TM 1-1520-253-MTF

TECHNICAL MANUAL

MAINTENANCE TEST FLIGHT MANUAL

UH-60Q HELICOPTER
HH-60L HELICOPTER

HEADQUARTERS
DEPARTMENT OF THE ARMY

29 January 1999

TM 1−1520−253−MTF
C 5

CHANGE NO. 5

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 19 April 2002

MAINTENANCE TEST FLIGHT MANUAL

UH-60Q HELICOPTER
HH-60L HELICOPTER

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TM 1−1520−253−MTF
C 5

Remove pages	Insert pages
A and B	A and B
i through iv	i through iv
1−1 through 1−4	1−1 through 1−4
2−1 and 2−2	2−1 and 2−2
2−9 through 2−12	2−9 through 2−12
2−29 and 2−30	2−29 and 2−30
2−33 through 2−36	2−33 through 2−36
- - - - - - - - - - - - -	2−36.1/(2−36.2 Blank)
2−37 through 2−42	2−37 through 2−42
- - - - - - - - - - - - -	2−42.1/(2−42.2 Blank)
2−45 through 2−54	2−45 through 2−54
- - - - - - - - - - - - -	2−54.1/(2−54.2 Blank)
2−55 through 2−58	2−55 through 2−58
2−63/(2−64 Blank)	2−63/(2−64 Blank)
3−1/(3−2 Blank)	3−1/(3−2 Blank)
4−27 and 4−28	4−27 and 4−28
4−41 and 4−42	4−41 and 4−42
4−45 through 4−50	4−45 through 4−50
- - - - - - - - - - - - -	4−50.1 through 4−50.3/ (4−50.4 Blank)
4−75 through 4−88	4−75 through 4−88
5−1 and 5−2	5−1 and 5−2
5−5 through 5−8	5−5 through 5−8
- - - - - - - - - - - - -	5−8.1 and 5−8.3/(5−8.4 Blank)
5−9 through 5−12	5−9 through 5−12
- - - - - - - - - - - - -	5−12.1 and 5−12.2
Cover	Cover

2. Retain these sheets in front of manual for reference purposes.

By Order of the Secretary of the Army:

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Chief of Staff

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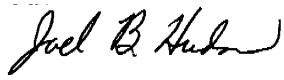

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TM 1–1520–253–MTF
C 4

CHANGE
NO. 4

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DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 15 June 2001

MAINTENANCE TEST
FLIGHT MANUAL

UH–60Q HELICOPTER

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TM 1-1520-253-MTF
C4

Remove pages	Insert pages
A/(B Blank)	A/(B Blank)
2-13 and 2-14	2-13 and 2-14
2-17 through 2-20	2-17 through 2-20
2-35 and 2-36	2-35 and 2-36
2-41 through 2-46	2-41 through 2-46
2-49 through 2-54	2-49 through 2-54
2-61 and 2-62	2-61 and 2-62
4-15 through 4-20	4-15 through 4-20
4-27 and 4-28	4-27 and 4-28
4-33 and 4-34	4-33 and 4-34
4-37 and 4-38	4-37 and 4-38
4-43 and 4-44	4-43 and 4-44

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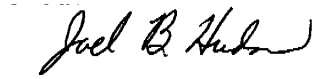

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TM 1–1520–253–MTF
C 3

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WASHINGTON, D.C., 27 November 2000

MAINTENANCE TEST
FLIGHT MANUAL

UH–60Q HELICOPTER

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TM 1-1520-253-MTF
C3

Remove Pages	**Insert Pages**
A/(B Blank)	A/(B Blank)
2-17 and 2-18	2-17 and 2-18
4-77 and 4-78	4-77 and 4-78

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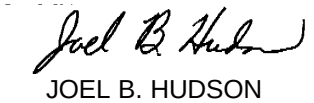

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MAINTENANCE TEST FLIGHT MANUAL

UH-60Q HELICOPTERS

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TM 1-1520-253-MTF
C 2

Remove pages	Insert pages
A/(B blank)	A/(B blank)
2-21 through 2-24	2-21 through 2-24
2-49 and 2-50	2-49 and 2-50

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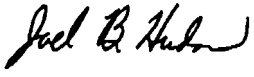

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UH-60Q HELICOPTERS

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TM 1-1520-253-MTF
C 1

Remove pages	Insert pages
None	A/(B blank)
2-33 and 2-34	2-33 and 2-34
2-49 and 2-50	2-49 and 2-50
3-1/(3-2 blank)	3-1/(3-2 blank)
4-39 and 4-40	4-39 and 4-40
4-47 and 4-48	4-47 and 4-48

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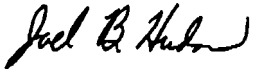

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Dates of issue for original and changed pages are:

Original	0	29 January 1999
Change	1	30 July 1999
Change	2	3 April 2000
Change	3	27 November 2000
Change	4	15 June 2001
Change	5	19 April 2002

Total number of pages in this manual is 212 consisting of the following

Page No.	*Change No.	Page No.	*Change No.
Title	5	2-15 - 2-16	0
Blank	0	2-17 - 2-19	4
A - B	5	2-20 - 2-21	0
a	0	2-22 - 2-23	2
b Blank	0	2-24 - 2-28	0
i - iv	5	2-29	5
1-1 - 1-4	5	2-30 - 2-32	0
2-1	5	2-33 - 2-36.1	5
2-2 - 2-8	0	2-36.2 Blank	5
2-9 - 2-12	5	2-37 - 2-42.1	5
2-13	0	2-42.2 Blank	5
2-14	4	2-43	4

*** Zero in this column indicates an original page.**

Page No.	*Change No.	Page No.	*Change No.
2-44	0	4-33	4
2-45	4	4-34 - 4-37	0
2-46 - 2-47	5	4-38	4
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2-49	4	4-40 - 4-41	0
2-50	5	4-42	5
2-51	0	4-43	0
2-52 - 2-54.1	5	4-44	4
2-54.2 Blank	5	4-45 - 4-46	5
2-55	5	4-47	0
2-56	0	4-48 - 4-50.3	5
2-57	5	4-50.4 Blank	5
2-58 - 2-61	0	4-51 - 4-74	0
2-62	4	4-75 - 4-86	5
2-63	5	4-87	0
2-64 Blank	0	4-88	5
3-1	5	4-89 - 4-97	0
3-2 Blank	1	4-98 Blank	0
4-1 - 4-15	0	5-1	5
4-16 - 4-17	4	5-2 - 5-4	0
4-18	0	5-5 - 5-8.3	5
4-19	4	5-8.4 Blank	5
4-20 - 4-26	0	5-9	0
4-27	4	5-10 - 5-12.2	5
4-28	5	5-13 - 5-17	0
4-29 - 4-32	0	5-18 Blank	0

*** Zero in this column indicates an original page.**

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 1-1520-253-10 Operator's Manual and must be completed before each maintenance test flight. Emergency procedures are found in the applicable Operator's Manual (-10) or Checklist (-CL) and are not duplicated in this publication. Before each maintenance test flight, the pilot will contact maintenance/quality control personnel regarding the maintenance that has been done. This manual should be used only by qualified maintenance test flight pilots as required in AR 95-1.

TABLE OF CONTENTS

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes, or if you know of a way to improve these procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of the applicable Operator's Manual (when using the 2028-2 from the Operator's Manual, make sure the publication number and title are changed to reflect this MTF) directly to: Commander, US Army Aviation and Missile Command, ATTN: AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5230. 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 Operator's Manual immediately preceeding the hard copy 2028.

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SECTION I. INTRODUCTION

1. Purpose. This manual has complete instructions for performing a maintenance test flight of the UH-60Q and HH-60L helicopters. For the specific conditions which require a general or limited maintenance test flight, refer to TM 1-1500-328-23, and TM 1-1520-237-23. A maintenance test flight is not required for folding and unfolding main rotor blades. Folding tail rotor blades does require a limited test flight.

2. Definition.

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 these conditions:

WARNING

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

CAUTION

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

NOTE

An operating procedure, condition, etc., which must be highlighted.

c. Designation Symbols. Designation Symbols, UH–60Q UH-60Q peculiar systems, HH–60L HH-60L peculiar systems, ES UH-60Q/HH-60L with ESSS provisions, ERFS UH-60Q/HH-60L with external extended range fuel system, 700 UH-60Q aircraft with T700-GE-700 engines, and 701C HH-60L aircraft with T700-GE-701C engines, are used in conjunction with text context, paragraph titles, and illustrations to show limited effectivity of the material. One or more designators may be used to indicate proper effectivity, unless the material applies to all models and configurations within the manual. Designator symbols shall precede procedural steps. If the material applies to all series and configurations, no designator symbols will be used. When practical, descriptive information is condensed and combined for all models to avoid duplication.

3. General Information.

a. This manual covers only maintenance test flight of the UH-60Q and HH-60Lhelicopters and in no way supersedes any information in TM 1-1520-253-10 or -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 for maintenance test flights will be as specified in TM 1-1500-328-23 and TM 1-1520-253-10. A qualified maintenance test pilot may perform single engine ground run-ups with the rotor system turning at flat pitch for the purpose of completing engine flushes, flat pitch rotor tracking, tail rotor balancing, engine and oil cooler vibration checks, and other maintenance operational checks that can be completed with the collective maintained in the full down position. The maintenance test pilot should occupy the left crew seat. The other seat must be occupied by an individual who has been briefed to monitor the flight controls and to ensure the collective is maintained in the full down position and frictioned, except during startup and shutdown.

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 before the maintenance test flight to determine maintenance done and type of maintenance test flight required (i.e., general or limited).

c. Configuration. The configuration of the helicopter should be determined before the maintenance test flight in order to determine performance parameters.

d. Post Test Flight Inspection. A thorough visual inspection will be done to the extent necessary to assure that deficiencies or shortcomings 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.

f. Asterisked Checks. An asterisk (*) before a check requires that the Test Flight Check Sheet be annotated. 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.

g. An (O) indicates a requirement if the equipment is installed.

h. Maintenance Test Flight Check Sheet. The Check Sheet contained in Section V will be used for all test flights. When a limited test flight is done 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. Continuation sheets may be used when necessary. Items that prove to be unsatisfactory during test flight, and re-

quire 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 sheet will be attached to DA Form 2408-13-1 upon completion. After accumulation of two or more sheets, the data should be reviewed to determine if trends are developing.

SECTION II. MAINTENANCE TEST FLIGHT CHECKLIST

General. This section contains the maintenance test flight requirements peculiar to Army model UH-60Q and HH-60L helicopters. Conditions requiring test flights shall be per TM 1-1500-328-23 or applicable maintenance manual. The requirements herein are established to assure a thorough inspection of the helicopter before flight, during flight and upon completion of the maintenance test flight.

PRIOR TO MAINTENANCE TEST FLIGHT

*1. Forms and Records - Check.

*2. Thorough flight readiness inspection per the requirements in TM 1-1520-253-10 - Performed.

*3. Special Preflight Checks - Accomplished.

INTERIOR

1. Tail rotor pedal travel - Check (pilot and copilot).

   a. Pull **PED ADJ** lock release lock with feet on pedals - Allow pedals to move to full aft position.

   b. Check for freedom of movement full forward with no binding.

   c. Check that lock will hold pedals in different positions throughout travel range.

2. Seat height adjustment - Check (pilot, and copilot), and medic's.

   a. Check full travel for smooth operation.

   b. Check that lock will hold in different positions throughout travel range.

INTERIOR (CONT)

3. Seat forward and aft adjustment - Check (pilot, copilot), and medic's.

   a. Check that seat moves through full range smoothly.

   b. Check that lock will hold in different positions throughout travel range.

4. Seat and pedals - Adjust for flight.

NOTE

Buckle release will be common in configuration on pilot, copilot, and medic's seats.

5. Seat belt and shoulder harness - Check (pilot, copilot), and medic's.

   a. Check inertia lock by jerking harness and with manual lock lever.

   b. Fasten and tighten for flight.

6. Copilot's collective stick - Extended and locked.

7. Cockpit doors - As desired.

8. Parking brakes - Check pilot's and copilot's.

9. Cockpit switches/circuit breakers - Check and set.

   a. Collective control grip switches - Off, **SVO OFF** switch centered.

   b. Collective friction - Off.

   c. **ENGINE IGNITION** switch - **OFF**.

   d. Compass calibration cards - Current and legible.

e. **BATT** and **BATT UTIL BUS** circuit breakers - In.

f. **BLADE DEICE POWER** switch - **OFF**, **MODE** switch - **AUTO**, **TEST** switch - **NORM**.

g. **STORES JETTISON** panel - **OFF** and safe.

h. PLS - Off.

i. Copilot's CSC panel switches - Set as desired.

j. **TAIL SERVO** switch - **NORMAL**.

k. **EMERGENCY CONTROL PANEL**, **CDU** control to **AUTO**, **EMERG COMM** and **EMERG IFF** to **NORM**.

l. FLIR and mode switches - **OFF**.

m. APX-100 - Set as desired.

n. **FUEL BOOST PUMP CONTROL** switches - **OFF**.

o. Rescue hoist panel **HOIST POWER** switch - **OFF**.

p. **AUXILIARY FUEL MANAGEMENT** panel switches - **OFF**.

q. ANVIS HUD panel - **OFF**.

r. APR-39 - Off.

s. IRCM - Off.

t. M-130 chaff - Off.

u. **AUX SW** panel switches - **OFF**.

v. **COMPASS** switch - **SLAVED**.

INTERIOR (CONT)

w. AUX ARC-222 - **TR/SC**.

x. Pilot's CSC panel switches - Set as desired.

y. Storm scope - Off.

z. MFDs - Off.

aa. CDU **DIGITS** switch - **ON**.

ab. Airspeed indicators - Red line 193 kts, slippage mark.

ac. Radar altimeters - Set **LO SET** bug at 80 feet, **HI SET** bug at 800 feet.

ad. Vertical speed indicators - Zero indication.

ae. Standby magnetic compass - Check full of fluid, no discoloration.

af. FAT gage(s) - Check for security and indication, bonding jumper installed.

ag. **BACKUP HYD PUMP** switch - **AUTO**.

ah. **HYD LEAK TEST** switch - **NORM**.

ai. **ANTICOLLISION/POSITION LIGHTS** - As required.

aj. Left panel light controls - **OFF**.

ak. **LIGHTED SWITCHES** dimming control - Set at midposition.

al. Left **DC ESNTL BUS** circuit breakers - In.

am. **CARGO HOOK EMERG REL** switch - **OPEN**, **ARMING** switch - **SAFE**.

an. **APU CONTR** switch - **OFF**, **APU FIRE EXTGH** T-handle - In.

ao. **EXT PWR** switch - **OFF**.

ap. **BATT** switch - **OFF**.

aq. **GENERATORS**, **APU** switch - **OFF**, **NO. 1** and **NO. 2** switches - **ON**.

ar. **FIRE DETR TEST** switch - **OPER**.

as. **FUEL PUMP** switch - **OFF**.

at. **FIRE EXTGH** switch - **OFF**.

au. **AIR SOURCE HEAT/START** switch - **APU** (**OFF** for external air source).

av. Engine control quadrant (both engines).

(1) Fuel selectors - **XFD** detent, then **DIR** detent, no binding.

(2) **ENG POWER CONT** levers - Full range, no binding, note positive detents, then **OFF**.

(3) **ENG EMER OFF** T-handles - Note positive detent full forward.

aw. **WINDSHIELD ANTI-ICE** switches - **OFF**.

ax. **ENG ANTI-ICE** switches - **OFF**.

ay. **PITOT HEAT** switch - **OFF**.

az. **INSTR LT** and **CONSOLE LT** controls - **OFF**.

INTERIOR (CONT)

ba. **WINDSHIELD WIPER** switch - **OFF**.

bb. **VENT BLOWER** switch - **OFF**.

bc. **HEATER** switch - **OFF**.

bd. Right **DC ESNTL BUS** circuit breakers - In.

be. Pilot's and copilot's overhead circuit breakers - In.

bf. Mission readiness and medical interior circuit breaker panels - Crewchief verify all circuit breakers in.

10. Helmet and gloves - On.

NOTE

Unless otherwise stated, the **MASTER CAUTION** light will be reset when performing the various checks.

MASTER CAUTION light will not illuminate if both MFDs are off.

11. **BATT** switch - **ON**, note stabilator audio. Check only **AC ESS BUS OFF** legend on CDU appears.

12. COM 1, COM 2, and COM 4 revert to CT mode, COM 5 looses its band, and COM 3 goes to squelch off when initially powered up. Reset radios as required, either now, or when APU generator is switched **ON**.

13. Clocks - Set and running.

14. Turn one MFD on. Reset pilot's **MASTER CAUTION** light.

15. Caution/Advisory panel - Check these legends:

    a. **#1** and **#2 CONV**.

    b. **AC ESS BUS OFF**.

    c. **STABILATOR**.

    d. **BOOST SERVO OFF**.

    e. **SAS OFF**.

WARNING

Before applying external power, make sure that stabilator is clear of personnel and equipment.

16. External power - Connected if required.

    a. **EXT PWR** switch - **RESET** then **ON**.

    b. **EXT PWR CONNECTED** and **BACKUP PUMP ON** advisory legends - Present.

BEFORE STARTING ENGINES

CAUTION

If FAT is 33°C (91°F) or above, observe the following backup pump operating limits. (Cowling should be open for extended ground operation and closed prior to engine start.)

FAT	Operating Time	Cooldown Time (Pump Off)
33°C (91°F) to 38°C (100°F)	24 min	72 min
39°C (102°F) and above	16 min	48 min

1. APU start:

   a. **SAS 1** switch - Off.

   b. **APU ACCUM LOW** advisory legend - Off.

   c. **FIRE DETR TEST** switch - Position **1**, note APU T-handle lights - On, master **FIRE** lights - On; then **OPER**.

   *d. **FUEL PUMP** switch - **APU BOOST**, note **PRIME BOOST PUMP ON** legend - On.

CAUTION

When helicopter power is supplied only by the battery, the MAIN fire extinguisher will not work. In case of APU fire, the RESERVE fire extinguisher must be used.

*e. **APU CONTR** switch - **ON**, note **APU ON** advisory legend on when operating speed is reached.

f. **APU ACCUM LOW** advisory legend - On.

WARNING

Ensure that stabilator is clear of personnel and equipment prior to placing APU generator switch to ON.

2. Stabilator - Clear.

3. **APU** generator switch - **ON**. Note the following:

a. **APU GEN ON** advisory legend appears.

b. **BACK-UP PUMP ON** advisory legend - Appears within about 4 seconds.

c. Engine out audio on, reset copilot's **MASTER CAUTION** light.

d. **APU ACCUM LOW** advisory legend disappears after accumulator is recharged.

e. 701C Check **% TRQ** digits - 0.

4. Turn on the other MFD.

BEFORE STARTING ENGINES (CONT)

5. **HEATER** switch - As desired.

6. **EXT PWR** switch - **OFF** and cable disconnected, if used.

7. CDU AMS - Verify and setup:

   a. Press **INI** key to check GPS status. Enter as required system date (MMDDYY) and time (HH:MM:SS) and press **ENT** (GPS could take up to 12 minutes to initialize).

   b. From the bus controller CDU press **DTS** key and then press **LOAD** key to down load DTS (DTS may take up to 3 minutes to load).

   c. Press **NAV** soft key, press **DO-GPS** or the desired soft key to set the navigator mode.

   d. Press **DAT** soft key to verify the DTS information (COM/NAV/Waypoint presets) has loaded, or set manually as desired.

   e. Press **FPN** soft key and via **FPN1** or **FPN2** enter desired flight plan and **ENGAGE**.

   f. CDU AMS **STS** soft key - Verify system status.

*8. Caution/Advisory and Master Warning Light check:

   a. **ILLUM ALL** soft key - Press. All legends in the caution/advisory grid shall appear, then after 10 seconds, the following legends should remain:

      (1) **LAND ASAP**

      (2) **#1** and **#2 GEN**.

      (3) **#1** and **#2 FUEL PRESS**.

(4) **#1** and **#2 ENGINE OIL PRESS**.

(5) **#1** and **#2 HYD PUMP**.

(6) **MAIN XMSN OIL PRESS**.

(7) **#1** and **#2 ENG ANTI-ICE ON**.

(8) **APU ON**.

(9) **APU GEN ON**.

(10) **PRIME BOOST PUMP ON**.

(11) **BACK-UP PUMP ON**.

(12) **PARKING BRAKE ON**.

b. These master warning lights should be on:

(1) **#1** and **#2 ENG OUT**.

(2) **LOW ROTOR RPM**.

c. **BRT/DIM TEST** switch - Hold in **TEST** position and check these:

(1) All master warning lights - On, **LOW ROTOR RPM** will flash.

(2) Pilot and copilot **MODE SEL** legend lights - On.

(3) **CIS MODE SEL** legend lights - On.

(4) VSI advisory lights - On.

(5) **AFCS FAILURE ADVISORY** lights - On.

(6) Release **BRT/DIM TEST** switch.

d. Panel lights dimming test:

BEFORE STARTING ENGINES (CONT)

(1) Place **BRT/DIM TEST** switch to **DIM**; then to **TEST** - Lights should not dim.

(2) Turn **INSTR LT PILOT FLT** control clockwise from **OFF** to increase intensity of panel lights.

(3) Place **BRT/DIM TEST** switch to **BRT/DIM**; then to **TEST** - All lights noted in step c. above, and **AUTO FLIGHT CONTROL** lights should be at decreased intensity. The **AFCS FAILURE ADVISORY** capsule lights will not dim.

(4) **FIRE DETR TEST** switch - Position **1**, note T-handle lights are on at a decreased intensity.

(5) While holding **BRT/DIM TEST** switch at **TEST**, turn **INST LT PILOT FLT** to **OFF** - All lights should return to bright.

(6) **FIRE DETR TEST** switch - Return to **OPER**. All fire warning lights - **OFF**.

NOTE

Refer to Section IV A for night vision goggles dimming check (if required).

*9. CDU - PDU test:

a. Check **CHAN 1** and **2** fault lights out.

b. Push **CDU PUSH TO TEST** switch and these lights should go on:

(1) **CHAN 1** and **2** fault lights.

(2) Digit displays should be all 8s.

(3) All light segments on vertical gages.

(4) **RTR OVERSPEED** lights on both PDUs.

c. Push PDU **TEST** switches. These lights should go on:

(1) Digital % Torque - 188.

(2) All light segments on vertical gages.

10. Photocell sensitivity - Check.

a. Turn **DIM** control knob fully clockwise. Cover all photocells and note all segment lights of the CDU and PDUs will stay at a set intensity.

b. Turn **DIM** control knob counterclockwise to a point below detent where intensity is less than previously noted.

c. Cover all photo cells, note reduced intensity of segments of CDU and PDU.

d. Uncover each photo cell individually, note the intensity increases as each photo cell is uncovered.

e. Adjust **DIM** control knob to desired intensity.

*11. Stabilator audio warning priority - Check.

a. **NO. 2 DC INST** circuit breaker - Pull out, then push back in. Steady tone heard in headset (engine out).

b. **STABILATOR MAN SLEW** switch - Momentarily **UP**, then **OFF**. **STABILATOR** and **MASTER CAUTION** lights on, beeping tone heard in headset (stabilator).

c. **MASTER CAUTION PRESS TO RESET** - Press, **MASTER CAUTION**lights off and steady tone heard in headset (engine out).

BEFORE STARTING ENGINES (CONT)

d. **MASTER CAUTION PRESS TO RESET** - Press, no tone should be heard in headset.

e. **STABILATOR AUTO CONTROL** switch - Press **ON**, **STABILATOR** caution light off.

f. Left hand landing gear WOW switch - Press and hold. Steady tone should be heard in headset (low rotor).

g. **STABILATOR MAN SLEW** switch - Momentarily **UP**, then **OFF**. **STABILATOR** legend appears, and **MASTER CAUTION** lights on, beeping tone heard in headset (stabilator).

h. **MASTER CAUTION PRESS TO RESET** - Press, **MASTER CAUTION** lights off and steady tone heard in headset (low rotor).

i. **MASTER CAUTION PRESS TO RESET** - Press, steady tone should be heard in headset (low rotor).

j. Left hand landing gear WOW switch - Release, no tone should be heard in headset.

k. **STABILATOR AUTO CONTROL** switch - Press **ON**, **STABILATOR** caution legend off.

12. Instrument lights, secondary lights, cockpit flood and cabin lights, landing light, and controllable searchlight - Check, set as desired. (Refer to Section IV for NVG Systems Check).

13. MFDs - Check modes of operation:

a. **NAV** button - Press. Check that navigation radio header information is displayed on MFD.

b. **COMM** button - Press. Check that communication header information for active radios is displayed on MFD.

c. **FP** button - Press. Check that engaged AMS flight plan is displayed on MFD.

d. **FLT** button - Press. Check that flight plan header information is displayed on MFD.

e. **ATT** button - Press. Check that attitude display is overlaid on MFD.

14. Heater and ventilating system operation - Check.

a. **VENT BLOWER** switch - **ON**. Ventilation blower should operate and air should come from each louver.

b. **VENT BLOWER** switch - **OFF**.

c. **HEATER** switch - **ON**.

d. **HEATER** knob - Slowly turn from **OFF** to **HI**, air temperature should increase with knob position.

e. **HEATER** knob/switch - **OFF** or as desired.

f. Environmental control system - Check (Refer to Section IV N).

