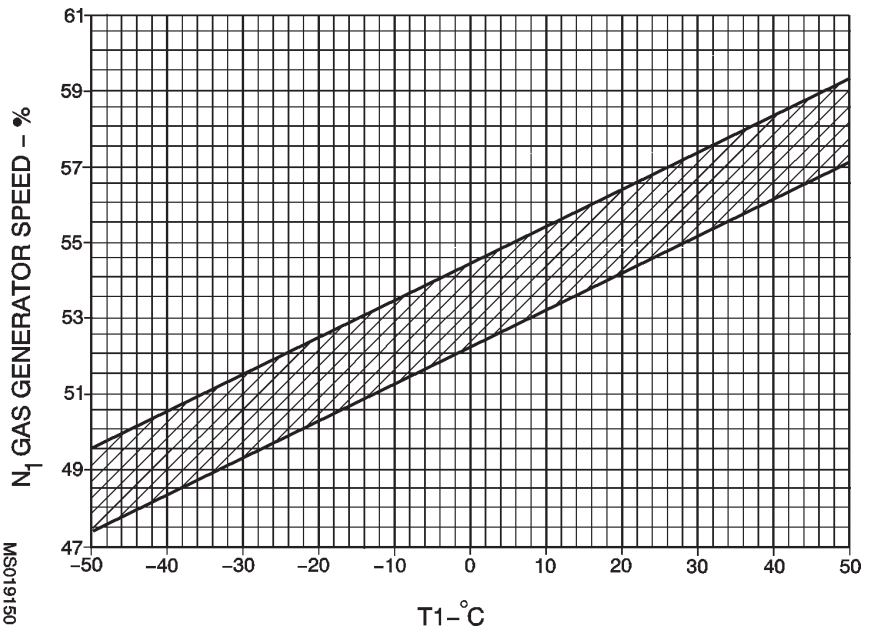


Figure 5-13. **714A** Power Assurance Check Engine Temperature Limits Chart
5-16



MS019149

Figure 5-14. **714A** Power Assurance Check Engine N1 Limits Chart 5-17



MS019150

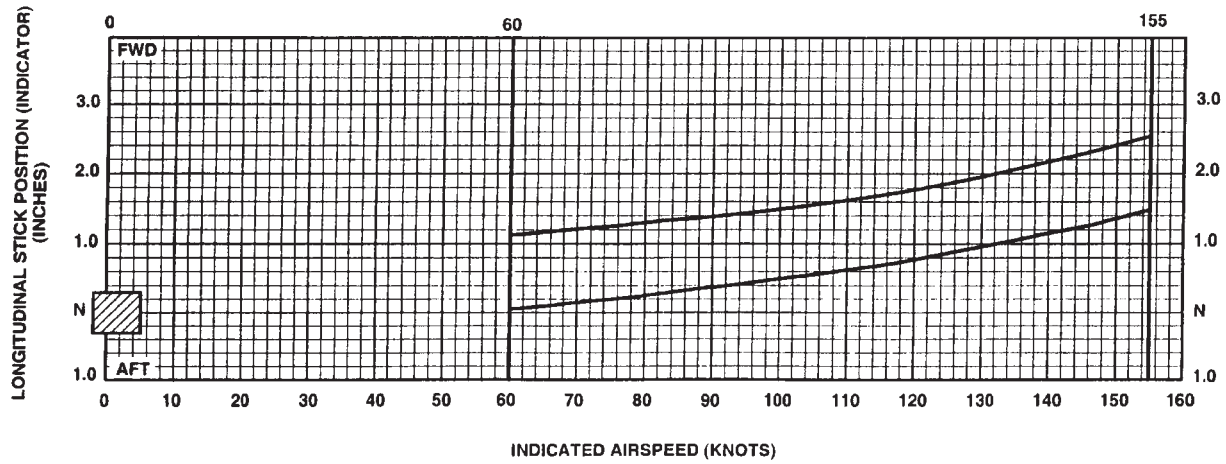
NOTE: To be used with sports computer. T1 reading must be accurate.

