TM 1-1520-237-MTF

TECHNICAL MANUAL

MAINTENANCE TEST FLIGHT MANUAL

UH-60A HELICOPTER
UH-60L HELICOPTER
EH-60A HELICOPTER

HEADQUARTERS
DEPARTMENT OF THE ARMY

31 March 1997

TM 1–1520–237–MTF
C 7

CHANGE NO. 7

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

MAINTENANCE TEST
FLIGHT MANUAL

UH–60A HELICOPTER
UH–60L HELICOPTER
EH–60A HELICOPTER

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TM 1–1520–237–MTF, dated 31 March 1997 , is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a vertical bar next to the figure title. Text that flows to the following change is indicated by a current change number

TM 1-1520-237-MTF
C7

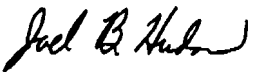
Remove pages	Insert pages
A through C/(D Blank)	A through C/(D Blank)
iii and iv	iii and iv
1-3 and 1-4	1-3 and 1-4
2-3 and 2-4	2-3 and 2-4
2-6.1/(2-6.2 Blank)	2-6.1/(2-6.2 Blank)
2-13 through 2-18	2-13 through 2-18
----------	2-18.1/(2-18.2 Blank)
2-35 and 2-36	2-35 and 2-36
2-41 and 2-42	2-41 and 2-42
2-45 and 2-46	2-45 and 2-46
2-51 through 2-56	2-51 through 2-56
2-59 and 2-60	2-59 and 2-60
2-65 and 2-66	2-65 and 2-66
4-7 and 4-8	4-7 and 4-8
4-17 through 4-20	4-17 through 4-20
4-21 and 4-22	4-21 and 4-22
4-25 and 4-26	4-25 and 4-26
4-34.1 through/	4-34.1 through/
(4-34.4 Blank)	(4-34.4 Blank)
4-39 and 4-40	4-39 and 4-40
4-45 and 4-46	4-45 and 4-46
4-55 and 4-56	4-55 and 4-56
4-87 and 4-88	4-87 and 4-88
4-99 and 4-100	4-99 and 4-100
5-19 and 5-20	5-19 and 5-20
Cover	Cover

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

By Order of the Secretary of the Army:

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

Official:



JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
0103659

DISTRIBUTION:
To be distributed in accordance with Initial Distribution Number (IDN) 310285 requirements for TM 1-1520-237-MTF.

TM 1–1520–237–MTF
C 6

CHANGE
NO. 6

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 27 November 2000

MAINTENANCE TEST
FLIGHT MANUAL

UH–60A HELICOPTER
UH–60L HELICOPTER
EH–60A HELICOPTER

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TM 1–1520–237–MTF, dated 31 March 1997 , is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a vertical bar next to the figure title. Text that flows to the following change is indicated by a current change number

TM 1-1520-237-MTF
C6

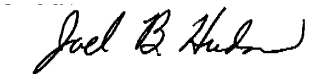
Remove Pages	**Insert Pages**
A through C/(D Blank)	A through C/(D Blank)
2-15 and 2-16	2-15 and 2-16
3-1/(3-2 Blank)	3-1/(3-2 Blank)

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

Official:

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



JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
0019570

DISTRIBUTION:
To be distributed in accordance with Initial Distribution No. (IDN) 310285, requirements for TM 1-1520-237-MTF.

CHANGE NO. 5

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 3 April 2000

MAINTENANCE TEST
FLIGHT MANUAL

UH–60A HELICOPTER
UH–60L HELICOPTER
EH–60A HELICOPTER

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TM 1–1520–237–MTF, dated 31 March 1997 , is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
A through C/(D blank)	A through C/(D blank)
2-21 and 2-22	2-21 and 2-22
2-51 and 2-52	2-51 and 2-52

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

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

Official:

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
9931328

DISTRIBUTION:
To be distributed in accordance with Initial Distribution Number (IDN) 310285 requirements for TM 1-1520-237-MTF.

CHANGE
NO. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 July 1999

MAINTENANCE TEST FLIGHT MANUAL

UH-60A HELICOPTER
UH-60L HELICOPTER
EH-60A HELICOPTER

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TM 1-1520-237-MTF, dated 31 March 1997, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

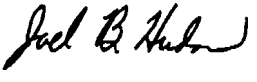
Remove pages	Insert pages
A and B	A through C/(D blank)
2-3 through 2-6	2-3 through 2-6
None	2-6.1/(2-6.2 blank)
2-9 and 2-10	2-9 and 2-10
2-25 and 2-26	2-25 and 2-26
2-31 and 2-32	2-31 and 2-32
2-45 and 2-46	2-45 and 2-46
3-1/(3-2 blank)	3-1/(3-2 blank)
4-27 and 4-28	4-27 and 4-28
4-59 and 4-60	4-59 and 4-60
4-65 through 4-70	4-65 through 4-70
4-73 and 4-74	4-73 and 4-74

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

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

Official:



JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
9917307

DISTRIBUTION:
To be distributed in accordance with Initial Distribution Number (IDN) 310285 requirements for TM 1-1520-237-MTF.

CHANGE NO. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 29 January 1999

MAINTENANCE TEST FLIGHT MANUAL

UH-60A HELICOPTER
UH-60L HELICOPTER
EH-60A HELICOPTER

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TM 1-1520-237-MTF, dated 31 March 1997, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
A/(B blank)	A and B
i through iv	i through iv
1-1 and 1-2	1-1 and 1-2
None	1-2.1/(1-2.2 blank)
2-27 through 2-30	2-27 through 2-30
2-39 and 2-40	2-39 and 2-40
2-61 through 2-64	2-61 through 2-64

TM 1-1520-237-MTF
C 3

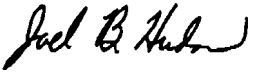
Remove pages	Insert pages
3-1/(3-2 blank)	3-1/(3-2 blank)
4-1 through 4-4	4-1 though 4-4
None	4-4.1/(4-4.2 blank)
4-11 through 4-14	4-11 through 4-14
4-17 and 4-18	4-17 and 4-18
4-35 and 4-36	4-35 and 4-36
4-47 through 4-50	4-47 through 4-50
4-55 and 4-56	4-55 and 4-56
4-81 and 4-82	4-81 and 4-82
None	4-82.1/(4-82.2 blank)
4-85 and 4-86	4-85 and 4-86
4-91 and 4-92	4-91 and 4-92
4-97/(4-98 blank)	4-97/(4-98 blank)

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

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

Official:



JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
05405

DISTRIBUTION:
To be distributed in accordance with Initial Distribution Number (IDN) 310285 requirements for TM 1-1520-237-MTF.

CHANGE
NO. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 October 1998

MAINTENANCE TEST FLIGHT MANUAL

UH-60A HELICOPTER
UH-60L HELICOPTER
EH-60A HELICOPTER

TM 1-1520-237-MTF, dated 31 March 1997, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

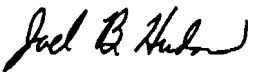
Remove pages	Insert pages
A and B	A and B
i and ii	i and ii
1-1 and 1-2	1-1 and 1-2
2-3 and 2-4	2-3 and 2-4
2-9 through 2-12	2-9 through 2-12
None	2-12.1/(2-12.2 blank)
2-13 and 2-14	2-13 and 2-14
2-17 through 2-20	2-17 through 2-20
None	2-20.1/(2-20.2 blank)
2-23 through 2-26	2-23 through 2-26
2-33 and 2-34	2-33 and 2-34
2-37 and 2-38	2-37 and 2-38
2-41 and 2-42	2-41 and 2-42
2-51 through 2-58	2-51 through 2-58
None	2-58.1/(2-58.2 blank)
2-59 and 2-60	2-59 and 2-60
2-63 through 2-66	2-63 through 2-66
3-1/(3-2 blank)	3-1/(3-2 blank)
4-19 and 4-20	4-19 and 4-20
None	4-20.1/(4-20.2 blank)
4-35 and 4-36	4-35 and 4-36
4-39 and 4-40	4-39 and 4-40
4-45 and 4-46	4-45 and 4-46
None	4-46.1/(4-46.2 blank)
4-47 through 4-50	4-47 through 4-50
4-65 through 4-68	4-65 through 4-68
4-87 and 4-88	4-87 and 4-88
4-91 and 4-92	4-91 and 4-92
5-21 and 5-22	5-21 and 5-22

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

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

Official:



JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
05176

DISTRIBUTION:
To be distributed in accordance with Initial Distribution Number (IDN) 310285 requirements for TM 1-1520-237-MTF.

CHANGE
NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 June 1997

MAINTENANCE TEST FLIGHT MANUAL

UH-60A HELICOPTER
UH-60L HELICOPTER
EH-60A HELICOPTER

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

TM 1-1520-237-MTF, dated 31 March 1997, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

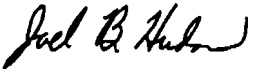
Remove pages	Insert pages
A/(B blank)	A/(B blank)
i and ii	i and ii
2-53 and 2-54	2-53 and 2-54
2-59 and 2-60	2-59 and 2-60
4-33 and 4-34	4-33 and 4-34
None	4-34.1 through 4-34.3/(4-34.4 blank)
4-75 and 4-76	4-75 and 4-76
None	4-76.1 and 4-76.2

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

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

Official:



JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
03942

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31 E, block no. 0285, requirements for TM 1-1520-237-MTF.

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 1-1520-237-10 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.

LIST OF EFFECTIVE PAGES

Insert latest changed pages; dispose of superseded pages in accordance with applicable regulations.

NOTE: On a changed page, the portion of the text affected by the latest change is indicated by a vertical line, or other change symbol in the outer margin of the page. Changes to illustrations are indicated by a vertical line along side the title.

Total number pages in this manual is 236.

Original	0	31 March 1997
Change	1	30 June 1997
Change	2	30 October 1998
Change	3	29 January 1999
Change	4	30 July 1999
Change	5	3 April 2000
Change	6	27 November 2000
Change	7	15 June 2001

Page No.	*Change No.	Page No.	*Change No.
Title	0	1-4	0
Blank	0	2-1 - 2-2	0
A - C	7	2-3	2
D Blank	7	2-4	7
a	0	2-5	0
b Blank	0	2-6	4
i	2	2-6.1	7
ii	3	2-6.2 Blank	7
iii	0	2-7 - 2-8	2
iv	3	2-9	4
1-1	2	2-10 - 2-12.1	2
1-2 - 1-2.1	3	2-12.2 Blank	2
1-2.2 Blank	3	2-13	2
1-3	7	2-14	7

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

Page No.	*Change No.	Page No.	*Change No.
2-15	0	2-59	7
2-16 - 2-18.1	7	2-60	2
2-18.2 Blank	7	2-61	3
2-19 - 2-20.1	2	2-62	0
2-20.2 Blank	2	2-63	3
2-21 - 2-22	5	2-64	0
2-23	0	2-65	7
2-24	2	2-66	2
2-25	4	3-1	6
2-26	2	3-2 Blank	6
2-27	0	4-1	0
2-28	3	4-2 - 4-4.1	3
2-29	0	4-4.2 Blank	3
2-30	3	4-5 - 4-7	0
2-31	0	4-8	7
2-32	4	4-9 - 4-10	0
2-33	0	4-11	3
2-34	2	4-12	0
2-35	7	4-13	3
2-36 - 2-37	0	4-14 - 4-16	0
2-38	2	4-17	3
2-39	3	4-18 - 4-19	7
2-40	0	4-20 - 4-20.1	2
2-41	7	4-20.2 Blank	2
2-42	2	4-21	7
2-43 - 2-44	0	4-22 - 4-25	0
2-45	7	4-26	7
2-46 - 2-50	0	4-27	0
2-51	7	4-28	4
2-52 - 2-53	2	4-29 - 4-32	0
2-54 - 2-56	7	4-33 - 4-34	1
2-57 - 2-58.1	2	4-34.1 - 4-34.3	7
2-58.2 Blank	2	4-34.4 Blank	7

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

Page No.	*Change No.	Page No.	*Change No.
4-35	3	4-93 - 4-96	0
4-36	2	4-97 - 4-98	3
4-37 - 4-38	0	4-99	7
4-39	7	4-100 - 4-103	3
4-40	2	4-104 Blank	3
4-41 - 4-45	0	5-1 - 5-18	0
4-46	7	5-19	7
4-46.1	2	5-20	0
4-46.2 Blank	2	5-21	2
4-47	3	5-22	0
4-48	2		
4-49	3		
4-50 - 4-54	0		
4-55	7		
4-56	3		
4-57 - 4-58	0		
4-59	4		
4-60 - 4-64	0		
4-65 - 4-66	4		
4-67	2		
4-68 - 4-70	4		
4-71 - 4-73	0		
4-74	4		
4-75 - 4-76.2	1		
4-77 - 4-81	0		
4-82 - 4-82.1	3		
4-82.2 Blank	3		
4-83 - 4-84	0		
4-85	3		
4-86	0		
4-87	7		
4-88 - 4-91	0		
4-92	3		

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

TABLE OF CONTENTS

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

Your 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-LS-LP, 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: ls-lp@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.