15. Windshield wiper system operating check.

BEFORE STARTING ENGINES (CONT)

CAUTION

Make sure windshield is clean and kept wet during operational check.

a. **WINDSHIELD WIPER** switch - **HI** and then to **LOW**, both wipers should operate in both positions.

b. **WINDSHIELD WIPER** switch - **OFF**, both blades stop.

c. **WINDSHIELD WIPER** switch - **PARK**, blades should position themselves on inboard edge of windshield.

*16. Flight control hydraulic system - Check.

a. **BOOST**, **SAS 1**, and **SAS 2** switches - Press **ON**.

b. **TRIM** - Press off.

*c. Cyclic forward stop - Check.

(1) Collective midposition, tail rotor pedals centered. Move cyclic stick full forward and centered laterally against forward stop.

(2) Measure distance from instrument panel to cyclic stick and record.

(3) Return cyclic stick to center position, and collective to full down.

d. Primary servo - Check.

(1) Copilot's **SVO OFF** switch - **1ST STG**, no allowable stick jump. **#1 PRI SERVO PRESS** legend should appear, and **MASTER CAUTION** lights should be on. Individually move cyclic, pedals and collective slowly through full range in no less than 5 seconds. There should be no binds, restrictions, control feedback or rotor blade chatter.

(2) Move the collective from full down to full up position in approximately one second. Repeat from full up to full down. Check **#2 PRI SERVO PRESS** legend does not appear, and that there is no longitudinal or lateral cyclic control feedback that cannot be easily restrained, during rapid movement of the collective.

(3) Opposite **SVO OFF** switch - **2ND STG**, then back to center. It should not be possible to switch off the 2nd stage.

(4) Copilot's **SVO OFF** switch - **2ND STG**, no allowable stick jump. **#2 PRI SERVO PRESS** legend should appear, and **MASTER CAUTION** lights should be on. Individually move cyclic, pedals and collective slowly through full range in no less than 5 seconds. There should be no binds, restrictions, control feedback or rotor blade chatter.

(5) Move the collective from full down to full up position in approximately one second. Repeat from full up to full down. Check **#1 PRI SERVO PRESS** caution legend does not appear, and that there is no longitudinal or lateral cyclic control feedback that cannot be easily restrained, during rapid movement of the collective.

(6) Opposite **SVO OFF** switch - **1ST STG**, then back to center. It should not be possible to switch off the first stage.

BEFORE STARTING ENGINES (CONT)

(7) Copilot's **SVO OFF** switch - Center (Collective full down.)

NOTE

If the **#1 PRI SERVO PRESS** or **#2 PRI SERVO PRESS** caution legend appears, a primary servo bypass valve may be jammed. If cyclic control feedback occurs while the collective is in motion that cannot be easily restrained, a rate related discrepancy may exist. Accordingly the appropriate primary servo must be replaced before flight.

(8) Pilot's **SVO OFF** switch - **1ST STG**, **#1 PRI SERVO PRESS** legend should appear, and **MASTER CAUTION** lights should be on.

(9) Pilot's **SVO OFF** switch - **2ND STG**, **#2 PRI SERVO PRESS** legend should appear, and **MASTER CAUTION** lights should be on.

(10) Pilot's **SVO OFF** switch - Center.

e. **BOOST SERVO** - Check.

(1) Collective - Midposition, Pedals - Centered.

(2) **BOOST** switch - Off. Maximum allowable collective stick and pedal jump 1/16-inch. **BOOST SERVO OFF** caution legend should appear, and **MASTER CAUTION** lights should be on.

NOTE

If excessive stick or pedal jump occurs with the collective in midposition and the pedals centered, the tail rotor system should be checked for unbalanced forces: i.e. redundant quadrant spring forces, cable tension, out of rig condition, etc.; or, a load demand spindle cable feedback force could cause the jump. Refer to appropriate technical manual.

During step (3), a control freeplay of approximately 1.5 inches total may indicate failure of the collective boost servo piston rod at the output rod end. If apparent freeplay occurs, this failure mode should be suspect and the boost servo inspected accordingly.

(3) Collective - Move through full range in no less than 5 seconds. Note slight increase in control forces, but that full control range is obtained with no unusual binds, restrictions or excessive freeplay.

NOTE

During step (4), a control freeplay of approximately 1.5 inches total differential (0.75 inches each pedal) may indicate failure of the yaw boost servo piston rod. If apparent freeplay occurs, this failure mode should be suspect and the boost servo inspected accordingly.

(4) Pedals - Move both pedals through the full range in no less than 5 seconds. Note slight increase in control forces, but that full control range is obtained with no unusual binds, restrictions or excessive freeplay.

(5) **BOOST** switch - Press **ON**, **BOOST SERVO OFF** caution legend disappears, and **MASTER CAUTION** lights off.

BEFORE STARTING ENGINES (CONT)

(6) Collective full down.

(7) **TRIM** switch - Press **ON**.

*17. Collective friction - Check as follows: Turn collective friction nut to full increase. Force required to start collective moving up and down should be between 20 and 40 pounds as measured by a spring scale attached to the front end of collective grip. Back off friction to a point where it turns easily (but not off its threads). Collective should move freely and remains at different positions.

*18. Tail rotor servo - Check as follows:

a. Collective - Midposition.

b. Slowly move pedals through full range, checking for binding or restrictions. Crewmember verify tail rotor blades pitch movement.

c. **TAIL SERVO** switch - **BACKUP**, these legends should appear:

(1) **#1 TAIL RTR SERVO** and both **MASTER CAUTION** lights.

(2) **#2 TAIL RTR SERVO ON** advisory legend.

d. Slowly move pedals through full range, checking for binding or restrictions. Crewmember verify tail rotor blades pitch movement.

e. **TAIL SERVO** switch - **NORMAL**, **#1 TAIL RTR SERVO** caution legend, both **MASTER CAUTION** lights, and **#2 TAIL RTR SERVO ON** advisory legend should be off.

f. Collective - Full down.

*19. AFCS - Check.

*a. SAS/FPS computer - Check (Refer to Section IV B).

*b. SAS engagement/disengagement error - Check.

NOTE

If cyclic stick jumps 1/16-inch or trailing edge of main rotor blade jump more than 1/4-inch, check SAS actuator movement to verify jump.

(1) **SAS 1** and **SAS 2** switches - Press off, check **SAS OFF** caution legend appears.

(2) **BOOST** and **TRIM** switches - **ON**.

(3) **SAS 1** switch - Press **ON**, then off. Cyclic stick jump should not be more than 1/16-inch and trailing edge of main rotor blade should not jump more than 1/4-inch.

(4) Repeat step (3) with **SAS 2**.

(5) **SAS 1** and **SAS 2** switches - Press **ON**, **SAS OFF** caution legend shall disappear.

*c. Flight control breakout forces - Check.

(1) **BOOST** and **SAS 1** switches - **ON**.

(2) **SAS 2** and **TRIM** switches - Press off.

(3) Cyclic and pedals - Centered.

(4) Using a spring scale, measure breakout forces (not to exceed):

(a) Pitch - 15 ounces fore and aft.

(b) Roll - 15 ounces left and right.

BEFORE STARTING ENGINES (CONT)

(c) Yaw - 4 pounds in each direction.

(5) **SAS 2** and **TRIM** switches - Press **ON**.

*d. Trim system - Check as follows:

(1) **BOOST**, **SAS 1**, **SAS 2** and **TRIM** switches - Press **ON**.

(2) **FPS** switch - Press off.

(3) Collective - Midposition, cyclic and pedals centered.

(4) **TRIM** switch - Press off, then **ON**. Check for no more than 1/8-inch jump in cyclic and pedals.

(5) Cyclic force gradient - Check pilot and copilot. Move cyclic in all directions. Note force gradient exists and that trim disengages when using cyclic trim release buttons.

(6) Cyclic trim - Check.

(a) Cyclic - Trim to midposition.

(b) Without releasing trim, displace cyclic full left and release. Cyclic should return smoothly to midposition.

(c) Repeat for full right, forward and aft stick displacement.

*(7) Cyclic force - Check.

(a) Trim cyclic full forward, pull cyclic full aft. Measured force should be between 4.7 and 9.0 pounds.

(b) Trim cyclic full left, pull cyclic full right. Measured force should be between 6.0 and 9.0 pounds.

(8) Yaw pedal force gradient - Check pilot and co-pilot. Move pedals back and forth to determine a force gradient exists, and that trim disengages when each pedal switch is pressed.

(9) Yaw pedal trim - Check.

(a) Pedals - Trim to midposition.

(b) Without releasing trim, displace one pedal full forward and release. Pedal should return smoothly to midposition.

(c) Repeat for other pedal.

(10) **FPS** switch - **ON**.

NOTE

When doing cyclic and tail rotor damping check, rapid movement of controls may be so great that backup pump cannot provide enough pressure fast enough. Therefore, applicable legends may appear and disappear, and possible momentary binding in controls may occur.

e. Damping forces - Check as follows:

(1) **BOOST**, **SAS 1** and **SAS 2** switches - **ON**.

(2) **TRIM** switch - Press off.

(3) Cyclic - Move fore and aft at increasing rates. Check that increased force is required for increased rate of movement. Repeat for lateral cyclic movement, noting a lighter and nearly constant force present.

BEFORE STARTING ENGINES (CONT)

(4) Pedals - Move back and forth at increasing rates. Check that increased force is required for increased rate of movement.

(5) **TRIM** switch - **ON**.

*f. Beep trim - Check as follows (Check pilot and copilot beep trim):

(1) **BOOST**, **SAS 1**, **SAS 2**, **TRIM** and **FPS** switches - **ON**.

(2) Collective - Midposition, cyclic and pedals centered.

(3) Cyclic - Beep left and release. Cyclic should return to center. Repeat in right direction.

(4) Cyclic - Beep forward and release. Cyclic should remain at beeped position. Repeat in aft direction.

*g. Beep time - Check.

(1) **BOOST**, **SAS 1**, **SAS 2**, and **TRIM** switches - **ON**.

(2) **FPS** switch - Press off.

(3) Cyclic - Trim full aft. Using **STICK TRIM** switch, beep cyclic full forward and note travel time between 19 and 25 seconds.

(4) Cyclic - Trim full left. Using **STICK TRIM** switch, beep cyclic full right and note travel time between 18 and 24 seconds.

(5) Cyclic - Centered.

(6) **FPS** switch - Press **ON**.

*h. Collective to yaw electronic coupling - Check as follows:

(1) **BOOST**, **SAS 1**, **SAS 2** and **TRIM** switches - **ON**.

(2) **FPS** switch - Press off.

(3) Collective - Full down, pedals centered (feet off pedals).

(4) Collective - Move full up; then full down. Note that left pedal moves full forward; then return to center ± 1/8-inch.

(5) **FPS** switch - Press **ON**.

*i. **FPS** heading hold - Check as follows:

(1) **BOOST**, **SAS 1**, **SAS 2**, **TRIM** and **FPS** switches - **ON**.

(2) Pedals - Centered. (Move feet 1 to 2 inches aft of pedals.)

(3) Compass null control - Push in and turn clockwise. Note that right pedal drives aft. When pedal microswitch contacts foot, drive stops. Repeat, turning counterclockwise, noting that left pedal drives aft. When pedal microswitch contacts foot, drive stops.

(4) Check both pilot's and copilot's pedal switches.

20. Compass - Set to null as required.

*21. Stabilator - Check. (Refer to Section IV C.)

22. Avionics - On, as applicable.

BEFORE STARTING ENGINES (CONT)

a. PLS - Set as desired.

b. FLIR - **OFF**.

c. APX-100, set as desired - **STBY**.

d. APR-39, set as desired - **ON**.

e. APR-144, set as desired - **ON**.

f. ANVIS HUD panel, set as desired - **ON**.

g. Storm scope - **OFF**.

h. Radar altimeters APN-209 - **ON**, **LO/HI** bugs set.

*23. Fuel quantity indicator - Test.

a. Fuel quantity - Note.

(1) Vertical strips should agree with digital fuel read out within approximately 140 lbs.

(2) Quantity indicated should be a reasonable value.

b. **FUEL IND TEST** switch on **MISC SW** panel - Press and hold.

(1) **FUEL QTY 1** and **2** indicators and digital read-outs should change.

(2) **#1** and **#2 FUEL LOW** legends and **MASTER CAUTION** lights - Illuminate.

c. **FUEL IND TEST** switch - Release.

(1) Fuel quantity indication - Returns to noted level.

(2) Digital readout - Returns to total fuel quantity of both tanks.

O24. ERFS **AUXILIARY FUEL MANAGEMENT** panel - Check. (Refer to Section IV D.1.)

*25. Barometric altimeter - Check tower setting against setting for field elevation. Unreliable for flight if more than 70-foot error exists.

*26. Radar altimeter - Check.

a. Check these indications:

(1) **OFF** flag - Not in view.

(2) Altitude pointer - 0 ± 5 feet.

(3) Digital readout - 0 to +3 feet.

(4) **LO** warning light - On.

(5) **HI** warning light - Off.

(6) **DH** light - On.

b. **HI SET** knob - Press and hold. Check these:

(1) Altitude pointer - 1000 ± 100 feet.

(2) Digital readout - 1000 ± 100 feet.

(3) **LO** warning light - Off.

(4) **HI** warning light - On.

(5) **DH** light - Off.

c. **HI SET** knob - Release, indications should return to those noted in step a. above.

BEFORE STARTING ENGINES (CONT)

*27. Fire detection system - Test.

a. **FIRE DETR TEST** switch - Position **1**. APU T-handle, **#1** and **#2 ENG EMER OFF** T-handles, and master **FIRE** warning lights on.

b. **FIRE DETR TEST** switch - Position **2**. **#1** and **#2 ENG EMER OFF** T-handles and master **FIRE** warning lights on.

c. **FIRE DETR TEST** switch - Return to **OPER**, all **FIRE** warning lights - Off.

CAUTION

Do not check windshield anti-ice when FAT is over 21°C (70°F).

*28. Windshield anti-ice system - Operation and backup hydraulic pump interlock check.

NOTE

When turning windshield anti-ice on, it takes about 45 to 60 seconds until a noticeable change in windshield temperature can be detected.

a. **WINDSHIELD ANTI-ICE PILOT**, **COPILOT** and **CTR** switches - **ON**, with APU generator supplying helicopter power and backup pump operating.

b. Note that windshields do not heat up.

c. **BACKUP HYD PUMP** switch - **OFF**, note increase in windshield temperature.

d. **WINDSHIELD ANTI-ICE** switches - **OFF**.

e. **BACKUP HYD PUMP** switch - **AUTO**.

WARNING

Pitot tubes may be very hot during pitot heat system check. Use care when touching these components.

*29. Pitot heat system - Check.

a. **PITOT HEAT** switch - **ON**, immediately check both pitot heads for increasing temperature, along entire mast assembly.

b. **LFT** and **RT PITOT HEAT** caution legends off.

c. Pull **LEFT** and **RT PITOT HEAT** circuit breakers - Note **LFT** and **RT PITOT HEAT** caution legends on after a 3 to 4 second delay.

d. Push circuit breakers in and note caution legends off.

e. **PITOT HEAT** switch - **OFF**.

*30. Blade deice system - **TEST**, as required. (Refer to Section IV E.)

31. Cargo hook functional check - If required. (Refer to Section IV F.)

O32. Rescue hoist system test - If required. (Refer to Section IV G.)

*33. Fuel boost pumps - Check.

BEFORE STARTING ENGINES (CONT)

a. **NO. 1 PUMP** switch - **ON**. Check **#1 FUEL PRESS** caution legend off and **NO. 1 PUMP** pressure light on.

b. **NO. 2 PUMP** switch - **ON**. Check **#2 FUEL PRESS** caution legend off and **NO. 2 PUMP** pressure light on.

c. **NO. 1** and **NO. 2 PUMP** switches - **OFF**, (If not required.)

34. Communications/navigation radios - Test, check and set as required. (Refer to Section IV H.)

STARTING ENGINES

CAUTION

If the situation requires that the helicopter engine be operated with blades removed or gust lock on, refer to Section IV I to prevent possible damage.

NOTE

If the situation requires that the helicopter be started without APU power see Buddy Start Procedures Section IV X.

1. **AIR SOURCE HEAT/START** switch - As required.

NOTE

If work was done on the fuel system, priming is required. See Section IV J.

a. For APU start of No. 1 or No. 2 engine, place **AIR SOURCE HEAT/START** switch to **APU**.

NOTE

Do not do a crossbleed start on first start of a new or newly installed engine.

b. For crossbleed engine start (operating engine is at least 90% **Ng SPEED** with **% RPM R** at 100%) place **AIR SOURCE HEAT/START** switch to **ENG**.

c. For external air source engine start, place **AIR SOURCE HEAT/ START** switch - **OFF**. External air source-connected.

2. Fire guard - Posted, rotor disc area clear.

3. Gust lock - Release. **GUST LOCK** legend disappears. Verify by crew chief.

4. **TAILWHEEL** lock switch - **LOCK**, crewman confirm locking pin proper position.

5. Cyclic and pedals centered, collective up no more than 1 inch, and frictioned.

6. Engine starter/air start valve/automatic fuel prime checks - Perform. (Refer to Section IV K.) (May be combined with step 7 below).

STARTING ENGINES (CONT)

CAUTION

Should the abort system not work, starter disengagement can be done by removing appropriate air source.

*7. Engine abort system and heater dropout - Check. (May be combined with previous check.)

a. **HEATER** switch - **ON**.

b. **ENG POWER CONT** lever - **OFF**.

c. Engine start button - Press and hold until **Ng SPEED** begins to increase. Note that heater drops off line.

d. Pull down on **ENG POWER CONT** lever - Note that starter drops out, and **Ng SPEED** decreases and heater comes back on line.

e. Repeat steps b. through d. for other engine.

f. **HEATER** switch - **OFF**.

8. **ENGINE IGNITION** switch - **ON**.

9. **BACKUP HYD PUMP** switch - **OFF**.

10. **ANTI-COLLISION LIGHTS** switches - **BOTH** and **DAY** or **NIGHT**, as required.

11. **ENG FUEL SYS** selector(s) - **DIR**.

12. **ENG POWER CONT** lever(s) - **OFF**.

WARNING

During the first start after engine installation, Ng indications should be monitored closely to detect unwanted acceleration above idle due to improper engine rigging.

NOTE

After an engine installation, perform the initial engine start against gust lock to check for leaks. Motor engine before advancing **ENG POWER CONT** lever to **IDLE**. Running engine against gust lock should be held to a minimum. During and after run, check for oil and fuel leaks. Refer to Section IV I.

*13. Engine start button(s) - Press and hold until Ng speed begins to increase.

CAUTION

Ensure that TGT is below 700 150°C, or 701C 80°C before moving ENG POWER CONT lever(s) to IDLE.

14. **ENG POWER CONT** lever(s) - **IDLE**. Start clock.

15. System indications - Check. If any of these conditions occur during start sequence. Perform emergency engine shutdown.

    a. No TGT indication within 45 seconds.

    b. TGT reaches 700 850°C or 701C 851°C before idle is attained.

STARTING ENGINES (CONT)

c. No **ENG OIL PRESS** within 45 seconds.

d. No **% RPM 1** or **2** or **% RPM R** within 45 seconds.

e. **ENGINE STARTER** caution light goes off before 52% **Ng SPEED**.

NOTE

These caution/advisory indications will occur during engine start cycle: **ENG ANTI-ICE ON** legend will appear, **FUEL PRESS** legend will appear and disappear, and **OIL FLTR BYPASS** may appear, but should disappear.

Under no condition should the ignition system be operated continuously for more than 2 minutes at any one time. The allowable ignition use cycle for engine starting is 2 minutes ON, 3 minutes OFF; then 2 minutes ON and 23 minutes OFF for cooling purposes.

At ambient temperatures of 15°C (59°F) and below, two consecutive start cycles may be made followed by a 3-minute rest period, followed by two additional consecutive start cycles. A 30-minute rest period is then required before any additional starts are attempted. At ambient temperatures of 15°C (59°F) to 52°C (126°F), two consecutive start cycles may be made. A 30-minute rest period is then required before any additional start cycles are attempted.

Motoring time for the starter is limited to 2 minutes with a 5-minute rest. The second 2-minute motoring requires a 30-minute rest before beginning another two-start cycle.

16. TGT - Monitor (not over 700 850°C or 701C 851°C).

STARTING ENGINES (CONT)

CAUTION

Operation other than transient in the % RPM 1 or 2 speed range of 20% to 40% and 60% to 90% shall be avoided.

17. **ENG OUT** warning light - Off about 55% Ng.

*18. Starter dropout - 52% to 65% Ng. **ENGINE STARTER** caution legend - Off. If **ENGINE STARTER** caution legend does not go off by 65% **Ng SPEED**, pull **ENG POWER CONT** lever out.

19. Engine **Ng SPEED** - Check as follows:

NOTE

These checks should not be done during the first start of a new or preserved engine.

*a. Clock - Stop when **TGT TEMP** peaks, note time. Time from **ENG POWER CONT** lever positioning to idle speed should not be over 45 seconds at FAT above -20°C (-4°F) and 60 seconds at altitudes over 10,000 feet and/or below -20°C (-4°F).

*b. Idle Speed - Record Idle speed. Minimum 63% Ng.

c. Ngs within 3% of each other at ground idle.

*20. **ENG OIL PRESS** - Check, 700 20 psi or 701C 22 psi minimum caution light off.

*21. **XMSN** oil pressure - Check, no less than 20 psi.

*22. Start other engine - Repeat steps 13 through 21.

23. **BACKUP HYD PUMP** switch - **AUTO**, if above 30**% RPM R** and **#1** and **#2 HYD PUMP** caution legends disappear.

*24. Hydraulic leak system - Check, monitor flight controls.

NOTE

During this check it is normal for the collective and pedals to move.

a. **HYD LEAK TEST** switch - **TEST**. These caution/advisory legends should be on:

(1) **#1 TAIL RTR SERVO**.

(2) **BOOST SERVO OFF**.

(3) **SAS OFF**.

(4) **#1** and **#2 RSVR LOW**.

(5) **BACK-UP RSVR LOW**.

(6) **#2 TL RTR SERVO ON**.

(7) **BACK-UP PUMP ON**.

b. Beep cyclic stick forward for 3 seconds. Note **TRIM FAIL** and **FLT PATH STAB** legends appear. Cyclic should not move during this check.

c. **HYD LEAK TEST** switch - **RESET**, then **NORM**. All legends except **TRIM FAIL**, **FLT PATH STAB** and **BACK-UP PUMP ON** should go off. **BACK-UP PUMP ON** legend should go off after about 90 seconds.

d. Both **FAILURE ADVISORY/POWER ON RESET** switches - Press and release.

(1) **FLT PATH STAB** and **TRIM FAIL** legends - Disappear.

(2) **TRIM FAILURE ADVISORY** light - Off.

25. Flight controls - Hold.

STARTING ENGINES (CONT)

WARNING

Loss of collective boost servo, either through intentional shutoff or loss of No. 2 hydraulic pressure, will cause the collective to rapidly move from the down position to midposition if not properly frictioned or held by hand. This movement can be enough to cause the helicopter to become airborne. During all ground operations with engines above IDLE, the flight controls shall be monitored.

Care should be taken not to move the ENG POWER CONT levers rapidly, either forward or rearward, when the tailwheel lock pin is not engaged. Overly rapid application of ENG POWER CONT levers can result in turning the helicopter, causing personnel injury or loss of life.

CAUTION

The crew chief will inform the pilot when all droop stops are out. If all droop stops are not out by 75%RPM R, shut down and investigate. If investigation reveals no discrepancy, operations may be resumed, providing all droop stops are out before attaining flight rpm and no unusual vibrations occur.

26. **NO. 1** and **NO. 2 ENG POWER CONT** levers - Advance slowly to **FLY** detent.

*a. Droop stops out - 70% to 75**% RPM R**.

b. **LOW ROTOR RPM** warning lights off at 96**% RPM R**.

*c. **#1** and **#2 GEN** caution legends - Off by 97**% RPM R**.

27. **ENG RPM** - Adjust to 100**% RPM R**.

*28. DEICE EOT - Check. (Refer to Section IV L.)

*29. APU generator backup - Check. (Refer to Section IV M.)

O30. **ERFS** Extended range transfer valves - Check. (Refer to Section IV V.2.)

31. **PITOT HEAT** and **WINDSHIELD ANTI-ICE** switches - As desired.

32. External electrical and/or pneumatic power - Disconnected.

33. **ECS** - Check. (Refer to Section IV N.)

RUN-UP

*1. **% TRQ 1** and **2** - Matched within 5%.

RUN-UP (CONT)

WARNING

The tailwheel may slide laterally on wet or icy surfaces as a result of the engine and rotor surge encountered in the engine overspeed system check. Make certain both engines are at 100% and the helicopter is clear of ground support personnel and equipment before the engine overspeed test, ECU LOCKOUT Np overspeed check, engine RPM TRIM check, and accel/decel check. Ensure parking brakes are set, tail wheel is locked, and collective is full down.