Figure 5-15. **714A** N1 Idle Speed
5-18

	Engine			Probable	Cause
	N1	Torque	Temperature		
5-19/(5-20 blank)	Correct	Low	High		Dirty inlet and/or compressor Bleed bend leaking Leaks in anti-icing
				FOD	
					Erosion Damaged combustor section PTIT indicating system Combustion chamber drain valve open
	Low	Low	Low		Calculation error Engine not properly topped Fuel control adjustment
	High	Correct	High		Calculation error Fuel control adjustment
	Correct	Correct	High		N1 indicating system error
	Correct	Low	Correct		Torque indicating system Torque transmitter malfunctioning
	Correct	Correct	Low		PTIT indicating system

TM 55-1520-240-MTF

Figure 5-16. Turbine Engine Analysis Check Troubleshooting Chart

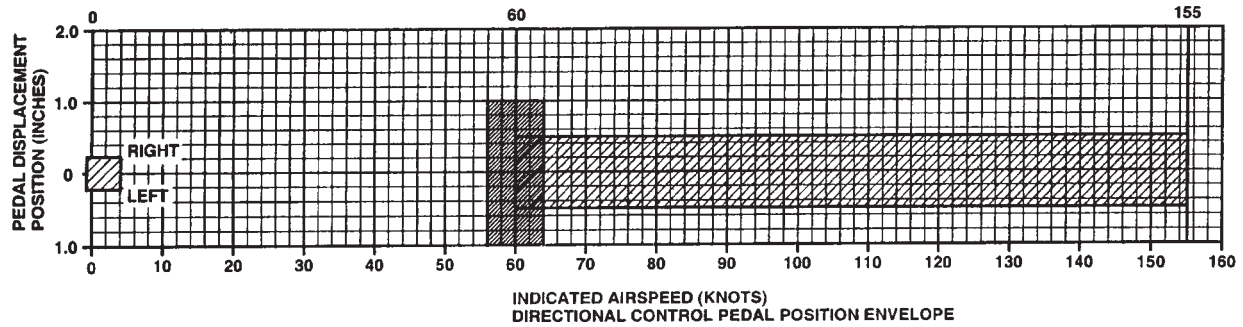
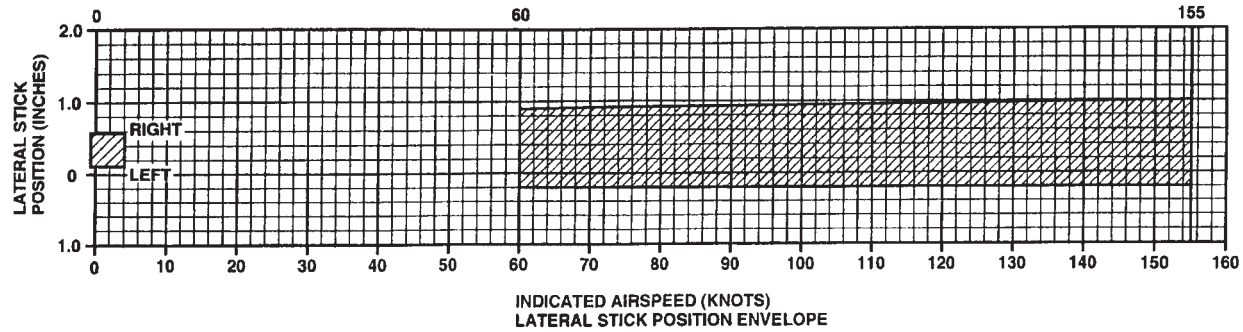


LONGITUDINAL STICK POSITION ENVELOPE

Figure FO-1. CH-47D Cockpit Controls Position Envelope (Sheet 1 of 2)

GROSS WEIGHT: STANDARD
UNBALLASTED CONFIGURATION

ROTOR RPM: 100%
RATE OF CLIMB: ZERO
CYCLIC TRIM: AUTO



A54126

Figure FO-1. CH-47D Cockpit Controls Position Envelope (Sheet 2 of 2)