Section		Page
I	Introduction	1-1
II	Maintenance Test Flight Checklist	2-1
	Prior to Maintenance Test Flight	2-1
	Interior	2-1
	Before Starting Engines	2-7
	Starting Engines	2-29
	Run-Up	2-39
	Taxi	2-45
	Before Takeoff	2-46
	Aircraft Hover	2-47
	Before Takeoff	2-52

TABLE OF CONTENTS (CONT)

Section		Page
	After Takeoff	2-52
	Climb	2-53
	Cruise	2-53
	Before Landing	2-61
	After Landing	2-62
	Engine Shutdown	2-62
III	Fault Isolation Procedures	3-1
IV	Special/Detailed Procedures	4-1
	General	4-1
	A. NVG Systems - Check	4-1
	B. SAS/FPS Computer Check	4-9
	C. Stabilator Check	4-12
	D. EH IINS Normal Alignment	4-15
	E. ERFS Extended Range Fuel System	4-17
	F. Blade Deice System	4-20
	G. Cargo Hook System Operational Check	4-23
	H. Rescue Hoist System Test	4-26

TABLE OF CONTENTS (CONT)

Section		Page
I.	Communication and Navigation Equipment - Ground Checks	4-30
J.	Operating Engine With Gust Lock On	4-36
K.	Engine Fuel System Priming	4-37
L.	Engine Starter/Air Start Valve/ Automatic Fuel Prime Checks	4-38
M.	Deice EOT Check	4-39
N.	APU Generator Backup Check	4-40
O.	EH Environmental Control System Checks	4-41
P.	Auxiliary Electric Cabin Heater/ Backup Pump/Generators Check. (On Helicopters with Auxiliary Cabin Heater Installed)	4-44
Q.	Engine Overspeed System - Test one engine at a time	4-46
R.	Engine Health Indicator Test/Engine Anti-Ice - Check each engine individually as follows:	4-47
S.	EH IINS Fast Alignment	4-51
T.	HIT Baseline Procedures, Engine Performance Data Checks (when required)	4-55
U.	700 Maximum Power Check	4-58
V.	701C Maximum Power Check	4-61

TABLE OF CONTENTS (CONT)

Section		Page
Section		Page
	W. Maximum Power Check (when engine is Ng limited).	4-64
	X. Vibration Absorber Check and Tuning	4-65
	Y. Communication and Navigation Equipment - Airborne Checks	4-69
	Z. ERFS External Extended Range Fuel Transfer Check	4-82
	AA. EH ECM Antenna - Check	4-83
	AB. Buddy Start System	4-84
	AC. AFMS Auxiliary Fuel Management System	4-98
	AD. AFMS Auxiliary Fuel Management System Transfer Check	4-102
V	Charts and Forms	5-1

SECTION I. INTRODUCTION

1. Purpose. This manual has complete instructions for performing a maintenance test flight of the UH-60A, EH-60A and UH-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 for UH-60A and UH-60L peculiar systems, UH-60A for UH-60A peculiar systems only, UH-60L for UH-60L peculiar systems only, ES for UH-60A/L with ESSS installed, ERFS for UH60A/L with Extended Range Fuel System installed, AFMS for UH60A/L with Auxiliary Fuel Management System installed, and EH for EH-60A helicopters 700 for UH-60A and EH-60A aircraft equipped with T700-GE-700 engines, 701C for UH-60L aircraft equipped 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-60A, EH-60A and UH-60L helicopters and in no way supersedes any information in TM 1-1520-237-10 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 1-1520-237-10 . 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.

c. Deleted.

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 de-

tected 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 require corrective action, shall be listed in the Remarks block during flight and transferred to DA Form 2408-13-1 immediately after termination of the flight. The 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-60A, EH-60A and UH-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 1-1520-237-10 - 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, copilot), and EH mission operators).

   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 EH mission operators).

   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 and copilot seats.

5. Seat belt and shoulder harness - Check (pilot, copilot), EH mission operators and observer).

   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.

CAUTION

EH The ECM antenna can be extended with the helicopter on the ground if the copilot's radar altimeter is turned off, removed, or the LO SET bug is set below the radar altimeter indication.

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

b. Collective friction - Off.

b.1. HUD **ADJ ON/OFF** switch - **OFF**.

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

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

e. Avionics - Off, frequencies set.

f. EH **ASE** - Off, inhibit switches set.

g. **TAIL SERVO** switch - **NORMAL**.

h. **COMPASS** switch - **SLAVED**.

i. **ENGINE IGNITION** switch - **OFF**.

j. CDU **DIGITS** switch - **ON**.

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

l. Clocks - Set and running.

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

INTERIOR (CONT)

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

o. EH Copilot's radar altimeter - Set **LO SET** bug at 200 feet, **HI SET** bug at 800 ft.

p. Vertical speed indicators - Zero indication.

q. Compass calibration card - Current and legible.

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

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

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

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

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

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

x. EH **AC ESNTL BUS** circuit breakers - In.

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

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

aa. EH **QF PWR** switch - **OFF**, **ECS** switches - **OFF**.

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

ac. **EXT PWR** switch - **OFF**.

ad. **BATT** switch - **OFF**.

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

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

ag. **FUEL PUMP** switch - **OFF**.

ah. **FIRE EXTGH** switch - **OFF**.

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

aj. 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.

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

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

am. **PITOT HEAT** switch - **OFF**.

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

ao. **WINDSHIELD WIPER** switch - **OFF**.

ap. **VENT BLOWER** switch - **OFF**.

aq. **HEATER** switch - **OFF**.

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

INTERIOR (CONT)

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

at. Mission readiness circuit breaker panel - 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.

On helicopters equipped with bit chip detectors, the **MASTER CAUTION** press to reset lights will not extinguish after being pressed to reset while the chip detector BIT is in progress. After the battery is turned on, the **CHIP INPUT MDL-LH**, **CHIP ACCESS MDL-LH**, **CHIP INT XMSN**, **CHIP TAIL XMSN**, **CHIP INPUT MDL-RH**, **CHIP ACCESS MDL-RH** caution lights will illuminate immediately, stay on for 45 to 70 seconds, and then go out. The **CHIP MAIN MDL SUMP** caution light will illuminate after approximately 30 seconds, stay on approximately 30 seconds, and then go out.

11. **BATT** switch - **ON**, note stabilator audio; then reset pilot's **MASTER CAUTION** light.

12. Caution/Advisory panel - Check these lights on:

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

b. **AC ESS BUS OFF**.

c. **STABILATOR**.

d. **BOOST SERVO OFF**.

e. **SAS OFF**.

e.1. **GPS POS ALERT**.

WARNING

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

13. External power - Connected if required.

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

b. **EXT PWR CONNECTED** and **BACK-UP PUMP ON** advisory lights - On.

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.)

NOTE

Before engine operation can be performed with the gust lock engaged all main rotor tie downs shall be removed.

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 light - 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** advisory light - On.

BEFORE STARTING ENGINES (CONT)

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 light on when operating speed is reached.

f. **APU ACCUM LOW** advisory light - 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 light on.

b. **BACK-UP PUMP ON** advisory light - On in about 4 seconds.

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

d. **APU ACCUM LOW** advisory light off after accumulator is recharged.

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

4. **EXT PWR** switch - **OFF** and cable disconnected, if used.EH **SYSTEMS SELECT** switches - **DG/VG**.

NOTE

EH Always place feet on the pedals, a hand on the cyclic, and disengage trim using the cyclic **TRIM REL** switch before changing the **SYSTEMS SELECT** switches from **DG/VG** to **IINS/IINS** or from **IINS/IINS** to **DG/VG**. In the **VG** position, the pitch and roll reference signals come from the copilot's vertical gyro. In the **DG** position, the heading/yaw reference signals used by both HSIs and the SAS/FPS computer come from the ASN-43 directional gyro. In the **IINS/IINS** position, the pitch, roll and heading/yaw reference signals, used by the copilot's VSI, both HSI's and the SAS/FPS computer, all come from the AN/ASN-132 IINS gyro.

*5. EH Obtain current altimeter setting and enter into mission log.

6. EH IINS - Normal alignment. (Refer to Section IV D.)

BEFORE STARTING ENGINES (CONT)

NOTE

EH When **NAVRDY** flashes on the CDU place the **MODE SEL** switch to **NAV**.

WARNING

EH Potential radiation hazard exists at the TACAN antenna when the TACAN is turned on. Make sure no person is within three feet of antenna. When TACAN is first turned on and line 3 left of CDU displays anything other than REC, immediately press line select key 3 left until the display shows REC.

7. EH IINS TACAN - On.

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

a. These caution/advisory lights should be on:

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

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

(3) **#1** and **#2 ENGINE OIL PRESS**.

(4) **#1** and **#2 HYD PUMP**.

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

(6) **#1** and **#2 ENG ANTI-ICE ON**.

(7) **APU ON**.

(8) **APU GEN ON**.

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

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

(11) **PARKING BRAKE ON**.

(12) EH **ANTENNA RE-TRACTED**.

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 caution/advisory lights on, **#1** and **#2 FUEL LOW** should flash.

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

(3) VSI advisory lights - On.

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

(5) Pilot **CIS MODE SEL** legend lights - On.

(6) EH **SYSTEMS SELECT** switches legend lights - On.

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

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

d. Caution/Advisory panel dimming test:

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

BEFORE STARTING ENGINES (CONT)

(2) Turn **INSTR LT PILOT FLT** control clockwise from **OFF**.

(3) Place **BRT/DIM TEST** switch to **BRT/DIM**; then to **TEST** - All lights noted in step c. above, and the **MISC SW** panel 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 **INSTR LT PILOT FLT** to **OFF** - All lights should return to bright.

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

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

NOTE

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

*9. CDU - PDU test:

a. Check static indications.

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

c. 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 PDU's.

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 PDU's 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).

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

BEFORE STARTING ENGINES (CONT)

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** 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 light off.

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

13. 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.

14. Windshield wiper system operating check.

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.

15. EH **SYSTEMS SELECT** switches - **DG/VG**.

*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.

BEFORE STARTING ENGINES (CONT)

(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** 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** caution light does not illuminate, 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** 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 light does not illuminate, 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.

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

NOTE

If the **#1 PRI SERVO PRESS** or **#2 PRI SERVO PRESS** caution light illuminates, 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** and **MASTER CAUTION** lights should be on.

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

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

e. **BOOST SERVO** - Check.

(1) Collective - Midposition, Pedals - Centered.

BEFORE STARTING ENGINES (CONT)

(2) **BOOST** switch - Off. Maximum allowable collective stick and pedal jump 1/16-inch. **BOOST SERVO OFF** caution light 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 light and **MASTER CAUTION** lights off.

(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 lights should be on:

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

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

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 light, both **MASTER CAUTION** lights, and **#2 TAIL RTR SERVO ON** advisory light should be off.

BEFORE STARTING ENGINES (CONT)

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 light on.

(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 light off.

*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.

(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.

BEFORE STARTING ENGINES (CONT)

(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 caution/advisory lights may flash on and off, 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.

(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.

BEFORE STARTING ENGINES (CONT)

(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.

(5) EH **SYSTEMS SELECT** switches - **IINS/IINS**.

(6) EH Repeat steps (2) through (4).

(7) EH **SYSTEMS SELECT** switches - **DG/VG**.