*2. Engine overspeed system - Test one engine at a time. Refer to Section IV O.

*3. 700 ECU lockout/Np overspeed - Check as follows:

a. **ENG RPM** switch - 100**% RPM R**.

NOTE

LOCKOUT is recognized by a rapid **% TRQ** increase on affected engine, and a rise in **% RPM R**. Observe TGT indications.

b. **ENG POWER CONT** lever - Momentarily advance one lever full forward to **LOCKOUT**. Immediately bring lever back to near vertical (about 6 o'clock) position. Slowly advance lever to a position where % **TRQ 1** and **2** are matched at 100**% RPM R**, then continue to advance lever slowly above 100%. At 106% ± 1%, the overspeed system should engage. Do not increase above 107**% RPM 1** or **2**.

c. Reengage ECU by moving the **ENG POWER CONT** lever aft to the **IDLE** detent. Monitor **% RPM 1** or **2** to make certain automatic governing mode has reengaged.

d. Repeat check for other engine.

*3.1. 701C DECU lockout/Np overspeed - Check as follows:

a. **ENG RPM** switch - 100**% RPM R**.

NOTE

LOCKOUT is recognized by a rapid **% TRQ** increase on affected engine, and a rise in **% RPM R**. Observe TGT indications.

b. **ENG POWER CONT** lever - Momentarily advance one lever full forward to **LOCKOUT**. Immediately bring lever back to near vertical (about 6 o'clock) position. Slowly advance lever to a position where % **TRQ 1** and **2** are matched at 100**% RPM R**, then continue to advance lever slowly above 100%. Do not increase above 107**% RPM 1** or **2**.

c. Reengage DECU by moving the **ENG POWER CONT** lever aft to the **IDLE** detent. Monitor **% RPM 1** or **2** to make certain automatic governing mode has reengaged.

d. Repeat check for other engine.

*4. **ENG RPM** trim - Check.

a. **ENG SPD TRIM** switch on overhead console -

(1) Full **DECR**. **% RPM R** should decrease to 96%.

(2) Full **INCR**. **% RPM R** should increase to 100%.

RUN-UP (CONT)

*5. Accel/decel - Check as follows:

a. Both **ENG POWER CONT** levers - **FLY**.

b. **% RPM 1** and **2** trimmed to 100**% RPM R**. Note **Ng SPEED**.

WARNING

Care should be taken not to move the ENG POWER CONT levers rapidly, either forward or rearward, when the tailwheel lock pin is not engaged. Overly rapid application of ENG POWER CONT levers can result in turning the helicopter, causing personnel injury or loss of life.

c. Retard one **ENG POWER CONT** lever to **IDLE** and rapidly advance it until **Ng SPEED** peaks at or above previously noted **Ng SPEED**; then rapidly retard **ENG POWER CONT** lever to **IDLE**.

d. Check that there is no acceleration or deceleration stall.

e. Return **ENG POWER CONT** lever to **FLY**.

f. Repeat for other engine.

*6. Electrical systems - Check.

*a. Underfrequency protection - Test. (During this test, the stabilator may experience an auto shutdown. If this occurs, reset **STABILATOR AUTO CONTROL**).

(1) **NO. 1** and **NO. 2 ENG POWER CONT** levers - Retard slowly.

(2) **#1 GEN** and **#2 GEN** caution legends - On between 93% and 97**% RPM R**. Allow for 3-second time delay at each **% RPM R** below 100**% RPM R**.

(3) **NO. 1** and **NO. 2 ENG POWER CONT** levers - **FLY**.

*b. AC system primary bus tie connector - Test.

(1) **GENERATORS NO. 1** switch - **OFF**.

(a) **#1 CONV** legend disappears.

(b) **#1 GEN** legend appears.

(2) Repeat steps (1) and (2) above with No. 2 generator.

*c. AC system essential bus tie connector - Test.

(1) **AC ESNTL BUS SPLY** circuit breaker on **NO. 1 AC PRI BUS** panel - Pull out.

(a) **AC ESS BUS** caution legend - May appear and disappear, but does not stay present.

(b) **STABILATOR** caution legend and audio tone - Off.

NOTE

If during check, **STABILATOR** and/or **FLT PATH STAB** caution legend appears, press **STABILATOR AUTO CONTROL** and/or **FAILURE ADVISORY POWER ON RESET** while **AC ESNTL BUS SPLY** circuit breaker is still out. If stabilator and/or **FPS** reengage check is okay:

(c) **FLT PATH STAB** legend - Disappears.

(d) Stabilator indicator **OFF** flag (pilot and copilot) - Not in view.

(2) **AC ESNTL BUS SPLY** circuit breaker - Push in.

*d. DC system bus tie connector - Test.

(1) **NO. 1 CONVERTER** circuit breaker - Pull out.

(a) **#1 CONV** legend - Appears.

(b) CDU lights - All remain on.

(c) **ADVISORY** lights - Off. **STABILATOR** caution legend and audio tone may or may not be on.

(2) Stabilator **AUTO CONTROL** and **POWER ON RESET** switches - Press to reset if necessary.

RUN-UP (CONT)

(3) **NO. 1 CONVERTER** circuit breaker - Push in. **#1 CONV** legend - Disappears.

(4) Repeat steps (1) through (3) above utilizing **NO. 2 CONVERTER** circuit breaker. If stabilator fails, ensure automatic control is regained prior to pushing **NO. 2 CONVERTER** circuit breaker in. The **FAILURE ADVISORY**lights should not go on; the stabilator may or may not fail.

7. FLIR - **ON**. Perform FLIR ground check as required (Section IV G).

8. **FUEL PUMP** switch - **OFF**.

9. **AIR SOURCE HEAT/START** switch - **OFF** unless heat is required.

10. **APU CONTR** switch - **OFF**.

11. No. 1 and No. 2 **ENG FUEL SYS** selectors - **XFD**.

12. SAS/FPS computer switch - Switch to **GRD**; then back to **NORM**. Ensure that all computer maintenance indicators are reset (black).

13. Perform main rotor tracking and balancing and tail rotor balancing, if required.

TAXI

1. **% RPM R** - 100%.

*2. System instruments - Check.

a. **% RPM 1** and **2**.

b. **XMSN OIL TEMP**.

c. **XMSN OIL PRESS**.

d. **ENG OIL TEMP**.

e. **ENG OIL PRESS**.

f. **TGT TEMP**.

g. **Ng SPEED**.

h. **% TRQ**.

3. Outside area - Clear.

4. Chocks - Removed.

O5. Chaff module safety pin - Remove.

O6. ES Ejector rack locking levers - Unlocked.

7. Doors - Secure.

8. Parking brakes - Release.

*9. Brakes - Check. Apply pilot's and copilot's brakes to check for proper operation.

*10. **TAILWHEEL LOCK** - Check.

a. Unlock tailwheel.

b. Begin to taxi and check that tailwheel swivels.

c. Check that tailwheel will lock.

TAXI (CONT)

CAUTION

HIT check may be deferred until arrival into the test flight hover area if conditions in the runup area prevent accurate and/or safe completion of check.

*11. Engine health indicator test/anti-ice - Check each engine individually. Refer to Section IV P. for detailed procedures.

BEFORE TAKEOFF

1. **NO. 1** and **NO. 2 ENG POWER CONT** levers - **FLY**.
2. **% RPM** - 100%.
3. Systems - Check.
4. **BOOST**, **SAS**, **TRIM**, **FPS** and stabilator **AUTO CONTROL** switches - **ON**.
5. Avionics - As required.
6. **ENG FUEL SYS** selectors - **DIR** or as required for fuel management.
7. Crew and mission equipment - Check.

AIRCRAFT HOVER

1. Hover power - Check. The power check is done by comparing the indicated torque required to hover with the predicted values from performance charts in TM 1-1520-253-10, 700 Chapter 7, or 701C Chapter 7A .
2. On MFD, press **HOV** fixed function key.

NOTE

Due to the flat profile of the main transmission, pitching the helicopter nose up may cause a transient drop in indicated main transmission oil pressure depending on the degree of nose up attitude and length of time attitude is held.

*3. Hover controllability - Check.

a. Hover into wind.

b. Cyclic position. Should be centered laterally and about 1 inch forward of neutral.

c. Left pedal should be forward of right by about 1/2-inch.

d. Check MFD hover display for radar altimeter indication, heading display and Doppler groundspeed accuracy.

*4. SAS - Check.

a. **BOOST**, **SAS 1** and **TRIM** switches - **ON**.

b. **SAS 2** and **FPS** switches - Press off.

c. Controllability - Hover at an altitude of 20 to 25 feet and check:

(1) Without releasing cyclic trim, move cyclic forward to obtain a 3° pitch attitude change. Cyclic stick should return to trim position. Pitch rate should be damped. Repeat in aft direction.

(2) Without releasing cyclic trim, move cyclic left to obtain a 5° to 7° roll attitude change. Cyclic stick should return to original trim position. Roll rate should be damped. Repeat in right direction.

AIRCRAFT HOVER (CONT)

(3) With feet off pedals, make a 20% torque change and observe heading response. Heading should not change more than 15° during ascent.

d. Repeat steps d. (1) through d. (3) with **SAS 2 ON** and **SAS 1** off.

e. **SAS 1** - Press **ON**.

*5. **FPS** - Check.

a. **BOOST**, **SAS 1**, **SAS 2**, **TRIM**, and **FPS** switches - **ON**.

b. Hands off attitude retention in pitch and roll should be ±1°(calm wind).

c. Heading should be ± 2°.

d. Without releasing cyclic trim, introduce a 5° in pitch attitude change in forward direction, helicopter should return to trimmed attitude with no more than one 3° overshoot. Repeat 5° attitude change in aft direction, attitude return should be same as in forward direction.

e. Without releasing cyclic trim, introduce a 10° left roll attitude change, helicopter should return to trim attitude with no more than one 3° overshoot. Repeat 10° roll change in right direction, return attitude should be same as in left roll direction.

f. Transient heading hold - With feet off pedals, increase torque 20% and return to the original power setting, heading should remain within ±15° of original heading.

*6. Tail rotor servo - Check.

a. Land aircraft.

b. **TAIL SERVO** switch - **BACKUP**. **#1 TAIL RTR SERVO** caution legend appears. Note time for **BACK-UP PUMP ON** advisory legend to appear, about 0.5 second. **#2 TL RTR SERVO ON** legend appears.

CAUTION

If #2 TAIL RTR SERVO ON advisory legend did not appear, do not hover helicopter.

c. Move tail rotor pedals 1 inch either side of neutral to check tail rotor response.

d. Pick helicopter up to normal hover.

e. Make 45° turns left and right.

f. **TAIL SERVO** switch - **NORMAL**. **#1 TAIL RTR SERVO** caution legend disappears. **#2 TAIL RTR SERVO ON** advisory legend disappears. **BACK-UP PUMP ON** advisory legend should disappear after 90 seconds.

*7. Generator underfrequency protection disable/low rotor RPM - Test.

a. **SAS 1** - Press off.

AIRCRAFT HOVER (CONT)

WARNING

Care should be taken not to move the ENG POWER CONT levers rapidly.

NOTE

Maintain No. 1 and No. 2 engine torque within 10% of each other. To prevent generator under-voltage drop out, do not reduce **% RPM R** below 85%.

b. **NO. 1** and **NO. 2 ENG POWER CONT** levers - Retard slowly to 90**% RPM R**, ensuring that the **#1 GEN** and **#2 GEN** caution legends do not appear.

NOTE

To avoid excessive exposure of avionics to power frequencies less than 400 Hz (**% RPM R** = 100%) minimize time at **% RPM R** below 95%.

c. **LOW ROTOR RPM** warning light and audio - On as **% RPM R** decreases to 95%.

d. **NO. 1** and **NO. 2 ENG POWER CONT** levers - **FLY**, **LOW ROTOR RPM** warning light and audio off.

e. **SAS 1** - Press ON.

*8. Compasses, turn rate indicators and vertical gyros - Check.

a. Hover at an altitude of 20-25 feet.

b. Make hovering turns.

c. Pilot and copilot HSI compass cards - Check for smooth operation. Compare with magnetic compass.

d. Pilot and copilot turn rate indicators - Check for proper operation (**NORM** and **ALTR**).

e. Pilot and copilot VERT GYROS - Check for proper operation (**NORM** and **ALTR**).

BEFORE TAKEOFF

1. **NO. 1** and **NO. 2 ENG POWER CONT** levers - **FLY**.

2. Systems - Check.

3. Avionics - As required.

4. Crew and mission equipment - Check.

5. Make normal takeoff.

AFTER TAKEOFF

*Copilot shall monitor and call out **STAB POS** indicator position versus airspeed. Stabilator should begin moving up at 30 to 50 KIAS.

CLIMB

1. Instruments - Check.

   a. Airspeed indicators - Check pilot and copilot indicators. Difference between indicators should not be over 5 KIAS.

   b. Vertical speed indicators - Check.

   c. Altimeters - Check.

CLIMB (CONT)

d. Horizontal situation indicator and magnetic compass - Check.

2. Climb to a predetermined altitude.

CRUISE

1. Stabilize airspeed at 80 KIAS.

a. Airspeed indicators - Check pilot and copilot indicators. Difference in indicators should not be over 5 KIAS.

*b. Autorotation RPM - Check.

NOTE

Conduct autorotation RPM check at an altitude that will allow for power recovery before reaching 500 feet AGL. Have a suitable forced landing area within range.

If **% RPM R** is expected to exceed 110%, do not allow **% RPM R** to increase beyond 120%. This may require collective application.

If **% RPM R** is maintained so as not to exceed 110%, no additional collective application is required during power recovery procedures. While advancing the power control levers as Np matches **% RPM R**, both will decrease to normal operating limits.

Transient Np up-speeds of several seconds duration are typically encountered during autorotation entry and recovery.

701C During entry the Np should split away from **% RPM R** prior to reaching approximately 109% and reducing to a value of 100 to 103% Np (**ENG POWER CONT** levers in **FLY**). When the main rotor has split away from Np, transient values as high as 110% to 114% Np may be seen when collective pull is initiated. This behavior is normal.

(1) Pressure altitude - Set copilot's altimeter to 29.92 in. Hg.

(2) Climb to check altitude and cruise until FAT has stabilized and record.

(3) Climb an additional 1000 feet for start of autorotation.

(4) Level off, stabilize at 80 KIAS.

CRUISE (CONT)

(5) **NO. 2 ENG POWER CONT** lever - **IDLE** and stabilized. Then set **ENG POWER CONT** lever just forward of the **IDLE** detent.

CAUTION

701C **If the Np follows up in a steady state manner for values that exceed 109% Np or the recovery Np peak exceeds 114%, discontinue further autorotational flight.**

(6) Collective slowly reduce to full down, maintaining 80 KIAS with aircraft in trim.

(7) **NO. 1 ENG POWER CONT** lever - Retard to **IDLE**. Then set **ENG POWER CONT** lever just forward of the **IDLE** detent.

NOTE

If **% RPM R** reaches 120%, adjust collective to maintain **% RPM R** below 120%, then initiate a power recovery. If during autorotation, **% RPM R** reaches limitations (90 or 120), initiate a power recovery.

(8) When passing through check altitude, record **% RPM R** and fuel quantity.

(9) **NO. 1** and **NO. 2 ENG POWER CONT** levers - Advance to **FLY** detent, **% RPM 1** or **2** should not be greater than **% RPM R**.

(10) Make a power recovery.

(11) Utilizing autorotation RPM correction chart in Section V, check that RPM is within ± 3%.

c. Vibrations - Note any abnormal vibration level.

2. Increase airspeed to 100 KIAS and stabilize.

a. Airspeed indicators - Check pilot and copilot indicators. Difference in indicators should not be over 5 KIAS.

*b. In-flight controllability - Check.

(1) Cyclic position - 1 inch forward of center.

(2) Directional control pedals - Right pedal may be 1 to 2 inches forward of left pedal.

NOTE

If the right pedal is more than 2 inches forward of the left pedal, a full complete rigging check of the flight control system shall be performed. If the rigging check is in accordance with maintenance specifications and the right pedal is still more than 2 inches forward of the left, annotate this discrepancy in the aircraft maintenance log that this aircraft exceeds the allowable 2 inch maximum pedal distance. Forward this information with aircraft model and serial number to maintenance logistics representative for engineering notification and release aircraft for flight. Due to collective to yaw pedal mixing, gross weight, altitude, and component variation, the pedal position may vary.

Any maintenance performed resulting in changes to autorotation RPM and collective high pitch stop will affect Vh pedal position. A recheck of Vh pedal position shall be performed following any such maintenance.

c. Vibrations - Note any abnormal vibration level.

*d. Collective - Full down, note **STAB POS** indicator pointer at about 3° to 7° up.

*3. Increase airspeed to 120 KIAS and stabilize.

a. Airspeed indicators - Check pilot and copilot indicators. Difference in indicators should not be over 5 KIAS.

b. Do a maximum power check. (Refer to Section IV R, S.)

*4. Adjust airspeed to 120 KIAS and stabilize; maintain fixed collective.

*a. Stabilator - Check.

(1) Note **STAB POS** indicator pointer position.

(2) Without releasing trim, enter a sideslip with ball displaced about one width to right. Note **STAB POS** pointer is displaced about 3° down from previously noted position.

(3) Release pedal and check that ball returns to one-half ball width of center and helicopter returns to original heading.

(4) Reference ball to trim.

(5) Repeat sideslip with one ball width to left. Note **STAB POS** pointer is now displaced about 3° up from original trim position.

(6) Make a 45° banked turn with fixed collective. Check **STAB POS** pointer is about 1° down from original trim position in the turn.

*b. FPS/SAS - Check as follows:

CRUISE (CONT)

(1) Maintain fixed collective. Without releasing trim, introduce slight longitudinal cyclic stick movement to change helicopter pitch attitude 5° nose up then allow cyclic to return to trimmed position. Then repeat with 5° nose down.

(2) Check that attitude returns to original trim with no more than one overshoot, and that response is symmetrical.

(3) Repeat in roll axis, but make a 10° attitude change. Check both directions.

(4) Roll helicopter against stick trim into to a 30° bank turn and allow cyclic stick to return to center (trimmed position). Check both directions.

(5) Check that helicopter smoothly returns to original trim attitude and new heading with only a slight overshoot, and that left and right response is symmetrical, and ball should return to 1/2 ball width of center.

(6) Repeat with single SAS and limit the control inputs to one-half of the values stated above. Note the same response for both **SAS 1** and **SAS 2**.

(7) **SAS 1** and **SAS 2** switches - **ON**.

*c. Beep trim - Check.

(1) Beep cyclic laterally into a 30° right bank; then beep back to level.

(2) Beep to a 30° left bank, and again back to level and maintain new heading.

(3) Ball should remain within 1/2 ball width of center.

d. Attitude/Airspeed - Check.

(1) Without releasing trim, slowly move cyclic aft to decrease airspeed about 15 KIAS and release.

(2) Attitude overshoot beyond original trim should not be over 15°, and airspeed overshoot should not be over 7 knots.

(3) Repeat in forward direction.

*e. Vibration absorber check and tuning. (Refer to Section IV T.)

5. Increase airspeed to 145 KIAS and stabilize.

*a. Airspeed indicators - Check pilot's and copilot's indicators. Difference in indicators should not be over 5 KIAS.

b. Vibrations - Note any abnormal level.

*6. Increase airspeed to Vh.

Vh is defined as:

100% TRQ.

700 837°C to 849°C or 701C 851°C.

Ng limiting.

*a. Cyclic - Laterally centered. Measure distance from instrument panel to cyclic stick. Cyclic should be at least 2 inches aft of ground cyclic forward stop check.

*b. Directional control pedals - Right pedal may not be more than 2 inches forward of left pedal.

CRUISE (CONT)

*c. High pitch stop - Vh can be obtained before collective is against upper stop. The condition where Vh and upper stop are reached simultaneously is acceptable.

*d. Check that **STAB POS** indicator pointer is 0° to 4° down.

e. Vibrations - Note any abnormal level.

*7. Decrease airspeed to cruise and stabilize.

*a. Communication and Navigation Equipment - Airborne Checks - Tests/Check operation. (Refer to Section IV U.)

NOTE

Functionally check receivers and transmitters when applicable.

Range of transmission or reception depends upon many variables, including weather conditions, time of day, operating frequency, power of transmitter and altitude of helicopter.

b. Flight instruments - Fly at different airspeeds and altitudes, checking performance of flight instruments as follows:

(1) Vertical situation indicators - Proper indication, no excessive precession or vibration and turn and slip indicates properly.

(2) Horizontal situation indicators - Proper indication, correct heading, operates smoothly, no fluctuation, pilot's and copilot's indicators read the same within 2°.

(3) Altimeters - Proper indication, no large fluctuations.

(4) Vertical speed indicators - Proper indication, nearly the same, no excessive fluctuation.

(5) Magnetic compass - Correct heading, no excessive fluctuation.

*O8. External extended range fuel transfer check. (Refer to ERFS Section IV V.)

BEFORE LANDING

1. **TAILWHEEL** switch - As required.
2. **PARKING BRAKE** - As required.
3. Crew and mission equipment - Check.

AFTER LANDING

1. **TAILWHEEL** switch - As required.
2. Exterior lights - As required.
3. Avionics - As required.

ENGINE SHUTDOWN

1. **TAILWHEEL** switch - **LOCK**.
2. **PARKING BRAKE** - Set.

ENGINE SHUTDOWN (CONT)

NOTE

PARKING BRAKE ON legend is actuated by **PARKING BRAKE** handle. Appearance of advisory legend does not necessarily mean that wheel brakes are set.

3. Landing gear - Chocked.

4. Chaff electronic module safety pin(s) - Install.

O5. ES Ejector rack locking levers - Locked.

6. **ENG ANTI-ICE**, **WINDSHIELD ANTI-ICE**, **PITOT HEAT**, **BLADE DEICE POWER**, and **HEATER** switches - **OFF**.

7. **SAS 1** - Off.

8. **AIR SOURCE HEAT/START** switch - **APU**.

9. **FUEL PUMP** switch - **APU BOOST**, **PRIME BOOST PUMP ON** legend should appear.

10. Ground power unit - Connected, **EXT PWR** switch - **RESET** then **ON**, if required.

11. **APU CONTR** switch - **ON**.

    a. **APU ON** legend - Appears.

    b. **APU ACCUM LOW** and **BACK-UP PUMP ON** legend - Appears.

    c. **GENERATORS NO. 1** and **NO. 2** switches - **OFF**. **#1 GEN**, **#2 GEN**, and **APU GEN ON** legends should appear.

12. **FUEL BOOST PUMP CONTROL NO. 1 PUMP** and **NO. 2 PUMP** switches - **OFF** if used.

13. Collective - Up no more than 1 inch.

CAUTION

To prevent damage to anti-flap stops, do not increase collective pitch at any time during rotor coast down.

14. **ENGINE IGNITION** switch - **OFF**.

15. **ECS** switches - **OFF**.

16. Flight controls - Hold.

CAUTION

The crewchief or copilot shall notify the pilot when all droop stops are seated. If one or more droop stops do not go in during rotor shutdown, accelerate the rotor to above 75% RPM R. Repeat rotor shutdown procedures, slightly displacing the cyclic in an attempt to dislodge the jammed droop stop(s). If the droop stop(s) still do not go in, make certain the rotor disc area is clear of personnel and proceed with normal shutdown procedures while keeping the cyclic in a neutral position.

*17. **ENG POWER CONT** levers - **IDLE**. Droop stops, verify in, about 50**% RPM R**.

ENGINE SHUTDOWN (CONT)

NOTE

Do not move **ENG POWER CONT** levers below **IDLE** until **APU ACCUM LOW** legend disappears.

18. Cyclic - Centered or as required to prevent droop stop pounding.

*19. System instruments - Check.

20. **BACKUP HYD PUMP** switch - **OFF**.

CAUTION

Before moving ENG POWER CONT lever OFF, engine must be cooled for 2 minutes at an Ng SPEED of 90% or less.

If an engine is shut down from a high power setting (above 90%) without being cooled for 2 minutes, and it is necessary to restart the engine, the restart should be accomplished within 5 minutes after shutdown. If the restart cannot be accomplished within 5 minutes, the engine should be allowed to cool for 4 hours before attempting an engine restart.

21. **NO. 1 ENG POWER CONT** lever - **OFF** after engines have cooled for 2 minutes.

22. **#1 ENG OUT** warning light and audio - On as **Ng SPEED** decreases below 55%.

23. **#1 ENG FUEL SYS** selector - **OFF**.

24. **TGT TEMP** - Monitor.

25. Repeat steps 20 through 23 for No. 2 engine. Engine out audio will not go on.

26. Avionics - Off.

27. Stabilator - Slew to 0.

28. 701C Note and record **DEC** codes.

29. **APU** generator switch - **OFF**.

30. **FUEL PUMP** switch - **OFF**.

31. **APU CONTR** switch - **OFF**.

32. **AIR SOURCE HEAT/START** switch - **OFF**.

33. All other overhead switches - OFF.

34. **BATT** switch - **OFF**.

*35. Post flight inspection - Perform.