EXAMPLE

WANTED

MAX INDICATED AIRSPEED FOR GIVEN
TEMP. PRESS ALTITUDE AND GROSS WEIGHT

KNOWN

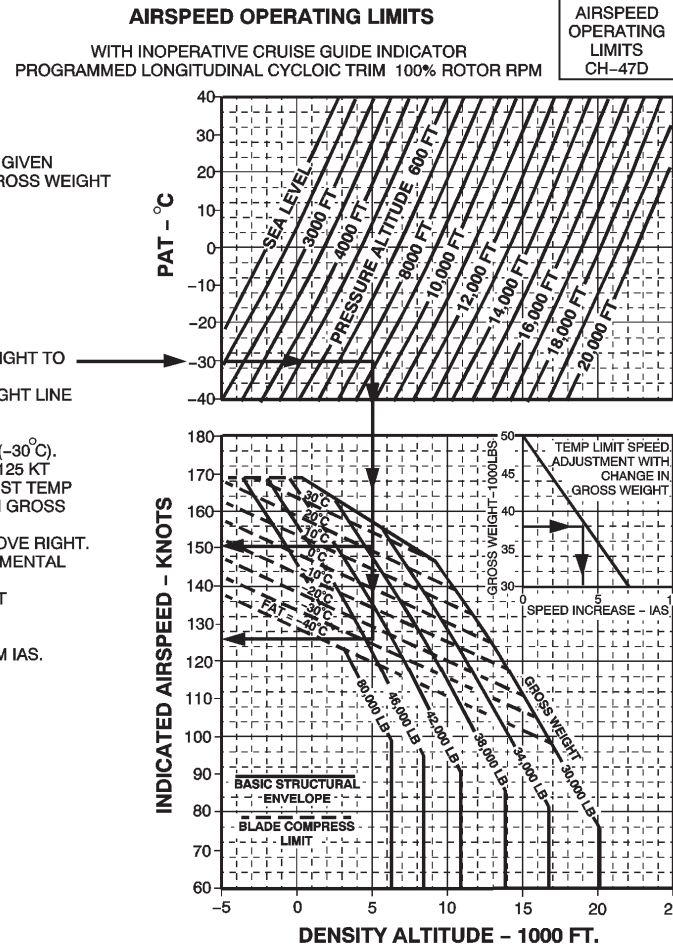
FAT -30°C
PRESS ALTITUDE = 8800 FT.
GROSS WEIGHT = 38,000 LBS

METHOD

ENTER FAT AT -30°C . MOVE RIGHT TO
PRESS ALTITUDE = 8800 FT.
MOVE DOWN TO GROSS WEIGHT LINE
(38,000 LB.) MOVE LEFT AND
READ IAS = 148 KT
MOVE DOWN TO TEMP LINE (-30°C).
MOVE LEFT AND READ IAS = 125 KT
USE INSERT GRAPH TO ADJUST TEMP
LIMIT SPEED FOR CHANGE IN GROSS
WEIGHT
ENTER AT GW = 38,000 LB. MOVE RIGHT.
THEN DOWN TO READ INCREMENTAL
SPEED INCREASE = 4KT (IAS)
NOW IAS = 125 + 4 = 129 KT AT
GROSS WEIGHT = 38,000 LB.

USE LOWER VALUE AS MAXIMUM IAS.