20. Compass - Set to null as required.

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

22. Avionics - On.

*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 readouts should change.

(2) **#1** and **#2 FUEL LOW** and **MASTER CAUTION** lights - Flash at a rate of four per second.

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 E.1.)

BEFORE STARTING ENGINES (CONT)

*25. Barometric altimeters - 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.

*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**.

BEFORE STARTING ENGINES (CONT)

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 lights off.

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

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

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

30. EH IINS display - Check.

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

31.1. Cargo hook functional check - If required. (Refer to Section IV G.)

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

*33. Fuel boost pumps - Check.

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

b. **NO. 2 PUMP** switch - **ON**. Check **#2 FUEL PRESS** caution light 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 I.)

STARTING ENGINES

CAUTION

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

NOTE

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

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

NOTE

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

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

STARTING ENGINES (CONT)

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** caution light off. 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 L.) (May be combined with step 7 below).

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**.

STARTING ENGINES (CONT)

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 J.

*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.

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**.

STARTING ENGINES (CONT)

NOTE

These caution/advisory light indications will occur during engine start cycle: **ENG ANTI-ICE ON** light will be on, **FUEL PRESS** will flicker and then go off, and **OIL FLTR BYPASS** may go on, but should go off.

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).

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 light - Off. If **ENGINE STARTER** caution light 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. Ng's 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.

STARTING ENGINES (CONT)

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

*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 lights 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 TAIL RTR SERVO ON**.

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

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

c. **HYD LEAK TEST** switch - **RESET**, then **NORM**. All lights except **TRIM FAIL**, **FLT PATH STAB** and **BACK-UP PUMP ON** should go off. **BACK-UP PUMP ON** light should go off after about 90 seconds (**BACK-UP PUMP ON** light should go off after about 180 seconds for dual accumulator installation).

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

(1) **FLT PATH STAB** and **TRIM FAIL** caution lights - Off.

(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 lights - Off by 97% **RPM R**.

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

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

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

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

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

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

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

O34. Auxiliary electric cabin heater/backup pump/generators - Check. (Refer to Section IV P.)

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 Q.

*3. ECU/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%. 700 At 106% ± 1%, the overspeed system should engage. Do not increase above 107% **RPM 1** or **2**.

c. Reengage ECU/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. Pilot's **ENG RPM** switch - Check operation for and override capability.

(1) Full **DECR** while holding copilot's switch to **INCR**. **% RPM R** should decrease to 96%.

(2) Full **INCR** while holding copilot's switch to **DECR**. **% RPM R** should increase to 100%.

b. Copilot's **ENG RPM** switch - Check **DECR**, then **INCR**. Set **% RPM R** to 100%.

*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**.

RUN-UP (CONT)

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 lights - 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** caution light - Off.

(b) **#1 GEN** caution light - On.

(2) **GENERATORS NO. 1** switch - **ON**, **#1 GEN** caution light off.

(3) 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 light - May flash but remains off.

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

NOTE

If during check, **STABILATOR** and/or **FLT PATH STAB** caution light comes on, 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** caution light - Off.

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

RUN-UP (CONT)

(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** caution light - On.

(b) CDU lights - All remain on.

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

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

(3) **NO. 1 CONVERTER** circuit breaker - Push in. **#1 CONV** caution light - Off.

(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. **FUEL PUMP** switch - **OFF**.

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

9. **APU CONTR** switch - **OFF**.

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

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

12. 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 (and EH flare) module safety pin - Remove.

O6. ES Ejector rack locking levers - Unlocked.

7. Doors - Secure.

8. Parking brakes - Release.

TAXI (CONT)

*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.

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 R. 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 1-1520-237-10, 700 Chapter 7, or 701C Chapter 7A .

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.

*2. 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.

*3. SAS - Check.

   a. EH **SYSTEMS SELECT** switches - **DG/VG**.

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

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

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

AIRCRAFT HOVER (CONT)

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

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

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

f. EH **SYSTEMS SELECT** switches - **IINS/IINS**.

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

h. EH **SYSTEMS SELECT** switches - **DG/VG**.

i. **SAS 1** - Press **ON**.

*4. **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.

g. EH **SYSTEMS SELECT** switches - **IINS/IINS**.

h. EH Repeat steps a. through f.

i. EH **SYSTEMS SELECT** switches - **DG/VG**.

*5. Tail rotor servo - Check.

a. Land aircraft.

b. **TAIL SERVO** switch - **BACKUP**. **#1 TAIL RTR SERVO** caution light on. Note time for **BACK-UP PUMP ON** advisory light to go on, about 0.5 second. **#2 TAIL RTR SERVO ON** advisory light on.

CAUTION

If #2 TAIL RTR SERVO ON advisory light did not go on, 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 light off. **#2 TAIL RTR SERVO ON** advisory light off. **BACK-UP PUMP ON** advisory light should go off after 90 seconds or 180 seconds with dual accumulators installed.

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

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

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 lights remain off.

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.

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

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

b. Make hovering turns.

AIRCRAFT HOVER (CONT)

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**).

f. EH **SYSTEMS SELECT** switches - **IINS/IINS**.

g. EH Repeat steps a., b. and d.

h. EH **SYSTEMS SELECT** switches - **DG/VG**.

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. EH IINS page select switch - **TCN**.
6. EH **IINS TACAN** mode - Select **T/R**.
7. EH **IINS TACAN NORM/UPDT** - Select **UPDT**.
8. 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.

   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.

   a.1. Autorotation RPM - Check.

CRUISE (CONT)

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.

(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 RPM R up in a steady state manner for RPM R 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%.

CRUISE (CONT)

b. 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 U, V, and W.)

*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) EH **SYSTEMS SELECT** switches - **IINS/IINS**.

(7) EH Repeat steps (1) through (5).

(8) EH **SYSTEMS SELECT** switches - **DG/VG**.

(9) 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**.

(10) EH **SAS 2** switch - **ON**, **SAS 1** switch - Off.

(11) EH **SYSTEMS SELECT** switches - **IINS/IINS**.

(12) EH Repeat step (9) for **SAS 2** only. Response should be similar to previous single SAS checks.

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

(14) EH **SYSTEMS SELECT** switches - **DG/VG**.

*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.

(4) EH **SYSTEMS SELECT** switches - **IINS/IINS**.

(5) EH Repeat steps (1) through (3).

(6) EH **SYSTEMS SELECT** switches - **DG/VG**.

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.

(4) EH **SYSTEMS SELECT** switches - **IINS/IINS**.

(5) EH Repeat steps (1) through (3) above.

(6) EH **SYSTEMS SELECT** switches - **DG/VG**.

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

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 or placard limit.

700 837°C to 849°C or 701C 851°C.

Ng limiting.

CRUISE (CONT)

*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.

*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 Y.)

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.

7.1. External extended range fuel transfer check. (Refer to **ERFS** Section IV Z **AFMS** Section IV AD.)

8. **EH** ECM antenna - Check. (Refer to Section IV AA.)

BEFORE LANDING

1. **EH** **IINS** page select switch - **TCN**.

BEFORE LANDING (CONT)

2. EH **IINS TACAN** mode - Select **REC**.
3. EH **IINS TACAN NORM/UPDT** - Select **NORM**.
4. EH **ASE** - **OFF**.
5. **TAILWHEEL** switch - As required.
6. **PARKING BRAKE** - As required.
7. 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.

NOTE

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

3. Landing gear - Chocked.
4. EH **IINS TACAN** mode - Select **OFF**.
5. EH **SYSTEMS SELECT** switches - **DG/VG**.

6. EH IINS CDU - Note any malfunction codes and record.

7. EH **IINS** mode select switch - **OFF**.

8. Chaff EH flare electronic module safety pin(s) - Install.

O9. ES Ejector rack locking levers - Locked.

9.1. **SAS 1** - Off.

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

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

12. **FUEL PUMP** switch - **APU BOOST**, **PRIME BOOST PUMP ON** advisory light should go on.

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

14. **APU CONTR** switch - **ON**.

    a. **APU ON** advisory light - On.

    b. **APU ACCUM LOW** and **BACK-UP PUMP ON** advisory lights - On.

    c. **GENERATORS NO. 1** and **NO. 2** switches - **OFF**. **#1 GEN** and **#2 GEN** caution lights and **APU GEN ON** advisory light should be on.

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

16. Collective - Up no more than 1 inch.

ENGINE SHUTDOWN (CONT)

CAUTION

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

17. **ENGINE IGNITION** switch - **OFF**.

18. EH **ECS** switches - **OFF**.

19. EH Insure mission equipment is off; then **Q/F PWR** switch - **OFF**.

20. 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.

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

NOTE

Do not move **ENG POWER CONT** levers below **IDLE** until **APU ACCUM LOW** advisory light goes off.

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

*23. System instruments - Check.

24. **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.

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

26. **#1 ENG OUT** warning light and audio - On as **Ng SPEED** decreases below 55%.

27. **#1 ENG FUEL SYS** selector - **OFF**.

28. **TGT TEMP** - Monitor.

ENGINE SHUTDOWN (CONT)

29. Repeat steps 25 through 28 for No. 2 engine. Engine out audio will not go on.

30. Avionics - Off.

31. Stabilator - Slew to 0.

32. 701C Note and record **DEC** codes.

33. **APU** generator switch - **OFF**.

34. **FUEL PUMP** switch - **OFF**.

35. **APU CONTR** switch - **OFF**.

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

37. All other overhead switches - OFF.

38. **BATT** switch - **OFF**.

*39. Post flight inspection - Perform.

*40. Check sheet - Signed.

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

42. Maintenance personnel - Debriefed as necessary.

SECTION III. FAULT ISOLATION PROCEDURES

General. Two 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 and TM 11-1520-249-23 (EH-60A), Avionics Fault Isolation Procedures Manuals, cover 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. Caution/Advisory **BRT/DIM TEST** switch - **BRT/DIM** momentarily; then **TEST** and hold.

d. All caution/advisory/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, and **AFCS FAILURE ADVISORY** lights illuminate.

f. While still holding caution/advisory **TEST** switch, press and release **PNL LTS** button on copilot's cyclic stick - All caution/advisory panel legends extinguish.

g. Press and release pilot's **PNL LTS** button. Caution/Advisory legends reilluminate. Release caution/advisory panel switch.

h. Rotate **CAUT ADVSY NVG DIMMING** control on instrument panel to **DIM**. Caution/Advisory panel legends decrease in brightness.

i. Rotate **MA WRN NVG DIMMING** control on instrument panel to **DIM**. Master warning legends decrease in brightness.

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

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

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

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

n. **LIGHTED SWITCHES** dimmer control - Rotate clockwise. Switches on **MODE SEL** panel, **TAIL WHEEL** switch, switches on **CIS MODE SEL** panel and **AUTO FLIGHT CONTROL** panel switches illuminated. **AFMS** Fuel quantity displays illuminated. Press **TEST/RESET** button to illuminate annunciators. **FUEL BOOST PUMP CONTROL** panel **PRESS-TO-TEST** lights illuminate when pressing to test.

o. 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.

p. 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.

q. 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.

r. 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.

s. Rotate **INSTR LT NON FLT** control clockwise from **OFF** toward **BRT**. Observe the following nonflight instruments illuminate and increase in brightness:

(1) CDU.

(2) Blade deice control panel.

(3) Blade deice test panel.

(4) Ice rate indicator.

(5) **AFMS** Auxiliary Fuel Management Control Panel.

(6) Copilot's collective grip.

(7) Pilot's collective grip.

NOTE

When checking nonflight instruments, the IRCM control panel will not illuminate.

(8) **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**. Lower console **AUTO FLIGHT CONTROL**, **COMPASS**, **RADIO RETRANSMISSION**, pilot, copilot, and 3 cabin ICS panels and when installed, **ERFS** **AUXILIARY FUEL MANAGEMENT** and **RESCUE HOIST** associated panel, **FUEL BOOST PUMP CONTROL** panel lights illuminate.

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

(1) ADF.

(2) VOR/LOC.

(3) Communications radios.

(3) ICS.

(4) M130 Dispenser.

(6) Doppler.

(7) IFF.

(8) Ciphony.

(9) Radar warning.

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 - **NORM**. 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.