*36. Check sheet - Signed.

37. All entries from remarks column of check sheet transcribed to DA Form 2408-13-1.

38. Maintenance personnel - Debriefed as necessary.

SECTION III. FAULT ISOLATION PROCEDURES

General. Fault Isolation Procedures Manuals have data for troubleshooting the helicopter's systems. Operational checkout procedures and logic-type troubleshooting charts give detailed step-by-step instructions to identify malfunctioning components. Component location diagrams and schematics are also included in these manuals. TM 1-1520-237-23, Aircraft Maintenance Manual, covers all helicopter systems except avionics. TM 11-1520-237-23-2, Avionics Fault Isolation Procedures Manual, covers only avionics.

SECTION IV. SPECIAL/DETAILED PROCEDURES

General. This section contains special/detailed procedures that were referenced in Section II.

A. NVG Systems - Check.

N1. NVG check if use is anticipated.

a. **MA WRN** and **CAUT ADVSY NVG DIMMING** control - Full clockwise position.

b. **INSTR LT PILOT FLT** - Turn control clockwise from **OFF**.

c. **BRT/DIM TEST** switch - **BRT/DIM** momentarily; then **TEST** and hold.

d. All master warning panels at reduced light level.

e. Pilot's and copilot's VSI/HSI **MODE SEL** legends, **CIS MODE SEL**, panel legends, pilot's and copilot's VSI legends, Emergency Control Panel, **VTAC** switch, **BRG 1/DIST** switch, and **AFCS FAILURE ADVISORY** lights illuminate.

f. Rotate **LWR CSL AUX DIMMER** control on instrument panel clockwise, and counterclockwise. Lower console panel legends increase and decrease in brightness.

g. Rotate **MA WRN NVG DIMMING** control on instrument panel clockwise, and counterclockwise. Master warning legends increase and decrease in brightness.

h. **INSTR LT PILOT FLT** dimmer control - Adjust as desired.

i. Set **BLUE-OFF-WHITE** switch on secondary overhead lights panel **OFF**.

j. Check **GLARESHIELD LIGHTS** dimmer control - Counterclockwise at **OFF**.

k. **GLARESHIELD LIGHTS** dimmer control - Rotate clockwise to **BRT**. Observe that six glareshield lights illuminate and increase in brightness.

l. **LIGHTED SWITCHES** dimmer control - Rotate clockwise. Switches on **MODE SEL** panel, **TAIL WHEEL** switch, switches on **CIS MODE SEL** panel, **AUTO FLIGHT CONTROL** panel switches illuminated, and **FUEL BOOST PUMP CONTROL** panel **PRESS-TO-TEST** lights illuminate when pressing to test.

m. Rotate **CPLT FLT INST LTS** control clockwise from **OFF** to **BRT**. Observe the following copilot's instruments illuminate and increase in brightness.

(1) Stabilator position/airspeed placard.

(2) Airspeed indicator.

(3) Barometric altimeter.

(4) Radar Altimeter.

(5) VSI.

(6) VSI/HSI MODE SEL.

(7) HSI.

(8) IVVI.

(9) Clock.

(10) Copilot's PDU.

(11) Stabilator indicator.

(12) **CPLT FLT INST LTS** control - Set as desired.

n. Rotate copilot's **RAD ALT DIMMING** control clockwise, then counterclockwise. Observe the copilot's radar altimeter digital display and warning indicator becomes bright then dim.

o. Rotate **INSTR LT PILOT FLT** control clockwise toward **BRT**. Observe the pilot's instruments in steps (1) through (11) above illuminate and increase in brightness for pilot's side of panel.

p. Rotate pilot's **RAD ALT DIMMING** control clockwise, then counterclockwise. Observe the pilot's radar altimeter digital display and warning indicator becomes bright then dim.

q. Rotate **INSTR LT NON FLT** control clockwise from **OFF** toward **BRT**. Observe the following non-flight instruments illuminate and increase in brightness:

(1) CDU.

(2) Copilot's collective grip.

(3) Pilot's collective grip.

(4) **INSTR LT NON FLT** control - Set as desired.

2. Upper/lower console lights - Check.

a. **CONSOLE LT UPPER** and **LOWER** dimmer control - Rotate counterclockwise to **OFF**.

b. **CONSOLE LT UPPER** control - Rotate clockwise from **OFF** to **BRT**. Upper console, quadrant panels, and secondary light panels illuminate and increase in brightness as control is turned clockwise.

c. **CONSOLE LT LOWER** control - Rotate clockwise from **OFF** to **BRT**. The following panel lights will illuminate:

(1) Lower console CDUs.

(2) Pilot, copilot, and cabin **CSC** panels

(3) **MISC SW** panel.

(4) **EMERGENCY CONTROL PANEL**.

(5) **AUTO FLT CONT** panel.

(6) Ice rate indicator panel.

(7) FLIR control panel.

(8) **FUEL BOOST PUMP CONTROL** panel.

(9) PLS CDU.

(10) **STORES JETTISON** panel.

(11) **BLADE DEICE** and **BLADE DE-ICE TEST** panel.

(12) VHF AM/FM emergency control panel.

(13) **COMPASS** control panel.

(14) **AUX SW**, and when installed, **AUXILIARY FUEL MANAGEMENT** and **RESCUE HOIST** panel,

(15) Environmental control system panel in cabin.

d. The lights will not illuminate on the following control panels:

(1) M130 Dispenser.

(2) IFF.

(3) Radar warning.

(4) IRCM.

3. Utility lights - Check.

   a. Momentary button on pilot's cockpit utility light - Press then release. Pilot's utility light illuminates with button pressed.

   b. Check blue, white, and spot function of pilot's cockpit utility light; then turn off.

   c. Repeat steps a. and b. for copilot's cockpit utility light.

   d. Repeat steps a. and b. for lower console auxiliary utility light.

4. Cargo hook well lights - Check.

   a. **CARGO HOOK LT** switch - **ON**.

   b. Crewman check cargo hook well lights - Illuminate.

   c. **CARGO HOOK LT** switch - **OFF**.

5. Cabin dome lights - Check.

   a. **CABIN DOME LT** switch on upper console - **WHITE**. **CABIN DOME LT** control on pilot's seat - Rotate clockwise to **BRT**. Observe cabin dome lights illuminate and increase in brightness as control is turned.

   b. **CABIN DOME LT** switch - **BLUE**. Observe cabin dome lights extinguish and blue lights illuminate brightly.

c. **CABIN DOME LT** control and **CABIN DOME LT** switch - As desired.

6. Searchlight - Check.

NOTE

Use of NVGs by the crewchief during this check will facilitate the accomplishment of this check.

a. **SRCH LT** switch - Check **OFF**.

b. Set searchlight **OUTPUT** switch on dimmer control box under pilot's seat to **NORM** (inboard position).

c. Pilot's searchlight control switch - **EXT** and hold. Searchlight extends to limits of travel.

d. Release searchlight control and press **SRCH LT** switch - **ON**. Searchlight illuminates brightly. **SEARCH LT ON** legend on caution/advisory panel will illuminate.

e. Move **SRCH LT** switch to **DIM** and hold. Searchlight decreases in brightness and extinguishes. Release **SRCH LT** switch. Verify by crewchief.

f. Move **SRCH LT** switch to **BRT** and hold. Searchlight will increase in brightness. Verify by crewchief.

g. Move pilot's searchlight control switch through all 4 positions: **L**, **R**, **RET**, **EXT**. Searchlight should follow control movement.

h. Pilot's searchlight control switch - **RET**. Searchlight follows direction of control switch movement.

i. Pilot's **SRCH LT** switch - **OFF**. **SEARCH LT ON** advisory light - Off.

j. Set **OUTPUT** switch on searchlight dimmer box to **BYPASS**.

k. Pilot's searchlight control - **EXT** and hold. Searchlight extends to limit of travel.

l. Pilot's searchlight **SRCH LT** switch - **ON**. Searchlight illuminates brightly. **SEARCH LT ON** advisory legend on.

m. **SRCH LT** switch - Hold at **DIM**. Searchlight should not decrease in brightness.

n. **SRCH LT** switch - **OFF**. Searchlight and advisory legend extinguishes.

o. Copilot's searchlight control switch - **ON** then **EXT** until lamp extends about 45° from fully retracted position, then move switch to **R** and hold. Searchlight rotates, lamp automatically extinguishes after about 1/4 turn and illuminates after about 3/4 turn from start position.

p. Move copilot's searchlight control through all 4 positions: **L**, **R**, **RET**, **EXT**. Searchlight should follow control movement.

q. Copilot's searchlight control switch - **RET**. Searchlight follows direction of control switch movement.

r. Copilot's **SRCH LT** switch - **OFF**. **SEARCH LT ON** advisory light - Off.

7. Exterior lights - Check.

a. **POSITION LIGHTS** switch - **BRT** and **STEADY**.

b. **NAV LTS** switch - **NORMAL**. All position lights should be illuminated brightly.

c. **POSITION LIGHTS** switch - **DIM** and **FLASH**. Verify all position lights flash at reduced intensity.

d. **FORMATION LT** switch - Rotate from **OFF** to position **5**, noting increase intensity at each position.

NOTE

Use of NVGs by the crewchief for the following steps is mandatory.

e. **NAV LTS** switch - **IR**. IR formation lights should be bright.

f. **FORMATION LT** switch - Set at position **4** or below. IR formation lights should dim.

g. Crewchief verify all position lights are dim and flashing.

h. **POSITION LIGHTS** switch - **BRT** and **STEADY**. Crewchief verify all position lights intensity.

i. Set lighting controls as desired.

B. SAS/FPS Computer Check.

1. **BOOST**, **SAS 1**, **SAS 2**, and **TRIM** switches - **ON**.

2. **FPS** switch - Off.

   a. Computer switch on SAS/FPS computer - **GND**. All computer maintenance indicators shall reset (black). **FLT PATH STAB**, and **TRIM FAIL** caution lights shall be off.

      (1) Left **FAILURE RESET** switch (AFCS control panel) - Press and release. **CPTR**, **SAS 2**, **TRIM**, and **R GYR** failure advisory lights will be off.

      (2) Right **FAILURE RESET** switch (AFCS control panel) - Press and release. **ACCL**, **CLTV**, **A/S**, and **GYRO** failure advisory lights will be off.

   b. Computer switch - **PROC A**.

      (1) **FLT PATH STAB**, and **TRIM FAIL** caution lights will flash once and then remain on.

      (2) **CPTR**, **SAS 2**, **CLTV**, **TRIM**, **R GYRO**, **A/S** and **GYRO** failure advisory lights will go on.

      (3) All computer maintenance indicators, except for **DIR GYRO**, **LAT ACCL**, and **FAN FAIL** will latch (white).

   c. Computer switch - **GND**.

      (1) All computer maintenance indicators will reset (black).

      (2) **FLT PATH STAB** and **TRIM FAIL** caution lights will go off.

(3) Left **FAILURE RESET** switch. Press and release **CPTR**, **SAS 2**, **TRIM**, and **R GYR** failure advisory lights will go off.

(4) Right **FAILURE RESET** switch - Press and release. **CLTV**, **A/S**, and **GYRO** failure advisory lights will go off.

d. Computer switch - **PROC B**.

(1) **FLT PATH STAB** and **TRIM FAIL** caution lights will flash once and then remain on.

(2) **CPTR**, **SAS 2**, **ACCL**, **TRIM**, **R GYRO** and **GYRO** failure advisory lights will go on.

(3) All computer maintenance indicators except for AIR SPEED, COLL STICK, and **FAN FAIL** will latch (white).

(4) Both **FAILURE RESET/POWER ON RESET** switches - Press and release. **FLT PATH STAB** and **TRIM FAIL** caution lights will go off momentarily and then go on. **CPTR**, **SAS 2**, **ACCL**, **TRIM**, **R GYRO**, and **GYRO FAILURE ADVISORY** lights will go off momentarily and then go on.

e. Computer switch - **GND**.

(1) All computer maintenance indicators will reset (black).

(2) **FLT PATH STAB** and **TRIM FAIL** caution lights will go off.

(3) Left **FAILURE RESET** switch - Press and release. **CPTR**, **SAS 2**, **TRIM**, and **R GYRO** failure advisory lights will go off.

(4) Right **FAILURE RESET** switch. Press and release. **ACCL** and **GYRO** failure advisory lights will go off.

f. Computer switch - **NORM**. **FAN TEST** switch on computer - 1 and release. **FAN FAIL** maintenance indicators will latch and **CPTR** failure advisory light will go on.

g. Computer switch - **GND**.

(1) **FAN FAIL** maintenance indicators will reset (black).

(2) Left **FAILURE RESET** switch. Press and release. **CPTR** failure advisory light will go off.

h. Computer switch - **NORM**.

(1) **FAN TEST** switch on computer - 2 and release. **FAN FAIL** maintenance indicators shall latch and **CPTR** failure advisory light will go on.

(2) Left **FAILURE RESET** switch - Press and release. **CPTR** failure advisory light will go off.

i. Computer switch - **GND**. **FAN FAIL** maintenance indicator will reset (black).

j. Computer switch - **NORM**.

k. **FPS** switch - **ON**.

C. Stabilator Check.

WARNING

If any part of the stabilator check fails, do not fly the helicopter.

1. **STAB POS** indicator should be 34° to 42° **DN**. **STABILATOR** caution legend not present.

2. **TEST** button - Press and hold until **STABILATOR** legend and **MASTER CAUTION** lights go on and the audible warning tone is heard in the pilot's and copilot's headsets. The **STAB POS** indicator should have moved 5 to 12 degrees less than in Step 1.

3. **AUTO CONTROL** switch - Press **ON**, **STAB POS** indicator should have moved to 34° to 42° **DN**. **STABILATOR** caution legend and tone - Off. Crew member verify stabilator position.

CAUTION

When manually slewing the stabilator, take care when approaching either extreme of stabilator travel, to prevent airframe damage if the limit switch is inoperative or improperly adjusted. The MAN SLEW switch should be bumped until limit switch stops stabilator movement.

4. **MAN SLEW** switch - **UP** and hold until stabilator stops. **STAB POS** indicators should be at 6° to 10° UP within about 7 seconds. **STABILATOR** legend appears, and **MASTER CAUTION** lights on and beeping audible warning tone in pilot's and copilot's headsets. **MASTER CAUTION** press to reset audio tone. Crewmember verify position.

5. **AUTO CONTROL** switch - Press **ON**. **STAB POS** indicators should move to 34° to 42° **DN**. **STABILATOR** caution legend disappears.

6. Pilot cyclic stabilator slew-up switch - Depress until **STAB POS** indicators read 6° to 10° up. **STABILATOR** and **MASTER CAUTION** lights on and beeping audible warning in pilot's and copilot's headsets. **MASTER CAUTION** press to reset audio tone.

7. **AUTO CONTROL** switch - Press **ON**. **STAB POS** indicators should move to 34° to 42° **DN**. **STABILATOR** caution legend off.

8. Repeat step 6 using copilot's cyclic stabilator slew-up switch.

9. **MAN SLEW** switch - **DN** hold until **STAB POS** indicators read 0°. Crewmember verify stabilator position.

10. **AUTO CONTROL** switch - Press **ON**. **STAB POS** indicators should move to 34° to 42° **DN**. **STABILATOR** caution legend off. Crewmember verify stabilator position.

11. Stabilator amplifier comparator - Check as follows:

    a. Momentarily switch **AMP 1** switch on stabilator system test panel to **COMP 1** position and then back to **OFF**.

    b. Observe the following:

        (1) **AUTO CONTROL** switch legend shall go off.

        (2) **STABILATOR** legend and **MASTER CAUTION** - Caution capsules shall illuminate.

        (3) Audible warning tone shall be heard in the pilot's and copilot's headsets.

    c. **AUTO CONTROL** switch - Press **ON**. **AUTO CONTROL** switch legend shall illuminate on and **STABILATOR** legend and **MASTER CAUTION** light shall extinguish and no audio tone in headset.

    d. Momentarily switch **AMP 1** switch on stabilator system test panel to **COMP 2** position and then back to off. Repeat steps b. through c.

    e. Momentarily switch **AMP 2** switch on stabilator system test panel to **COMP 1** position and then back to off. Repeat steps b. through c.

    f. Momentarily switch **AMP 2** switch on stabilator system test panel to **COMP 2** position and then back to off. Repeat steps b. through c.

D. Extended Range Fuel System. ERFS

O1. **AUXILIARY FUEL MANAGEMENT** panel - Test and set.

a. **TEST** button - Press and hold. All control panel indicator lights on, digital display indicates 8888.

b. **TEST** button - Release. Digital display indicates 8 in left digit position, and sequentially moves through each digital position from left to right three times.

c. Digital display then indicates **GOOD** for about 5 seconds.

d. Digital display then indicates fuel type, either 4, 5, or 8, (preset fuel type) in left most digital position for about 3 seconds.

e. Digital display indicates some value of auxiliary fuel remaining in tanks.

f. **STATUS** button - Press and hold.

g. **AUX FUEL** caution light will go off. Control panel indicator lights will display last system status.

h. **STATUS** button - Release. All **NO FLOW**, **EMPTY**, and **AUX FUEL** caution lights off.

i. Control panel **AUX FUEL QTY** switch **OUTBD**.

j. Manipulate **INCR/DECR** switch to obtain total outboard fuel quantity indication in pounds using a constant weight per gallon.

k. Repeat steps i. and j. for **AUX FUEL QTY** switch **INBD** position.

l. **AUX FUEL QTY** switch - **TOTAL**, note digital display quantity.

m. Digital display shall equal input quantity in step j., added to quantity in step k.

n. **AUX FUEL QTY** switch - **CAL**.

o. Manipulate **INCR/DECR** switch to obtain the ″K″ factor annotated in the log book.

p. **AUX FUEL QTY** switch - Total.

O2. **ERFS** Extended range transfer valves - Check.

a. Inboard/outboard bleed air valves check.

(1) No. 1 or 2 engine - 100% **AIR SOURCE HEAT/START** switch **ENG**.

(2) **PRESS** switches **OUTBD** and **INBD** - **OFF**.

(3) **MODE** select - **MANUAL**.

(4) **TANKS** select - **OUTBD**.

(5) **MANUAL XFR LEFT** switch - **ON**.

(6) Check for no fuel transfer (no decrease in aux/no increase in main).

(7) **TANKS** select - **INBD**.

(8) Check for no fuel transfer.

(9) Repeat steps (6) through (8) with **MANUAL XFR LEFT** - **OFF**, **MANUAL XFR RIGHT** - **ON**.

b. Fuel transfer valves check.

(1) **PRESS** switches **INBD** and **OUTBD** - **ON**.

(2) **MODE** select - **MANUAL**.

(3) **TANKS** select - **OUTBD**.

(4) **MANUAL XFR** switch - **OFF**. Verify no transfer takes place.

(5) **MANUAL XFR LEFT** switch - **ON**. Verify transfer from left. Check **OUTBD AUX QTY** reduced. Repeat with **MANUAL XFR LEFT** - **OFF** and **MANUAL XFR RIGHT** - **ON**.

(6) Repeat for inboard tanks (if installed).

(7) **MANUAL XFR** switch - **OFF**.

E. Blade Deice System Check.

1. **BACKUP HYD PUMP** switch - **OFF**. **BACK-UP PUMP ON** advisory legend should be off.

CAUTION

To prevent overheating of droop stops, blade deice test shall not be done more than one time within a 30-minute period when rotor head is not turning.

2. Ice rate meter **PRESS TO TEST** button - Press and release. Start clock.

3. Ice rate meter indicator - Moves to half scale (1.0 ± 1/8 inch), holds about 50 ± 10 seconds and then falls to 0 or below, **ICE DETECTED** legend and **MASTER CAUTION** lights on after 15 to 20 seconds into the test, and FAIL flag not visible in flag window. Ice rate meter should move to zero within 75 seconds after pressing **PRESS TO TEST** button. Reset clock.

NOTE

PWR MAIN RTR and **PWR TAIL RTR** failure monitor lights may flash and **MR DE-ICE FAULT** capsule may go on during tests in steps 5. through 19.

4. **BLADE DE-ICE TEST** panel select switch - **NORM**.

5. **BLADE DEICE POWER** switch - **TEST**, start clock.

6. **PWR MAIN RTR** and **PWR TAIL RTR** monitor lights - Check. **PWR MAIN RTR** monitor light may go on for 2 to 4 seconds. If either light goes on and remains on for 10 seconds or more, do this:

   a. **BLADE DEICE POWER** switch - **OFF**. If either light is still on:

   b. **APU** generator switch and/or **EXT PWR** switch - **OFF**.

7. **TEST IN PROGRESS** light - Check. Light should go on for 105 to 135 seconds. No other blade deice system lights should be on. **PWR MAIN RTR** and **PWR TAIL RTR** monitor lights may go on momentarily near end of test. The **TEST IN PROGRESS** lights should then go off. Reset clock.

WARNING

Droop stop hinge pins and cams may become very hot during test. Use care when touching those components.

8. Crewman touch each droop stop cam - Cams should be warm to touch.

9. **BLADE DEICE POWER** switch - **OFF**.

10. **BLADE DE-ICE TEST** select switch - **SYNC 1**.

11. **BLADE DEICE POWER** switch - **TEST**. **MR DE-ICE FAIL** caution legend should appear.

12. **BLADE DEICE POWER** switch - **OFF**. **MR DE-ICE FAIL** caution legend disappear.

13. **BLADE DE-ICE TEST** select switch - **SYNC 2**.

14. **BLADE DEICE POWER** switch - **TEST**. **MR DE-ICE FAIL** caution legend should appear.

15. **BLADE DEICE POWER** switch - **OFF**. **MR DE-ICE FAIL** caution legend disappear.

16. **BLADE DE-ICE TEST** select switch - **OAT**.

17. **BLADE DEICE POWER** switch - **TEST**. **MR DE-ICE FAIL** and **TR DE-ICE FAIL** caution legends should appear.

18. **BLADE DEICE POWER** switch - **OFF**. **MR DE-ICE FAIL** and **TR DE-ICE FAIL** caution legends disappear.

19. **BLADE DE-ICE TEST** select switch - **NORM**.

20. **BACKUP HYD PUMP** switch - **AUTO**.

F. Cargo Hook System Operational Check.

1. Cargo hook functional check.

   a. **CARGO HOOK CONTR** switch - As required, **CKPT** for pilot and copilot check or **ALL** for crewmember check.

   b. **CARGO HOOK ARMING** switch - **ARMED**.

   c. **HOOK ARMED** legend - Appears.

   d. Place about 20 pounds downward pressure on load beam.

   e. **CARGO REL** switch (pilot and copilot): **NORMAL RLSE** (crewmember) - Press and release.

   f. **CARGO HOOK OPEN** legend - Appears.

   g. **CARGO HOOK OPEN** legend - Disappears when hook closes.

   h. Repeat steps c. through f. copilot and crewmember positions.

   i. **CARGO HOOK ARMING** switch - **SAFE**.

   j. **HOOK ARMED** legend - Disappears.

   k. While applying downward pressure on load beam, rotate manual release knob (lever) on right side of hook clockwise, latching mechanism should release the load beam.

2. Emergency Release Circuit.

   a. **EMERG REL TEST** light - Press, light should be on.

NOTE

To prevent unintentional discharge of the cargo hook explosive cartridge, the pilot shall call off each procedural step of the emergency release circuit test before that step is done. Station being checked shall reply to pilot's command.

b. Short test.

(1) **CARGO HOOK EMERG REL** switch - **SHORT**.

(2) Pilot's **HOOK EMER REL** button - Press and hold.

(3) **CARGO HOOK TEST** light - On.

(4) **HOOK EMER REL** button - Release. **TEST** light off.

(5) Repeat steps (2) through (4) for copilot's **HOOK EMER REL** button, and crewmember's cargo hook control pendant **EMER RLSE** button.

c. Open test.

(1) **CARGO HOOK EMERG REL** switch - **OPEN**.

(2) Pilot's **HOOK EMER REL** button - Press and hold.

(3) **CARGO HOOK TEST** light - On.

(4) **HOOK EMER REL** button - Release. **TEST** light off.

(5) Repeat steps (2) through (4) for copilot's **HOOK EMER REL** button, and crewmember's cargo hook control pendant **EMER RLSE** button.

d. **CARGO HOOK EMERG REL** switch - **NORM**. If cargo hook is not to be used immediately after completing circuit test check, **EMERG REL** switch shall remain at **OPEN** until ready for load pickup.

G. Rescue Hoist Operational Check.

Check hoist with pilot controls.

1. **HOIST POWER** switch - **ON**.

2. **ARM-TEST** switch - **TEST**. Observe **SQUIB TEST** light illuminates.

3. **ARM-TEST** switch - **ARM**.

4. Pilot lower hoist using **PILOT OVERRIDE UP-DOWN** switch - Observe cable lowers.

5. Pilot raise hoist to full up position.

6. Crewman - Perform hoist check.

   a. Crewman lower hoist using rescue hoist pendant thumbwheel (check variable speeds). Cable should lower. Pilot verify override capability using **PILOT OVERRIDE UP-DOWN** switch.

   b. Verify **UP** and **DOWN** control using thumbwheel switch.

   c. Raise rescue hoist to full up.