MAX IAS = 129 KT



MS019215

Figure FO-2. Airspeed Operating Limits With Inoperative Cruise Guide Indicator

AIRSPED OPERATING LIMITS
WITH RETRACTED LONGITUDINAL CYCLIC TRIM

NOTE: USE OF THE CRUISE GUIDE INDICATOR TO EXCEED THESE LIMITATIONS IS PROHIBITED

AIRSPED OPERATING LIMITS
CH-47D

EXAMPLE

WANTED

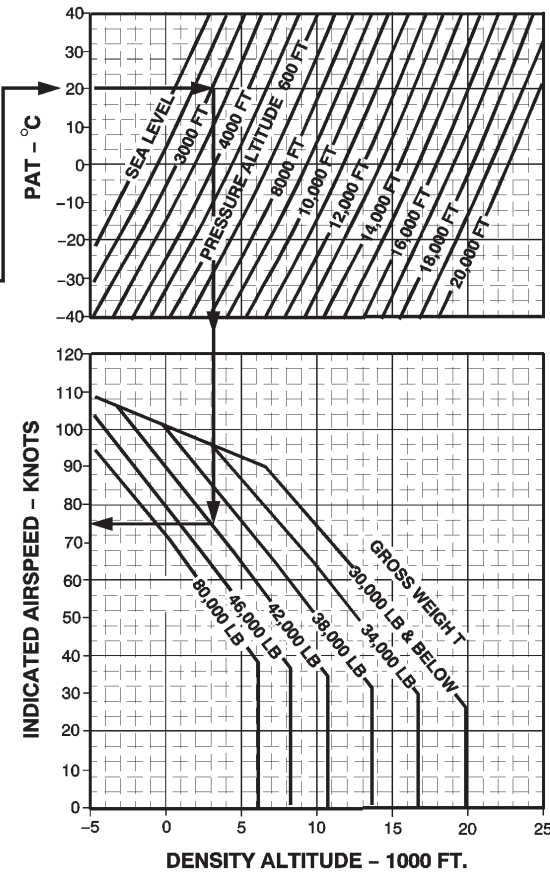
MAX INDICATED AIRSPEED FOR GIVEN
TEMP. PRESS ALTITUDE AND GROSS WEIGHT

KNOWN

FAT = 20°C
PRESS ALTITUDE = 2000 FT.
GROSS WEIGHT = 42,000 LBS

METHOD

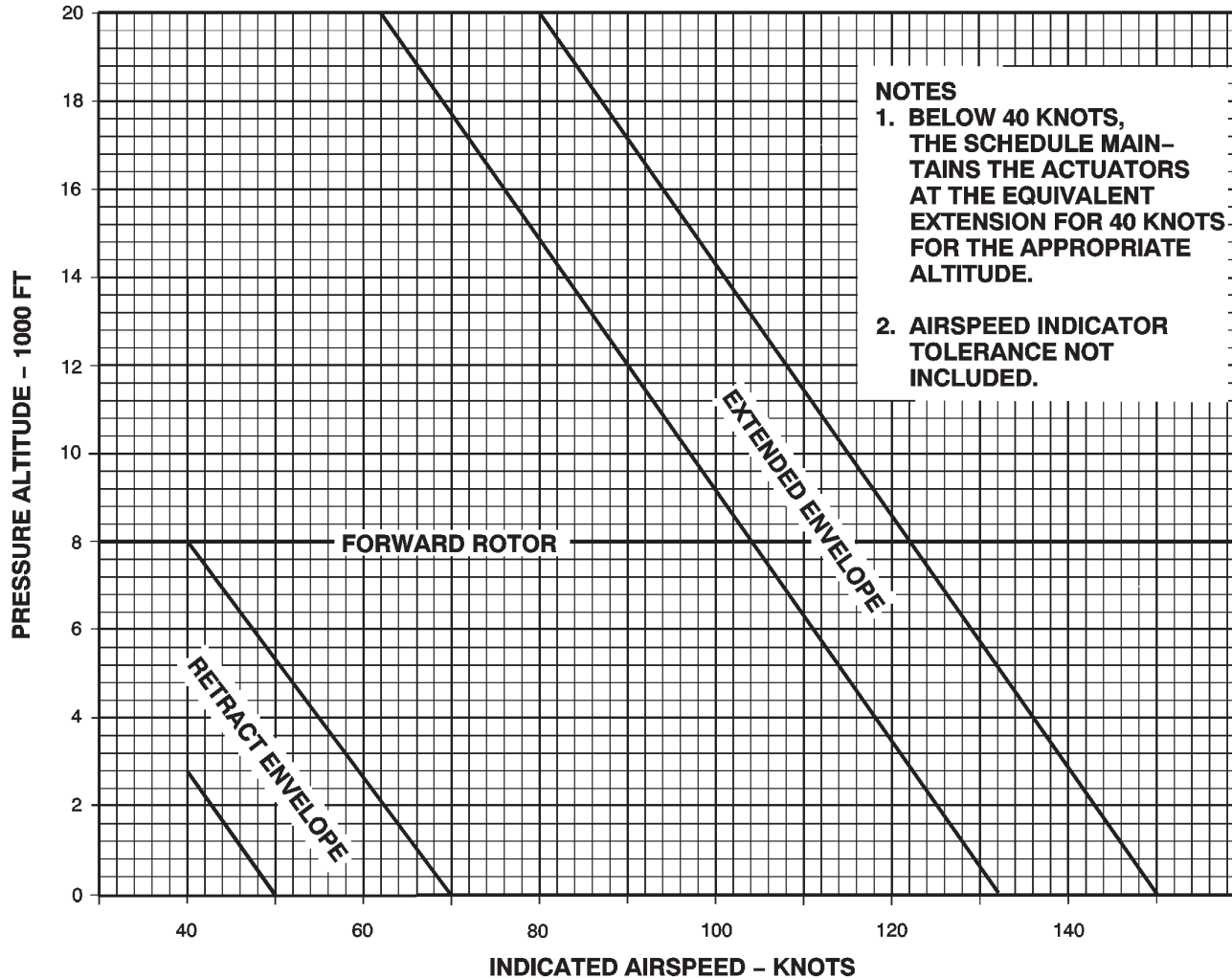
ENTER FAT AT = 20°C. MOVE RIGHT TO
PRESS ALTITUDE = 2000 FT.
MOVE DOWN TO GROSS WEIGHT LINE
(42,000 LB.) MOVE LEFT AND
READ IAS = 74 KT