NOTE

For the purpose of this check, the pilot's **STAB POS** indicator should be used. The copilot's **STAB POS** indicator may vary from the pilot's indicator as much as ± 2°.

1. **STAB POS** indicator should be 34° to 42° **DN**. **STABILATOR** caution light - Off.

2. **TEST** button - Press and hold until **STABILATOR** 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 light 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** 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 light off.

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 light 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 light 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** 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** 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. IINS Normal Alignment. EH

NOTE

Present position must be entered during the first two minutes of normal alignment. If present position is displayed, it must be reentered. About eight minutes after turn-on, flashing **NAVRDY** will be displayed on line 6 indicating full alignment. A steady **NAVRDY** indicates INV attitude data degraded, NAV performance are available, or Mode select switch may be returned to **OFF** for two minutes and then turned on to reinitiate.

1. IINS mode select switch - **NORM**, CDU screen will remain blank for about 30 seconds. Check **BRT** knob, set midrange.

2. Rotate page select switch to **POS**.

3. When CDU lights, press line select key 7 right to display UTM coordinate system.

4. From mission log - Enter present position alignment coordinates.

   a. Enter grid zone.

   b. Enter spheroid, if change is required.

   c. Enter area, easting and northing.

5. Rotate page select to **INS**.

6. Enter current field altimeter setting as barometric pressure.

7. Enter field elevation in AALT.

90 feet is entered as .09

340 feet is entered as .34

1560 feet is entered as 1.56

8. Rotate page select switch to **DEST** - Set **DEST** page to D0 (Destination 0).

9. From mission log - Verify/enter desired destinations.

10. Rotate page select switch to **TCN** - Verify TACAN Off.

11. From mission log - Verify/enter TACAN stations as required.

12. Rotate page select switch to **INS**.

E. 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**.

F. Blade Deice System Check.

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

CAUTION

Do not perform blade deice test when blade erosion kit is installed.

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** 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 light should be on.

12. **BLADE DEICE POWER** switch - **OFF**. **MR DE-ICE FAIL** caution light off.

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

14. **BLADE DEICE POWER** switch - **TEST**. **MR DE-ICE FAIL** caution light should be on.

15. **BLADE DEICE POWER** switch - **OFF**. **MR DE-ICE FAIL** caution light off.

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

17. **BLADE DEICE POWER** switch - **TEST**. **MR DE-ICE FAIL** and **TR DE-ICE FAIL** caution lights should be on.

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

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

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

G. 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** advisory light - On.

   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** advisory light - On.

   g. **CARGO HOOK OPEN** advisory light - Out when hook closes.

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

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

   j. **HOOK ARMED** advisory light - Off.

   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.

H. Rescue Hoist System Test.

1. Preflight.

   a. Check oil level:

      (1) Release reaction arm and pivot hoist to operating position.

      (2) Check oil level in hoist and boom head.

      (3) Return hoist to stowed position and secure reaction arm.

   b. Check upper attachment (make sure hose clamp is installed).

   c. Check lower attachment assembly (mounting plates, pip pins and star plate).

   d. Check position switch (positions 2 and 4).

   e. Ensure hoist main power cable cannon plug is safetied at junction box.

   f. Cable cut switches - Down and safetied.

   g. Make sure metallic shorting strip is removed from cable cut cannon plug.

   h. Cable cutter connector attachment.

   i. Check recovery devices are functional and complete. Make sure recovery devices are secure.

   j. Make sure crewmembers have proper personal equipment (safety harness, leather gloves, and proper visor).

   k. Hoist control circuit breaker - In (mission essential circuit breaker panel).

2. Operational check.

   a. **SQUIB** switch - Hold at **TEST**.

   b. **SQUIB IND** light - On.

   c. **SQUIB** switch release.

   d. **MASTER** power switch - **ON**.

   e. Hoist operator - Check power on indicator (blue light), check yellow caution light on control pendant is on, and cooling fan operating.

   f. Check ICS switch on pendant.

WARNING

Hands must be kept off hoist boom during operation to prevent hand entrapment and injury.

   g. Hoist operator - **BOOM** switch - Rotate boom out and in, and then out to test boom operation.

   h. **RESCUE HOIST CONTROL** panel - Rotate boom in; then out.

   i. Speed mode switch high.

WARNING

Rescue hoist cable is stiff and abrasive. Broken cable strands are sharp, therefore leather work gloves must be worn whenever handling rescue hoist cable.

A crewmember must reel cable out from the boom head in line with the boom axis during the following test procedures. Care must be taken not to pull the cable taut around the cable guide/roller, since kinking of the cable might result. Avoid damaging cable on rough surfaces, including the ground.

j. **RESCUE HOIST CONTROL** panel - **DOWN**, reel cable out until caution light is off.

k. **RESCUE HOIST CONTROL** panel - Reel in cable and observe that cable speed slows when caution light goes on (8 to 10 feet of cable out).

l. Boom up limit actuator arm - Push up on arm during reeling in to check that hoist stops running when up limit switches are activated. Observe that cable slows when hook is 12 to 18 inches from full up position.

m. Speed mode switch - **LOW SPEED** and repeat steps j. through l.

n. Repeat steps j. through l., using control pendant assembly. Check that cable speed can be regulated by control pendant from 0 to 250 fpm when cable is reeled out beyond 10 feet.

CAUTION

Make sure hoist cable is completely up, to prevent cable wear between cable and hook assembly.

o. **BOOM** switch - Rotate boom in to stowed position.

I. Communication and Navigation Equipment - Ground Checks.

1. No. 1 and No. 2 (if installed) AN/ARC-114A FM, AN/ARC-164 UHF and VHF-AM. Check transmission and reception.

2. AN/ARN-89/AN/ARN-149 ADF- Check operation.

   a. Check reception.

   b. Mode selector - **COMP**.

   c. Pilot's and copilot's HSI, VSI **MODE SEL BRG 2** switch - **ADF**.

   d. HSI #2 needle should indicate approximate magnetic bearing to known ground station.

   e. **CW**, **VOICE**, **TEST** switch - **TEST**.

   f. Check that #2 HSI needle swings 180°.

3. 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**.

4. 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 TM 1-1520-237-10.

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.

5. AN/ASN-128 Doppler - Test.

a. **MODE** selector - **LAMP TEST**. All display (left, right, center and storage) segments and the **MEM** and **MAL** indicators go on.

b. Turn **DIM** control fully clockwise, fully counter-clockwise, and then fully clockwise again. All segments of display should alternately glow bright, go off and glow bright.

c. **MODE** selector - **TEST**, after about 15 seconds, left display should indicate **GO**. Other displays may be indicated as shown below.

LEFT DISPLAY	REMARKS

NOTE

If the **MAL** lamp lights during any mode of operation except **LAMP TEST**, the computer-display unit **MODE** switch should be first placed **MODE** OFF and then to **TEST**, to verify the failure. If the **MAL** lamp remains lighted after recycling to **TEST**, notify organizational maintenance personnel of the navigation set malfunction.

GO	If right display is blank, system is operating satisfactorily.
GO	If right display is P; then pitch or roll data is missing, or pitch is over 90°. In this case, pitch and roll in the computer are both set to zero and navigation continues in a degraded operation. Problem may be in the vertical gyroscope or helicopter wiring.

NOTE

If the **TEST** mode display is **MN** or **NG**, the **MODE** switch should be recycled through **OFF** to verify that the failure is not a momentary one. If the **TEST** mode display is **MN**, the data entry may be made in the **UTM** or **LAT/LONG** mode, but any navigation must be carried on with the system in the **BACKUP** mode.

LEFT DISPLAY	REMARKS
MN	A failure has occurred and the **BACKUP** mode, used for manual navigation (MN), is the only means of valid navigation. The operator may use the computer as a dead reckoning device by entering ground speed and track data. The operator should update present position as soon as possible, because it is possible significant navigation errors may have accumulated.
NG	A failure has occurred in the computer-display unit and the operator should not use the system.

d. Enter present position and destination.

5.1. **GPS** AN/ASN-128B DGNS - Test.

a. Set the **MODE** selector to **LAMP TEST**. Enter **GPS** mode ″**M**″ or ″**Y**″. Verify the following:

(1) All edge lighting is illuminated.

(2) The **MAL** lamp is illuminated.

(3) All keyboard keys are lit.

b. Depress the **BRT** pushbutton at least 10 times, then depress the **DIM** pushbutton at least 10 times, then depress the **BRT** pushbutton at least 10 times. LCD display shall alternately glow bright, extinguish, and glow bright.

c. Set the **MODE** selector to **TEST**.

NOTE

After Doppler and/or GPS self tests have completed (approximately 15 seconds for Doppler, up to two minutes for GPS), one of the following displays will be observed in the left and right displays:

In the event the **TEST** mode display is not **GO ALL** the system should be recycled through **OFF** to verify the failure is to a momentary one.

LEFT DISPLAY	RIGHT DISPLAY	REMARKS
GO		Doppler has completed built in test (BIT) and is operating satisfactorily, GPS is still performing BIT (GPS has a two minute BIT cycle maximum). Note that a rotating bar in the display indicates that the GPS is still performing self test.
GO	**ALL**	The entire system has completed BIT and is operating satisfactorily.

LEFT DISPLAY	RIGHT DISPLAY	REMARKS
GO	**P**	Pitch or Roll data is missing or exceeds 90°. In this case, pitch and roll in the computer are both set to zero and navigation in the Doppler mode continues with degraded operation. Problem may be in the vertical gyro or aircraft cabling.
NG	**C**, **R**, **S**, or **H** followed by a numeric code	A failure has occurred in the computer display unit or the signal data converter power supply. The operator should not use the system.
DN	GPS failure code	GPS has failed but operator can use Doppler to perform all navigation.
DF	Doppler failure code	Doppler has failed. GPS is still performing self test.
GN	Doppler failure code	Doppler has failed but operator can use GPS to perform all navigation.

d. Load several known local waypoints into DGNS either through CDU or through data loader module.

e. Load SA/AS variables into DGNS through SA/AS port on SDC.

e.1. Perform DGNS system start-up procedure. Ensure four (4) satellite measurements (SAT) are being used and estimated position error (EPE) is 50 (meters) or less with keys loaded or 200 (meters) or less with a cold start.

*6. Command Instrument System (CIS) - Test.

a. Select an ILS frequency and select **ILS** 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.

7. EH AN/ALQ-156(V)2 TEST

a. **PUSH FOR STANDBY** pushbutton - **OUT**.

b. M130 **ARM/SAFE** switch - **SAFE**.

c. **POWER ON/OFF** switch - **ON**.

d. **STATUS** indicator - **WRMUP** for 8 to 10 minutes, then **WRMUP** goes off.

e. **PUSH FOR STANDBY** push button - Press once.

f. **STBY STATUS** indicator - **ON**.

g. **PUSH FOR STANDBY** pushbutton - Press once.

h. **STBY STATUS** indicator - **OFF** (CM on mode).

i. **POWER ON/OFF** switch - As required.

8. EH AN/ALQ162(V)2 TEST

a. Program module inhibit switches - Set as directed.

b. Function switch - **STBY**. Observe control unit front panel lights and **WRMUP** lamp lights. **WRMUP** lamp should go out after 3 minutes.

c. Lamp test switch - Press. Observe that all four lamps in pushbutton switch light.

d. **VOLUME** control - Fully clockwise.

e. Put on aircraft headset.

f. Function switch - **OPR**.

g. **BIT** switch - Press. A tone should be heard in the headset.

h. Function switch - As required.

J. 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.

K. 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**.

L. 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**.

M. 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 light should go on after 15 to 30 seconds, and **MR DE-ICE FAIL** caution light should go on after about 50 to 70 seconds.
5. **POWER** switch - **OFF**, **TR DE-ICE FAIL** and **MR DE-ICE FAIL** caution lights should go off. Reset clock.
6. **BLADE DE-ICE TEST** select switch - **NORM**.
7. **BLADE DEICE MODE** select switch - **AUTO**.
8. **BLADE DEICE POWER** switch - **OFF**.