7. **ARM** switch - **OFF**.

8. **HOIST POWER** switch - **OFF**.

H. Communication and Navigation Equipment - Ground Checks.

1. Avionics Management system. Check status.

   a. **STS** fixed function key - Press. Observe status of systems.

   b. COM 1, 2, 3, 4 and 5 radios. Check transmission and reception.

   c. Emergency Communication Panel. Check transmission and reception.

2. AN/ARN-147 VOR/ILS/MB system - Test.

NOTE

Test will not be valid if signal reception is invalid.

   a. HSI **CRS** control (pilot and copilot) - Set 315° in course display.

   b. Access **NAV TESTS** page by pressing **TST** fixed function key, then **NAV** soft key. To start test, **VOR/ILS** soft keys - Press, until **TEST** under VOR/ILS is displayed in inverse video.

   c. All indications next to **PRI FAULT** and **SEC FAULT** under **TEST** should read **PASS**.

   d. HSI VOR/LOC course arrow and VSI course deviator pointer - Centered (±1 dot).

   e. To-from arrow - **TO**.

   f. On **NAV TESTS** screen, **RTN** soft key - Press.

3. AN/ARN-149 ADF system - Test.

a. Access **NAV TESTS** page by pressing **TST** fixed function key, then **NAV** soft key. To start test, **ADF** soft key - Press, until **TEST** under ADF is displayed in inverse video.

b. No. 2 bearing pointer deflects 90° away from original reading.

c. **RTN** soft key Press, to exit test screen.

d. Verify No. 2 bearing pointer returns to original reading.

4. AN/ARN-153 TACAN system - Test.

a. **VTAC** switch on instrument panel - **TACAN**.

b. HSI **CRS** control (pilot and copilot) - Set 180° in course display.

c. Access **NAV TESTS** page by pressing **TST** fixed function key, then **NAV** soft key. To start test, **TACAN** soft key - Press, until **TACAN** is displayed in inverse video.

d. All indications below **TACAN** should read **G**.

e. Indications on the HSI shall be as follows:

f. Distance indicator shall read between 399.5 and 000.5 nmi.

g. No. 1 bearing pointer shall read between 177° and 183°.

h. Course deviation bar shall be centered within 1/2 dot, and To/From indicator shall indicate TO.

i. TACAN indications on the HSI will be removed unless there is a station that the set is tuned to nearby.

5. AN/APX-100 IFF - Test.

   a. **MASTER** switch - **STBY**. Allow 2 minutes for warmup.

   b. **MASTER** switch - **NORM**.

   c. **TEST**, **TEST/MON** and **REPLY** indicators - **PRESS-TO-TEST**.

   d. **ANT** switch - **DIV**.

   e. **M-1** switch - Hold at **TEST**, observe that the **GO** indicator light is on.

   f. **M-1** switch - Return to **OUT**. Check modes **2**, **3A** and **M-C** by repeating steps d. and e.

   g. **ANT** switch - **TOP**, repeat steps d. and e.

   h. **ANT** switch - **BOT**, repeat steps d. and e.

   i. **ANT** switch - **DIV**.

6. AN/APR-39 Radar detector - Test.

   a. Allow for at least 30 seconds for warmup.

   b. **SELF-TEST** switch - Press and hold. Display should be as in Figure 4-4 .

   c. **BRIL** and filter controls - Adjust for desired scope display, brightness and color.

   d. **AUDIO** control - Adjust volume as desired.

   e. **SELF-TEST** switch - Release.

*7. Command Instrument System (CIS) - Test. ▌

a. Select an ILS frequency, select **ILS** on pilot's **CIS MODE SEL** panel, and select **HDG** and **NAV** on pilot's **CIS MODE SEL** panel.

b. In avionics compartment, press and hold **TEST** button on command instrument system processor.

c. Pilot's and copilot's VSI pointers should deflect in the same direction and about the same amount.

d. Roll bars should be about 0.5 inch right of center.

e. Pitch bars should be about 0.5 inch below center.

f. Collective position indicator should be about 0.5 inch below center.

g. Release **TEST** button. All commands should return to their previous position.

h. Select **PLT** on pilot's **MODE SEL CRS HDG** control panel if necessary.

i. Turn pilot's **HDG** control on HSI to line up with actual helicopter heading.

j. Select **HDG** on pilot's **MODE SEL** panel. Pilot's and copilot's VSI roll command bar should come into view and line up on center.

k. Turn pilot's **HDG** control clockwise. VSI roll command bars should move right (maximum of 3/4 of a dot).

l. Turn pilot's **HDG** control counterclockwise. VSI roll command bars should move left and center as heading bug passes through actual aircraft heading. While continuing to turn **HDG** control counterclockwise VSI roll command bars should continue to move left (maximum of 3/4 of a dot).

m. On the copilot's **MODE SEL** panel **CRS HDG** control, select **CPLT**.

n. Repeat steps h. through l., using copilot's HDG control.

I. Operating Engine with Gust Lock On.

1. Ensure all blade tie down devices have been removed and secured.

2. Helicopter shall be faced into the wind.

3. Engine cowling for engine being run, should be open.

NOTE

With engine cowling open, sunlight may actuate fire warning system and/or may disable the test mode.

WARNING

When operating an engine against the gust lock do not advance the ENG POWER CONT lever beyond the IDLE detent.

Injury to personnel and damage to equipment will result if main and tail rotor blades slip during engine operation. Stay clear of rotors and blades.

4. Normal start procedures may be done when above requirements have been met except that **%RPM 1** and **2**, **%RPM R** and **XMSN PRESS** will remain at zero.

NOTE

Engine operation against the gust lock restricted to one engine at a time.

J. Engine Fuel System Priming.

1. **ENG FUEL SYS** selectors - **DIR**.

2. **ENG POWER CONT** levers - Hold at **LOCKOUT**.

3. **FUEL BOOST PUMP CONTROL** switch - **ON** until crewman reports steady flow of fuel coming from overboard drain for about 15 seconds, then **FUEL BOOST PUMP CONTROL** switch - **OFF**.

4. Repeat steps 2. and 3. with **ENG FUEL SYS** selectors at **XFD**.

5. **ENG POWER CONT** levers - **OFF**.

K. Engine Starter/Air Start Valve/Automatic Fuel Prime Checks.

NOTE

This check is required to be done whenever a starter motor or start valve has been replaced. Check should be done no less than three times.

1. **ENGINE IGNITION** switch - **OFF**.
2. **FUEL PUMP** switch - **OFF**.
3. Engine start button - Press and hold until **Ng SPEED** begins to increase. Release and the starter should remain engaged.
4. **PRIME BOOST PUMP ON** advisory light on when starter is engaged and goes off when starter drops out.
5. **Ng SPEED** should increase to at least 24%.
6. Abort start by pulling out **ENG POWER CONT** lever, and checking that starter drops out.
7. **FUEL PUMP** switch - **ON**.

L. Deice EOT Check.

CAUTION

To prevent rotor blades overheating in ambient temperatures above 21°C (70°F), operate rotor at 100% for 5 minutes before doing deice EOT check. Do not do deice EOT check if FAT is above 38°C (100°F).

1. **BLADE DE-ICE TEST** select switch - **EOT**.
2. **BLADE DEICE MODE** select switch - **MANUAL M**.
3. **POWER** switch - **ON**, start clock.
4. **TR DE-ICE FAIL** caution legend should appear after 15 to 30 seconds, and **MR DE-ICE FAIL** caution legend should appear after about 50 to 70 seconds.
5. **POWER** switch - **OFF**, **TR DE-ICE FAIL** and **MR DE-ICE FAIL** caution legend should disappear. Reset clock.
6. **BLADE DE-ICE TEST** select switch - **NORM**.
7. **BLADE DEICE MODE** select switch - **AUTO**.
8. **BLADE DEICE POWER** switch - **OFF**.

M. APU Generator Backup Check.

CAUTION

To prevent blade overheating, do not do generator backup check if FAT is above 38°C (100°F).

NOTE

If the helicopter engine was started using external air source and/or external ac power, the APU must be started to do the APU generator backup check.

1. **GENERATORS NO. 1** switch - **OFF**. **GEN** caution legend should appear.
2. **BLADE DEICE MODE** select switch - **MANUAL M**.
3. **BLADE DEICE POWER** switch - **ON**. Wait 30 seconds. No deice lights or legends should be on.
4. **GENERATORS NO. 1** switch - **ON**. **GEN** caution legend should disappear.
5. **GENERATORS NO. 2** switch - **OFF**. Wait 30 seconds. No deice lights or legends should be on.
6. **GENERATORS NO. 2** switch - **ON**. **GEN** caution legend should disappear.
7. **BLADE DEICE MODE** select switch - **AUTO**.
8. **BLADE DEICE POWER** switch - **OFF**.

N. Environmental Control System Checks.

CAUTION

During operation of the air conditioner system, the right cabin door should remain closed. If opening is required, the right cabin door should not remain open for more than 1 minute.

1. Air conditioner check. Perform with APU generator or external power source supplying power.

NOTE

Air conditioner will not operate if windshield anti-ice or backup pump is operating and APU generator is sole source of power, or if the rescue hoist **HOIST POWER** switch is **ON**.

a. Turn **COOLER - WARMER** rheostat to **WARMER** and place mode switch to **AC**.

NOTE

Operational check of the air conditioner at ambient temperatures of about 21°C (70°F) or less is not possible, due to low-pressure and low-temperature safety devices designed into the system. Attempts to operate the air conditioner at that temperature range may result in system shutdown.

b. In 10 to 15 seconds **AC ON** advisory light will go on. Let system run for 10 minutes. Check air circulating from ducts.

c. Turn **BACKUP HYD PUMP** switch - **ON**, then **OFF**. Check that **AC ON** light goes off when backup pump is on and goes on when **BACKUP HYD PUMP** switch is **OFF**. Turn **WINDSHIELD ANTI-ICE ON**, then **OFF**. Check that **AC ON** light goes off when **WINDSHIELD ANTI-ICE** is **ON** and comes on when **WINDSHIELD ANTI-ICE** is **OFF**.

d. Turn **COOLER - WARMER** rheostat to **COOLER**. Check that cooler air is now circulating from ducts. (Cockpit may not be cooler).

e. Place air conditioning switch to **VENT**. Check that **AC ON** advisory light goes out and that air still flows from cabin.

2. Heater check.

NOTE

Heater will operate with either backup pump or windshield anti-ice operating, but not both, when APU generator is sole source of power.

a. Place air conditioning switch to **HEAT**. **HEAT ON** advisory light will go on and warm air will flow from ducts.

b. Turn **BACKUP HYD PUMP** switch - **ON** and **WINDSHIELD ANTI-ICE** separately to make sure heater remains on. Turn both on together and check that the **HEAT ON** advisory light goes out. Turn **BACKUP HYD PUMP** and **WINDSHIELD ANTI-ICE** switches - **OFF**. Check that **HEAT ON** advisory light comes on.

c. Place air conditioning switch to **OFF**. Check that **HEAT ON** advisory light goes out. Fan will continue blowing for a time to cool elements.

3. Perform with main generators on.

NOTE

With main generators on, the air conditioner and heater will operate with both backup pump and windshield anti-ice operating.

a. Turn on air conditioner and then turn on backup pump and windshield anti-ice. Make sure **AC ON** advisory light stays on.

b. Turn off air conditioner and turn on heater. Make sure **HEAT ON** advisory light comes on.

c. Turn off backup pump, windshield anti-ice, and heater. Check that **HEAT ON** advisory light goes out.

O. Engine Overspeed System - Test one engine at a time.

WARNING

Engine overspeed check shall not be made during flight.

CAUTION

Delay in release of TEST A and TEST B switches may result in Ng recycling below idle, subsequent engine stall, and TGT increase. To avoid engine damage, TGT must be monitored during overspeed check.

NOTE

Do not let Ng drop below ground idle.

1. Adjust **% RPM R** at 100%. **Ng SPEED** - Note.
2. **ENG OVSP** switch **TEST A** - Press and hold.
3. **Ng SPEED** - Remains constant.
4. **ENG OVSP** switch **TEST A** - Release.
5. **ENG OVSP** switch **TEST B** - Press and hold.
6. **Ng SPEED** - Remains constant.
7. **ENG OVSP** switch **TEST B** - Release.
8. **ENG OVSP** switches **TEST A** and **TEST B** - Press simultaneously, and hold no longer than 1 second.

9. Note a reduction in Np, Ng, and torque.

10. **Ng SPEED - Ng SPEED** decreases then accelerates to speed noted in step 1.

11. Repeat steps 1. through 10. for other engine.

P. Engine Health Indicator Test/Engine Anti-ice - Check each engine individually as follows:

NOTE

Minimize time spent doing HIT/ANTI-ICE check with one engine at 0% TRQ.

1. Position helicopter into prevailing wind.
2. **ENG ANTI-ICE**, **HEATER**, and **AIR SOURCE HEAT/START** switches - **OFF**.
3. **% RPM R** - 100%.
4. **ENG POWER CONT** lever on engine not being checked - Retard to obtain 0-5% **TRQ** at about 92% to 98% **RPM**.
5. Collective pitch - Increase to 60% **TRQ**, hold for at least 30 seconds.

NOTE

Use the higher reading of the two FAT gages.

6. FAT and pressure altitude - Note.
7. Record date, A/C hours, FAT, pressure altitude and TGT on ENGINE HEALTH INDICATOR TEST (HIT) log.
8. If Ng is less than 90 percent and FAT is 15°C (59°F) or below, then increase collective to achieve 90 percent Ng. If Ng is less than 90 percent and FAT is above 15°C (59°F), then increase collective to achieve 94 percent Ng.
9. **AIR SOURCE HEAT/START** switch - **ENG**. If **TGT** rises more than 5°C, troubleshoot bleed air system for leaks.

10. **AIR SOURCE HEAT/START** switch - **OFF**.

WARNING

Do not cycle anti-ice bleed and start valve more than once to determine proper operation. Valve malfunction can cause engine flameout at low power settings or during rapid collective movements. If any part of the engine anti-ice check fails, with the exception of the TGT rise greater than 110°C noted in step 11a., do not fly aircraft.

11. For engine being checked, set **ENG ANTI-ICE** switch to **ON** and note the following:

    a. Increase in TGT of at least 30°C but less than 110°C.

NOTE

TGT rise greater than 110°C indicates failure of the engine inlet anti-ice valve. A malfunctioning engine inlet anti-ice system may result in power losses as much as 40%. Aircraft should not be flown in conditions requiring the use of engine anti-ice.

    b. **ENG ANTI-ICE ON** legend appears.

    c. **ENG INLET ANTI-ICE ON** legend appears after inlet fairing temperature reaches 93°C (200°F) and if FAT is less than 4°C (39°F). If FAT is greater than 13°C the legend should not appear.

12. Set **ENG ANTI-ICE** switch to **OFF** and note the following:

a. Decrease in TGT to approximate value in Step 7.

b. **ENG ANTI-ICE ON** legend disappears.

c. **ENG INLET ANTI-ICE ON** legend disappears after inlet fairing temperature goes below 93°C (200°F).

13. Collective - Readjust to 60% TRQ if necessary.

14. **ENG POWER CONT** lever of engine not being checked - **FLY**.

15. **ENG POWER CONT** lever on opposite engine - 0% **TRQ** and about 92% to 98% **RPM**. (**TRQ** on the other engine should be 60% ± 5%).

16. Collective pitch - Readjust to 60% **TRQ** if necessary, and hold for at least 30 seconds.

17. Repeat steps 6. through 12. for other engine.

18. Collective pitch - Full down.

19. **ENG POWER CONT** lever of engine not being checked - **FLY**.

20. Check TGT reference table, 700 Figure 4 or 701C Figure 4.1, Section V, for TGT corresponding to recorded FAT and pressure altitude, record on HIT log②. Compare Table TGT② with indicated TGT① and record TGT margin on HIT log. TGT margin is indicated TGT①, minus Table TGT②.

NOTE

When using HIT table, round FAT up, and pressure altitude to nearest value.

21. If TGT margin is 5°C or less from the limit, make appropriate entry on DA Form 2408-13-1.

22. If TGT margin is outside acceptance limits, repeat check. Make sure all procedures are followed.

23. If TGT margin is still outside acceptance limits, do not fly the helicopter. Make appropriate entry on DA Form 2408-13-1.

Q. HIT Baseline Procedures, Engine Performance Data Checks (when required).

Prior to completing maximum power check, a new HIT baseline is established by the maintenance test pilot and used if engine performance is satisfactory on the maximum power check. During initial HIT check, the maintenance pilot compensates for the particular engine characteristics and establishes the TGT limits to be used in the operational HIT check. The operational pilot will compare engine performance to this baseline as a check on engine performance.

CAUTION

If icing conditions exist, do not keep anti-icing off for longer than is necessary to do HIT check.

1. Position helicopter into prevailing wind to minimize hot gas reingestion.
2. **ENG ANTI-ICE** and **HEATER** switches - **OFF**. Set altimeter to 29.92 in. Hg.
3. **% RPM R** set at - 100%.
4. **ENG POWER CONT** lever on engine not being checked - Retard to obtain 0-5% **TRQ** at about 92% to 98% **RPM**.
5. Collective pitch - Increase to 60% **TRQ**, hold for at least 30 seconds.

NOTE

If helicopter is equipped with two FAT gages, and the readings are different, the higher reading must be used.

6. FAT and pressure altitude - Note.

7. Record date, A/C hours, FAT, pressure altitude, and indicated TGT (Figure 5 Section V).

8. Collective pitch full down, repeat steps 3 through 7 two more times. This completes logging of data. Remaining items can be done following shutdown.

9. Utilizing HIT baseline worksheet (Figure 5), calculate average indicated TGT for above three readings.

10. Determine table TGT from TGT reference table (Figure 700 4, or 701C 4.1,) for recorded FAT and pressure altitude.

NOTE

When using HIT table, round FAT up, and pressure altitude to nearest value.

11. Subtract table TGT on HIT baseline worksheet from average TGT.

12. Establish TGT upper and lower limits by adding 20°C and subtracting 20°C from answer in step 11. Record upper and lower limits on HIT log sheet in helicopter logbook.

13. During operational checks, the HIT TGT margin must fall within the upper and lower limits.

14. Example For HIT Baseline: (Shown 700)

    a. FAT = 15°C

    b. PRESS ALT = 500 FT

    c. TGT (3) = 665, 668, 667

    d. Average TGT = (665 + 668 + 667) ÷ 3 = 667°C

e. Table value of TGT (for 15°C FAT and 500 FT Altitude) = 684°C

f. Average TGT - table TGT = 667°-684°= -17°C

g. TGT acceptance Limit

-17°C + 20°C = 3°C

-17°C -20°C = -37°C

h. Therefore, an operational HIT check (TGT Margin), which is less than 3°C and greater than -37°C is acceptable.

i. HIT baseline worksheet data must be transferred to the historical records.

R. Maximum Power Check.700

The maximum power check provides an accurate indication of available power by incorporating ambient temperature effects into the power available calculation. When an engine is reinstalled or installed for the first time, or after an engine fails the health indicator test (HIT) check not caused by a faulty anti-icing start and bleed valve or a dirty compressor, an in-flight check will be made to ensure that the engine meets minimum power requirements and to establish/re-establish the engine torque factor (ETF). Performance data will be taken at an engine limiting condition (TGT or Ng) while maintaining a constant pressure altitude (PA). Engine anti-ice and heater will be off and altimeter will be set to 29.92 in. Hg. Data will be taken on one engine at a time. If the maximum power check is being performed on only one engine as a result of maintenance performed, i.e.; single engine installation/reinstallation or a failed HIT check, the Maintenance Officer will have to recompute a new aircraft torque factor (ATF). To obtain this new ATF, will require data (ETF) from both engines. It is the Maintenance Officer's discretion as to the method of which he uses to obtain ETF data for the other engine. He may either perform an actual maximum power check on the other engine or he may use ETF data obtained from a previous maximum power check.

NOTE

To avoid torque oscillation when making performance checks, a torque split of at least 10% will be held between engines. If flight conditions prevent setting the performance point at 120 knots and keeping 10% torque split, allow forward flight speed to increase or decrease; however, a torque split of 10% must be maintained.

1. With both **ENG POWER CONT** levers in **FLY**, establish 120 knots level flight, 100% **RPM R**.

CAUTION

Do not exceed the single engine torque limit of 110%. Dual-engine torque limit of 100% may be exceeded only if the torque applied by the other engine is less than 100% and the average of two engines does not exceed 100%.

2. Retard the **ENG POWER CONT** lever on the engine not being checked until **RPM R** is reduced by 2%.

NOTE

If the engine being checked reaches the aircraft single-engine torque limit of 110% before any reduction of **RPM R**, perform the power check at a higher altitude. If due to inclement weather, a higher altitude cannot be obtained, delay the maximum power check until weather permits or as an alternative to grounding. Refer to TM 1-2840-248-23.

a. Observe TGT on engine being checked. TGT should be within the normal TGT limiter range of 837°C to 849°C. Transient overshoot of up to 886°C for a maximum duration of 10 seconds may be observed followed by a TGT settling to the normal limiting range of 837°C to 849°C. If TGT is outside the normal range, discontinue the maximum power check and trouble shoot as shown in TM 1-2840-248-23.

b. Slowly advance the **ENG POWER CONT** lever of the engine not being checked only enough to reestablish **% RPM R** to 100% without any change in TGT on engine being checked.

*c. Wait 30 seconds and record **Ng, TGT, % TRQ, FAT,** and pressure altitude.

3. During step 2, if the engine not being checked indicated 0% **TRQ** without any reduction in **% RPM R**, do the following:

   a. Increase collective pitch while maintaining the same altitude.

   b. Allow forward airspeed to increase beyond 120 knots until a reduction of 2% **RPM R** is observed.

   c. Observe TGT on engine being checked.

   d. Slowly decrease collective pitch to allow **% RPM R** to return to 100% without any change in TGT on engine being checked.

   *e. Wait 30 seconds and record **Ng, TGT, % TRQ, FAT,** and pressure altitude.

4. Advance the **ENG POWER CONT** lever on the engine not being checked to **FLY**.

5. If required, repeat steps 1 thru 4 for the other engine.

6. To establish the engine torque factor (ETF) and aircraft torque factor (ATF), refer to TM 1-2840-248-23.

R.1. Maximum Power Check. 701C

NOTE

At extremely low ambient temperatures, T4,5 limiting may not be achieved even by utilizing engine anti-ice. In this case, defer this check until warmer conditions are available.

The torque factor method provides an accurate indication of available power by incorporating ambient temperature effects into the power available calculation.

When an engine is reinstalled or installed for the first time, or after an engine fails the health indicator test (HIT). Check for other than a faulty anti-icing start and bleed valve or a dirty compressor, an in-flight check will be made to ensure that the engine meets minimum power requirements and to establish/reestablish the engine torque factor (ETF). Performance data will be taken at an engine limiting condition while maintaining approximately 120 KIAS forward flight speed. Engine anti-ice and heater will be off and altimeter will be set to 29.92 in. Hg. Data will be taken on one engine at a time.

If the maximum power check is being performed because of a single-engine installation/reinstallation of failed HIT check, it is the Maintenance Officer's discretion to obtain new ETF data for the other engine.

NOTE

To avoid torque oscillations when making performance checks, a torque split of at least 10% will be held between engines. If flight conditions prevent setting the performance point at 120 knots and keeping the 10% torque split, allow forward flight speed to increase or decrease; however, a torque split of at least 10% must be maintained.

The 701C DEC will limit TGT to 866° ±9°C (10 minute limit) with both engines operating or 891° ±9°C (2½ minute limit) when the other engine power decreases below about 50% TRQ. During cold conditions, the HMU can limit Ng before a TGT limit is reached.

1. With both **ENG POWER CONT** levers in **FLY**, establish 120 knots level flight, 100% **RPM R**.

CAUTION

Do not exceed the single-engine torque limit of 135%. Dual-engine torque limit of 100% may be exceeded only if the torque applied by the other engine is less than 100% and the average of two engines does not exceed 100%.

2. Retard the **ENG POWER CONT** lever for the engine not being checked to approximately 55% **TRQ** (not lower than 50%). Maintain this torque by adjusting the **ENG POWER CONT** lever during the following steps.

3. Adjust collective until 2% **RPM R** droop is noted. Observe single-engine torque limit of 135%. Allow airspeed to increase as necessary. Record TGT on engine being checked.

NOTE

If during step 3. droop occurs prior to TGT limit (866° ±9°C) and FAT is approximately -14°C (7°F) and below, engine is Ng limited. Proceed with maximum power check under Ng limiting conditions.

If TGT limiting at 866°±9°C or 891°±9°C cannot be met before engine Ng limits, use engine anti-ice to verify TGT limiter settings in step 3 and 5. Engine anti-ice and other heater switches are **OFF** prior to step 4.

4. Establish 120 knots single-engine flight on engine being checked. Retard other engine back to zero torque and adjust collective to obtain previously recorded TGT (866°±9°C) and stabilize for 30 seconds. Record **TRQ**, **TGT TEMP**, **Ng**, pressure altitude and **FAT**.