MS019216

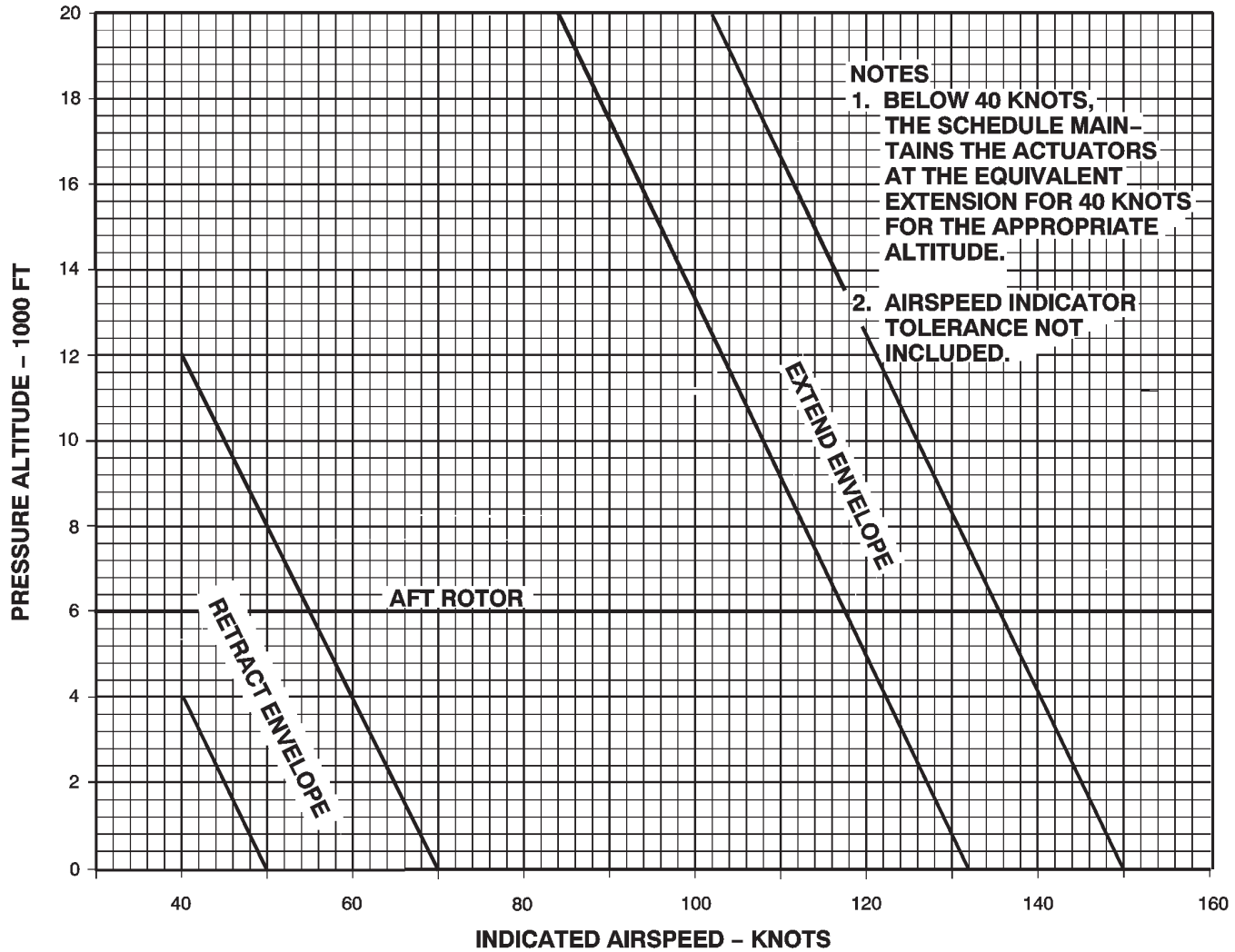
Figure FO-3. Airspeed Operating Limits With Retracted Longitudinal Cyclic Trim