N. 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 light should be on.
2. **BLADE DEICE MODE** select switch - **MANUAL M**.
3. **BLADE DEICE POWER** switch - **ON**. Wait 30 seconds. No deice lights should be on.
4. **GENERATORS NO. 1** switch - **ON**. **GEN** caution light should go off.
5. **GENERATORS NO. 2** switch - **OFF**. Wait 30 seconds. No deice lights should be on.
6. **GENERATORS NO. 2** switch - **ON**. **GEN** caution light should go off.
7. **BLADE DEICE MODE** select switch - **AUTO**.
8. **BLADE DEICE POWER** switch - **OFF**.

O. Environmental Control System Checks. EH

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.

a. Place **TEMP CONT** rheostat to **WARM** and place **AIR COND** switch to **COOL**.

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 **AIR COND ON** advisory light will go on. Let system run for 10 minutes. Check air circulating from cabin ducts and 4 air outlets between pilots.

c. Turn **BACKUP HYD PUMP** switch - **ON**, then **OFF**. Check that **AIR COND ON** advisory light goes off when backup pump is on and comes on when **BACKUP HYD PUMP** switch is **OFF**. Turn **WINDSHIELD ANTI-ICE ON**, then **OFF**. Check that **AIR COND ON** light goes off when **WINDSHIELD ANTI-ICE** is **ON** and comes on when **WINDSHIELD ANTI-ICE** is **OFF**.

d. Rotate **TEMP CONT** rheostat to **COOL**. Check that cooler air is now circulating from ducts in cabin and 4 air outlets between pilots. (Cockpit may not be cooler).

e. Place **AIR COND** switch to **FAN**. Check that **AIR COND ON** advisory light goes out and that air still flows from cabin and cockpit ducts.

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 COND** switch to **FAN** and **HTR** switch - **ON**. **CABIN HEAT ON** advisory light will go on and warm air will flow from cabin and cockpit 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 **CABIN HEAT ON** advisory light goes out. Turn **BACKUP HYD PUMP** and **WINDSHIELD ANTI-ICE** switches - **OFF**. Check that **CABIN HEAT ON** advisory light comes on.

c. Place **HTR** and **FAN** switch - **OFF**. Check that **CABIN HEAT ON** advisory light goes out.

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 **AIR COND ON** advisory light stays on.

b. Turn off air conditioner and turn on heater. Make sure **CABIN HEAT ON** advisory light comes on.

c. Turn off backup pump, windshield anti-ice, and heater. Check that **CABIN HEAT ON** advisory light goes out.

P. Auxiliary Electric Cabin Heater/Backup Pump/ Generators Check. (On Helicopters with Auxiliary Cabin Heater Installed.)

NOTE

If the backup pump is on or goes on during auxiliary cabin heater operation, the heater will drop off line and provide a **HTR INOP** light. The heater control switch must be reset to continue operation. Do not reset more than three times with an unknown cause of failure.

1. **AUX CABIN HEATER** switch - **ON**.

2. Have crewmember set cabin temperature controller to fully clockwise.

NOTE

During temperature controller check, cabin temperature must be below 29°C (84°F) to check heater on, and above 10°C (50°F) to check heater off.

3. Have crewmember check heater duct outlet for airflow. Observe after a short time air temperature increases.

4. Cabin temperature controller - Set to fully counterclockwise.

5. Have crewmember verify airflow from duct becomes cooler.

6. Heater/backup pump/generators interlock - Check.

   a. **BACKUP HYD PUMP** switch - **ON**. Heater operation stopped. **HTR INOP** light illuminated.

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

c. **AUX CABIN HEATER** switch - Momentarily **RESET** then **ON**. Aux cabin heater operating and **HTR ON** light illuminated.

d. **GENERATORS NO. 1** switch - **OFF**. Heater operation stopped. **HTR INOP** light illuminated.

e. **GENERATORS NO. 1** switch - **ON**.

f. **AUX CABIN HEATER** switch - Momentarily **RESET** then **ON**. AUX cabin heater operating and **HTR ON** light illuminated.

g. Repeat steps d. through f. using No. 2 generator.

7. **AUX CABIN HEATER** switch - **OFF**.

Q. 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.

R. 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

If helicopter is equipped with two FAT gages, the higher reading must be used.

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** advisory light comes on.

    c. **ENG INLET ANTI-ICE ON** advisory light comes on 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 advisory light should not illuminate.

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** advisory light goes off.

    c. **ENG INLET ANTI-ICE ON** advisory light goes off 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 5, 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.

S. IINS Fast Alignment. EH

1. Fast alignment is a backup method of IINS alignment and should not be normally used.

   a. Stored heading alignment.

NOTE

A full normal alignment must have been performed without switching to **NAV** prior to shutdown. Aircraft must not have been moved since normal alignment and shutdown.

(1) Obtain current field altimeter setting. Enter in mission log.

(2) Rotate page select switch to **POS**.

(3) Check **BRT** knob, set midrange.

(4) Rotate mode select switch to **FAST** - CDU screen will remain blank for about 30 seconds.

(5) When CDU lights, press line select key 7 right to display UTM coordinate system (UMT or L/L).

(6) From mission log - Verify present position coordinates.

(a) If correct - Continue.

(b) If not correct - Perform normal or BATH (Best Available True Heading) alignment.

NOTE

Present position coordinates cannot be entered in this mode.

(7) Rotate page select switch to **INS**.

(8) Enter current field altimeter setting as barometric pressure.

(9) Verify/enter field elevation as AALT.

Example:

90 feet is entered as .09

340 feet is entered as .34

1560 feet is entered as 1.56

(10) Rotate page select switch to **DEST** - Set **DEST** page to D0 (Destination 0).

(11) From mission log - Verify/enter desired destinations.

(12) Rotate page select switch to **TCN** - Verify TACAN OFF.

(13) From mission log - Verify/enter TACAN stations as required.

(14) Rotate page select switch to **STR**.

(15) When flashing **NAVRDY** appears - Pull out and rotate mode select switch to **NAV**.

(16) Monitor pedals for movement. IINS **SYSTEMS SELECT** - Select **HDG DG** and **ATT VG**.

(17) Verify the following:

(a) HSI **NAV** flag, distance flag, and **HDG** flag - Out of view.

(b) HSI bearing pointer and compass card may act erratically.

(c) Pilot's and copilot's **MODE SEL** panel - Select **IINS**.

(d) Verify HSI TO/FROM arrow - In view.

(e) Verify VSI **ATT** flag - Out of view.

b. BATH alignment.

NOTE

A BATH alignment has degraded accuracy only. No restrictions on prior normal alignment or aircraft movement.

(1) Obtain current field altimeter setting. Enter in mission log.

(2) Rotate page select switch to **POS**.

(3) Check **BRT** knob, set midrange.

(4) Rotate mode select switch to **FAST** - CDU screen will remain blank for about 30 seconds.

(5) When CDU lights, press line select key 7 right to display coordinate system (UMT or L/L).

(6) Enter true or magnetic heading within 60 seconds.

(7) If known - From mission log, verify/enter present position within first 60 seconds.

(8) Rotate page select switch to **INS**.

(9) Enter current field altimeter setting as barometric pressure during alignment.

(10) Verify/enter field elevation as AALT.

Example:

90 feet is entered as .09

340 feet is entered as .34

1560 feet is entered as 1.56

(11) Rotate page select switch to **DEST** - Set **DEST** page to D0 (Destination 0).

(12) From mission log - Verify/enter desired destinations.

(13) Rotate page select switch to **TCN** - Verify TACAN OFF.

(14) From mission log - Verify/enter TACAN stations as required.

(15) Rotate page select switch to **STR**.

(16) When flashing **NAVRDY** appears - Pull out and rotate mode select switch to **NAV**.

(17) Monitor pedals for movement. IINS **SYSTEMS SELECT** - Select **HDG DG** and **ATT VG**.

(18) Verify HSI **NAV** flag - Out of view. HSI bearing pointer and compass card may act erratically.

(19) Pilot's and copilot's **MODE SEL** panel - Select **IINS**.

(a) Verify HSI TO/FROM arrow - In view.

(b) Verify VSI **ATT** flag - Out of view.

T. 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 6 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 6), calculate average indicated TGT for above three readings.

10. Determine table TGT from TGT reference table (Figure 700 4 ., or 701C 5.,) 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.

U. 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 55-2840-248-23.

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 55-2840-248-23.

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 55-2840-248-23.

V. 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° ±6°C (10 minute limit) with both engines operating or 891° ±5°C (2 1/2 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° ±6°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°±6°C or 891°±5°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°±6°C) and stabilize for 30 seconds. Record **TRQ, TGT, Ng,** pressure altitude and **FAT**.

5. Slowly increase collective until 1 to 2% droop occurs. Do not exceed 2 1/2 minute limiter setting of 891°±5°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 55-2840-248-23.

W. 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°±6°C or 701C 866°±6°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 2 1/2 minute limit cannot be obtained.

6. If it is desired to verify TGT limiter settings use engine anti-ice as necessary.

X. 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 or DEC 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 or DEC 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 or DEC 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 or DEC lockout operations and ECU or DEC 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 or DEC 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.

Y. Communication and Navigation Equipment - Airborne Checks.

1. No. 1 and No. 2 (if installed) AN/ARC-114A FM - Check transmission, reception and homing.

   a. Pilot's and copilot's **MODE SEL FM HOME** switches - **ON**.

   b. Mode selector - **HOMING**.

   c. Frequency - Select station at a known geographical reference.

   d. 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. AN/ARC-186(V) VHF-AM and VHF-FM - Check (If ▌ installed.)

   a. Communications mode check.

      (1) Mode select switch - **TR**.

      (2) Select out-of-band frequency to check warning. (On helicopters with panel mounted transceiver.)

      (3) Select frequency of station to be used for check, **MAN** or **PRE** as desired.

      (4) Communicate with check station.

   b. Squelch disable/tone check.

(1) Select **SQ DIS** - Check for noise.

(2) Select momentary **TONE**, check for tone of about 1000 Hz.

c. Preset channel load.

(1) Mode select switch - **TR**.

(2) Frequency control select switch - **MAN**.

(3) Set MHz frequency for desired channel and rotate **PRESET** channel selector thumbwheel.

(4) **LOAD** button - Press and release.

(5) Repeat steps (3) through (4) for other preset channels.

d. Retransmission mode check.

Do a retransmission check as follows:

NOTE

Do not disable squelch when retransmit switches are in retransmit position. Squelch level is used to key transmitter for retransmission.

(1) Establish two base stations at unrelated frequencies.

(2) Set appropriate receiver-transmitter to desired retransmit frequency.

(3) Place **RADIO TRANSMISSION** selector switch to radios to be used.

(4) Establish communication between base stations through aircraft radios.

(5) Note that selected frequencies are heard loud and clear and that received audio is present and clear at each crew station.

e. DF mode check.

(1) Select frequency of station to be used for homing.

(2) Mode select switch - **DF**.

(3) Frequency control select switch - **MAN** or **PRE** as desired.

(4) Check for homing indication.

3. AN/ARC-164 UHF and AN/ARC-115A VHF - Check transmission and reception.

4. AN/ARN-89/AN/ARN-149 ADF - Check reception.

5. AN/ARN-123/AN/ARN-147 VOR - Test check reception and operation.

a. Test

(1) Both HSI **CRS** set - 315° on **COURSE** set display.

(2) VOR/MB **TEST** switch - Down and hold. The MB light on each VSI should go on.

(3) HSI VOR/LOC course bar - Centered ± 1 dot.

(4) NO. 2 bearing pointer - Should be at 310° to 320° position.

(5) VOR/MB **TEST** switch - Release.

(6) NO. 2 bearing pointer - Should return to original heading.

(7) **MODE SEL CRS HDG** switch - **CPLT**.

(8) Repeat steps (2) through (6).

b. 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.

c. 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.

6. 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.

7. AN/APN-209 Radar altimeter - Check in-flight accuracy with an object of known height.

8. AN/ASN-128 Doppler - Check operation procedures.

a. Select three points to which you navigate to, using AN/ASN-128.