5. Slowly increase collective until 1 to 2% droop occurs. Do not exceed 2½ minute limiter setting of 891°±9°C or 135% **TRQ**. Record limiting TGT, then return to level flight.

6. To establish the engine torque factor (ETF) and aircraft torque factor (ATF), refer to TM 1-2840-248-23.

S. Maximum Power Check (when engine is Ng limited).

NOTE

At ambient temperatures below approximately 0°C (32°F) and down to approximately -20°C (-4°F), the engine may be either TGT limited, Ng limited, or fuel flow limited. Below -20°C (-4°F) the engine should always be Ng limited. The target torque value chart automatically accounts for Ng, fuel flow, or TGT limiting.

If during the maximum power check droop occurs prior to TGT limit of 700 843°±9°C or 701C 866°±9°C. Engine may be Ng limited due to cold FAT. If this occurs, proceed as follows:

1. Establish 120 knot single engine flight with zero torque on engine not being checked. Observe single-engine torque limitations.

2. Increase collective until 2% droop is obtained. Note TGT and Ng.

3. Reduce collective to regain 100% **RPM R** while maintaining maximum TGT and Ng noted during step 2.

4. Record **TRQ**, **TGT**, **Ng**, pressure altitude and **FAT**.

5. Because engine is Ng limited due to cold ambient conditions, 700 ECU limiting at the 30 minute limit or 701C DEC limiting at the 10 minute and 2½ minute limit cannot be obtained.

6. If it is desired to verify TGT limiter settings use engine anti-ice as necessary.

T. Vibration Absorber Check and Tuning.

NOTE

These procedures are for use with the AVA (RADS-AT) vibration analysis system.

1. Setup.

   a. Verify accelerometers, magnetic pickup, brackets and other equipment are installed correctly.

   b. Ensure cabin absorber and nose absorber are inspected in accordance with TM 1-1520-237-23 to ensure all components are properly installed and serviceable.

2. In-flight Check.

NOTE

The goal for pilot heel vertical level is a range of 0.30 to 0.60 ips. Experience has shown that if the level drops below the range limit of 0.30 ips the nose absorber may interfere with the cabin absorber tuning and actually degrade cabin and cockpit 4/rev vibration levels.

   a. Fly the aircraft at 120 KIAS and acquire data.

   b. Fly the aircraft at 145 KIAS and acquire data.

   c. Perform diagnostics using the AVA. If no adjustments are required the appropriate message will appear. If tuning is required proceed with vibration absorber tuning (ABTUNE).

3. Vibration Absorber Tuning.

NOTE

ECU lockout operations for the purposes of vibration absorber tuning require strict monitoring of instruments and close cockpit crew coordination. These procedures assume that data for 120 KIAS and 145 KIAS has already been acquired and that RPM data for determining the tuning of the cabin absorber is ready to be acquired.

a. Maintain 145 KIAS, straight and level flight, and minimize flight control inputs as this can affect the quality of the data being collected.

b. Using the **INCR/DECR** switch, adjust **% RPM R** to 96 and acquire data. Using the **INCR/DECR** switch, adjust **% RPM R** to acquire data at 97, 98, 99, and 100% **RPM R**.

c. Decrease airspeed to approximately 100 KIAS and ensure **% TRQ 1** and **2** are less than 55.

NOTE

The Maintenance Pilot (MP) will manipulate the **ENG POWER CONT** lever for ECU operations and monitor the collective throughout the maneuver. The pilot (PI) will concentrate on flying the aircraft and minimize all flight control inputs. Collective pitch control changes should only be made at the direction of the MP. The crew chief, if available, should be utilized to collect data during ECU lockout operations to avoid further distractions of the cockpit crew. Furthermore, the NO. 1 **ENG POWER CONT** lever (closest to the MP) should be used for ECU lockout operations and ECU lockout operation should be verified on the ground prior to takeoff.

d. NO. 1 **ENG POWER CONT** lever to **LOCKOUT** and retard. Adjust **% TRQ** on No. 1 engine to approximately 10% below No. 2 engine.

e. In a coordinated maneuver the PI must now increase collective and forward airspeed to return the aircraft to 145 KIAS straight and level flight. The MP must continually manipulate the NO. 1 **ENG POWER CONT** lever to maintain **% TRQ** approximately 10% below the other engine. During this time **% RPM R** should be kept at 100.

f. At 145 KIAS, straight and level flight, slowly advance the NO. 1 **ENG POWER CONT** lever, while monitoring **% TRQ** and TGT to adjust **% RPM R** to 103.

g. Acquire data for 103% **RPM R**. Using the **INCR/DECR** switch, adjust **% RPM R** to 102 and 101 and acquire data at each setting.

h. When all data has been acquired, adjust **% TRQ** on No. 1 engine to approximately 10% below the other engine. Slowly reduce airspeed and decrease power required to below 55% TRQ. Reset the No. 1 engine from ECU lockout by placing the **ENG POWER CONT** lever in the **IDLE** detent then slowly advance it to the **FLY** detent while observing **% TRQ** matching to ensure automatic governing has been regained. Adjust the **INCR/DECR** switch to obtain 100% **RPM R**.

CAUTION

In-flight adjustments may be done on the cabin absorber to reduce the time required for absorber tuning. By reducing the airspeed to approximately 100 KIAS the absorber motion will be reduced so that tuning weight adjustments can be made. Extreme care must be exercised when removing or installing weights to prevent injury to personnel.

i. Perform diagnostics and make adjustments accordingly.

NOTE

Upon completion of adjustments, in-flight verification should be made to ensure vibration levels are acceptable and absorbers are correctly adjusted and tuned.

U. Communication and Navigation Equipment - Airborne Checks.

1. VHF/FM AN/ARC 201 (COM 1 or 4) Radios - Check.

   (1) Establish communications with ground stations.

   (2) Mode selector - **FM HOME**.

   a. Frequency - Select station at a known geographical reference.

   b. Observe pilot's and copilot's course deviation pointer on VSI as follows:

      (1) FM navigation (**NAV**) flag will move from view, and will come into view if the received signal is too weak or lost.

      (2) A steering (course deviation) pointer moves either right or left to indicate any deviation from the course to the transmitting station.

2. UHF AN/ARC-164 (COM 2) - Check transmission and reception.

3. VHF/AM-FM AN/ARC-222 (COM 3) - Check transmission and reception.

4. HF AN/ARC-220 (COM 5) - Check transmission and reception.

5. AN/APX-100 IFF - Check operation.

NOTE

Do not make checks with **MASTER** control switch in **EMER**, or **M-3A** codes **7600** or **7700**, without first obtaining authorization from the interrogating station.

a. Check all modes and **M-C** in normal operation.

b. Check for an altitude altimeter encoder accuracy of ± 100 feet against barometric.

c. Check emergency operation.

6. AN/APN-209 Radar altimeter - Check in-flight accuracy with an object of known height.

7. AN/ARN-149 ADF - Check reception.

8. AN/ARN-147 VOR - Check reception and operation.

a. VOR

(1) Check that HSI #2 needle bearing is within ± 4° of bearing station to reference.

(2) Hold exact heading to station.

(3) Turn pilot's **CRS** set knob until course deviation bar and pointer are centered.

(4) Course set display window should read bearing to station ± 4°with TO-FROM arrow indicating TO. NO. 2 relative bearing pointer should be straight up. Reciprocal of bearing to station with FROM showing and relative heading pointer straight down.

(5) Measure indicator sensitivity by turning pilot's course selector indicator knob until course deviation bar and pointer are centered on second dot and note course selected. There should be about 10° difference between this course and course noted for a centered bar. Repeat for the opposite side. Check **CRS HDG** switch is functional by repeating above check on copilot's HSI. When over outer and middle markers verify correct audio identifier and turn on of VSI marker beacon annunciator light.

b. ILS

(1) Check ILS localizer and glide slope on a published approach.

NOTE

When an ILS frequency is selected, ILS indications will automatically change to indicate ILS.

(2) Check proper sensing of both pointers.

(3) Check for proper altitude over final approach fix, with glide slope centered and for runway alignment with localizer pointer centered.

9. AN/ASN-128B Navigation sensor (Doppler Only Mode) - Check accuracy.

a. Select three points to which you navigate to, using DOP as navigation sensor.

(1) Determine accurate grid coordinates and variation for each point.

(2) Distance between checkpoints should be 25 to 40 Km.

(3) At each checkpoint, have a course change of at least 30 degrees. See sample course on Figure 11, Section V.

b. Plot course on appropriate map and determine the amount of cross-track and along the track allowable error for each point.

(1) Allowable cross-track error can be determined by multiplying the distance between checkpoints by +5%. (ie. distance from 1 to 2 is 25 km. The cross-track error would be ± 1.25 km at checkpoint B.)

(2) Allowable along the track error can be determined by multiplying the distance between checkpoints by ±2%. (ie. a 25 km distance would have an along the track error of ± .5 km.)

(3) Plot allowable error box at each checkpoint along your doppler route.

c. Comply with starting procedures outlined in TM 1-1520-253-10. Program doppler navigation route in AMS as a flight plan

d. **BRG 1/DIST** switch - **DOPPLER/GPS**

e. **MODE SEL DOP GPS** switch - **DOP/GPS**

f. In flight, airspeed 80 KIAS, approach checkpoint ″1″ aligned with the course to checkpoint ″2″. Over checkpoint ″1″, select Doppler only on CDU by pressing **NAV**, then **DOP** soft key. Engage **NAV** on **CIS MODE SEL** panel.

g. Using steering commands from CIS and #1 needle on HSI, navigate to checkpoint ″2″. Enroute, check doppler display information for accuracy.

h. Doppler system should provide information to navigate helicopter to a point inside allowable error box at each checkpoint. When each programmed point is passed, the CIS will switch to HEADING MODE and the **NAV** light will go off.

i. After checkpoint ″2″ is passed, increase forward airspeed to 110 KIAS and align helicopter with next course to checkpoint ″3″.

j. Update doppler over checkpoint ″2″, **FLY-TO DEST** thumbwheel ″3″, engage **NAV** mode on **CIS MODE SEL** panel, and repeat steps f. and g. at 110 KIAS.

k. After checkpoint ″3″ is passed, increase forward airspeed to 140 KIAS and align helicopter with next course to checkpoint ″1″.

l. Update doppler over checkpoint ″3″, **FLY-TO DEST** thumbwheel ″1″, and engage **NAV** on **CIS MODE SEL** panel. Repeat steps f. and g. at 140 KIAS.

10. Storm Scope WX 1000 check.

a. With flight plan engaged in AMS, **NAVAID DISPLAY** - Press, until mode is on.

b. Check that display agrees with MFD display.

11. AMS SAR MODES

a. Establish a SAR pattern in the AMS.

b. Fly the helicopter to the SAR start at waypoint. As the helicopter approaches the datum, activate the pattern by pressing **ARM**, or **ENGAGE** soft key.

c. **BRG 1 DIST** switch - **DOPPLER/GPS**.

d. **MODE SEL DOP GPS** switch - **DOP/GPS**. Follow the flight director commands, flying a few legs of the pattern. The flight director cues should intercept the course with minimal overshoots. Bank angle should be no more than 20°.

12. PLS AN/ARS-6. Check operation as required.

a. Establish communications with ground radio over COM 2. Check modes of operation, and indications with ground station, to include verification of steering accuracy and range indications starting at a range of 15 nm, and 2500 ft AGL.

V. External Extended Range Fuel Transfer Check. ERFS

NOTE

When ambient temperature is below 4°C (39°F), **PRESS OUTBD/INBD** switches shall not be turned off after transfer check has been completed to avoid potential for freeze-up of the pressure regulator.

1. **AIR SOURCE HEAT/START** switch - **ENG**.

WARNING

FUEL BOOST PUMP CONTROL switches shall remain on during external range fuel transfer and remain on for 10 minutes after PRESS switches are moved to OFF. Failure to observe this warning may cause engine flame-out.

2. **FUEL BOOST PUMP CONTROL** switches - **ON**.
3. **PRESS OUTBD** and **INBD** switches - **ON** for tanks installed.
4. Fuel quantity switch - **TOTAL**.
5. **TANKS** switch - As desired.
6. **MODE** switch - **MANUAL**.
7. **MANUAL XFR RIGHT** switch - **ON**.
8. Main **FUEL QTY TOTAL FUEL** readout - Check for increase of about 20 pounds.

9. **TANKS** switch - Repeat for other position (if installed).

10. **MANUAL XFR RIGHT** switch - **OFF**.

11. **MANUAL XFR LEFT** switch - **ON**.

12. Repeat steps 8. and 9. for **MANUAL XFR LEFT**.

13. **MANUAL XFR** switches - **OFF**.

14. External extended range fuel transfer system - Set as desired.

W. FLIR Ground Check.

1. FLIR Power ON and Initialization.

   a. On FLIR HCU, place **PWR** switch - **ON**.

   b. On MFD, place **OFF** - **ON** switch - **ON**.

   c. On MFD, **FLIR** switch - Press.

   d. Wait 5 minutes for FLIR to arrive at operating temperature.

   e. On MFD, check for **RDY** indication on right end of status bar, and no IBIT failures indicated.

   f. Depress **MENU** switch on HCU and verify the following indications:

      (1) Menus - **OFF**.

      (2) Autoscan - **FULL**.

      (3) Autoscan rate - **MED**.

      (4) FOV - **WIDE**.

      (5) Gain and level - **AUTO**.

      (6) DC restoration - **OFF**.

      (7) Filtering Off/Hi/Med/Lo - **OFF**.

      (8) Freeze frame - **OFF**.

      (9) Video frame - **OFF**.

      (10) Day/Night symbology - **DAY**.

      (11) Decluttered symbology - **FULL**.

(12) Polarity - **WHITE**.

(13) Mode - **CAGE**.

g. Press the HCU pointing control in any direction. The FLIR turret will uncage, and enter inertial pointing mode.

h. Operate the HCU pointing control up, down right and left. Observe the following turret movements:

(1) HCU pointing control **UP** - Turret elevation increases.

(2) HCU pointing control down - Turret elevation decreases.

(3) HCU pointing control left - Turret slews left (counterclockwise).

(4) HCU pointing control right - Turret slews right (clockwise).

i. Grayscale Check:

(1) Toggle the **MENU** switch to **MENU**.

(2) Using the HCU pointing control, point to **MENU**.

(3) Toggle the **MENU** switch to **HOOK**.

(4) Using the HCU pointing control, point to **CAL**, then to **GRAYSCALE**.

(5) Toggle the **MENU** switch to **LOCK** to activate the grayscale.

(6) Toggle the **MENU** switch to **HOOK**.

(7) Point to **EXIT** with the HCU pointing control.

(8) Toggle the **MENU** switch to **HOOK** to exit the program.

(9) Adjust the brightness control of the MFD for a minimum of 8 shades of gray across the top of the display, and for minimum blooming of spot size.

j. Deactivate grayscale:

(1) Toggle **MENU** switch to **MENU**.

(2) Using the HCU pointing control, point to **CAL**.

(3) Toggle the **MENU** switch to **HOOK**.

(4) Using the HCU pointing control, point to **GRAYSCALE**.

(5) Toggle the **MENU** switch to **LOCK**. The gray-scale on MFD will be removed from the display.

(6) Toggle the **MENU** switch to **HOOK**.

(7) Point to **EXIT** with the HCU pointing control.

(8) Toggle the **MENU** switch to **HOOK** to exit the program.

k. Cage check:

(1) Toggle the **MENU** switch to **MENU**.

(2) Using the HCU pointing control, point to **MENU**.

(3) Toggle the **MENU** switch to **HOOK** .

(4) Using the HCU pointing control, point to **CAGE**.

(5) Toggle the **MENU** switch to **LOCK**.

(6) Check that the TFU moves to default cage position of 0° azimuth, and 0° elevation.

(7) Push the HCU pointing control. Verify that FLIR exits cage mode, and enters **INRPT** mode.

l. Manual/Auto gain check:

(1) Toggle the **MENU** switch to **MENU**.

(2) Point to **GN/LVL** with the HCU pointing control.

(3) Toggle the **MENU** switch to **HOOK**.

(4) Point to **MAN** with the HCU pointing control.

(5) Toggle the **MENU** switch to **HOOK**.

(6) Adjust the gain and level through range with HCU pointing control.

(7) Toggle the **MENU** switch to **HOOK**.

(8) Point to **AUTO** with the HCU pointing control.

(9) Toggle the **MENU** switch to **LOCK**.

(10) Verify that gain and level readjust to the **AUTO** settings.

(11) Place **AUTO-GAIN** switch to **GAIN UP**, and **GAIN DOWN** positions.

(12) Verify that FLIR gain changes.

(13) Place **AUTO-GAIN** switch to **LVL UP**, and **LVL DOWN** positions.

(14) Verify that FLIR level changes.

m. Polarity check:

(1) Toggle the **MENU** switch to **MENU**.

(2) Point to **POL** with the HCU pointing control.

(3) Toggle **MENU** switch to **HOOK**.

(4) Verify that FLIR imagery changes to black hot.

(5) Toggle **MENU** switch to **HOOK**.

(6) Verify that FLIR imagery changes to white hot.

(7) Toggle the **MENU** switch to **MENU** to exit the program.

n. Heading hold mode check:

(1) Toggle the **MENU** switch to **MENU**.

(2) Point to **HDHLD** with the HCU pointing control.

(3) To activate heading hold, toggle **MENU** switch to **LOCK**.

(4) Verify mode annunciation on VDU changes to **HDHLD**.

o. Field of View Check:

(1) Place **FOV** switch to **WFOV**.

(2) Observe that field of view widens in MFD.

(3) Place **FOV** switch to **NFOV**.

(4) Observe that field of view narrows in MFD.

(5) Place **FOV** switch to **ZOOM**.

(6) Observe field of view narrows, and is magnified in MFD.

p. Freeze Check:

(1) Toggle **MENU** switch to **FREEZE**.

(2) Verify that picture on MFD is ″frozen.″ Changing the position of the helicopter, magnification of picture, or position of the turret will have no effect on the image in the VDU.

(3) Toggle **MENU** switch to **FREEZE**.

(4) Verify that picture on MFD is ″unfrozen,″ and the system operates normally.

2. Verify maintenance settings as follows:

a. Access **MAINT** menu. Key is 3, 7, 4.

b. **IMAGER CALIBRATION** page settings as follows:

(1) TACH REF PHASE: 1046

(2) DIGITIZING DELAY: 3717

(3) MACRO ROW DELAY: 32

(4) MICRO DELAY ROW A: 15 ns

(5) MICRO DELAY ROW B: 15 ns

(6) MICRO DELAY ROW C: 15 ns

(7) MICRO DELAY ROW D: 15 ns

(8) SCANNER FACETS: 6

(9) H-PHASE: 5

(10) V-PHASE: 5

c. Access **IMAGE ATHERM/DATA** page. Settings are as follows:

(1) DCR ATHERM FOV DIFF: -11.38 DCRU/°C

(2) DCR ATHERM FOV DIFF BIAS: 129 DCRU

d. From **IMAGE ATHERM/DATA** page, access **MEASURED IMAGER DATA** page. Indications are as follows:

(1) AMBIENT TEMP: (Outside air temp)°C

(2) DETECTOR TEMP: (Less than 70 K)

(3) MOTOR CURRENT: 0.x AMPS

(4) DCRU VALUE: 2047 DCRU

e. From **MAINTENANCE (USE CAUTION)** page, acccess **GIMBAL CALIBRATION** page. Indications are as follows:

(1) ALPHA OFFSET: 0

(2) BETA OFFSET: 0.0°

(3) GAMMA OFFSET: -138.0°

(4) 3 AXIS STOW AZ POS: 180.0°

(5) 3 AXIS STOW EL POS: 134.0°

X. OBOGS - Ground Check.

1. With either APU or main engine operating, **AIR SOURCE** switch - **APU** or **ENGINE**, as desired.

2. **OBOGS** switch on **AUX SW** panel - **ON**. Check **PWR ON** light illuminates and that **BIT FAULT** light goes out within 5 minutes.

3. **BOS QTY** gage on O2 status indicator panel - Check for charge.

4. Open any regulator. Check **OXY FLOW** gage for reading.

Y. Medical Suction Collection System Ground Check.

1. **MED INT** switch on **AUX SW** panel - **ON**.

2. **SUCTION** switch on overhead control panel - **ON**.

3. Suction regulator on medical station side control panel - Set as desired. Check that liquid is drawn through suction hose, and deposited in medical waste container.

4. Check all stations, as required.

Z. Litter Lift Ground Check.

1. **MED INT** switch on **AUX SW** panel - **ON**.

2. All **EMERGENCY STOP** switches - **RUN**

3. Raise and lower litter platforms with platform controls.

4. While raising or lowering a platform, any **EMERGENCY STOP** switch - **STOP**. Check that platform stops.

AA. Multi Function Display (MFD) Ground Check.

1. **TEST** switch on AMS CDU - Press.
2. **MFD** soft key - Press, to initiate built in test (BIT).
3. **CONTINUE** soft key - Press, to access **IBIT** status page.
4. Bezel switch test.
   a. From IBIT Status page, **BEZEL** soft key - Press, to access **BEZEL SWITCH TEST** menu page.
   b. **CONTINUE** soft key - Press, to access **BEZEL SWITCH TEST** status page.
   c. Press bezel switches to test them. Good switches will have their display shaded. If a selected switch is not shaded when pressed, **FAIL** soft key - Press, to indicate status.
   d. If all switches check good, **PASS** soft key - Press.
   e. Press **RETURN** twice to return to IBIT Status Menu.
5. Glass test.
   a. From IBIT status menu page, **GLASS** soft key - Press.
   b. Select colors from **GLASS TEST** by pressing appropriate soft key. Center box will turn the color of the soft key. If all switch names were shaded when pressed, **PASS** soft key - Press.
   c. If any soft key name was not shaded when it's switch was pressed, **FAIL** soft key - Press.

d. To verify that the entire screen will illuminate correctly, select a color, and then **CONTINUE** soft key - Press. Display will change to test pattern, showing bands of color.

e. Press **RETURN** twice to return to IBIT Status Menu.

6. Video Test.

a. From IBIT status menu page, **VIDEO** soft key - Press.

b. **CONTINUE** soft key - Press. Display will show eight bands of green varying from dark to light from left to right across the screen. If the test passed, **PASS** soft key - Press.

c. If the test failed, **FAIL** soft key - Press.

d. Press **RETURN** twice to return to IBIT Status Menu.

7. BIT History.

a. From IBIT status menu page, **BIT HISTORY** soft key - Press. Use **PAGE UP** and **PAGE DOWN** soft keys to scroll through the pages, as required.

b. To return to IBIT Status Menu, **RETURN** soft key - Press.

AB. Buddy Start System.

CAUTION

It is possible to start the No. 1 engine without electrical cables using only the battery and an external air source. This procedure will result in a loss of the engine Hot Start Prevention system and a loss of engine instrumentation which could result in engine damage. This procedure is not recommended.

The following procedure will be used as an emergency aircraft evacuation maintenance recovery procedure only, and not as a normal or standard operating procedures. When an aircraft has an inoperable APU, and no auxiliary ground power unit available, a second aircraft may be used to start the No. 1 engine on the disabled aircraft.

WARNING

Flight of an aircraft with an inoperable APU affects the pilot's ability to respond to secondary in-flight emergencies. Preflight mission planning should recognize this as a hazard. Flight without a functional APU must be limited to that necessary to move the aircraft to a suitable location for repair of the APU.

NOTE

This procedure does not require the disabled aircraft to have a functional 24 vdc battery installed. However, it is recommended for establishing communication between the aircraft prior to connecting ac power from the ″donor″ aircraft.

1. Using APU bleed air on the ″donor″ aircraft to start the No. 1 engine on the ″receiver″ aircraft. Position the ″donor″ aircraft a safe distance away from the disabled (receiver) aircraft, so that the pilot can observe the ″receiver″ aircraft. Ensure that the rotor blade tips of the aircraft are at least 50 feet apart.

NOTE

Exceeding this distance will result in the cable or pneumatic hose not reaching between the two aircraft, or cause excessive strain on electrical connectors or excessive bends or kinking of the pneumatic hose.

   a. Do not start APU on ″donor″ aircraft.

   b. Remove the buddy start stowage bags from each aircraft, and couple the pneumatic hoses together with the center Marmon clamp.

c. Remove the ac cables from each aircraft's kit bag. Couple the center connectors together.

2. Receiver Aircraft.

WARNING

On the ″receiver″ aircraft, assure loose ac cable utility port connector remains capped to avoid electrical shock hazard. The connector pins will be electrically hot during buddy start procedure.

a. Preflight checks - Complete.

b. Insert the pneumatic hose into the external pneumatic port and insert the ac power cable connector to the **EXT PWR RECP** of the ″receiver″ aircraft.

NOTE

Verify the pneumatic connector is securely in place.

c. Before Starting Engines.

(1) Copilot's collective - Extended and locked.

(2) Shoulder harness locks - Check.

(3) **PARKING BRAKE** - Release, then set.

(4) Circuit breakers and switches - Set as follows:

(a) Circuit breakers - In.

(b) Avionics - Off, frequencies set.

(c) **BLADE DEICE POWER** - **OFF**.

(d) Radar altimeter - Set.