FP-7/(FP-8 blank)



MS019217

Figure FO-4. CH-47D FWD and AFT LCT Indicator Schedule (Sheet 1 of 2)



MS019218

Figure FO-4. CH-47D FWD and AFT LCT Indicator Schedule (Sheet 2 of 2)

CH-47D SERIAL NUMBER	DATE	PURPOSE OF TEST FLIGHT	REMARKS:		
PILOT RANK, NAME & UNIT					
OPERATING WEIGHT	FAT	PRESSURE ALTITUDE			
SYMBOLS: ✓ = Satisfactory, X = Deficiency					
BEFORE STARTING ENGINES		23. Fuel QTY			
1. Forms and Records		24. LCT			
2. Weight and Balance		25. AFCS			
3. FAT Gage		26. Flight Control Checks			
4. Magnetic Compass		a. Control Interference			
5. System Instruments		b. Neutral Meas in.			
6. Flight Instruments		c. Cyclic Placard Measurement			
STARTING ENGINES		d. Control Breakout Forces			
1. BATT and Essen busses		e. FLT Control Travel Hyd			
2. 712 Caution Lights		f. Control Interlock Check			
714A Caution/Advisory		g. Control Centering			
3. Interphone		27. 714A DECU Prestart BIT			
4. Troop Alarm & Jump Lights		28. EAPS Fans			
5. Master Caution/Dome Lights		29. 714A Abort Start check			
6. Floodlights		30. No. 1 Engine Start			
7. Emergency Floodlights		a. Eng oil press psi			
8. Pilot & Copilot Utility Lights		b. GND Idle 45 sec %			
9. PWR XFER switches		31. No. 2 Engine Start			
10. Maintenance Panel		a. Eng oil press psi			
11. XMSN Oil Press gage		b. GND Idle 45 sec %			
12. EAPS Bypass Door check		32. 714A P-3 Bellows			
13. PITOT, AFCS, & Wind. Anti-Ice		33. 714A Overspeed Check			
14. Lights check		34. 714A Rev Start			
15. Parking brakes/swivel locks		35. XMNS Oil Press 7 psi min			
16. Ramp Isolation Check		36. ECL Flight			
17. CGI		37. 712 Beep Operation (P&CP)			
18. Altimeter		38. 714A DECU Start Bit			
19. VGI Norm Emerg		39. Engine Oil press Fluct			
20. Fire Detector		a. No. 1 psi			
21. Fire Pull Handles		b. No. 2 psi			
22. Crossfeed Fuel Vaves		40. Systems/Maintenance Panel			
			41. 712 Minimum Beep Check	HOVER CHECK	
			a. No. 1	1. Mechanical Rig Check in.	
			b. No. 2	2. Control Position Checks	
			42. 712 Bleed Band check FAT	a. Long in.	
			a. No. 1	b. Lateral in.	
			b. No. 2	c. Pedals Split in.	
			ENG Run-Up	3. AFCS	
			1. Generators Check	a. LCTs Retract	
			a. Generator-rectifier / X-TIE	b. Engagement Error	
			b. Underfrequency	c. Pitch Axis	
			c. Differential Current	d. Pitch Beep	
			2. FUEL Pump & XFEED Check	e. Roll Axis	
			3. XMSN OIL PRESS Ind.	f. Yaw Axis	
			4. XMSN OIL TEMP Ind.	g. Bank Angle Heading Hold	
			5. HSI & VGI	h. Radar Altitude Hold	
			6. 712 Emerg. Eng Trim	4. LH Fuel System Check	
			a. No. 1 ENG	L - Fwd Mn AFT	
			b. No. 2 ENG	R - Fwd Mn AFT	
			7. Altimeters Check	5. Torque Differential	
			8. Transponder Check	No. 1 No. 2	
			9. AN/ASN 128(B)	a. Torque	
			TAXI CHECK	b. N1	
			1. Brakes Checks	6. Droop Eliminator Check	
			2. Power Steering	No. 1 No. 2	
			BEFORE HOVER CHECKS	a. Torque	
			1. 714A FADEC System Check	b. RRPM	
			a. FADEC NR% Check	7. 714A PTIT Load Share	
			b. FADEC REV. Mode	8. LH Fuel System Stop	
			2. RH Fuel System Check	L - Fwd Mn AFT	
			L - Fwd Mn AFT	R - Fwd Mn AFT	
			R - Fwd Mn AFT		
			3. Ground Instability		