(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 1-1520-237-10.

d. Program doppler navigation system during helicopter runup procedures and engage DOPPLER mode on **MODE SEL** panel. **FLY-TO DEST** thumbwheel ″1″.

e. In flight, airspeed 80 KIAS, approach checkpoint ″1″ aligned with the course to checkpoint ″2″. Over checkpoint ″1″, initialize or update doppler and engage **NAV** on **CIS MODE SEL** panel. **FLY-TO DEST** thumbwheel ″2″.

f. Using steering commands from CIS and #1 needle on HSI, navigate to checkpoint ″2″. Enroute, check doppler display information for accuracy.

g. 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.

h. After checkpoint ″2″ is passed, increase forward airspeed to 110 KIAS and align helicopter with next course to checkpoint ″3″.

i. 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.

j. After checkpoint ″3″ is passed, increase forward airspeed to 140 KIAS and align helicopter with next course to checkpoint ″1″.

k. 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.

8.1. AN/ASN-128B DGNS - Check Operation Procedures.

a. Verify proper system operation with **MODE** selector to **TEST**. Left display **GO** and right display **ALL**. **MAL** lamp is off.

b. Verify proper response of CDU panel lighting to aircraft **BRT** and **DIM** controls. Adjust to comfortable level.

c. Perform DGNS system start-up procedure. Ensure four (4) satellite measurements (SAT) are being used and estimated position error (EPE) is 50 (meters) or less with keys loaded or 200 (meters) or less with a cold start.

d. Fly helicopter over surveyed test course consisting of two (2) waypoints used as checkpoints (CP) a minimum of 20KM apart.

e. To minimize errors in establishing positions over the checkpoints (CP), the altitude shall be the lowest compatible with safety standards.

f. If checkpoint (CP) information was not entered through the data loader during start-up, enter checkpoints using the CDU.

g. Set **MODE** selector to **MGRS** or **LAT/LONG**.

h. Set **DISPLAY** selector to **XTK/TKE**. Observe standard cross track (**XTX**) and track angle error (**TKE**) display.

i. Depress **DPLR/GPS** select button on HSI **MODE SEL** panel.

j. To display fly-to destination number depress the **INC** key or **DEC** key, or depress the first number key and the second number key.

k. Fly shortest distance to first destination from present position, set **DISPLAY** selector to **DIST/BRG/TIME** position and steer helicopter to bearing displayed. As an aid to maintaining course, set **DISPLAY** selector to **XTK/TKE** position and steer the helicopter to keep track angle error (**TKE**) nominally zero. If the display indicates a **L** (left) **TKE**, the aircraft must be flown to the left to zero the error.

l. At the first destination set **DISPLAY** selector to **PP** and **KYBD** key is depressed and released note the position, altitude and magnetic variation.

m. Fly to the remaining destinations using the procedures described in (k) and (l) above.

n. Return to ground station.

o. Zeroize loaded keys from DGNS memory.

NOTE

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

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

(1) Lift zeroize switch guard and toggle switch.

(2) Release toggle switch and switch guard.

8.2. DGNS Flight Test Data Analysis.
Compare all **MARK** positions with the actual positions of the corresponding check point. Compare differences, if any, with allowable navigation error limits outlined in TM 11-5841-305-12. If errors exceed the allowable navigation error limits, use the self test of the GPS system and fault isolation procedures to determine the failure mode.

9. Command Instrument System (CIS) - Check operation.

a. Heading mode (HDG).

(1) Select **PLT** on pilot's **MODE SEL** panel.

(2) Use pilot's **HDG** control to select desired heading. Verify that roll command bars keep selected helicopter heading when centered.

(3) Change heading 45° and check that bank angle is about 20° ± 3°decreasing to zero, when heading and roll bars are centered.

(4) Repeat in other direction.

(5) On copilot's **MODE SEL** panel **CRS HDG** control, select **CPLT**.

(6) Repeat steps (2) through (4) using copilot's HDG control.

b. Altitude hold mode (barometric).

(1) Engage **ALT** switch on pilot's **CIS MODE SEL** panel with helicopter level above 2000 feet at a convenient airspeed. Collective position indicator should come into view.

(2) Check that collective position indicator, when centered, holds barometric altitude ± 50 feet.

(3) Climb 200 feet and check that collective position indicator, when centered, returns helicopter to original altitude.

(4) Repeat for a 200-foot descent.

(5) Press to disengage **ALT**. Collective position indicator should disappear from view.

c. VOR Nav Mode - Check.

(1) Select VOR frequency on AN/ARN-123A.

(2) Push **VOR-ILS** button on pilot's and copilot's **MODE SEL** panels. **VOR** should light on both panels.

(3) Push to select **NAV** on pilot's **CIS MODE SEL** panel. Roll command bar on pilot's and copilot's VSI should come into view.

(4) If necessary, push to select **PLT** on pilot's **MODE SEL** panel **CRS HDG** control.

(5) Position helicopter 6 to 15 miles from VOR station.

(6) Set HSI, **CRS** and **HDG** controls for a 90° intercept to a radial 15° from present radial. **CIS MODE SEL** panel **HDG** light should be on.

(7) Note that roll command indicates a turn to 45° intercept when course deviation bar becomes active. The **HDG** light should go off.

(8) Course intercept should occur with no more than one overshoot nor more than a 23° ± 3° angle of bank at any point.

(9) Track a VOR radial perpendicular to wind and check for proper crab angle, lateral deviations of roll command should correspond to raw data, and less than 1/3 dot course error.

(10) Track radial over station and check for a wings level command through cone of silence.

(11) Push to select **CPLT** on copilot's **MODE SEL** panel **CRS/HDG** control. Repeat steps (5) through (10) using copilot's HSI, **CRS** and **HDG** controls.

d. ILS NAV mode - Check.

(1) Select ILS frequency on AN/ARN-123A.

(2) If required, push **VOR-ILS** button on pilot's and copilot's **MODE SEL** panels. ILS should light on both panels.

NOTE

If **VOR** had already lit, changing to an ILS frequency automatically causes the **VOR** legends to go off and the **ILS** legends to light. The reverse is also true.

(3) Push to select **NAV** on pilots **CIS MODE SEL** panel. Roll command bar, pitch command bar and collective pointer on both VSI's should come into view.

(4) Select decision height on pilot's or copilot's radar altimeter.

NOTE

The highest low level bug setting will determine decision height for that VSI only. Example, if the pilot's low level (decision height) is set for 300 feet and the copilot's for 200 feet radar altimeter, only the pilot's **DH** light on the pilot's VSI will go on as the helicopter descends to 300 feet radar altimeter.

(5) Intercept an ILS beyond outer marker at a 90° angle. Observe **MB** lights go on over marker cone on both VSI's.

(6) Fly CIS commands and check that localizer glide slope intercepts are smooth with no more than one overshoot. **CIS MODE SEL** panel altitude light should go off.

(7) Localizer and glide slope tracking should hold to less than 1/3 dot deviation.

(8) Pitch commands should be less than 10°.

(9) At decision height as determined by **LO** level bug on radar altimeter, CIS should command a level off to radar altimeter altitude (ignore collective position indicator if terrain below is not flat).

(10) Over runway, press and release **GA** (go-around) switch on either pilot's or copilot's cyclic stick and check for an 80 KIAS, 500 ± 50 fpm rate of climb, with wings level commands.

(11) Pitch commands should be less than ± 10°.

(12) Disengage **GA** mode by engaging any other mode on the **CIS MODE SEL** panel.

e. Back CRS mode - Check.

(1) Set up inbound back course on HSI and fly a back course localizer intercept.

(2) Intercept and tracking should be similar to that of front course.

f. Level off mode - Check.

(1) Press the CIS **NAV** and **VOR** switches.

(2) Increase pilot's radar altimeter **LO SET** warning bug (**L**) until **LO** warning light comes on.

(3) Check that CIS **ALT ON** switch legend and **DH** lamp on pilot's VSI are on, and that collective position indicator appears in opposite direction to which collective should be moved.

(4) Fly collective position indicator and note that altitude is held to ± 10 feet if below 250 feet, or ± 20 feet if above 250 feet using digital readout.

(5) Rotate **LO SET** warning bug (**L**) in both directions and note collective position indicator is unaffected.

(6) Press either **NAV** or **ALT** switch to disengage level off mode.

g. FM home mode - Check.

(1) Frequency - Select.

(2) Mode selector switch - **HOMING**.

(3) **MODE SEL** panel - **FM HOME**.

(4) **CIS MODE SEL** panel - **NAV**.

(5) Observe homing indications on vertical situation indicator (VSI). These are:

(a) FM navigation (**NAV**), flag will move from view, and will come into view if the received signal is not present or too weak.

(b) A steering (course deviation) pointer moves either left or right about 5° to indicate any deviation from the course to the transmitting station.

(c) Fly roll command bar to a ground station.

(d) Station passage will be indicated by course deviation change and **CIS MODE SEL NAV** switch light going off and **HDG** switch light going on.

h. Doppler mode - Check. UH

(1) Engage **NAV** mode with **DPLR** mode selected and updated.

(2) Follow roll commands to a checkpoint.

(3) Check that **HDG** mode is automatically engaged on fly over, and **NAV** light goes off.

(4) Select a new checkpoint.

(5) Reengage **NAV** mode.

(6) Check that roll commands head helicopter to new checkpoint.

Z. 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.

AA. ECM Antenna - Check. EH

1. Airspeed - Adjust to less than 120 KIAS.

2. Copilot's radar altimeter - Set **L** (lo set) bug to an altitude that will allow safe completion of check.

3. Altitude - Adjust to climb above lo-bug altitude selected.

4. Check - **ANTENNA RETRACTED** advisory light is illuminated.

5. **ECM** antenna switch - Extend. Check **ANTENNA RETRACTED** advisory light goes off and that **ANTENNA EXTENDED** caution light does not come on.

6. Altitude - Descend below lo-bug altitude selected. Check the **ANTENNA EXTENDED** caution light comes on and that ECM antenna automatically retracts and the **ECM ANTENNA RETRACTED** advisory light comes on and the **ANTENNA EXTENDED** caution light goes out.

7. Copilots radar altimeter **L** (lo set) bug set to 200 feet.

AB. Buddy Start System.

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. Primary Starting Procedure.

2. 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.

3. 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.

4. Before Starting Engines.

   a. Copilot's collective - Extended and locked.

   b. Shoulder harness locks - Check.

   c. **PARKING BRAKE** - Release, then set.

   d. Circuit breakers and switches - Set as follows:

      (1) Circuit breakers - In.

      (2) Avionics - Off, frequencies set.

      (3) **BLADE DEICE POWER** - **OFF**.

      (4) Radar altimeter - Set. EH Left **LO** bug 200 feet.

      (5) Clocks - Set and running.

      (6) **BACKUP HYD PUMP** - **AUTO**.

      (7) **ANTICOLLISION/POSITION LIGHTS** - As required.

      (8) EH **Q/F PWR** switch - **OFF**.

      (9) EH **ECS** panel switches - **OFF**.

      (10) **CARGO HOOK EMERG REL** switch - **OPEN**, **ARMING** switch - **SAFE**.

      (11) **APU CONTR** switch - **OFF**; **APU** T-handle - In.

(12) **GENERATORS NO. 1** and **NO. 2** switches - Check **ON**.

(13) **AIR SOURCE HEAT/START** switch - **OFF**.

(14) **EMER OFF** T-handles - Full forward.

(15) **BATT** switch - **ON**.

e. No. 1 dc primary bus, **BACKUP PUMP PWR** circuit breaker - Pull out.

NOTE

If UHF 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.

f. UHF radio - On. Establish communications with ″donor″ aircraft.

5. Donor Aircraft.

a. Engines operating at 100% RPM, flat pitch and brakes set.

NOTE

If UHF 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 breader - 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.

6. Engine Starting Procedure.

Receiver aircraft:

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 light - Off.

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** 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 light goes off before reaching 52% **Ng SPEED**.

(e) **TGT** reaches 850°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 light 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** - Check below 700 150°C or 701C 80°C before advancing **ENG POWER CONT** lever.

NOTE

Closely cross check **Ng** and **TGT** indicator, as both **Ng** and **TGT** 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 light. Check, off at 52% to 65% **Ng SPEED**. If **ENGINE STARTER** caution light remains on after 65% Ng.

(a) **ENG POWER CONT** lever - Pull out.

If caution light remains on:

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 SPEEDS** 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 lights - Check off.

j. When the engine starts and **TGT** 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.

7. 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.

8. 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 deice. Avoid fight 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. Auxiliary Fuel Management System. AFMS

1. **AUXILIARY FUEL MANAGEMENT CONTROL PANEL (AFMP)** - Test and set.