(e) Clocks - Set and running.

(f) **BACKUP HYD PUMP** - **AUTO**.

(g) **ANTICOLLISION/POSITION LIGHTS** - As required.

(h) **ECS** panel switches - **OFF**.

(i) **CARGO HOOK EMERG REL** switch - **OPEN**, **ARMING** switch - **SAFE**.

(j) **APU CONTR** switch - **OFF**; **APU** T-handle - In.

(k) **GENERATORS NO. 1** and **NO. 2** switches - Check **ON**.

(l) **AIR SOURCE HEAT/START** switch - **OFF**.

(m) **EMER OFF** T-handles - Full forward.

(n) **BATT** switch - **ON**.

(5) No. 1 dc primary bus, **BACKUP PUMP PWR** circuit breaker - Pull out.

NOTE

If radio communication is not available due to a dead battery in the ″receiver″ aircraft, ensure crew coordination steps between both aircraft are taken to accomplish start until ac power from the ″donor″ aircraft is on line.

(6) Establish communications with ″donor″ aircraft.

3. Donor Aircraft.

   a. Engines operating at 100% RPM, flat pitch and brakes set.

NOTE

If radio communication is not available due to a dead battery in the ″receiver″ aircraft, ensure crew coordination steps between both aircraft are taken to accomplish start until ac power from the ″donor″ aircraft is on line.

   b. Establish radio communication with ″receiver″ aircraft.

   c. No. 1 dc primary bus, **AIR SOURCE HEAT/START** circuit breaker - Check in.

   d. **AIR SOURCE HEAT/START** switch - **OFF**.

CAUTION

Ensure APU is off.

   e. Place the **HEATER** control switch - **ON** and **HI** for 5 to 6 seconds. (This will remove any trapped air pressure from the plumbing to the external pneumatic port). Then turn **HEATER** control switch - **OFF**.

   f. No. 2 ac primary bus, **UTIL RECP** circuit breaker - Pull out.

g. Insert the ″donor″ aircraft end of the pneumatic hose into the external pneumatic port, slowly opening air valve with tip extension on the hose. Connect the hose to the port. Gently pull on the hose at the base of the connector to verify connector is mated properly.

NOTE

If any resistance is encountered when inserting the pneumatic hose connector, relieve trapped air pressure in aircraft pneumatic system by turning on **HEATER** to **HI** for 5 to 6 seconds, then **OFF**. Ensure APU is off.

h. Connect the ac electrical cable to the **AC UTILITY RECP** receptacle in the cabin overhead.

i. No. 2 ac primary bus, **UTIL RECP** circuit breaker - In.

j. Notify ″receiver″ aircraft - Ready to start APU.

CAUTION

Air supply from the APU will immediately pressurize the pneumatic hose and the pneumatic systems of both aircraft when the APU is started. Ensure that pneumatic hoses are flexible without excessive bends or kinks, and ground personnel are clear before pressurization.

k. Start APU.

l. Notify ″receiver″ aircraft - APU is on line.

4. Receiver aircraft.

Engine Starting Procedure:

NOTE

Electrical power is only supplied to monitor engine parameters on the CDU. Do not energize any other non-flight essential electrical equipment until the main generators are on line.

a. **EXT PWR RESET** switch - **RESET** then **ON**.

b. **ENG FUEL SYS** selector(s) - As required, **XFD** for first start of day.

c. **FUEL BOOST PUMP CONTROL** switches - **ON**.

d. **ENGINE IGNITION** switch - **ON**.

e. **GUST LOCK** caution legend not present.

f. Fire guard - Posted if available.

g. Rotor blades - Check clear.

h. Engine - Start as follows:

CAUTION

If start is attempted with ENGINE IGNITION switch OFF, do not place switch ON. Complete EMER ENG SHUTDOWN procedure.

(1) If any of these indications occur, perform EMER ENG SHUTDOWN as required.

(a) No **TGT TEMP** increase (light off) within 45 seconds.

(b) No **ENG OIL PRESS** within 45 seconds.

(c) No **% RPM 1** within 45 seconds.

(d) **ENGINE STARTER** caution legend disappears before reaching 52% **Ng SPEED**.

(e) **TGT TEMP** reaches 700 850°C or 701C 851°C before idle is attained (Ng 63%).

CAUTION

To avoid damage to the engine start switch actuators, do not move the ENG POWER CONT lever from IDLE to OFF while pressing the starter button.

During engine start and runup ensure that cyclic is kept in neutral, collective no more than one inch above full down, and pedals centered until % RPM R reaches 50% minimum to prevent damage to anti-flap bracket bushings.

(2) Starter button - Press until **Ng SPEED** increases; release.

NOTE

If an **ENGINE STARTER** caution legend goes off when the starter button is released, and the **ENG POWER CONT** lever is **OFF**, the start attempt may be continued by pressing and holding the starter button until 52% to 65% **Ng SPEED** is reached; then release button.

(3) **TGT TEMP** - Check below 700 150°C or 701C 80°C before advancing **ENG POWER CONT** lever.

NOTE

Closely cross check **Ng SPEED** and **TGT TEMP** indicator, as both **Ng SPEED** and **TGT TEMP** accelerate rapidly during start. Perform EMER ENG SHUTDOWN procedures as required.

(4) **ENG POWER CONT** lever - **IDLE**. Start clock.

(5) System indications - Check.

(6) **ENGINE STARTER** caution legend. Check, off at 52% to 65% **Ng SPEED**. If **ENGINE STARTER** caution legend remains on after 65% Ng.

(a) **ENG POWER CONT** lever - Pull out.

If caution legend remains:

WARNING

Areas adjacent to the aircraft pneumatic hose disconnect handle (metal ring on hose) may be extremely hot and may cause burns to the hand even though the disconnect handle is cool to the touch. Always use the disconnect handle when disconnecting the pneumatic hose.

(b) Notify ″donor″ aircraft to shutdown APU or disconnect pneumatic hose.

i. Systems - Check.

(1) **Ng SPEED** 63% or greater and within 3% of each other.

(2) **% RPM** - Check that **% RPM 1** is not in the range of 20% to 40% and 60% to 90%. Advance **ENG POWER CONT** lever as required.

(3) **XMSN PRESS** - Check.

(4) **ENG OIL PRESS** - Check.

(5) **#1** and **#2 HYD PUMP** caution legends - Check off.

j. When the engine starts and **TGT TEMP** has stabilized at the idle position, the following actions shall be performed in this order:

(1) Notify ″donor″ aircraft - Engine start normal.

(2) Flight controls - Hold.

CAUTION

Restrict the rate of ENG POWER CONT lever movement, when the tailwheel lockpin is not engaged. Rapid application of ENG POWER CONT lever can result in turning the helicopter.

(3) Advance **NO.1 ENG POWER CONT** lever to **FLY**. Both main generators should come on line, with all ac power available.

(4) **EXT PWR RESET** switch - **OFF**.

NOTE

A momentary loss of all ac power will be evident when the generator switches are turned off and will result in a loss of CDU indication until main generator switches are turned back on.

(5) **GENERATORS NO. 1** and **NO. 2** switches - **OFF**.

CAUTION

Whenever the No. 1 generator is off or failed, and the BACKUP PUMP PWR circuit breaker is out for any reason, ac electrical power must be shut off before resetting BACKUP PUMP PWR circuit breaker. Otherwise, it is possible to damage the current limiters.

(6) No. 1 dc primary bus, **BACKUP PUMP PWR** circuit breaker - In.

(7) **GENERATORS NO. 1** and **NO. 2** switches - **ON**.

(8) Notify other aircraft start complete.

5. Donor Aircraft.

a. **FUEL PUMP** switch - **APU BOOST** - **OFF**.

b. **APU CONTR** switch - **OFF**.

c. **AIR SOURCE HEAT/START** switch - **OFF**.

d. No. 2 ac primary bus, **UTIL RECP** circuit breaker - Pull out.

NOTE

HEATER control switch may be placed to the **ON** position for 5 to 6 seconds, then **OFF**. This will bleed any trapped air pressure from pneumatic line to external port. If this procedure is not followed, it may take up to one minute for pneumatic hose to deflate.

WARNING

Areas adjacent to the aircraft pneumatic hose disconnect handle (metal ring on hose) may be extremely hot and may cause burns to the hand even though the disconnect handle is cool to the touch. Always use the disconnect handle when disconnecting the pneumatic hose.

e. Disconnect pneumatic hose and electrical cable from aircraft. Disconnect the center connection and place each item in the storage bag, and place in ″donor″ aircraft.

f. No. 2 ac primary bus, **UTIL RECP** circuit breaker - In.

6. Receiver Aircraft.

WARNING

Areas adjacent to the aircraft pneumatic hose disconnect handle (metal ring on hose) may be extremely hot and may cause burns to the hand even though the disconnect handle is cool to the touch. Always use the disconnect handle when disconnecting the pneumatic hose.

a. Disconnect pneumatic hose and electrical cable from aircraft. Place each item in the storage bag, and place in ″receiver″ aircraft.

WARNING

Flight will be conducted without fully checking the aircraft systems like hydraulic system leak test and full range flight control servos check. Emergency procedures that utilize the APU generator cannot be performed such as loss of one main generator during flight in icing conditions will shut off the main and tail rotor de-ice. Avoid flight in icing conditions. Flight in IMC or inadvertent IMC should also be avoided.

CAUTION

Attempting an in-flight restart of a main engine will result in 14 to 18% loss of torque on operating engine or possible flameout. Fly aircraft within OEI envelope to avoid performing an in-flight restart in case of one engine failure.

During shut down of aircraft with inoperative APU, pilot cannot monitor engine indications due to lack of electrical power or direct fire extinguishing agents into No. 2 engine. Before engine shut down, aircraft should be connected to a suitable source of pneumatic and electrical power.

b. Start the No. 2 engine using cross bleed engine start procedure.

AC. Functional Check Flight Checks

NOTE

This section contains specific conditions requiring verification of maintenance performed by the accomplishment of a check flight in accordance with this manual. Perform a functional check flight after any of the following maintenance actions. This list is not all inclusive. The minimum required checks are listed for each requirement.

1. FLIGHT CONTROLS:

   a. After adjustment of main rotor and/or tail rotor flight controls.

      (1) Cyclic forward stop.

      (2) Flight control breakout forces.

      (3) Hover controllability.

      (4) Autorotation RPM (80 KIAS).

      (5) In flight controllability (100 KIAS).

      (6) Level Flight (Vh).

      (7) Airspeed Indicators.

      (8) Stabilator Position Indicator.

      (9) Cyclic (Vh).

      (10) Tail Rotor Pedals (Vh).

      (11) High Pitch Stop (Vh).

      (12) Rig checks.

(13) Track and Balance.

b. After installation of pitch trim assembly.

(1) Automatic flight control system.

(2) Cyclic forward stop.

(3) Flight control breakout forces.

(4) Trim System.

(5) Damping forces.

(6) Hover controllability.

(7) SAS (hover).

(8) FPS (hover).

(9) In flight controllability (100 KIAS).

(10) FPS/SAS (Flight).

(11) Cyclic (Vh).

c. After installation of collective boost servo.

(1) Flight controls hydraulics.

(2) Flight control breakout forces.

(3) Collective to yaw electronic coupling.

(4) Hover controllability.

d. After installation of a SAS actuator or SAS Servo Valve.

(1) AFCS.

(2) Flight control breakout forces.

(3) Trim System.

(4) Beep trim system.

(5) Hover controllability.

(6) SAS (hover).

(7) In flight controllability (100 KIAS).

(8) SAS (flight).

e. After installation of tail rotor servo.

(1) Tail rotor track and balance.

(2) Tail rotor servo and backup checks.

(3) Damping forces.

(4) Hover controllability.

(5) Tail rotor servo (hover).

(6) In flight controllability (100 KIAS).

(7) Cyclic (Vh).

(8) Tail Rotor Pedals (Vh).

f. After installation of the mixing unit.

(1) Cyclic forward stop.

(2) Flight controls hydraulics.

(3) AFCS.

(4) Hover controllability.

(5) SAS/FPS (hover and flight).

(6) Autorotation RPM (80 KIAS).

(7) In flight controllability (100 KIAS).

(8) Cyclic (Vh).

(9) Tail Rotor Pedals (Vh).

(10) High pitch stop (Vh).

g. After installation of the primary servo.

(1) Flight controls hydraulics.

(2) Hover controllability.

(3) In flight controllability (100 KIAS and Vh).

h. After installation of the position transmitter/ stabilator limit switch (70400-06712).

(1) Stabilator ground check.

(2) In flight collective full down (100 KIAS).

(3) Stabilator check (120 KIAS).

(4) Stabilator (150 KIAS).

i. After maintenance requiring tuning of vibration absorbers.

(1) Vibrations (80 KIAS).

(2) Vibrations (100 KIAS).

(3) Vibrations (120 KIAS).

(4) Vibrations (140 KIAS).

(5) Vibrations (Vh).

j. After maintenance requiring autorotation check.

(1) Autorotation RPM (80 KIAS).

k. After replacement of main rotor blade.

(1) Main Rotor track and balance.

(2) Hover controllability.

(3) Autorotation RPM (80 KIAS).

(4) Vibrations (120 KIAS).

(5) Vibrations (130 KIAS).

(6) Vibrations (Vh).

l. After replacement of main rotor head.

(1) Flight controls hydraulics.

(2) Main Rotor track and balance.

(3) Hover controllability.

(4) Autorotation RPM (80 KIAS).

(5) In flight controllability (100 KIAS).

(6) 4/rev Vibrations (100 KIAS).

(7) 4/rev Vibrations (120 KIAS).

(8) 4/rev Vibrations (140 KIAS).

(9) Tail rotor pedals (Vh).

(10) High pitch stop (Vh).

(11) Vibrations (Vh).

m. After Installation of Inner Retention Plate.

(1) Tail Rotor Track and Balance.

(2) Tail Rotor Servo.

(3) Hover Controllability.

(4) In-flight Controllability (100 KIAS).

(5) Tail Rotor Pedals (Vh).

n. Replacement of Main Rotor Head Spindle.

(1) Track and Balance.

If adjustments are made to other pitch links.

(2) Autorotation RPM (80 KIAS).

o. Replacement of Main Rotor Head Elastomeric Bearing.

(1) Track and Balance.

If adjustments are made to other pitch links.

(2) Autorotation RPM (80 KIAS).

2. ENGINE:

a. After Engine Installation, or replacement of ECU or Engine accessory module, or HMU installation.

(1) Throttles.

(2) Engine starter/air start valve/automatic fuel prime check.

(3) Engine Abort System/Heater dropout.

(4) Fuel Boost Pumps.

(5) Engine Start.

(6) Ng Speed.

(7) Torques 1 and 2.

(8) Engine Overspeed.

(9) ECU lockout Nf overspeed.

(10) Engine RPM trim.

(11) Accel/Decel.

(12) Maximum power/TGT limiting Check.

(13) Engine HIT baseline.

b. After replacement of Load demand rotary inputs or replacement and/or rigging of load demand push pull cables.

(1) Ng speed.

(2) Accel/Decel.

(3) Maximum power/TGT limiting Check.

(4) Engine HIT baseline.

(5) High pitch stop (Vh).

c. Replacement of engine yellow harness.

(1) Engine start.

(2) Ng speed.

(3) ECU lockout Nf overspeed.

(4) Maximum power/TGT limiting Check.

(5) Engine HIT baseline.

d. Replacement of engine thermocouple harness.

(1) Engine start.

(2) Maximum power/TGT limiting Check.

(3) Engine HIT baseline.

3. ROTOR DRIVE SYSTEMS:

a. After installation of Main module.

(1) Flight controls hydraulics.

(2) Main rotor track and balance.

(3) Engine Start.

(4) Hover Controllability.

(5) Generator underfrequency protection disable/low rotor RPM.

(6) Vibrations (80 KIAS).

(7) In flight controllability (100 KIAS).

b. After installation of Input module.

(1) Autorotation RPM (80 KIAS).

c. After installation of tail gear box.

(1) Tail rotor track and balance.

(2) Tail rotor servo.

(3) Hover controllability.

(4) Tail Rotor servo (hover).

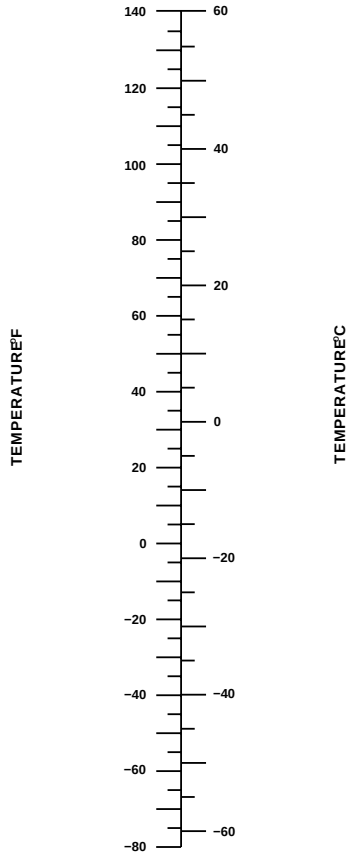
(5) In flight controllability (100 KIAS and Vh).

SECTION V. CHARTS AND FORMS

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

LIST OF CHARTS

TEMPERATURE CONVERSION
FAHRENHEIT/CELSIUS



UH60A_45341A (R1)
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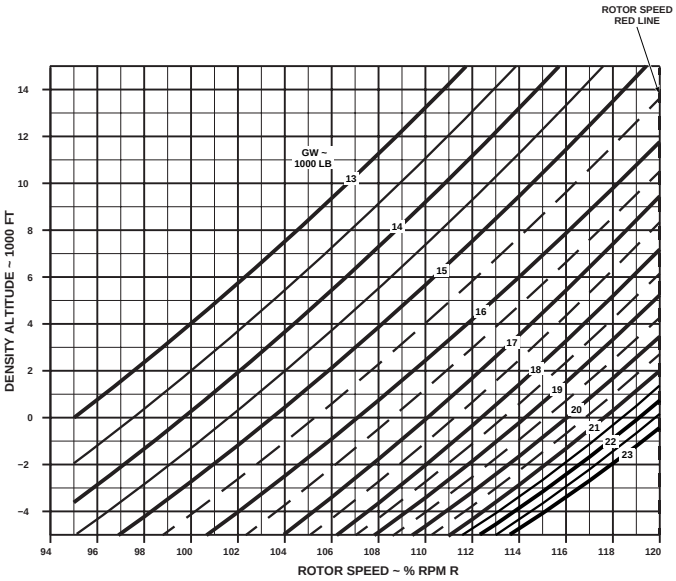
Figure 1. Temperature Conversion

AUTOROTATION RPM CORRECTION CHART



DATA BASIS: FLIGHT TEST

NOTES

1. FULL LOW COLLECTIVE
2. TEST AIRSPEED 80 KIAS PILOT IND. (± 5 KTS)
3. AUTOROTATION TEST TOLERANCE IS ±3% RPM R.
4. CHART CONSTRUCTED FOR 356 INCHES CG
   ROTOR SPEED INCREASES 1% RPM R FOR CG FORWARD OF 351 INCHES.
5. ROTOR SPEED DECREASES 3% WITH ESSS WINGS INSTALLED.
6. ROTOR SPEED DECREASES 4% WITH ESSS WINGS AND (2) 230 GALLON TANKS INSTALLED.
7. ROTOR SPEED CHANGES 4% PER FULL TURN OF ROTATING PUSHROD.

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Figure 2. Autorotation RPM Correction

DENSITY ALTITUDE CHART

$$\frac{1}{\sqrt{\sigma}} = \frac{TAS}{EAS}$$

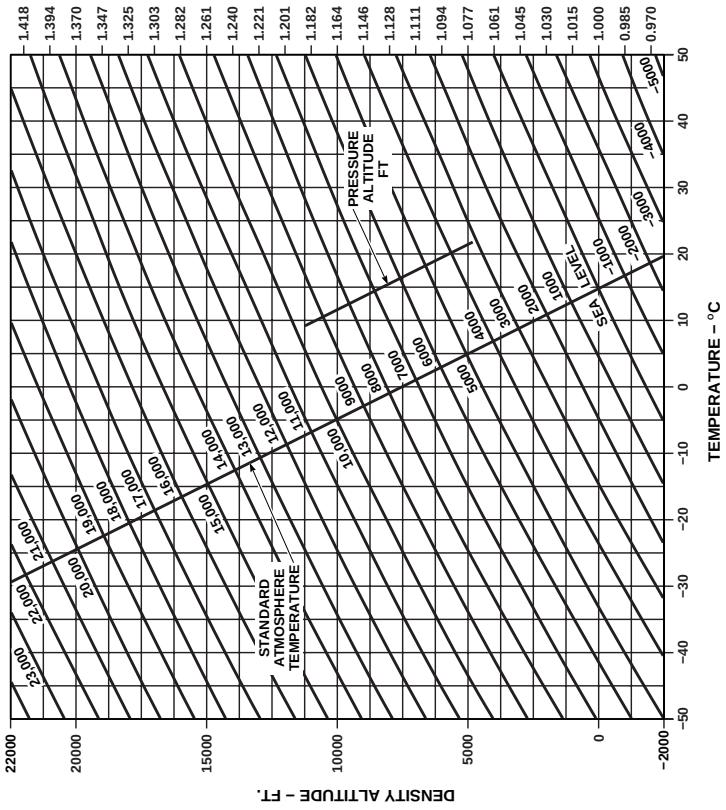

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Figure 3. Density Altitude Chart

FAT °C	ENGINE HEALTH INDICATOR TEST (HIT) TGT REFERRENCE TABLE (TRQ = 60% -% RPM R = 100%) PRESSURE ALTITUDE - FEET					
	-1000	-500	0	500	1000	1500
55	781	786	789	793	797	802
50	768	772	776	780	784	788
45	754	759	762	766	770	774
41	744	748	751	755	759	763
39	738	742	746	750	754	758
37	733	737	740	744	748	752
35	728	732	735	739	743	747
33	722	726	730	733	737	741
31	717	721	724	728	732	735
29	711	716	719	723	726	730
27	706	710	713	717	721	725
25	701	705	708	712	715	719
23	695	699	703	706	710	714
21	690	694	697	701	704	708
19	684	688	692	695	699	703
17	679	683	686	690	693	697
15	673	677	680	684	688	692
13	668	672	675	679	682	686
11	663	667	670	673	676	681
9	657	661	664	668	671	675
7	652	656	659	662	666	670
5	647	651	654	657	660	665
3	642	645	648	652	655	659
1	636	640	643	647	650	654
-1	631	635	638	641	645	649
-3	626	630	633	636	640	643
-5	621	625	628	631	634	638
-7	616	619	623	626	629	633
-9	610	614	617	621	624	628
-11	605	609	612	615	619	623
-13	600	604	607	610	613	617
-15	594	598	601	605	608	612
-17	589	593	596	599	603	606
-19	584	587	590	594	597	601
-21	578	582	585	588	592	595
-25	568	571	574	578	581	585
-30	554	558	561	564	567	571
-35	541	545	548	551	554	558
-40	528	532	534	538	541	544
-45	515	519	522	525	528	531
-50	502	506	508	511	514	518
-55	489	493	495	498	501	504

Figure 4. TGT Reference Table (Sheet 1 of 3) 700

FAT °C	ENGINE HEALTH INDICATOR TEST (HIT) TGT REFERRENCE TABLE (TRQ = 60% -% RPM R = 100%) PRESSURE ALTITUDE - FEET					
	2000	2500	3000	3500	4000	4500
55	806	811	815	821	826	832
50	792	797	801	807	812	817
45	778	783	787	793	797	803
41	767	772	776	781	785	791
39	762	766	770	776	780	786
37	756	760	765	770	775	780
35	750	755	759	764	769	774
33	745	749	753	759	763	768
31	739	744	748	753	758	763
29	734	738	742	748	752	757
27	728	732	737	742	746	751
25	723	727	731	736	741	746
23	717	721	726	731	735	740
21	712	716	720	725	729	734
19	706	710	714	720	724	728
17	701	705	709	714	718	723
15	695	699	703	708	712	717
13	690	694	698	703	707	711
11	684	688	692	697	701	705
9	679	683	687	691	695	700
7	673	677	681	686	689	694
5	668	672	676	680	684	688
3	663	667	670	675	678	683
1	657	661	665	669	673	677
-1	652	656	660	664	667	672
-3	647	651	654	659	662	666
-5	642	645	649	653	657	661
-7	636	640	644	648	651	656
-9	631	635	639	643	646	650
-11	626	630	633	637	641	645
-13	621	624	628	632	636	640
-15	615	619	622	627	630	634
-17	610	614	617	621	625	629
-19	604	608	611	616	619	623
-21	599	603	606	610	614	618
-25	588	591	595	599	602	606
-30	574	578	581	585	588	592
-35	560	564	567	571	575	578
-40	547	550	554	557	561	564
-45	534	537	540	544	547	551
-50	520	524	527	531	534	537
-55	507	510	513	517	520	524