Figure FO-5. Maintenance Test Flight Check Sheet (1 of 2)

CH-47D SERIAL NUMBER	DATE	PURPOSE OF TEST FLIGHT	14. 712 Engine TEAC	18. Record instrument indications
PILOT RANK, NAME & UNIT			No.1 act/req No. 2 act/req	a. FAT
OPERATING WEIGHT	FAT	PRESSURE ALTITUDE	a. N1	b. PA
SYMBOLS: ✓ = Satisfactory, X = Deficiency			b. PTIT	c. RRPM
IN-FLIGHT CHECKS		7. Speed Sweep Check - 120 KIAS	c. Torque	d. Torque No. 1 No. 2
1. Fuel consumption		a. Long Measure	d. FAT	e. N1 No.1 No. 2
2. Speed sweep check 50 KIAS		b. Emerg Exit Doors (P & C/P)	e. PA	f. PTIT No. 1 No. 2
a. CYCLIC TRIM-CK RET		8. STVA Evaluation 120 KIAS	15. 714A Power Assurance Check	g. ENG oil Temp No. 1 No. 2
b. 60 KIAS		9. Rotor Droop / Thrust Slippage Ck	No.1 act/req No. 2 act/req	h. ENG oil press No.1 No. 2
(1) Long Measure in.		10. Speed Sweep Check - 140 KIAS	a. TQ	i. XSMN Oil Pressure & Temperatures
(2) Lat measure in.		a. Long measure in.	b. PTIT	FWD
(3) Pedal measure in.		b. Lateral Measure in.	c. N1	AFT
(4) A/S indicators		c. Pedal Separation in.	d. FAT	MIX
3. CYCLIC TRIM-CK 70 KIAS		d. A/S Indicators	e. PA	Left
a. LCT Ltoff PA		11. 150 KIAS	f. FF	Right
b. IAS FWD AFT		a. Long Measure	16. Baseline PAT/HIT No.1 No. 2	j. Hydraulic Pressure & Temperatures
4. Speed Sweep 80 KIAS		b. 1/REV, 3/REV Vib Check	a. DECU display	No. 1 Flight
a. Long Measure in.		c. Coordinated Turn	b. FAT	No. 2 Flight
5. AFCS check - 90 KIAS		12. Cyclic Trim check PA-	c. Adjustment Factor/N1	Utility
a. Pedal Separation		a. IAS FWD AFT	d. Adjusted PAT/PTIT	19. Maintenance Panel
b. Pitch axis		13. Autorotation	17. NAV & COM	20. Compass Swing
c. Poll axis		a. RRPM%	a. VOR/ILS/NDB/Marker Beacon	ENGINE SHUTDOWN
d. Heading select		b. PA ft.	b. AN/ASN 128 (B)	1. Engine Shutdown/Coastdown
e. Baro. Alt. Hold		c. Pedal separation in.	c. UHF/VHF/SINCGARS/HF	No.1 ____sec No. 2 ____sec
f. DASH Low Rate Check		d. Vibration Level	d. ASE	2. DECU Shutdown Bit
6. Speed Sweep 100 KIAS		e. FAT °C	e. MISC	
a. Long Measure in.		f. Fuel Qty. lbs.		
			TEST FLIGHT COMPLETE	

			Test Pilot Signature	

			Time Date	

Figure FO-5. Maintenance Test Flight Check Sheet (2 of 2)

TM 1-1520-240-MTF

By Order of the Secretary of the Army:

Official:

ERIC K. SHINSEKI
General, United States Army
Chief of Staff

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
0230910

TM 1-1520-240-MTF

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigrams = .035 grains
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 38.82 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