NOTE

This test procedure can only be performed while aircraft is on ground with weight on wheels. In case of a retest, allow a minimum of 10 seconds before pressing **TEST** a second time.

a. **TEST/RESET** button - Press and release. Verify displays and annunciators illuminate momentarily.

NOTE

E07 will be displayed if test is initiated within approximately one minute of applying ac power. If E07 appears, press TEST/RESET again. E07 should not appear until test is finished.

b. Verify AUX FUEL QTY LBS displays as applicable with no error codes displayed. Error codes are listed below:

CODES	MEANING
	Internal AFMP Microprocessor fail
E02	Internal AFMP Memory fail
E03	Internal AFMP Display fail
E04 or "----"	Internal AFMP Tank gaging electronics fail
E05 or "FP"	External Auxiliary tank probe (OPEN)
E06 or "FP"	External Auxiliary tank probe (SHORT)

E07	External attitude sensor input failure detection is enabled five minutes after power up; Press **TEST/REST** button to acknowledge error code and display fuel quantity without attitude compensation.

2. Extended range transfer valves - Check.

a. Inboard/outboard bleed air valves check.

(1) **No. 1** or **No. 2** engine - 100%.

(2) **AIR SOURCE HEAT/START** switch **ENG**.

(3) **PRESS** switch - **OFF**.

(4) **XFER FROM** switch - **OUTBD**.

(5) **MAN XFER** switch - **BOTH**.

(6) **XFER MODE** switch - **MAN**.

(7) Observe **L** and **R NO FLOW** lights illuminate and no fuel transfer to main tank.

b. Fuel transfer valves check.

(1) **PRESS** switch - **OUTBD**.

(2) **XFER MODE** switch - **OFF**.

NOTE

Allow sufficient time for external tank pressurization (approximately 10 minutes for a half full 230 gallon tank).

(3) **MAN XFER** switch - **RIGHT**.

(4) Verify no fuel transfer.

(5) **XFER MODE** switch - **MAN**.

(6) Check for flicker of **R NO FLOW** light. Verify transfer of 20 pounds of fuel to the main tanks and corresponding decrease on AFMP.

(7) **MAN XFER** switch - **LEFT**.

(8) Check for flicker of **L NO FLOW** light. Verify transfer of 20 pounds of fuel to the main tanks and corresponding decrease on AFMP.

(9) **MAN XFER** switch - **BOTH**.

(10) **XFER MODE** switch - **OFF**, then **ON**.

(11) Check for flicker of **L** and **R NO FLOW** light. Verify transfer of 40 pounds of fuel to the main tanks and corresponding decrease on AFMP.

(12) **XFER MODE** switch - **OFF**.

(13) **PRESS** switch - **INBD**, if tanks installed.

(14) **XFER FROM** switch - **INBD**, if tanks installed.

(15) Repeat steps 3 through 12.

c. **AUTO** mode transfer check.

NOTE

At least one main tank must have a fuel quantity of less than 1,000 pounds to complete this check.

(1) **PRESS** switch -**ALL**.

(2) **MAN XFER** switch - **BOTH**.

(3) **XFER FROM** switch - **INBD** or **OUTBD**.

(4) **XFER MODE** switch - **AUTO**.

(5) Verify flicker of **L** and **R NO FLOW** lights. Monitor fuel transfer and verify fuel transfer stops when the **TOTAL FUEL** quantity reaches 2,200 pounds ± 50 pounds.

(6) When transfer appears stopped, set **XFER MODE** switch to **MAN**. Flickering of **L** and **R NO FLOW** lights will confirm that **AUTO MODE** had stopped transfering fuel.

(7) **XFER MODE** switch - **OFF**.

AD. Auxiliary Fuel Management System Fuel Transfer Check. AFMS

NOTE

When ambient temperature is below 4°C (39°F), AFMS/ERFS 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**.
2. **FUEL BOOST PUMP CONTROL** switches - **ON**.
3. **PRESS** switch - **ALL**.
4. **XFER FROM** switch - **OUTBD**.
5. **MAN XFER** switch - **LEFT**.
6. **XFER MODE** switch - **MAN**. Verify **L NO FLOW** light flickers and extinguishes without causing **AUX FUEL** or **MASTER CAUTION** to illuminate.
7. Main **FUEL QTY TOTAL FUEL** readout - Check for an increase of 20 pounds.
8. **MAN XFER** switch - **RIGHT**. Check for flicker of **R NO FLOW** light.
9. Main **FUEL QTY TOTAL FUEL** readout - Check for increase of about 20 pounds.
10. **XFER MODE** switch - **OFF**.
11. **MAN XFER** switch - **BOTH**.
12. **XFER MODE** switch - **OFF**, then **ON**. Check for flicker of L and R NO FLOW lights.

13. Main **FUEL QTY TOTAL FUEL** readout - Verify transfer of 40 pounds of fuel to the main tanks and corresponding decease on AFMP.

14. **XFER MODE** switch - **OFF**.

15. **XFER FROM** switch - **INBD** if installed.

16. Repeat steps 5 through 14.

17. **XFER FROM** switch - **OUTBD** or **INBD**.

18. **MAN XFER** switch - **BOTH**.

19. **XFER MODE** switch - **AUTO**.

20. Main **FUEL QTY TOTAL FUEL** readout - Verify the **AUTO** mode maintains **TOTAL FUEL** quantity greater than 2,000 pounds while fuel quantities on the AFMP decrease accordingly. **TOTAL FUEL** should vary between 2,200 and 2,000 pounds.

21. Auxiliary fuel management system - Set as desired.

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.

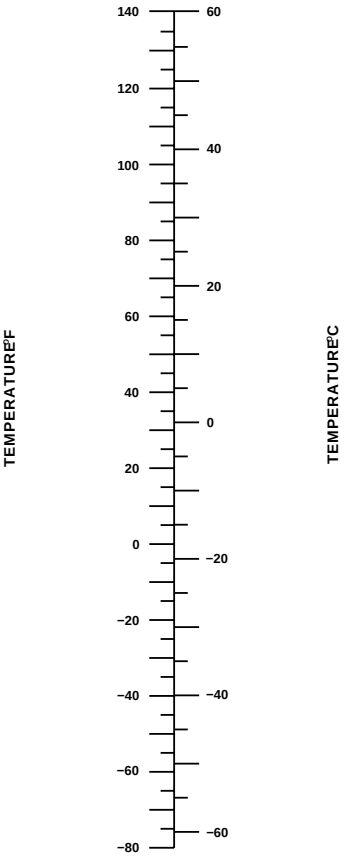
NOTE

EH Changes required to this section will be submitted upon completion and approval of the performance data substantiation report.

LIST OF CHARTS

FIGURE		PAGE
1	Temperature Conversion	5-2
2	Autorotation RPM Correction	5-3
3	Density Altitude Chart	5-4
4	TGT Reference Table 700	5-5
5	TGT Reference Table 701C	5-8
6	HIT Baseline Worksheet	5-11
7	Determining TGT Reference	5-12
8	Determining Engine Torque Factor (ETF)	5-13
9	Determining Target Torque Value (TTV) 700	5-15
10	Determining Target Torque Value (TTV) 701C	5-16
11	Sample Doppler Route	5-17
12	Doppler Error Box	5-18
13	Maintenance Test Flight Check Sheet	5-19

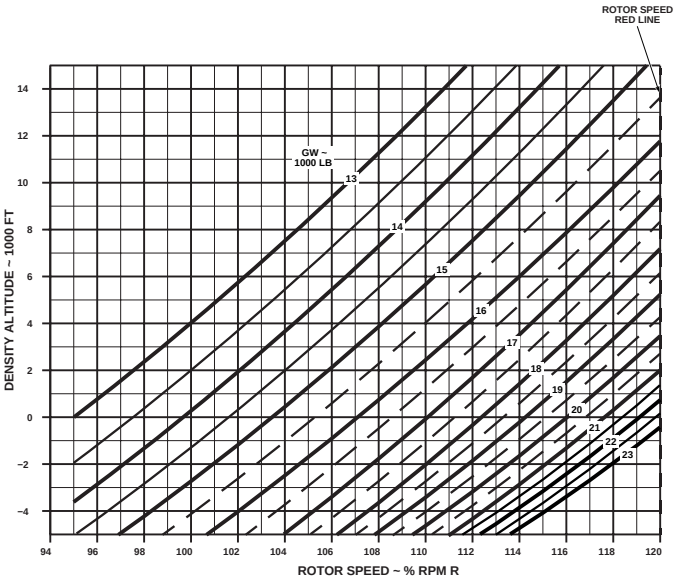
TEMPERATURE CONVERSION
FAHRENHEIT/CELSIUS



UH60A_45341A (R1)
SA

Figure 1. Temperature Conversion

AUTOROTATION RPM CORRECTION CHART



DATA BASIS: FLIGHT TEST

NOTES

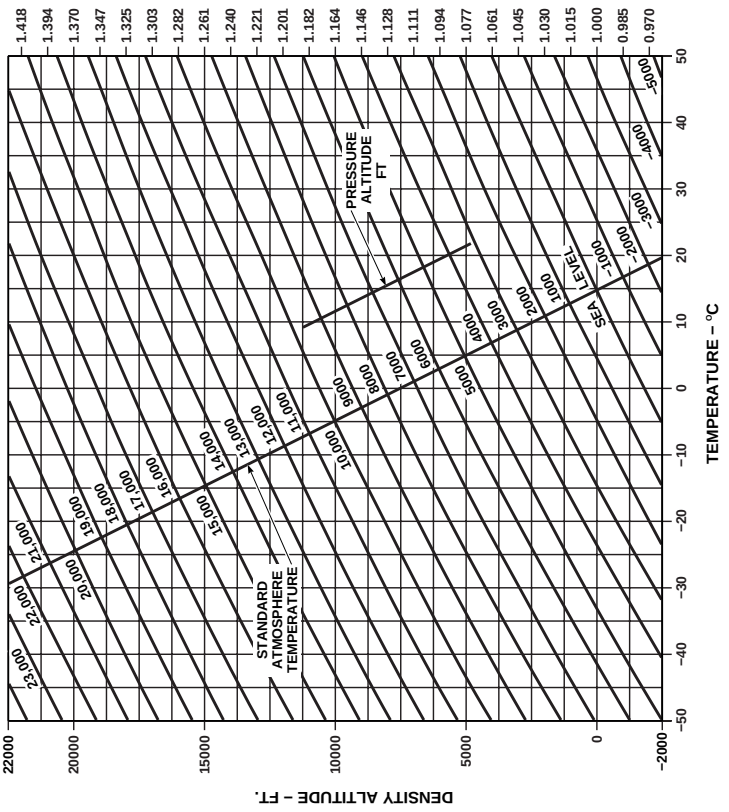
1. FULL LOW COLLECTIVE
2. TEST AIRSPEED 80 KIAS PILOT IND. (± 5 KTS)
3. AUTOROTATION TEST TOLERANCE IS ±3% RPM R.
4. CHART CONSTRUCTED FOR 356 INCHES CG
   ROTOR SPEED INCREASES 1% RPM R FOR CG FORWARD OF 351 INCHES.
5. ROTOR SPEED DECREASES 3% WITH ESSS WINGS INSTALLED.
6. ROTOR SPEED DECREASES 4% WITH ESSS WINGS AND (2) 230 GALLON TANKS INSTALLED.
7. ROTOR SPEED CHANGES 4% PER FULL TURN OF ROTATING PUSHROD.