Figure 4. TGT Reference Table (Sheet 2 of 3) 700

FAT °C	ENGINE HEALTH INDICATOR TEST (HIT) TGT REFERRENCE TABLE (TRQ = 60% -% RPM R = 100%) PRESSURE ALTITUDE - FEET					
	5000	6000	7000	8000	9000	10000
55						
50	822	833				
45	808	819	830			
41	796	807	818	830		
39	791	801	812	824		
37	785	795	806	818	830	
35	779	790	800	812	824	
33	773	784	794	806	818	831
31	767	778	788	800	812	825
29	762	772	782	794	805	818
27	756	766	777	788	799	812
25	750	760	771	782	793	806
23	744	754	765	776	787	800
21	739	745	759	770	781	793
19	733	743	753	764	775	787
17	727	737	747	758	769	781
15	721	731	741	752	763	775
13	716	725	735	746	757	768
11	710	719	729	740	751	762
9	704	713	723	734	745	756
7	698	708	717	728	738	750
5	692	702	711	722	732	744
3	687	696	705	716	726	737
1	681	690	699	709	720	731
-1	676	684	693	703	714	725
-3	670	679	687	697	707	718
-5	665	673	682	692	701	712
-7	659	668	676	686	696	706
-9	654	662	670	680	690	700
-11	649	657	665	674	684	694
-13	643	651	659	668	678	688
-15	638	646	654	663	672	682
-17	632	640	648	657	666	676
-19	627	635	643	652	661	670
-21	621	629	637	646	655	665
-25	610	618	626	635	644	653
-30	596	604	612	620	629	638
-35	582	590	597	606	614	623
-40	568	575	583	592	600	609
-45	554	561	569	578	586	594
-50	540	546	555	563	571	579
-55	527	534	541	549	557	565

Figure 4. TGT Reference Table (Sheet 3 of 3) 700

FAT °C	PRESSURE ALTITUDE - FEET					
	-1000	-500	0	500	1000	1500
55	736	740	744	748	753	758
50	721	724	728	733	737	742
45	706	709	713	717	721	725
39	690	692	696	700	704	707
37	684	687	690	694	698	702
35	679	681	685	689	692	695
33	673	676	679	683	687	690
31	668	670	674	677	681	685
29	662	665	668	671	675	679
27	657	659	662	666	670	673
25	651	654	657	660	664	667
23	645	648	651	655	658	662
21	639	642	645	649	652	656
19	634	636	640	643	647	650
17	628	631	634	638	641	644
15	623	625	629	632	635	638
13	617	620	623	626	630	633
11	612	614	618	621	624	627
9	606	609	612	616	619	622
7	600	603	607	610	613	616
5	595	598	601	605	608	611
3	589	592	595	599	602	605
1	584	586	590	593	597	600
-1	577	579	583	586	590	593
-3	571	574	557	581	584	587
-5	566	568	572	575	578	581
-7	560	563	566	569	573	576
-9	554	557	560	564	567	570
-11	549	552	555	558	561	564
-13	543	546	549	553	556	559
-15	538	540	544	547	550	553
-17	532	535	538	541	544	547
-19	526	529	532	536	539	542
-21	521	523	527	530	533	536
-23	515	518	521	524	527	530
-25	510	512	515	519	522	524
-27	504	507	510	513	516	519
-29	498	501	504	507	510	513
-31	492	495	498	501	504	507
-33	487	490	493	496	499	501
-35	482	484	487	490	493	496
-37	476	478	481	484	487	490
-39	470	473	476	479	482	484
-45	453	456	459	462	465	467
-50	439	441	444	447	450	453
-55	425	427	430	433	436	438

Figure 4.1. TGT Reference Table (Sheet 1 of 3) 701C

FAT°C	PRESSURE ALTITUDE - FEET					
	2000	2500	3000	3500	4000	4500
55	763	769	775	781	787	792
50	747	752	758	764	770	776
45	731	736	741	747	753	759
39	712	716	721	725	732	738
37	706	710	714	720	725	731
35	700	704	709	713	719	724
33	694	698	703	707	712	717
31	689	692	697	702	707	711
29	683	687	691	696	701	705
27	677	681	685	690	695	700
25	671	675	680	684	689	694
23	666	669	674	678	683	688
21	660	664	668	672	677	682
19	654	658	662	667	671	676
17	648	652	656	661	665	670
15	642	646	650	655	659	664
13	636	640	644	649	654	658
11	631	634	638	643	647	652
9	625	629	633	637	641	646
7	620	623	627	631	635	640
5	614	618	621	625	630	634
3	609	612	616	620	624	629
1	603	607	610	614	618	622
-1	596	600	603	607	611	615
-3	591	594	598	602	606	609
-5	585	589	592	596	600	604
-7	579	583	587	590	594	598
-9	574	577	581	585	589	592
-11	568	571	575	579	583	586
-13	562	566	569	573	577	581
-15	556	560	564	567	571	575
-17	551	555	558	562	565	569
-19	545	549	552	556	559	563
-21	539	543	548	550	554	557
-23	534	537	540	544	548	551
-25	528	531	535	538	542	545
-27	522	526	529	532	536	539
-29	516	520	523	525	530	534
-31	511	514	517	521	524	528
-33	505	508	511	515	518	522
-35	499	502	506	509	512	516
-37	493	497	500	503	506	510
-39	487	491	494	497	500	504
-45	470	473	476	479	483	486
-50	456	459	462	465	468	471
-55	441	444	447	450	454	457

Figure 4.1. TGT Reference Table (Sheet 2 of 3) 701C

FAT	PRESSURE ALTITUDE - FEET						
°C	5000	5500	6000	7000	8000	9000	10000
55	796	801	805	814	825	835	846
50	782	788	792	802	811	822	832
45	764	771	776	788	798	808	818
39	744	750	755	768	780	792	802
37	737	743	748	761	773	787	796
35	730	736	741	754	766	779	791
33	723	729	735	746	759	772	786
31	716	722	727	739	752	765	779
29	710	715	720	732	745	758	771
27	704	709	714	725	737	750	764
25	698	703	707	718	730	743	756
23	692	697	701	711	723	736	749
21	686	691	695	705	715	728	742
19	680	685	689	699	709	721	734
17	674	679	683	693	703	714	727
15	668	673	677	686	697	708	719
13	662	666	671	680	690	701	712
11	656	660	665	674	684	695	706
9	650	654	659	668	678	689	699
7	644	648	652	662	671	682	693
5	637	642	646	656	665	676	687
3	631	636	640	649	659	669	680
1	626	629	634	643	653	663	674
-1	618	622	625	635	645	655	666
-3	613	617	620	629	639	649	659
-5	607	611	615	623	632	642	652
-7	601	605	609	617	625	636	646
-9	596	599	603	611	620	630	639
-11	590	594	597	606	614	623	633
-13	584	588	591	600	608	617	627
-15	578	582	586	594	602	611	620
-17	572	576	580	588	596	605	614
-19	566	570	574	582	591	599	608
-21	560	564	568	577	585	593	602
-23	555	558	562	571	579	587	596
-25	549	552	556	565	573	581	589
-27	543	547	550	559	567	575	583
-29	537	541	545	553	561	569	577
-31	531	535	539	547	554	563	571
-33	525	529	533	541	548	556	565
-35	519	523	527	539	542	550	558
-37	513	517	521	529	536	544	552
-39	507	511	515	523	530	538	546
-45	489	493	497	505	512	519	527
-50	475	478	482	490	497	504	512
-55	460	464	467	475	481	489	496

Figure 4.1. TGT Reference Table (Sheet 3 of 3) 701C

DATE _____ PRESS _____ ALT _____

FAT

A/C S/N _____ ENGINE S/N _____

A/C HOURS _____ ENGINE HOURS _____

NOTE: SET 60% torque on engine being checked.

INDICATED TGT

1. _____

2. _____

3. _____

TOTAL _____ ÷3 = _____ Average Indicated TGT

_____ (Table TGT)

_____ TGT Margin

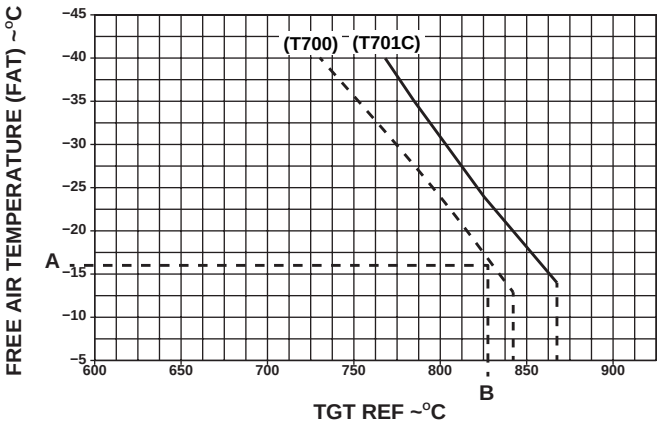
TGT Acceptance Limits

TGT Margin +20°C _____

TGT Margin -20°C _____

Record limits in A/C Engine Health Indicator Test Log

Figure 5. Hit Baseline Worksheet



EXAMPLE

WANTED

TGT REFERENCE
(TGT REF)

KNOWN

FAT = −16°C (1.4°F)

METHOD

ENTER CHART ON LEFT
AT −16°C (3.2°F) ---------- A
MOVE RIGHT TO INTERSECTION
OF −16°C (3.2°F) LINE AND
TGT REF LINE.
MOVE STRAIGHT DOWN TO
READ 827°C (1521°F) -------- B

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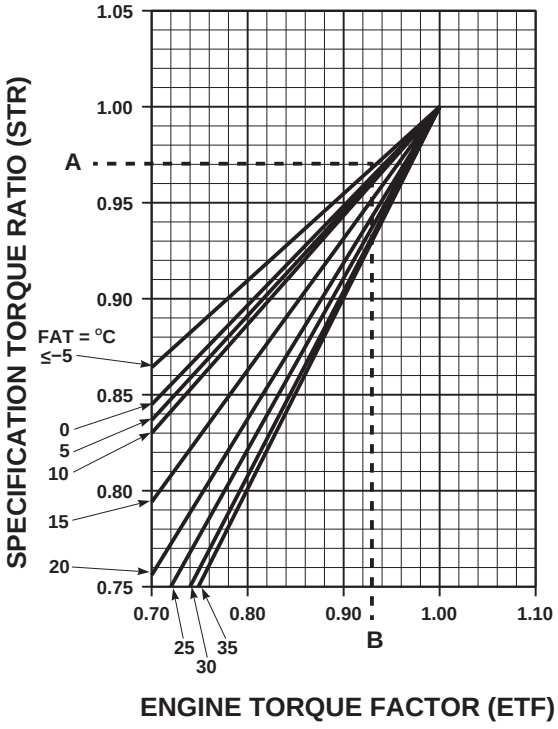
Figure 6. Determining TGT Reference



NOTE

≤ MEANS LESS THAN OR EQUAL TO.

FAT −5°C (23°F) AND BELOW WILL BE PLOTTED ON THE −5°C LINE ON CHART.

WHEN STR IS GREATER THAN OR EQUAL TO 1.0, ASSUME ETF TO BE 1.0.

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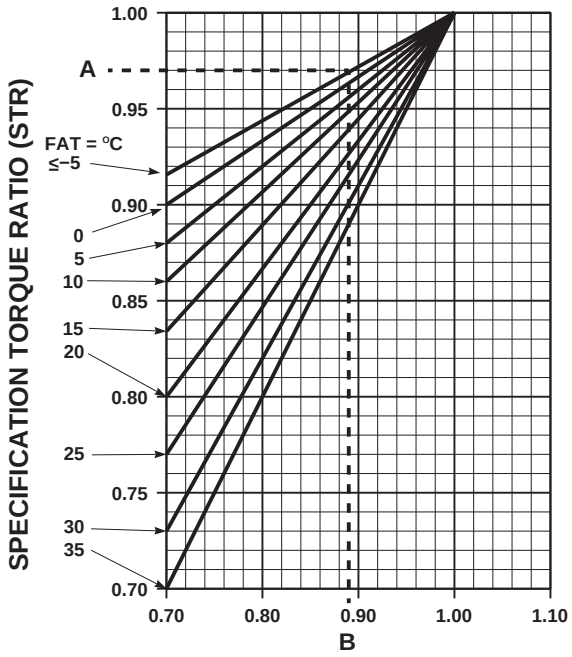
Figure 7. Determining Engine Torque Factor (ETF) (Sheet 1 of 2)

700



NOTE

≤ MEANS LESS THAN OR EQUAL TO.

FAT −5°C (23°F) AND BELOW WILL BE PLOTTED ON THE −5°C LINE ON CHART.

WHEN STR IS GREATER THAN OR EQUAL TO 1.0, ASSUME ETF TO BE 1.0.

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Figure 7. Determining Engine Torque Factor (ETF) (Sheet 2 of 2)

701C

SPECIFICATION TORQUE AVAILABLE − 30 MINUTE LIMIT

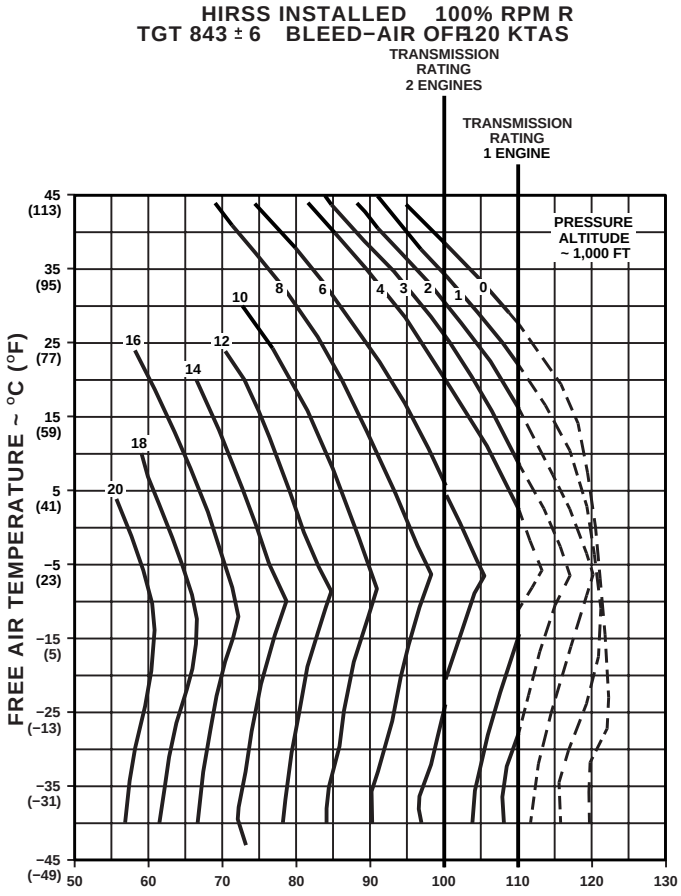

Figure 8. Determining Target Torque Value (TTV)

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SPECIFICATION TORQUE AVAILABLE − 10 MINUTE LIMIT

HIRSS INSTALLED **100% RPM R**
TGT 866 ±9 **120 KTAS**

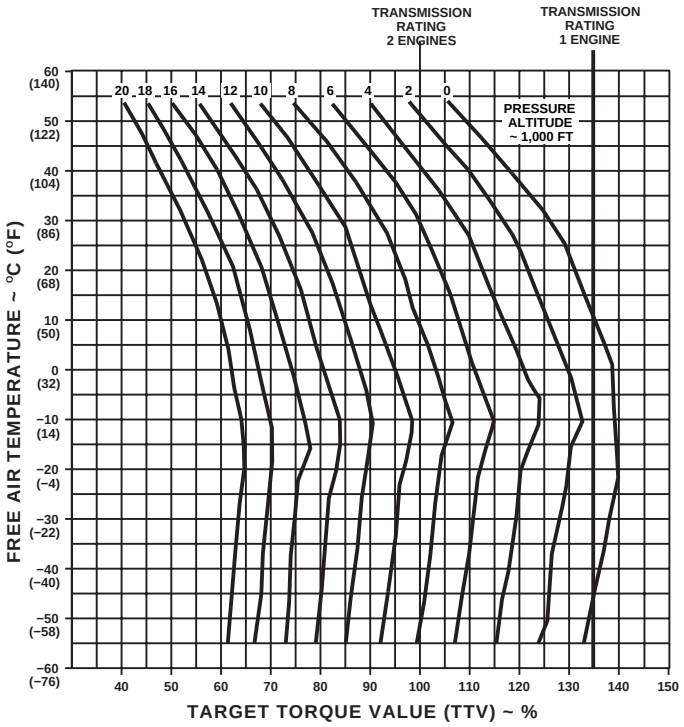

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Figure 8.1. Determining Target Torque Value (TTV)

701C

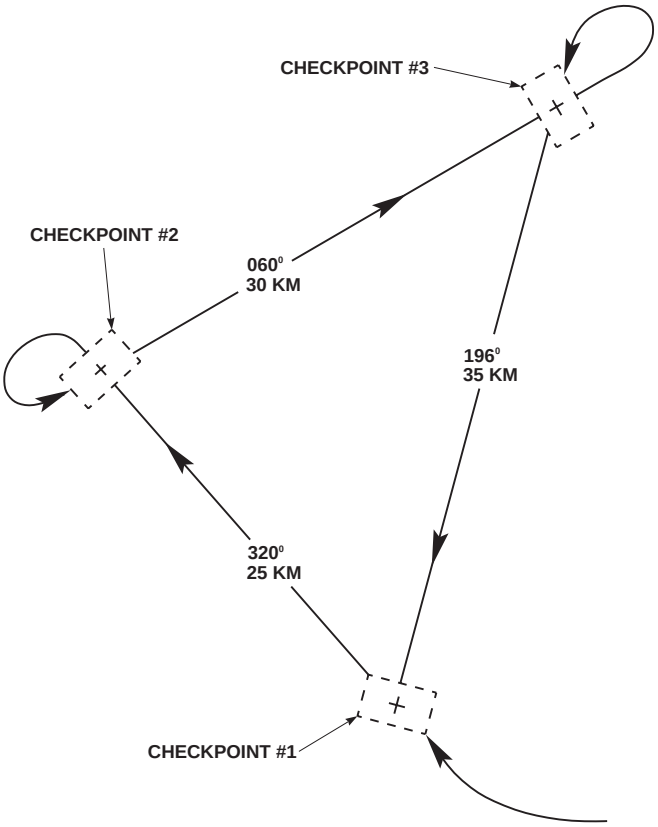

Figure 9. Sample Doppler Route

DISTANCE 25 KM X 5% = ± 1.25 KM CROSS TRACK ERROR
DISTANCE 25 KM X 2% = ± .50 KM ALONG THE TRACK ERROR

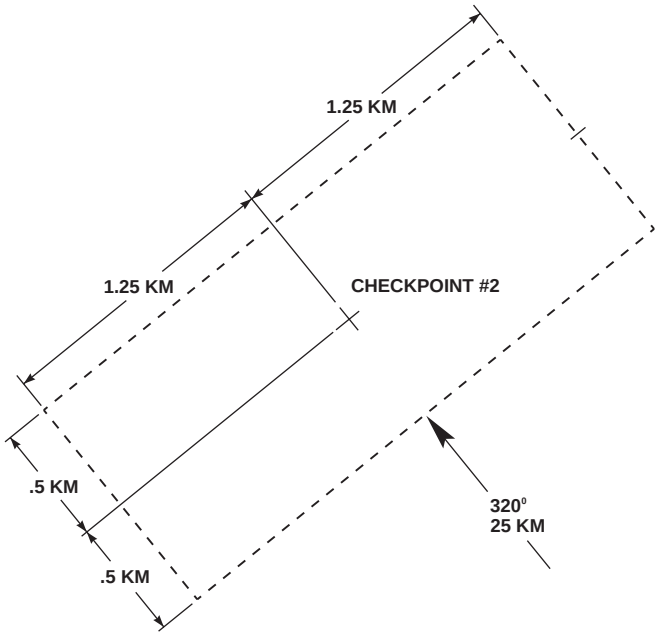

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Figure 10. Doppler Error Box

UH-60QMAINTENANCE TEST FLIGHT CHECK SHEET SUGGESTED FORMAT							
A/C NO.	PURPOSE OF TEST						DATE
PILOT AND UNIT							TIME
GROSS WEIGHT LB	CG	FAT°C	PRESS ALT	DENSITY ALT			
SYMBOLS ✓ = SATISFACTORY X = DEFICIENCY							
■ **PRIOR TO MTF**							. Trim system
1. Forms and records							(1) Cyclic force
2. Flight readiness inspection							(a) Aft cyclic force lb
3. Special preflight checks							(b) Right cyclic force lb
■ **BEFORE STARTING ENGINE**							(2) Beep time rate
1. Fuel pump							(a) Aft to fwd sec
2. APU start							(b) Left to right sec
3. Caution/Advisory panel							e. Collective to yaw coupling
4. CDU/PDU/TRQ							f. FPS heading hold
5. Stabilator audio priority							10. Stabilator
6. Flight control hydraulic system							11. Fuel quantity
a. Forward cyclic stop inch							12. Altimeter (BARO) ft
7. Collective friction LB							13. Altimeter (RADAR)
8. Tail rotor servo							14. Fire detector
9. AFCS check							15. Windshield anti-ice
a. SAS /FPS computer check							16. Pitot heater
b. SAS engage -disengage error							17. Blade deice test
c. Flight control breakout force							18. Fuel boost pumps
(1) Pitch Fwd oz. AFT oz.							19. Start abort&heater dropout
(2) Roll Left oz. RT oz.						■	**STARTING ENGINES**
(3) Yaw Fwd lb. AFT lb.							1. No.1 engine start
REMARKS:							

Figure 11. Maintenance Test Flight Check Sheet (Sheet 1 of 4)

	a. Dropout %Ng		c. XMSN oil press psi
	b. Idle speed %Ng		d. Engine #1 #2
	c. Time to idle sec		Oil temp °C
	d. Engine oil pressure		Oil press psi
	2. XMSN oil pressure		TGT °C
	3. No.2 Engine start		Ng %
	a. Dropout %Ng		TRQ %
	b. Idle speed %Ng		2. Brakes - pilot and copilot
	c. Time to idle sec		3. Tailwheel
	d. Engine oil pressure		4. HIT/Anti-ice check
	4. Hydraulic leak test	■	**BEFORE TAKEOFF**
	5. Droops stops %RPM R	■	**AIRCRAFT HOVER**
	6. Generator caution lights off		1. Controllability
	7. Deice EOT		2. SAS 1
	8. APU generator backup check		3. SAS 2
■	**RUNUP**		4. FPS
	1. TRQ 1% 2%		5. Tail rotor servo check
	2. Engine overspeed		6. Generator under frequency low rotor RPM
	3. ECU/DEC lockout/NP overspeed		7. Compass/turn-rate indicator
	4. Eng RPM trim	■	**AFTER TAKEOFF**
	5. Accel/decel		Stabilator
	6. Electrical systems	■	**CRUISE**
	a. Generator underfrequency		1. Airspeed 80 KIAS
	#1 #2 %RPM R		a. Autorotation
	7. AC/DC bus tie connector test		(1) Fuel quantity lb
■	**TAXI**		(2) Press alt ft
	1. System instruments		(3) FAT °C
	a. %RPM #1 #2		(4) Rotor speed %RPM R
	b. XMSN oil temp °C		
REMARKS:			

Figure 11. Maintenance Test Flight Check Sheet (Sheet 2 of 4)

	b. KIAS difference KIAS		7. Airspeed cruise
	2. Airspeed 100 KIAS		a. NAV-COMM equipment
	a. Controllability		(1) Intercom
	(1) Cyclic position		(2) VHF-FM
	(2) TR pedal position		(3) VHF-AM
	b. KIAS difference KIAS		(4) UHF/AM
			(5) ADF
	c. Autorotative stabilator position 0°		(6) VOR
	3. Airspeed 120 KIAS		(7) ILS
	Maximum power check		(8) XPDR
	a. Press alt ft		(9) R ALT
	b. FAT °C		(10)
	c. Engine #1 #2		(11)
	TGT °C		b. Flight instruments
	Ng %		(1)
	TRQ %		(2)
	4. Airspeed 120 KIAS		(3) Altimeters
	a. Stabilator		(4) Vertical speed indicator
	b.		(5) Magnetic compass
	c. Beep trim		c. Fuel transfer
	5. Airspeed 145 KIAS		
	a. KIAS difference KIAS		
	b. Vibration absorbers	■	**BEFORE LANDING**
	6. Airspeed Vh	■	**AFTER LANDING**
	a. Cyclic position inch	■	**ENGINE SHUTDOWN**
	b. Pedal position		1. Droop stops in %RPM R
	c. High pitch stop		2. System instruments
	d. Stabilator		3. Postflight inspection performed
REMARKS:			

Figure 11. Maintenance Test Flight Check Sheet (Sheet 3 of 4)

REMARKS:

SIGNATURE_____

Figure 11. Maintenance Test Flight Check Sheet (Sheet 4 of 4)

By Order of the Secretary of the Army:

DENNIS J. REIMER
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
05411

DISTRIBUTION:
To be distributed in accordance with Initial Distribution Number (IDN) 313813, requirements for TM 1-1520-253-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 ounce
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 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Temperature Conversion

°C to °F = (9/5 x °C) + 32.
°F to °C = (°F - 32) x 5/9.

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