AA9530A_CL
SA

Figure 2. Autorotation RPM Correction

DENSITY ALTITUDE CHART

$$\frac{1}{\sqrt{\sigma}} = \frac{TAS}{EAS}$$



AA1287A_CL
SA

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 5. 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 5. 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 5. 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

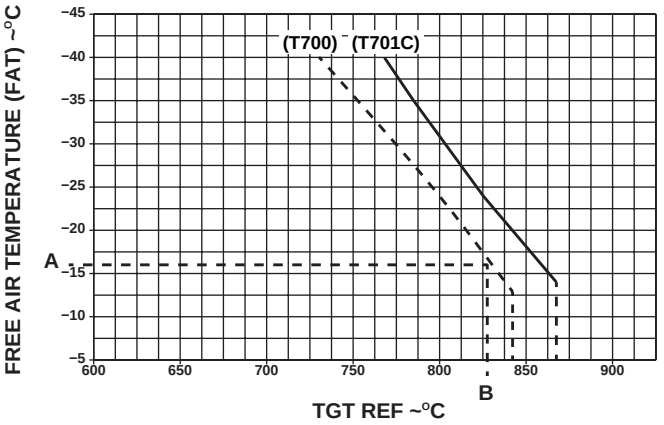
TGT Acceptance Limits

TGT Margin +20°C _____

TGT Margin -20°C _____

Record limits in A/C Engine Health Indicator Test Log

Figure 6. Hit Baseline Worksheet



EXAMPLE

WANTED

TGT REFERENCE
(TGT REF)

KNOWN

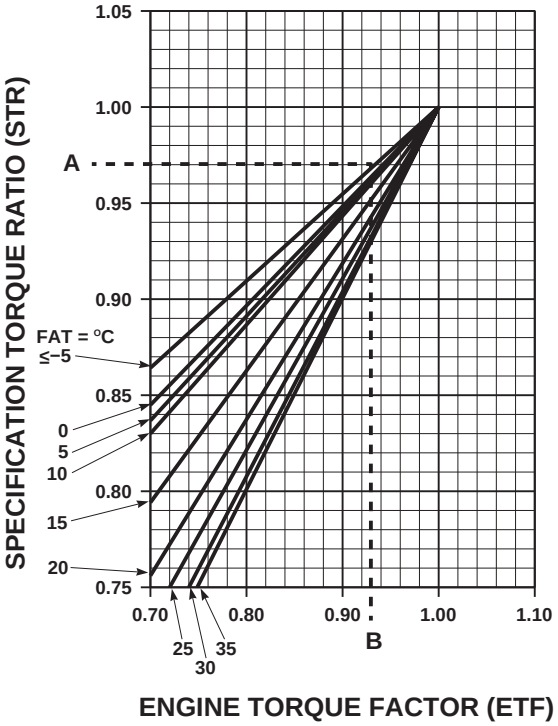
FAT = −16°C (1.4°F)

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

AA9903CL
SA

Figure 7. Determining TGT Reference



NOTE

≤ MEANS LESS THAN OR EQUAL TO.

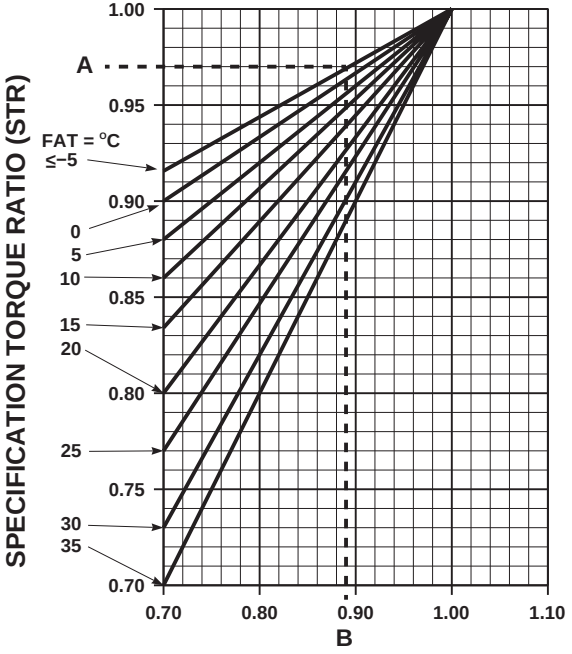
FAT −5°C (23°F) AND BELOW WILL BE PLOTTED ON THE −5°C LINE ON CHART.

WHEN STR IS GREATER THAN OR EQUAL TO 1.0, ASSUME ETF TO BE 1.0.

AA9904CL
SA

Figure 8. 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.

AA9905CL
SA

Figure 8. Determining Engine Torque Factor (ETF)(Sheet 2 of 2)

701C

SPECIFICATION TORQUE AVAILABLE − 30 MINUTE LIMIT

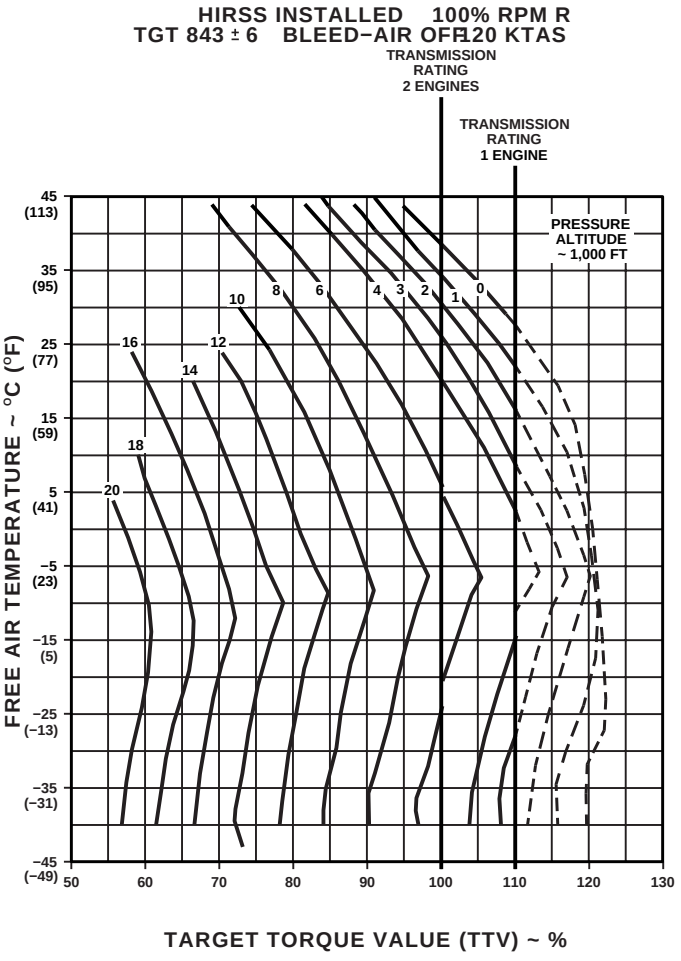
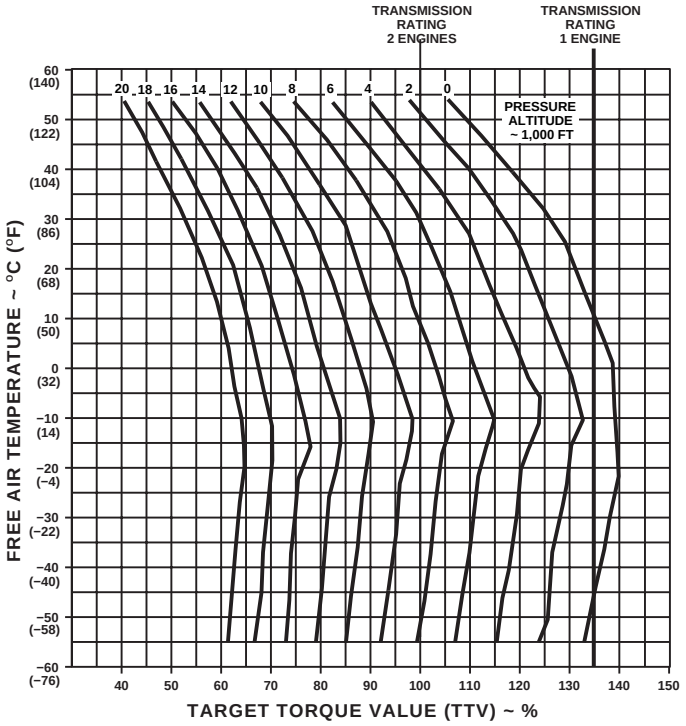


Figure 9. Determining Target Torque Value (TTV)

700

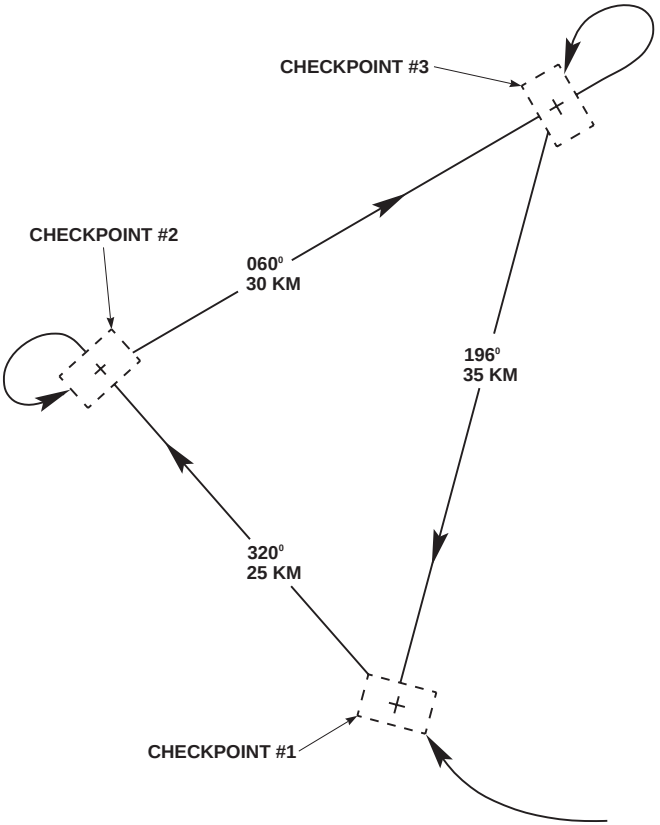
SPECIFICATION TORQUE AVAILABLE − 10 MINUTE LIMIT

HIRSS INSTALLED **100% RPM R**
TGT 866 ±6 **120 KTAS**



AA7281A_CL
SA

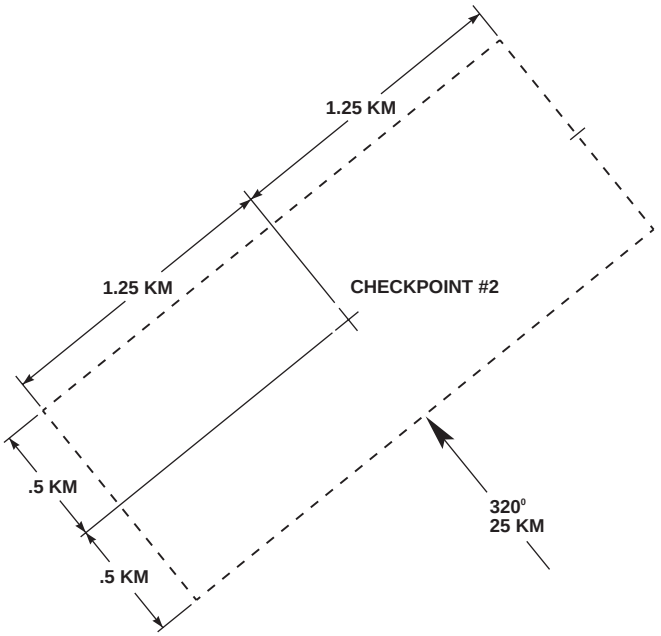
Figure 10. Determining Target Torque Value (TTV)



AA2462CL
SA

Figure 11. 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



AA2461CL
SA

Figure 12. Doppler Error Box

UH-60AMAINTENANCE 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**		d. 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 13. 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 13. 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) Doppler
	c. Engine #1 #2		(11) CIS
	TGT °C		b. Flight instruments
	Ng %		(1) VSI
	TRQ %		(2) HSI
	4. Airspeed 120 KIAS		(3) Altimeters
	a. Stabilator		(4) Vertical speed indicator
	b. FPS/SAS		(5) Magnetic compass
	c. KIAS difference		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 13. Maintenance Test Flight Check Sheet (Sheet 3 of 4)

REMARKS:

SIGNATURE_____

Figure 13. Maintenance Test Flight Check Sheet (Sheet 4 of 4)

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.

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
03521

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31-E, block no. 0285, requirements for TM 1-1520-237-MTF.

*US GOVERNMENT PRINTING OFFICE: 1998 0-446-015